Personal Computer World

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On this month's CD
REALMS OF THE HAUNTING

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PLUS STACKS OF SOFTWARE

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Personal Computer World

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BPA INTERNATIONAL® 143,615 JAN-JUNE '96

Editorial

Looking at the *PCW* team's predictions for 1997 *(page 29)* it is interesting to see how many of us took a similar theme. The internet revolution has been happening for at least three years but now it seems we are, to paraphrase Winston Churchill, at "the end of the beginning" of the revolution. Some sense of what the revolution will bring us is starting to emerge as the new order establishes itself.

Let there be no doubt that a fundamental shift of power is underway. For the first time in nearly two decades Bill Gates and Andy Grove probably have cause for concern. As Clive Akass points out, Intel and Microsoft are not going to disappear but their place at the centre of the universe is slipping. They will remain profitable for years — the business world has invested too much already in their respective products for that not to happen. Gradually, however, customers will start to look at other solutions when the time comes to assess IT strategy.

News from the US suggests corporates are becoming more than a little fed up with being tied to Microsoft and Intel; sick of the enormous costs involved in upgrading software and upgrading hardware to accommodate that software. That's why so many have decided not to bother upgrading to Windows 95 and there is no evidence yet of a mass switch to NT.

But now there is a choice. It's no surprise that the prospect of network computers running applications written in Java from central servers is enticing to businesses large and small. There are savings on maintenance, software and far less likelihood of employees screwing up their PCs with pointless shareware, screensavers and viruses. Music to IT managers' ears.

Corel recently rewrote its entire OfficeSuite in Java in less than three months and is ready to deliver it early this year. Of course, Bill Gates won't be quaking in his boots at this achievement — it will take a lot more than Corel to worry him just yet. But those who have tried it in the *PCW* office were more than impressed with its speed and flexibility. This is the definite taste of the future. The second half of the revolution is underway.

PJ Fisher

Managing Editor

Next Month

In next month's *PCW*, the next generation of PC hardware is brought under the microscope.

MMX Inside

The first PCs equipped with Intel's MMX technology hit the streets. Worth the wait? We find out.

Video Capture Cards

Good thinking, Batman! Turn your PC into a video editing suite.

PDAs

Becoming more than just assistants as Windows CE starts to arrive.

Plus...

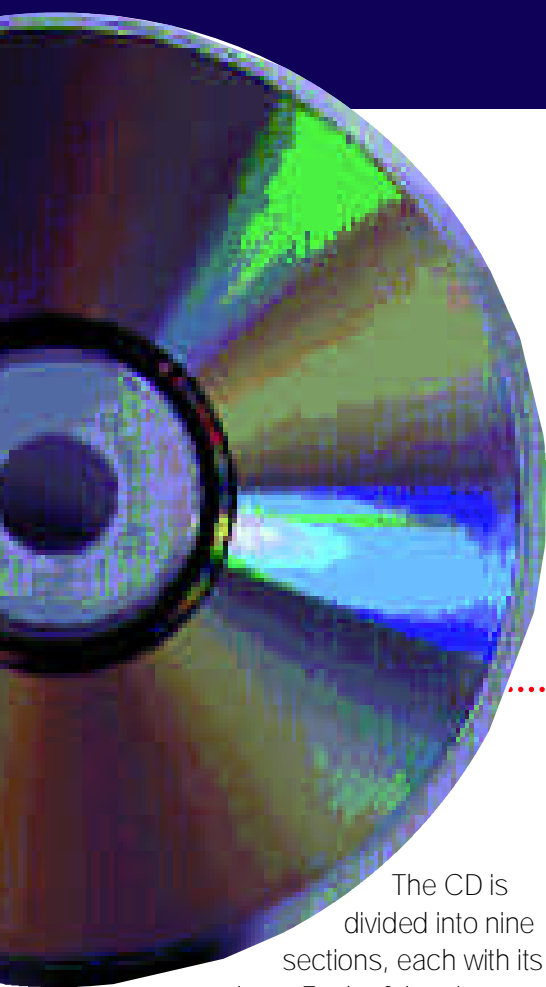Visual Programming Tools including Java.

March 97 issue
■ On sale Thursday 6th February
April 97 issue
■ On sale Thursday 6th March

** Next month's contents subject to change.*

Personal Computer World

February
Cover disc

Welcome to issue 6 of our new-look *PCW* CD-ROM. This month's disc is crammed with exciting games, music, images, practical computer advice, software and much more.

The CD is divided into nine sections, each with its own icon. Each of the nine section buttons is almost always visible on-screen so you can move from section to section just by clicking on that button, rather than having to continually return to a home page. If you are not sure where each section is, roll over the buttons and the name of that section will be displayed along with a contents list of the section. Exit the disc by clicking on the "Q" in the bottom left of the screen.
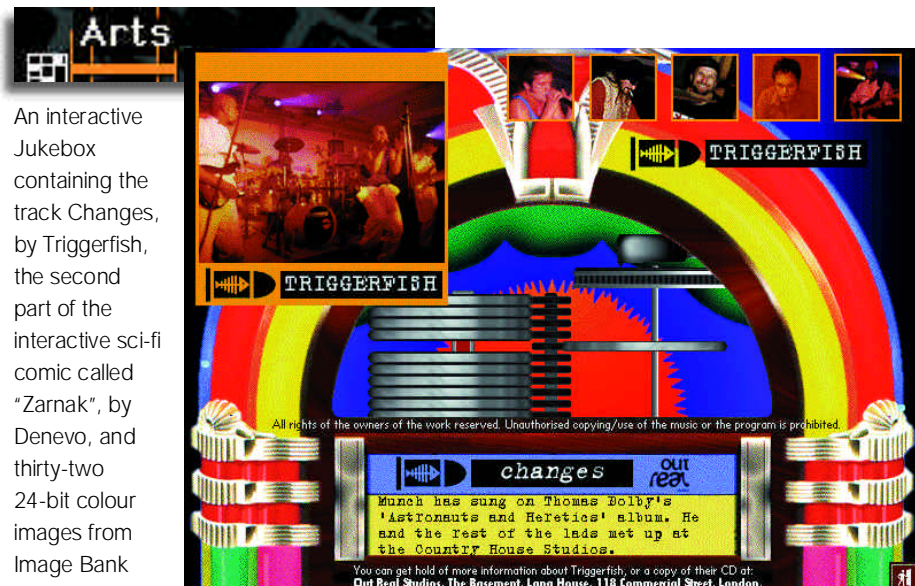
An interactive Jukebox containing the track Changes, by Triggerfish, the second part of the interactive sci-fi comic called "Zarnak", by Denevo, and thirty-two 24-bit colour images from Image Bank

How to use the CD-ROM

1. Quit existing applications.
2. Put the disc into your CD-ROM drive.

3. Win 95: If you've got Windows 95, the *PCW* interactive loader will appear on your screen. If your CD doesn't auto-load, start Windows Explorer and double-click PCW.exe.
Win 3.1: From Windows Program Manager choose File/Run, then type in <CD Drive>:\PCW.exe and press enter.
4. Click on main menu. If you don't have Quicktime for Windows and Video for Windows installed, you will be offered the chance to install them before continuing.

Hardware requirements

To run the CD-ROM, you need a PC with Windows 3.1 or later and a colour VGA display. We recommend a multimedia 486 or Pentium PC with a minimum 8Mb of RAM. The optimum configuration is a 16Mb Pentium.

Possible CD-ROM problems

1. If you have launched Acrobat reader in the Hands On section and cannot find the search icon that is described in the first page of notes, this may be because you already have a copy of Acrobat reader on your C: drive, so the autostart for this cover disc is not asking you to install our version which includes the search facilities. You can either delete your Acrobat reader from the C: drive, or change its name and run PCW.EXE again, which this time should ask you to install the Acrobat reader with search facilities.
2. If you get a message such as "Not ready reading drive D:", you may have a dud CD.
Return the disc to: TIB House, 11 Edward Street, Bradford, DB4 7BH, for a free replacement.

■ For other problems concerning the CD, call 0891 715929. Calls cost 39p/minute off-peak and 49p at all other times.

CD Index

A searchable database of the *PCW* cover disc contents since September 1996.

Games

Great games to keep you entertained

Here, you can preview the four games on this month's CD. You can play some games right away. Others you'll need to install first, or can only play from DOS.

Getting Started

A beginner's interactive guide to notebooks, printers and desktop PCs.
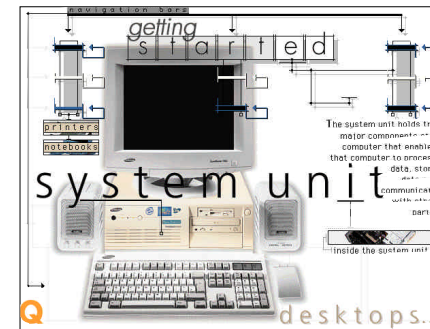
Hands on

Install and launch the Acrobat reader to view and search *PCW Hands On* articles from the past year.

Over 500 fully searchable pages of hints, tips and practical advice on every aspect of personal computing...
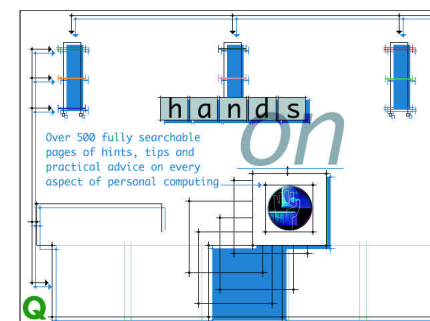
All the regulars are here in a year's *Hands On*

Multimedia
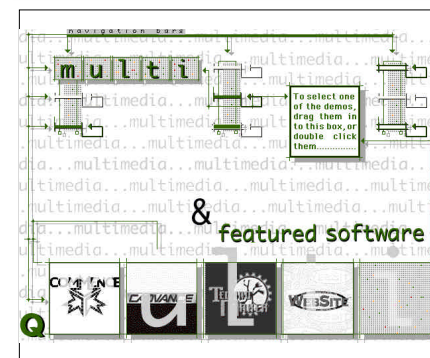
The Multimedia and Featured Software

Floppy disk

This month's PCW floppy contains three separate programs, plus a collection of clipart. There is a personal information manager (Above & Beyond), a number of popular card games (Excellent Card games by Travel) and an icon calculator (Iconcalc).

■ To install the programs on your desktop from the floppy disk:
Put the floppy into the drive.
Windows 95 — Click on START\RUN from the taskbar. Type into the box a:\FLOP0297.EXE then click OK.
Win3.11 — Go to FILE\RUN on PROGRAM MANAGER. Type into the box a:\FLOP0297.EXE then click OK.

■ To install the programs from the CD: From Windows Explorer or File Manager, double-click on FLOP0297.EXE in the directory <CD Drive>/FLOPPY/
This will create a directory on your hard disk called PCW0297* which will contain the sub-directories abov400, cards, clipart and iconcalc:
abov400 (Windows 3.X / Win95). To set up this program, double-click on C:\PCW0297*\ABOV400\INSTALL.EXE
Cards (Windows 3.X / Win95). To set up this game, double-click on C:\PCW0297*\CARDS\SETUP.EXE
Clipart (Windows 3.X / Win95). A collection of clipart images. These files can be imported into any Microsoft package which supports MSclipart format.
Iconcalc (Windows 3.X / Win95). A calculator application which will sit on your menubar in Windows 95 or as an icon in Windows 3.X, ready for you to just type in any calculations you wish to make. To install the icon calculator, double-click on C:\PCW0297*\ICONCALC\ICONCALC.EXE (*default directory name)

Possible problems with the floppy

■ If you have problems with the floppy, such as a message "cannot read from drive a:", please return the disk to TIB plc, TIB House, 11 Edward Street, Bradford BD4 7BH, together with a SAE and two 25p stamps. Where it is a duplication fault, the postage will be returned with your replacement disk. TIB is on 01274 736990.

■ Our floppy-disk hotline is available on weekdays from 10.30am - 4.30pm on 0891 715929.

■ *PCW* cover disks are thoroughly virus checked, but *PCW* cannot accept liability for problems arising from use of the disk.

You are advised not to install any software on a networked PC without having checked it first.

section contains four interactive Windows demos for you to explore.

Reference
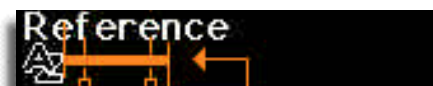
PCW reviews index, advertisers' index, glossary and general information about the CD.

The Room

Browse through VNU's web e-zine. Play with the interactive radio.

Browse through VNU's new e-zine, even if you're not on the web

Software Library

A library of shareware, utilities and drivers, each with a brief description which can be copied onto your hard disk, using the Netscape browser.

Multimedia & Featured Software

To preview any of the multimedia demonstrations, drag one of the images along the bottom into the box in the top right corner.

Acacia's Revise Series A revision aid for students studying for their GCSE exams.

navigation bars
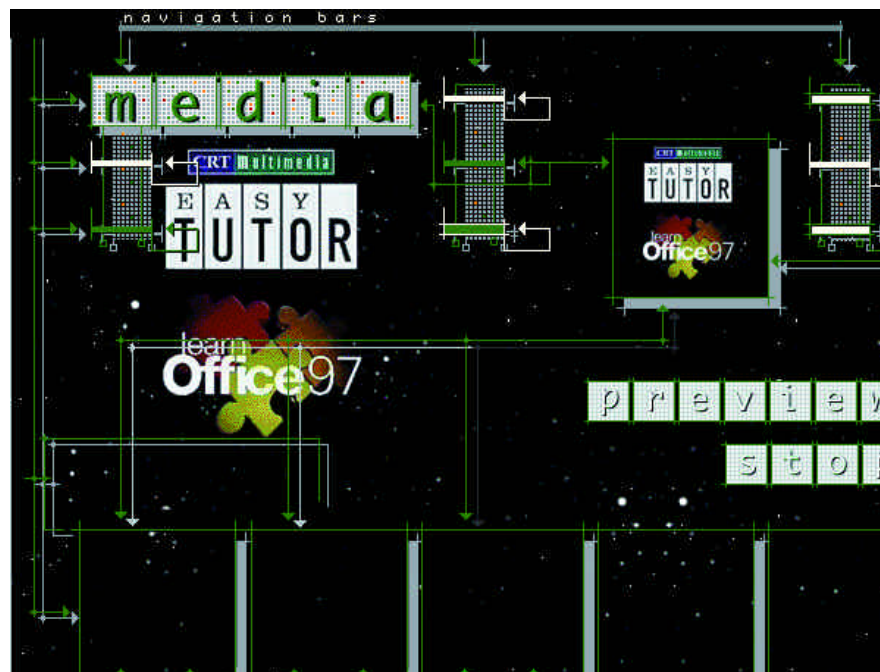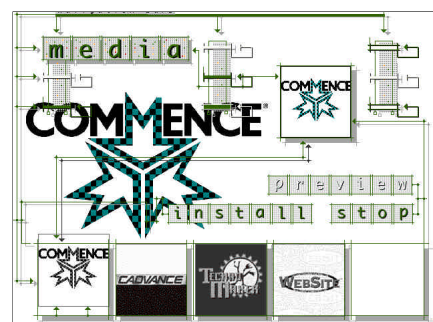
Teach yourself to use Windows 95 application programs

The Evolution of Life An imaginative exploration with evolutionary questions and discoveries.

EasyTutor 97 demo (Windows 95) The fastest, easiest way to learn Word, Excel and Powerpoint for Windows 95.

At the heart of the disk lies the Cybertation, the evolutionary engine. This has been developed using the most advanced techniques from a branch of artificial intelligence known as artificial life.

3 of 5

3 of 5
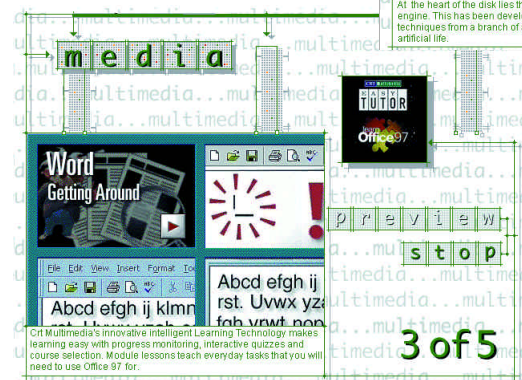
Above Explore the evolution of life.

Left Learn how to get around in Word.

Below Go flat-out racing in dream cars

Games

To preview any of the games, drag one of the images along the bottom into the box in the top right corner.

Realms of the Haunting "ROTH" tops the bill for this month's games demo. It uses a combination of first person

With highly detailed models with scarily realistic handling, you can bring to life the cars everyone wants to race flat out. Every car and course is built in incredible real-time 3D, complete with variable

3 of 5

■ Fast Track

If you would prefer to play or install the Games and Multimedia demos from outside the main *PCW* interface, or want to know the location of the Resources homepage (in order to use your own internet browser rather than the default Netscape browser), click on the HELP button on the *PCW* loader. This help\info file also contains the locations of other items on the disc, along with a full contents list and help tips.

perspective with high-res, full-motion, video-cut scenes. The gameplay is based on exploration, puzzle-solving and combat, as you find yourself in the role of Adam Randall, whose father's death leads you to a manor house in Cornwall. Through the contents of a strange, hand-delivered parcel, you are enticed into a

Using an innovative combination of first person 3D and third person FMV cut scenes, Realms Of The Haunting places you in the role of Adam Randall, whose father's Cornwall.

1 of 5

Microsoft Soccer is the most graphically realistic soccer game available for the PC. With Football's rich and realistic graphics and sound, including player movements, crowd chants and noises, users feel they are at a match.

1 of 4

Above Get all dark and brooding as you play Realms of the Haunting.
Left Get a result with Microsoft soccer.
Below Battle wolves and crazed monkeys, with Lara

styles, ball control and penalty situations.

Screamer 2 With fast, furious driving action, you can bring to life the cars that everyone would like to race flat-out. Each car and course has been built in real-time 3D and is complete with variable camera views. Note: from Windows 95, after installation, you will need to run

macabre and brooding fantasy.

Microsoft Soccer Designed to appeal to football's extensive international audience, this game is one of the most graphically realistic PC soccer games to date. The player movements, which are based on motion capture of real players and smooth animation, include numerous kick

Please note: the demos featured in the Games and Multimedia sections can be previewed and some will run from the PCW main interface. However, due to technical issues concerning the software supplied to us, some demos will not run alongside the interface and others require installation to your hard disk.

SETUP.EXE in C:\S2DEMO before running S2.BAT (the game).

Tomb Raider Tomb Raider is the first 3D action adventure game to feature a woman as the main character. Your role is to guide Lara as she battles wolves, crazed monkeys and more, to unfold the mystery of Atlantis.

Correction
■ Sorry users, the Cachchk files referred to in the Software Library section have been mistakenly omitted from the disc.
■ Pegasus Mail 16-bit is actually for Win 3.1, *not* Win 95, as mentioned in the Software Library.

Using the Hands On section

Load Acrobat either by selecting Hands On from the launch menu or by going into the Hands On section of the main menu.

Just type in the word you want to search for — in our case, CD-ROM

In a second or two, a list of all the files containing that word will appear

To search Acrobat files, just click on the icon. A dialogue will appear. Just type in the word you want to search for and click the search icon. In a second or so, the search results dialogue will appear containing a list of the files containing that word.

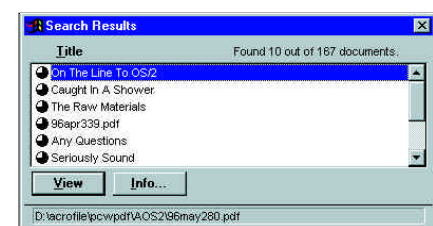You can then view any of the files. The word you search for (CD-ROM drives in our example) is highlighted. On average-sized monitors the text will be greeked but you can use the magnifying glass icon to expand the text. Just click on the icon, then

select the area of the page you want to magnify, with your mouse.

The default index for the Acrobat files is a global search of all files. You should find the global search sufficiently fast. If you're looking for a very common word however, such as "Windows", you may want to narrow the search. To do this, click on the indexes button in the search dialogue then click add, and add any additional indexes which have the prefix PDX and are located in <CD Drive>\ACROFILE\PCWPDF\

Using the Software Library section

The files in this section are copied to your hard disk using the default Netscape browser on the CD. If you already have your own frames-compatible browser installed and want to access the resources section, run your browser, go to File Open and open D:\html\res\resource.htm

■ **Compressed Zip files or self-extracting archives**
Most files in this section are compressed Zip files or self-extracting archives. Click on the file that you would like to copy to your hard disk. A box will appear, stating the name of the file to copy and the destination directory. Click on OK . If you are using the default browser, you will be given the option of:
1. Copy the file only, from the CD to a destination of your choice, with no further

action
2. Decompress the files contained in the archive into the destination of your choice

By selecting both of the above you can copy the file *and* decompress it into your chosen location.

If you have to abort the copy, and subsequent attempts to download the same file give an unexpected filename, go to c:\vnu\netscape and delete the copy of the file contained therein. Next time you click on the hypertext link, the transfer should work OK.

■ **Other file types**
Click on the file that you would like to copy to your hard disk. This will bring up the "save as" dialogue box. Choose where you want to copy the file (make sure you don't try to copy the file to the CD itself, or you will get an error message). It's a good idea to create a directory or folder for it first (using Windows File Manager or Explorer).

Note: Avoid copying any of the resources files into your Windows directory or into the root of your C: drive.

Using Netscape
The *Personal Computer World* Interactive CD-ROM uses Netscape as the delivery mechanism for the resources section and to run the Room e-zine.

If you're on the internet, chances are you're already using Netscape and have a

rough idea how it works. If you're not, this provides a great opportunity to find out what this browser business is all about.

You navigate through web (or HTML) pages using hyperlinks. These are images or, more often, highlighted text which takes you backwards and forwards through different pages. You can also move between pages you've already visited by using the back and forward arrows on the toolbar.

Netscape 2.0 also has a feature called "frames" which divides the screen into separate areas. When using frames, the right mouse button, rather than the arrow keys, is used to move backwards and forwards.

When using Netscape from within PCW Interactive you'll need to go to File/Exit to return to the main screen.

Installing PKUnzip or Winzip
Zip files are the standard compression format for distributing programs and utilities on the web and on floppy disk. If you choose to copy the resources zip files onto your hard disk and decompress them later, you will need to install PKUnzip or Winzip before you can "unzip" them. Go to the Essential Utilities section and click the link "PKZip/PKUnzip" or "Winzip".

■ **Winzip:** choose Winzip and a new page will appear offering you Winzip for Win95 and Winzip for Windows 3.11. Select the appropriate platform and save it to a location of your choice. If you have less than 16Mb of RAM it's probably a good idea to quit Navigator and the PCW CD next. Then use File Manager or Explorer to find Winzip95.exe or wz60wn16.exe.

■ **PKUnzip:** choose PKUnzip and save pkz204g.exe onto your hard disk — the C:\DOS\ folder is as good a place as any to save it. After you've quit Navigator and the PCW CD, double-click on the file to expand it to 16 separate files (if you have chosen not to decompress and save it to your HD in one action).

■ **Associating the file:** unless you intend to use DOS to unzip files (laborious and tricky) you need to associate .zip files with PKUnzip. From File Manager, choose File Associate to associate *.zip files with PKUNZIP.EXE. Under Windows 95, zip files will be associated automatically.

All the goodies are here. From our *Hands On* **section files, to Flying Tigers, from a Porsche screensaver to Netscape Navigator, Acrobat Reader and more. There's something for everyone**

February 1997
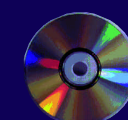
PCW INTERACTIVE
Entire Contents List:

Multimedia section
• Acacia's Revise Series
• The Evolution of Life
• EasyTutor 97 demo (Win95 only)

Games section
• Realms of the Haunting
• Microsoft Soccer (Win95 only)
• Screamer 2
• Tomb Raider

Arts section
• Jukebox containing the track *Changes* from Triggerfish
• 32 graphics images from the Image Bank
• Zarnak (pt 2) — new interactive sci-fi comic

Getting Started
• A beginner's interactive exploration of notebooks, printers and desktop PCs

CD Index
• A searchable index of the *PCW* cover disks since Sept '96

Hands on
• Hints, tips and practical advice on every aspect of personal computing

The Room
• A browse through VNU's new e-zine

F O L D   H E R E

Reference section
• 14-month products and features archivable database
• Advertisers' index
• General info about the CD
• Glossary of PC terms

Software library section
Including those files referred to in our *Hands On* section
• Acrobat Reader v3.0 (Win95/Win 3.11)
• Advanced Tactical Fighters
• Adventure Maths
• Alf's Filter Factory plug-in for Photoshop 3.0
• Almathera plug-in for Photoshop 3.0
• Avery Label templates
• Bookmark importer
• Chess
• Dr Seuss'Alphabet

• Fractal Design Expression
• Flash View
• Font Selection
• Frontier Mail
• GPS software
• 32 downloadable images from the Image Bank
• Internet Explorer 3.0 (Win95 / NT)
• Kids' Icons
• Klik-N-View Business Cards
• LapLink v7.5
• McAfee Virus Checker
• MicroAngelo v2.1
• Microsoft 3D Movie Maker
• Microsoft GIF Animator
• Netscape Navigator v3.0 (Win 3.x / Win95 / NT)
• Novell Education Certificate Sampler
• Paint Shop Pro v4.1 (Win3.11 / Win95)

• Pegasus Mail for 16- and 32-bit
• PKZIP & PKUnzip
• Project/Event Planner
• Quake v1.01
• Sega Baku Baku
• SkyMap Windows Planetarium
• Terrapin
• The Win95 Service Pack
• Tips'n'Tricks for '95
• VBRun 100, 200, 300, 400.dll
• Video for Windows
• VistaCalc Spreadsheet
• Visual Basic Tools
• *What PC?* — mobile pages buyers' guide for Psion 3a incl. the new Nicholson London Pages
• Wincode
• Win95 service pack 1
• Winzip
• Worms

Wanted: material for *PCW* **cover CD-ROMs**
We are always on the lookout for material for our cover-mounted CD-ROMs. If you think that you have something that might be suitable such as software, pictures, fonts, demos and so on, please let us know: email Steven Rogers at stevenr@vnu.co.uk or write to him at CD Development, New Media, VNU Business Publications Ltd, 32-34 Broadwick Street, London W1A 2HG. *Please note that Steve cannot deal with technical support.*

Newsprint

Edited by Clive Akass. Send your news and views to: news@pcw.vnu.co.uk

Man of the year

Scott McNeally, head of Sun, whose Java portable programs enabled network computers to make their envigorating impact.

Chip of the year

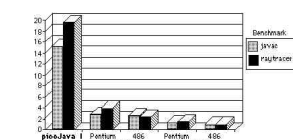…is not even set in silicon yet. Sun says its picoJava chip will run Java 5 to 20 times faster than Pentiums. That may be hype, but hard-wired Java is an idea to watch.

U-turn of the year

Bill Gates' switch to the web was the biggest u-turn since the retreat from Stalingrad — and, in cash terms, probably cost more.

1996: the network strikes back

The new year sees computing entering a new digital age, starting with the electronic media (TV, radio and datacoms) still predominantly analogue.

Rupert Murdoch is about to change all that by pushing digital broadcasting, with the promise of channels by the hundred. This will facilitate the long-expected convergence of TVs and PCs.

Last year saw the first pilots of new forms of TV-web hybrid programs. There were also huge realignments in the face of this emerging multi-billion-dollar market, with cable companies merging and phone giants BT and MCI proposing marriage.

For PC users, the changes were reflected in a renewed stress on the network. Win95, the operating system which dominated 1995, dated quickly as the browser evolved into the universal interface.

Microsoft's Bill Gates saw this coming and bet the firm on the internet (see left). This in turn spawned company intranets.

Joker of the 1996 pack was the network computer, a rethink of the pre-PC dumb terminal that drew its power from the network. Some saw it as hype; others saw it as the death of the PC. But with the new Java portable programs (left, top) it put the Wintel giants on the defensive.

So 1996 was the year of the network. By its end, as Newsprint observed, a PC without a connection was like a bath without a tap. **Clive Akass**

… and so do British firms

Acorn's electronic newspaper, the Newspad, shows one direction in which networks are taking IT. It is also the kind of purpose-built IT appliance that many believe will begin to outsell the general-purpose computer.

Acorn, ARM (see p31) and palmtop-maker Psion put British firms among the world's top innovators last year, though Psion has a fight on its hands with the new Windows CE machines (see page 34).

Chip-fraud raids in UK

Ten companies in Britain were raided last month as part of a Europe-wide investigation into counterfeit chips, says Intel.

Details are hazy, as it is unclear which police units were involved. Scotland Yard knew nothing about the raids, which were initiated by police in Bavaria and coincided with similar swoops in Germany, France, Italy and Belgium.

European police were later looking for 12 gang members, also suspected of tax fraud and money laundering. Twelve others were arrested. The highly organised gang, spread across nine countries, specialised in re-marking 133MHz Pentiums, costing around $200 each, as 166MHz versions worth twice as much. A 133MHz Pentium will run at the high clock rate but will be unreliable. Later versions have an internal speed limiter and a near-indelible clock rating on the underside to avoid fraud.

An Intel spokeswoman confirmed that UK firms were raided but could give no details. She added: "We provided technical assistance to identify sample chips seized."

Doubt over DVD ROM

The first DVD ROM players to go on sale this year could be obsolete by Christmas because they do not read disks recorded on DVD-RAM drives.

The uncertainty emerged at Comdex, where DVD-ROM drives were on show, write Tim Bajarin and Clive Akass.

It is the latest twist of the epic three-year fight to agree a standard that satisfies both the PC industry and movie moguls, who fear quality digital recording will boost piracy.

DVD-RAM drives will read ROM discs but no one can say if ROM drives will read RAM discs. Nick Sunby, product marketing manager at Hitachi Europe, said: "The DVD-RAM specification has not yet been entirely settled, so there is no absolute guarantee."

Eddie Moore, product manager at Ideal Hardware, said early adopters are unlikely to be deterred, with ROM drives starting as low as £300-£400.

He stressed: "There is a commitment from the DVD consortium to make DVD-RAM backwards compatible."

■ See page 134

PJ **Fisher**, managing editor, reckons: "The internet will lose its mystique. With both Netscape and Microsoft developing technology that will turn browsers into virtual operating systems, the idea of 'surfing the net' will become irrelevant. Instead, companies will build TCP/IP-based intranets and accessing the internet will be just another option available to PC users."

Clive Akass, news editor, sees big changes. "Fledgling 21st century computing is bursting out of the eggshell of traditional PC architecture. Microsoft and Intel will increasingly become like IBM: as rich as ever, perhaps even richer but with their glory days past. They will never regain their overwhelming dominance."

Similarly **Eleanor Turton-Hill**, technical editor, predicts: "The seeds of great technological change will be sown. Corel and Oracle will give birth to their Java suites, and the industry will finally start to take notice of a whole new hardware architecture based around the idea of the network computer (see opposite) or thin client. But progress will be slow."

Ben Tisdall, group editor, reckons: "This will be the first year that commerce on the internet becomes important. By the end of '97, sales of the products best suited to the internet will be well established. That means

1997: future schlock

IT forecasting is notoriously hard. But PCW staff bravely chance their reputations with predictions of the key technology trends of 1997.

International modem links from AX Components (01403 240055) show what won't happen in 1997: a world standard-isation of telecoms hardware. But the USB (above right) could provide a universal docking facility, complete with power, for mobiles (see p44)

rejuvenate the PC's flagging serial bus, and IEEE-1394(a.k.a. FireWire) will dominate higher-bandwidth tasks, finally marrying PCs and consumer electronics."

Adele Dyer, reviews editor, believes this will be the year of ISDN, with cheaper sign-ons and adaptors finally making it viable for small, as well as large, businesses: "More of a wish than a prediction is that notebook batteries will get lighter and last longer."

Senior staff writer, **Dylan Armbrust**, says: "The future is bright, fast, and 3D. You will hear about 300MHz-plus chips from the likes of Intel and Cyrix. And you will find 3D graphics in everyday apps — not just games."

Adam Evans, staff writer, sees the price of fast, high-capacity, portable storage falling like a stone: "We will also see very small devices fitted to mobile phones and digital cameras. Could it be the start of the end for the floppy as we know it?"

things like home-banking, air and cinema tickets, software and technical support."

Gordon Laing, features editor, predicts a big year for storage and bus technologies: "DVD will arrive en-masse and take over PCs. The Universal Serial Bus (USB) will

Microsoft pushes Psion off the map

■ Microsoft will not supply Psion with an updated AutoRoute Express for Series 3x palmtops. New versions will be limited to palmtops using compact Windows CE.

Gillian Kent, consumer marketing manager, said the current Psion version resulted from "a one-off arrangement" with no long-term deal.

Unfortunately, no-one told Psion, which hasn't adopted CE. But a spokesman said the news wasn't "all that startling". **Dylan Armbrust**

Bowser browser for the barking mad

■ Help is at hand for people who can't bear to be parted from their dogs while at the office. A company called DogSaver is offering software which throws up a doggie picture when your computer is idle.

You have a choice of several breeds to match your own pet but, as yet, none of them will run to pick up your paper from the doormat.

A shareware version can be downloaded from the web site at www.dogsaver.com.
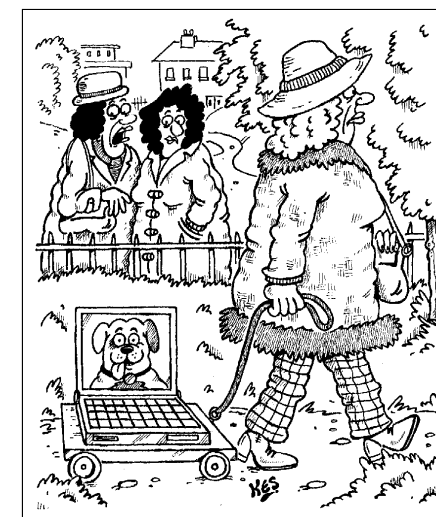
"She was fine until Fido died. Then she started feeding dog food into the floppy disk drive…"

Hyperlink row casts Scots mist over the web

A court battle between a Shetland paper and a local online news service could have wide implications for web publications.

Scotland's supreme Court of Session granted an interim ban on the online *Shetland News* carrying links to an online version of the printed *Shetland Times*.

Shetland News editor Dr Jonathan Wills, backed by the National Union of Journalists, said: "All we have done is direct our readers to the Shetland Times online edition, thus doing everyone a favour."

He claimed in a statement: "If the Shetland Times were to succeed in their frivolous and vindictive action, there would have to be a new Act of Parliament allowing the internet to continue to function in this country in its present form."

The Shetland Times is widely reported on the web to be saying that links alone constitute breach of copyright, which would indeed cripple the web if it were upheld. However, the paper's claim apparently rests on the broader basis of links combined with a description of the linked site's content, making it much closer to a conventional copyright case but still testing the legal limits of what can be done on the web.

A court decision is unlikely for months.

Retina chip sees gestures

Mitsubishi has developed an artificial retina in the form of a chip that can detect and interpret human gestures in real time. The chip is used in a Mitsubishi game controlled entirely by body language.

ARM chips to get Windows CE

CAROLINE SWIFT, business editor of the *Cambridge Evening News*, reports from Silicon Fen

Only the Great Hall of King's College proved large enough for last month's meeting of worldwide partners of Advanced Risc Machines, such is the takeup of the Cambridge company's RISC technology. ARM is now working with Microsoft to port Windows CE *(see page 34)* to its power-efficient RISC chips which will extend the compact operating system's reach to a broad range of devices.

Steve Williams, director of business development for ARM's portable segment, said: "In the four years since Apple pioneered the use of ARM in portable devices with the Newton Messagepad, ARM CPUs have been designed into cellular phones, pagers, GPS units, radios, wireless LANs — almost any kind of portable device you can think of. A port of Windows CE to ARM will expand the already large pool of software available, making it easier for OEMs to quickly adapt products to shifting markets."

ARM chief Robin Saxby is adding more engineers to his 150-person Cambridge team. While the chip industry is seeing negative growth worldwide, ARM's star is rising — US awareness of the small UK firm has grown immeasurably in a year. Offices in California, Tokyo and Munich are running and Seoul is next. "We are not threatening, we are partnering," says Saxby. "We are at the centre of a global alliance setting standards. We are enablers of change."

ARM licenses technology to partners such as LG Electronics, Digital Semiconductor, Samsung, Texas Instruments, Asahi Sharp, VLSI, Cirrus Logic, GEC Plessey, Symbios and Yamaha.

The ARM7 family includes the ARM7100 and ARM7500 single-chip solutions, and the ARM7TDMI "Thumb". The ARM810 and StrongARM chips deliver claimed supercomputer performance from two AA batteries.

ARM's Cambridge parent Acorn is equally bouyant after unveiling a range of devices at the Oracle Open World Show 96, including the Acorn network computer, the Office NC, the Set-top Box NC, the ExecPhone NC, and the NC TV. More about these another day.

Postal strike boosts email usage

The postal strike did wonders for email, notes UUNET Pipex, the Cambridge-based internet service provider. Email activity doubled during the strike and averages have remained constantly higher, it reports. Pipex has set up a new operations centre in Silicon Fen which will monitor activities on its UK, Europe and worldwide network 24 hours a day to prevent congestion. It will certainly have to cope with more customers: Dixons has agreed to sell only Pipex Dial internet connections in its 800 stores.

Short Stories

■ This new NEC chip will boost graphics peformance in high-end PCs. It provides burst-mode access in 1.7 nanoseconds — a claimed 20 times faster than normal fast-page memory — and a 600Mb/sec peak transfer rate.
NEC 01908 691133
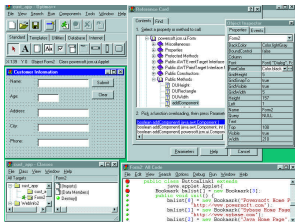
■ Sybase is designing a Java rapid application development environment, codenamed Starbuck, targeted at corporate systems, which it believes rival offerings do not cater well for.

Starbuck features include provision for server-side Java applets and the ability to run Java code in the HTML context for which it is designed.

The tool should be on sale some time next year but a trial pre-release version is available at www.powersoft.com

Visioneer upgrade
■ Visioneer has announced a standalone version (£84.95 RRP) of its PaperPort software, for Windows 95 or NT with any TWAIN scanner. It supports nested folders and features ScanDirect, which lets you scan directly into any of the 150 supported applications.
Visioneer 0181 358 5857

Improved remover
■ The latest version of Micro-help Uninstaller for Win95 or NT features an application clean-up wizard and a quick-cleanup facility. It costs £40 inc VAT.
Rod. Manhattan 0181 875 4444

Lotus and Corel fight back with web suites

Lotus and Corel are web-enabling their products to claw back market share from Microsoft Office.

Lotus says it has enhanced the web publishing features of SmartSuite 7.0 and has developed Java versions of its component software — cutdown apps designed to be used with Notes.

Corel, which bought former market-leading word processor WordPerfect from Novell last year, claims its Corel Office suite is outselling MS Office in US shops, though Microsoft's lead is overwhelming in preinstalled versions.

Corel is now shippping its Ventura 7 desktop publishing software which can also output web pages and includes a Quark-style dimensions bar.

But its greatest chance of outflanking Microsoft is the Java version of its office suite, beta versions of which are available at www.corel.com.

Corel has launched its own network computer reference design using a PowerPC processor, to boost the sales of Java apps. Another Corel NC is video enabled, providing what the company says is one of the cheapest available video-conferencing solutions.

Its palmtop design, announced late last year, appears to have been put on the back burner. All the designs will be made by hardware partners. "We have no plans to become a hardware manufacturer," said Corel president Michael Cowpland.
Lotus 01784 455445; Corel 0800 581028

Flook fluke as SG site picks UK strip name

A new 3D strip cartoon on Silicon Graphics' web site uses exactly the same name as a strip that ran for years in the *Daily Mirror* and *Mail*.

The UK Flook, drawn by jazz clarinetist Wally Fawkes, better known as Trog, was discontinued some time ago. But a *Daily Mirror* spokesman said: "We still own the copyright."

The SG strip at www.sgi.com is quite different. It demonstrates the use of a Virtual Reality Markup Language (VRML2) engine.

BT deal on 'pirate' DIR disk

British Telecom appears to have backed down in its bid to suppress a "pirate" CD of UK phone numbers.

It obtained a temporary injunction banning the German firm Topware from selling the CD, based on scans of printed directories.

But a second hearing was adjourned and the case is now expected to be settled out of court, *reports*

VNU Newswire. BT has often been criticised for its charges for CD directories of information many think should be publc domain.

Shortly after introducing heavy charges for phoned DIR inquiries, BT was asking no less than £2,000 for a DIR CD and hundreds more for quarterly updates.

Official licensees now sell DIR disks for about £200,

though TDS sells a business-only version for £50.

Topware charges £20, in line with prices of similar disks in the US. But it, too, has been slated for allowing searches on a number or an address.

And *PCW* readers have complained that the CD is innacurate and out of date.
CD Direct (dealer) 0800 317864; TDS 0990 1347020

Comdex Shorts

■ Toshiba and Ricoh showed rewritable DVD drives, known as DVD-RAM, expected to be available by the end of 1997 at under $1,000. Hitachi and Panasonic should have models out at the same time.

DVD-RAM discs will be kept in caddies to guarantee writing integrity. They can be taken from the caddy for use in draw-loading DVD-ROM drives, but they should be not be rewritten once removed.

Toshiba and Hitachi will not release recordable or rewritable CD drives, opting to go straight for DVD-RAM.

Major companies showed DVD-ROM drives, many connected to big-screen TVs via MPEG-II decoding cards for use as home cinema.

■ Hitachi, Mitsumi, and LG Electronics showed 16-speed CD-ROM drives, due to ship early this year.

Several vendors, including Panasonic, are skipping 16-speed and opting to put out 20-speeds by next summer. Speeds refer to the maximum data transfer rate possible; 16-speeds typically operate between eight and 16 times, and 20-speed models between 12 and 20 times.

Many drives are also likely to feature constant angular velocity (CAV) modes which spin the disc at a steady rate to improve access times and mechanical stability.

Conventional CD drives vary the rotational speed to maintain a constant linear velocity, CLV.

Gordon Laing reporting from Comdex

There's no escape from Minolta's digital camera with detachable lens

So-called budget digital cameras are cropping up everywhere. Interestingly, many of those launched at Comdex were seen earlier in the UK, giving *PCW* time to include them in this month's group test *(page 176)*.

Most visible at Comdex was Minolta's Dimâge V (pictured), the first digital camera to feature a removable lens. The imaging portion can rotate through 360 degrees and detach altogether. One connecting cable later and you can point the lens at difficult-to-reach subjects with the aid of the colour LCD viewer on the main body. The Dimâge V shoots 640 x 480 JPEG images and features a flash. It is due to be released in March.
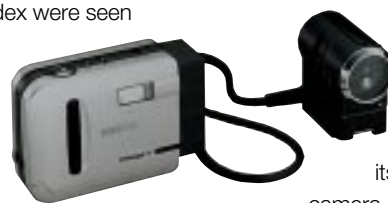
Those believing Sony's MiniDisc had lost its way may have had a surprise at Sharp's stand. Sharp showed its MD-PS1 digital data camera, which can store up to 2,000 640 x 480 pixel images on a removable MiniDisc cartridge.

Digital audio may be captured too, with up to 40 minutes accompanying 365 images on a single MiniDisc. There were no release details, but the MD-PS1 could be a whole year away, by which time Iomega rival n●hand *(opposite)* should be on the market.

Sony offers a wide view of the world

The wide screen experience is coming to your PC. Almost hidden among the DSC-F1 digital cameras on Sony's stand was a 24in Multiscan W900 monitor with a 16:10 aspect ratio; the conventional PC and TV display has a squarish 4:3 ratio.

The W900 supports resolutions up to 1920 x 1200 non-interlaced at 76Hz and 1920 x 1080 at 85Hz in a 16:9 mode. You'll need a graphics card which can drive these wide resolutions, but the W900 also supports traditional modes.

The W900 should be available early in 1997, priced at $4,900, and comes as standard with the Colortron hardware colour calibrator.

The image on the W900 was surprisingly sharp and well-focused in the corners, and very bright. Sony attributes this to impregnating the barium of the electron gun into a porous Tungsten disk to generate a smaller beam spot size.

Mini Zip for palmtops

Not content with taking over the desktop storage world with its Zip and Jaz drives, Iomega announced n●hand drives for hand-held devices. They take small (50 x 50mm) 20Mb cartridges based on Zip technology.

Iomega expects n●hand to be fitted to digital cameras, PDAs, cellular phones, handheld games, printers and global positioning system devices. At around $10 per cartridge, n●hand is much cheaper than the solid state flash memory traditionally used in handheld devices.

The drives will be much the same size as a Type-III PC Card hard disk, and future Zip drives will be able to read n●hand cartridges with a caddy. Iomega anticipates delivering n●hand drives in the second half of 1997

and hopes to see them in devices before 1998.

Syquest, Iomega's rival in the removable storage market, announced its long-delayed SyJet drive which should be available in the UK by the time you read this.

The SyJet stores 1.5Gb per cartridge (around half as much again as the Jaz) and SyQuest claims it offers superior performance, making it ideal for AV applications.

Iomega 0800 973194
Syquest 0131 339 2022
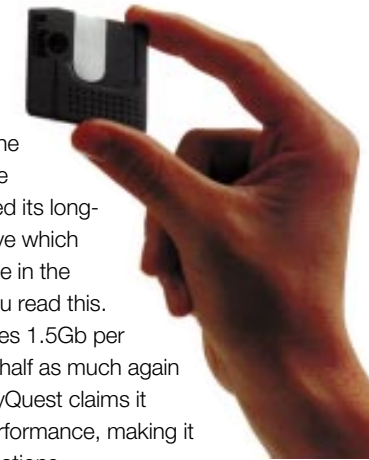
TFT colour screens fall flat

Flatscreen displays were all over Comdex. Samsung showed a 20.1in TFT panel with an enormous 1,280 x 1,024 resolution (right). Two models with either analogue or digital VGA interfaces will be available early next year for about $10,000.

NEC demonstrated a 20.1in LCD monitor with a 160 degree wide-angle view and a 1,280 x 1,024 resolution. Sharp showed a 1,024 x 768, 21.4in STN LCD panel, and said it would begin to make a largest-yet 40in direct view

800 x 600 TFT LCD panel on a trial basis. It is built by joining two 29in TFT LCD panels, maintaining a uniform pixel pitch even across the join. Almost everyone showed 15in and 17in viewable TFT panel displays.

Plasma screens, to be used on hang-on-the-wall TVs, look better with every demonstration. Major companies demonstrated plasma screens of around 33in, but Panasonic stole the show with a 42in 640 x 480 model, 3in thick with a 160 degree view. It could be on sale within two years.

Hitachi launches MPEG videocam

Hitachi débuted an MPEG-I digital video camera featuring the world's first single-chip codec LSI.

Up to 20 minutes of video can be compressed into MPEG-I format in real time, onto removable 260Mb Type-III PC Card hard disks.

Alternatively, the MPEG camera can be used to capture up to 3,000 704 x 480 stills in JPEG format, or 1,000 images with up to ten seconds audio each.

You could use it to make and transport video clips for presentations or web sites, or put its composite video output straight onto TV or tape.

Hitachi hopes to ship it early this year for less than $3,000, including a 260Mb Type-III hard disk.

Spot your reporter: Hitachi's viewfinder captures the charm of PCW's Gordon Laing

Those CE palmtops — a hands-on view

Microsoft's Windows CE operating system and the palmtops on which it runs were undoubtedly the stars of Comdex. Seven models were launched or demonstrated, from NEC, Hewlett-Packard, Hitachi, Philips, Casio, Compaq and LG Electronics. Five were based on Hitachi's processor, while NEC and Philips use their own processors.

Microsoft's CE hardware specification is very strict, so the seven palmtops look, feel and operate similarly. Prices are about the same too, with base 2Mb versions typically coming in at $499, and 4Mb models, some with built-in 14.4 modems, at up to $750.

Realising it could be some time before we get to see CE in the UK, I took the opportunity to play around extensively the seven models.

All feature Psion Series 3-sized keyboards, greyscale touch screens and a pen as a pointer. Communication is via an IrDA-compliant infra-red port, a serial port and a Type-II PC Card slot.

Some made the terrible error of allowing only a PC Card modem to be fitted, which occupies your only slot and consumes a lot of power. But you might also connect to a suitable mobile phone with a PC data card. LG Electronics showed a prototype with

built-in cellular communications due for release in 1997 — Nokia 9000 look out.

All the devices felt quick, thanks to the operating system and applications being set in ROM. They launched, operated and switched at a speed which wouldn't disappoint most desktop users. ALT-TAB still switches between open tasks, which are also shown Windows 95-style on the taskbar below. The lack of a minimise button on windows may confuse some, particularly when you want to launch another application — time to head straight for the Start button.

Windows 95's My Computer has been

replaced by My Pocket Computer, although there are no drives or letters. PC Card memory is shown as a folder on the same first hierarchical branch as other main system folders.

Pocket Internet Explorer is a neat web browser, but, infuriatingly, there's no progress indicator or highlighting of hyperlinks when the pen is poised above. I found myself repeatedly pressing links without having any idea whether I was heading for my desired location.

Hewlett-Packard looked to have one of the most desirable CE devices thanks to being the only one to feature a wide 640 x

240 pixel display — the other six measure 480 x 240 pixels. HP's is not due in the US until spring 1997, but the 50 percent larger screen may be worth the wait.

All in all I was impressed with the first CE devices, and in spite of a few annoying features, I kicked myself for not buying one while at Comdex. Now I'd rather wait for HP's larger screen and opt for a 4Mb model with modem.

Interestingly, the show was also packed with alternative PDAs and palmtops, including Apple's quick MessagePad 2000 Newton, and Sharp's full-colour Zaurus complete with built-in digital camera.

Short Stories

New Xerox scan suite
■ Xerox has launched a £199 colour scanning software suite called Pagis Pro that is said to integrate fully into the Win95 or NT desktop. Built-in intelligence will optimise scans of both text and graphical content on the same page.

Pages are stored in highly compressed .XIF files. Bundled Textbridge text-reading and Verity search software allows automatic indexing.

Xerox Imaging 01754 668421

Wintel 32-bit apps run on RISC processors
■ Microsoft is testing software called Windows x86, which runs most Intel-based Win32 applications unmodified on RISC platforms running NT. The current Windows on Windows (WOW) module runs only 16-bit Windows apps.

Performance is said to be like that of a 486 processor. Applications which do not run on a corresponding x86 NT build, or which call NT APIs directly, are not supported.

A preview version of the software was distributed to delegates at the Microsoft Developers Conference in Los Angeles late last year.

Fast MO drive
■ Plasmon has launched a 2.6Gb magneto-optical drive, the Limdow DW260, with a write speed boosted to 4Mb/sec thanks to the elimination of a pre-erase pass. It's compatible with existing MO media and ships with software allowing data interchange between Mac and Windows systems. The price is less than £1,500.

Plasmon 01763 262963

Permanent address
■ People who often change job or service provider are offered a permanent email address free at netaddress.usa.net.

Schools table
■ 1996 school and college performance tables are at www.niss.ac.uk/dfee/performance.html

MSN relaunches as Virgin joins in

Microsoft relaunched its online service amid a huge TV advertising campaign

— and on the same day Richard Branson launched his Virgin Net.

MSN was first launched with Win95 but was hit by problems, not least being that it was not web-based and could offer only indirect web access.

Its interface *(above)* is full of scrolling teasers and still hides its web base. The software is almost unrecognisable as a customised Internet Explorer 3.0.

Virgin is aiming at new home users, tempting them with a three-month free trial instead of the usual one month.

CompuServe, which still leads the UK market with at least 200,000 users, has dropped its WoW consumer service after reporting a £34 million three-month loss. It has launched its revamped software CompuServe 3.0 with new CSi logo.

MSN, which boasts of winning users from CompuServe, is now reckoned to be just behind AOL's 80,000, with Demon a close fourth.

Britain's online service, CIX, which has had to come to terms with the burgeoning internet, now offers 100 percent local-rate access with a simplified price structure.

PC vendor Dan Technology has slated service providers who demand credit card numbers before giving free trial access. Technical director Chris Bakolas said: "It's all too easy for busy people to provide these details, access a service once or twice and then forget all about it until they notice their credit card account is being debited."

He said a number of Dan users had complained of being caught out. "While I'm certain that companies … are simply trying to save administrative costs, this sort of thing leaves a bad taste in the mouth." Dan will now bundle only Pipex Dial trials with PCs.   Dan 0181 830 1100

Refund plan "would push up PC prices"

PC prices will soar if an EU draft directive goes ahead, it was claimed last week. The directive would make it easier for users to demand a full refund if goods are found faulty within a year of purchase.

The plan is not appropriate for PCs because of their scope for "endless user upgrade and modification", said Keith Warburton, director of the Personal Computer Association which represents computer and component suppliers. He claimed an increase in claims would raise prices by up to 50 percent.

An EC spokesman denied the proposals would drive up prices. "They encourage good practice ," he said.

Still evolving…

We ran a review in December of a CD called The Evolution of Life (Notting Hill, £39.95) and an interview with evolutionary biologist Richard Dawkins on the parallels between life and computing.

Blackwell has launched a similar CD called Evolution (right), based on a book by Mark Ridley. It has a more linear structure than the Notting Hill CD, with experiments and a mini-encyclopaedia. It

looks good value at £29.95.

Donald Michie, professor emeritus of machine intelligence at Edinburgh University, explains in Letters *(page 58)* what Dawkins called one of his most intractable problems: why consciousness evolved.

Troubled Borland hires hatchet man Yocum as King Kahn quits

Tim Bajarin reports from the US

Borland is in serious trouble. Current wisdom in Silicon Valley is that it would take a top-notch management team to turn the company around and take it forward again.

Founder Philippe Kahn has finally left and the others managing the company during the last six months could not rectify the problems.

In late November, Borland's board brought in Silicon Valley veteran Del Yocum to take the reins.

Del became famous as Steve Jobs' sidekick during Apple's early days, and many credit him with keeping the company together when John Sculley gave Jobs the boot in 1985.

In early 1992, Yocum went to Tektronics and after getting it back on track tried for the fourth time to go into retirement. Del is adept at seeing a

Kahn in his Borland heyday

company's problems and getting it to focus on what it does best.

Borland has tried to be too many things and strayed from its roots. Its database and spreadsheet days are gone but its development tools can keep it viable.

Yocum will have to fire people, dump much of the large, expensive Borland campus, and make the company's intranet a key part of future strategy.

Videophones go portable

I have felt for some time that the videophone is the "killer app" for the consumer market, although low bandwidth and poor frame rates over standard phone lines make it impractical as yet as a serious business or consumer product.

Two companies are about to unleash low-cost, portable video conferencing systems built around PCMCIA cards for notebook users. Toshiba and Silicon Valley startup Winnov use different software approaches but provide a total system for about $500.

The Noteworthy Business Video Phone from Toshiba has a colour analogue camera, video cable connectors and a CD-ROM software package compatible with Intel's ProShare architecture. It ships this month.

Winnov's VideumConf Traveler uses VDOnet's VDOPhone and White Pine's Enhanced Cu-SeeME software. This system will ship in February.

The transfer rate on these systems is less than thrilling. Winnov's Traveler is likely to peak at five frames per second over a typical web link, or up to 15 on ISDN. Toshiba claims its ID-D30 is the world's lightest and smallest PC Card-based digital camera, but its frame rates are similar to Winnov's.

It will be targeted at business users who will accept its limitations to link to the office or family while on the road.

Top ten will reveal X rating

If you want to get a handle on whether Java or Active X will be the big winner in the future, watch where top ten software companies over the next six months place their bets.

As far as we can tell, none has gone the whole hog for either Java or Active X yet.

Java has the lion's share of the mind set with backers claiming more than 5,000 developers on their bandwagon. Most industry observers expect Java to be big, but its growth in business will depend on whether it becomes the primary platform for top applications vendors.

These could support both, but history has shown us that the big players end up choosing one, driving it

to the status of a standard. Microsoft, the biggest corporate software vendor, will lead the way with Active X. However we will be looking very closely at what the other nine top vendors do: wherever this group goes, the heart of the business market is bound to follow.

Boom time for Silicon Valley stars

Demand for good engineers and marketeers in Silicon Valley is so high companies are offering signing bonuses to attract talented people.

A 26-year-old friend with a four-year college degree in marketing and four years of high-tech product management under her belt had four job offers when she left her current company. Each

of the positions on offer came with a signing bonus of $25,000 or more and a starting salary of at least $65,000 a year, plus stock options and profit sharing. In some companies, end-of-year profit sharing cheques will be as much as half of current salary.

Clearly, Silicon Valley is in boom mode.

■ Here is a thing for anyone who wants to get back at chip thieves. Kalamazoo's £90 Byte Back card emits a deafening 120 decibel siren if disturbed and sprays indelible dye over the computer's innards.

Sounds wonderful… so long as you aren't the one doing the disturbing.

Kalamazoo 0121 411 2345
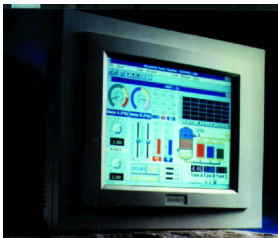
■ This device gives new meaning to the term "thin client". It's a 486 panel PC with a 10.4in colour TFT touch screen and ethernet port for industrial applications.

Fairchild 01703 211789

Superscape opens up a global third dimension

Supercity: hub of the virtual world

Web surfers can now enter a new dimension of the internet with the recent launch of the Virtual World Wide Web (VWWW).

Spearheaded by Superscape VR, the new VWWW is a global network of linked virtual worlds on the internet.

Following on from its successful co-operation with Intel on the Virtual Stonehenge site (*PCW*, *Cutting Edge,* Sept

1996), Superscape is hoping to change the face of the web into an interactive, virtual 3D forum for both commercial and entertainment purposes.

Ian Andrew, president and founder of Superscape, boldly stated that this was the "next killer app" that will allow the VWWW to take on a life of its own. The hub of the VWWW is Supercity, the heart of the 3D virtual reality worlds. Visitors to the site can roam the streets, visit the shopping mall or art gallery, or play in the amusement arcade.

It appears that the VWWW is already a success. Superscape's hub site has been receiving an average of 80,000 hits a day, or 2.6 million a month, since it was launched.

At present there are 55 linked VWWW sites, but Andrew expects there to be 200 sites by May 1997 and 2,000 after a year of operation.

If you want to explore the VWWW all you need is a standard Microsoft or Netscape browser. Type vwww.com and then download the required Viscape plug-in.

Dylan Armbrust

Superscape 01256 745745
www.superscape.com; vwww.com

Doctors sick of Medline access problems

If your doctor seems harassed, tired and out of sorts and has rocketing blood pressure, you should offer this simple advice: stop trying to use Medline.

This database of more than eight million medical records, dating all the way back to 1966, is run by the US National Library of Medicine and the British Medical Association provides its members with a free password-protected gateway through a computer in its London Library. So doctors in London can access Medline for the price of a local call.

In November, GPs who had for years been successfully using PCs to search for medical information, started to receive gobbledegook, dropped lines and "no carrier" error messages. For weeks, the BMA told everyone who complained that

they should change their system settings. Now the BMA has admitted that the fault lies with its system. The BMA is set to launch a web page this month and offer doctors access to Medline via the internet. But direct access will continue as a fast (and for London doctors, cheaper) alternative.

On 11th November the BMA replaced its Novell host system with a Unix box running Ovid server software. Users were sent a long confusing note, of use only to the computer literate, warning that the "formerly strongly recommended" pcAnywhere access software should be replaced by Smartcomm, Procomm, Crosstalk or Hyperterminal.

Whatever package is used, advises the BMA, it "must" support VT100 emulation. Some comms software does not support

VT100. The BMA later explained that it actually meant VT100 or VT102.

Service on the new server was at first erratic and then collapsed completely. Calling modems were quickly dropped after connection. More notes told doctors what software settings to use. But these also failed. Early last month, the BMA discovered the real problem. The new server did not register the end of a session so the next caller is rejected. "The system has gone haywire," admitted a librarian.

The BMA has ordered new software but there is still no firm date for a return to normality. The risk now is that some doctors will have made trial-and-error changes to their PCs which will prevent them accessing Medline when the BMA gets it working again. **Barry Fox**

Clone maker pre-empts Apple with BeOS bundle

Mac clone maker Power Computing is to bundle the Be operating system as well as the Mac OS with its new systems. The move last month came as Apple back-pedalled over stories that it may adopt the BeOS as the next MacOS.

Be software engineers had the advantage over their counterparts in Apple (and Microsoft) in that they could design the operating systems without having to account for legacy systems. It is object-oriented, and supports multiple PowerPC processors, multi-threading, pre-emptive multitasking and protected memory. And unlike Apple's delayed next-generation OS, codenamed Copland, it is available.

Talks between Apple and Be, founded by former Apple exec Jean Louis Gassée, are said to have foundered last month over money. Apple chief technology officer Ellen Hancock told a developers' conference in Europe that she wants her own developers to create the next OS. "We have to make our operating system a better citizen in mixed environments, including NT," she said

On a flying visit to London she said that rather than release a complete upgrade to System 7.5, Apple will roll out elements in January and July with a kernel-based System 8 coming later in the summer.
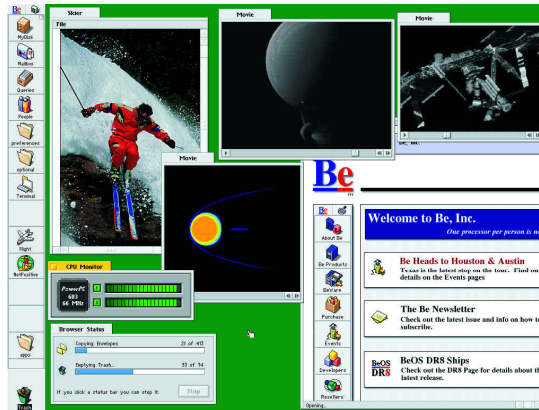
Graham Barr, a director at UK-based Multimedia Corporation, said his company had spent money implementing Apple ideas which were thrown out of the window. He said: "This is going on and on and we're asking: 'When will you give us good news?'"

Hancock accepted that Apple had made mistakes and promised that System 7 will exist well into 1998. She went on: "My current plan says that my team is building the operating system. Be is a developer and we give it development support. Anything past that is rumour."

But analysts in the US speculated that the Power Computing move could force Apple into adopting the BeOS.

■ *Additional reporting by VNU newswire*

Above Busily multitasking: the BeOS

The Commodore Multimedia Keyboard Plus Win 95 keyboard packs a 3W stereo amp and speakers to provide PC sound without desktop clutter.
CPC 01792 654455

Top 10 Windows software

#	Title	Publisher	Last month
1	Microsoft Word 95	Microsoft	–
2	Microsoft Encarta 97	Microsoft	3
3	Norton Anti Virus v2	Symantec	5
4	Microsoft Flight Simulator v6	Microsoft	7
5	Microsoft Autoroute Express v5	Microsoft	–
6	Masterclips 101,000	IMSI	–
7	Windows 3.x to Windows 95 U/G	Microsoft	2
8	SoftNET Value Starter Pack	Software W'house	1
9	First Aid Deluxe	Rod Manhattan	4
10	Partition Magic	POW Distribution	6

Top 10 DOS software

#	Title	Publisher	Last month
1	System Commander	POW Distribution	1
2	Novell Groupwise	Novell	–
3	MS-DOS v6.22 U/G	Microsoft	3
4	Total Insanity	Europress	–
5	Formula 1 Grand Prix	Microprose	5
6	Turbo C++ v3	Borland	4
7	Quake	GT Interactive	7
8	Turbo Pascal v7	Borland	6
9	Norton PC Anywhere v.5	Symantec	–
10	Duke Nukem	Eidos	–

Top 10 CD-ROMs

#	Title	Publisher	Last month
1	Encarta 97	Microsoft	2
2	Inside Independence Day (HMV Excl)	Electronic Arts	1
3	Star Wars Trilogy	One Stop	-
4	Cinemania 96	Microsoft	5
5	Encarta 97 World Atlas	Microsoft	3
6	Music File	File Productions	6
7	Autoroute Express UK & IRE	Microsoft	7
8	Guinness Disc of Records	Grolier	-
9	Unexplained	Flagtower	-
10	Encyclopedia of Science Fiction	Grolier	-

Top 10 peripherals

#	Title	Publisher	Last month
1	MiroConnect 34	Miro	–
2	Philips 28.8 External Fax/ Modem	Philips	5
3	Epson Stylus Color 500	Epson	4
4	Primax 4,800 Flatbed Scanner	Primax	1
5	Screenbeat Passive Speakers	Hi-tex	11
6	Vista S6E Scanner	Umax	16
7	Hauppage Win/TV Card	Hauppage	–
8	Goldstar 8x CD-ROM Drive	Goldstar	15
9	Evergreen 486 to 586	Evergreen	10
10	USR 33,6000 Voice Fax/Modem	US Robotics	7

Software and peripherals figures supplied by Software Warehouse. CD figures courtesy of HMV Games/Level One

Serial killers

Gordon Laing detects strong signs ahead that a standard interface could soon unite PCs and consumer electronics.

Microsoft's Windows CE palmtop operating system may have been the star of the Comdex show, but coming a close second were the two emerging serial bus technologies which will link PCs, peripherals and consumer electronics into the next century: the Universal Serial Bus (USB), and IEEE-1394, or Firewire, as Apple more excitingly named it.

Most PC devices require a dedicated socket and don't like being connected or disconnected with the power on; hardly plug-and-play, and that's before you start looking into performance. The dated 25/9-pin PC serial port looks destined to be replaced by the USB, already making an appearance on several PCs we have recently tested.

A USB host provides multiple USB ports for connecting so-called hub peripherals, which in turn has several USB ports for connecting additional peripherals, known as nodes. A single USB host could control up to 127 devices, all using the same connector, and all hot-pluggable. USB peripherals include keyboards, pointing devices, modems, digital cameras, monitors, digital speakers and printers.

The USB 12Mbit/sec bandwidth is sufficient to carry digital audio directly to loudspeakers equipped with digital-to-analogue converters, eliminating the need for a soundcard. It's a neat idea but there are limitations. General MIDI wavetable samples could be stored in system RAM and also sent down the USB, but this would cripple your system resources. And there's no means of getting audio into your PC without an analogue-to-digital converter, most often found on soundcards.

IEEE 1394, or Firewire, combines the connectivity ease of USB with a bandwidth high enough for, say, digital video. It uses small, hot pluggable connectors to link up to 63 auto-identified devices. It offers bandwidths of 100Mbits/sec and 200Mbits/sec, with 400Mbit/sec due in 1997 and 1.2Gbit/sec further down the line.

Firewire needs two chips per device: the physical interface (PHY) connects to the other device's PHY. The Link interface connects the PHY and the device internals. All PHY chips use the same technology, whereas the Link is device-specific. This approach allows 1394 to act as a peer-to-peer system as opposed to USB's client-server design. A 1394 system needs neither a serving host, nor a PC. But the need for two pieces of silicon instead of one will make 1394 peripherals more expensive than, say, SCSI, IDE or USB devices. Adaptec's AHA-8940 1394 PCI Host adaptor has an OEM sample price of £259, while its Link chip for embedded solutions costs £49.

Sony's latest range of digital Handycam camcorders are the first consumer goods to feature 1394 Firewire digital interfaces — the future starts here.

At Comdex, Sony proposed a possible home of the future using a 1394 network allowing TV sets, VCRs, camcorders and a home PC to exchange information without a server. Sony has already fitted 1394 interfaces to its latest range of DVC digital tape Handycam camcorders. Consider the possibilities: film high-quality digital video, transfer it digitally over 1394 to your PC's hard disk, edit in Adobe Premiere, then digitally output it back to DVC tape. You can do this today with Sony's DVC camcorders and a suitable 1394 PC host adaptor.

Sony's DVC format is similar to MJPEG in that compression takes place on individual frames, allowing frame level-editing, as opposed to MPEG and MPEG II digital video which compresses across multiple frames. The two formats are incompatible and to exchange information would require either conversion into analogue video or a highly sophisticated processing box. While MPEG-II decoding is cheap and easy, real-time MPEG-II encoding is expensive. No one at Sony or the 1394 Trade Association could suggest how the DVC format of Sony's new camcorders could exchange video digitally with the MPEG-II format of DVD.

However, the fact that consumer giant Sony already features 1394 ports on several products is a strong sign that we could finally have a standard interface to unite PCs and consumer electronics.

1394 Trade Association; www.1394ta.org ■

Java shakes IT up

Java looks likely to be adopted on a massive scale and the IT industry is preparing for an earthquake. Eleanor Turton-Hill reads the seismograph.

Java is more than just a toy for net surfers and computer geeks, or just another programming language. Robin Bloor (author of *The Enterprise by Other Means*), claims that Java, brainchild of Sun Microsystems, is at the epicentre of an earthquake which will rearrange the IT industry.

Java, Bloor argues, has two major qualities which fill a desperate need in the computer industry. First, unlike the current generation of office tools, Java applets are small and fast. Second, Java is portable. Instead of sitting directly on the operating system, Java lives in a browser; it is in a development layer all of its own. This has become known as the Java virtual machine (JVM) and is the key to Java's platform independence because it separates the development environment from the operating system.

Bloor's vision of the future is shared by major software manufacturers who are now positioning themselves in readiness for great industry change. Corel, for instance, is developing new Java versions of WordPerfect, Quattro Pro and CorelCHART. These are currently in beta form and are scheduled to be available in the first quarter of 1997. Oracle has also announced plans for a set of Java-based office applets (codenamed Hatrick) including a word processor, spreadsheet and presentation graphics tool.

The move towards Java has been driven by an increasing dissatisfaction with bulky office software. As PC hardware has become more powerful, so software has become more demanding and systems become crippled. Microsoft Office 95 requires an amazing 89Mb of hard disk space and at least 12Mb of RAM to run smoothly. The core idea behind the new Java suite is to replicate the functionality of MS Office in a tiny fraction of the code, so that each component runs considerably faster. Instead of buying a massive monolithic word processing application and using 20 percent of its capabilities, users will be able to buy only the parts they require and end up with an efficient and manageable package that more closely matches their needs.

The resources required to support the Java applet also encourage a different hardware model. Unlike today's office suites which are centred around a "fat" client, the Java suite is network-centric. Application components reside on the server and are downloaded as required. Consequently, the Network Computers (NCs) running Java are much simpler than the average Windows machine and require far less power. Oracle, Sun, IBM, and Corel have already announced NCs and Microsoft, in conjunction with Intel, has recently announced the Net PC. The hardware varies but the basic idea is the same.

In a business environment, the PC should be replaced by a cheaper device that depends more on downloading software for its operation. The new computing paradigm, as Bloor explains, marks a return to the centralised model of mainframe days. This network-centric approach to computing greatly simplifies software maintenance. If your Java suite needs upgrading, you simply update the software on the server. No more trekking around from machine to machine holding a huge pile of diskettes.

The major question mark is over Microsoft, for whom the change to thin-client computing poses fundamental problems. The browser is the only operating system Java needs, so Windows will no longer be able to "lock" users into buying Microsoft applications. As Bloor commented: "We never bought OS's for their features. We don't buy OS's, we buy applications."

Microsoft shows no signs of re-writing its applications in Java. Applications marketing manager Jeremy Gittings recently commented: "I can't tell you what we're going to do with Office in the future. We may be distributing it in a different way." As a software architecture, the applet idea makes sense. A so-called "productivity" application is one which allows you to carry out your day-to-day tasks effectively rather than forcing you to load up 3,000 functions every time you want to type a letter. The idea of building software from selected components has been around for a long time and has been exploited successfully in some parts of the industry. But Java has arrived at a time when it is likely to be adopted on a mass scale.

The repercussions remain to be seen. In Bloor's own words: "The return to centralised computing is a major earthquake and…it will rearrange the landscape. Some buildings will be left standing. Others will not. Its tremors will be felt across the world, by IT vendors, by all types of organisations and even by national economies." ■
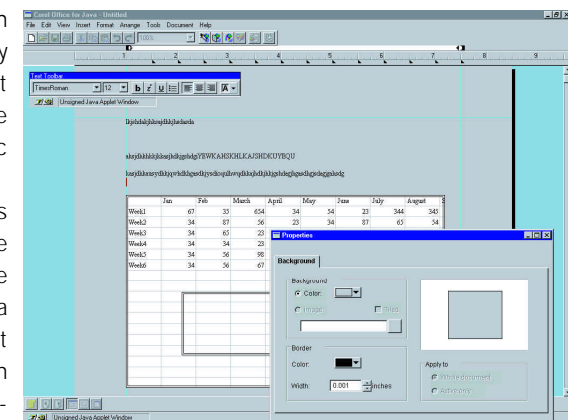
Here's a sneak preview of Corel's new suite of office applications, rewritten entirely in Java and running within the Netscape browser. The suite is currently in beta form and will be available in the first quarter of 1997.

The future is bright

The past year has been surprisingly good for the PC industry, but will 1997 be even better? Tim Bajarin crystal balls it into 1997 on a wave of optimism.

Well, it's that time of year again when we look back at how things have turned out over the past year. At the start of 1996, the annual growth rate for PC sales in the US was expected to continue at around 15-17 percent, although alarm bells rang in late January when Dataquest forecast less than ten percent growth in the belief that companies would postpone upgrades until NT 4.0 shipped.

The year also started out with a lot of noise about how the NC would change the face of corporate and consumer computing and how Intel's MMX multimedia extensions would make multimedia systems hot items this Christmas while sales of dedicated games machines declined. It was also to be the year when Apple's Pippin got a foothold in the home market and the first DVD units would hit the shelves along with DVD movies.

As regards the internet, virtual reality on the web was expected to be main-stream by the end of last year and it was thought web marketing would make fistfuls of money. Some pundits predicted a move from an advertising-subsidised web to one where real products and goods would be sold and supported.

Considering that delivery of DVD and MMX was pushed to 1997, and that the games machine is seeing a mild resurgence due to Nintendo's 64-bit product, 1996 was surprisingly good to the PC industry. Consumer sales have made up for a sluggish corporate market so the original 15-17 percent growth predictions seem to have been near the mark. Believe it or not, most researchers see 1997 as being an even stronger year. Many think US growth will top out at 18 percent or so, far below the 35 percent of the mid-eighties but extraordinary by the standards of other industries; 1998 may see a decline due to US economic problems and a market that is becoming saturated at some levels. In the short term, however, Intel's delivery of

MMX, which adds multimedia processing power to the basic PC, could start the strongest upgrade move we have ever seen, especially in the home market. The entry-level clock speed will start the year at 166MHz and rise to 200MHz by next Christmas.

Meanwhile, upgrades stemming from the adoption of Windows NT should be in full swing. The NC seems to be losing steam, at least as a consumer product. Some corporates may buy NCs for task-specific areas such as car-rental and airline reservation counters. However, moves to create a PC that is easier to use and easier to administrate will make the most sense for people who like the PC's versatility and power.

The fate of Java will be determined in the next six months as it battles with Active X for the attention of developers (*see p39*). Movie players were expected to create the first big sales for DVD but following delays in the launch, vendors think that PC-based DVD-ROM drives will spearhead the market.

I reckon about one in three PCs will be sold with DVD drives by next Christmas. By that time, too, there will be two types of consumer PCs: one optimised for creativity and communication, the other for entertainment. The first will have expansion slots and the ability to handle internet telephony, a home video studio, a digital darkroom, a videophone, 3D virtual worlds, and web creation. It will have CD-ROM initially, but could add a DVD drive.

The entertainment PC will have the ergonomics of a rack-mounted stereo system. It will be capable of handling DVD, 3D, DSS, a TV tuner, consumer quality audio, a joystick, a wireless keyboard and USB and 1394 Firewire ports for consumer electronics connections. It can use a TV as a monitor, but is best connected to a dual-purpose display. Of course, it could have a modem for internet connections and email.

The days of dedicated game machines are numbered. Systems like the Nintendo 64 may stay around for another year or two, but a flexible entertainment PC is more attractive as a home entertainment system. Internet usage will grow, but electronic commerce will be slow in coming as we still do not have the right model to enable it.

Users will look for more powerful software to help them extend what they do on a PC to new applications and new digital worlds. All this makes my forecast for 1997 a rosy one as the industry continues to benefit from strong demand for all types of digital material that only the PC vendors can deliver. ■
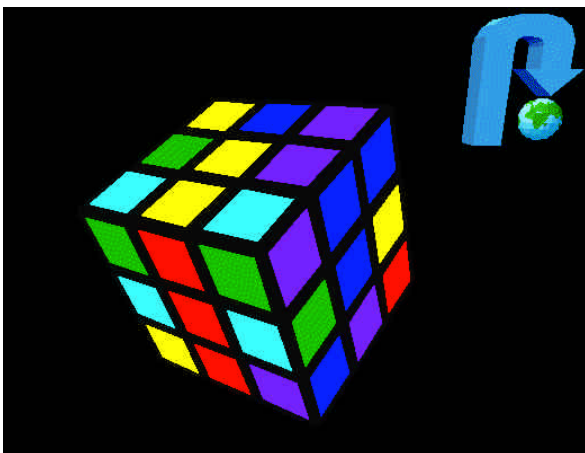
Mainstream virtual reality… a Rubik Cube game at vwww.com, a hub of the new virtual web (see *Newsprint*)

T he last time I appeared on stage was as a hotel manager. Although my part was little more than a cameo, I felt that mine was nevertheless the pivotal role, much as Orson Welles' in The Third Man. Basically, the whole plot turned on the premise, or the "Maguffin," as Hitchcock would have called it, that the hotel had been unexpectedly overbooked. Regardless, a young couple turned up — she claiming to be a virgin, albeit a well-pregnant one, and he some sort of roving DIY man — and demanded a double with ante-natal and donkey-feeding facilities. No chance, I said, not at this time of year. Instead, I directed them to our cattle shed annex (a relatively lowly one) around the back. A big mistake. No sooner had they checked in, than all their farm labourer friends dropped by, followed by three oriental types with camels. The whole thing was Berkoff meets Beckett with a few tunes thrown in, but it seemed to go down well with our relatively unsophisticated audience.

The reason this came to mind is that, the other week, I was invited to take to the stage again. This time, the stage was to be a "virtual" one and I was to be the lead character. It was AOL's UK Live show, the online equivalent of Question Time. Fate was repaying me for having written "The Official AOL UK Membership Guide".

For those of you who've never seen this sort of thing in action, I should explain how it works. What happens is that interested parties log on and then go to the Chat area, where they're all kept in a sort of virtual holding pen. From here, they ask their questions. However, in the online world, the interviewee has something of the status of a Chinese emperor. Mere mortals are not allowed to address him directly, while he, for his part, doesn't deign to talk directly to them. Instead, the lowly scum type in their questions and send them to an MC, who relays them to the interviewee, who types his replies to the MC, who then passes them back to the floor.

If you think this sounds like a highly efficient way of racking up both a sizeable phone bill and a heftyish online bill, you wouldn't be far wrong. If you also think it sounds like the zenith of nerdiness, you'd probably be on the right track there, too. And to want to talk to me, of all people. I mean, there are all sorts of other, more rewarding things you can do online — get the latest news, check on the weather, surf the internet for hardcore porn, and so on — and all sorts of more interesting things you can do offline, like defur the kettle or worm the cat. It therefore makes you wonder exactly what sort of life the people who gladly participate in these chat/Q&A sessions lead. But to log on to question me about a book which tells them how to use AOL, when they must know perfectly well how to use AOL, otherwise they wouldn't be able to log on and question me, hints at something of a trainspotter or beermat collector mentality. Especially when you consider that the rival

event that evening was Manchester United vs Juventus on ITV. But ours not to reason why…

Anyway, at the appointed hour, having uncorked a half-decent bottle of Chablis, I signed on to do my "Hello, good evening, it's a pleasure to be here" bit. And was immediately bounced off when AOL broke the connection. One has to learn not to take this sort of thing personally, so I signed on once again. This time, somewhat more successfully. "Please welcome Michael Hewitt, author of The Official AOL UK Membership Guide," said the MC, in as cheery a manner as he could muster in plain ASCII. "Who'd like to start us off?"

Silence. I remember seeing Steve Davis at a book signing session at WH Smith in Manchester, sitting forlornly by himself amid a pile of unsold copies of his autobiography. I feared the evening might turn out rather like that. But AOL came to the rescue by falling over yet again, and this time bounced out the MC. By the time he'd managed to log himself back onboard, half the audience had signed off in frustration. The other half, who presumably only stayed because someone from a band called Motorhead was due on the next night, and they'd got their dates wrong, were prevented from asking me about my forthcoming album by the fact that the whole system was now running so slowly that it would have been quicker to send their questions in by carrier pigeon.

Michael Hewitt

Sounding Off

A star is born. Michael Hewitt finds it easier to tread the boards than dial up and chat, as he finds out when he's a guest speaker on AOL.

I reckon that, for the hour I was online, I answered just ten questions, none of them technical. So when, at the end, and with an air of semi-desperation, the MC said: "And remember, the AOL UK Membership Guide is available here, on AOL, for just £14.95" I felt it must have been rather like trying to flog a WordStar manual.

To be fair, AOL doesn't normally perform that badly, but it's just as well it did on that occasion. The virtual stage, I discovered, is just not me, darling. It's far too constricting of my talents. I can only hope, therefore, that someone gets round to writing "Nativity II: Nappy Rash". Then I can resume my thespian career in earnest. ■

In December's column, I asked how you pronounce that "@" in email addresses. It's particularly problematic over the phone, when gestures and other visual clues aren't possible, and where "at" or the printer's term "commercial at" could be confused with the rest of the address. The response has been encouraging and is threatening to take over this column. This saves me thinking of something else to write about, so heartfelt thanks to you all.

Here are some of the better suggestions. Let's get the serious ones over with first. Chris Hoare suggested the highly logical "domain", but in spite of this (with a capital D) being the name of a park in Sydney famous for speech-making, and therefore rather appropriate for online discussion, it didn't really grab me. Immanuel Burton suggested "adnotum". I didn't think this passed the telephone test, so he came back with "epinota". I think it sounds elegant, and before the pedant hit-squad writes in to point out that this is a combination of a Greek and a Latin root, I would point out so are "television" and "automobile". David White suggested "around" which is both conceptual and descriptive (a-round) and Massimiliano Celona, from Italy, suggested "via", which is commendably short, appropriate and Romantic, although possibly confusing, as "via" often appears in email headers with a different meaning. Getting more involved with word-play, we have Kevin O'Connell's wonderfully biblical "begat" and Jane Krupka's "ampersat" which is neatly counterpointed by David White with "ampersNOT". Nick Phillips' "splat" was, I thought, excellent — short, unambiguous and onomatopoeic.

On to the more graphic. "Epididymis" (or a-pididymis) sounds academic and philologically authentic, but it's only the tube that connects a testicle to its associated plumbing. Thank you, Alexander Newman, but alas, we can't publish your similar but rather more earthy version. *PCW*'s own Patrick Ramus is also disqualified on the grounds of anatomical impoliteness. Veikko Rekunen, from Finland, suggests "kissantasu" or "cat's paw", and also from Finland came Holger Granholm's "kissanhanta" — "cat's tail". Obviously a nation of cat-lovers. I wonder what they call an asterisk? Someone signing himself as Ken suggests "asp", which, as Shakespearean scholars will realise, is the snake whose bite caused Cleop@ra's demise. I did like Peter Lewis's "plug 'ole" — he also suggested "Ascot" (where the ladies wear 'ats), "lasso" and "helter-skelter". Nigel Tate's "bubble-a" is neatly depictive, and Roger Green's "crash helmet" is appropriate to the monospaced fonts used in email messages.

Turning to the gastronomic, Paul Freedman came up with "Strudel", which he reckons comes from Israeli or American-Jewish parlance. I'd always thought of it as Austrian, but the Oxford English Dictionary ascribes it to the German for "whirlpool", so at least the shape is still right. Carole and Stephen Cotterell suggested "e-snail", and Marc Bouron "jam roll". The prolific David White offered "Chelsea bun" but I felt that Jim Bell's "sausage roll (end view)", although impeccably descriptive, was a bit too much of a mouthful. Anyway, keep them coming — either by post to *PCW* (mark the envelope "Tim Nott — @ sign") or by email to timn@cix.compulink.co.uk. There will be a £25 book or record token for the best and £15 each for the two runners-up. Closing date is 1st February 1997 and as all existing suggestions have already been entered, there is no need to resubmit. All entries will become the intellectual property of the public domain, so if your suggestion doesn't win a prize, you can bask in the glory of having added a useful term to the language.

"Which marketing genius came up with a name that everyone is going to shorten to 'Wince'? Ouch! I think we should be told"

Tim Nott

A Curious Experiment

By the time you read this, the first wave of Personal Digital Assistants with Windows CE should be hitting the high street. These were all the rage at Comdex. As this clashed with Nouveau Beaujolais week, I was

Homefront

From Ascot to chelsea buns, sausage rolls and strudel. What can Tim Nott be talking about? Not Windows CE, although that poses a question, too.

unable to attend so I've yet to see the real thing. I did, however, play with a virtual one on the Microsoft web site. It's cute, with a Windows 95 look-and-feel, mini-versions of Word and Excel, a PIM, a "pocket" Internet Explorer, and sundry ways (including infra-red links) of talking to a desktop PC. It all works in just 2Mb RAM and four of ROM. My big question was, what does CE stand for? Various theories abound — Consumer Edition, Compact Edition and Companion Edition being some of the more serious ones — but the official Microsoft line is that it doesn't stand for anything. So, second big question. Which marketing genius came up with a name that everyone is going to shorten to "Wince"? Ouch! I think we should be told. This isn't a call for entries, it's just a thought. ■

The Comdex show, in Las Vegas, is now so large that the event has become self-defeating. There are not enough hotel rooms to go around and prices triple. The events and hotels are often several miles apart. There are not enough taxis and the queues for the shuttle buses are hours long, making it impossible to keep appointments and cover the show adequately.

One word kept re-occurring: arrogant. And one visitor prayed: "*Please* God, peel another banana skin…" Who was everyone talking about? Microsoft, Bill Gates and they way they handled the launch of the Windows CE handheld. Microsoft had hired the enormous theatre in the bizarre Treasure Island Hotel where the famous Cirque du Soleil performs nightly. Although the building holds about 1,500 people, by the time Microsoft's staff and cronies had been invited, there were not enough seats for the press. So some journalists, who had flown in from Europe specially to attend, had to take part in a lottery to decide who got in. I made it in by posing as the head of research at Philips in Eindhoven. Fortunately, no-one asked me to get up and say a few words in praise of Chairman Bill.

Gates gave a lengthy presentation, reminding us that the CE launch took him full circle because 15 years ago he had written "most of the code" for the Tandy/Radio Shack Model 100. This was the first real portable and just like the new CE handhelds, it had all its operating and applications software in ROM. The TRS 100 was way ahead of its time and widely used by journalists. But it had a design fault. When printing to paper, it failed to send line feeds. So unless the printer could be hard-set to add its own line feed, or users knew how to write extra code, the 100 over-wrote one line of text *ad infinitum*, to produce a single thick black strip of ink. Because the software was in ROM, users had no hope of an upgrade.

The CE's software is also in ROM so I wanted to ask Bill what would happen if there were a bug. But the great man now only makes statements *ex-cathedra*. Instead of a question-and-answer session he vanished, leaving us with a 90-minute private circus show.

Despite everything, Comdex did provide a valuable glimpse of the future and what the next generation of processors, particularly the Pentium MMX, will bring. It is now practical for the CPU to do the jobs normally carried out by dedicated hardware. And processing speeds will go on rising. In his keynote speech, Intel's Andy Grove predicted 10GHz. This will probably rely on opto-electronic processing because pure electrical signals become unmanageable at such high frequencies. But the technology is ready for military and telecoms use and will filter down to consumer level.

Mediamatics has already demonstrated MPEG-1 Video CD software decoding on an MMX PC, with no additional hardware decoder. Picture quality matches that from hardware boards. MPEG-2 decoding needs at least five times the processing power but Mediamatics will soon offer DVD Express, a software package which decodes MPEG-2 video and Dolby AC-3 surround-sound audio from a DVD disc. Picture quality cannot yet match hardware, so the first step will be to display the video in a small window.

Sony demonstrated a DVC digital camcorder, with its 25Mbit/sec data stream fed direct into a consumer PC, upgraded to use a Pentium 200MHz MMX processor. Without extra hardware, the PC was decoding digital video in real time. Picture quality was superb, but motion was jerky because the software cannot yet cope with the full 30fps video picture rate. Sony promises that DV software coding will be running at full frame rate this year.

This month, Motorola is destined to launch a software modem. An interface board carries the electrical connectors, a modulator and buffering memory. All the difficult work, such as error correction, data compression and control of the modulator, is carried out by the PC's processor. Upgrading is by disc, or downloading code from an internet site. Because the interface board has only a few chips, it uses far less power than a hardware modem and so is ideal for portables. The Philips Velo Windows CE handheld PC will use a software-only modem, running at 19.2K. Motorola's soft-modem

Barry Fox

Straight Talking

Barry Fox visits the Comdex show in Las Vegas and sorts the craps from the high rollers.

already runs at 28.8K, with upgrades to 33.6, and the promise of 56K later. Motorola will start by selling soft-modems only to OEMs who then build them into branded PCs. This protects against people who buy a soft-modem and then try to use it with an inadequate processor; a Pentium 150 is the safe minimum. Motorola foresees a future PC with the processor chip running all the multimedia and comms functions, purely in software.

Why has this sea change not been more widely reported? Probably because the briefing material on "fluid software-centric architecture", produced by Motorola's Information Systems Group in Massachusetts, reads like gibberish and phone calls to ISG hit an impenetrable wall of voicemail. ∎

S ince I began working in computing, various oracles have been consistently predicting the death of the mainframe (and especially Oracle). First it was mini-computers that were supposed to see them off. Then PCs took over the role of the grim reaper. But there is life in the old iron yet. From the PC user's viewpoint, it may be hard to understand why anything so inflexible and unfriendly is still worthwhile but there are real business arguments for hanging on to big iron.

With my paranoid hat on, it would be easy for me to say that data centre managers (the current terminology for the "priests of the mainframe") do not know anything else, and are out to preserve their jobs. And there is, perhaps, an element of truth in this. Data centres have never understood PCs, considering them to be overpriced and unnecessarily fancy terminals. Yet this is not the whole story.

One of the things that is easy to forget is the difficulty of replacing years of programming. One of the corporates with which I work had three incompatible mainframe systems. This was obviously not an efficient way to operate, and it decided to trim down to a single technology. One set of boxes was disposed of quite quickly, but the other, a collection of Dec-10s, took around ten years to shut down. Mostly, this was because the Digital machines were ahead of their time and were running sophisticated planning models that proved hard to reproduce and improve upon. But there was also a problem with staffing.

When making technological change, it doesn't do to forget the people element. If you want to swap everything from a mainframe over to a new environment you need staff to keep working on the old machines right up until the end. This is both a matter of maintaining the code, which will continue to be used until a replacement is available, and providing the information necessary to allow the new systems to take over the job. It's a soul-destroying task. Once an environment is doomed, it is much harder to find people who are willing to work on it. Who wants to tie themselves to a loser?

Even more significant to the survival of the mainframe was the solid design. It is hard to believe now, but when IBM's 360 series of mainframes was introduced it was a genuinely revolutionary concept in computing. Whereas before, each mainframe had been a law unto itself requiring a different approach to programming, the 360 was a family, making it easy to throw more power at a problem as the requirements increased without re-writing code. (In fact IBM made it even easier to increase a mainframe's power by installing extra, disabled capacity without the purchaser's knowledge. When things got tight, an engineer could come in and beef up the machine at the tweak of a screwdriver, after which he would sit and read for a few hours to justify the massive bill that went along with his hard graft.)

When mainframes began to be used for high transaction rate systems like banking and airline reservations, manufacturers and customers got together to design specially tuned operating systems, networks and programs (all written in assembler to begin with) to cope with the massive requirements of worldwide networked applications. This legacy of tried and tested technology proved a difficult challenge for the alternatives. It might seem obvious that it would be more sensible to distribute processing around the world, perhaps to a set of UNIX boxes, rather than pump everything back to a centre in the UK, but matching the performance and reliability of a mainframe is no easy trick.

A distributed network is far more sophisticated than the simplistic mainframe/terminal link, making it harder to be as reliable. And what happens in a reservation system when the same seat is booked on the computer in Sydney and the computer in Oslo? No problem with a centralised mainframe — big headaches for the distributed boys.

Equally, it seems obvious that PCs are far superior to mainframes in many respects. There's no arguing about the user interface benefits. Look at what your bank is using now. Okay, it may still have Windows 3x, but even that is a good way ahead of what was practical with the old, dumb mainframe terminals. There's also no arguing

Brian Clegg

Business Matters

Any old iron? There are business arguments for hanging on to the monstrous mainframe, despite its widely-predicted demise, reasons Brian Clegg.

that PC processing is ludicrously cheap. Yet banks of PCs haven't replaced mainframes because they make the problems of networking and co-ordination generated by UNIX boxes look simple. The closest they have come to supplanting mainframes is hiding their user interface.

It's not that I have any enthusiasm for mainframes. These great monstrosities, lurking in their air-conditioned lairs, are a painful anachronism. Yet it is going to be a good while before our mammoth mainframe applications can be dragged off their old hosts. Arthur C. Clarke might have missed a trick in having a mainframe aboard a space vessel, but HAL's second cousins will certainly still be around in 2001. ■
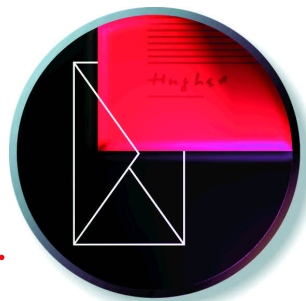
Letters

What size partitions?

Alex Kefford writes *(Letters, PCW Dec)*: "…let us not forget that most PCs these days have at least 1Gb hard drives, so any file, no matter how small, will consume 32K because of the way the FAT is constructed."

I agree, as long as the hard disk is not partitioned. However, partitioning it to less than 128Mb partitions will make the cluster size only 2,048 bytes (2Kb). Using the HPFS of OS/2 will give 512-byte clusters no matter how big the partitions.
**Holger Granholm
holger.granholm@niflheim.
aland.fi**

BoS did it first

Where have you lot been during the past decade? I read, with disbelief, your news headline and story *(PCW, Dec)*: "Gates coup as PC banking arrives". *Gates coup*? *Arrives*? You must be joking!

My wife and I have used the Bank of Scotland's Home & Office Banking System (HOBS) since 1985 to pay bills, check our accounts, transfer funds between accounts… you name it; and if it's banking we've done it on HOBS either via modem and regular PC, or a viewdata set provided by our local bank.

As the BoS would do, give credit where credit's due!
**Elliot R Robertson
Elliot@westec.demon.co.uk**

News editor, Clive Akass replies: The BoS certainly deserves the credit for
pioneering PC banking. But an awful lot of money is going to be made when we Sassenachs and the rest of the world catch up. Gates's coup was commercial, not technological.

Put reliability first

On arrival at Microsoft's HQ in Winnersh, you discover that the reception desk contains a large slave monitor showing what the receptionist is doing. You provide her with your name, organisation etc. and you confirm on the screen that the details are correct. During this process, a very familiar red and white cross appears with the famous phase "The program has attempted an illegal operation"! So, even Microsoft suffers the same problems as its poor users.

Obviously this event caused much hilarity in reception and very considerable embarrassment to the receptionist. She was, however, able to call an internal number and obtain immediate help with her problem — something a lot of us cannot do.

In the real world, computer crashes cost time and money. It has become accepted that software fails, and there is little real complaint from users. A friend of mine many years ago received one of those famously inaccurate bills from a bank. He duly complained and he was told that there had been a computer error. He knew this could only be a human clerical error and nothing to do with the
computer. The manager admitted as much but said that the public accepts errors made by computers but not those made by clerks. As the software is produced by people who are probably a lot more clever than clerks, why do we put up with this so readily?

Instead of rushing new, flashy, products into the marketplace, I and many others would much rather see bug-fixed versions of the old products widely available to provide stability rather than new features which most people will never use.

We are in a never-ending cycle of new products with new bugs. How much do we really benefit? My vote is for reliability.
**Terry Wood
whiteo@barnes.globalnet.
co.uk**

In praise of ATs

Julian Evans is not alone in holding the PC/AT keyboard in revered esteem (*Retro, PCW Dec*). I, too, use a PC/AT c.1985 model. I have found its layout to be more comfortable than any other design; more so

Julian Evans and his keyboard

than that of the original PC where the PrtScr and Enter keys were too close for comfort.

I believe the first clone of the AT keyboard was on a Walters PC which, again, I have used for the past ten years or so. My Pentium 133 with Sony SVGA remains unused as I happily edit and compile on my trusty 286-powered luggable (if you remember the genre) with its mono screen and Hercules graphics. The P39 long persistence phosphor was another IBM good idea.

So how about a Retro feature on the Hercules Mono Graphics Card? This set the standard for many years with its resolution of 720 x 348.
**Alec Butterworth
106217.210@compuserve.
com**

Laurels for Logitech support

In response to Steven Johnston's letter about Logitech *(PCW, Nov)*, we all hear horror stories about the support we receive (or not) from various firms and suppose that everything is a bit hit and miss.

I feel that I must redress the balance and so restore a bit of faith in the way that companies treat us.

I, too, had problems with my Logitech Scanman Colour, but after one phone call to Logitech support I was sent not only a new set of drivers but a new parallel port card, both of which were free.

Later on I installed some new software and the scanner again didn't work. Logitech came to the rescue and sent me the latest set of drivers, having chased me around London trying to catch me on my mobile phone. So I reckon this is a big thumbs up for Logitech.

Steven Johnston may find that if he REM's out the printer driver in the 386 Enhanced section in his System Ini and changes his printer to EPP or

The meaning of life, the computer, the universe and everything

Consciousness and the selfish gene

In his interview with *PCW*'s Clive Akass (December), Richard Dawkins wonders what can have been the mental attribute known as "consciousness". He does not really have very far to look since he already accepts the survival value to our species, of language development.

We are the most elaborately social animal on this planet. In such an animal, the ability to communicate not only feelings but thoughts, descriptions, stories, advice, theories, recipes and so on is not only of obvious benefit but also scarcely conceivable without an ability to summon into awareness the contents of a message before sending it.

It could be objected that although some forms of consciousness can be explained in such terms, not all can. What do we say of the introspective musings of creative mathematicians and other abstract thinkers, or of the unspoken ruminations of everyday life? On the face of it, none of this has anything to do with consciousness. Yet if when I make a note in my diary I am really sending a message to myself, then perhaps the same applies in the case where I merely make a mental note.

In this sense, many of the memory transactions in which we park for later use intermediate steps in solving a problem, can be seen as a secondary use of

mechanisms originally developed for external communication. Their hijacking for the internal purposes of transmitting articulate messages from present to future states may have been crucial to the appearance in humans of the otherwise perplexing capacity for conscious thought.
Donald Michie
Professor Emeritus of Machine Intelligence, University of Edinburgh

More than meets the blinkered eye

In likening the human to a computer with genes as the program *(PCW, December)* Richard Dawkins misses a deeper understanding of our existence, revealed by an extension of his analogy.

The missing component is data, or information. As computer systems develop and network, data outstrips coding size, diversity, complexity, significance and power. So, too, in human society, information has long supplanted genes in the evolution of our behaviour, capabilities and perception. Indeed, acquired information now allows control over our genetic code.

What is human life? By analogy, what is the internet? Emphatically, it is not understood in terms of processor architectures or computer coding. It is about information. However, a full understanding of the internet's significance

is well beyond the scope of computer science. Similarly, complete comprehension of human life goes far outside the terms of science.
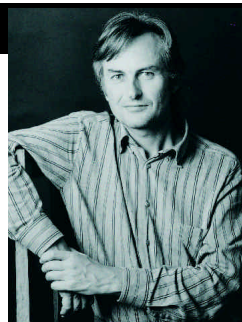

Prof. Richard Dawkins

It is becoming apparent that science may never explain human consciousness (Prof. Roger Penrose: *Emperor's New Mind*). Its causal assumptions certainly preclude the deterministic mechanism of an electronic computer or purely physical brain from giving rise to true free-will decisions and an objectively moral conscience.

Unless these vital human characteristics are illusory, they need to arise from some transcendent origin of first cause within us. Similar, indeed, to the origin of cause which first gave rise to the universe out of nothing.

There is more to our existence than meets the blinkered eyes of Prof. Dawkins, who has long used science to promulgate his own brand of materialistic atheism, rather than open-mindedly seek the truth.
Dr Peter Beardwood
Stockport

ECP mode, he may get it to work.
Lester Shaw, London

More on Apple, please

I am 15 years old and have been buying *PCW* for well over four years. As a keen programmer in C++, HTML, OPL (on the Psion Series 3) and Visual Basic I am always on the lookout for new ideas which I can develop into my applications. But recently I have been disappointed. You do provide some programming news and information, but the majority of the routines that are published can only be made to run on heavy workstation-level machines with at least 64Mb of

RAM and professional client/server development packages. Whatever happened to the days when I could pick up your magazine and actually try out some of the sample code that was provided, on my computer?

As a Mac fan, I am also disappointed that there seems to be not so many articles on the Apple world of computing since the company's financial difficulties began. I appreciate that running articles about Apple a few months ago would have been a lost cause, but now the company is slowly getting back onto its feet. Will there be more articles in the future on Apple-related topics?

Matt Dudbridge
barried@aol.com

PCW replies: Matt, we cover Apple more than most "PC" magazines but the fact is that Mac OS is of diminishing importance in the world of computing. Fewer developers are bothering with it simply because it is losing market share — why bother to put resources towards a dying OS? The sad truth is this: Apple is in long-term decline and the industry is moving on without it.

You might feel this is a pity but really it's just cold, harsh, economics; beneath all the hype, that's what the PC business is all about. Having

said that*, next month's* Cutting Edge Focus *takes a look at Apple's internet technology.*

Surely not?

Are Messrs Hewitt, Nott, Fox and Clegg all the same person?

Strange question? Not really. Remember when you were a kid and you used to have one of those little books where, by quickly flicking through the top right page corners, you could watch a cartoon? Try doing the same with the four consecutive pages of columns written by the above distinguished gents *(pages 49 to 55, PCW, Dec)*. Weird, isn't it?

Poor old Michael Hewitt lost his hair colour by the time he

became Tim Nott, who, by the time he had become Barry Fox had lost his hair but gained a cheeky smile. Sadly, by the time he had metamorphosed into Brian Clegg he'd lost it but gained a natty beard! Oh well, it takes all sorts to write a magazine, I suppose.

Seriously though, someone tell Mr Nott that although we'd like to buy bundled pre-loaded software with "the CD-ROM" and "the licence", some of us haven't actually got the cash.
Phill Skeldon
skeldop@CYSERV1.CYBASE.CO.UK

PCW replies: Tim Nott was actually on your side in

PCW's new ultimate columnist? "Michael T. Fox-Clegg" esq

attacking an industry which insists on pre-installing software without including the original media. PCW, of course, does not condone in any way the unauthorised copying of software. ■

CD comment

Hands On happy

Putting the Hands On section of your magazine onto your cover-mounted CD is a great idea. Would it be possible to put all sections (features, group tests, reviews, etc.) for each month onto a CD? As an alternative, all issues for each volume could be distributed on a CD or two in the last issue of the year, thereby enabling readers to throw away their year's supply of the magazine and replace it with the CD-ROM(s).
Paul Hooper

More Hands On, please

Excellent magazine… new cover disc brilliant… and whoever thought up the Hands On section on the CD deserves a pay rise. It has enabled me to clear out a mass of shelf space. I never usually throw away old copies as they are a mine of information, but when I need to find something that I "remember reading

somewhere", I often have to look through months' worth of copies in order to find it. But this month I loaded Acrobat instead — brilliant. Any chance of getting more than 12 months' of Hands On onto the CD in the near future?
P. Emmanuel
PJEmmanuel@aol.com

PCW replies: We will load as much Hands On material as possible but even with 650Mb there comes a point when we have to start rotating. As for entire issues, check out the new PCW on CD-ROM now available with 16 months' of back issues (see page 534).

The right idea

I buy your magazine for its contents, not for the CD.
Dejan Stamenkovic
ivan@harare.iafrica.com

PCW replies: Thank you. (Memo to marketing department: such people do still exist.)

Gadgets

PCW Gadget Photography by David Whyte

Cherry Keyboard

This flexible keyboard is perfect for those tired wrists and sore fingers. The Cherry ErgoPlus is one of the newer entrants into the ergonomic keyboard market. Slide the halves together and you have a regular keyboard. Split it apart, up to 30 degrees, and set the pitch (centre height), raisable in the middle to 170 degrees, and Voila! No more RSI. The beauty is that, unlike other ergonomic keyboards, you can adjust it gradually into an ergonomic shape, thus avoiding the shock and awkwardness that comes with using a new keyboard. It costs £150 (plus VAT).
Cherry 01582 763100

Trafficmaster Freeway

Tired of traffic? Who isn't? But now you can avoid it all with the Trafficmaster Freeway. This is the newest mobile digital receiver from Trafficmaster that gives you up-to-the-minute road information while you drive. Hear the comforting words: "You are approaching M25, Junction 18, traffic flowing freely"; or those ever-disheartening expressions, "stationary" and "very slow traffic". With Trafficmaster Freeway you'll have advance notice of conditions so you can drive with ease. It is available through high street vendors at £79.99 (plus VAT).
Trafficmaster 01908 249800

Hewlett-Packard CE Handheld

Microsoft's Windows CE operating system for specific palmtop PCs is going to be huge. At the Comdex computer show, last November, the first seven Windows CE palmtops, from NEC, Philips, Hitachi, LG Electronics, Compaq, Casio and Hewlett-Packard were demonstrated. Microsoft's hardware platform specification is pretty strict, resulting in most of these units being similarly priced and featured. Standing out from the crowd, however, is Hewlett Packard's product, the only one of the seven to boast a 640 x 240 pixel display (the others are 480 x 240). Although the first six of the above-named are now available in the US, they'll have to wait until mid-1997 for the HP. Hopefully, we should see UK Windows CE devices by then.
Hewlett Packard 0990 474747

FujiFilm Fotonex 4000SL

Fed up fiddling with 35mm? Not ready for a digital camera? Why not try out the recent Advanced Photo System (APS) which keeps its slightly-smaller- than-35mm film format safely inside the cartridge when loading, and even after processing. It's simplicity itself to load and safely tucked inside the cartridge post-processing, there's no chance of scratching those precious negatives. Of course this makes the frames impossible to scan on a conventional device, so Fuji has come up with the dedicated AS-1 APS film scanner (*reviewed on p75*). To use APS film, you'll need an APS camera — there are lots of compact models available but more advanced users may be interested in Fuji's excellent 4x zoom SLR model (*pictured*), available for around £399 (Incl. VAT).
Fuji Photo Film UK 0171 586 5900
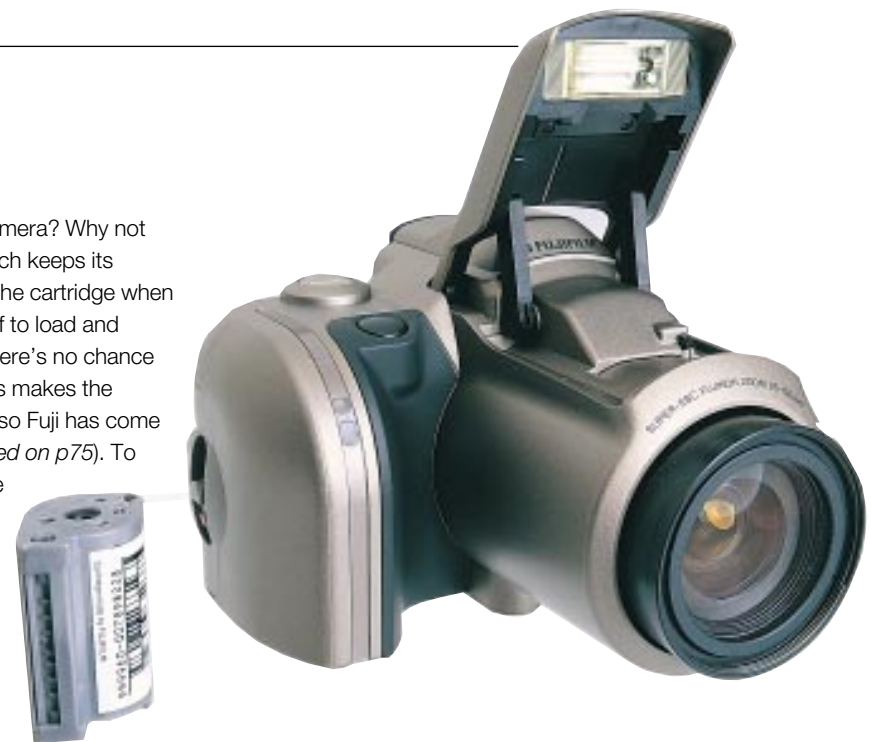
Sennheiser HDC 451

Noise-cancelling headphones are not new but these lightweight units from Sennheiser make the technology truly portable. A microphone situated on the outside of each earpiece listens to external noise which is then reversed in phase and fed into the earpieces. The out-of-phase noise cancels the external noise allowing the music or film soundtrack to shine through.

In reality, this means you can listen at comfortable levels instead of hurting your ears by whacking up the volume to cancel the racket of background noise. Some may balk at the thought of paying around £165.95 for a pair of headphones, but once used you'd be loathe to return to standard headphones. Now, if only they could design a pair that cancel out screaming babies…
Sennheiser NoiseGard Helpline 01494 551533

Casio Office

Your mission, should you choose to accept it, is to fit as many cool gadgets into one discrete briefcase as possible. Despite having issued this promotional photograph, Casio won't do it for you. But you could get your own case and fill it with the same bits. Illustrating its wide range of suitable products, Casio has included its NX-4000 Colour digital diary, D-100LC and HR170LA calculators, KL750 label printer, OH-20 mini overhead projector (a *Gadgets* veteran), the ubiquitous QV-10 digital camera and a TP35 memo recorder. Remarkable! Mix and match your own but make sure it doesn't self destruct…
Casio Electronics 0181 450 9131

First Impressions

Notebook survives a good kicking and lives… was it the **Sharp** (p68) or the **Panasonic** (p70)? And if you need guidance, there's **Autoroute 5** (p82) and **Map Maker Pro** (p87). Put a smile on your face with the **Epson** digital camera (p74) and a smile in your PC with **Fujifilm AS-1** (p75). Net-wise we look at a **Starfish** friend (p79) and **Autonomy** (p80).

Contents

Ratings

★★★★★ Buy while stocks last
★★★★   Great buy
★★★   Good buy
★★   There's a better buy somewhere
★   Buy it and weep

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 suite of PC benchtests uses complete versions of industry-standard Windows 95 applications — currently Word, Excel, WordPerfect and FoxPro. We also run a graphics re-draw test using CorelDraw 6, and a Doom 2 frame rate test which is a good indication of games performance.

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. Mainly Windows-based, it is used to isolate specific components like hard disks, graphics cards and CD-ROM drives.
● All graphs in *PCW* are drawn so that the bigger the bar, the better the result. Normally we'll also include the original data we worked from: for example, the time in minutes and seconds to print a page in a comparative test of printers.

■ Hardware

HP Pavilion 7230P

Nice one for the home — built for comfort, not for speed.

The puzzling thing about the 7230P is trying to identify the differences from its predecessor, the HP7130P. Strangely, not much seems to have changed.

The Pavilion range is for the novice home user and setting up the machine is easy. Colour-matched sockets and cabling, curvaceous styling — all is designed to make it friendly and accessible and goes a long way towards making the PC a viable aesthetic addition to the home. However, depending on your tastes, you might take exception to the four large feet that swivel out to stabilise the top-heavy system box — it reminds you of a cute, shaggy, cartoon dog. The only annoying factor about the design is that for the large-fingered, it can be a little awkward to insert floppies and press the power switch.

The specification is pretty much entry-level these days with a 133MHz Pentium, 16Mb EDO RAM, 1.6Gb hard drive and eight-speed CD-ROM. Nevertheless, it also comes with a built-in scanner and 28.8Kb/sec fax/modem, both ready to run straight out of the box; another plus for the home user who wants everything in one, easy-to-use, package.

Getting into the machine is simple enough and reveals a tidy interior with easy access to the important parts. HP has saved money by opting for SiS chipsets

A curvy little number, but its get-up-and-go got up and went

on both the motherboard and on-board video system; an unfortunate decision, which was reflected in our test results. There is no on-board Level-2 cache but a COAST socket is provided if you want to upgrade, to a maximum of 512Kb. The expansion slots are easily accessible and there are three ISA and two PCI slots free.

The 15in multimedia monitor supplied with this model had a crisp, steady display, a built-in microphone above the screen and a handy headphones socket on the front fascia. The supplied Altec Lansing speakers sound good and slot directly onto the monitor to form a stylish multimedia unit. The soundcard features 16-bit stereo as standard, though it is possible to upgrade it to wavetable synthesis. The video system comes with 1Mb Video DRAM, upgradeable to a maximum of 2Mb, though this is the one part of the internal workings that is difficult to access.

The most interesting feature is the built-in photodrive which can scan photographs up to 4 x 6ins at a maximum of 400dpi. HP claims that the ability to capture images is something home users want, and most would probably agree. The supplied graphics software is easily good enough for most home users' requirements.

The Pavilion range comes with a specially-developed interface called Personal Page (essentially a highly-simplified version of Win95) that will be appreciated by technophobes; but is learning a crippled version of Win95 actually worthwhile? The rest of the bundled software is a good mixture including Microsoft Works, a couple of financial packages and a selection of CD-ROM reference titles.
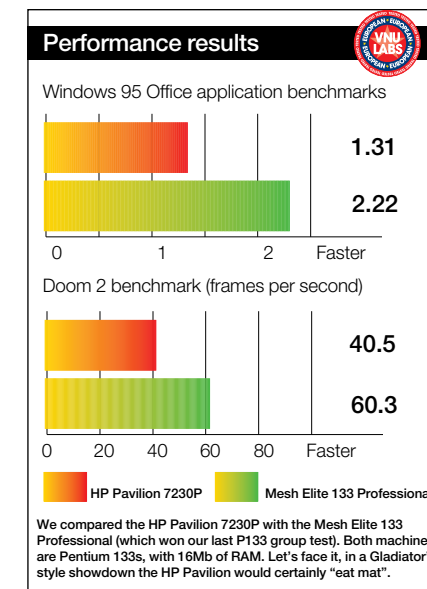
Unspectacular performance means that the Pavilion will live or die by how much the novice home user values its ease of use.

Adam Evans

Performance results

Windows 95 Office application benchmarks

1.31
2.22

0   1   2   Faster

Doom 2 benchmark (frames per second)

40.5
60.3

0   20   40   60   80   Faster

■ HP Pavilion 7230P   ■ Mesh Elite 133 Professional

We compared the HP Pavilion 7230P with the Mesh Elite 133 Professional (which won our last P133 group test). Both machines are Pentium 133s, with 16Mb of RAM. Let's face it, in a Gladiator's-style showdown the HP Pavilion would certainly "eat mat".

●PCW Details

Price £1,670 for the system box, plus: 14in monitor £299; 15in monitor £389; 17in monitor £683 (All prices incl. VAT).

Contact Hewlett-Packard 0171 512 5202

Good Points Stylish looks. Built-in scanner.

Bad Points Expensive. The size of the scanner may prove limiting in the long run.

Conclusion Easy to use, but no great performer.
★★★

p67 ➤

■ Hardware

Red Box Videostation

All-in-one powerful video editing.

Conventional linear editing of video tape involves getting several complex devices to work in harmony. Typically, you need multiple VCR decks feeding into an edit controller connected to a video/audio mixer, title and effects generators and an image processor. By performing these functions in software, all you need is a PC and a way of getting the video source onto the computer's hard disk so you can manipulate it.

Red Box's Videostation solution is a powerful PC-based on its successful Winstation range with the addition of miro's latest video capture card, the miroVIDEO DC30, and software from Adobe and Asymetrix to control the editing functions.

Our review machine was powered by a Cyrix P200+ (133MHz and 166MHz Pentium options are available) equipped with 512Kb of pipeline burst cache and a big Quantum Fireball IDE hard disk. For daily use, a 3.2Gb hard disk might sound like overkill but with a ten-minute video sequence occupying perhaps half this space, it's about right.

The screwless desktop case looks like a tower unit that's fallen over but there's plenty of room inside for expansion. There are three internal and one external 3.5in bays, plus three 5.25in external bays free. Two PCI and three ISA slots are available

for controller cards. PC graphics are generated by a Hercules Terminator 3D card with 2Mb of EDO RAM, able to output non-interlaced resolutions up to 1,280 x 1,024 at 75Hz. Dropping to a more practical 1,024 x 768 at 75Hz with 65,636 colours better matches the capabilities of the liyama VisionMaster 8515 monitor, a 15in FST unit with 0.28 dot pitch. This rather plain looking monitor with a minimal set of control buttons working in conjunction with an on-screen display provides a stable, flicker-free picture fully adjustable for any type of geometrical distortion.

Multimedia features comprise a Toshiba eight-speed CD-ROM drive and sound produced by the DC30 capture card. A conventional soundcard can work in tandem with the DC30, if required. Output is through a rather nice set of Labtec LCS1020 speakers. Although rated at a mere 9W, they deliver distortion-free sound at all reasonable volume levels.

Software for general-purpose use as a conventional PC is limited to Windows 95, which is fully installed together with all the appropriate drivers, and utilities such as Xing's MPEG player, as supplied with the Hercules card. For use as a video editor there is everything you need in the form of Adobe Premiere LE 4.2 for editing, Asymetrix 3D/FX for special effects and titling and Adobe PhotoShop LE for image manipulation. Red Box is keen to stress that the LE (Light Edition) software from Adobe, while fully functional, does not offer the range of facilities available in the full versions of Premiere and PhotoShop, to which there are upgrade routes.

The video features of the DC30 permit real-time monitoring on the PC screen thanks to the inclusion of a video overlay chip. Compression ratios of up to 3.5:1 for PAL video are possible but in practice the limitations of the IDE hard disk in the Videostation restrict compression ratios to

10:1. This is nowhere near studio quality but lets you work at a reasonable speed with sequences up to ten minutes in length with minimal image degradation using an S-VHS source replayed to a domestic TV. Other video standards (NTSC, SECAM and CCIR 601) can also be handled. At the time of review, some of the drivers for miro's DC30 were still under development and, while stable, were not fully functional.

More professional results are obtainable with the Pro version of the Videostation, which although still based on the DC30, comes with two hard disks, one of which is a Micropolis AV SCSI disk able to maintain a faster, more consistent data stream, enabling lower compression ratios.

Paul Wardley

Performance results

Windows 95 Office application benchmarks

Red Box VideoStation	**4.31**
Red Box WinStation	**4.55**

0　2　4　Faster

Doom 2 benchmark (frames per second)

Red Box VideoStation	**70.8**
Red Box WinStation	**28**

0　20　40　60　80　Faster

■ Red Box VideoStation　■ Red Box WinStation

We compared the Red Box VideoSation with the Red Box WinStation CP P200+Pro, reviewed in *PCW* August 1996. The WinStation was a SCSI machine, which explains the speed of the application tests, but as a prototype did not score well on Doom II.

●**PCW** Details

Price £2,472 (plus VAT)

Contact Red Box 01480 471687

Good Points Build quality. Performance. Expandability.

Bad Points No bundled software other than for video editing.

Conclusion You can buy an equally powerful PC, a miro DC30 (which comes bundled with Adobe Premiere LE) and a set of cables for less than Red Box is charging, but you'd be hard-pressed to get everything working as well together as it does in the Videostation.

★★★★

Personal Computer World
Recommended

■   H a r d w a r e

Sharp WideNote 100T

A small format sub-notebook with an excellent TFT screen.

The Sharp Widenote is not the first of its breed as far as the notebook as a whole is concerned. It is a small format sub-notebook, very similar in design to HP's latest OmniBook, the 800. However, where th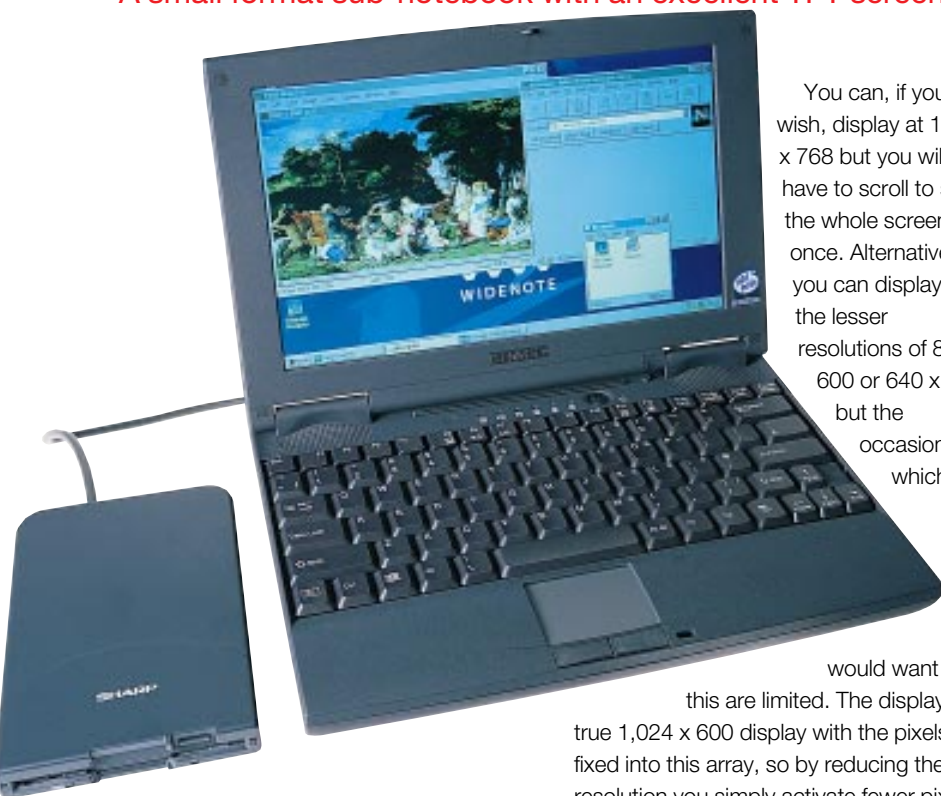e Sharp differs is in the wide TFT (thin film transfer) screen. This screen nicely sidesteps one of the traditional problems associated with notebooks (that you can fit very little on the screen) by letting you display two windows side by side.

The wide screen, developed by Sharp itself, measures an astonishing 16in x 9in aspect ratio but the figure quoted is the 11.2in that it measures, across. The difference in ratio is, at first, very striking to the eye. It looks as if you are going to have to adopt a whole new way of working. However, Sharp has developed it to display at the unusual resolution of 1,024 x 600, so you can see the whole desktop at once without scrolling. The physical size of the screen quickly ceases to be novel and you wonder why all notebook screens are not made with this ratio.

You can, if you wish, display at 1,024 x 768 but you will have to scroll to see the whole screen at once. Alternatively, you can display at the lesser resolutions of 800 x 600 or 640 x 480, but the occasions on which you would want to do this are limited. The display is a true 1,024 x 600 display with the pixels fixed into this array, so by reducing the resolution you simply activate fewer pixels and the screen will only be partially filled.

The screen is very bright, clear and clean. Sharp develops its own TFT screens and, compared with the screens used by other manufacturers, it is apparent how much thought, time, and research and development money has been put into this screen. It uses what Sharp calls Super-High

Aperture ratio. This reduces the size of transistors and the buss bars; that is, the electronics around the pixels, so that more light shines through and the screen glows brighter.

The WideNote is also at the leading edge of notebook technology in other respects. It is a Pentium 133, with 16Mb of RAM and 256Kb of cache. The IrDA port operates at a top speed of 4Mbit/sec, which conforms to IrDA 1.1 standard.

The drawbacks to this notebook are the same as with any sub-notebook. The floppy drive is external, as is any CD-ROM drive you chose to connect via the PC card slots. As a result, any extra drives you need to take with you will considerably add to the bulk and weight. However, these notebooks are primarily designed as lightweight, minimalist options, so if that is what you want, this is a good choice.
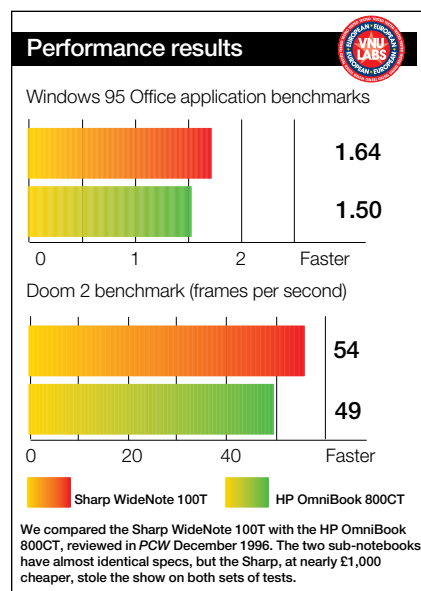
The glidepad is not to everyone's taste. I love them but others find them immensely annoying. In a recent VNU Labs usability test, most users were annoyed by them, especially as the test was conducted on a moving train.

In most respects, this notebook is much like Hewlett-Packard's OmniBook 800. Both are sub-notebooks with external floppy drives and 4Mbit/sec IrDA and they are similar in size and weight. The Sharp has a slightly smaller hard disk, but otherwise the specs are comparable. The Sharp has a larger screen (the HP screen is only 10.4in) and more importantly it comes in at around a grand cheaper than the HP. This difference in price makes it a good deal.

Adele Dyer

Performance results

VNU LABS

Windows 95 Office application benchmarks

(Sharp)	**1.64**
(HP)	**1.50**

0   1   2   Faster

Doom 2 benchmark (frames per second)

(Sharp)	**54**
(HP)	**49**

0   20   40   Faster

■ Sharp WideNote 100T   ■ HP OmniBook 800CT

We compared the Sharp WideNote 100T with the HP OmniBook 800CT, reviewed in *PCW* December 1996. The two sub-notebooks have almost identical specs, but the Sharp, at nearly £1,000 cheaper, stole the show on both sets of tests.

•PCW Details

Price £2,695 (Plus VAT)
Contact Sharp 0800 262958
Good Points Excellent screen.
Bad Points Hard disk could be larger.
Conclusion An excellent deal.
★★★★★

■ H a r d w a r e

Panasonic CF-25

We liked it so much, we gave it a good kicking… and it still worked.

Have you had one of those awful experiences with a notebook where you dropped it, or banged it against something? Then you'll remember that you knackered the thing and faced a sizeable repair bill, never mind the loss of time and data. Well, now, if you buy the CF-25 you will no longer have to worry about those nasty knocks according to Panasonic. It claims to have built one of the most rugged and durable notebooks on the market. It is designed to perform and endure and is aimed primarily at the mobile, or field-based, professional. It has also been passed by the Ministry of Defence for use in its field operations, which indicates a larger market appeal.

I looked at the higher-end CF-25 EGC2 model with a Pentium 133MHz processor, 1.35Gb hard drive, 8Mb RAM (expandable to 72Mb), and a 10.4in Thin Film Transfer (TFT) LCD display. This basic configuration will set your finance department back more than three grand. Panasonic also offers a lower specced CF-25 CG82 with a Pentium 100MHz CPU and 840Mb hard drive with a price tag of £2,699 (RRP excl. VAT).

There are the standard I/O connectors, built-in speaker, floppy drive (CD-ROM option available) and headphone jack. It can

accept three Type II, one Type III and one Type I PCMCIA cards with the lower slots doubling as a Zoom Video (ZV) port. All open access points have rubber seals to keep out any nasties.

The case is made from a charcoal grey, lightweight, magnesium alloy 20 times stronger than the usual plastic used for notebooks. The display design is unique. It is magnesium-cased, inside and out, and screwed securely at 12 equidistant locations, reducing the risk of torsional force (twisting). The keyboard, touchpad and buttons are sealed off from the internal circuitry, making the surface resistant to water spills, dust or drizzle.

Inside, the hard drive (the most vulnerable part) is surrounded by a polymer called Cosmo Gel, designed to absorb the initial shock of a fall as well as the more destructive after-shocks caused by a tumble. What this means is that the CF-25 is supposed to be immune to dust and water infiltration, surface stress (such as someone standing on it) and knocks and bangs. The question is, how does it hold

up? It's very useable. The keyboard action is responsive and the large wrist-rest makes typing easier. The TFT display (800 x 600 in 16-bit colour), is clear and vibrant. One weakness was the build quality of the floppy drive. It didn't take or eject a disk at all well and only after finding a third replacement was the unit acceptable.

In terms of durability, I put the CF-25 through the equivalent of notebook hell: I poured water on the keyboard and screen, I stood on top of it, I kicked it along the floor, I dropped it many times on its side and on its edge… and I broke it. Yep, the hard drive failed and I co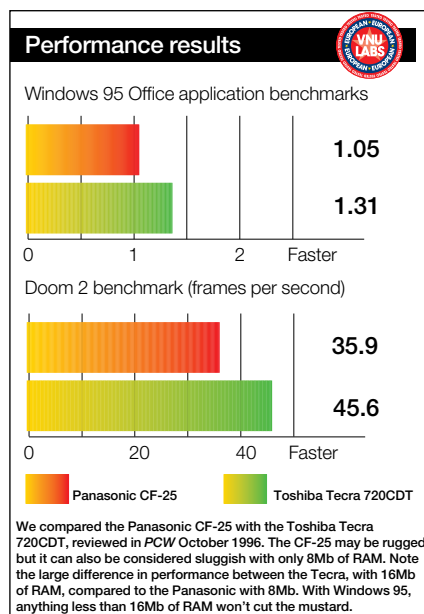uldn't get it to re-boot. Some of the keys also came loose, but this was easy to fix. I called Panasonic and they said that this shouldn't have happened and sent a representative to investigate what had gone wrong. After replacing the broken hard drive we abused it all over again and the unit worked fine. We did the same again on a third unit and it held up.

I may have broken the hard drive the first time around, after a lot of banging and dropping, but I'm impressed with the CF-25. No other notebook I've come across could even have withstood one hard blow, let alone ten or 15, so I consider that Panasonic has been successful in its design. For the corporate road warrior or clumsy oaf, this is an ideal and durable tool.

Dylan Armbrust

Performance results

Windows 95 Office application benchmarks

1.05

1.31

0   1   2   Faster

Doom 2 benchmark (frames per second)

35.9

45.6

0   20   40   Faster

■ Panasonic CF-25   ■ Toshiba Tecra 720CDT

We compared the Panasonic CF-25 with the Toshiba Tecra 720CDT, reviewed in *PCW* October 1996. The CF-25 may be rugged but it can also be considered sluggish with only 8Mb of RAM. Note the large difference in performance between the Tecra, with 16Mb of RAM, compared to the Panasonic with 8Mb. With Windows 95, anything less than 16Mb of RAM won't cut the mustard.

●**PCW** Details

Price RRP £2,999 (Plus VAT)

Contact Panasonic 0500 404041

Good Points Tough, well designed. Good display.

Bad Points Sub-standard floppy drive(s).

Conclusion After much abuse, the CF-25 managed to hold up. On the whole it's an impressive notebook.

★★★★

■ H a r d w a r e

Canon BJC-240

This cheap inkjet printer gives exceptional quality output.

Canon's new bottom of the range inkjet printer is an upgraded version of the BJC-210, with enhanced driver software and new technology to improve photographic image quality. Its current retail price is likely to fall to a street price of around £130.

I've never been a fan of swappable cartridge inkjet printers. They are designed so that only one cartridge can sit inside the machine at once. The BJC-240, like others of its kind comes with a three-colour (CMY) cartridge and a separate black cartridge. Any black printing you do while in colour mode is achieved by mixing the three colours from the colour cartridge resulting in a "composite" black, but if you want to swap from colour to black text printing, you have to remove the colour cartridge and replace it with its black counterpart. While this is a messy and annoying process, you must remember that these printers are extremely cheap.

When it comes to producing decent quality output, this printer is a massive improvement on its predecessor. Canon's "photorealistic" technology has been built into both the driver software and the cartridge, producing photographic images of stunning quality. The way the ink is applied to the paper completely eliminates the striped banding which the BJC-210 was prone to produce.

The downside is that photographic images are extremely slow. In our tests, full-page photos took over 15 minutes to print, and results of really exceptional quality were dependent on expensive high-resolution paper. Plain copier paper tended to warp badly, due to ink moisture. Plain black text printing produced passable, but not stunning, results. The resolution capability has a threshold of 360dpi and despite smoothing technology built into the driver, plain black text tended to suffer from feathering.

Eleanor Turton-Hill

•PCW Details

Price RRP £199 (plus VAT)

Contact Canon UK 0500 246246

Good Points Excellent improvement to photographic quality output.

Bad Points Dependent on expensive, high-resolution paper.

Conclusion If you can afford it, go for a four-colour model. If you want to something cheap, this printer is ideal.

★★★

■ H a r d w a r e

Agfa SnapScan

A nifty flatbed scanner with great colour performance.

Budget flatbed scanners are all the rage, but it comes as a welcome surprise to see Agfa, traditionally a high-end manufacturer, enter the fray. Agfa couldn't quite match the rock bottom flatbeds, but with its current RRP and an expected street price under £300 (plus VAT), it won't break the bank. The SnapScan measures 375 x 530 x 139mm, and it is a good-looking device.

It comes in two versions, for Macintosh or Windows. We looked at the PC version, which comes with an Adaptec AVA-1502P 16-bit ISA SCSI card as standard, and all the software and a detailed user guide on CD. Software for both Windows 95 and 3.x includes two separate TWAIN drivers for beginners or experts, PhotoImpact SE for image editing and archiving, OmniPage LE for OCR, software to fax or copy (as long as you have a fax modem and printer), and the

excellent FotoFlavour colour correction utility. An automatic document feeder and transparency adaptor are optional.

SnapScan is a 24-bit 300 x 600dpi optical device, capable of interpolation up to 2,400 x 2,400dpi. In our resolving power tests, interpolation greatly benefited scanning tiny line art images. Despite being a mere 24-bit device, colour performance was excellent, capturing a full range in both quick-speed and slower quality modes.

Agfa has in the past opted for quality at the expense of speed. But the SnapScan is a nifty device, turning in A4 colour previews in 13 seconds, A5 colour scans at 100dpi in 15 seconds (speed mode) or 50 seconds (quality mode), and A4 line art scans at

150dpi in 13 seconds.

The SnapScan rivals previous *PCW* flatbed winners such as Umax's S6E, and consequently comes highly recommended.

Gordon Laing

●PCW Details

Price RRP £349 (plus VAT)

Contact Agfa 0181 231 4200

Good Points Excellent screen.

Bad Points Don't expect £800 performance.

Conclusion One of the best flatbeds under £500.

★★★★

■ H a r d w a r e

Epson PhotoPC 500

One of the new digital cameras, with optional LCD screen.

Digital cameras are coming onto the market thick and fast and we have reviewed ten in our group test this month (*p176*) but the Epson Photo PC 500 arrived too late to be included. A plethora of digital cameras were launched at the Comdex show (*see Newsprint*) and this is the first of to make it to these shores.

In looks and functionality it is strangely like the Agfa and the Sanyo

models. It has two resolutions: 640 x 480, or 320 x 240. It has a slightly larger internal memory than the Sanyo, with 2Mb as standard. You can get 2Mb (RRP £99 plus VAT) or 4Mb (RRP £179 plus VAT) memory modules to upgrade the camera. With the additional 4Mb, you can store 100 images at 640 x 480, or 200 images at 320 x 240.

However, unlike any other digital camera, it has an optional LCD screen (RRP £199 plus VAT) which can be slotted onto the side of the camera rather than at the back.

Although the LCD was not included with the model we reviewed, we had previously seen it at Comdex and can say that it is a fairly large box, about the size

of two cigarette packets and there is a "macro" button for taking close-up pictures. The viewfinder will not focus properly when taking close-ups, so you will need the LCD for these.

Because the Photo PC 500 arrived late, we were unable to test it in the same way as the rest of the cameras in our group test (i.e. with our still-life set-up). However, the quality was similar to that of the Agfa and the Sanyo cameras.

Adele Dyer

●PCW Details

Price RRP £400 (plus VAT)

Contact Epson 0800 289622

Good Points Optional LCD.

Bad Points Bulky. Macro facility on LCD only.

Conclusion A good camera. There are others in the £400-£500 price range which include the LCD as standard.

★★★★
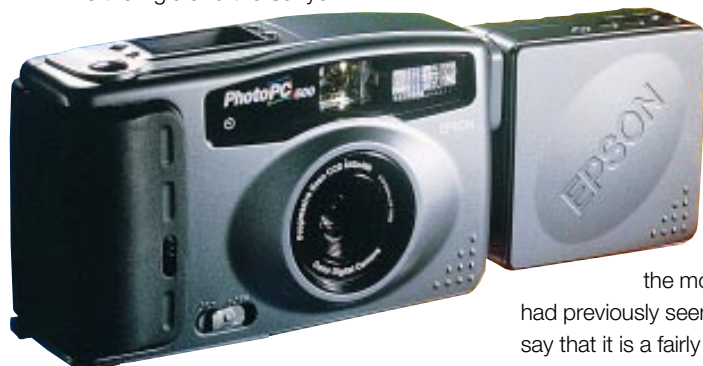
■ H a r d w a r e

FujiFilm AS-1

An quick and easy way to get APS images into your PC.

The recent APS (advanced photo system) photographic format is making its bid for the 35mm consumer market. It's dead easy to use: the film remains entirely within the protective cartridge when loading the camera; and even after processing the film is returned to you in the cartridge, along with your printed photographs. But what if you want to get your APS images into your PC? Enter Fuji's AS-1, a dedicated APS film scanner. Connect it to your parallel port, and install the Windows-only TWAIN driver, supplied on a CD with Adobe's easy-to-use PhotoDeluxe image manipulation package.

The AS-1 measures 75 x 180 x 285mm, and features an opening door into which the entire APS cartridge slots. The TWAIN driver offers thumbnail previews of individual frames or the entire roll — 25 images in about one minute. Select the one you want

and scan away. Image resolution is fixed at 512 x 896 pixels in 30-bit colour, producing a 1.3Mb file (note APS's wide aspect ratio). You can select any quarter of the image and devote your pixels to this region, but it's still not a lot to play with. At this low-ish resolution, you're limited to outputting A6 prints, or publishing electronically.

The AS-1 is considered a bridge from analogue to digital. That is, for the user who wants conventional prints, fancies playing around with images on their PC, but is not ready to take the digital camera plunge. The AS-1 is a lot easier to use and smaller than a flatbed, and besides it's the only desktop device which will scan APS.

Unfortunately it cannot read APS's magnetic data strip, containing exposure, date and formatting information. Resolution is low and no parallel pass-through port makes switching to your printer

inconvenient. This is especially odd, considering Fuji's complementary A6 colour printer at the same price.

Gordon Laing

●PCW Details

Price RRP £399.99 (Incl. VAT)

Contact Fuji Photo Film 0171 586 5900

Good Points Quick and easy APS film scanning for the home.

Bad Points Low resolution. Cannot read data strip. No parallel pass-through.

Conclusion Fair, but the only solution for APS users wanting scans.

★★★

■ Software

Microsoft Money 97

## Personal finance software which gives you online access to your bank, too.

The supply side of personal finance software in the UK seems to have settled down now into a handful of mainstream products. All the popular programs now run under Windows, offering a hard core of similar facilities at comparable prices, making differentiation difficult. Microsoft's Money 97, though, can distinguish itself in two ways. First it's a 32-bit program, needing Windows 95 (or NT) to run, and second it offers online access to your bank through its Home Banking facility.

At least, that's the theory. There's no questioning its Win95 credentials, so if you're still running Windows 3.1, Money 97 is not for you. Online access to your bank, however, is a more fluid concept in the UK at present. In fact, the box identifies one UK bank only, Barclays, whose service is due to be launched in the Spring. If other UK banks plan to follow, they're keeping secret about it (at the time of writing) although TSB has a scheme running via CompuServe and the Bank of Scotland has had its own service using dedicated software for years. Neither of these systems though, offers any kind of accounting functions.

When it comes, Money 97 users with Barclays accounts will be able to pay and track bills electronically, transfer funds between accounts, download their personal bank and credit-card statements, and conduct other financial transactions at home, as well as talk to your friendly bank manager by email. Microsoft claims that even if you don't use Online Services, you can still use the Home Banking area to store information about your bank and connect to your bank's internet site, for which you will, of course, need a modem.

Meanwhile, for those without access to online banking, Microsoft 97 offers all the usual personal accounting facilities. The basic screen is the Account Register, providing users with a common format to record transactions. Added features like a dropdown
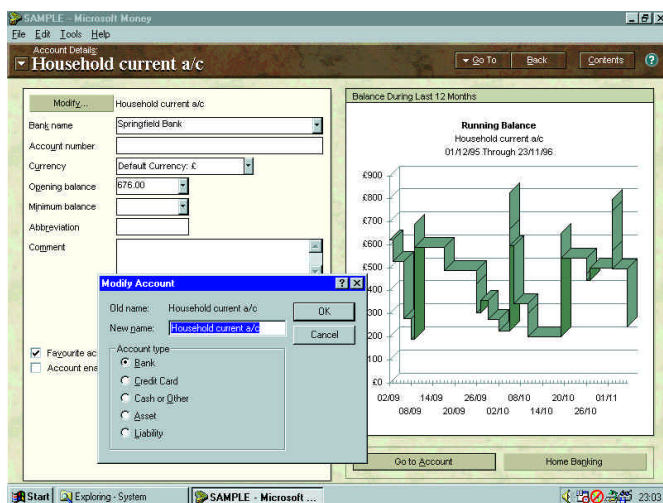
calendar keep data entry to the minimum. The Payment Wizard helps manage credit card and loan payments, while the PayCheque Wizard (merely a spelling conversion from the American paycheck, or wages slip) enters your salary and looks after your deductions. As well as the Paycheque Wizard, there are others for retirement planning, mortgage and other loan calculations, and savings plans. There's even a new Converter Wizard, allowing Quicken users to convert their Quicken files without further data re-entry.

There's also a handy Balance Forecast graph showing the best time to pay bills to avoid overdraft charges, and a payment reminder so that you never forget to make a payment — ideal for the unorganised. Possibly less welcome, and no aid to
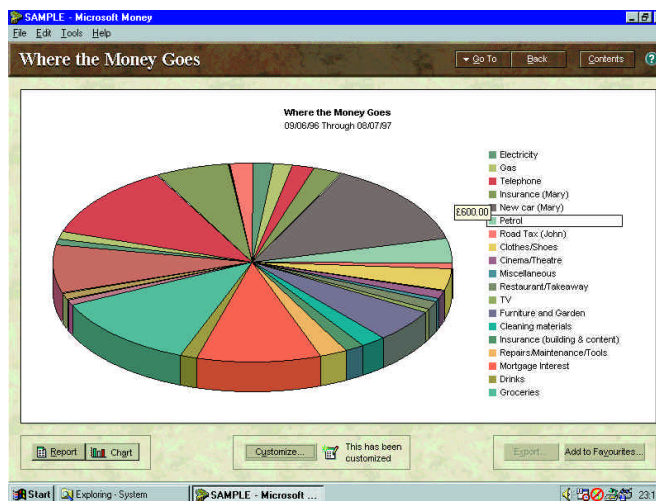
Above Money 97's graphical evidence of why you're not rich

Left Easy access to all aspects of your accounts is a feature of MS Money 97

confidentiality, is the chart of the day which sits in the middle of the contents screen, revealing the state of your finances. You can also call up charts for a graphical summary of things like actual performance against budget, who you owe, and the value of your investments. The latter will benefit from Money's Investment Portfolio to manage and track stocks and shares.

If you have a modem and an internet account (with anybody), the final button on the main Contents screen takes you to Microsoft's MoneyZone at www.microsoft. com/moneyzone which offers information on Microsoft Money, personal finance and Online Services, although most of the information relates to North America only, as does the trial copy of Money 97, which is also offered.

James Taylor

•PCW Details

Price £25.52 (plus VAT)

Contact Microsoft 0345 002000

Good Points Useful set of features. Exceptionally easy to use.

Bad Points Online banking facilities of limited benefit in the UK, so far.

Conclusion An excellent program, at a very competitive price.
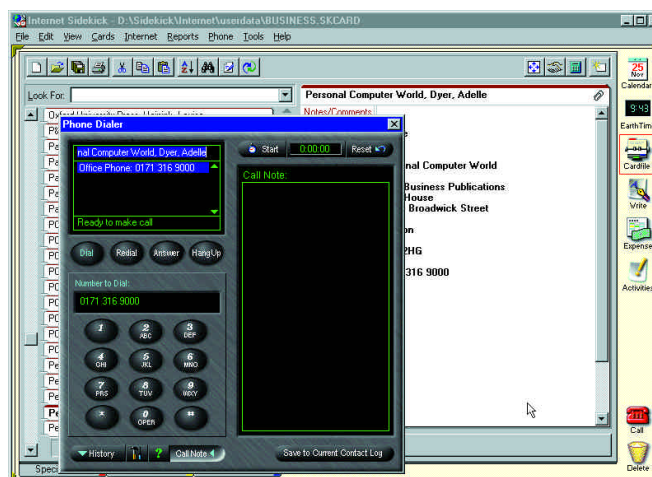
★★★★

■ Software

Starfish Internet Sidekick

Sidekick breaks the group scheduling mould by employing the internet.

Sidekick is probably the best personal information manager around. Internet Sidekick adds some enhancements which will appeal to current users and make it invaluable to the internet user. It may also have created a new approach to group scheduling.

According to Starfish, many businesses find more than half their daily scheduling involves people who do not work in the office, but beyond the corporate "firewall". Other, decentralised, businesses use freelance personnel or outside contractors. In such cases it can prove impossible to use computer scheduling because people employ a variety of platforms and software. Using Starfish Internet Sidekick, however, you can schedule appointments with anyone who has an internet email account. Internet Sidekick automatically sends event invitations to everyone on your list and collects replies when they accept or decline. The group event is automatically placed on your calendar. If some participants do not have internet email accounts, Internet Sidekick can send a message by fax or remind you to phone them. It automatically maintains a calendar of resources such as cars, conference rooms or equipment. You can book a resource and it will automatically confirm or decline your request, depending on whether the car, or whatever, is available.

But using the internet/intranet has additional benefits. One is the

comparatively low cost: there's no need for a server, the maintenance and administration costs are minimal, and ease-of-use reduces training costs.

Apart from the benefits of internet scheduling, various features make Internet Sidekick an ideal PIM (personal information manager) for net users. For example, you can launch your web browser from Sidekick and jump directly to the URL of a worldwide web site stored in your cardfile. You can also use Netscape Navigator, Microsoft Exchange, and Eudora Pro (32-bit) address books, or even connect to an internet time server and automatically correct your computer's system clock.

Apart from the internet features, Sidekick includes some enhancements which might make an upgrade worthwhile even for the non-internet user. There's

nothing dramatic, rather a few nice touches such as a much-needed "activities view" where you can view and manage all your appointments, calls, "to do" items, group events and resource reservations in one place.

Your cardfile can be linked to the web so you can jump to your contact's URL

Windows telephony used on the improved phone dialler interface

The "phone dialler" has also been improved. It has a smart, slick, sculptured interface with improved handling. It also now uses Windows telephony to provide advanced features. It will answer the phone when you are out and a log records information on unanswered calls. Another feature is "caller ID", which detects the number of an incoming call, assuming the number is in your cardfile, and displays details about the caller. These features, of course, require the necessary hardware and software to work, and the proper phone service.

The expense view now lets you organise your expenses by trip or time period and place them in appropriate folders. There is a new field for VAT, new categories, improved reporting methods and custom print-outs.

One of Sidekick's great strengths has been its excellent, fully-functional, word processor which has a word count, and now an automatic spelling checker which works in the background as you type. Unrecognised words are lined out and a right click on the mouse button gives you alternatives from the spelling dictionary. Curiously, among the words it failed to recognise was "internet"!

Paul Begg
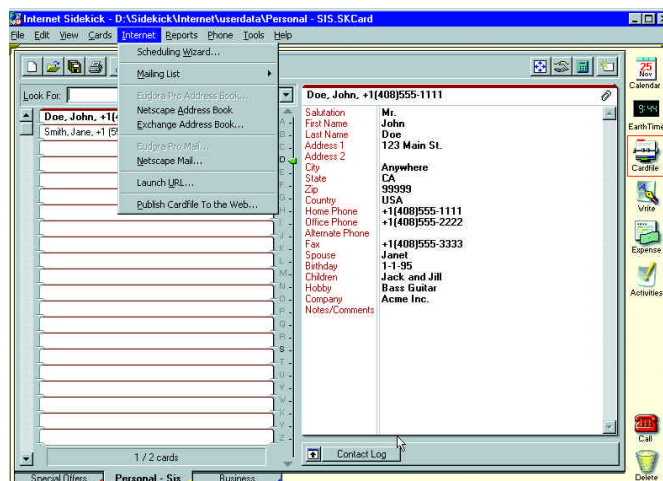
•PCW Details

Price RRP £69.99 (Incl.VAT)

Contact Starfish 0181 875 4455

Good Points A novel idea expands the use of a well-designed, flexible and customisable PIM.

Bad Points Use "in the field" may throw up deficiencies.

Conclusion A useful upgrade and perhaps the solution to the scheduling needs of many people.

★★★★

■ S o f t w a r e

Autonomy

A good internet research tool, once you've trained your agents to "fetch".

As the internet has grown over the last few years, so finding the information you need has become increasingly difficult, even with sophisticated search engines like AltaVista.

The problem with many search tools is that they simply return too many hits: try to find out about a fairly general topic and you'll spend days or weeks sifting through the information that's been returned by a search engine.

Autonomy aims to change all that with AgentWare: it is based on the concept of "agents". These are small programs which perform a task for you, without the need for you to watch over them. An agent can run on your computer, or you can send it off to work elsewhere and retrieve it when you want, so you don't have to be connected to the internet all the time.

Rather than merely typing in key words, you can give Autonomy's agents a description such as "The Channel Tunnel, or Chunnel, links Britain and France carrying rail services such as EuroStar and Le Shuttle". Agents will search for information that appears to be relevant and present the results to you. By telling the system to ignore certain types of information, or that other types are relevant, it becomes more "intelligent" and better able to find what you want.

That's the theory, anyway. Autonomy's AgentWare system gives you a few components; the main screen allows you to create additional agents, each characterised by a cartoon dog, and send

them to various places. You can train them by typing in a phrase, or send them to do web research, to collect articles from online papers or search the library of found documents. They can go to AgentWorld,

Trained "doggy-agents" do the web research work for you — the more you tell them, the more intelligent and effective they become in their searches

where they continue searches while you're offline, or try to find people with similar interests for you to meet and greet.

For most people, the web research system will be one of the main uses: if the system was simply a basic web crawler, it would be useful, but in fact it can do a lot more than that; deciding which items are relevant, based on their content.

Nevertheless, your first search is likely to be disappointing; it's best to recall an agent after a while and hit the "retrain" button, which will present you with some of the found articles so that you can say whether or not they are relevant. Once you've been through this a few times, you'll be able to achieve much better results.

Using the web researcher first is probably a pre-requisite for useful results from the "Press Office", too; this attempts

to build a customised daily paper by sending your agents to look at pages like The Times, CNN and the Electronic Telegraph. But a poorly trained agent will produce poor results. Our first attempt at finding out news about the Chunnel fire resulted in space shuttle stories instead — it is hardly the same thing. But better training did, thankfully, produce something more useful.

Training is ultimately the key to Autonomy; you can't expect to type in words and see instantly useful results. But if you do invest the time, then you will be rewarded with a system that can save you a lot of effort in the future, so people who often carry out searches, or look up news items on the same topics, will find it invaluable.

Let's just hope, that at a whopping £1.50 per minute (a scandalous £90 per hour), you don't have to call the help line. Call us old-fashioned, but that's nothing less than a rip-off and loses the product an otherwise wholehearted recommendation.

Nigel Whitfield

●PCW Details

Price £49.99 (incl VAT)

Contact CD Revolution 01932 562000

Good Points Saves you ploughing through hundreds of useless links. Provides customised daily papers.

Bad Points Steep learning curve and ridiculous help-line charge.

Conclusion A good tool for those who do repetitive research, if you're prepared to make the investment in training the agents.

★★★

■ S o f t w a r e

Personal Computer World
Recommended

AutoRoute 5.0 Express

Find your way in life across the UK and Europe with Microsoft's multimedia route planner.

Microsoft has just released it's newest, multimedia versions of AutoRoute Express to help us Brits on our travels to work or play. There are two versions available: AutoRoute Express 5.0 Great Britain and AutoRoute Express 5.0 Europe. Strangely, Microsoft hasn't included Northern Ireland in the former edition but has instead put it in the European version. The interfaces of each edition are identical, as are the majority of the functions, so you would have no problem switching between the two.

For those not familiar with AutoRoute you'll find it is feature-laden. And like all things Microsoft nowadays, AutoRoute is internet-orientated. Both editions provide web links directly from articles or points of interest displayed on the map. This allows you to get up-to-date information on hotel prices, restaurants, road conditions and more. All you need is a modem and a web browser.

You can adjust your map display to include all roads, towns, topographical features and so on, or you can reduce the amount of information displayed, in varying degrees, to eventually show only roads. Finding a location is easy; just click on the Find menu and select what you want to search for. You can select places, points of interest, pictures and more. You can also search by postal code or Ordnance Survey co-ordinates in the GB edition.

Route planning is easy. You can use the Route menu option or simply right-click on the map and select your Start, Via, and End locations. Like all route planners, there are the driving profiles that need to be set, such as speed, petrol consumption and

preferred hours of travel. Once your route and profiles have been set, it will work out either the Quickest, the Shortest or Custom route, depending on what you select. You can additionally select an area to avoid and AutoRoute will work out a detour around that area. This can

Web-ready online access and accurate route planning make Autoroute a winner
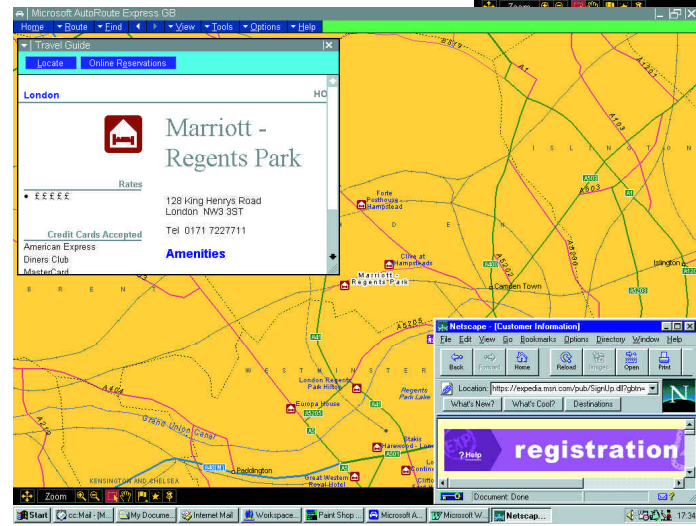
be handy if you know there are roadworks at some stage on your journey.

Additional features include Pushpins, location pictures and 360-degree photos of famous places plus, for the European Edition, a phrase book for twelve main European languages. There are lots of accompanying articles, as well, which complement the photos. The Pushpin feature is handy for marking important places, such as a client's or acquaintance's address. Once entered, you can add a memo box to it and use or locate it for any route planning activity.

But how accurate is it? I ran two tests to see how it would work. My first selected route using the European edition, went from

Paris to Reykjavik. Allowing for a driving window from 9am to 5pm with average fuel consumption and average road speeds, AutoRoute came up with six-days and 33 minutes for the journey, which would seem about right, taking the ferries into account.

But an easier to judge journey, using the GB Edition, from London to Bishops Lydeard in Somerset, was calculated to take 2hrs 40mins, which is about right from my personal experience of the route. Once the journey time has been calculated, you can print out a hard copy of your map and route itinerary.

Microsoft has done a good job on version 5 and I found it easy and enjoyable to use. Whether it is used in a home or office setting, you will find it to be an excellent travel aid.

Dylan Armbrust

•PCW Details

Price £59.99 (plus VAT)

Contact Microsoft 0345 002000

Good Points Fairly accurate route planning and custom Pushpin locators.

Bad Points GB Edition doesn't include N. Ireland.

Conclusion It's accurate, easy-to-use and web-ready. Two thumbs up to Microsoft.

★★★★★

■ S o f t w a r e

Matlab 5 **BETA**

A powerful mathematical tool based on the m-files concept.

Engineering students, or those heavily into data analysis, signal processing or control systems, will almost certainly have encountered Matlab. The launch of version 5, a 32-bit successor to Matlab 4.2c, is now imminent on all currently-supported platforms except Windows 3.1x. For those who are unfamiliar with the product, Matlab started as an educational tool for science and engineering students. At its most basic, it is an interactive electronic calculator for numerical linear algebra. Its original architects took the best numerical algorithms available, and bundled them in a user-friendly computational shell.
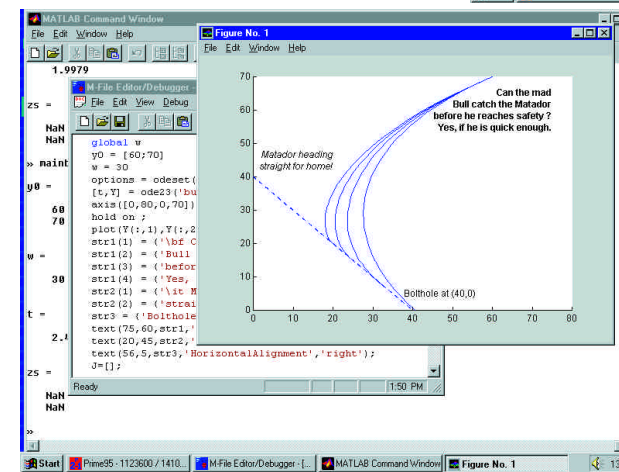
Programming in Matlab is based on the concept of an m-file. A main program m-file is a script file which can call up data files, built-in matrix functions, and function m-files defined by the user. There is also the capability to convert m-files to C-code. Furthermore, Matlab can compile C and FORTRAN MEX files. Specialist collections of m-files are available from The MathWorks in so-called "Toolboxes"; there are toolboxes for signal processing, neural networks, fuzzy logic, control systems design and so on.

Matlab 5 contains many improvements, while preserving its ease of use. An enhancement that has been on many users' wish lists is the capability to create multidimensional arrays. This was something that really had to be tackled because of competition from other programming systems. That, together the possibility that structures and arrays can contain data of different types, provides far more flexibility for programmers to logically associate data. On the graphics side, it is much easier to produce publication-quality output. For example, multi-line annotations

of graphs, incorporating a subset of LaTeX, providing Greek letters and sub- and super-scripts. This is a great feature and one hopes that its scope will soon be increased.

Programmers will like the new visual editor/debugger and the performance profiler. The latter provides an analysis of the time taken on each line of an m-file through a

Right A cell array, with mixed data types, including LaTeX symbols.
Below M-file Editor/Debugger and graphical output, with multi-line annotations, within the Command Window

complete run. It is rather primitive at the moment, and can only be applied with profit to each basic function m-file within a program which calls up several functions. An interactive GUI builder is included, which might encourage users to take up the challenge of GUI development, which was so time consuming and difficult in earlier versions. Help on functions is still available in the Command Window, although if you are using Matlab interactively, it can be a real pain scrolling backwards and forwards between commands and the help text. Internet awareness is built into Matlab 5

(even if your PC is not connected) by virtue of the additional browser-based Help Desk. Access to the latter requires Internet Explorer or Netscape Navigator 2.0. For users connected to the net, the Help Desk

increases the help and reference base, and enables bug reports and enhancement requests to be sent to The MathWorks home page at www.mathworks.com without leaving Matlab.

For ease-of-use, particularly in the graphics area, Matlab 5 has huge advantages over traditional programming languages. Although it is often compared with Mathematica, they are really different animals. Mathematica is fundamentally a symbolic package, with stunning graphical capabilities, which can also do numerical computations. Other competitors include the well-liked, but rather limited MathCad, and the more serious contender PV-WAVE with IMSL. My feeling is that the latest version of Matlab has leapfrogged the latter.

Nigel Backhouse

•PCW Details

Price £1,500 (plus VAT)

Contact Cambridge Control 01273 722838

Good Points Multidimensional arrays, sparse matrix enhancements and OOP capabilities.

Bad Points Not many but some room for improvement in GUI building.

Conclusion Only your inventiveness will limit the application of this powerful tool.

★★★★

■ S o f t w a r e

Sound Forge 4.0

A well-featured, sophisticated sound editing package.

Sound forge will be familiar to many musicians, sound recordists and multimedia producers. But for those who are unfamiliar with the package; for editing sound recordings, Sound Forge is the equivalent of Microsoft Word or Adobe Photoshop.

The program offers a plethora of features, with two particularly important qualities. First, it doesn't go to sleep for very long; editing sound requires the processing of masses of data (10Mb per minute for CD-quality stereo) and Sound Forge is supremely efficient in this area. Second, the audible results are as true as you would expect. Quite a few sound-editing processes are destructive, and many low-end sound editors just don't have the necessary sophistication in their algorithms to create a good result, often introducing unwanted audible artefacts — none of those here.

Much as with editing other media, there are four basic things you can do with sound: record and playback; cut, paste and move; alter basic characteristics (e.g. stereo to mono), depth (number of bits), and range of frequencies; and add effects that create illusions of movement, space and so on, like reverberation or echo. Sound Forge does all these things, and more, to a surprising level of sophistication.

For example, cutting and pasting can be carried out at the most accurate level possible; namely at the level of the single sound sample. What's more, whereas most of the competition can handle sound at 44.1KHz (CD quality) and at 48KHz, Sound Forge can go up to 60KHz.

You can synchronise events, too, via virtual drivers to other programs. Sound Forge supports all known SMPTE time code formats and MIDI Time code.

Another really big strength of this program is the wide variety, combined with the very high quality, of its sound effects. Reverberation is the most important effect you need when dealing with recorded sound. This is the diffused result of millions of small
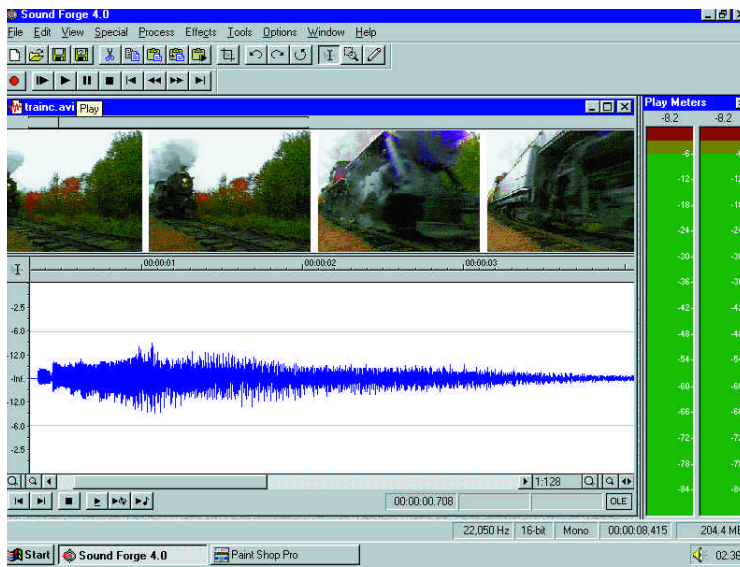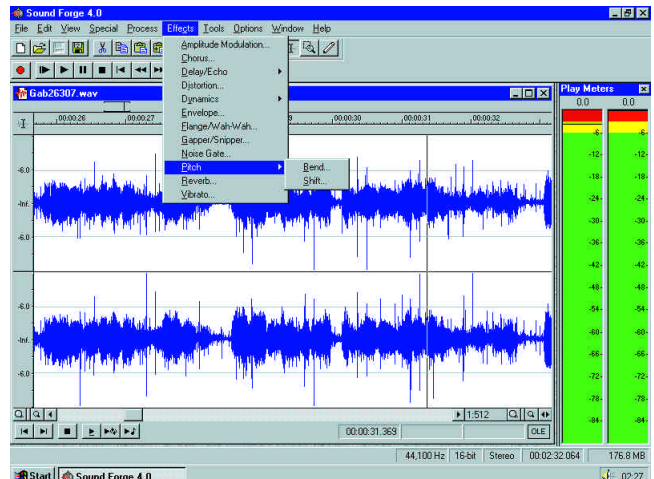
Above Sound Forge has a wealth of effects to enhance your sounds
Left The latest version of Sound Forge enables you to edit sound in Video for Windows files

sound reflections within a closed space, which we perceive as so-called ambience. The Sound Forge reverb algorithm works rapidly and you achieve the kind of results you would get from expensive dedicated hardware. And, as with all the effects on offer, you can program your own settings. Among these are chorus, flange, delay, pitch shift, time stretching, filtering, and equalisation. And Sound Forge is one of the few programs of its kind to offer an enhancer effect — in other words, the addition of harmonics which add more life to a recording.

On top of all that, Sound Forge enables you to edit sound in Video for Windows (AVI) files as well as to edit and download musical samples to external sampling equipment, such as Akais, Kurzweils and the like.

And, there's another rarity in programs of this kind; this is one of the few sound editors that has plug-ins. These are external programs often marketed by third-party manufacturers and used to enhance basic functions. Plug-ins for Sound Forge include Q-Sound (a 3D localiser), Spectrum Analyser, Noise Reduction, and L1-Ultramaximiser (a sophisticated compressor limiter).

In all, this is one of the most impressive and most professional sound editors around. Its price tag is hardly negligible, although it is £200 less than the previous version. But then you are paying for quality and that is rarely a bad buy.

Panicos Georghiades and Gabriel Jacobs

●PCW Details

Price £299 (plus VAT)

Contact Arbiter Group 0181 202 1199

Good Points Quality. Speed. Packed with features. Very sophisticated.

Bad Points Price.

Conclusion There isn't much around that competes with this program on its own terms.

★★★★★

■ S o f t w a r e

Map Maker Pro 2.0

Fills the gap between low and high-end CAD packages for dedicated map-making in the field.

I f you've ever tried to draw an accurate map using a standard drawing package, you probably found it frustrating. Illustration software lacks such essentials as co-ordinate input and the facility to incorporate non-graphic data (like a town's population) from an external database. Low to medium-range CAD software lacks other essential map-making aids, such as importing scanned images or Bézier editing. The traditional solution is high-end CAD software with Geographical Information System add-ons, costing thousands of pounds.
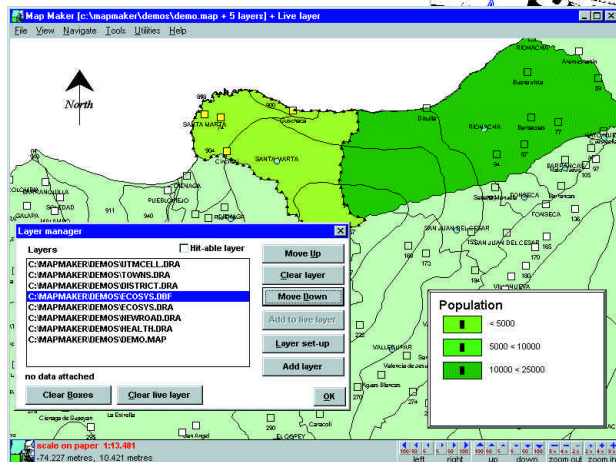
Map Maker Pro seeks to fill the gap. Inexpensive and modest in system requirements (386, 4Mb, Win 3.1 or later), it's specifically aimed at people working in the field with notebook PCs. Start it up, and the screen is practically clean: there's a menu bar, a status bar with scale and navigation controls and that's it. No toolbars, no scroll bars, no palettes. All commands are chosen either from the menus, keyboard shortcuts or a right-mouse pop-up menu. It's designed to give notebook users the maximum uncluttered work area.

A map is composed of layers. Typically, the base layer would be a bitmap, scanned from an existing map or aerial photograph. Other layers can contain vector objects such as roads, rivers, and coastlines, that the user creates. However, you can also import industry-standard .DXF drawing files, or plain text files containing raw surveying data: co-ordinates, bearings and labels.

The basic building blocks are the line (roads, rivers), polygon (countries, lakes), and point (towns, landmarks) drawing tools. After you create an object a dialogue box appears, to assign it a style: you might want a lake to appear as a pale blue shape with a
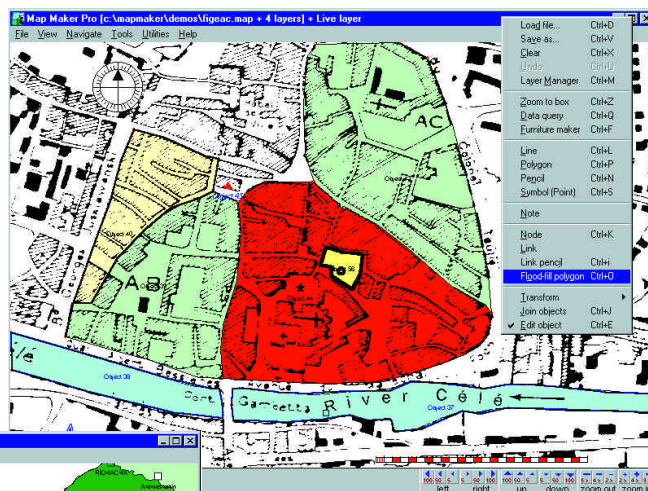
darker outline, or a footpath to appear as a dotted line. Styles encompass line, fill, symbol and text — whatever is relevant to the current object is applied. Although you can create double lines to represent roads, for

Above Drawing over a scanned bitmap with the right-button menu tools
Left Managing layers and data

example, I could not find a way of colouring the space between them.

The "cellular map" feature is particularly useful for defining different-coloured regions. Instead of creating individual polygons for each and trying to fit them together like a jigsaw, you start by creating nodes where lines will intersect. Link the nodes with complex boundary lines, and you can then create exact-fitting coloured polygons from any enclosed area. Maps can be embellished with "furniture" such as title blocks, north points and scale bars, as well as angled or curved text annotations.

You can produce hard copy on a standard printer. Up to 100 sheets can be "tiled" for large wall maps. Or, you can export a map as a bitmap or vector file. Map Maker even includes templates for printing out simple surveying tools like a clinometer or plane table. But Map Maker isn't just for drawing maps. You can link

non-graphic data in a variety of ways, add a variety of charts to a map and create hyperlinks to pop-up data panels, pictures or other maps. There's a scripting language for customisation and you can link to other programs (including Global Positioning Systems) to incorporate "live" data from monitoring equipment such as temperature or pollution sensors in the field.

On the down side, it isn't easy to master. The menu arrangement and layer management was confusing and the manual takes no prisoners. It had a tendency to crash on my PC but managed to rescue unsaved data when relaunched. To try it out, there is a cut-down version available as shareware.

Tim Nott

•PCW Details

Price £165 (plus VAT)

Contact Map Maker 01223 363738. Shareware version from; www.ibmpcug.co.uk/~MapMaker/

Good Points Inexpensive and undemanding. Packs a lot of specialist equipment into a small footprint.

Bad Points Difficult interface. Prone to occasional crashes.

Conclusion An excellent and inexpensive tool for dedicated map-making.

★★★★

■ S o f t w a r e

Chronicle of the 20th Century

An enjoyable reference source which will hold your interest for hours.

The paper version of *Chronicle of the 20th Century* has sold more than five million copies worldwide and now it has done the sensible thing and gone digital. It is one of the prime candidates for this treatment with its heavy database/encyclopedia type of content. Generally, books turned into CD-ROMs do not work astonishingly well, but this is the exception to the rule.

There are several ways you can look at Chronicle but most people will browse through the pages on each month of each year, up to July '96. One main event is covered in each month, with a few brief news items, and a picture story. This may seem skimpy, but unless more than one disk were used it would be a tight fit for more than the 1,159 months covered.

The stories are linked well and you can follow a particular issue through to its logical conclusion by clicking on buttons. Some of the story developments are only news-in-brief entries, but you do have the advantage of seeing how long an issue has been in the news, sometimes over the course of a number of years. An event like the sinking of Greenpeace's Rainbow Warrior ship in the South Pacific, merits a lead story and the repercussions can be tracked over several years.

The search engine is efficient. You can search by word, or by news story link or by looking at the graphical interfaces covering each year to pick out something that catches your eye. The lattermost is particularly useful. Each month of each year is marked by the picture relating to the main story of that month and this is often a good starting point form which to explore a particular time period.

In addition to the month-by-month breakdown, several subjects are covered in more depth. There are eight in all: World
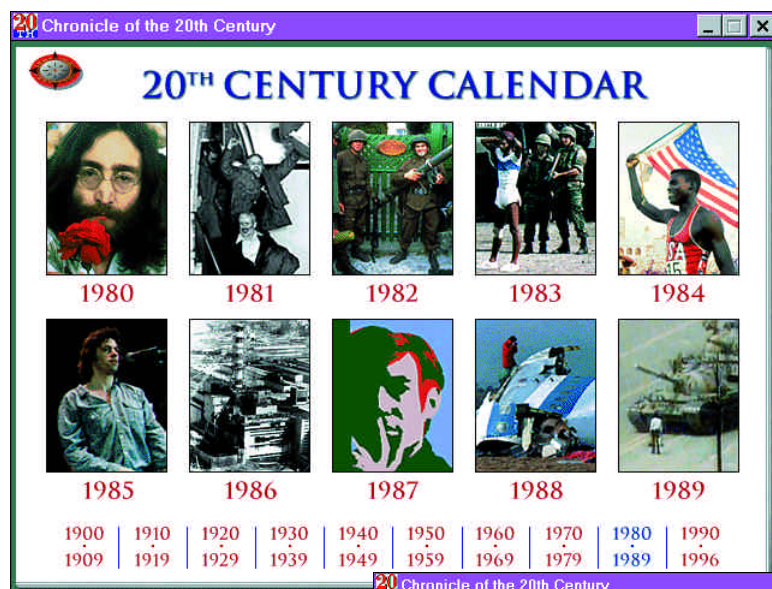
You can search pictorially or year by year, while each month shows a main story and a few shorter news items

section, Richard Nixon got his own little write-up but Kissinger did not. He is in the small print but not in the big picture. Surely he deserves some credit for bringing the war to an end?

For further reference on personalities, there is a section full of biographies. Just about all the major movers and shakers of the 20th century are here, from Lenin to Mandela, from Nureyev to Einstein. The biographies are well

War I, the Russian Revolution, European Dictators, America between the wars, World War II, Space Exploration, Vietnam and the Fall of Communism. Although this doesn't cover many areas, at least it deals with the most important issues.

It is in these areas that most of the sound and video occurs. Dorling Kindersley has put together little multimedia clips to introduce each of the main subjects, and video, pictures and sound files go with the various sub-sections. But it is not all singing and dancing; these in-depth sections include far more articles than any other.

There was only one, rather crucial, omission that I could find: in the in-depth look at the Vietnam war, under the leaders

written, with a chronology of their lives, and the pieces additionally give a good idea of their personalities.

This is an excellent reference product which will keep you absorbed for hours. It is unbiased geographically and is very enjoyable to use.

Adele Dyer

•PCW Contacts
Price £49.99 (Incl. VAT)
Contact Dorling Kindersley 0171 753 3488
Good Points Bulging with information.
Bad Points Some slight oversights.
Conclusion An excellent reference.
★★★★★

■ S o f t w a r e

Who's Who 1897-1997
One Hundred Years of Biography

Who's Who on disc turns a standard reference work into a flexible, easily searchable source of information.

The *Who's Who* book originated in 1849 and was later bought by publishers A&C Black which expanded the range of listings and added biographical entries.

This welcome CD-ROM edition contains all nine editions of *Who Was Who,* plus the 1996 edition of *Who's Who*. There are more than 90,000 biographical entries of the great, the good, the famous and the forgotten, from the Victorian era to the present day.

This alone makes *Who's Who* on CD-ROM extremely good value. But the principal benefit of the electronic version is the ability to search by name, either by
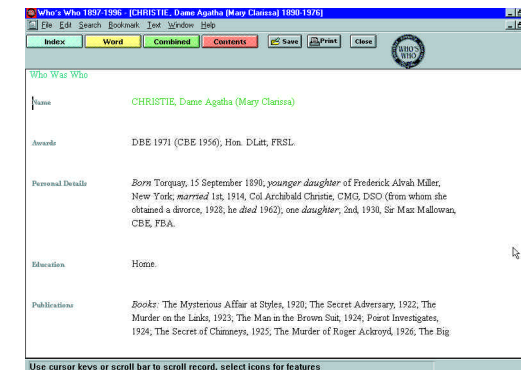
scrolling through the list or by entering the someone's name. You can also search by word or specific category, like title, profession, educational institution, or hobby and interests. This gives academics, writers and researchers unprecedented

It may not look much, but it's the information that counts

opportunities — it is impossible to use the printed version of the book in this way.

Who's Who is alarmingly expensive, but it is an exceedingly useful resource.

Paul Begg

•PCW Contacts
Price £293.75 (Incl. VAT). Educational licence £581.63: commercial licence £1,169.13
Contact Oxford University Press 01865 267815
Good Points Adds even more to an originally valuable research resource.
Bad Points Nothing springs to mind, although photographs would have added a new dimension.
Conclusion Expensive, but well worth it.
★★★★★

■ S o f t w a r e

Picasso

If you can get to grips with the Picasso-esque interface, sit back and enjoy the view

Grolier has taken a leaf out of its subject's book in designing this CD-ROM. It is filled to the brim with perplexing icons and bizarre symbols, making it difficult to get to grips with the CD at first. But the unusual graphics soon begin to grow on you and before you know it, that squiggly line is an obvious shortcut to the main screen!

If you don't know much about the artist, the best way to get started is by using the gallery of pictures which displays a major work from each of Picasso's 17 artistic periods. Clicking on a picture leads to a large amount of detailed information on the works of that particular period. The information is well-presented and comes in small enough chunks to be easily digested by the artistic non-expert. You can examine the main themes running through the 100

Picasso was a big fan of nudes

major and 400 minor works covered, and consider Picasso's works in relation to his personal life and contemporary world events.

The excellent, detailed, images certainly do justice to his work and the thoughtful design of the CD means that screens are uncluttered and do not distract your attention from the paintings. Although the spoken commentary is clear and informative, it's pretty dry.

One of the best features on this disc is the ability to rotate some of the sculptures in 3D. This really brings them to life and it's a shame that other sections don't use the interactive potential of the PC so well. This title is an excellent source of information on Picasso's works but it falls down on details
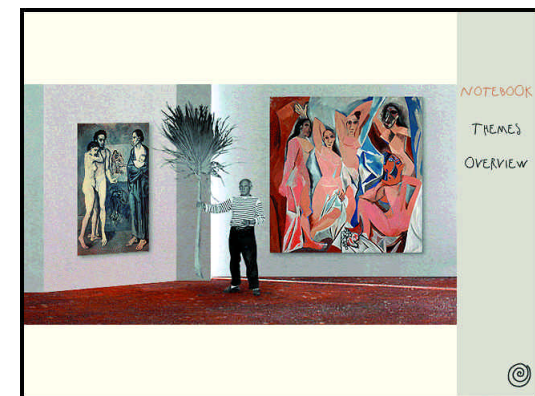
of his artistic contemporaries and his famously controversial personal life.

Adam Evans

•PCW Contacts
Price £39.99 (Incl. VAT)
Contact Grolier Interactive 01865 264800
Good Points Image quality is excellent.
Bad Points Disappointing lack of interactivity in some sections.
Conclusion A good buy for the would-be art critic who doesn't need to learn too much about Picasso himself.
★★★

■ Software

Weird

This CD could leave the unexplained, well… unexplained, but you'll have fun finding out.

An American eccentric, named Charles Fort, spent most of his life collecting stories of strange or unusual things and events. He published his material in four books, the first of which he called *Book of the Damned* because it catalogued those things to which conventional science denied an existence. Today "the damned" are collectively known as Fortean or Forteana.

A CD-ROM devoted to Forteana would be welcome and valuable. Wouldn't it be great to be able to access reports of fish falls or look up eye-witness accounts of the Yeti? You could listen to descriptions, view and compare photographs, watch video, and maybe have direct links to Fortean sites on the net? If you think all this would be great, don't bother with Weird.

A golden rule for every reviewer is to not be critical of something for failing to be what it was never intended to be. I am breaking that rule when criticising Weird because the producer, TwoPointZero, states that it was a conscious decision not to make Weird an encyclopedia, nor to provide a powerful find function, nor make the information easy to find. "Where's the fun in that?" it asks.

Well, I say "who wants fun?" Isn't a trip to the outer limits of reality compelling enough in itself? I might want gimmicky incentives to encourage me to explore something as dull as the Periodic Table, but not so with a subject as fascinating as "the unexplained". I want to get right down to the nitty-gritty and be astounded, astonished and taken to the edge of accepted normality. In not allowing me do that, the producer of Weird seems to have misunderstood its product and its market.

Moreover, I was disappointed by the content, or rather the lack of it. Weird is glitzy and glamorous, but short on content. It is an exploration of the extraordinary, the bizarre and the downright weird.

The operative word here is "exploration" because you travel down corridors, clicking

Above It's not that the content is thin, it's just so tedious to get at
Right If you want the challenge of exploring corridors, Weird is a definite "must have"

your mouse button to progress from one screen to another, ending in rooms or "environments" where you can click on objects to discover more about them. You may get a so-called "fact file", a video, some pictures or an animation. There are altogether 15 "environments", over 3,000 images, over two hours of audio and 45 minutes of video. If you want to see where you have been or how to get to where you've not been, there's a map you can access by clicking on the tab key. Once you have visited all 15 "environments", you can quickly and easily teleport yourself to any one in which you are particularly interested. But until then, you have to suffer the tedium of exploration.

On paper this all sounds good and Weird does have strengths (you cannot disregard 3,000 images, it's one hell of a collection!) but I having reviewed titles like Encarta, from companies which are doing their damnedest to give users quick and easy access to as much quality information as they can get, I find it bizarre that TwoPointZero is doing the exact opposite. Nouvelle cuisine for the
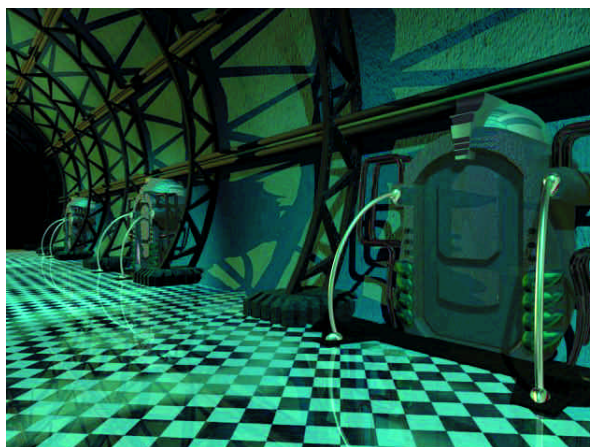
mind seems to sum up Weird — small quantities of information, very attractively presented and highly priced. In this instance I think it is fair to criticise Weird for not being what it was not intended to be.

If you want a "fun" way to experience bite-sized portions of the unexplained then Weird could be for you — otherwise, don't bother.

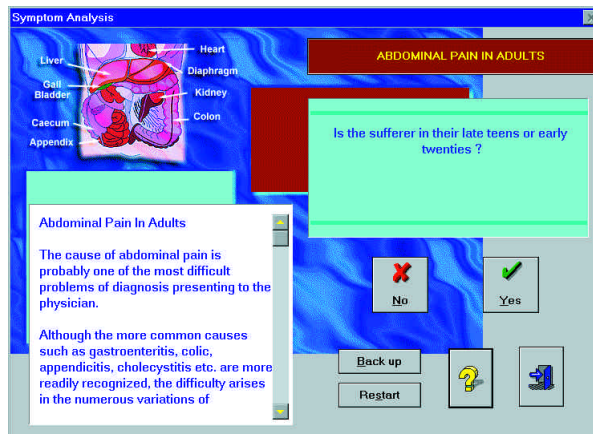**Paul Begg**

■ S o f t w a r e

Doctor in the House

Okay as a household guide but Dr Hilary won't replace your local GP.

Doctor Hilary Jones wants to give the public easier access to medical information via this CD but I wouldn't throw out the medical dictionary just yet, nor give up my local GP.

This disc is very easy to use and understand. Topics range from common accidents to infectious diseases, drug side effects to symptom analysis, including information on what to do and what not to do in certain situations. Pictures, illustrating the extent of previous injuries, are provided with an informative voice-over to accompany them.

"Doctor in the House" covers many of the health issues recently highlighted throughout the world. It takes into account today's obsession with weight and provides suitable advice in the light of that. It even includes the latest advice on CJD (Creutzfeldt-Jakob Disease). The section on symptom analysis particularly caught my eye. This gives you a probable diagnosis of your symptoms, based on your answers to a series of questions. Although it seems to work pretty well, the thought of putting my life into the hands of a CD-ROM doesn't appeal to me.

A panacea for the multimedia age?

The video review section is rather disappointing; it seems to be stuffed with fuzzy clips of women in leotards, proving how easy it is to bend your legs into awkward positions. But I do recommend the graphic review section packed with gruesome pictures of every disease you can think of (not for the squeamish).

This package will not only appeal to those with an interest in medicine, but would be ideal for families with young children, as it's equipped with the answer to every accident and virus under the sun.

Etelka Clark

●PCW Contacts

Price £19.95 (Incl. VAT)
Contact GSP Publishing 01480 496 575
Good Points Clear. Straightforward and easy to use.
Bad Points A bit hazy in places.
Conclusion A nice thought, but I'd stick to the day job, Doc.
★★

■ S o f t w a r e

The Music File

A huge, fast, database of nearly all UK record releases, for keen record collectors.

The Music File is one of those database-orientated CD-ROMs, made by tiny software houses, that usually make our hearts sink. All too often they take a subject covered by a giant like Microsoft and produced something that just doesn't match up. So it was a pleasant surprise to discover that The Music File is an excellent product.
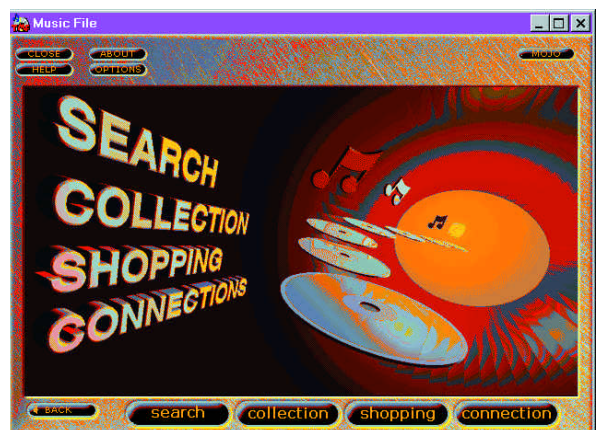
The basic idea behind the CD is not a new one: a database of nearly every record released in the UK, complete with format, catalogue numbers, track listings and where to buy it. The venture has been endorsed by *Mojo*, the music magazine. Unlike others of its ilk, this is an excellently designed piece of software. It is bright and lively, fast to search and the interface is easy to use.

The main section is a database of

Bags of information and a snazzy interface

recordings with their full listings, and you can use this to build up a database of your own collection as well as to make a list of anything you want to buy. The latter is, in turn, linked to a database of specialist music shops which can obtain any of the more obscure recordings you come across.

It does not include the multimedia bits and pieces which make Microsoft's "Music Central" so popular. There are no videos, sound clips or pictures, but this does not seem to matter; after all, this is a music reference tool for aficionados. For those with net access, there is a good list of web sites, covering a huge number of artists.

All-in-all, this is well worth its entirely reasonable price tag.

Adele Dyer

●PCW Contacts

Price £13.99 (Incl. VAT)
Contact File Productions 01624 823833; email sales@pdms.com
Good Points Fast. Packed with information.
Bad Points Not really multimedia.
**Conclusion** A must for any serious music fan.
★★★★★

■ S o f t w a r e

Oxford Children's Encyclopaedia on CD-ROM

If Encarta is a bit more than you need, try this reference tool for size. It suits the younger user.

Back in 1987/8, Oxford University Press recognised the need for an encyclopedia for young children and, in 1991, after four years research, it published the nine-volume Oxford Children's Encyclopaedia in 1991. It won enthusiastic recommendations from educationalists, parents and children, has sold over 150,000 copies worldwide, and is available in several different translations, including a Braille edition.

Now, it has been revised, which is no simple task. It involved 40 consultants, 20 specialist writers and a large editorial team — and the good news is that it is available both as a book and as a CD-ROM. The CD-ROM edition benefits from extensive multimedia additions and, of course, a search engine which makes it a lot easier to
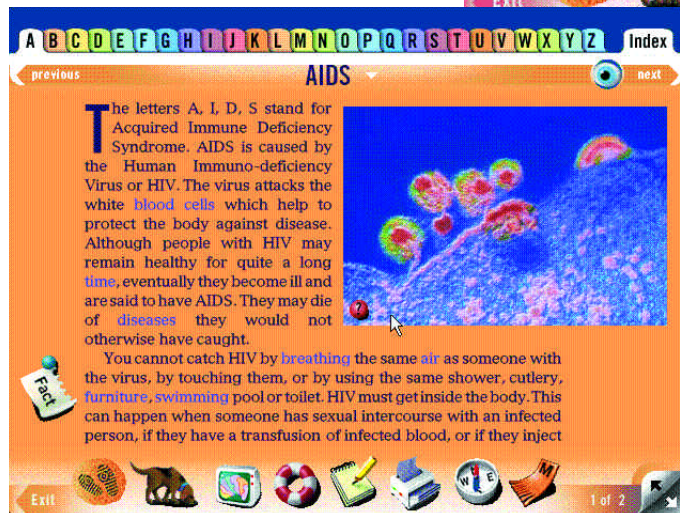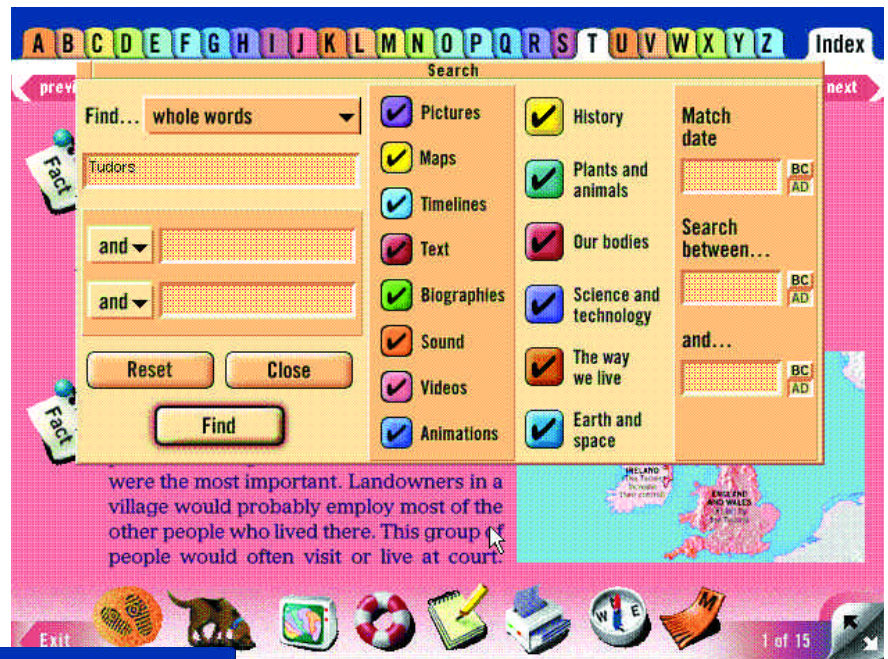
Above Powerful searching reveals primary and related topics

Left Difficult subjects aren't avoided, but they are handled with delicacy and care

Technology, The Way We Live, Our Bodies, Plants and Animals, Earth and Space, and, of course, the index. The animations and videos were especially chosen to enhance the text, although there are some deficiencies caused by over-priced copyright, and the interface design is the result of expert advice and input resulting from extensive testing in schools.

Overall this is an excellent encyclopedia, which is entertaining and easy-to-use and well thought-out. It reflects the extensive research and effort that went into the book and which has latterly been been built on for the CD-ROM.

Paul Begg

find the information you want.

I recently toured several senior schools and it was evident that most IT departments had settled on Microsoft's Encarta. This is probably a wise decision as Encarta is an excellent encyclopedia, but for younger students the content can be beyond them. The beauty of the Oxford Children's Encyclopaedia is that is has been specifically designed for eight-to-

thirteen-year-olds. Moreover, at £59.99 (incl VAT), it is affordable for most schools and homes — and considerably less than the nine-volume book edition for which you'll have to pay £150.

The search engine lets you use the usual Boolean searches, searching by different media types, themes, and by date. But children can also take one of six 3D tours looking at History, Science and

---

•PCW Details

Price £59.99 (Incl VAT)

Contact Oxford University Press 01865 267815

Good Points Well designed. Good price. Links with the National Curriculum.

Bad Points No real deficiencies.

Conclusion An excellent encyclopedia for junior students at home or at school.

★★★★★

■ S o f t w a r e

Creatures

Feel the need to practice your maternal or paternal skills? As far as we know there are no dirty nappies and these creatures don't keep you awake at night.

Artificial life has finally found its way onto your PC. Small furry animals will inhabit your monitor, demanding food and attention. You will be forced to spend hours of your time nurturing their development, protecting them from gremlins and generally having a dry run at practising your "parenting skills".

The CD can neither be classed as educational, nor as a game. It is a new concept in entertainment, that has been in development for four years and has been worked on by biologists, physicists and artificial life experts.

With each CD there is a floppy disk containing six eggs, some holding male and others holding female creatures. Whenever you choose, these can be hatched to let loose your creatures. You can either allow them to hatch by themselves, or put them in the incubator. Once hatched, each creature has a life cycle of around ten hours.
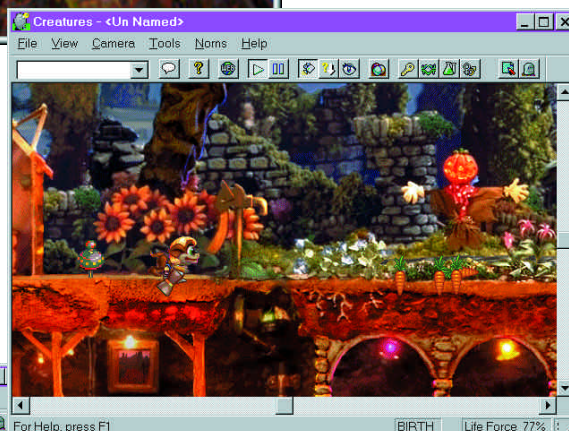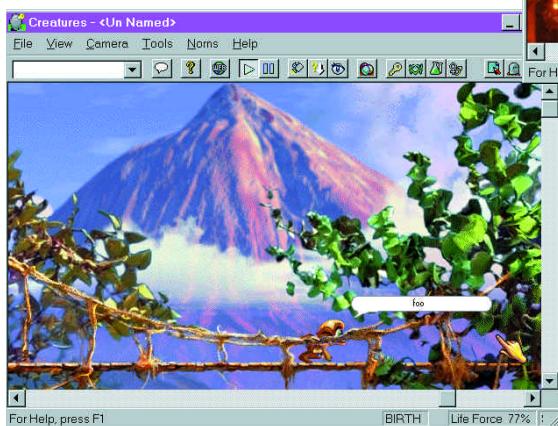
You will have to take care of your creature. You will have to make sure it has enough to eat and drink and is protected from harm. But there is more to it. Creatures should be taught how communicate and taught about basic concepts. They should also be kept under control, so you can reward your creature by tickling it, or you can give it a slap when it does wrong — politically-correct owners may prefer not to do this.

Not that your creature will always take notice of you. You can try to show it things, but there is no guarantee that it will do your bidding, just like any human creature. Sometimes they react and sometimes they don't. Sometimes they will ignore you completely and walk off in the opposite direction. The artificial life element of them means they will very much do their own

thing. They find their way around. You can make suggestions about what they might want to do but they have the final say.

Eventually, the creatures will grow up and develop. They quickly turn from cute babies into sulky adolescents, who will become interested in the opposite sex and try to chat them up. Then, of course they are ready to breed. You will need to have

breeding pairs ready at about the same time, so you can continue the species. As they have a short life cycle you will need to do this in reasonable time. As they grow older, the creatures will visibly change.

The creatures can be cutesy or annoying depending, I suspect, on how old and cynical you are. They take up hours of your time and while some may find the creatures themselves and the

environments in which they live utterly absorbing, others may find they are bored long before the creatures have grown up.

Creatures will probably be of most interest to those with the most patience. Ultimately, if you like watching things develop and are likely to be a good parent, you will probably enjoy this game. It is certainly innovative and exciting in concept, if not in execution.

Adele Dyer

Incubate your eggs and, later, let you creatures explore

■ S o f t w a r e

Living Books
Little Monster at School

Occupy your own little monster with this tri-lingual learning package.

Based on Mercer Mayer's childrens' stories, this version is three books in one with the text narrated and written in English, German and French.

The story follows Little Monster or Petit Monstre or even Kleines Monster and his friends, Yally, Little Laff and Grendella through a day at school. Here we learn counting, the alphabet, nature studies, music and social skills.

The action concentrates more on the "edu" than the "tainment", but will hold kids' attention with attractive characters, quirky movements and funny songs. Unless you are one of the minority of UK citizens who can speak German or French, the

Early in the morning, mum wakes me and says, "Hurry up, Little Monster, it's time for school."

movement between languages could leave you facing tricky grammar questions as you are only offered straight translation.

The official target market is three-to-eight-year-olds but I think it would be ideal for children who are just starting school or

Three different ways for kids to say "no" to their parents !

those beginning French or German lessons.

If you are mono-lingual it would be best approached as something to do alongside your children, lest they leave you behind and start conversing with each other in French. It's available now for PCs and Macs and comes with a copy of the original paperback of the story.

Ambrose McNevin

●PCW Details
Price £30 (Incl. VAT)
Contact Living Books 01429 520250
Good Points Useful learning tool.
Bad Points Will make us all Europeans.
Conclusion Ideal gift for someone else's kids.
★★★★

Helicop Investigates
Words and Numbers

Nice to look at but a nightmare to load; will this helicopter nosedrive or will it be a high flier?

The main character, as you might expect, is a helicopter which flies around trying to find various words and solve puzzles while getting shot at by various, nasty, flying missiles.

You will need Windows 95 to run this game, on at least a 486 DX2/66 with at least 8Mb of RAM, but 16Mb is recommended. You will need to load DirectX if you do not already have it on your system. All this makes it sound like it is going to be quite a little runner, but this is sadly not the case.

When I had set it up, the screen was not the right size. Landers Software claims it will be able to correct any problems caused through odd configurations but it was disappointing the game did not load first

Game playing skills should be up to scratch before you take off on the learning curve

time. The bad setup on my machine caused half of the buttons to appear with no markings and for the rest of the screen to drop off the side. If you do invest, be prepared for some fiddling before you get it to work. The graphics are good, but marred by bad execution.

The game itself does not involve as much learning as you might require. You have to reach a certain stage in the game before any words and numbers come into the equation. And, of course, if your game playing skills are below par, you might well end up just crashing out of the game long before you get to the educational bits.

Adele Dyer

●PCW Details
Price £29.99 (Incl. VAT)
Contact Landers Software 0141 226 5611
Good Points Good graphics.
Bad Points Configuration problems.
Conclusion Be prepared for some setup problems.
★★

Long Term Tests

■ S o f t w a r e

CorelDraw 4

Jam-packed and at a bargain price, this popular drawing package offers stability and versatility.

CorelDraw 4 was supplied with my PC as part of a software bundle, but I was wrong to think of it as a marketing gimmick. At the time it was already one version out-of-date but nevertheless a highly capable drawing package, and very easy to use. Installation was fast and hassle-free from CD: there were no nasty surprises and it worked first time. There were numerous installation options, for example to decide to run the program from CD or HDD, or on a LAN. There was also the choice of 11 languages. A full installation requires 34Mb, but using the custom option I cut this down to under 15Mb.

The program itself is intuitive. There are no cryptic toolbars, just a rectangular box to represent a sheet of paper, a list of drawing tools down one side, and the usual File and Edit line of commands at the top of the screen. For those who demand accuracy, there is near-comprehensive aligning and a "wireframe" view. Curves can be efficiently manipulated by adding/removing nodes. Text can be rotated, converted to lines, filled and made to "fit to a path", but not, strangely enough, underlined. "Roll-ups" are employed to give fast access to formatting options.

CorelDraw 4 uses a system of "layers". These are like overlays and offer many benefits, and I found them especially useful when "tracing" a bitmap image I had pasted in. The layer with the original image on is "locked" so it isn't selected each time you click on it, then you just use the pencil tool

You can have fun with the features found in CorelDraw 4

to draw over it on another layer. The autotrace facility does the whole job for you, but this added curves to corners no matter how much I fiddled with it.
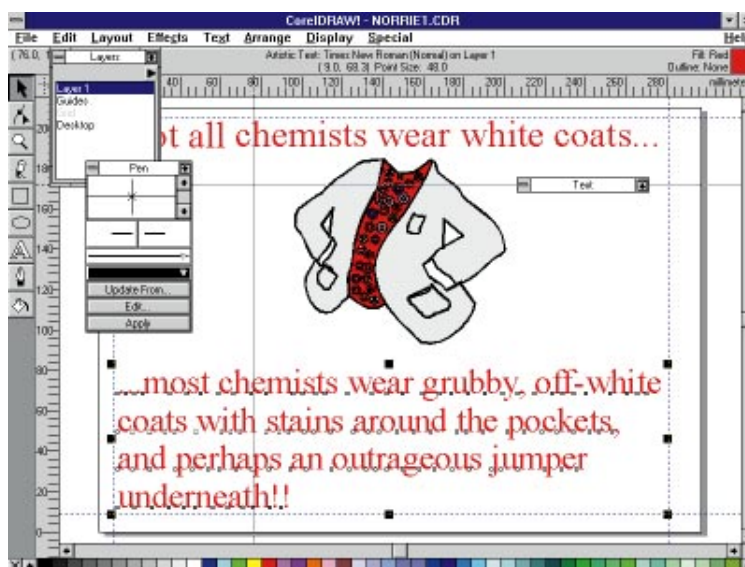
While CorelDraw is a vectorised drawing package, that does not mean it is limited to lines and curves. Several types of "fountain fill" are offered in numerous colour models. Apart from tracing, CorelDraw can only resize and arrange bitmap images on the page (they can only be imported or pasted in as an object), but there is a long list of popular bitmap formats to which it can export. A variety of fractal textures (bitmap form) and symbols were supplied, all of which can be extensively edited.

CorelDraw's online help is extremely good. It is clear and concise, and not bogged down with search engines and useless "examples". Nevertheless, a tutor would have been a useful aid for those who object to paying £12 for a manual and a further £7 shipping. The only

documentation was a thin installation guide, but this was easy to understand and contained only useful information. A readme file on the CD advertised a quick tour, but this was not on the CD, probably because I got my copy with a new PC.

I had no problems setting up my printer. CorelDraw also offers scanner support, but I suspect this would be intended for use with Corel PhotoPaint. Numerous TrueType fonts were provided, only three or four of which I actually use. There were over 1000 clip-art images for almost every occasion, and the useful ability to search for keywords. Unfortunately I encountered spelling mistakes in these, which is a pity since the images are on CD so they cannot be corrected.

CorelDraw is definitely worth having. It is the only Windows 3.11 application I have used that has never crashed, and even though Corel is now on version 7 (for Windows 95; see page 122), if you still use Windows 3.1(1) and need a graphics program, this is a capable (and no doubt cheap) option.

Richard Guy

■ S o f t w a r e

10 MONTH TEST

Linux

Get hold of this free on the net and, if you manage to get to grips with it without any good documentation, you may be converted for life.
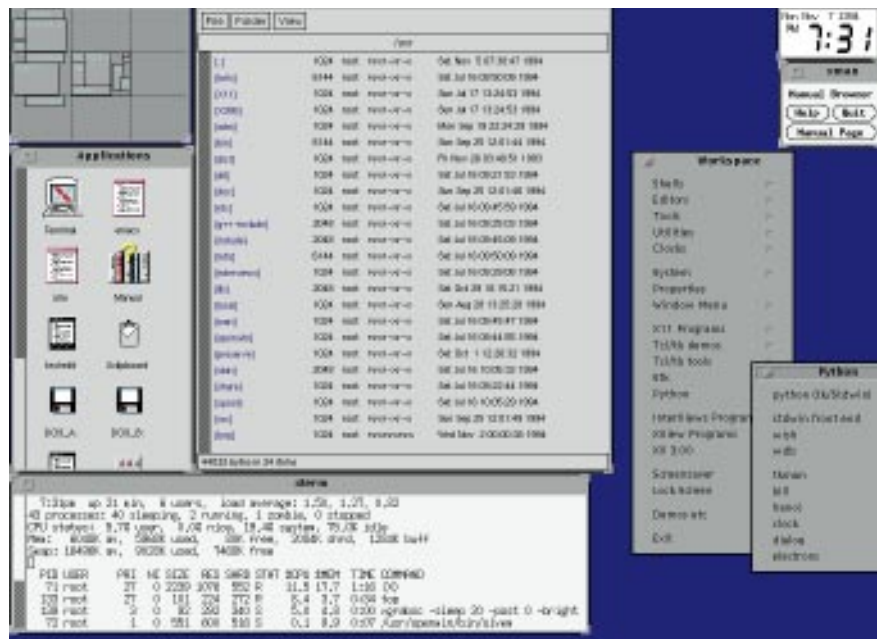
Last November, unaware that *PCW* would soon give us Linux on the cover CD, I bought Slackware Linux 3.0. Linux is a free version of Unix, downloadable from the net or available in many versions ("distributions") on cheap CDs. Just out of curiosity, I wanted to see what this much talked about operating system was and what I could do with it.

At that time I had a Windows 3.11-based 486 and I installed Linux on the DOS partition. This option is a bonus for those who want to try the system out without committing themselves with repartitioning. Thanks to the installation script, all went well and I got a well-working system — almost. I was a bit confused since the setup script assumed I already knew many things about Unix: but what on earth were groff, ncurses and pine...? My lack of knowledge and the lack of explanations caused me to make a few mistakes, like not installing "groff".

Then I had a struggle to set up X Window System, my Italian keyboard, the printer, and so on. There are many documents on the net that help the user install and set up the packages available under Linux, but in many cases they're

All applications multitask seamlessly under Linux

written by non-professionals and are sometimes obscure. For example, I was unable to set up the PPP connection and I had to get help from my provider. Because of these difficulties, and the unfashionable look of most programs — Linux is mainly a character-based OS — I was, at this stage, disappointed.

By the time I got everything to work perfectly, I had acquired enough experience with Linux to start being productive. I reinstalled the system on my Pentium using a native Linux partition, obtaining a remarkable performance boost. At this stage I forced myself never to use DOS programs again, and to use the Linux counterpart instead.

Now I'm hooked. I used to use Windows for word processing and the internet, and DOS for TeX and programming with Turbo Pascal and Turbo C++: Linux gives me excellent alternatives to these applications.

The programs Linux offers for internet connectivity (Netscape, xftp, telnet, xarchie, etc.) are as good as Windows', and above all they never crash. Linux's native TCP/IP support, moreover, is significantly faster. It's also easy to set up a web or an anonymous ftp server — all the bits are included.

I miss WinWord, but there are several word processors ready or in the pipeline. For text processing there are TeX, LaTeX, .dvi and PostScript visualisers.

The standard Linux shell, "bash", is light years ahead of COMMAND.COM or 4DOS.

It offers a powerful script language (bye bye, .BATs), command history and completion, job control, and many more features. There's seamless multitasking, too. Pressing ALT+F1...F6 switches between different sessions, so if one session is busy with a full-screen application, you can still work on another. It's like having many computers in one.

In conclusion, Linux is a powerful multitasking and multiuser operating system, and it's free. At my university, Linux-based Pentium machines outperform and are replacing our old VAX/VMS. All applications multitask seamlessly, and the system offers far more stability than Windows 95.

I wouldn't recommend that everyone use Linux as it's still not as easy to use and configure as Windows or the Mac. But university students, researchers and hackers in general will find in Linux an invaluable alternative to commercial operating systems.

Guido Gonzato

How you can contribute to our Long Term Tests section

We welcome readers' contributions to our Long Term Tests section and pay for any we publish. If you've used a piece of hardware or software for some time, write a 300-word article (for hardware) or a 650-word piece (for software) with GIF format screenshot, and send it on disk in MS Word (Mac or PC) or ASCII format to Dylan Armbrust at the usual *PCW* address, marking your envelope "Long Term Test", or email it to dylana@vnu.co.uk.

•PCW Details

Price Free on the net

Good Points Stable as a rock with fast, true multitasking ability.

Bad Points No all-encompassing documentation so tough to learn.

Conclusion Excellent. I won't go back to DOS or Windows.

★★★★★

■ H a r d w a r e

2.5 YEAR TEST

Dell 433s/L

Although this PC is Pentium-less, it's reliable, with good keyboard and monitor.

My Dell is now almost two and a half years old so the specification (486SX33, 4Mb RAM, 120Mb hard disk) is looking a bit dated. However, the performance remains good as Dell tends to go for a higher spec.

The case is an average size for a desktop and offers reasonable expansion possibilities. It has the advantage of two 5.25in drive bays at the front (one being taken up by the 3.5in floppy disk). The keyboard is the best I have used and has stood up admirably to all I have thrown at it (including a fair amount of game playing). The supplied 14in monitor is excellent, the picture being very stable and all the adjustments easily accessible at the front. Although the graphics card has only

512Kb, it will run at up to 800 x 600 in 256 colours giving a good-quality picture.

Dell provides its own excellent manuals which advise on backup and installing new components. Particularly useful is the quick start guide aimed at beginners, which takes them step-by-step through setting up the computer.

The 433s/L has been very reliable and I have had no problems with it at all. Dell provides diagnostics software and complementary embedded hardware to quickly pinpoint any faults that may occur, and technical support is on a freephone number. And I've had the peace of mind of buying from a large manufacturer.
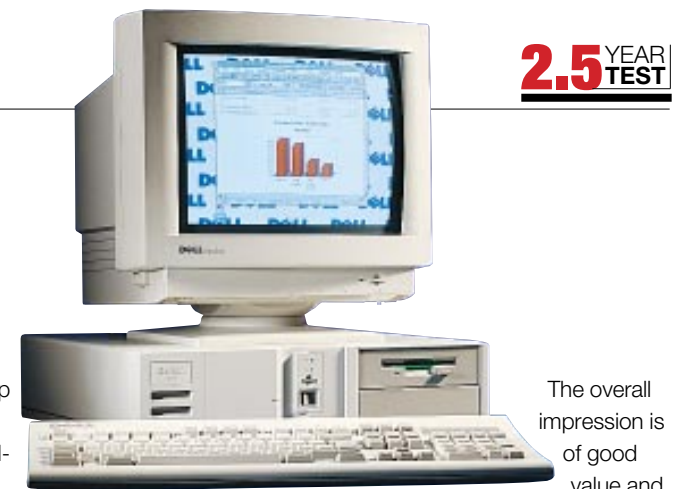
The overall impression is of good value and reliability. Dell will certainly be at the top of my wish list when I come to replace my current PC.

Michael Buttery

•PCW Details

Price Replaced by newer models.

Contact Dell 01344 720000

Good Points Good monitor and super-strong keyboard.

Bad Points Only 512Kb for graphics memory.

Conclusion A reliable workhorse that hasn't let me down.

★★★★

■ H a r d w a r e

2 YEAR TEST

Microsoft Natural Keyboard

This ergonomic keyboard takes a bit of getting used to, but stops the aches and pains.

The appalling design of the standard computer keyboard is one of my favourite hobby-horses, and when the Natural Keyboard landed on my desk two years ago, I was impressed. There's a wide wrist-rest and the main keys are split into two banks. These are angled, not just in plan, but in elevation — it's rather like typing on the surface of a dome. The folding prop is at the front rather than the rear, so providing you have your seat correctly adjusted, you type slightly "downhill".

The result is a far more comfortable typing position. The hands fall naturally onto the keys without having to twist the forearms or bend the wrists.

This design does presume a modicum of keyboard skill. The "hunt-and-peck" approach becomes difficult and you really have to learn the discipline of using the correct fingering. I'm by no means an accomplished touch-typist, but after a few weeks of referring to it as a "ketboard" I'm convinced my skill and speed improved. The extra Windows keys — now largely adopted elsewhere — are also useful, and there are software goodies such as disabling Caps Lock (useful) or making silly noises as you type (fun for five minutes, then infuriating).

Bad points? Personally (I have big hands) I find the wrist rest could do with being a centimetre deeper. I also feel at this price one should get

a switch-based keyboard rather than a membrane-based one — again, it's personal, but I prefer the "clicky" action of the former. I also noticed that after two years, the letters were wearing off the keys. However, mine was a prototype model and Microsoft states that this problem has now been addressed.

Following a major beverage incident, I'm now on my second Natural Keyboard (and I hated going back to a "flatty").

Tim Nott

•PCW Details

Price Street £49 (plus VAT)

Contact Microsoft 0345 002000

Good Points Much more comfortable than a conventional keyboard.

Bad Points Expensive.

Conclusion Be kind to your hands — why pay less?

★★★★

Open secret

A kingpin of the computer networking world, ISDN has been around for years in the guise of the UK's telephone network. But just what is it, and how does it work? Mark Baynes unearths some of its mysteries.

I SDN (Integrated Services Digital Network) has been regarded by many as the best kept secret of the computer networking world for too long. The continuing growth of the internet and particularly the web seems to have finally pushed ISDN out into the open, as PC users have become increasingly frustrated as they wait for graphic-intensive web pages to download and want more speed from their dial-up net connection. Businesses are also looking for cost-effective ways to provide their staff with good-quality connections to the net.

The joke is that ISDN has been around for many years in the shape of the UK's telephone network which has slowly been migrating away from being a public switched telephone network, or PSTN, towards having an all digital infrastructure — an ISDN. What is still analogue, however, is what is called the "local loop", the copper telephone cable that runs from the telephone exchange (which is digital in the UK) to your home or business. So in fact, when you make an ordinary voice telephone call to someone it goes through an ISDN, but the real benefits of ISDN are not available until you pay for your particular strand of the local loop to be upgraded to ISDN.

But just what is ISDN, how fast does it go, where do you get it from, what do you need to use it, and perhaps more importantly, why bother? After all, modem speeds seem to be steadily creeping up from 28.8Kbps to 33.6Kbps and now to 56Kbps, and ISDN is just a go-faster modem, isn't it? Wrong! Over the following pages we'll reveal all, as we cover everything you wanted to know about ISDN including reviews of the

ISDN Contents

Illustration: MARC ARUNDALE

ISDN can be bought in two flavours, Basic Rate ISDN (BRI) which is also known as ISDN-2, and Primary Rate ISDN (PRI) or ISDN-30. A Basic Rate installation consists of two 64Kbps B channels for data transmission and one hidden 16Kbps D channel for control information. The two 64Kbps B channels can be used separately or bonded together to give one channel of 128Kbps.

A Primary Rate ISDN installation consists of 30 B channels (although a minimum of six can be installed) of 64Kbps each, plus a 64kbps D channel for control data which will normally be installed into a company's PABX for maximum flexibility. As with Basic Rate the B channels can be bonded to give a single pipe of 1.92Mbps. If you are a home user, a telecommuter or a small business, then you will need only a Basic Rate ISDN installation.

Currently only BT can install Basic Rate ISDN for you although one or two of the cable TV companies are beginning to offer Basic Rate. Primary Rate can be obtained from a variety of sources such as Mercury and Energis, but the simple fact is that if you want ISDN in your home, you have to get it from BT and there is nothing you can do about it.

Until September of last year you would have paid £400 for this, but after much criticism from the computer industry and the trade press BT finally bowed to pressure and introduced a slightly more flexible pricing structure *(see page 118)* which means you can now get Basic Rate installed for £199. Many industry commentators still consider this to be over-priced, however. On top of the installation costs you will also have to pay a quarterly rental fee of either £88 or £133.75 dependent on your payment scheme, but the good news is that call charges are exactly the same as for a normal telephone call and are eligible for BT's call discounts.

What you should be aware of is that under BT's new pricing scheme you are locked in to using BT's ISDN service for either one or two years. After this you can swap to using Mercury's ISDN service if you wish, which may make sense dependent on its call charges.

A lot of recent coverage of ISDN talks about 64Kbps this and 128Kbps the other, but there is so much more to ISDN than speed. Two channels means two lines so while you are zooming around the net or undertaking a big FTP job you can still make phone calls. And you can bond (Bandwidth ON Demand INteroperability Group) or amalgamate the two channels to give you a 128Kbps pipe. Basic facilities — services which are the same as those used on normal telephone lines such as call diversion and caller identity — are available, but there's more. For a set-up fee to BT of £20 and a £10 quarterly rental, you can have another ten telephone numbers routed through your ISDN device, each of which is connected to a different device such as a telephone, fax machine or other data device. This is known as Multiple Subscriber Numbering and is ideal for the small business, and is just one of the facilities which illustrates the flexibility of ISDN.

One of the main uses of ISDN by businesses is to
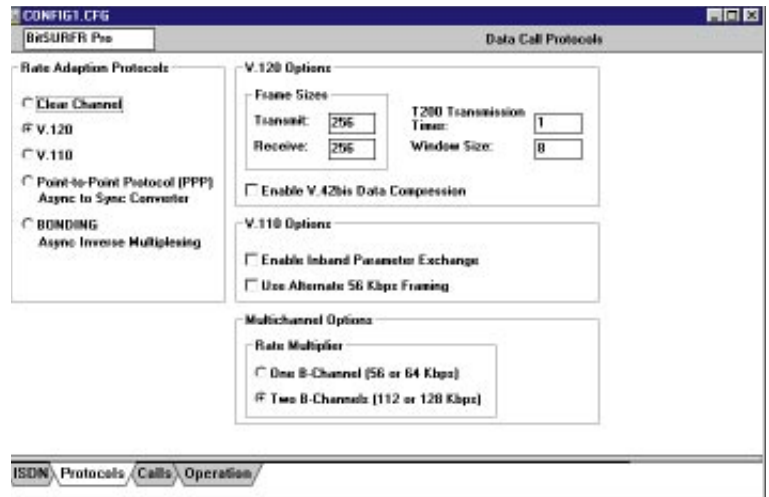
Motorola BitSURFR Pro channel configuration

provide either primary or back-up links between different locations. Bandwidth-On-Demand is a process whereby an ISDN connection between two points being used for an application, such as file transfer or using a software application on a remote device, is only provided for the exact time it is needed, then it is disconnected or "torn down". The application is fooled or "spoofed" into thinking that the connection is always there however, so the user does not have to go through a connect and logon process every time communication between the two points takes place.

Which ISP?

If you want to use ISDN to connect to the net, you need an ISP which provides dial-up ISDN access. Most of them do now and most at no extra charge; the only difference might be that you dial a slightly different number but this is not necessarily the case. You should always check with your ISP before you invest in an ISDN connection to find out how they support a dial-up ISDN connection. Typically, this is using the V.120 rate adaptation scheme (you will need to check whether the ISDN hardware you purchase supports V.120) which allows a PC's data stream to be converted to the 64Kbps of a single ISDN channel. Dial-up ISDN access from an ISP at 128Kbps is a rarity; typically you will need a router to have 128Kbps net access, but it may be more widely available soon.

• Stage One — Getting Your ISDN line installed
My experience of having Basic Rate installed is as follows. I chose Fast Start because installation only (!) costs £199 and then rang BT on 0800 800800. I was given an installation date of only seven working days later: this time may vary depending on BT's workload in your area. Three days after my initial call a BT engineer came to string a new cable from the telephone pole nearest my house to the outside wall. And no, contrary to popular belief, they do not need to dig the road up. I was told that another engineer would do the installation proper as they aren't insured to climb ladders, apparently...

On the appointed day, a knowledgeable BT ISDN
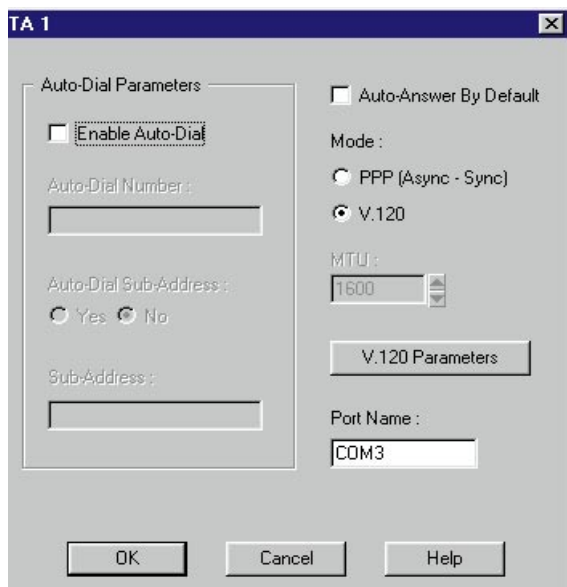
engineer turned up, drilled a hole through my outside wall and pulled the exterior cable through it, connected this to a small (50x40x20mm) junction box just inside, then ran another cable from this through to my study and connected this to the Basic Rate linebox on the wall of my study. This is a lovely shade of BT grey and measures 135x121x42mm but is not really noticeable. A green "customer confidence" LED is always on to show the line is okay and underneath the linebox are two shuttered RJ45 customer sockets for you to connect your ISDN into. A quick check by the engineer that the line was working and that was it. It really is that simple.

• Stage Two — Get your ISDN Hardware
The individual user has a simple choice to make with regard to ISDN hardware: whether to buy a Terminal Adapter (TA) or an internal card. The small office may consider using an ISDN bridge/router but these cost upwards of £800 so aren't economical for less than four users to share. You really need to be a networking expert to install one as they are designed to provide shared ISDN access over a LAN (Local Area Network).

A TA is an external device which in many cases looks similar to a modem: indeed some, such as the Motorola BitSURFR Pro, use the exact same casing as Motorola's Premier modem range. You physically connect a TA to your PC in the same way as a modem and install it in exactly the same way as you would install a modem, but the driver is obviously an ISDN driver. There is nothing mysterious about how this is done — it's via the good old Hayes AT command set. In addition to an ISDN port, most TAs have one or two ports which you can plug a telephone into and so you can use one Basic Rate channel for phone calls as and when required. Internal cards are typically ISA bus designs, but PCI and PCMCIA PC cards are available and have one or two ISDN ports,

and a few feature an analogue modem on the card.

The choice to buy a TA or a card is a case of six of one and half a dozen of the other. A good TA will provide you with a couple of phone jacks, giving you the flexibility to attach an analogue phone and/or fax machine to the unit. But the drawback with a TA is that it typically attaches to a PC's com port which is rather like trying to squeeze an elephant through a keyhole. The typical PC com port employs a so-called "high-speed" 16550 UART chip which has a theoretical maximum throughput rate of 115.2Kbps which is in practice more like around 80Kbps. Not only is this hardly sufficient for a V.34 modem, but it's also of little use if you are bonding two ISDN channels together to try and achieve 128Kbps.

The better option in terms of speed would then seem to be an ISA card which slots straight into the PC's bus. But then, ISDN cards don't always have one telephone port, let alone two, so you cannot make as much use as you might like to of your ISDN installation.
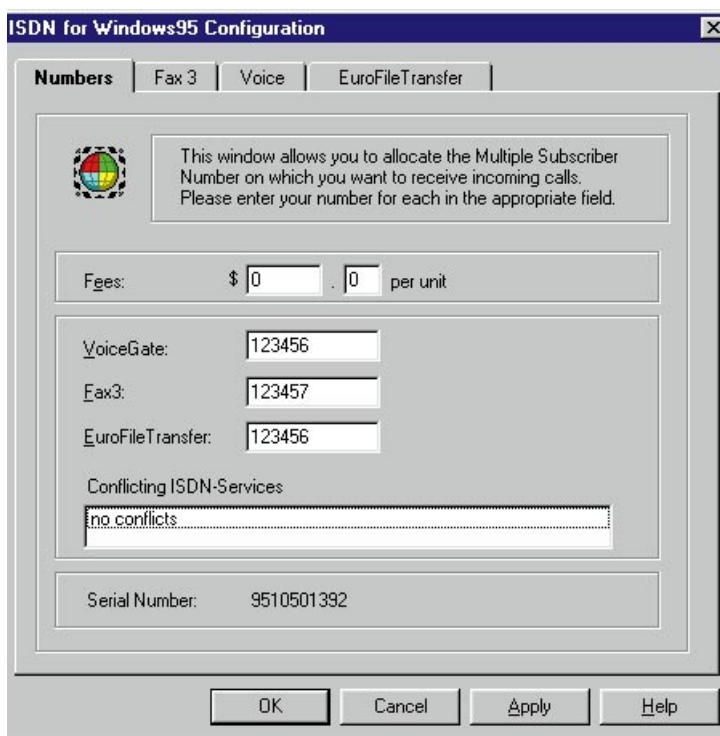
• Stage Three — Get your ISDN Software
In September 1995, Microsoft stated it would add support for ISDN to Windows 95 and twenty two of the big ISDN TA and card manufacturers would be writing ISDN drivers for Win95. My experience of Win95 driver support for ISDN when conducting this review over a year later is that excellent Win95 ISDN support is the exception, ambivalence the norm and indifference quite frequent. The Microsoft ISDN Accelerator Pack for Win95 can be found at the Microsoft web site www.microsoft.com/windows/getisdn/default.htm but at the time of writing this only directly supported a few cards. Don't install it unless you know it supports your hardware.

3Com OfficeConnect Remote 530s

Editors Choice

This is a beautifully-built unit whose small size belies its power. The OfficeConnect Remote is designed to connect a LAN (Local Area Network at one location with a number of LANs at remote locations) using bridging or routing (see main text) and as such is primarily designed to use ISDN for file transfer as opposed to internet access, although it can do this.

It is small enough (220 x 185 x 55mm) to be placed on a shelf by itself or a number of units can be stacked. At the front of the unit are indicators for alert, power, link status and the two ISDN channels, the WAN (Wide Area Network) connection and a series of LEDs for ISDN utilisation. At the rear are a power socket, recessed reset button, 9-pin serial port, co-ax (thin ethernet) LAN port, MDI/MDIX switch for specifying whether the unit is attached to a network hub or a single PC, a 10BaseT, ISDN and voice ports and a serial port which is used for WAN links of up to 2Mb.

The configuration software resides in the unit itself and is activated by connecting the unit to a PC via the serial port and using HyperTerminal or similar. A Quick Configuration option is provided which is adequate, but to get the maximum from the OfficeConnect you will need to know your networking.

Win95 driver available **n/a**
Bonding support **n/a**
MS Accelerator Pack included **n/a**

•PCW Details

Price £840

Contact 3Com 01628 897000

Good Points Excellent build quality and functionality at a good price.

Bad Points None.

Conclusion Ideal for the small business.

★★★★★

Congo Voice Router

The ACC Congo Voice Router is aimed at "the telecommuter, small office or internet user" according to the publicity blurb, but is more likely to be used in an office environment than for a single user (which would not be economic). At the front right of the unit are ISDN indicator status LEDs for each B channel, mode and link status, in the centre LEDs for LAN activity, and on the right a power and status LED. At the rear of the unit are a data on/off switch, power input port, 8-pin console jack, two phone ports, a 10BaseT port and an ISDN port.

After turning the power on you have to wait a good couple of minutes for the unit to warm up. A small and well-written Quick Start guide is provided along with a more detailed user manual. You should read the Quick Start guide thoroughly before starting configuration as this takes you through — and explains — all the IP information you will need from your ISP or systems manager to get the Congo running. Express Access and WebWizard configuration software is included. The Congo is also available as a straight router at a cost of £795 for an IP version or £1195 for an IP/ IPX version.

Win95 driver available **n/a**
Bonding support **n/a**
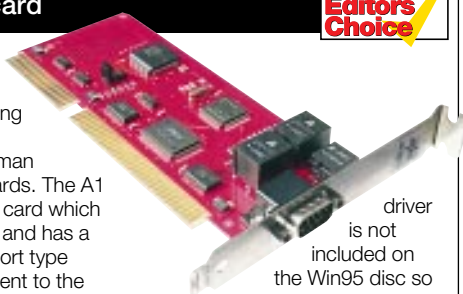MS Accelerator Pack included **n/a**

•PCW Details

Price £995 IP only, £1295 IP/IPX

Contact ACC 01372 470606

Good Points A good bundle of hardware and software.

Bad Points Slightly overpriced.

Conclusion Worthy of consideration.

★★★

AVM A1 ISA card

Editors Choice

AVM is a German company which has, according to Dataquest, 45 percent of the German market for ISDN cards. The A1 is a half-height ISA card which supports CAPI 2.0 and has a single 9-pin com-port type socket for attachment to the accompanying six-meter-long black ISDN connection cable, via the usual thumbscrews. Main configuration of the card is by setting the correct setting on the single bank of jumpers; by default these are set to I/O 300.

Four disks — ISDN tools installation, DOS, Windows 3.01 and Windows 95 installation — are included as well as two small manuals. While the manuals provide instructions for DOS and Windows setup, there is nothing regarding Win95 in them apart from a readme file on the floppy, but this is just about adequate.

After installation, the AVM CAPI driver will load with Win95. You can be sure of this as a DOS message appears for a time after boot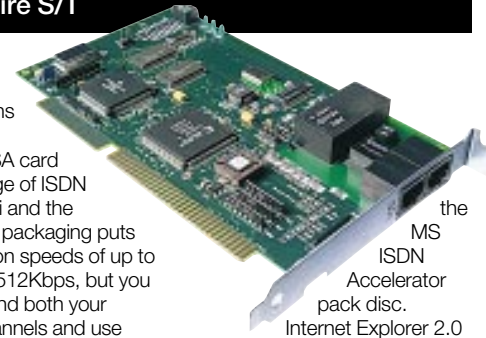ing. For some reason the Win95 NDIS WAN driver is not included on the Win95 disc so I downloaded it from the AVM FTP site, but in use the AVM A1 card proved trouble free. Another niggle is that a de-install has to be run from the installation floppy.

Win95 driver available ✓
Bonding support ✓
MS Accelerator Pack included ✗

•PCW Details

Price £150

Contact SAS Distribution 01293 852800

Good Points Good-quality card from a European market leader.

Bad Points Documentation could be better.

Conclusion High-quality card at a very low price. Recommended.

★★★★

Digi DataFire S/T

Digi is a big player in communications boards. The DataFire S/T ISA card is one of a range of ISDN cards from Digi and the garish product packaging puts the emphasis on speeds of up to 128Kbps and 512Kbps, but you will need to bond both your Basic Rate channels and use MPP to achieve these data rates.

Two ISDN ports are provided and before installation you will have to check where you have some free memory on your PC and set the appropriate settings with the single bank of four DIP switches located at the rear of the card; these are clearly labelled. Three green status LEDs are situated next to the switches but these will not be visible when the cover is on your PC. The documentation with the DataFire is minimal and biased to the US market. Hey Digi, we use ISDN in Europe too!

There was no Win95 documentation but this was the easiest card to configure by just adding it as a network card, and feeding in the Win95 disk and the MS ISDN Accelerator pack disc. Internet Explorer 2.0 included. Drivers for NT 3.5 and DOS included.
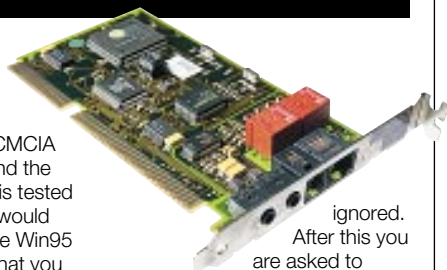
Win95 driver available ✓
Bonding support ✓
MS Accelerator Pack included ✓

•PCW Details

Price £395

Contact Interquad 01753 536464

Good Points Very easy to set up and install. Good Windows driver support.

Bad Points Documentation pretty useless.

Conclusion High-quality build and driver support but an equally high price.

★★★★

Eicon Diva Pro

Eicon produces four different products under the Diva for Windows 95 banner — ISA and PCMCIA cards, the Diva Pro and the Piccola: the Diva Pro is tested here. The packaging would seem to promise close Win95 support and that is what you get. Enclosed in the box are a plug-and-play card, 36-page instruction manual, ISDN cable and four disks. The card itself has ports for a modem line, microphone and speakers as well as the main ISDN line, which means you can make the most of the flexibility of ISDN with this product. Fax/modem facilities are provided courtesy of a DSP chip which allows the Diva Pro to emulate a V.32bis modem.

The card was detected by Win95 first time and then asked for the manufacturer-supplied driver. Once you do this, you need to select Euro-ISDN (DSS1) as the protocol. Ignore the greyed-out SPID (Service Profile IDentifier) boxes: SPIDs are only of concern to ISDN in the US and can be safely ignored. After this you are asked to supply your ISDN number for outgoing calls and optionally a number for incoming calls.

Win95 driver available ✓
Bonding support ✓
MS Accelerator Pack included ✓

•PCW Details

Price £390

Contact Eicon Technology 0181 967 8000

Good Points Tight Win95 support, integrated modem.

Bad Points Hardware documentation online only, software installation somewhat troublesome.

Conclusion A good all-rounder.

★★★

Hayes Ultra ISDN 64k

The Hayes Ultra ISDN 64k is an external TA which could easily be mistaken for a conventional modem at first — and second — glance, as it is a classic Hayes silver and black box. At the front of the unit is a row of eight LEDs which provide an indication of control and usage status.

Documentation is pretty good with three different manuals — one for the Ultra itself, one for Smartcom, Hayes' comms software package, and one for SCOPE (Simple Communications Programming Environment), a scripting language which is a component of Smartcom. There is also a single-sheet Smartcom ISDN reference card.

The Smartcom software comes on three disks and is a simple install, but I found I could discover no Win95 drivers for the Ultra. Hayes technical support explained that there was a Win95 .inf file for the Ultra on the BBS. But why isn't it on the disks that come with the Ultra in the first place? A quick reading of the ISDN reference sheet alone was enough to set up the TA and use Smartcom to access the BBS and download the .inf file, and allow me to use the Ultra under Win95 Dial Up Networking.

Win95 driver available ✓
Bonding support ✗
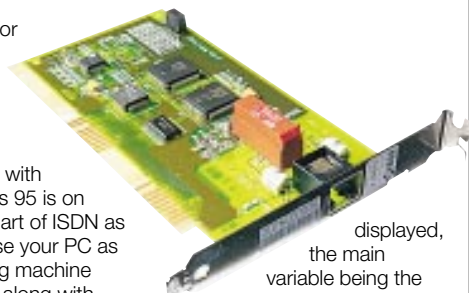MS Accelerator Pack included ✗

•PCW Details

Price £399

Contact Hayes 01252 775577

Good Points Robust build quality.

Bad Points Win95 drivers not bundled. No bonding support.

Conclusion An expensive unit for what it does.

★★

ISDN for Windows 95

Inside the ISDN for Windows 95 box are an ITK ISDN ISA adaptor card, ISDN cable and a CD-ROM.

The emphasis with ISDN for Windows 95 is on the "integrated" part of ISDN as it allows you to use your PC as a digital answering machine and fax machine, along with sending and receiving files using Euro File Transfer (EFT) as well as using ISDN with all the comms programs that are part of Windows 95, such as Dial-Up Networking and HyperTerminal.

This is done through close integration with the MS Exchange client in Win95 and this needs to be properly installed before attempting to set up this package.

The settings for the ISA card have to be set via four jumpers but the appropriate interrupts and addresses are clearly set out so this wasn't too much of a problem. There is no transmission LED on the card itself. After copying is complete, the configuration screen is displayed, the main variable being the Multiple Subscriber Number (see main text).

Win95 driver available ✓
Bonding support ✓
MS Accelerator Pack included ✗

•PCW Details

Price £199

Contact Acotec UK 0990 134455

Good Points Close Win95 integration.

Bad Points Dependent on Exchange.

Conclusion Good low-cost bundle if you already use MS Exchange.

★★★★

Lava Link 650

The Lava Link 650 is a "Windows Communications Accelerator" that should alleviate the com port transmission speed bottleneck. The 650 is a simple card which slots into any available ISA slot and which has a single com port to which you attach your TA (or modem, as the 650 is also of use for V.34 modems).

On the card itself are two sets of jumpers, one for the IRQ setting and one to designate which com port you wish the 650 to be seen as (1 to 4). Both jumpers are clearly labelled. One installation disk and one instruction pamphlet are included and, while the pamphlet is fairly minimal, it does the job and there is plenty of context-sensitive help.

Win95 autodetected the card so you change the standard com port drivers for the 650 drivers on the disk. From then on, whenever a configuration device attached to the 650 com port is chosen from the port settings button in Dial Up Networking, you are provided with options to fully configure flow and FIFO control.

But note that if you set the maximum transmission speed to 230,400 or 460,800 it will default to 115,200 if your TA .inf file determines that these greater speeds are not supported by the ISDN device.

Win95 driver available **n/a**
Bonding support **n/a**
MS Accelerator Pack included **n/a**

•PCW Details

Price £40

Contact Comtech 01753 685444

Good Points Simple to use and install.

Bad Points None.

Conclusion Essential if you are buying a TA.

★★★★

Motorola BitSURFR Pro ISDN Office

Personal Computer World **Editors Choice**

The Office Solution's packaging flags it as "128Kbps ISDN" with "full Euro-ISDN comp-atibility". The BitSURFR Pro is a nicely-designed unit with the same shell as the Motorola Premier range but in a lovely shade of purple.

On top are six clearly marked LEDs, indicating control and transmission operations. There are two ports for telephones (one for each channel) and an ISDN port and four DIP switches which are just visible in a deep recess. Then there is the standard 25-pin data port and power adaptor port.

Other components are two telephone-jack adaptors, power transformer, data lead to connect to your com port, ISDN lead, User and Getting Started manuals, Motorola config. software, HyperACCESS Lite comms software, NetManage Internet Chameleon v4.6 for Windows guide and software. The software was good. and it was easy to configure and use the BitSURFR

Pro by just referring to the Getting Started manual. Also sold by BT as the BT Ignition.

Win95 driver available ✓
Bonding support ✓
MS Accelerator Pack included ✗

• PCW Details

Price £299

Contact Motorola 01635 564467

Good Points A very good "all-in-one" solution ideal for the home office.

Bad Points Does it come in a different colour?

Conclusion A very good and versatile TA bundle.

★★★★

Paxdata Ultimate TA

This is an unusual-looking, small (150 x 80 x 28mm) TA which looks more like a device for testing cables than transmitting data down them. On the left-hand side is the power port, at the bottom are three RJ45 sockets labelled Port 1, Config and Port 2, and on the right-hand side is a single RJ45 socket for the ISDN line marked Line. On the front is an LED display panel. The ISDN cable supplied is a bit of a pain as the accompanying manual states the connectors on either end are different to prevent it being connected to a DTE port, but it took some fiddling to get the proper end into the Basic Rate ISDN wall terminal.

As with many other devices in this review, there is no mention of Win95 support in the manual but an accompanying A4 sheet gives details of driver installation. Actually, there are no drivers supplied with the Ultimate at all. The Win95 instruction sheet gives contact details for Paxdata networks and they will email the contents of the mdmpax.inf

Win95 driver file to you in an hour or so, but Paxdata promises to bundle the Win95 drivers by the time this review appears.

Win95 driver available ✓
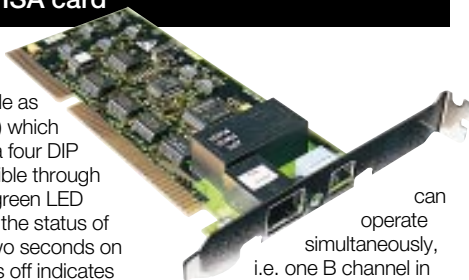Bonding support ✓
MS Accelerator Pack included ✗

• PCW Details

Price £399

Contact Paxdata 01442 236336

Good Points Very compact unit.

Bad Points A little too complicated to set up.

Conclusion Low on size, high on price.

★★★

Racal X.Toll ISA card

The Racal X.Toll is an ISA card (also available as a PCMCIA type II) which is configurable via four DIP switches, accessible through the end plate. A green LED provides proof of the status of your ISDN link: two seconds on then two seconds off indicates that the card is okay but there is no connection; half a second on, one and a half seconds off indicates one channel is in use; half a second on followed by half a second off indicates that both channels are being used.

Racal gets maximum points for including drivers for Win95, Windows for Workgroups and NT on disks which are clearly labelled. The documentation takes you through hardware and software setup. The software consists of basic configuration from within Control Panel plus three components in a Program Manager group — LSI (Line Status Indicator in the form of a traffic light), monitor and self-test. The card supports two modes of operation, either NDIS WAN mode or TA mode (com port emulation) and both modes

can operate simultaneously, i.e. one B channel in each mode. Windows for Workgroups can only be used in TA mode. Channel bonding to give a 128Kbps pipe is only available when using NDIS WAN mode.

Win95 driver available ✓
Bonding support ✓
MS Accelerator Pack included ✗

• PCW Details

Price £250

Contact Racal 01256 763911

Good Points Solid and reliable, comprehensive Win95, WfW and NT support.

Bad Points Software could be a bit more polished.

Conclusion Good, solid ISA card at a good price.

★★★★

Tricom TA 64/42V

The Tricom was the most robust of all the TAs in the review and it is obviously designed for heavy-duty use for jobs like providing dial-on-demand connections for a branch office or as leased line back-up. The unit has LEDs at the front for power status and four LEDs for each of the two ISDN channels. At the rear is a permanently attached power lead, a single port marked telephone/fax and five RJ45 ports, one of which is marked Async, three marked Async/Sync D Channel and one marked ISDN.

No drivers of any type are included with the Tricom which is no real surprise as most people buying this type of TA will already have specialised comms software for the particular application they are running. A call to Tricom's technical support to check on the situation regarding Win95 drivers brought the information that it was a matter of installing the standard Win95 28.8 modem driver and then entering a couple of Hayes commands to set up the S 114 register

which controls the async port speed. Once this was done via HyperTerminal, operation was straightforward, and the documentation for the Hayes commands is pretty thorough.

Win95 driver available ✗
Bonding support ✓
MS Accelerator Pack included ✗

• PCW Details

Price £699

Contact Tricom 01494 480276

Good Points Built like a tank.

Bad Points You need to thoroughly understand comms and ISDN to configure it.

Conclusion No-frills industrial-strength TA for the business user.

★★★★

Editor's Choice

The most noticeable issue when reviewing these ISDN products was the variety of approaches to and, in some cases, almost complete lack of, Windows 95 support. Microsoft states there was not enough widespread use of ISDN for support to be included in Win95 (apart from Germany, where part of Actotec's ISDN for Windows 95 product was included) but there will be native support in the successor to Win95, Memphis, which is due to go into beta in June 1997. Some products provide driver support through TAPI (Telephony API), others through CAPI (Common ISDN API) and others simply provide a Win95 modem driver which uses standard Hayes commands to support ISDN.

In the next six months, however, we are likely to see ISDN finally come out of the shadows as it provides a tried and tested means of providing high-speed digital connections. Technologies such as cable modems and ADSL (Asymmetric Digital Subscriber Line) will eventually provide high bandwidth to the home but this is several years off. For the time being, ISDN is the only sensible means of providing yourself with an on ramp to the Information Superhighway.

• Editor's Choice for an ISDN TA —
Motorola BitSURFR Pro ISDN Office Solution
Throughout the testing I kept the Motorola BitSURFR to hand as I knew I could configure it within seconds if needed and frequently ran a telephone from one of its ports when I was busy. An excellent product that really is a solution.

• Editor's Choice for an ISDN ISA CARD —
AVM A1 ISA card
The ISA card I liked the best and found the easiest to install was in fact the Digi ST C1, but the AVM A1 is almost as easy to set up and, at £150, is significantly cheaper than the £395 DataFire. Also available is the AVM B1 server card at £740.

• Editor's Choice for an ISDN Bridge/Router —
OfficeConnect Remote 530
3Com has long had a reputation for producing networking components with excellent build quality at good prices which feature ease of use and very good documentation. The OfficeConnect Remote 530 continues this tradition.
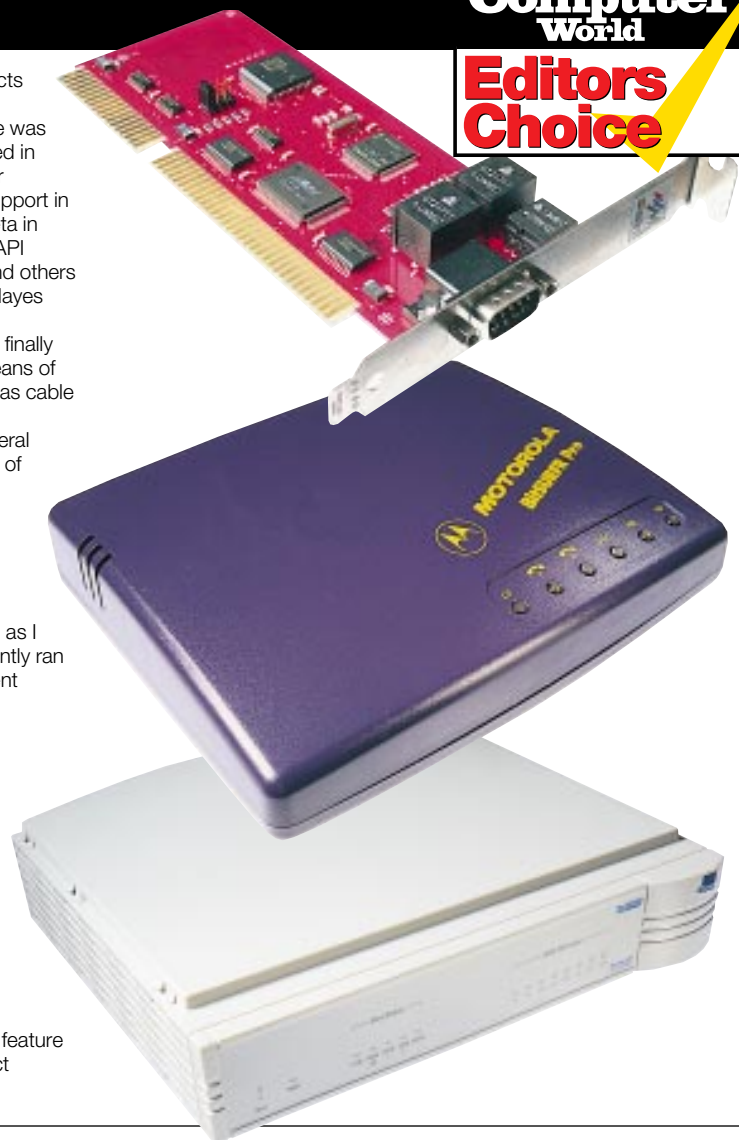
US Robotics' x2 technology

Towards the end of last year US Robotics announced its "x2" technology which will allow modems to receive data at speeds of up to 56Kbps. But this is asymmetric technology in that it will only be able to transmit data at 33.6Kbps. All currently-shipping USR modems will be upgradable via software or a plug-in Rockwell chip to x2 and other modem manufacturers will have to quickly conform to USR's new standard to keep up with the technology race.

So if a modem using x2 can run at 56Kbps, why bother with ISDN at all? One problem is that x2 has to be supported at both ends of the connection so it will be some time before ISPs invest in the additional hardware. Additionally, x2 is still running over an analogue line so the quality of the signal will not be comparable to the all-digital signal of ISDN. The fact is that while x2 is a good idea, it is simply an ingenious way to squeeze a little more from outdated transmission methods which rely on analogue lines rather than all-digital ISDN lines and may be seen as the last gasp of the venerable but dated modem.

BT ISDN Basic Rate Pricing

	Connection charge	Quarterly rental	Annual rental	Minimum contract period	Call allowance
Start Up	£199	£133.75	£535	Two years	Year 1 = £105
					Year 2 = £105
					thereafter £230 p.a.
Fast Start	£500	£133.75	£535	One year	Year 1 = £355
					thereafter £230 p.a.
Low Start	£400	£88	£352	One year	

CorelDraw

7 v 7

xRes

PhotoPaint

http://www

CorelCHART!

FreeHand

When two Sevens Clash

PAUL SHORROCK
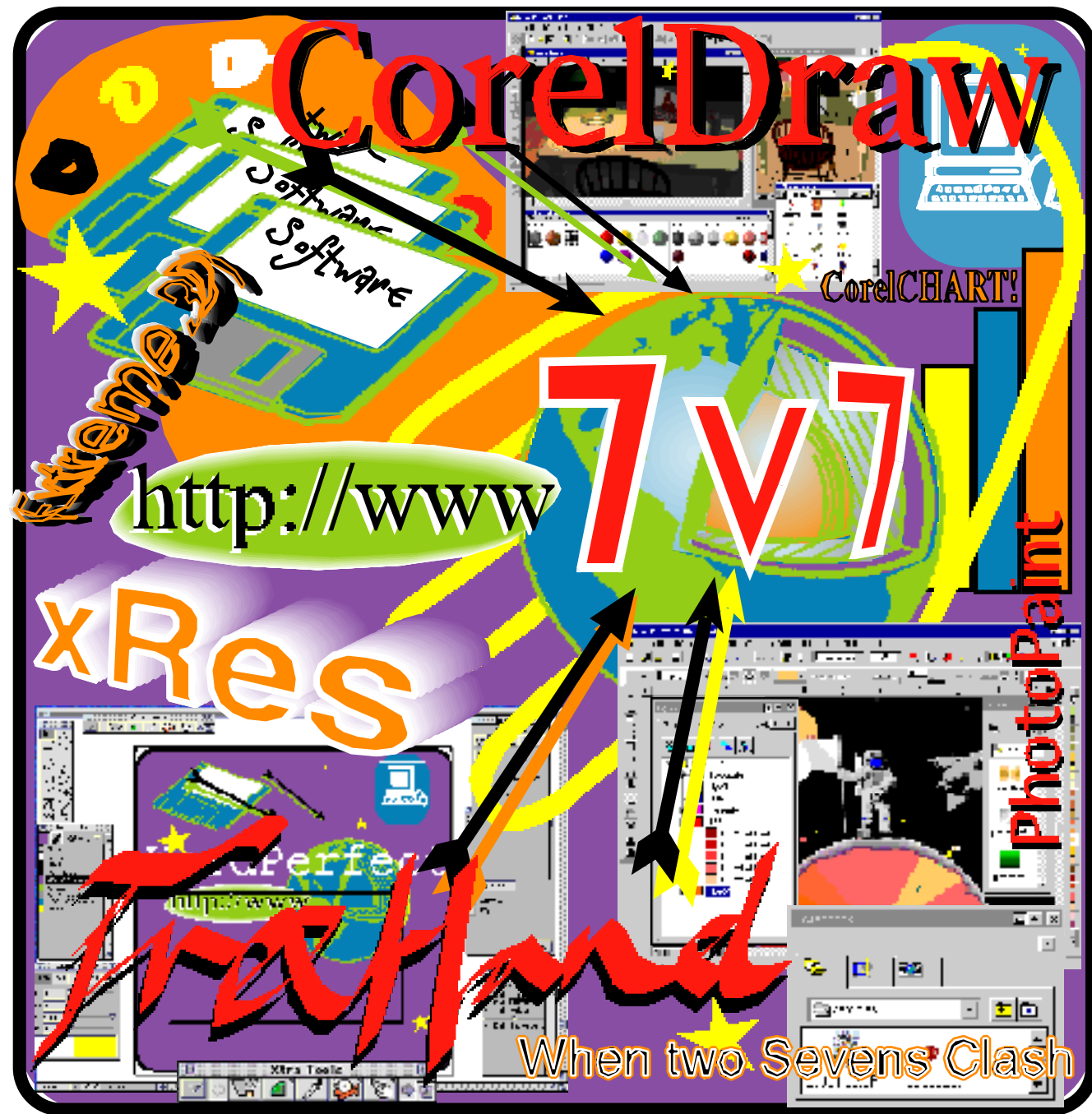
Seven-a-side

Need a drawing program? No, you need a graphics suite. This is the model established by Micrografx and Corel, and now Macromedia has joined the ranks. Tim Nott looks at the latest products — still both in beta version — from the last two companies.

CorelDraw 7

Starting with the traditional head count, the core products are Draw (vector graphics), PhotoPaint (image processing), Dream 3D (solid modelling and rendering). Also in the box are Multimedia Manager, OCR-Trace for converting bitmapped graphics to vectors, Texture for designing multi-layered surface textures, Depth for simpler 3D text and logo effects, Scan for direct scanning with simple image correction, and Capture for custom-shaped screen grabs. Then there's Colour Manager Wizard for matching scanner, screen and print colours, Script Editor for creating add-ons to Draw and PhotoPaint, Memo for sticky notes, and the customary Corel bounty of around 1,000 TrueType and Type 1 fonts, 32,000 pieces of clip-art and sundry images, and 3D models and templates.
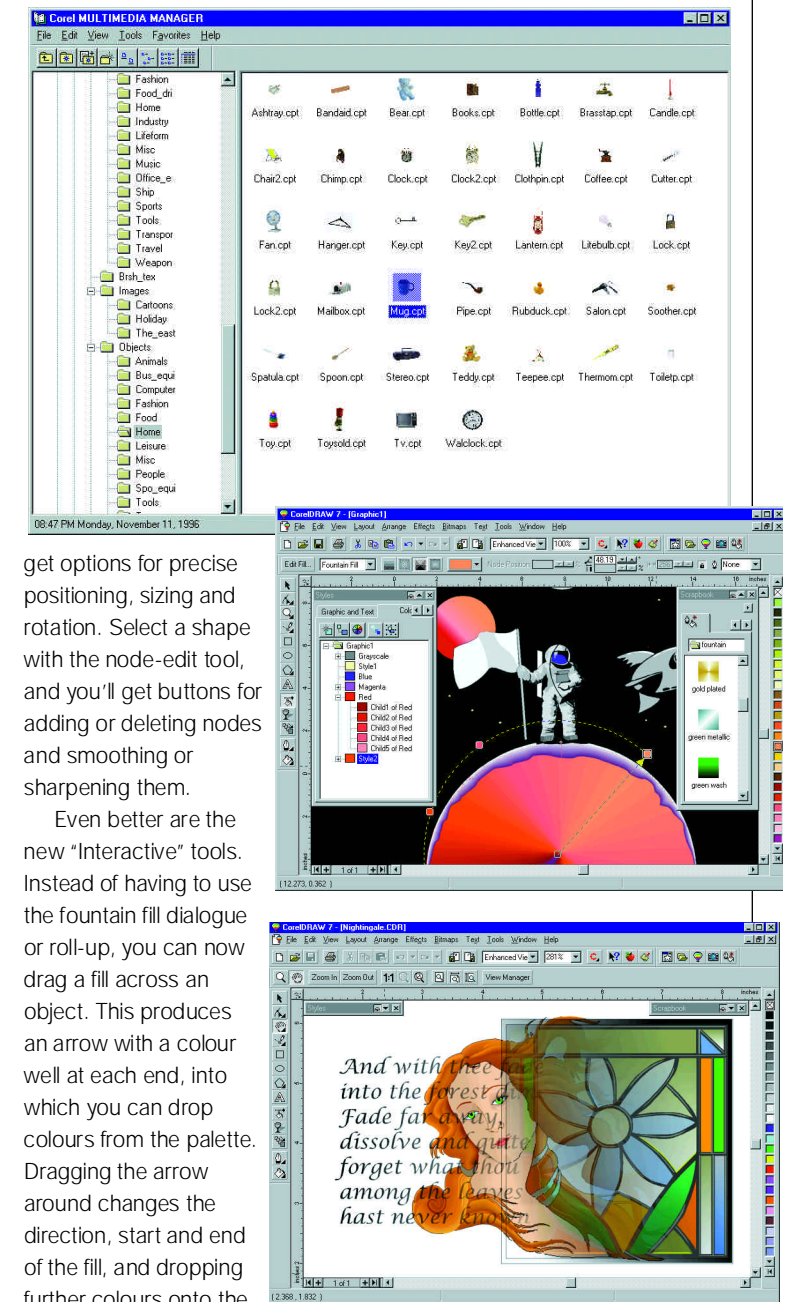
The presentation and animation applications seen in version 6 weren't included but at the time of writing Corel stated that negotiations with third-party developers were still taking place, so there may well be more in the box. For those worried about disk space, the full installation is stated to be around 350Mb.

Like Macromedia, Corel has caught web fever, with URL-inserting toolbars throughout and, with standard HTML output for image maps there's Barista (no lawyer jokes, please), Corel's own web-enhancing technology. Although, in the beta, I was unable to produce anything that Internet Explorer could read. It promises columns, multiple fonts, animation and "much more". An Envoy reader (Corel's equivalent of Adobe Acrobat) is supplied, and you can create Envoy documents from any application using the Envoy print driver.

Although we don't have room to cover each component in detail, it's worth taking a short look at Multimedia Manager. This is a file browser and launcher that covers Corel and many other graphic formats, as well as sound and animations. It's been drastically overhauled and now looks almost exactly like Windows 95 Explorer, except that every icon is a miniature of the relevant graphic file. Although this makes matters simpler, the disadvantage is that the icons are far too small to preview photographs or complex drawings.

Moving briskly on to the main attraction. Whereas FreeHand has palettes, Corel has "roll-ups". Like the palettes, these can be nested, but the tree-like twitching is far clumsier than Macromedia's tabs and, as the name implies, they can be "rolled-up" into their own title bar. The bad news is that even though there are two less than before, 28 of the things remain. The good news is that you may never have to use them.

A new context-sensitive Property Bar provides instant access to most object attributes and tool options. Type some text, and you'll have a word processor-style formatting ribbon with a pop-up font preview panel. Switch to the drawing tools, and you'll get options for precise positioning, sizing and rotation. Select a shape with the node-edit tool, and you'll get buttons for adding or deleting nodes and smoothing or sharpening them.

Even better are the new "Interactive" tools. Instead of having to use the fountain fill dialogue or roll-up, you can now drag a fill across an object. This produces an arrow with a colour well at each end, into which you can drop colours from the palette. Dragging the arrow around changes the direction, start and end of the fill, and dropping further colours onto the arrow creates new intermediate shades in the fill. You'll also notice that the Property Bar has changed to offer relevant options like switching from a linear, to a radial or conical fill. Click a button, and the fill, together with its control arrow, will change accordingly. Unlike the dialogue boxes or roll-ups, it's all real time — you don't need to click an OK or Apply button.

Blending objects, which is creating intermediate ones that gradually change their shape and fill, has also gone interactive; you drag from one shape to another. An added feature is that you can "accelerate" blends, making the transition non-linear, which is great for accenting highlights. There's more drag-and-drop between objects; hold down the right mouse button,

Top A new Explorer look for Multimedia Manager but the thumbnails are too small

Middle Interactive fountain fills: just drop the colours on the path

Bottom Fading away — anything can be transparent

drag one object on top of another and a menu appears from which you can copy or move the object itself, or copy its outline, fill and text style, to the target.

The transparency tool, another interactive newcomer, works in a similar way to the fountain fill tool except that the fill graduates from full-colour to transparent. And it works on practically any object, including bitmaps and text. Another new feature is "enhanced" view, with anti-aliasing giving a smoother edge to text and graphics on-screen, and the acquisition of WordPerfect sees the incorporation of the latter's proofing tools, including on-the-fly spelling correction and a grammar checker.

Although roll-ups seem on the way out, two that you'll want to use are the Scrapbooks and the Colour Styles. The former lets you browse clip-art, symbols and your hard disk in general, lets you store objects as "scraps" and has special folders for saving fill and outline styles. The latter works in a similar, if rather less elegant, way to FreeHand's colour list in that you can create "children" shades of "parent" colours and change all the shades in a drawing at once.

Although there is a lot that's new here, it's rather depressing to note that most of it — the anti-aliasing, property bar, interactive tools, transparency and colour families — has been copied from Corel Xara. Originally Xara Studio, this is a British-developed drawing package which appeared in 1995. Corel obviously liked, or feared, it so much that it acquired the distribution rights, although not the use of the code in its own products. Although Corel 7 seems considerably faster than 6, particularly in saving and redrawing in "normal" view, it still doesn't match the assembler-written performance of the original Xara, particularly in enhanced view where the beta was decidedly sluggish.

Moving on to PhotoPaint, this has a Property Bar, a Scrapbook, an Internet toolbar, interactive fill tools and a transparency feature. The best of the newcomers are the Repeat Stroke and the Image Sprayer. The former lets you record a paint stroke, then replay it elsewhere in the image with controllable, but random, variations in size and direction. You can also change brushes and colours between strokes. The latter, a flattering copy of Fractal Design Painter's "Image Hose", lets you assemble a collection of images and spray them, again with controlled variation, onto the screen. Although the range of naturalistic brush effects isn't up to those seen in xRes, there's a good range of image-enhancing tools and a more generous supply of plug-ins, including Paint Alchemy and Kai's Spheroid and Fractal Explorers. All the filters and plug-ins are also available in Draw, for use on imported bitmaps.

Dream 3D is a lot less ambitious than Macromedia's Extreme 3D. It doesn't have animation, the Metaform tool or the high quality of rendering. And, despite the instability of the Extreme 3D beta, Dream 3D seemed slow in comparison. On the plus side, there are easier

camera controls for navigating the view, a scene Wizard for setting up stock indoor and outdoor scenes, and VRML output for "Virtual Reality" 3D web output. For simpler 3D effects, Corel Depth is far easier, particularly for logos and solid-effect text. There's a set of Wizards and a library of preset styles (although you can create your own effects) and just one light source.

Draw, like FreeHand, has built-in bitmap Autotracing but there's also a separate dedicated application, OCR-Trace, which goes further, creating special effects such as mosaic or woodcut effect vectors from a bitmap. It will also convert a scanned document into text and export this to a variety of word-processing formats, but as this needs a resolution of 300dpi or more it wouldn't work on faxes imported from Windows 95 Messaging. Corel Script lets you create your own add-ons for Draw and Photopaint. As with word-processor macros, you can record scripts (a useful way of saving special effects as "presets") or program commands in the editor which comes with its own dialogue box creation tools.

This just leaves us space to look at the new kid on the block, Corel Texture, which lets you create layered textures with various lighting effects. Your top layer, for example, might be rough, translucent and metallic to catch highlights, and the bottom layer contoured to give a bevelled-edge or framed effect. Intermediate layers can simulate clouds, wood, stone or simply consist of a translucent shaded fill. There are some clever features such as edge-matching for seamless tiling, and when you're happy with the tiny preview you can render a larger image to screen, which can take some time. And when you are happy with that, because no other Corel applications can read the native .TEX format you have to render the image to a .BMP file, which takes even longer.
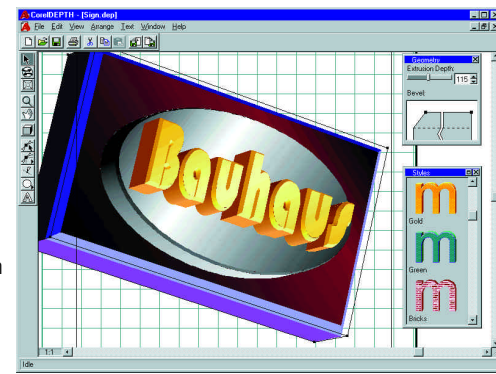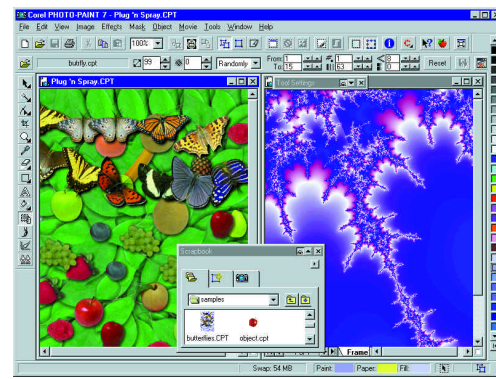
Top
PhotoPaint: spray-on leaves, fruit and butterflies on the left, and a fractal plug-in effect on the right

Bottom
Depth: quick and easy 3D logos

•PCW Details

Price £495 (plus VAT)

Contact Corel 0800 973189

Good Points Draw has a vastly improved interface, good consistency between applications and lots in the box.

Bad Points Huge, many of the "innovations" are copied, and the 3D compares poorly with Macromedia.

Conclusion More imitation than innovation, but resulting in a much better interface than version 6.

★★★★

Macromedia FreeHand Graphics Studio

O ne way *not* to win friends and impress them with your integration is to make them run six Setup programs and enter a total of 48 digits as serial numbers. I'd hoped that Macromedia would rationalise this before releasing the product, but no. In addition to the core of FreeHand (vector drawing), xRes (image processing and painting) and Extreme 3D (solid modelling), there's Fontographer for typeface creation and a special edition of Kai's Power Tools. The release version will come with 500 fonts and a 10,000-piece clip-art library. There are various web-browser plug-ins for Shockwave.

Shockwave is Macromedia's own-brand technology for enhancing web pages. With Shockwave "plugged in" to your browser, you can zoom in to FreeHand illustrations and view multiple true vector fonts. Similar plug-ins let you pan and zoom xRes images without downloading the entire file, and view 3D models from Extreme 3D and multimedia shows from Director (not part of the package). To complement this, the core components have the corresponding technology, including the facility to create image maps containing URLs. Although there's an Afterburner to compress images, there was no way to create HTML files in the review copy. Macromedia assured me that an "Xtra" to do this will be included. FreeHand can export directly to Adobe Acrobat Portable Document Format (PDF) — normally you'd need to buy Acrobat Distiller for this.

FreeHand is now part of the Macromedia empire and, like Illustrator, from Apple Mac origins, it's taken a while to get to grips with the Windows interface. The last version, for instance, had no button bar, no Recent file list and no function (apart from switching zoom levels) for the right mouse button. These shortcomings have now been rectified, and there's been a general facelift of the interface. Part of the new look is a standard button bar which offers the usual file, print, clipboard and undo functions, various grouping and alignment tools, and toggles for the main floating palettes. More unusual is a Find and Replace button for changing graphic attributes like stroke-width or the font of any objects in the document, page or selection. Below this is a word-processor style text formatting bar, with additional controls for fitting text onto a shaped path or flowing it into a container.

Complementing these is the usual toolbox containing the main drawing and shaping tools and a variety of palettes. Taking the most important of these, the Inspector, you have five tabs corresponding to the fill, line, text and placement attributes of the selected object and the page setup options. Other palettes include the colour list and picker, layers, styles and half-tones. You can drag individual pages out of a palette to have, say, both outline and fill properties visible at once, or nest them together to create one big

all-purpose palette. Each palette or toolbox will collapse to show just the title bar and tabs. Another way of combining palettes is to dock them together to form a "raft"; they'll all move together when you drag them, and collapse in unison when any one is minimised.

FreeHand really excels in its colour management. Unlike most drawing packages where you start off with a default palette, here you start with black and white. You can add colours either by mixing them, or from a variety of industry-standard libraries, then drag and drop from the palette onto objects. Even though you can bypass the palette and drop straight from the mixer, it makes sense to take the disciplined approach as you can name colours and create any number of shades. This is where it gets clever, as changing the "parent" colour changes all the dependent shades, so if you've created a piece of artwork in subtle shades of Leafy Green and
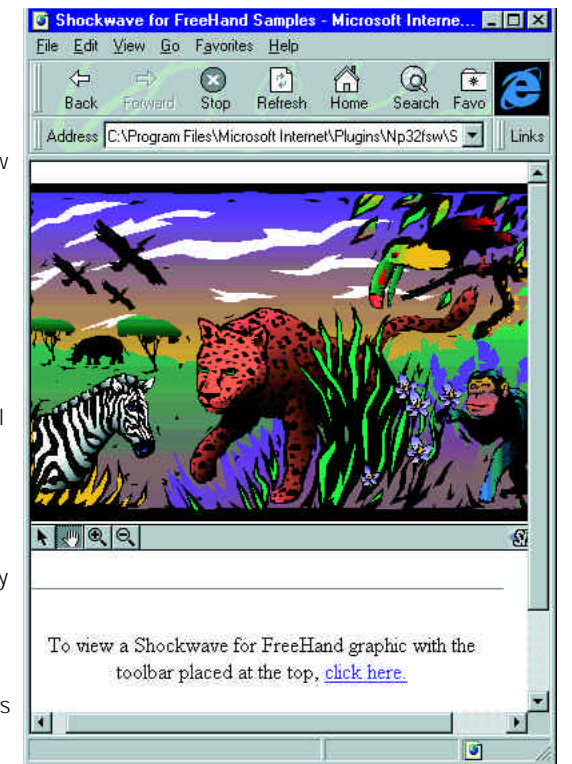
Above & left
Monkey business: Zoom into FreeHand web graphics with Shockwave

Below
All change with FreeHand's excellent palette management
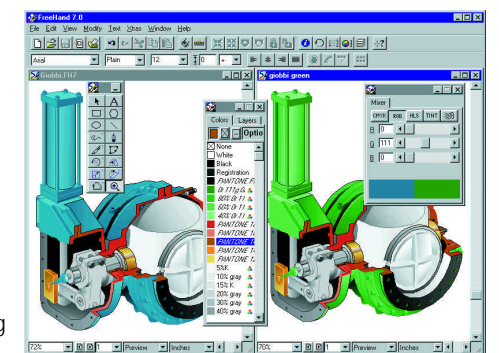
your client changes their mind in favour of Autumn Gold, you can transform the entire picture at a stroke.

There's an improved tracing tool for converting bitmapped images to vectors, and blending has been much improved; you can now blend between multiple shapes along a user-defined path. FreeHand is open to third-party add-ons either through Java (or, in the Mac version, AppleTalk) scripts and via "Xtras". Bundled Xtras include URL tagging, chart creation, colour correction, various shape distortion effects such as roughen, curve or fractalise, Boolean operations (adding and subtracting shapes), transparency and more.

Turning to xRes, it has a very "PhotoShop feel" to it. As well as Macromedia Xtras it supports Adobe standard plug-ins such as the bundled Kai's Power Tools. The interface is broadly similar to FreeHand's, with toolbar, toolbox and palettes, but with different stylistic details in the palette tabs and controls. As with FreeHand, you can drag tabbed pages to and from palettes and collapse them. Despite the different look and feel, there is some degree of integration with FreeHand. You can double-click a bitmap in the latter, and launch xRes to edit it via Macromedia's Information Exchange. Although it's claimed that this happens "in-place" as does normal OLE, it didn't in our beta copy. You can also copy text via the clipboard from FreeHand into xRes. There's a competent selection of image-processing tools and filters and good painting tools, including textured surfaces and "natural" media like oils and charcoal and great multi-stroke effects like Cubist or Van Gogh (all adjustable) ,unlike FreeHand, no support for pressure-sensitive input devices.

Its selling point is the way it deals with large files — that is, over 20Mb. Any changes you make to a file are applied immediately to the screen image rather than the entire file, which means a massive increase in perceived performance. It also means you can load very large files with a modest amount of RAM, but you'll need 500Mb of disk space free as a swap file. Once satisfied with the results, saving to a format other than the native .LRG, such as TIFF, will "render" the changes to the entire file. One useful "Xtra" is the ability to batch-convert files between bitmap formats.

Extreme 3D derives from a variety of products, including Macromedia's MacroModel which originally sold for over £1,000. Once again, we have a rather different interface. You can't resize or collapse the various palettes, although you can move them out of the main window. The best way to get started is to set up multiple views (three wire-frames from different angles and a rendered Camera view) and start creating solid shapes. You have 3D primitives such as cones and blocks but you can also create surfaces from sweeping 2D shapes along a path or twisting them around an axis. Having created objects you can link them, apply surface materials like metal or wood, light them in various ways, and change the camera angle

and perspective. But this reviewer's task was not made any easier by the lack of documentation and a tendency for the beta version to go belly-up at frequent intervals; it was all rather exciting. There are some cool tools here, such as the Metaform that "melts" hard-edged shapes into smooth organic forms that flow into each other.

Having created objects, you can animate them by creating a frame-by-frame score, and here there are additional tools such as "Particles" which can be used to create effects such as fireworks, falling snow or wafting smoke. The resulting animation can be exported to Macromedia Director, or to the web via VRML.

Finally, Fontographer is considered the number one professional choice for designing and editing TrueType and Adobe Type 1 or 3 typefaces. Everything you could possibly need is here: as well as editing character outlines, you can define font metrics such as kerning of letter pairs, and apply "hints" that enhance screen appearance by subtly distorting the outline to fit the pixel grid. You can create a new font from scratch but bear in mind that it took Hermann Zapf six years to perfect Optima, and that was without the complications of a computer. What's probably more useful to the majority of designers is to add symbols (logos, fractions or even signatures, say) to an existing font, should the terms of the software licence permit it. The review copy was a demo (you couldn't save the results) but Macromedia claims that the release version will contain the real thing. It showed a peculiar bug in that the toolbar was composed of characters, rather than icons, which meant considerable guesswork, so let's hope they crack this one.
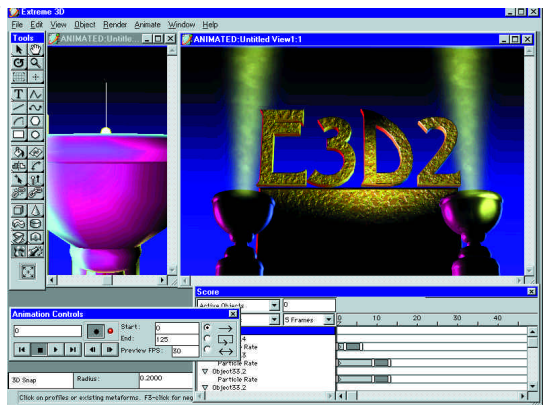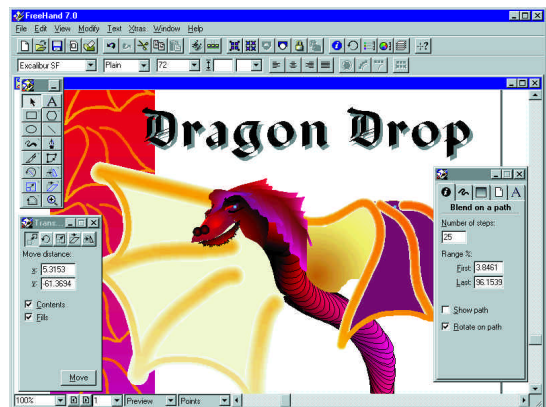
Top
Ask the Inspector about blends on a path

Bottom
Extreme 3D: Stunning rendering with animation, too

•PCW Details

Price £550 (plus VAT)

Contact Computers Unlimited 0181 358 5857

Good Points FreeHand has superb colour handling and a much improved interface. xRes handles huge files. Extreme 3D promises to be brilliant and powerful.

Bad Points Poor consistency between interfaces. No graphics browser

Conclusion Four strong products that need more work on integration.

★★★★

Conclusion

If size were everything, Corel would win hands down. There's not just more applications, but more help, more templates, more tutorials and more fonts, clip-art and other resources. By comparison, FreeHand Studio, which takes a fifth of the disk space, seems positively spartan. On the other hand, it's arguable that much of the contents of Draw might stay in the box. Do professional illustrators really need OCR, grammar checking and sticky notes? But let us look at it piece by piece. Of the two star turns, FreeHand has a rather more professional reputation than Draw, and its colour management is certainly far more disciplined. But a look at the feature list shows that there is little else in FreeHand that does not appear in Draw, including high-end features such as Hexachrome separations, automatic trapping and pressure-sensitive pen support.

Conversely, there is a lot in Draw: fractal textured fills, script recording, and graduated transparency that does not figure in FreeHand; and although both were in beta form, Corel was considerably faster at redrawing. Add to this the vast interface improvements brought by the Property Bar and Interactive tools, and I would give round one to Corel.

For bitmap editing, the honours are closer. They both have essentials such as multiple undo and bundled plug-ins, but xRes's superior brush styles and large file handling are more likely to attract the professional. So round two to Macromedia, and on to 3D modelling where, despite the instability of the unfinished Extreme 3D, it is better equipped and faster than either Dream 3D or Depth.

As for the extras, this is largely a matter of personal preference. Anyone seriously into type design would gladly trade Fontographer for all the Corel extras, but it is a dedicated art and one the professional illustrator would probably leave to the professional typographer. For web support, although neither beta had this fully functioning, the Shockwave platform is already proven whereas Barista has yet to really show its paces. I reckon that makes it three-one to Macromedia so far.

Neither package is going to be all things to all users. Top bitmappers will probably stick to Adobe Photoshop for image processing and Fractal Design Painter for artistic brushwork. And they will probably have a copy of Paintshop Pro just for browsing, quick-viewing and converting graphics. Top 3D modellers will probably stick with products like Autodesk 3D Studio. However, looking back at the overall picture, the overwhelming impression is that Corel offers a more integrated package. Even though its MediaManager has limitations, it is an essential tool that Macromedia lacks. There is also a more consistent interface with the Corel products, and much more effort has been made to help the user with templates and tutors. "Professional" does not have to mean an arduous learning curve. So this time, I think Corel just takes the prize on the strengths of Draw, integration and user friendliness. That brings the core to four-three, but next time around, if Macromedia can fill in the gaps and achieve a consistent house style, the result could be very different. ■

Key Features

CorelDraw 7
1. New property bars throughout
2. HTML, Barista and Envoy output
3. Interactive tools for blends and fills
4. Graduated transparency
5. Anti-aliased viewing in Draw
6. New right-drag attribute copying
7. Image sprayer in PhotoPaint
8. Both Draw and PhotoPaint support Adobe-standard plug-ins
9. New texture creator
10. Scripting language in Draw and PhotoPaint
11. Colour "families" allow wholesale change
12. 1,000 fonts, 32,000 clip-art images

FreeHand 7
1. Shockwave and VRML output
2. FreeHand at last has a proper Windows interface
3. Superb rendering and animation in Extreme 3D
4. Large file handling in xRes
5. Better blends in FreeHand
6. Better tracing in FreeHand
7. Professional font creation
8. Drag-and-drop customisable tool palettes in xRes and FreeHand
9. Excellent colour management in FreeHand
10. Xtras and script development add-ons
11. 500 fonts and 10,000 clip-art pictures
12. Simultaneous PC and Macintosh releases

Flip side **storage**

It won't be long before DVD-ROMs, double-sided or multi-layered, will have 24 times the capacity of the ageing CD-ROM. **Tim Frost** reports on the progress of the young pretender.
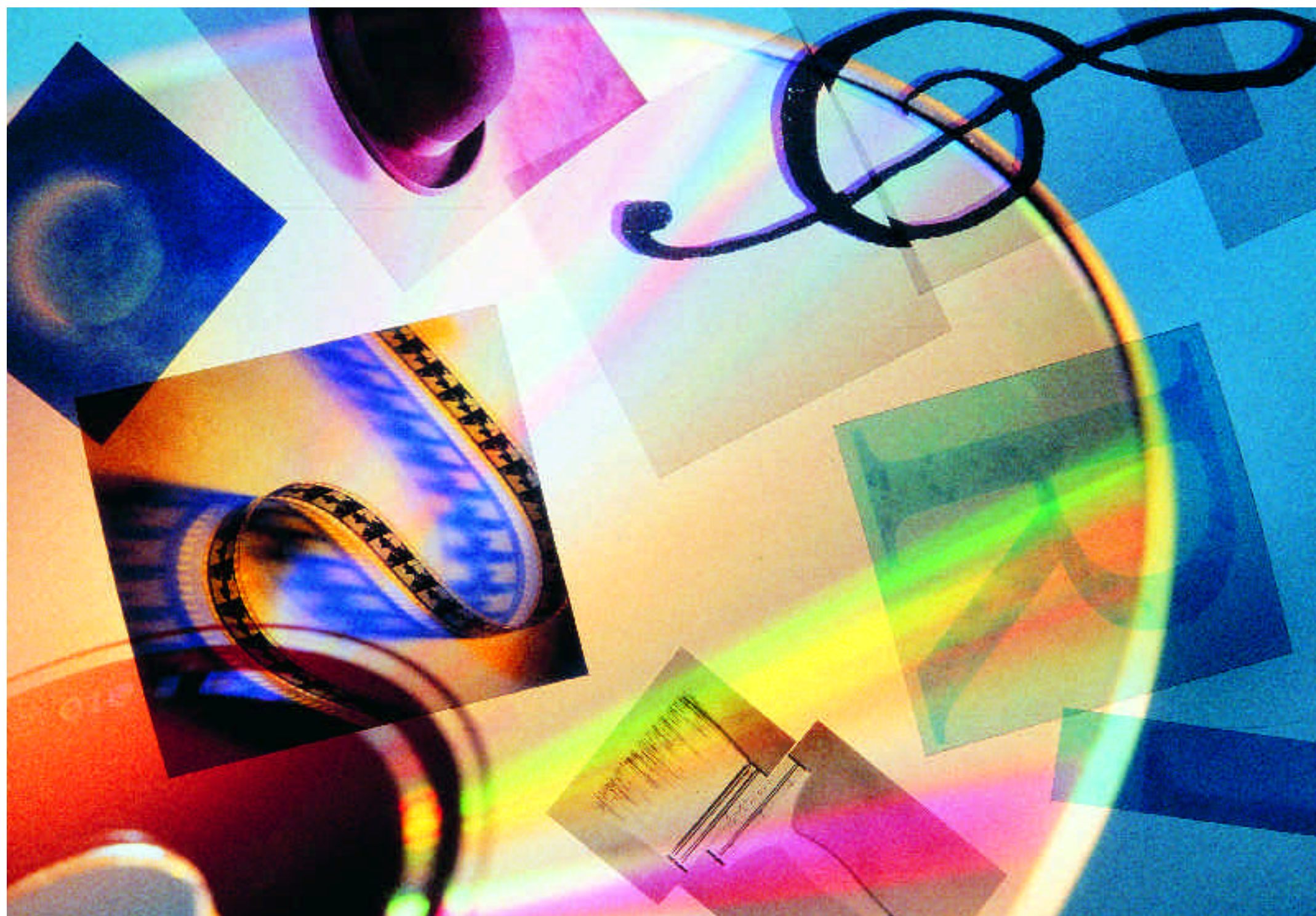
The CD-ROM is a storage system like any other. The fact that it started with a ridiculously high capacity for its time doesn't protect it from the pressure to offer more capacity or die. For a disc that has been around for ten years, it's done well to remain as popular as it has, considering hard-disk capacity has increased in size a hundred times over the same period. But now it really is time for CD-ROM to get a facelift if it is going to survive into the next century.

So say hello and welcome to the new CD-ROM: the DVD-ROM, originally called digital video disc but now increasingly becoming known as digital versatile disc. It has a capacity that starts at six times that of the CD, and will increase to 12 or 24 times that of the CD during the next year or so.

When a new, high-density CD was suggested, two distinct requirements emerged. The first was to be able to use DVD as a carrier for video movies, to replace pre-recorded VHS, and the second was to use it as a high-capacity CD-ROM. What we have ended up with is a disc format that will quite happily do both.

The new DVD disc looks just like an ordinary CD, but instead of holding a mere 650Mb, the DVD's capacity ranges anywhere between 4.7Gb to 17Gb, making it usable both as a ROM software carrier and as the new carrier for pre-recorded video. The movie companies immediately saw a big CD as a way of stimulating the video market, producing better quality sound and pictures on a disc that costs considerably less to produce than a VHS tape. Using MPEG2 video compression, the same system that will be used for digital TV, satellite and cable transmissions, it is quite possible to fit a full-length movie onto one side of a DVD disc. The picture quality is as good as live TV and the DVD-Video disc can carry multi-channel digital sound. However, while DVD-Video has been grabbing the most headlines, DVD-ROM is going to be much bigger for a long time to come. Over the next few years, computer-based DVD drives are likely to outsell home DVD-Video machines by a ratio of at least 5:1.

With the enthusiastic backing of the computer industry in general and the CD-ROM drive manufacturers in particular, by the end of this decade there will already be more DVD-ROM drives in use than CD-ROM drives.

The need for more capacity in the computer world is obvious to anyone who already has multi-CD games and software packages. Existing programs are outgrowing CD and, without a higher capacity version, you could see the return to the multiple disc sets that we thought had gone away when CD-ROM took over from floppy disk. Since disc capacity is one of the key restricting factors on the image and sound quality in multimedia and games titles, the increased capacity also means better, and more, graphics and sound in future titles. Give a software developer half a dozen times the disc capacity and just watch those graphics, sound and video files grow.

How is it done?

DVD has managed its move up in capacity without any real magic tricks. It has all been achieved mainly by tightening up the tolerances throughout the system. The pitch of the tracks (the distance between each) is a lot smaller, so more tracks can be placed on the disc. The pit size is smaller, which means more pits representing the digital ones and zeros can be placed on each track. Smaller pits also mean that the laser has to produce a smaller spot, and consequently the laser's wavelength has been reduced from the 780nm of a standard CD, to 635nm or 650nm (nanometers, or 10^{-9} of a meter).

The structure of the data put on the disc is also being made more efficient. When CD was developed in the late

The CD-ROM data layer is near the top surface of the disc. DVD's data layer is right in the middle so the disc can be made double-sided. The laser has to be refocused using a second lens so that the DVD drive can read both CD and DVD
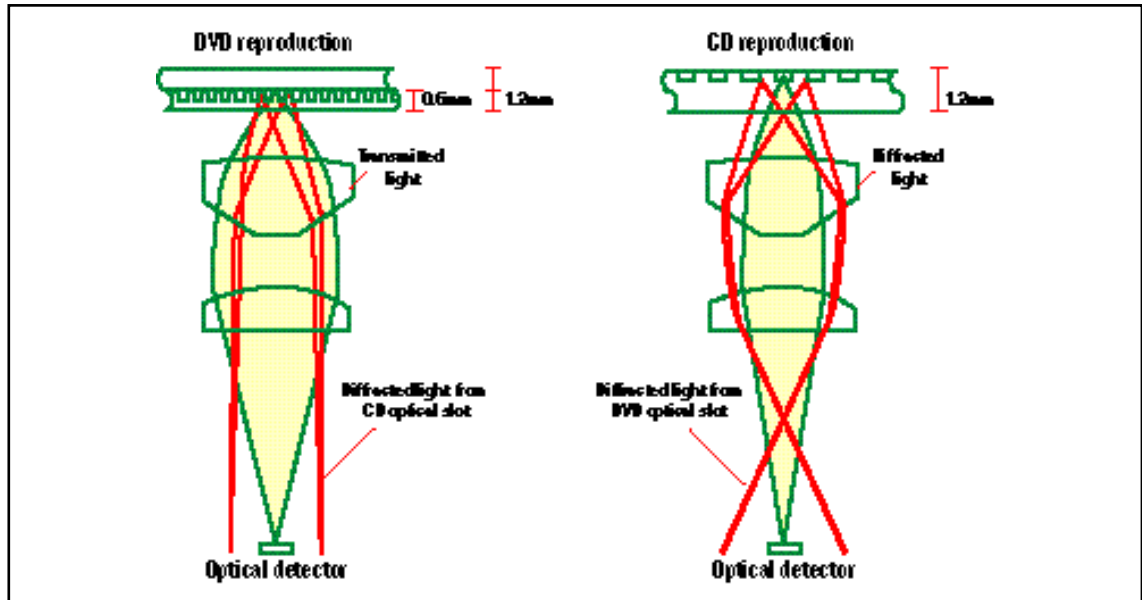
seventies, it was necessary to build in some heavy-duty and relatively crude error correction systems to guarantee the discs would play. When bits are being used for error detection they are not being used to carry useful data, so DVD's more efficient and effective error correction leaves more room for real data.

The biggest practical difference between the two ROMs is that while CD is single-sided, you can turn a DVD over and play the other side, so doubling the 4.7Gb capacity of the disc.

As well as double-sided discs, the DVD specification includes multiple-layer discs using semi-transparent data layers placed over the main data layer. The laser refocuses almost instantly between layers, thereby creating a disc that can seamlessly deliver 8.5Gb of data without having to take the disc out of the drive to turn it over. While all drives have the capability of reading dual-layer discs, it will be some time (a year, or more) before multi-layer discs can be reliably manufactured.

Like DVD discs, there is little to distinguish a DVD-ROM drive from an ordinary CD-ROM drive as the only giveaway is the DVD logo on the front. Even inside the drive there are more similarities than differences: the interface is IDE/ATAPI or SCSI-2 for the more upmarket drives, and the transport is much like any other CD-ROM drive. But the laser is different and it also has a pair of lens on a swivel: one to focus the beam onto the DVD data layers and the other for

reading ordinary CDs. The DVD drive will perform similarly to an eight-speed CD-ROM drive and, as with CD-ROM, expect to see double-speed or quad-speed drives coming out as the technology matures.

One of the major achievements of DVD is that it has brought all the conceivable uses of CD for data, video, audio, or a mix of all three, within a single physical file structure called UDF, the Universal Disk Format. The UDF file structure ensures that any file can be accessed by any drive, computer or consumer video. It also allows sensible interfacing with standard operating systems as it

The history of DVD

When Philips and Sony got together to develop CD, there were just the two companies talking primarily about a replacement for the LP. Decisions about how the system would work were carried out largely by engineers and all went very smoothly. The specification for the CD's successor went entirely the other way, with arguments, confusions, half-truths and Machiavellian intrigue behind the scenes.

It all started badly with Toshiba and the movie-makers Time/Warner in one corner, and Sony and Philips in the other, offering two totally incompatible disc formats, creating the possibility of a VHS/Betamax-type battle. A single DVD specification was eventually hammered out between the two opposing sides after pressure from the computer industry. The likes of Microsoft, Intel, Apple and IBM gave both sides a simple ultimatum: produce a single standard, quickly, or don' t expect any support from the computer world.

The major developers, 11 in all, created an uneasy alliance under the DVD-Alliance banner, continuing to bicker over each element of technology being incorporated in the final specification. The reasons for the continued rearguard actions was simple. For every item of original technology put into DVD, a licence fee has to be paid to the owners of the technology. These licence fees may only be a few cents per drive but when the market amounts to millions of drives a year, it is well worth arguing over.

If this didn't make matters bad enough, in waded the movie industry. Paranoid about loosing all its DVD-Video material to universal pirating, Hollywood first decided it wanted an anti-copying system along the same lines as the SCMS system introduced for DAT tapes. Just as that was being sorted out, somebody told Hollywood that you could use a computer for bit-for-bit file copying from a DVD disc to some other medium. Hollywood went ballistic, insisting on a more complex, but still only moderately secure, encryption system which has to be applied both to DVD-Video players and DVD-ROM drives.
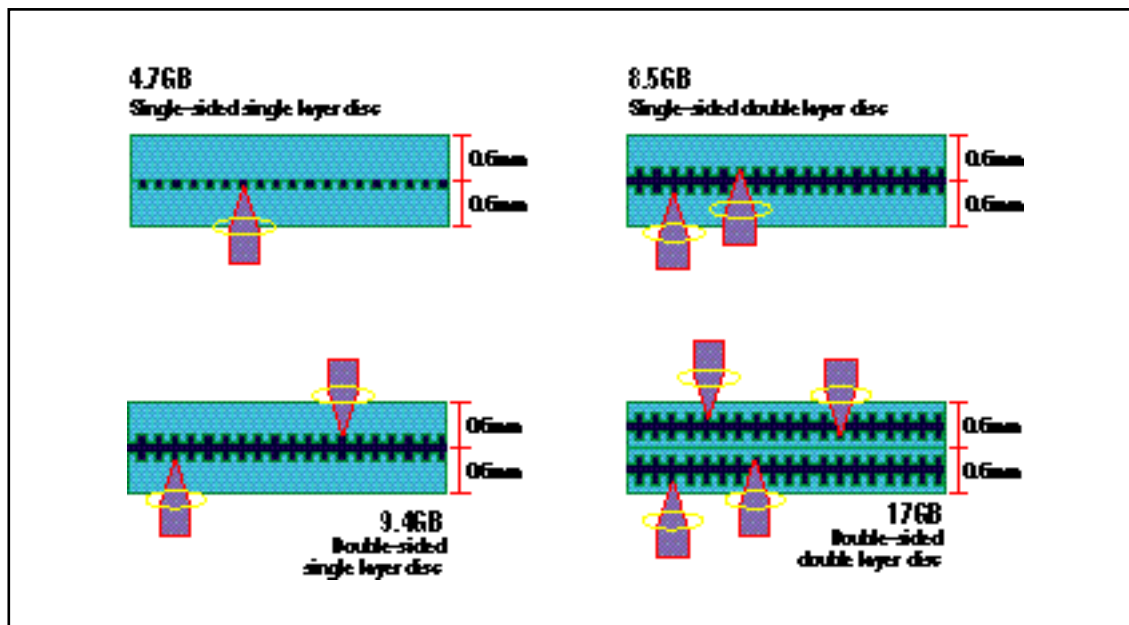
includes CD standard ISO9660 compatibility.

UDF overcomes the incompatibility problems form which CD suffered, when the standard had to be constantly rewritten each time a new application like multimedia, interactivity, or video emerged. Both discs and drives are trickling out but that trickle will become a flood because the manufacture of DVD discs is relatively straightforward, and titles from games and other image-intensive applications will appear with increasing regularity throughout this year. The crunch time for a general switch-over to DVD-based software is expected to arrive around the end of next year, as DVD-ROM drives reach entry-level pricing and start to outsell CD-ROM drives.

The downside of DVD

It is not quite all sweetness and light for DVD-ROM. The hopes that the backward-compatibility will let you get away with just a DVD drive in your PC are dashed if you ever need to play CD-Rs. Unlike ordinary CDs, the reflective surface of a CD-R (CD-Recordable) is made to exactly match the 780nm laser of an ordinary CD-ROM drive. Put a CD-R in a DVD-ROM drive and it won't reflect enough 650nm light for the drive to read the data. There is no immediate solution to this problem but there are two proposals in the air to fix it for future users.

The one being proposed by Philips is a new CD-R standard, CD-R II, which will use a modified CD-R dye layer to reflect both 650nm and 780nm light and create a universally playable CD-R. The CD-R disc manufacturers believe that a dye with such a wide window of reflectivity will be hellishly difficult to create and may significantly push up the cost of blank CD-Rs.

The alternative solution, being presented by Sony, is to use dual-semiconductor lasers in DVD drives, which can produce both 635/650nm and 780nm wavelengths. Sony believes these dual lasers will not add substantially to the cost of a DVD drive.

DVD video encryption

Video files on DVD will be encrypted, so they can simply be digitally copied and played. The 40-bit key to the encryption is on the disc in encrypted form, and the drive checks the key and uses it to unlock the video. To prevent you copying the key as well as the data to another disc, the copy protection chip inside the DVD-ROM drive re-encrypts the key in a different way so that a copy ends up with a key re-encoded in a way that a DVD-ROM drive won't recognise. The MPEG decoder card (or decoder software) will be able to recognise the newly-encrypted key and decode and play the video. The system seems to please Hollywood, although it is admitted that it is only designed to combat home taping by the non-technical. Warner has already stated that encryption may only be applied to mainstream blockbuster video titles. Computer software producers will follow CD-ROM traditions in not including copy-protection on DVD-ROMs.

DVD Recordable

DVD-R (or, DVD-Recordable) will follow hard on the heels of DVD-ROM and, at about 3.8Gb per side, DVD-R will not quite have the full capacity of DVD-ROM. An early release of DVD-R is important to the development of DVD-ROM titles since software developers need a simple and relatively cheap way of producing test discs before going into full production. DVD-R will also find friends among those who want high-capacity archiving at a relatively low cost, but the majority of desktop computer users will want to wait for DVD-RAM — the record-erase version.

DVD-RAM uses magneto-optical technology rather than the pure optical technology of CD and DVD discs. However, DVD-RAM drives will read CDs, DVD-ROMs, DVD-Rs and DVD-RAM. The first generations of DVD-RAM, expected later this year, will deliver 2.6Gb of re-usable data space.

Playing
the game

There are few inventions to which you can readily link the name of the inventor. But the Wright Brothers invented the aeroplane and Nolan Bushnell invented the computer game.

The idea that a computer, essentially an academic tool, could be used for something as trivial as a games machine was a strange concept back in 1970. Nolan Bushnell was unique in that he had the right mix of engineering and business skills to come up with the goods. Born in Utah in the USA, he worked in an amusement park during his holidays from college, where he was studying engineering. When he graduated he went to work for Ampex, the recording tape company, working on some of the first digital techniques.

At university his first interest was in ham radio, but he drifted into computing. Those were the days of punched cards and paper tape — a CRT was seen as cutting-edge technology. His first program was a fox and geese game, which was a classic chessboard program. But the important step forward was Computerspace, an action game where you took on the role of a rocket doing battle with an alien spaceship. The second game was Pong, a simple tennis game which later evolved into games with joysticks. This was the first genre of computer gaming and it was also the first product from Atari, Nolan Bushnell's company. The company name comes from the ancient board game of GO: it's a polite warning to your opponent that he's about to be engulfed; it also means "jackpot" or "bullseye".

One important thing to remember is that all this happened at the dawn of microprocessing. The first real microprocessor was the Intel 4004 which didn't appear in commercial quantities until 1975. The first video game to use a microprocessor was Asteroids, in 1977. Even Space Invaders wasn't computer-based.

Computerspace and Pong pushed the technology of the day to its limits. These were games in firmware — more hardware than software. "If we wanted to show a score we had to put flip-flops on the board and make up a seven-segment display," says Bushnell.

Pong was a modified state machine rather than a traditional Von Neuman design. Even when processors became available they were too slow for interactive games, and arcade games owed more to signal processing than what we know as computing. All Nolan's original patents concern firmware. But perhaps the most innovative aspect of the design was that these machines had a coin slot. This may not have been a feat of engineering but it was one that created an industry.

Computerspace was a hit and over $3m-worth of machines were sold, and Pong was even more successful. It's interesting that the world's second arcade machine played a game which was simpler than the world's first, but it's a reflection of Bushnell's understanding of marketing. The complicated Computerspace game was popular in computing companies and on university campuses, but Pong appealed to everyone. It's a view he carries through to today: "Good gameplay is necessary but not sufficient. Good graphics are not necessary." Despite the huge success of his first two machines, Bushnell was "incessantly" told that computer games were not a worthwhile venture, merely a fad.

It's gameplay which makes a successful machine and it's something which Bushnell believes the British are particularly good at. "There is a unique sense of play in the British mind," he says, but warns that: "The UK developer has problems profiting." The UK has produced more games per capita than anywhere else in the world and he attributes the wealth of talent to the Sinclair and BBC micros which led to the technology being embraced by the academic community. But he feels that the British are great game players, with a culture that has produced darts and whist, for example — something he attributes, in part, to our climate.

In 1976, Nolan sold Atari to Warner Brothers, making himself very wealthy and taking on the role of chairman.

There was more to Atari than coin-ops: there was the home computer division (later sold to former Commodore boss, Jack Tramiel), a pinball division and location-based entertainment (LBE) among numerous others.

Bushnell is bitter about the death of Atari: "They picked at the bones and then ground them up until there

Nolan Bushnell: If you've ever put a coin in a slot to play a computer game, your life has been touched by this man

was nothing left — although there may still be some shareholders." He left in 1978 and feels that a number of mistakes were made in 1983. At the time, Atari could have had the rights to Nintendo (a company which is today twice as profitable as Microsoft). Whatever is left, the spirit of Atari died a long time ago.

Bushnell's entrepreneurial flair led him to expand the location-based entertainment in the form of the Chuck E Cheese pizza parlour, a fun-based restaurant with arcade machines. He set up about 17 companies including ETAK, a computer mapping firm which he sold to Rupert Murdoch (and which is today behind many in-car navigation systems), Magnum Microwaves, and Bi-video, a kiosk-based shopping system.

One of his failures, in the early eighties, was Androbot, a robot for the home, and Nolan acknowledges that it was far too early for the technology: "I understand now what was required, right down to how many MIPS it needs." Androbot was a simple drinks-carrying robo, and there was the Petster, which looked like a cat and ran towards you when you clapped. Still more an expensive executive toy than genuinely useful, Bushnell believes that the day of the domestic robot will come, but it's a project of the future.

He was recruited by Commodore as a marketing guru to help with the CDTV. He worked on the architecture but claims he "learnt with $3m what it took Trip Hawkins $100m to find out: there is no market for a $700 games machine." The CDTV didn't break Commodore's back but it remains to be seen if Trip Hawkins' failure, 3DO, will survive its eponymous console. Bushnell claims that even at $400, the CDTV was too expensive, but at $200 the Sony Playstation and Nintendo 64 have got it right.

It is with this background of understanding the juxtaposition between the market and the technology that Nolan Bushnell is taking on the internet. His company, Aristo International, is promoting a technology which he says will not be ready for use in homes for three to five years, but which can be offered via dedicated consoles in leisure locations like bars, airport lounges or anywhere you might today find an arcade machine.

Bushnell sees the same problems with the internet as most people: it's too slow, line speeds are too low and latency makes it behave unpredictably. He sees strong parallels with the arcade machines of 1972 waiting for technology to catch up. Ironically, the US may have to wait longer for his next generation products. The situation is better in the UK: ISDN is more widespread and cable

TV is newer and so more data-friendly. In the US, ISDN availability outside the major city centres is poor and it will initially be high volume systems, like those envisaged by Nolan Bushnell, which justify the cost.

The initial products will be Touchnet, Playnet Music and Teamnet. These are three consoles which Bushnell sees as the key to getting the internet into public places. It's not an original idea: from Cybercafés to Philips' "vision of the future" there are similar systems. Prestel has also experimented with coin-operated terminals but it's difficult to tell the man who invented the video game that the internet is yet to prove itself.

Touchnet is, at one level, a Pentium machine running NT 4 with a custom front-end. What's in the box is an enabling technology; what you have on your desk is irrelevant. There is a wide choice of things you can do with a Touchnet machine: browse the web, chat, compete in tournaments and play games. This would be ideal set into the top of a bar, and the right games are the kind you already find there — "Non-twitch games. You wouldn't want to play Duke Nuke 'Em when you've had a couple of beers," claims Bushnell. So instead there would be card games, chess and other favourites.

"…you wouldn't want to play Duke Nuke 'Em when you've had a couple of beers"

Playnet Music will be a universal jukebox. There will be thousands of them, capable of playing nearly every track you could think of, downloading the music in real time over the internet. Because some records will be requested a number of times in a particular location, there is a lot of local hard disk space needed and tunes must be cached, making this music-on-demand system very taxing on bandwidth.

Teamnet is aimed at college bars: it is an action game played between two teams of four people either in the same bar or against a team anywhere on the network. It's a more traditional arcade game with a trackball and four buttons. There is scope for intense competition and leagues, with the kind of addictive quality ideal for the "just one more game" nature of arcade machines, which in turn makes them highly lucrative.

The first Aristo International machines are now on-site. "The first of millions," claims Bushnell. Time will be the ultimate judge but Bushnell exudes confidence and wouldn't be doing it if he didn't think there was huge potential. "I'm only interested in hundreds of millions of dollars," he says. It may be a claim laced with avarice but you can't deny the man's record. If you have ever put a coin in a slot to play a computer game, your life has been touched by Nolan Bushnell. ■
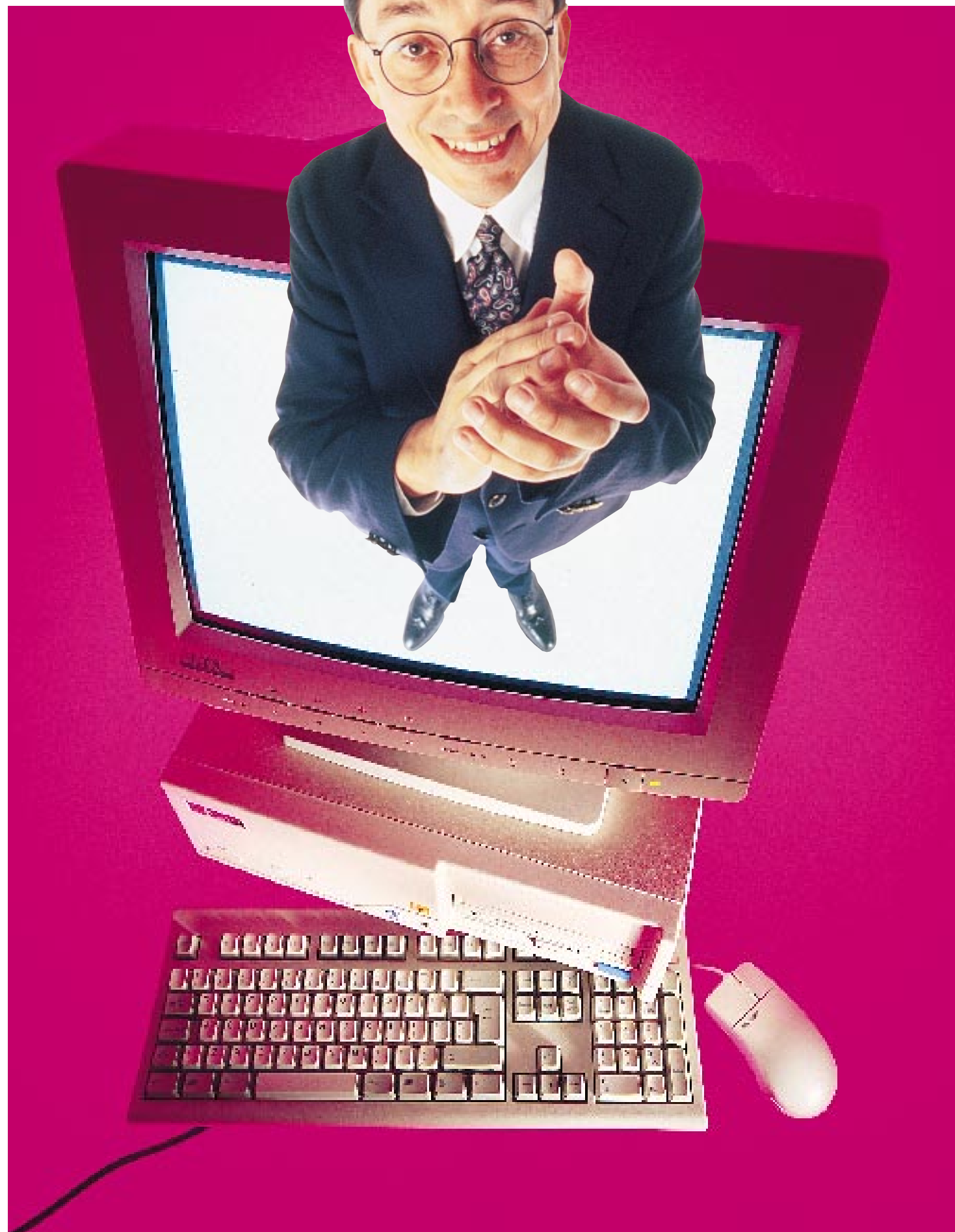
The only way is up

Hardware becomes outdated as quick as a flash but the top-of-the-range PCs can often be upgraded. Matt Loney tests Pentium 200s, looking at bundled software, peripherals, performance and upgrade opportunities.

B uying a computer is like buying nothing else. Buy a hi-fi, a bike, or a camera and two years down the line it will still play CDs as well, go just as fast or snap the same quality photos. Of course, if you have the money you can upgrade to the newest technology, but if you don't want to then you don't have to. As any vinyl purist, penny farthing peddler or pinhole photographer will tell you, the technological advances don't adversely affect your average enthusiast.

But computers are different. Every year specifications creep up: you find less and less software that will run on your system and the software you do find runs slower and slower. So what do you do? Well, one solution is to buy the ultimate PC, the fastest PC on the market today.

Buying the ultimate is the best way to protect yourself against the technological tango that Microsoft and Intel dance together, pushing up system specifications so that even the best you can buy today will look archaic by the turn of the century. If you can afford the latest technology and get a PC that will blow your socks off, you can future-proof yourself at least to a degree and have a damned good time with it while it lasts.

The ten machines reviewed here all use Intel Pentium processors whistling along at 200MHz, and boy! do they go. Boosted by 32Mb of RAM, pipelined burst cache and impressive graphics cards, all have large 17in monitors: with this sort of power, anything less just doesn't make sense. And all are fitted out with wavetable cards, speakers, fast CD-ROM drives and built-in fax modems — just about everything you need in a PC, whether you want to manipulate vast spreadsheets, surf the net, edit video, pilot an X-Wing fighter or simply track down nasties in Quake and blast the hell out them.

The specifications we asked for were a Intel 200MHz Pentium processor, 32Mb of RAM, a 2Gb hard disk, an eight-speed CD-ROM drive, 512Kb of burst mode pipelined cache, a graphics card with 2Mb of VRAM, a wavetable sound card, a V.34 fax modem and a 17in monitor. This is what we got:

P200 Photography by David Whyte

P200s Contents

Armari Arcturus

Armari seems to be getting a reputation for well-built machines.

A lot of it is down to the quality of the case, and the company seems to have found a good supplier. One screw and the plastic shell slides easily off to reveal a robust metal chassis inside.

Armari has used a very simple but elegant case for its machine. The front is tidy: there are two spare 5.25in and one spare 3.5in bays, with space for a second hard disk inside, mounted vertically behind the power supply.

Once you have the top off there is plenty of room for expansion both in the case and on the Tyan Tomcat 3 motherboard which is widely rated as one of the best around. For a start, it has sockets for two Pentium processors, although you would need to install Windows NT to really take advantage of that feature. There are eight memory sockets to take up to 512Mb of RAM in a good range of SIMM combinations, and nine card slots. Of these, you have three ISA and three PCI slots free. The motherboard uses the Intel 430HX chipset which has support for two USB sockets, but these are not guaranteed to work.

Memory-wise, you get 32Mb of EDO RAMas standard, with 512Kb cache, an eight-speed Teac CD-ROM and a 2.11Gb Quantum Fireball hard disk which, on the review model, was partitioned into two logical disks to reduce space wastage.

your eyes glued to the superb monitor for hours.

Monitor
The VisonMaster Pro 17 is one reason for the high price of this machine, but if you want a top monitor it's worth it.

The Matrox Millennium graphics card comes with 2Mb which you can upgrade to 8Mb.

This system came with the excellent Yamaha YST-M20DSP units; they may only put out 10 Watts but the clarity will blow you away, and their Digital Surround Processing technology makes them ideal for games.

You get a great range of software with this machine, including a trial version of Hellbender which will keep

• PCW Details

Hardware Bundle Yamaha DSP speakers, microphone.
Software Bundle Adobe Acrobat, Asymetrix 3dFX, Creative Webphone, Microsoft Office Home CD sampler, MS Works 4.
Warranty One year on site next day. Two year option £79.50, three-year option £145.
Technical Support Telephone, fax and email.
Price £2,272
Contact Armari 0181 810 7441; fax 0181 810 8846
Good Points Expansion — in particular dual processor support for those for whom not even a 200MHz Pentium is enough.
Bad Points Only that the price is high .
Conclusion A nicely put together package, smacking of quality. But of course you have to pay for it.
★★★

Atlantic Proteus P200

The Atlantic came with the highest specification of the bunch. The 3.2Gb hard disk was somewhat in excess of what was asked for but gives you two partitions, each almost as large as the hard disks supplied with the other machines.

Atlantic's excess does not end there: with this machine you also get an MPC level 3-ready twelve-speed CD-ROM, and a graphics card which boosted graphics performance to match the best. With 4Mb of VRAM fitted as standard, the ATI 3D Rage II graphics card outshone the rest here.

The Atlantic is not the easiest of machines to open up; you have to prise the front off before unscrewing and removing the side panel, and you can only get at the processor after first removing the power supply unit. However, you're not likely to be upgrading a Pentium Pro for some time so don't let this put you off.

An unusual layout leaves the processor hidden behind the power supply unit. This is due to the elongated motherboard which runs the height of the machine and which also means that most of the peripheral ports can come straight off the motherboard, in turn reducing the number of cables cluttering the insides up.

Expansion is well catered for, with space for five extra storage devices inside: two 5.25in and three 3.5in bays (one internal. Only one of the three ISA slots are free, but three of the four

Monitor
ADI Microscan. Control panel flips down out of the front of the case with a full range of controls. Looks flat and square, until you realise the bevel edges are creating the illusion.

PCI slots).

The Creative Labs sound card came with Trust Multimedia speakers which, although they were only rated at 25 Watts, are ample for most PC applications and they can generate reasonable volumes which are a whole lot easier on the ear than others rated at a higher power. Plus they are small, compact, and come with two dinky stands which let you point them at your face.

Atlantic runs a lease purchase system.

• PCW Details

Hardware Bundle Trust Multimedia 25W speakers with stands.
Software Bundle ClarisWorks 4, Corel 4, Maestro Series software, Quicken 4, World Book CD.
Warranty Five years, one year on site.
Tech Support Telephone.
Price £1,979
Contact Atlantic 01792 700 002; fax 01792 792888
Good Points Software bundle, large hard disk, excellent graphics card.
Bad Points None.
Conclusion Twelve-speed CD-ROM, 3.2Gb hard disk, ATI graphics card: who could want for more? Great specfications and a good selection of software make this an attractive choice, even at the price.
★★★

Carrera Media 200+

The Media 200+ is a neat package indeed. Carrera has been around for a good few years and has a justified reputation as a quality supplier. They've got it just about right here, with a good combination of monitor, case and components.

Let's start, in no particular order, with the case. Three screws remove the side panel but inside you'll find the motherboard and drive bays on two separate subsystems which slide out of the back of the case with the loosening of a couple more screws.

At the back of the case, two metal handles pull out. Removing a couple of screws around one of these lets you pull out the motherboard assembly complete with expansion cards; the upper handle removes the power supply unit and up to five storage devices. Very neat.

It comes with a 2Gb IBM hard disk with 32Mb of EDO RAM expandable to 512Mb, 512Kb of cache memory and an eight-speed Toshiba CD-ROM drive. This choice of quality components extends to the speakers, which are small Yamaha units (YST-M20DSP) and which, despite being rated at just 10W, sound better at higher volumes than all the rest in this test bar the Aiwa units which come

with the Purple. Plus, the Digital Surround Processing technology of these speakers really does pull you into games.

The small but perfectly formed Mitsumi keyboard is a joy to use, with useful pegs on the bottom which keep the cable out of the way.

Card-wise, the Creative Labs SB32 sound card, Matrox Mystique graphics card with 2Mb of RAM expandable to 4Mb, plus the new US Robotics Sportster Voice 33.6Kbps voice fax modem leave space for

another five cards: two ISA and three PCI. The processor's heat sink means you can only fit half-length ISA cards.

Monitor
Carrera bundles the excellent Iiyama Vision Master Pro 17 with this computer.

PCW Details

Hardware Bundle Yamaha YST-M20DSP 10W speakers.
Software Bundle Lotus SmartSuite, CorelDraw, Quicken, PC Check diagnostics software.
Warranty One year parts and three years labour return to base. First year on site £39 extra.
Tech Support Toll-free telephone and fax.
Price £2,049 (plus VAT)
Contact Carrera 0171 830 0486
Good Points Well made, well put together, and good quality stuff for the price. Great speakers.
Bad Points None.
Conclusion A neat package from a reputable name
★★★

Dan Ultimate 200/L

Personal Computer World
Highly Commended

The adverts call it "the PC you always dreamed of". Well, maybe not quite, but it is certainly no nightmare. The Dan Ultimate PC was the only one of the crowd to be supplied with a Zip drive as standard. Even PCs bought for home use are going to get filled up with a lot of valuable information: your accounts, letters, and so on. With Zip drives retailing at just over the £100 mark, it just does not make sense to sell a computer with a gigabyte hard disk without one.

With the Zip drive installed you are left with just two free drive bays — one 5.25in and the other 3.5in. In fact, while Dan has put together a package that is otherwise very nice, it is, like the Vale PC, somewhat lacking in the expansion department. There is a single free ISA slot and three empty PCI slots. However, one of these PCI slots makes the Dan stand out from the crowd — it's a PCI 4/Multimedia bus 2.0 slot. Again, like the Vale, memory is restricted to 128Mb of RAM, but you do get 512Kb of cache RAM which helps boost performance.

This machine has a full set of manuals, including all the manufacturer's manuals and one usable user manual. The Windows 95 keyboard is okay, but as spongy as a fruit cake. Sound is mediocre, with two 80W speakers, but like the other powerful speakers in the test they fail at high volumes. You get a condenser microphone, too.

A good range of software comes with this PC — the standard Lotus SmartSuite, and also Serif Page Plus DTP software. It has a 2.5Gb Quantum hard disk, eight-speed Toshiba hard disk, a SoundBlaster AWE-32 sound card and a Matrox Mystique with 2Mb of VRAM expandable to 4Mb.

Monitor
The Iiyama VisionMaster 17 monitor has only three buttons on the front to control the full range of functions but everything is there. There's an on-screen menu, and it is Energy Star-compliant.

•PCW Details

Hardware Bundle 80W active speakers. Microphone.
Software Bundle Lotus SmartSuite, Encarta 96, Serif Page Plus Home Office Edition DTP, PaintShop Pro.
Warranty One year back to base, 2nd and 3rd years on site.
Tech Support Telephone, fax.
Price £2,014 (plus VAT)
Contact Dan 0181 830 1100 / 0113 259 1200
Good Points Fast, with good software bundle, and comes with a Zip drive as standard.
Bad Points Speakers.
Conclusion Not the cheapest but one of the fastest, and built with good-quality components (speakers excepted).
★★★★

Dotlink Terminator 200im

Dotlink is currently moving to new systems boxes which, the company says, will make the brand look less like a clone. As it is, the Dotlink Terminator 200im does not look any more like a clone than the other PCs here.

At £1,749 (plus VAT the Terminator is one of the cheapest in the group, but Dotlink has hardly skimped on the components. For a start, you get a Hercules Terminator 3D graphics card with a full 4Mb of VRAM as standard. It is this which is responsible for boosting the CorelDraw test to one of the fastest times we measured, just behind the Purple's results.

Another benefit of this card, apart from straight performance, is the Hercules Entertainment Centre, an all-singing, all-dancing suite of applets which brings control of video, MIDI, CD sound and wave files together in one neat package.

The Diamond Supra 28.8Kbps fax modem and Creative Labs SoundBlaster board are less special but are, all the same, solid brands. With the sound card you get a pair of Juster Multimedia 120W-per-channel speakers which look like they belong in the corner of a passion wagon and are certainly loud, but which, like most other multimedia PC speakers, sound terrible at high volumes.

Things get better with the keyboard, which covers enough acreage for a smallholding and is the best in the test with slicker action than Die Hard.

Storage is provided by a 2.5Gb Quantum hard disk with a fast access time of 9.9ms which contributed to the fast CorelDraw test results. On the review machine this was partitioned into three logical drives, but Dotlink says it will partition the disk to order. An eight-speed Goldstar CD-ROM drive completes the package.

Monitor
The ViewSonic monitor has a reasonably flat screen — not as flat as the VisionMasters, but the bevelled edges help. It's extraordinarily easy to use with the best on-screen menu of any in this test.

•PCW Details

Hardware Bundle Juster Multimedia SP120 speakers.
Software Bundle Lotus SmartSuite.
Warranty One year RTB parts and labour, 2nd year RTB labour only. One, two or three year on site available at £25, £79 and £99.
Tech Support Telephone, during office hours for the lifetime of the machine.
Price £1,749 (plus VAT)
Contact Dotlink 0181 902 5802
Good Points Graphics card, keyboard.
Bad Points Speakers.
Conclusion Good value.
★★★

Evesham Vale Platinum SE

The Vale SE has one of the most stylish boxes of the lot, looking like it's sitting in a puddle of molten plastic, and the only one with a lockable case. You can't open it up without one of the two keys provided, a quick twist of which lets you slide the side panel easily off.

Sadly, this machine is a classic example of the maxim about not judging a book by its cover. Inside, the Vale loses points on the bits that really matter: speed and expansion. To take expansion first, you get two empty 3.5in bays (one internal), one empty 5.25in bay, three empty ISA slots and just one free PCI slot. Granted, this will be enough for most people, but just adding one SCSI device will cut the expansion potential by a third. Similarly, the 128Mb limit on RAM on the Intel TC430HX is unlikely to affect many people, at least for the foreseeable future. Of more immediate concern is the cache size, which is 128Kb and not expandable.

However, even with this handicap the Vale managed to come in the middle of the field when it came to the tests. Hard disk performance from the Seagate 2.5Gb device was reasonable, as was graphics performance from the Matrox Millennium card fitted with 2Mb of VRAM.

A Yamaha OPL4-ML audio CODEC built in to the motherboard provides wavetable synthesis but unfortunately the three audio sockets which come direct from the motherboard along with the games socket are not labelled (an extra Creative Technology card

provides the line out socket). With the package you get a fast 33.6 PCAM voice fax modem, Matshita eight-speed CD-ROM, a PS/2 Microsoft mouse, Zy-Fi 2 Pro speakers from Zydec which pump out 120W peak power and which are quite capable, a good keyboard, and half a dozen CD-ROM discs aimed more at the home entertainment market than at the small office/home office market.

Monitor
The Iiyama Vision Master 17 is a good budget monitor. It has a 0.25mm dot pitch, Diamondtron FST tube, and although there are only three buttons, an on-screen menu gives full control over picture and power management.

•PCW Details

Hardware Bundle Yamaha DSP speakers.
Software Bundle Explorapedia — The World of Nature, Fine Artist, Golf, Works & Money, Dinosaurs, Encarta.
Warranty One year on site free, second year £69, third and fourth years £149 (plus VAT).
Tech Support Telephone, fax.
Price £2,058
Contact Evesham Micros 01388 765500; fax 01386 765354
Good Points Looks good.
Bad Points Poor expansion, poor speakers.
Conclusion Looks nice, but mediocre inside mainly due to limited expansion potential.
★★

Opus Powerhouse 200

If the Total Memory is the Lada, the Opus is the Skoda, but the good thing about the Opus is that it's priced like a Skoda too. Opus is a large company which has made a name for itself supplying the education sector with reliable, if slow, workhorses. But it still makes ugly computers. This desktop looks worse than the one from Total Memory, and the thin blue speed stripe and collection of badges telling you that a) it goes fast, b) it has Intel Inside, c) it runs Windows 95, c) it has Pipeline burst cache, and d) it has Energy Star compliance don't help. It's like putting stickers saying "Windscreen Wipers" on your car. Okay, so with a Skoda maybe that would add something, but here it just looks tacky.

But, and it's a big BUT, this machine is cheap: almost £200 less than its nearest rival.

You may be sacrificing looks for money here (and even that is a matter of opinion) but you certainly don't sacrifice speed. The Opus performed as well as any other machine in this test, and its ATI 3D Xpression Plus graphics card helped it come out near the top in the CorelDraw test. The only physical limitations of the machine are slight and are inside where space is a little limited, although not quite so much as in the Tulip. Here there are two free drive bays (one of each size), one free

ISA slot and three empty PCI slots. The motherboard will take up to 128Mb of main memory and is limited to 256Kb of cache memory.

The Opus has two USB ports built in but lacks a PS/2 mouse port, so in the absence of any USB peripherals you have to sacrifice one of the two serial ports. It comes with a Seagate Medalist Pro 2520 hard disk, a Mitsumi eight-speed CD-ROM, and a Dynamode 33.6Kbps voice fax modem.

Opus lets the side down when it comes to the bundle: you get a tiny pair of speakers which are poor quality, and no software apart from Windows 95.

Monitor The CTX monitor is not in the Iiyama league but is fine for most applications.

•PCW Details

Hardware Bundle Speakers.
Software Bundle None.
Warranty One year on site.
Tech Support Telephone, fax.
Price £1,569
Contact Opus 01293 821555; fax 01293 782663
Good Points Fantastic price. Twin USP sockets.
Bad Points Ugly.
Conclusion Fast with CorelDraw and the cheapest of the lot. The money you save will pay for an application suite and a decent pair of speakers.
★★★★

Purple Computers Legend II

Purple Computers has only been around since last summer, but if first appearances are anything to go by, it is off to a good start. Feeling seasonal, we opened the smallest box first, and were rewarded with a set of speakers that blew the rest away. The Aiwa TS-CD20 consists of two tiny satellite speakers and a lump of a subwoofer: max power output may only be 20 Watts but none of it is wasted. These were the only speakers we could turn up to full volume without distorting the hell out of them.

The system case offers stacks of expansion options and more storage space than you can shake a stick at, with bays all over the place. At the front you have the floppy disk with four 5.25in form factor bays below. Under those, in the bottom half of the case you find the hard disk with space for another five 3.5in form factor devices. The Diamond graphics card performance was blistering, allowing CorelDraw to do its stuff more than twice as fast as any other machine in the group.

The Tyan motherboard is built to take two Pentiums but only one socket is soldered in (don't even think about trying to solder in

a second one — you'll never do it) and there are nine expansion sockets in all. Three PCI and three ISA slots are unencumbered by cards. The machine comes as standard with a Supra Express 28.8i voice fax modem which can be upgraded through software to 33.6Kbps, Creative Technology wavetable audio card, and a Diamond Multimedia Stealth 3D card with 2Mb of VRAM. The keyboard is the same good one as those supplied with the Armari and Vale computers.

Monitor Purple Computers bundles the reasonable if unremarkable ViewSonic 17GS, with 0.27mm dot pitch and slightly curved screen.

•PCW Details

Hardware Bundle Aiwa TS-CD20-powered subwoofer system.
Software Bundle Microsoft Works, Encarta, Golf; but check with Purple for options.
Warranty Two years parts and labour, three years labour, RTB.
Tech Support Telephone, fax.
Price £1,838.38
Contact Purple 0321 787753; fax 01639 885856
Good Points Blistering graphics performance. AIWA subwoofer speaker system that blows the competition away.
Bad Points Price a bit on the high side.
Conclusion Tops for sound, tops for expansion and very, very fast graphics performance, but also a high price tag.
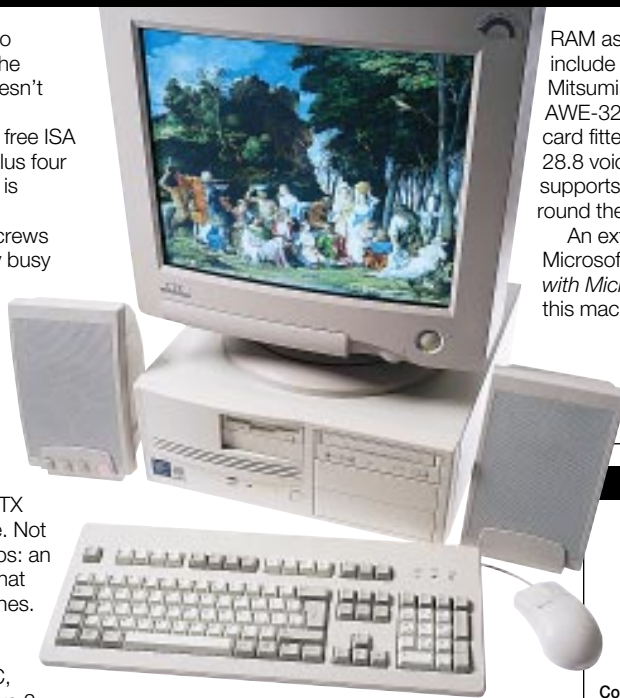★★★★★

Total Memory Phoenix Multimedia Plus

This is one of the two desktop cases of the bunch, but that doesn't mean it loses out particularly on expansion: two free ISA slots and two free PCI slots, plus four spare drive bays (one internal) is respectable for a desktop PC.

Open up the case (three screws release the top) and it is pretty busy inside. The advantage of tower systems is that they can be as ugly as sin (and most are) but it doesn't matter because you can just stick them under your desk. The Total Memory PC is not particularly ugly, it's just that it's not particularly attractive either, and with the lumpish CTX monitor it's a bit of an eyesore. Not even the Cherry keyboard helps: an ugly slab of plastic with keys that have as much life as gravestones. Yep, we hated it.

The speakers are the only nice external feature of this PC, being the same Zydec Zy-Fi Pro 2 units as the ones bundled with the Vale. Turn up the power to 120 Watts and you can distract yourself from the ergonomics.

In the objective stakes the Total Memory PC did not fair too badly at all. In fact, it came out top overall in the VNU Labs tests. Maximum memory is restricted to 128Mb, but you do get a full 512Kb of cache

RAM as standard with this model. Standard fittings include a 2.05Gb Quantum Fireball hard disk, Mitsumi eight-speed CD-ROM, a SoundBlaster AWE-32 sound card, a Matrox Mystique graphics card fitted with 2Mb VRAM, and the US Robotics 28.8 voice fax modem. The motherboard also supports USB, and two sockets are to be found round the back of the case.

An extra box contains keyboard, software, Microsoft Mouse and the book, *Getting Results with Microsoft Office for Windows 95*. You can get this machine for less than the quoted £2,125 price tag by leaving out Microsoft Office, which brings the cost down to £1,970.

Monitor
The CTX monitor with 0.26mm dot

pitch and flat, square tube has a complicated-looking but easy-to-use flip-down panel.

•PCW Details

Hardware Bundle Zydec Zy-Fi Pro 2 speakers, desktop microphone.
Software Bundle Microsoft Office Professional, Quick Link II fax, MS Office Pro.
Warranty One year on site, £125 for three-year on-site.
Tech Support Toll free.
Price £2,125
Contact Total Memory 01256 332460; fax 01256 332461
Good Points Fastest overall — but only by a whisker.
Bad Points Poor styling.
Conclusion In terms of style this may be the Lada of the bunch, but it has the engine of a Porsche.
★★

Tulip VisionLine de S/200

This is the classiest case of the lot. It is one of the two machines in this group with a lockable case, but unlike the Vale PC the same lock can also stop anybody switching the Tulip on.

A neat feature of this arrangement is that the power switch is electronic. Of all the machines reviewed here, it is the only one where you can shut down Windows, and Windows will turn off the computer (Apple switched on to this over a decade ago).

Tulip sells through dealers, and not only designs its own cases but also its motherboards. This usually results in compact and very well built machines (with lush features like the power switch) and here you even get built-in Ethernet. But there are drawbacks — for instance, expansion. Okay, Tulip obviously set out to design a small desktop PC. But if you want to add extra storage devices you should consider the tower model instead.

There is only one free 5.25in drive bay. Both the floppy drive and the hard disk are mounted on their side at the far right of the case and there is, potentially, space to wedge a second hard disk in there, but you won't be able to bolt it down.

An Alliance AT24 graphics controller is built into the motherboard,

but if you need more than that can offer with its 2Mb VRAM you can use up one of the three empty PCI slots (there are also three empty ISA slots). Cache RAM you can do less about; 256Kb is the limit, and you won't fit more than 128Mb of main RAM into the four sockets.

This is the only PC to use a riser for the expansion slots (four ISA, two PCI), an arrangement which obscures the memory sockets: upgrading either processor or the memory on this PC will mean removing other parts first. There are, however, two USB sockets.

You don't get any bundled software with this machine except Windows 95 or Windows for Workgroups. Dealers will supply applications at extra cost.

Monitor Tulip's monitor is well designed and

changing the settings is easy. The tube is flat, however.

•PCW Details

Hardware Bundle 2 Watts per channel passive speakers.
Software Bundle None.
Warranty 3 years RTB on system unit, 1 year on monitor.
Technical Support Via dealers.
Price £1,752
Contact Tulip 01293 420200; fax 01293 553307
Good Points Built-in Ethernet, slick design.
Bad Points No fax modem. Slowest of the bunch.
Conclusion Slow, without any bundled goodies, but a slick design from an established, reliable manufacturer.
★★★

Table of Features

Manufacturer	Evesham Micros	Tulip Computers	Carrera Technology	Armari	Dan Technology
Model name	Platinum SE	Vision Line de S/200	Carrera Media 200+	Arcturus	Ultimate 200/L
Tel no	01386 765500	01293 420200	0171 830 0486	0181 810 7441	0181 830 1100
Fax no	01386 765354	01293 553307	0171 803 0286	0181 810 8846	0181 830 1122
Price (excl VAT)	£2,058	£1,752	£2,049	£2,272	£2,091
Processor	Intel Pentium 200	Intel Pentium 200	IBM 6X86 200+	Intel Pentium 200	Intel Pentium 200
Expansion Bus					
Local Bus architecture	PCI	PCI	PCI	PCI	PCI
PCI slots	4	2	4	3	4
ISA slots	3	3	4	3	3
Shared slots	1	1	○	1	1
Motherboard	Intel	Tulip	Boston Boards	Tyan	Asustek
Mcdel	Tuscon	TC 48	P5 STD	Tomcat 3	PSTST2P4
Chipset	Intel Triton TC4304x	Intel Triton-VX chipset	Intel Triton 430HX	Intel Triton 82430HX	Intel Triton 430HX
No. of spare 3.5in bays	2	None	1	1	2
No. of spare 5.25in bays	1	2	2	2	1
Hard disk					
Manufacturer	Seagate	Western Digital	IBM	Qantum	Seagate
Model name	ST S2520A	Caviar 21600	46H3290	Fireball TM 2110A	SY52520A
Size	2.5Gb	2.16Gb	2Gb	2.11Gb	2.5Gb
Interface	EIDE	EIDE	EIDE	EIDE	EIDE
Average access time	11ms	11ms	9.5ms	11ms	11ms
Ram and Cache					
Main RAM	32Mb	32Mb	32Mb	32Mb	32Mb
Max RAM	128Mb	128Mb	512Mb	512Mb	128Mb
RAM type	EDO	EDO	EDO	EDO	EDO
SIMM Type	72	72	72	72	72
Secondary cache	256Kb	256Kb	512Kb	512Kb	512Kb
Max secondary cache	256Kb	256Kb	512Kb	512Kb	512Kb
Cache type	Pipeline Burst	Pipeline Burst	Pipeline Burst	Pipeline Burst	Pipeline Burst
Multimedia					
CD-ROM manufacturer	Panasonic	Mitsumi	Toshiba	Teac	Toshiba
CD-ROM model	CR-583	CRMC-FX 810T	XB-5602	58	XM-5602B
CD-ROM speed	8X	8X	8X	8X	8X
Sound card manufacturer	Yamaha/Creative Labs	Creative Labs	Creative Labs	Creative Labs	Creative Labs
Sound card model	Yamaha OPL35A	SoundBlaster 16 Value PNP	SB32 PNP	SoundBlaster 32 PnP	SoundBlaster AWE-32
		on board, Creative			
		Wave CT1920 add-on			
Graphics					
Manufacturer	Matrox	Alliance	Matrox	Matrox	Matrox
Model	Milennium MGA-2064W	AT24	Mystique SGRAM	Milennium	Mystique
RAM	2Mb WRAM	2Mb/2Mb VRAM	2Mb (up to 4Mb)	2Mb (up to 8Mb)	2Mb/4Mb VRAM
Monitor	liyama	Tulip	liyama	liyama	liyama
Model	Vision Master Pro17	n/a	Vision Master Pro 17	Vision Master Pro 17	Vision Master Pro 17
Size	17in	17in	17in	17in	17in
Max refresh rate	75Hz	75Hz	75Hz	107Hz	75Hz
Other info					
Modem included	●	○	●	●	●
Model and speed	PCAM 33600	n/a	USR 33600 voice	Supra Express	Dan 33.6 internal fax
			fax modem	28.8Kbs voice fax modem	
Other extras		Two USB ports			Internal Zip drive with cartridges
Software supplied	Windows 95,	MSDOS/Windows	Windows 95,	Windows 95,	Windows 95, Encarta 96,
	Media 96 Pack	for WorkGroups,	Lotus SmartSuite,	Microsoft Works	PagePlus 95
		Windows 95	CorelDraw, Quicken,		SmartSuite 96
			PC Check		
Standard warranty	1 year on site	3 years RTB on	1 year parts and	1 year on site next day	1 year RTB
		system unit,	three years labour		
		1 year on monitor	RTB		
Warranty options	1st and 2nd year,		1st year one site £39	2nd year on site	On site
	£69 plus VAT; 1st,			£79.50; 3rd year on	
	2nd and 3rd years £149 plus VAT			site £145	

Table of Features

Manufacturer	Total Memory and Media	Dotlink Systems	Opus Technology	Purple	Atlantic
Model name	Phoenix Multimedia Plus	Terminator 200im	Opus Powerhouse 200	Legend II	Proteus P200
Tel no	01256 332460	0181 902 5802	01293 821555	0321 787753	01792 700 002
Fax no	01256 332461	0181 903 6508	01293 782663	01639 885856	01792 792 888
Price (excl VAT)	£2,125	£1,749	£1,569	£1,838.35	£1,979
Processor	Intel Pentium P200	Intel Pentium P200	Intel Pentium 200	Intel Pentium 200	Intel Pentium P200
Expansion Bus					
Local Bus architecture	PCI	PCI	PCI	PCI	PCI
PCI slots	3	4	3	3	4
ISA slots	4	4	2	4	3
Shared slots	0	1	1	1	0
Motherboard	A-Bit	Gigabyte	Opus	Tyan	Intel
Model	PR5	Hawk	TR5	Tomcat 512	Marl
Chipset	Triton 430VX	Triton 430HX	Intel 1430VX	Intel Triton 430HX	Intel Triton 430HX
No. of spare 3.5in bays	2	3	2	4	1
No. of sare 5.25in bays	2	2	1	4	2
Hard disk					
Manufacturer	Quantum	Quantum	Seagate	Quantum	Quantum
Model name	Fireball 2110	Sirocco 2500AT	Medalist Pro	Fireball 2012	Fireball
Size	2.1Gb	2.5Gb	2.5Gb	2.1Gb	3.2Gb
Interface	EIDE	EIDE	EIDE	EIDE	EIDE
Average access time	10.5ms	9.9ms	12ms	8.6ms	8ms
Ram and Cache					
Main RAM	32Mb	32Mb	16Mb	32Mb	32Mb
Max RAM	128Mb	512Mb	128Mb	512Mb	128Mb
RAM type	SDRAM	EDO	EDO	EDO	EDO
SIMM type	168	72	72	72	72
Secondary cache	512Kb	512Kb	256Kb	512Kb	256Kb
Max secondary cache	512Kb	512Kb	512Kb	512Kb	256Kb
Cache type	Pipeline Burst	Pipeline Burst	Pipeline Burst	Pipeline Burst	Pipeline Burst
Multimedia					
CD-ROM manufacturer	Mitsumi	Goldstar	Mitsumi	Panasonic	Mitsumi
CD-ROM model	FX8105	GCD-R580B	FX-800S	CD-583	FX-120
CD-ROM speed	8X	8X	8X	8X	12X
Sound card manufacturer	Creative Labs	Creative Labs	Advance Logic	Creative Labs	Creative Labs
Sound card model	SoundBlaster AWE-32	SoundBlaster 32 PnP	Pro 32 PnP	SoundBlaster 32 PnP	SoundBlaster 32
Graphics					
Manufacturer	Matrox	Hercules	ATI	Diamond	ATI
Model	Mystique	Terminator 3D	3D Xpression+	Multimedia Stealth 3D	3D Xpression Plus
RAM	2Mb/4Mb SGRAM	4Mb/4Mb EDO RAM	2Mb/4Mb	2Mb/4Mb	4Mb SDRAM
Monitor	CTX	Viewsonic	CTX	Viewsonic	ADI
Model	1785XA	17GS	176SD	17GS	5V
Size	17in	17in	17in	17in	17
Max refresh rate	75Hz	85Hz	75Hz	86Hz	75Hz
Other info					
Modem included	●	●	●	●	●
Model and speed	US Robotics 28.8 VFC	Supra Express 28.8	Dynamode 33.6	Diamond 33.6 VFM	Rockwell 33.6Kbps
Other extras	Two USB ports				
Software supplied	Windows 95,	Windows 95,	Windows 95	Windows 95,	Lotus SmartSuite 96
	Microsoft Office	SmartSuite 96		Encarta 96	CorelDraw 4,
	Professional			Works 4, other	ClarisWorks 95
				options available	World Book, Quicken 4
					accounts, Rats and
					Slay games, Pipex dial
					Internet, Netscape
					Navigator, Windows 95
Standard warranty	1 year on site	1 year parts and labour,	1 year on site	2 years parts and	1 year on site parts
		2 years labour RTB		labour, 3 years labour	and labour, four years
				return to base	RTB labour only
Warranty options	3 years on site £125	1 year on site £25, 2 years	2nd and 3rd years on site	On site	3 years parts and labour
		£79, 3 years £99			£159 plus VAT

Key: ● Yes ○ No

Developments in PC technology

There's never a dull moment when it comes to new technological developments in the PC industry. Newer, faster, smarter — these are the catchwords of the day. So the question most people want answered is, what new technology can we expect to see showing up in our PCs in the near future?

Intel MMX Chip

The much talked about MMX chip will be officially available on 8th January, 1997 *(says VNU Newswire)*. Its performance is expected to be impressive. So are the prices. It was first believed that the MMX chips would be priced at a premium, as is Intel's usual strategy, but now it is thought they will be comparable to the price of current Pentiums. This essentially means that Pentiums as we know them will be redundant.

MMX chips include an extra 57 instructions, 32Kb of L1 cache (as opposed to 16Kb on current Pentiums and Pentium Pros), larger registers and parallel processing. The 57 new instructions are primarily designed to make multimedia applications run more quickly. Applications will be optimised to run on MMX processors, but will recognise old-style Pentiums and will offer them code they can cope with.

However, it is the changes to the cache and the registers which will make the most difference to performance. The benefit of the increased size of the level 1 cache is obvious, as the processor can store more data close to hand without having to store in the more inaccessible level 2 cache or in RAM. The eight MMX 64-bit registers will each be able to hold eight bytes of data and all eight bytes will be processed in parallel per clock cycle when running MMX-enhanced code. Current processors have general 32-bit registers which can only hold one byte at a time and only one byte can be processed simultaneously.

The applications most likely to be affected are graphics-heavy packages, especially those where 3D rendering is a factor. Adobe's Photoshop 4 already supports the new hardware, while a host of multimedia CD titles are currently under development and will be shipped with MMX machines.

Universal Serial Bus

USB gives you just one connection via which you can connect up to 127 peripherals. This includes everything from keyboards, mice and modems to scanners, printers and external tape drives. We are already seeing USB ports appearing on the PC. In fact, two of the machines in this test have the connection already.

USB is supported by specific chipsets on Pentium and Pentium Pro PCs. Software drivers will be included in Windows 95 and Windows NT. Each peripheral is automatically managed by the PC: the PC senses which peripherals are connected, even if they are connected

while the system is running so peripherals can be hot-docked. The PC will also manage the resources, from drivers to bus resources for each peripheral, while the peripheral can take its power directly from the PC itself.

How USB connects inside your PC. (Picture courtesy of Intel)

Full-speed USB bandwidth of 12Mbits per second will support external CD-ROM drives and telephony devices, as well as providing ISDN and PBX interfaces. Meanwhile, low-speed bandwidth of 1.5Mbits per second will support low-end devices like mice and keyboards.

The system works like a daisy-chain on a series of hubs. To each USB hub, up to seven peripherals can be attached. This can include a second hub up to which another seven peripherals can be attached, and so on.

Accelerated Graphics Port (AGP) Interface

The AGP interface is a new platform bus specification, designed to enable high-performance graphics capabilities, particularly 3D rendering. It is a completely separate bus from the PCI I/O bus and is specifically meant for point-to-point graphics components. As a result, it will have its own I/O connector.

The new features of AGP include a dedicated, high bandwidth, pipeline access to main memory and much faster transfer rates. The AGP will make use of the main memory for functions such as z-buffering, texturing and alpha blending, all of which are necessary elements of advanced, high-end 3D graphics.

The AGP features should not be confused with a similar technology called Unified Memory Architecture (UMA). UMA was designed to move the entire graphics frame buffer from the graphics subsystem to the PC main memory, in the hope it would reduce costs. UMA requires a fixed allocation of system memory at boot-up, which can have a negative impact on a system's performance. AGP, on the other hand, allows for dynamic allocation and reallocation of main memory. This makes it more flexible in use and it allows for memory to be reclaimed by the operating system or other applications after the AGP interface has been used.

You can expect to see the AGP show up on motherboards by mid-1997 but with one caveat — it will only be available on what Intel calls the Klamath-enabled PCs. In other words, only PCs with MMX-enabled Pentium Pro chips will be AGP ready. At present, almost all the major graphics card manufacturers are working on an AGP graphics card.

Dylan Armbrust

Editor's Choice

Einstein predicted a few curious facts about speed; one of which was that as you put more and more energy into making something go faster, the less effect this energy will have on the speed. He was right. Take these PCs, for instance. You can put a bigger cache RAM in, a zippier hard disk and a flashier graphics card, but each PC in this bunch is so fast anyway that the money, time and energy you put in will be rewarded with relatively small increases in speed.

Each of the machines included here produced impressively high scores on our VNU European Labs tests, but there is little variation in the figures. In fact, the results are more bunched up than in any group of PCs ever tested in the VNU Labs. So Einstein was right.

With processors this fast, all using the Intel Triton HX or VX chipsets, all using 32Mb of RAM, all using fast EIDE hard disks, and all using PCI graphics cards, there is little room for individuality. The only noticeable differences were with screen draws. The Dotlink, Opus, Tulip and Purple computers managed to escape the gravitational pull of the rest of the pack and speed up CorelDraw operations by about a factor of two. By a curious coincidence, these were among the poorest performers in the overall results.

The Legend II from Purple gets the Editor's Choice award. If you need expansion, this machine is the obvious choice. With its huge tower case, it has enough expansion to keep anybody happy — you'll never fill up the drive bays in this monster. The components which come with this PC do make it an attractive option — from the Iiyama Vision Master Pro 17 monitor which is the best of the monitors looked at here, to the Aiwa speakers which we loved. Only the Yamahas which came bundled with the Armari and Carrera PCs are in the same league, and without a subwoofer, even they don't come close.

There is little point in spending £2,000 on a multimedia PC where sound is an integral part of the package, and chucking in a pair of £19 speakers — you might as well go back to the old piezzo-electric buzzers. And don't get taken in by manufacturers' boasts of high-powered speakers. None here were capable of the same quality, at even vaguely loud settings, that you get with the Yamaha or Aiwa units.

If it's a low price tag you're after, the Dotlink is worth a look. At £1,749 it's the second cheapest here and comes with the Hercules 3D graphics card fitted out with 4Mb of RAM and a reasonable monitor. It even figures well with expansion, having eight slots and five empty drive bays. In short, there is nothing wrong with it. Only the speakers, although powerful, let it down. For the money you'll save, however, you could easily afford a pair of high-quality speakers and even have change left over for a subwoofer, such as the Aiwa units.

Dan and Carrera

have also put together good packages. There is little to choose between these two but the Dan has the edge, providing a Zip drive as standard, and it's this feature which earns it a Highly Commended award. It has been built using high-quality components and produced excellent scores on our performance tests.
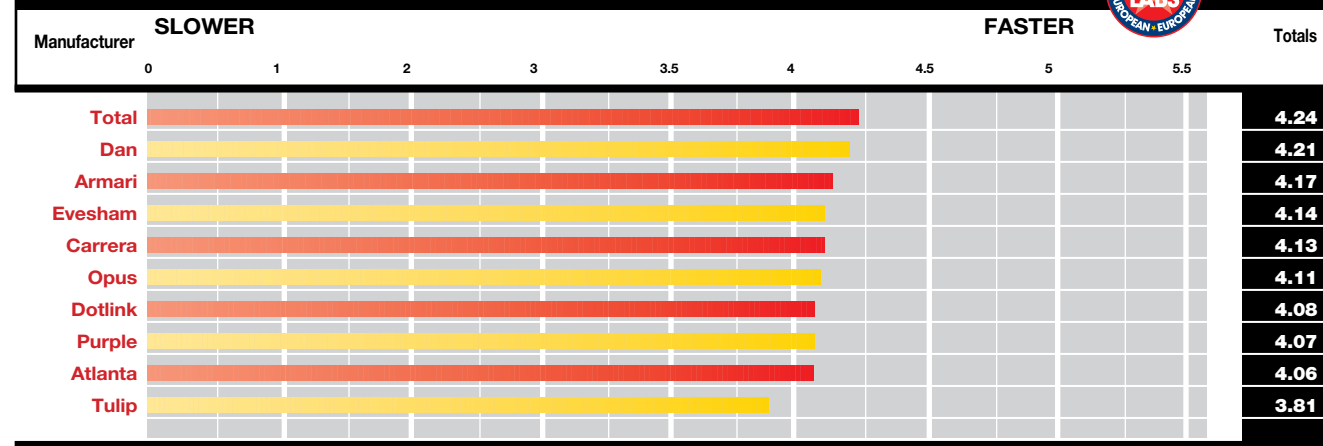
The cheapest by far in this round-up is the Opus, which earns a Highly Commended award for its excellent value for money.

Like Opus, Tulip is an established manufacturer but selling through a network of dealers. This PC was the slowest overall by a margin, but it was second fastest at drawing in Corel. That it does not come with a fax modem or any bundled software will put a lot of people off, but the idea is that the dealer would add these (at extra cost). Otherwise, it is a well-built machine from a reputable manufacturer

The Armari comes in at a higher price — another good package with the same Iiyama monitor as the Dan and Carrera, and again the Yamaha speakers — but what you pay for here is the Tyan Tomcat 3 motherboard with dual processor sockets. Don't buy it just for the extra Pentium socket unless you are sure you need it. After all, it will cost another £400-plus to fill the socket, and even then you will have to migrate to Windows NT before you can realise any improvement in speed.

It's a nice idea to have twin Pentium 200s humming away inside your PC, but the reality of getting the extra speed is expensive, a fact Einstein missed out.

Performance Results

Manufacturer	SLOWER							FASTER		Totals
	0	1	2	3	3.5	4	4.5	5	5.5	
Total										4.24
Dan										4.21
Armari										4.17
Evesham										4.14
Carrera										4.13
Opus										4.11
Dotlink										4.08
Purple										4.07
Atlanta										4.06
Tulip										3.81

The units shown here are relative values based on our control score from the Compaq Prolinea 4100 (DX4100, 16Mb RAM). Here, the control is represented as 1

Smile please!

The digital camera market is exploding. Just before Christmas, almost every camera manufacturer released so-called budget digital cameras. But who is buying them, and what can you do with them, anyway? Adele Dyer and Gordon Laing take an in-depth look at ten sub-£1,000 models and consider whether good old film is on its way out.

How digital cameras work

In principal, a digital camera is similar to a traditional film-based camera. There's a viewfinder to aim it, a lens to focus the image onto a light-sensitive device, some means by which several images can be stored and removed for later use, and the whole lot is fitted into a box.

Although the principle may be the same as a film camera, the inner workings are quite different. In a conventional camera, the light-sensitive and image-storage parts are both looked after by the film. In a digital camera, the imaging is performed by a charge coupled device (CCD) which consists of a grid of light-sensitive elements. Each element converts light into a voltage proportional to the brightness, which is later converted into digital information which the PC can understand. The brighter the light, the higher the voltage, resulting in a brighter computer pixel. The more elements, the higher the resolution, and thus the greater the detail that can be captured. This grid of elements produces a colour bitmap file of the same resolution, typically 640 x 480 pixels.

Digital cameras predominantly rely on flash memory to store images. Flash memory is non-volatile, which means it can retain the image information regardless of battery condition. Some digital cameras may use hard disks, usually in Type-III PC Card form, but these are rare and better suited to studio-based operation where they won't get shaken around too much. The greater the memory or compression, the more images that can be stored at any time. Higher-resolution images occupy more space in the memory.

Some digital cameras feature small, colour LCD screens allowing you to view your images immediately, and delete those which aren't required so as to free-up memory. With or without a screen, the main advantage of a digital camera over conventional film is the speed at which you can access and start using the images.

Most digital cameras offer a wired connection to a computer, usually slow serial on budget models or fast SCSI on professional ones. Several also offer removable cards, usually conforming to the PC Card standard, which you can whip out of the camera and slot straight into a PC or notebook. Either way, you'll be accessing your images within seconds and they'll already be in a computer-friendly, bitmapped file format ready to pop immediately into a presentation, DTP layout, web page and so on.

The big downside is price and quality. Flash memory and even low-resolution CCDs are sure to fall in price but are currently very expensive. A typical, consumer-styled digital camera could cost several hundred pounds. For the same money or less, you could buy a 35mm compact or SLR camera, which uses cheap film offering much better image quality.

Yes, if you want to match 35mm film quality on a digital camera today, you'll need to spend several thousand pounds and deal with large file sizes. If you simply *must* have the quickest photo-to-page times demanded by the world's news press, a top-of-the-range digital camera could be your only option: take your digital photo, send it across the world's telephone lines and have it on your newspage layouts in minutes, without chemicals or a scanner in sight.

Decent image quality at large sizes is all very well, but what if you only want to reproduce small images, like in a catalogue or for insurance security or property purposes? What if you only want to work with low-resolution on-screen applications such as computer presentations, web pages or CD authoring? These and others are applications where the budget digital camera comes into its own.

Gordon Laing

Digital Cameras Contents

Agfa ePhoto 307

Agfa has inevitably made the move into digital cameras. It has offered high-end models for some time, but the budget consumer market had to wait until Apple Expo, last November, for the launch of the ePhoto 307. Then again, many will have seen a similar camera before in the form of Sanyo's VPC-G1, reviewed on page 185.

Agfa has not ruled out the possibility of using LCD screens in its future products but has opted out this time, citing high costs and power consumption as two reasons to keep away. Consequently, its current price is lower than screen-based cameras with equivalent performance, and the absence of an AC adaptor as standard is not so much of a horror.

The design is similar to many compact film cameras, with a sliding panel protecting the lens when shut and powering up the device when open. The lens is equivalent to a 43mm focal length on a 35mm camera, and is fixed-focused from 0.6m to infinity.

Many will be pleased to find a self-timer and a flash provided as standard, and there's even a red-eye reduction mode. The highest resolution is 640 x 480 pixels, at which setting 36 images may be stored in the non-expandable memory. Switching to 320 x 240 doubles the image capacity to 72 images. PC and Macintosh software and cables are included as standard, and image transfer is by serial only.

On the bright side, the excellent Adobe Photo Deluxe is part of the package.

Gordon Laing

● PCW Details

Price RRP £399 (plus VAT)

Contact Agfa 0181 231 4200

Good Points Vibrant images. Good price.

Bad Points Unexpandable memory. No screen.

Conclusion A great choice for the budget user.

★★★★

Casio QV-100/QV10a

Casio is best known for manufacturing mass-market electronic goods, so it was definitely a sign of things to come when it released the QV-10a digital camera. Just as important as the low price was the first use of a full-colour mini LCD screen at the rear, replacing the conventional viewfinder.

A screen shows you just what you're going to get, without the gamble of using a non-SLR optical viewfinder. Better still, you can use it to instantly review your images without going near a PC, which is great for making sure you've got the picture you want and erasing the ones you don't like, to free up precious memory. Unfortunately LCD screens are hard to see in direct sunlight and eat up batteries like there's no tomorrow.

But this aside, the greatest criticism of the QV-10a is its low maximum resolution of 320 x 240 pixels, making it suitable only for electronic publishing (you can store 96 such images). The brand new QV-100 addresses this point and is essentially a QV-10a with 640 x 480 pixels, storing up to 64 such images, or 192 at 320 x 240 pixels. Neither

Casio models' memories can be expanded.

The QV-100 features a lens equivalent to the 40.5mm focal length of a 35mm camera, and focusing is fixed from 11cm to infinity. You can still output composite video to a TV or VCR and turn the lens portion through 180 degrees to photograph yourself.

A disadvantage is that the AC adaptor is not standard, the serial-only connection is slow, while Windows and Macintosh are separate products. The QV-100 however is better looking than its inferior partner, and has fixed the public's complaints. It'll sell like hot cakes.

Gordon Laing

•PCW Details

Price QV-100: £499.99
QV-10a: £349.99
(suggested retail prices, plus VAT)

Contact Casio Electronics
0181 450 9131

Good Points Higher-resolution version of the popular QV-10a.

Bad Points AC adaptor not standard. Average quality.

Conclusion The souped-up QV-10a will sell and sell.

★★★★

Canon PowerShot 600

Personal Computer World
Recommended

Those with more to spend and higher expectations to fulfil should consider the PowerShot 600. There's no screen and the case is fairly large compared to other models we tested, so what do you get for your money? Canon provides a decent CCD capable of three resolutions: 320 x 240, 640 x 480, and a well above average 832 x 608 pixels. At this highest resolution, the PowerShot 600 is more than capable of going into print at larger than a few inches; perfect for the catalogue photographer who finds that 640 x 480 doesn't quite cut the mustard.

The 600 can operate at three levels of compression, storing at 832 x 608 pixels, four images in fine mode, nine in normal, or 15 in economy mode, per 1Mb of memory. One megabyte of flash memory is fitted as standard. Those wanting more will find a PC Card slot capable of accommodating

Types I, II or even III cards, opening up the possibility of using a hard disk. A standard docking station provides a quick parallel port interface to your PC; software is a Windows-only TWAIN driver. In Canon's favour, images are exported in the standard JPEG file format. The 600's lens is equivalent to a 50mm focal length on a 35mm camera, and focuses from 10cm to infinity. Canon offers an optional wide angle lens adaptor which fits over the existing optics. The 600 also features a flash and the facility to record up to 11 seconds of audio per image as standard.

•PCW Details

Price £799 (plus VAT)

Contact Canon UK 0121 680 8062

Good Points High resolution. Slot for Type-III card. Audio and JPEG format.

Bad Points Relatively pricey. No screen.

Conclusion Extremely flexible all-rounder at the higher end.

★★★★

Fuji DS-7

Fuji has tentatively dipped a toe in the water of the digital camera market with a seemingly unpretentious little product.

At £499 on the street it rests slap bang in the middle of the less-than-£1,000 price category, its nearest rival in terms of price and functionality being the Kodak DC 25.

The DS-7 recommends itself in more ways than one. It is one of only two cameras we saw to make use of flash memory cards and it comes with a 2Mb card as standard.

These cards have a couple of advantages. They can easily be swapped in and out, so when out and about you can continue to take pictures without worrying about running out of memory. Additionally, they will fit into a PC Card to transfer data to a notebook, so download times are fast. If you do not have a notebook with a PC

Card slot, PC and Mac cables are supplied for serial cable connection.

The functionality is clearly marked out. There are three focusing distances: macro, near and far. And there are two aperture settings, for indoor and outdoor photography.

There's no viewfinder, only an LCD display. The brightness of the LCD can be altered using a simple dial, and the options you choose, such as using the self-timer and the near focusing distance, will be displayed on the LCD. Two resolutions are available: economy at 320 x 240 or standard at 640 x 480; these are chosen using a dial. The self-timer is also set here.

Adele Dyer

•PCW Details

Price RRP £599 (plus VAT)

Contact Fujifilm 0171 586 5900

Good Points Bundled with PhotoDeluxe.

Bad Points No flash.

**Conclusion** Good functionality and output for the price.

★★★★

Kodak DC 20

The DC 20 is the baby of the Kodak family of digital cameras. Not only is it by far the smallest of the bunch and able to fit neatly into the palm of your hand, it is also the one with the least functionality.

It's a bit like those simple, throwaway 35mm cameras. Of course, at £230 it's a little too expensive to throw away, but because all you can do is point and shoot you have the advantage of being able to concentrate on snapping away and having some fun doing so.

There are few of the features you find on other cameras: there is no flash, no self-timer, no macro facility, no LCD, no room for a PC Card and not even a tripod screw hole. However, you can add close-up, telephoto and wide-angle lenses. The viewfinder, though, is laughable — just an almost square hole cut through the camera, so it can be rather hard to line up.
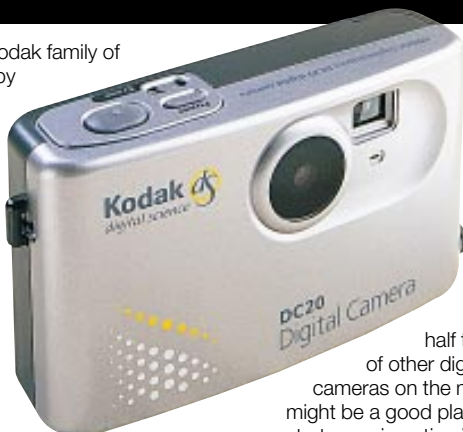
The internal memory is only 1Mb and is not expandable. On this you can store eight high-resolution images. The resolution is low at only 320 x 240 or 493 x 373 and the focal length is fixed and equivalent to a 47mm lens. Nevertheless, the output is not at all bad, producing vibrant, well-contrasted images.

For the price, you can't really expect that much. But at less than half the price of other digital cameras on the market, it might be a good place to start experimenting if you are interested in the concept of digital photography.

Adele Dyer

•PCW Details

Price £230 (plus VAT)

Contact Kodak 0800 281487

Good Points The cheapest of the bunch.

Bad Points Viewfinder. Very limited functionality.

Conclusion A fun place to start.

★★★

Kodak DC 25

The DC 25 is the latest in the Kodak consumer range and fits nicely between the simple and tiny DC 20 and the larger and more fully-functioned DC 50. It is the only Kodak camera in this range to have an LCD and the only one to take flash memory cards, expanding the camera's internal 2Mb memory.

The DC 25 is aimed at the home user, reflected both in the low price of £340 and the bundled software. The latter includes Kodak's Picture Easy software for downloading and storing images, Picture Postcard for emailing images and text as a postcard, Photo-Enhancer for simple photo manipulation (which has templates for producing documents) and Kai's Power Goo morphing package.

The camera is easy to operate and feels very much like a compact analogue camera. It has a viewfinder and an automatic flash, but the focusing is fixed so there are no distance options, like macro, near or far. The highest resolution is just 493 x 373. The LCD allows you to preview your pictures and play them back, but doubles as a screen to control the functionality. A menu-driven system helps you do this, and scrolling is controlled from the buttons on the back of the camera . You can erase pictures by choosing them here, or opt to erase all the pictures stored.

Adele Dyer

•PCW Details

Price £340 (plus VAT)

Contact Kodak 0800 281487

Good Points Flash memory cards. Flash.

Bad Points Lacking in versatility.

Conclusion Good value and easy-to-use.

★★★★

Kodak DC 50

The Kodak DC 50 has been on the market for a year now, yet still stands out among the other digital cameras on the market. It is the only one in the sub-£1,000 category to have a zoom lens to let you focus from wide angle to telephoto, and everything in-between, at the press of a button. Some of the other models we've looked at, like the DC 20, can have extra lenses added, but this is the only one which will zoom in and out. This makes it very easy to use, and one of the best for lining up a shot.

The shape of the camera is unlike any other (apart from Kodak's DC 40). It is long and thin and you grip it across the body, rather than at the corners, which makes it extremely stable to hold. The zoom and shutter buttons are conveniently placed adjacent to your index finger.

There is no LCD screen on this model but the viewfinder is reasonably accurate. The DC 50 does not take flash memory cards and only has 1Mb of internal flash memory, but it will take Type I or Type II PC cards.

The resolution is quite high at 756 x 504 with three compression ratios: good, better and best. On the "best" setting, the 1Mb internal memory will hold seven images. Kodak has just dropped the price of the DC 50 to £640 (from over £900), which brings it into a slightly more affordable price bracket.

Adele Dyer

•PCW Details

Price £640 (plus VAT)

Contact Kodak 0800 281487

Good Points Zoom facility. Quite high resolution.

Bad Points Small internal memory.

Conclusion A pleasure to use.

★★★★★

Olympus C-800 L

This is one of the latest digital cameras to come onto the market. In fact, it is the high-end model in a series of digital cameras from Olympus, ranging in price from a £450 model to this one costing £930. There is currently a debate raging among digital-camera manufacturers as to whether these items are photographic equipment or a computer peripheral; it is easy to see how Olympus sees its product, as it clearly looks and feels just like a camera.

The main reason this product is expensive is that it is capable of a high resolution (1,024 x 768) and has a large internal memory of 6Mb on an internal flash memory. You can store up to 30 high-quality images in the memory. However, it will not take a PC Card to increase the memory. As the flash memory is internal, you will not be able to increase memory by swapping in flash memory cards. It seems a shame that this facility has been omitted.

The high resolution does produce some good images which compare favourably with those cameras costing over £1,000. Images can be output directly to Olympus's P-150E printer, a dye-sub which costs around £420.

The camera has both a viewfinder and an LCD screen. Although the quality of the LCD is good, the viewfinder comes in handy if you need to save the batteries. Another useful feature is the red-eye reduction on the flash.

Adele Dyer

•PCW Details

Price £930 (plus VAT)

Contact Digital Camera Company 01483 452100

Good Points Very high resolution.

Bad Points Memory limited to 6Mb.

Conclusion High resolution at a high price.

★★★

Ricoh RDC-2

The Ricoh's design is the most unusual of any digital camera. It is flat and oblong, a bit like an oversized cigarette case, with a unique feature — a flip-up LCD screen. Unlike many of the other cameras with screens, the Ricoh also has a viewfinder. But, as with all these cameras, the viewfinder was not great to use and it's easier to line up the picture using the optional LCD screen.

There are fairly standard functions available, including auto white balance, self-timer and the ability to turn off the flash. The Ricoh has an audio record facility, too, so you can store sound to go with your pictures. However, unlike some of the others, the functions you are currently running do not appear on the little LCD display. So, you can turn off the flash and put it on self-timer (as we did to take the test shot) but you cannot check whether the options are actually operating until the picture has been taken. The maximum resolution on this camera is 768 x 567. Compression can be set at high, standard or economy.

Output was not as wonderful as we might have expected from a camera in this price range. Despite the fact that the flash had been turned off and did not fire, the output appeared as if it had, leaving the picture over-exposed.

The lens can be set in different modes, with equivalent focal lengths of either 35mm or 55mm.

Adele Dyer

•PCW Details

Price £850 (plus VAT)

Contact Digital Camera Company 01483 452100

Good Points Reasonably high resolution.

Bad Points Not easy to see the functionality.

Conclusion Expensive, considering its output.

★★★

Sanyo VPC-G1 Image PC

Sanyo released its VPC-G1 Image PC digital camera a few months ago and already it's beginning to look rather large compared with the others in its price range. Thickness and height are fine, but the 166mm length is a bit too much. The reason for this is Sanyo's provision for memory expansion via its own SIM modules. Sixteen high-resolution 640 x 480 pixel images or 32 low-resolution 320 x 240 pixel images may be stored per megabyte. Sanyo has fitted 1Mb flash memory as standard and offers expansion modules of 2Mb or 4Mb.

The lens is equivalent to a 43mm focal length on a 35mm camera and is fixed-focused, covering a range from 60cm to infinity. There's no colour LCD screen, but this keeps costs down. Sanyo has provided a built-in flash.

Eagle-eyed readers may spot the fact that the Sanyo VPC-G1 and the Agfa ePhoto 307 share the same basic body, with lens, LCD status panel and buttons occupying the same locations, except that Agfa has dispensed with the expandable memory option, thereby creating a more compact but limited-capacity model.

Image quality is identical and extremely vibrant. The 640 x 480 resolution is perfect for any electronic applications and good enough for small reproduction in print.

Unlike Agfa, Sanyo's package is Windows-only but offers live image viewing on a connected PC's screen. In common with the Agfa, however, the AC adaptor is an optional extra.

Gordon Laing

•PCW Details

Price RRP £399 (plus VAT)

Contact Bannerbridge 01268 419101

Good Points Vibrant images. Expandability.

Bad Points Larger than most.

Conclusion Great choice for the budget user.

★★★★

CASE STUDIES — DIGITAL CAMERAS IN USE

Digital cameras are still regarded by many as toys. Not that they are viewed as not being good enough; just that they are still seen, in many cases, as equipment looking for a purpose. Slowly, however, various organisations are adopting the new technology and developing applications for it.

The main reasons for using a digital camera in place of a traditional film camera are speed, cost and ease of storage. The drastic reduction in the time it takes to actually get hold of pictures has made digital cameras popular in certain sectors: for instance, insurance claims can be quickly mopped up, or estate agents can use digital cameras for illustrating house details.

Security

Supermarket crèches are beginning to use digital cameras to photograph each child with its parent(s) as they come into the crèche so everyone is sure that the children leave with their parents rather than a stranger.

At the other end of the security scale, the police used digital cameras during Euro '96. They took digital photographs of known football hooligans as they boarded trains to that day's match and, using GSM mobile phones, sent the photos to their colleagues at the venue. Potential offenders could be more easily identified as they stepped off the train at the other end because the police could identify the hairstyles and clothing of the people they wanted to watch, as well as their faces.

Catalogue production

In traditional areas of print, the need for speed is the main reason for swapping to digital cameras, despite some initial scepticism. Most of the national dailies in the UK only use digital cameras when time is too tight to develop pictures taken with a traditional camera. For catalogue production, though, the time taken to produce images is often just as critical in the decision to go digital as is the reduction in cost it offers.

Northern Lights, a lighting manufacturer, bought a DCS 410, the latest in Kodak's range of professional digital cameras, to photograph products for a catalogue. The catalogue is A4, but none of the pictures are bigger than a third of a page, so the lower image resolution doesn't noticeably reduce the quality of the finished product. But the time taken to produce the images is drastically cut.

John Fleming, a partner in the firm, explained the old process: "We would have to bring in a photographer, wait to get the negatives back, send them to repro for scanning, lay out the pages, in-house, using Quark and then send the final pages back to repro to be put on film. By bringing the camera in-house we have cut out the 'wet' process." It has also cut out the photographer, because Northern Lights now does its own photography. It has set up a studio with non-flash lights. The camera, a Kodak DCS 410, is mounted on a tripod and linked to the PC by a SCSI cable. The preview facilities have been invaluable for non-professional photographers, and as Fleming says, "The beauty of the system is that you can instantly go to the PC and look at what you have taken."

The process has been speeded up to such an extent that Northern Lights is now changing the way it issues its catalogue; from an infrequent, bound, volume to a rolling catalogue of inserts which can be updated every few months. Costs have been vastly reduced. "There are no film or processing costs and no costs for separation. It cost £5,500 for the camera, then everything else was free. We will recoup the cost in the one catalogue we have produced this year," says Fleming.

Image storage

In other sectors of business, the image storage facility is important. Jewellers, for example, find that using digital technology means valuations can be carried out more effectively using a stored digital image as a record in place of a written description. And museums are cataloguing their artefacts, using digital images which can be archived to disk or CD-ROM. The advantage over traditional film is that the images do not have to be scanned, thereby saving days of work.

Even traffic cameras are swapping to digital film. Many motorists now ignore the cameras — on the assumption that they contain no film. To counter this, the police are pioneering a scheme to put digital cameras inside traffic cameras. These are then linked to a SCSI hard disk in a box by the roadside and periodically downloaded via a telephone link. In this way, the camera can continue to operate at all times, increasing the number of images it can take within the same time scale from around 50 to about 50,000.

Packaging design

Taking large quantities of images can also be an issue in more traditional markets. When Start Design began work on the packaging for Virgin Ginger Beer, digital cameras offered a good way to process many images very quickly.

Gess Gethua, director at Start Design, says the packaging was to have a 1930 retro feel: "The layout of the can uses words like 'cripes' and 'golly-gosh', so for the images we got hold of all this old ephemera and took shots of all of it." The shots were then layered up, as in a collage, and at the print stage will be given a green tint. The final file size is over 300Mb.

To achieve the right "feel", the team used the camera's full range of effects. The Kodak DCS 460 they used has various settings for giving the effect of daylight, flash, or tungsten lighting. These can be applied to one image, so the shot can be taken once and downloaded with different effects applied. For this project, one particularly good feature was the 4,000 ASA exposure setting which gave a grainy image, like an old sepia photograph.

By the time they had finished, the team had more than 400 images available. They retained only the shots they liked when they were previewed and these were saved directly onto the server. As Start Design does its own artwork and repro, this saved them days of work in development and scanning.

It will be a while before digital cameras replace traditional cameras. Estimates vary from two years to a more realistic ten years. In that time we can expect to see more innovative uses for digital cameras, and the future looks exciting.

Adele Dyer

DIGITAL CAMERA OUTPUT RESULTS

Agfa ePhoto 307

Canon Powershot 600

Casio QV-10a

Casio QV-100

EPix Pro

Fuji DS-7

Kodak DC20

Kodak DC25

Kodak DC50

Minolta RD-175

Nikon E2N

Olympus C-800 L

Polaroid PDC 2000

Ricoh RDC-2

Sanyo VPC-G1 Image PC

Flatbed scan of polaroid print

35mm transparency

How we did the tests

We set up a still-life model with a shiny blue bottle, a matt red vase, a green cactus and a guitar, to provide three primary colours, a variety of natural and man-made textures, and shaded graduations from the background sheet. We shot the same composition with every camera set to its highest image quality. As well using the ten cameras reviewed here, we photographed the same composition with a variety of others, too, including several high-end models designed for going into print. Notice colour reproduction and resolved detail on each. Although the cheaper cameras are not designed for printing at this size, showing their images adjacent to each other indicates their relative quality and resolving power. We've included a 35mm transparency, scanned by our repro house, as a reference image.

Digital cameras are quick and convenient, but for the same cost as a budget model you could buy a Polaroid camera and cheap flatbed scanner, so we took a colour polaroid print and scanned it using an Agfa SnapScan flatbed.

CONCLUSION

The only advantage all-digital cameras have over conventional film is speed and convenience for computers. If you need to get images in electronic form in the fastest possible time, then a digital camera is the only choice. Choosing the best overall is a nigh-on impossible job. It is more sensible to carefully consider what you actually want to use it for.

Do you need to go into print? If you want to match the 35mm film quality found in magazines or newspapers, then you're just going to have to bite the bullet and fork out for a pricey model capable of high resolutions, like the top-of-the-range Kodaks, Nikons, Agfas, Minoltas and Polaroids of this world. Then again, if you're printing at the smaller sizes found in catalogues, property details or security passes, many of the middle range to budget-priced models, operating at between 640 x 480 and 1,024 x 768 pixels, will be sufficient.

The last thing anyone wants on a web page is a high-resolution image slowing them down. The biggest images found are in the region of 320 x 240 pixels, making even the cheapest Casio QV-10a and Kodak DC 20 cameras more than a suitable choice.

Web imaging is truly the application where budget digital cameras rule. In fact, they are ideal for any on-screen publishing or presentation use, where people are typically running their PCs at 640 x 480 or 800 x 600 pixels resolution. A digital camera can quickly capture and output an image to be incorporated immediately into a presentation. Bearing PC screen resolutions in mind, a digital camera working at between 320 x 240 and 1,024 x 768 pixels would be suitable.

Once you've figured out where you want to use your images, the numerous extra features of today's digital cameras come into play. Many digital cameras now boast built-in colour LCD panels, allowing you to immediately view your images, discard those you don't like, and giving you the opportunity to instantly try again. Many digital cameras have dispensed with a viewfinder and rely on these screens alone, for composition. It takes a bit of getting used to, but at least you know exactly what you're going to get — unlike many of the poor optical viewfinders we encountered. On the downside, the screens become difficult to view in direct sunlight and drain your batteries quickly.

Power consumption is a real issue with digital cameras: you may never have to buy film again, but if you have to replace the batteries after every few hours of use, there's no cost saving. Cameras with built-in screens are the real offenders, particularly if they're not supplied with AC adaptors or are not compatible with rechargeable batteries, or are fitted with optical viewfinders as an alternative.

Other features to consider may include audio note-taking, composite video output to television or VCR, built-in flash, optional lenses or macro modes for close-up work, along with the all-important memory capacity. Decide carefully what you really want, before you buy. Bear in mind that because most digital cameras are sensitive to light, many can operate adequately in moderately lit rooms without a flash.

Our favourites

Here are the models which really stand out in this, our first digital camera group test. Our overall favourite is Kodak's DC-50. It is the only budget camera we tested which had a zoom lens and a viewfinder that honestly showed what you were going to get. Decent quality, the flexibility of a built-in PC Card slot and comfortable handling make this a winner.

As far as the built-in screens were concerned, we were particularly impressed with Kodak's DC-25 and Fuji's DS-7. Neck and neck in terms of quality, design and looks, Kodak had the edge in terms of overall usability. Fuji's DS-7 is still an excellent choice, however.

At the higher end, Canon's PowerShot 600 and the Olympus C-800 L catered well for those with greater expectations and deeper pockets. People with less to spend and only wanting to publish electronically, or acquire a neat, compact, gadget, should consider Kodak's tiny DC-20 and both Casios as well as the uncannily similar Agfa ePhoto 307 and the Sanyo VPC-G1.

Ultimately there were none we utterly disliked, and in almost all cases we were sorry to see them go.

Forthcoming digital cameras

At the time of going to press, digital cameras were being released left, right and centre. Nikon had just announced its budget-priced but highly innovative CoolPIX 100 and 300 models. The 100's battery pack slides off to reveal a PC Card connected to the main body, allowing the whole camera to slot straight into a notebook without any cables or removable media. The 300 features a touch-sensitive LCD screen and pen. Sony showed its 640 x 480 pixel infra-red equipped DSC-F1 at Live 96, but UK release dates remain unknown. Of particular interest is Sony's optional mini dye-sub colour printer, designed to output 85 x 113mm prints.

At Comdex Fall 1996, Sharp previewed a model storing images on Sony's MiniDisc format, and a colour Zaurus PDA with built-in camera. Epson showed a camera bearing a remarkable resemblance to the Sanyo VPC-G1, while Minolta displayed its Dimâge V *(pictured, below)* complete with LCD panel and removable imaging section.

Gordon Laing

■ *Our thanks to the Digital Camera Company (01483 452100) who supplied the cameras for this feature.*

Minolta's Dimâge V digital image camera

Table of Features

Manufacturer	Agfa	Canon	Casio	Fuji	Kodak
Model	ePhoto 307	PowerShot 600	QV-100	DS-7	DC-20
Dimensions	140 x 79 x 48mm	159 x 92 x 57mm	139 x 40 x 66mm	129 x 47 x 77mm	102 x 31 x 61mm
Weight without battery	370g incl. battery	380g	180g	240g	110g
Built-in memory	2Mb	1Mb	4Mb	2Mb (flash card)	1Mb
Equivalent 35mm focal length	43mm	50mm	40.5mm	38mm	47mm
Max image size	640 x 480	832 x 608	640 x 480	640 x 480	493 x 393
No. of images at max size	36	4	64	30	8
Smallest image size	320 x 240	320 x 240	320 x 240	320 x 240	320 x 240
No. of images at small size	72	15	192	60	16
Native file format	JPEG	JPEG	Proprietary	Proprietary	Proprietary
Cable connection	Serial	Parallel	Serial	Serial	Serial
Removable card	None	Type I, II or III PC Card	None	Solid State Floppy Disk Card	None
Flash	●	●	○	○	○
Macro facility	○	●	●	●	○
Optional lenses	None	2 available	Third-party only	None	3 available
Audio recording	○	●	○	○	○
Viewfinder	●	●	○	○	●
LCD screen	○	○	●	●	○
AC adaptor included	Optional	In the box	Optional	In the box	None
RRP	£399 (+VAT)	£799 (+VAT)	£499.99 (+VAT)	£599 (+VAT)	£230 (+VAT)
Street price	n/a	n/a	n/a	£499 (+VAT)	£220 (+VAT)
Supplier	Agfa	Canon UK	Casio	Fujifilm	Kodak
Telephone	0181 231 4200	0121 680 8062	0181 893 2592	0171 586 5900	0800 281487

Key: ● Yes ○ No

Table of Features

Manufacturer	Kodak	Kodak	Olympus	Ricoh	Sanyo
Model	DC-25	DC-50	C-800L	RDC-2	VPC-G1
Dimensions	130 x 40 x 71mm	116.5 x 150 x 62mm	145 x 47 x 72mm	143 x 76 x 36mm	166 x 47 x 88mm
Weight without battery	270g	520g	310g	285g	310g
Built-in memory	2Mb	1Mb	6Mb	2Mb	1Mb
Equivalent 35mm focal length	47mm	37 - 111mm	36mm	35mm or 55mm	43mm
Max image size	493 x 393	756 x 504	1024 x 768	768 x 576	640 x 480
No. of images at max size	14	7	30	9	16
Smallest image size	320 x 240	Max with compression	Max with compression	Max with compression	320 x 240
No. of images at small size	29	22	120	38	32
Native file format	Proprietary	Proprietary	JPEG	DCS	JPEG
Cable connection	Serial	Serial	Serial	Serial	Serial
Removable card	CompactFlash card	Type I or Type II PC Card	None	Type I or Type II PC Card	SIM upgrade modules
Flash	●	●	● (with red-eye reduction)	●	●
Macro facility	○	○	○	○	○
Optional lenses	None	None	None	None	None
Audio recording	○	○	○	●	○
Viewfinder	●	●	●	●	●
LCD screen	●	○	●	●	○
AC adaptor included	None	Optional	Optional	In the box	Optional
RRP	£340 (+VAT)	£640 (+VAT)	n/a	n/a	£495 (+VAT)
Street price	n/a	n/a	£930 (+VAT)	£850 (+VAT)	£399 (+VAT)
Supplier	Kodak	Kodak	Digital Camera Company	Digital Camera Company	Bannerbridge
Telephone	0800 281487	0800 281487	01483 452100	01483 452100	01268 419101

Key: ● Yes ○ No
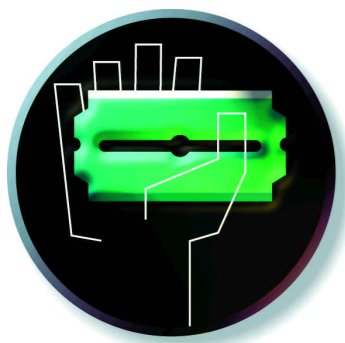
The mail must get through

But increasingly, as internet email grows in popularity, it isn't a first class service. Nigel Whitfield explores the past, present and future of electronic mail and the problems facing it.

Whether you're connected to the internet or just use it on a local network, email is one of the most indispensable of business tools. For some people it's the closest they come to the mythical "paperless office", while for others it's just a way to keep in touch with friends and family. And it can also be one of the most irritating things you'll ever install on your computer. Make the wrong choice of email system, and you could live to regret it for a long time.

What's now thought of as internet email is actually a collection of many different types of system: some really are connected to the net directly, while others are linked to different types of network such as Fidonet bulletin boards or UUCP networks, via a series of gateways. Others are corporate email systems, some using standard software and others using off-the-shelf packages like cc:Mail to link them up. Whatever sort of system someone's using, chances are you'll be able to send mail to them just by quoting an address in the form user@host.somewhere and let the system take care of the rest.

Basic beginnings
It hasn't always been that way. While email on the internet itself has long been simple to address, talking to the rest of the world was tricky. And even talking to other people on the net was not as colourful as it is now: the Unix roots of the internet meant that many of the email programs used on the net looked pretty old-fashioned compared to the graphical tools that Windows and Mac users are used to. Email on the internet was designed to transmit text, and it's remained that way until very recently. To be exact, it was designed to transmit American text, with a limited set of characters that precluded accented letters, pound signs and much else.

Add the lack of flexible addressing, which made it necessary to specify the route your message might take to reach some recipients, and it's easy to see why it took internet email a comparatively long time to become the de-facto means of communication between businesses and inviduals. Who really wanted to be bothered with addresses like @cunyvms.cuny.edu: online-l@pucc.bitnet, or worse?

A few years ago, knowing how to direct mail like that would be essential for many net users. Now it's all hidden, and gateways to systems as diverse as Fidonet and CompuServe can all appear to have an internet address which passes messages on. And within those systems, it's much easier than it was to send mail to the rest of the world. By linking to the internet, online services like CompuServe gave their users the ability to contact people on all the other systems that did the same, and coupled with the number of graduates who became used to the net for communicating at college, people suddenly realised that email was a way you could reach a large number of the people you wanted to contact.

When worlds collide
While internet email is the glue that links different systems together, it still only really allows the exchange of text-based information. Files can only be sent if they're converted into a format that can be sent as text. Meanwhile, on the departmental LAN, internal email systems have grown and become much more than a way to send a simple text note from one place to another. Even old systems provide fill-in forms for standard office tasks like purchase requests or telephone messages, while the latest mail programs like Microsoft Exchange allow different fonts, colours and drag-and-drop attachments — a far cry from the text-based world of the internet.

As you'd expect, when the two try to talk to each other, things start to go wrong — badly in some cases — and what should have been a simple means of exchanging information becomes a nightmare of garbled text and bizarre attachments. All of which, naturally, is completely avoidable.

On the internet, there are standards for just about everything, drawn up now by the IETF (Internet Engineering Task Force). In the UNIX world these standards, called RFCs (Request for Comments), are widely used, and complying with them makes it possible for systems to swap messages with very few problems.

There are standards that cover just about every aspect of email, from where to send error responses when a message can't be delivered, down to how addresses should be written. For people who are on mailing lists, there are standards that define how a group of mail messages can be wrapped up in a single one, saving on bandwidth and making it easier to handle. Adhering to the standards makes it possible to do things like respond automatically to different types of message, or splitting a digest into its component parts.

MIME artistry
All that, though, still isn't enough in a world where people want to send files or add other information to their messages. And so MIME was born. It stands for Multipurpose Internet Mail Extensions, and it's a way that the text-based email of the internet can be used to transfer just about any form of information.

MIME allows, for instance, for binary files to be attached to messages, just like on a LAN email system, with descriptive comments and information about the type of information. There are even defined types of information, such as "audio/basic", so that some types of file can be swapped very easily between people with completely different computer systems.

You want bold, centred text in your email? Then you should be using MIME's richtext format, which looks a little like HTML and adds extra features to a standard message without completely messing it up for people who don't have a compatible mailer. In fact, the whole of MIME has been designed so that if you don't have a mail program that understands it, you can still make out a lot of what's going on.

Perhaps that's why it's been so resolutely ignored and botched by the people who make corporate email systems. In the PC world, standards are something that everyone tries to set, instead of following, and it's the readiness of
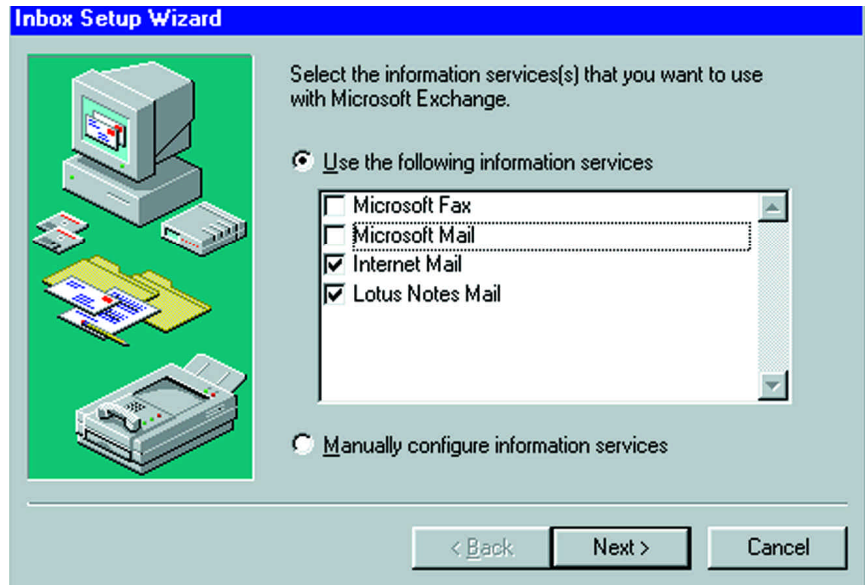
The future of email

Email is growing. Although the pretty face of the internet is the web, email is far more useful to most people and, for many of them, an indispensable tool. That internet email is viewed as important is evidenced by the fact that companies like Microsoft now provide an internet mail program that works in a rather better way than their first attempt, which used Exchange to talk to the rest of the world, resulting in a slew of messages around the internet with bizarre attachments in "ms/tnef" format, clogging up mailing lists with data that was only useful to other Exchange users.

NetScape's Navigator includes a basic mail program, and no corporate email system worth its salt would be seen without a gateway to the internet via SMTP or UUCP, and at least some rudimentary way of handling MIME attachments. As people wake up to the problems caused by misbehaving gateways that mangle and lose messages, expect companies to work harder to comply with established standards.

All of that, though, is not quite enough. Sending mail on the internet can still be plagued with problems, including bizarre error responses to your messages. Just what does "554 Service unavailable" really mean?

At the moment there's no set standard for the format of error messages on the internet. That's set to change soon, with draft proposals already available. It may seem like a trivial idea, but it's potentially one of the most significant changes for people who rely on email. If error messages have a standard format, your email program can turn that "554 Service unavailable" into something more useful and work out what to do next, whether it's telling you in plain English or just sending a second copy of the note automatically.

Other areas where improvements can be expected are the interface to mail programs, bringing some of the power of traditional email systems to the desktop, with powerful tools for searching and organising your messages. Some LAN mail systems can already do this, but they'll often fall down when presented with the finer details of internet mail.

Windows 95 and MacOS have already taken a step towards making email more useful, with a single mailbox that can be used for internet, LAN and fax messages, via Exchange and PowerTalk respectively. But it's still not as simple as it should be to send a message to its ultimate destination, and you'll often have to choose what sort of note it is. Better address books and systems for managing mail should improve that in future.

And for your incoming messages, agent-based technology offers the potential to help make sense of the mountain of email that busy people receive. Based on systems similar to Autonomy's AgentWare, these will allow you to sort messages based on an intelligent look at their contents, instead of just scanning for a single phrase in the text or the subject.

So what the future holds for email is simple: standards, to make sure that you really can exchange different types of messages with people; simplification, to make it easier to know what you're doing and what's gone wrong; and sorting, to help find the messages that matter and hold back the tidal wave of junk.

Inbox Setup Wizard

Select the information service(s) that you want to use with Microsoft Exchange.

○ Use the following information services

- ☐ Microsoft Fax
- ☐ Microsoft Mail
- ☑ Internet Mail
- ☑ Lotus Notes Mail

○ Manually configure information services

< Back | Next > | Cancel

MS Exchange allows integration of mail and fax documents, but can be tricky to set up

companies like Microsoft to re-invent other people's wheels that causes most of the problems with sending email on the internet. They're not the only guilty party, of course. Everyone's at it, deciding to do their own thing to preserve the features of their own email system across the internet.

That's all very well — if you can do it in a way that works. But if you've ever tried to send a file from your LAN through an internet gateway to someone in another company, chances are you'll have had a thoroughly frustrating time.

For instance, there are gateways that will try to open any files that pass through them, and bounce the mail if they can't understand what's in it. And there are some that will subtly alter some of the characters in a uuencoded file attachment so that it can't be unpacked. Perhaps you have a message that's urgent, and your mailer lets you set a "Precedence" option? Beware: while some systems will act on it and put your message to the head of the queue, others will silently delete it if the value isn't one they understand.

And how do you know a message has been received? Again, there's no simple way, especially since many LAN gateways don't allow you to add your own internet headers. Even when you do, which headers should you put in? There's Return-Receipt-To:, Acknowledge-To, X-Confirm-Reading-To: and doubtless a few others, some of which will survive gateways and some which won't. Small wonder, then, that the only reliable way to be sure email has arrived is to ring the recipient and ask them, or make sure that every message receives an automatic reply.

But where do you send the reply? To the address in the "From:" field, or perhaps to the Reply-To: address, or should it go to the "envelope" address, which may be different. In practice, you won't be given a choice.

Building a better email system

If you want to build an email system that works, where do you start? And what sort of features should you be looking at?

The most important thing to consider is what you want to use your email for. Is it primarily for communicating with the outside world, or for exchanging information with other colleagues in the office? Do you want to be able to track the use of resources via a central scheduler, or provide people with simple message templates for common tasks? Just how easy do you want it to be for people to send messages to the internet?

All those questions are going to have some bearing on the type of email system you choose, and bear in mind that if you decide after a while to swap to a different system, you could be in for a massive upheaval. You'll often be often unable to access messages that were received with an old program.

There's unfortunately no such a thing as a completely infallible email system, but there are things you do to make sure everything runs as smoothly as possible, and those too are important considerations when you're connecting everything up.

To an extent, you may find that the choice of LAN email system has been made for you when your network was installed, leaving you with a system like MS Mail or Novell MHS already up and running, with just a question mark over how to integrate it into the rest of the world.

Fortunately, where there used to be only a few ways to connect a system like MS Mail or MHS to the internet, there are now dozens, and you can choose the solution that best suits your needs, from a dial-up gateway system like TFS to a post office server designed to sit on the end of a leased line connection to the internet.

Whichever you choose, it's important to find out exactly what functions are supported; can you, for example, arrange for attachments on LAN mail messages to be automatically converted to MIME format, and for the same thing to happen in reverse when a message is received from the internet? And what happens with some of the advanced MIME features, like large "multipart" files that are split over several messages.

If a gateway program won't handle MIME attachments, avoid it. There are other ways of sending files over the Internet, but MIME is the standard, and it's what you should be using if you want to be sure of exchanging data safely with other people.

Check too to find out what happens with the different addresses on internet mail when it reaches your system. Some MS Mail gateways offer users the "envelope" address instead of the Reply-Address. That might sound trivial, but it can make it impossible to reply to people. It's a little like the letters that come from your bank, where the address on the back of the envelope is the bank's central mail room, but you really need to send your reply to your own branch, at the address on the letter. If a mail gateway can't make this distinction, it's broken. Not only will you have problems sending mail to some people, but error messages are likely to be sent back to the wrong place as well.

Of course, few vendors of email gateways are going to readily admit to the sort of problems their software can cause. A good place to look for advice is a newsgroup like comp.mail.misc where you can swap experiences with other people. You should also make it clear that you are looking for a mail gateway that supports MIME and complies with the internet RFCs for sending and receiving mail.

Technical gripes aside, other ways to make email more efficient include the use of auto-response systems, especially for addresses that appear in information such as sales brochures. Make sure that important addresses generate an automatic response, so that everyone who writes knows straight away that their message has been received, and whether or not they can expect a personal reply.

Email filtering is also an essential tool, and here it can help to make sure that gateways to the internet can support more than one address for each user, or lists of users. For instance, "sales" could be an address that sends messages to more than one person, while "online-I" could be the address at which a user subscribes to the Online-L mailing list. By ensuring that mail on different topics is routed to different addresses — even if it's all ultimately for the same user — it becomes much easier to put messages in appropriate folders, making sure that important messages aren't lost beneath a pile of junk mail, press releases or invitations to dinner.

This may seem like a lot of different things to consider when all you really want to do is to send a message from one person to another, but remember that messages are a lot more than just the text of old. If you want to be able to reliably swap data, DTP files, pictures, sound and anything else, you need a reliable email system, and you need one that won't talk gibberish when it comes into contact with the outside world.

Microsoft's new Internet Mail package works perfectly — as long as the recipient is using the same client

Even large companies like CompuServe seem able to blissfully ignore some of those addresses, directing errors back to the wrong place — potentially disastrous on mailing lists, where an error sent back to the list will generate another error and so on. Few of the PC mail programs used for internet email by the man in the street offer any options for automatic responses at all, let alone the flexibility found in the longer established world of internet email.

For all that they look old and clunky, the tools that people have been using on the internet for years, first with text-based mail and now with MIME attachments, are actually far more sophisticated than many of the systems that large companies use to link their LANs to the rest of the world.

It may be unfashionable to look at the way people have done things in the past, but if email is to become useful and reliable, the people who offer to link you to the internet should concentrate less on re-inventing the wheel and more on making existing ones turn smoothly. There are already millions of people using a mail system that works and, with technologies like MIME, can offer everything that email needs to, without tying you to a single mail program or gateway. Communication is the name of the game; but wouldn't it be much easier if everyone talked the same language?
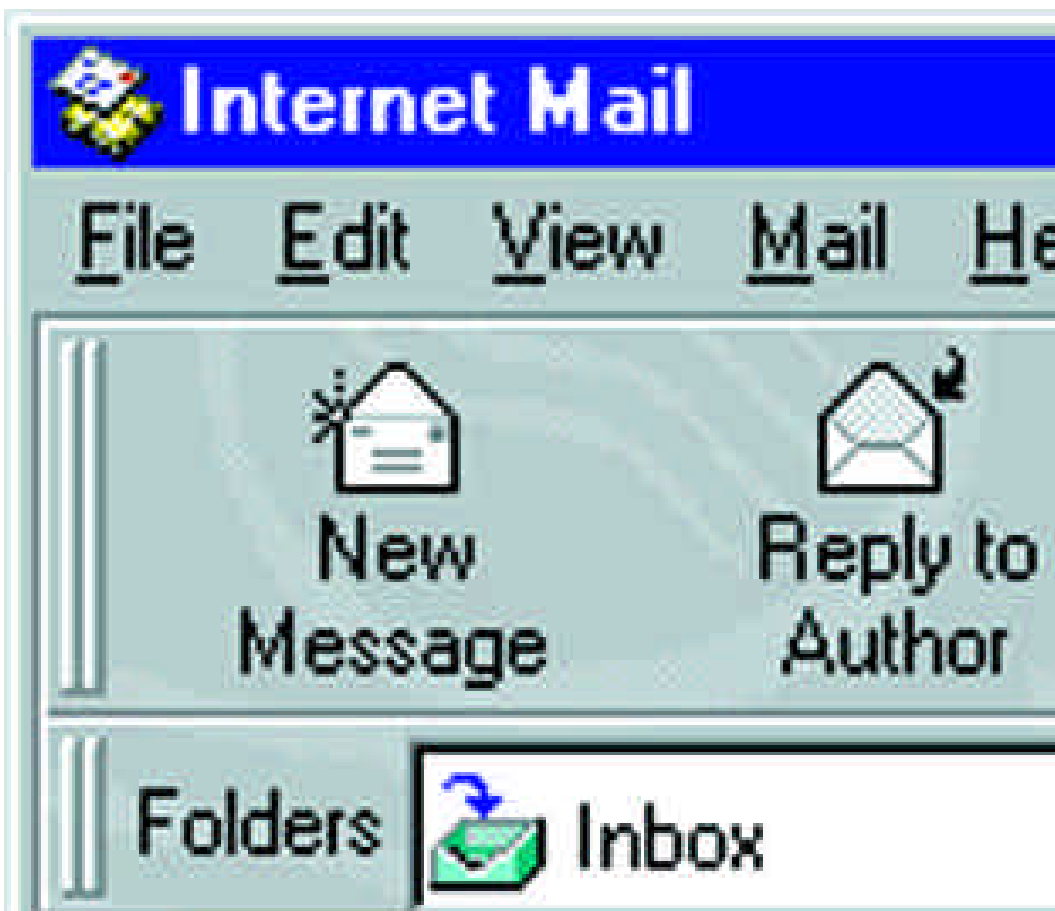
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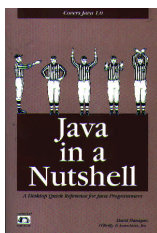
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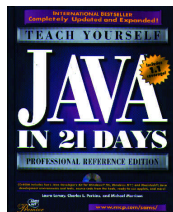
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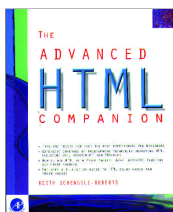
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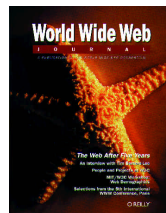
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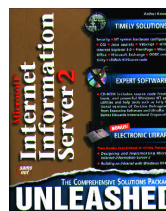
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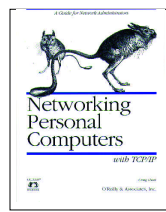*£54.95*
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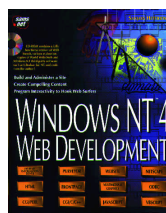
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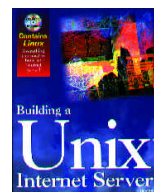
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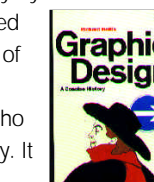*ISBN 0-500-68022-1*
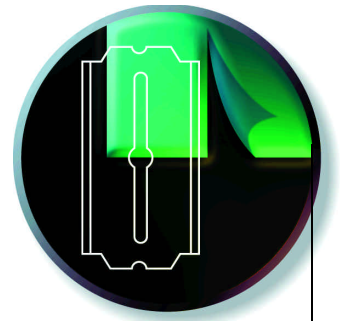*Thames and Hudson*

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Doing it in style

Jim Smith welcomes the arrival of style sheets on the internet and shows how to get them into your pages. Plus, he can't resist returning to JavaScript with the news that multimedia mouseovering is now possible on the web.

Style sheets appeal to both newcomer-designer and HTML purist alike because they solve two of the most taxing and contradictory problems affecting both users. To designers, they mean you can at last specify things like font, margin width and line-spacing: all the things print designers take for granted. To the HTML purist they're a way of getting all that page-description information out of HTML, which can then return to its role as a content-mark-up language.

This latter is particularly important if HTML and the web are to successfully colonise new areas. HTML coding is simply supposed to provide a way of indicating the type of information in the document, so that a speech-synthesising browser knows that anything inside <B> bold tags has to be said with emphasis, for example. The more cluttered pages become with information about column-widths and fonts, the more difficult they will be to process.

Clearly, style sheets are powerful things. Sadly, they currently only work with Internet Explorer 3.0, but Netscape has committed to supporting the style-sheet standard (yes, it's a standard, not some piece of homebrew HTML from one of the browser vendors).

Internet Explorer's current version of style sheets leaves a lot to be desired. Although MIE 3.0 supports external style sheets (external files), you can only use one of them, not the multiple style sheets which the W3C standards body wants to introduce. Called Cascading Style Sheets, the W3C standard is a flexible way of designing a site. The rather confusing term

"cascading" actually means a kind of hierarchy; the point is that style sheets can contain contradictory information about what kind of style to use: one can define a paragraph as being 12-point Times, another as 18-point Arial. It's the browser that decides which to display according to built-in rules of hierarchy (some of which are already implemented, as we shall see). So a browser may decide to use Style Sheet One's definition of a paragraph over Style Sheet Two's, because Style Sheet One is the "master" document and Style Sheet Two is only a draft.

The designer can specify which elements are to be used by the cunningly simple expedient of adding the word "important" to a style item definition, but this could be duplicated by another document.

The basic syntax of defining a style is simple. You simply append the style you want a particular page element to be to the end of that element's tag in a declaration. The actual form of the style declaration depends somewhat on where you're going to put it, but if you're defining a whole group of styles to refer to at the top of a document, which is technically known as an embedded style-sheet, it looks like this:

You mark out the style declaration with a new tag <STYLE>. Most older browsers will just ignore this, but note that what follows is not protected within angled brackets, so should be hidden from feeble-minded browsers with comment brackets. MIE 3.0 will still pick up the style information.

Note the MIME type we give the browser after style: this isn't strictly necessary but since it's presumed that at some point there

will be other kinds of style sheets, it's probably a good idea to start pointing out which one you're using.

```
<STYLE TYPE="text/css">

    <!--

    BODY  {font: 10pt "Arial"}

    H1 {font: 18pt "Arial":
font-weight: bold: colour: blue}

    -->

</STYLE>
```

Designers will be pleased to note that you really are defining font-sizes in points, although there is a pixel option.

I've deliberately picked some simple definitions to get started with, but it seems that nearly everything you could want for page layout is available: other things that can be set include margin-widths, font-overlay, drop-shadow and so on. Full details can be had on Microsoft's style sheet reference pages www.microsoft.com/workshop/author/howto/css-f.htm and HTML reference manual www.microsoft.com/workshop/author/newhtml/htmlref.htm.

Having decided what you want your styles to be, it's important to consider how you want to get them into your page. There are three ways of making an HTML obey your styles: linked, embedded and inline.

A linked style sheet is an external document, as I have described. Ultimately, you will be able to link to more than one document, when the next versions of

Internet Explorer and Navigator come out, but for now you're limited to one.

The syntax for linking to an external style sheet is: in the <HEAD> tags add a line

```
<LINK
REL=STYLESHEET
```

probably not a good idea to conceal a 100Kb image beneath a 10Kb button.

When the user's mouse pointer wanders over a button, it triggers a JavaScript onmouseover handler. This calls a function that passes

```
HREF="http://www.somecompany.co.uk/
style1.css" TYPE="text/css">
```

Here, the TYPE attribute has a real purpose: it saves you having to instruct your server to deliver .css documents properly.

A linked style sheet contains much the same formatting information as our embedded document, but it obviously doesn't need to pretend that it's HTML to avoid offending non-savvy browsers.

A linked document is more powerful than an embedded one because it can apply to many files and those files can have their formatting changed by making amendments just to the style sheet file. However, if you have a site that automatically obeys your master style sheet, you're almost bound to want to break your own design rules at some point; that's how your embedded document comes, as this overrides any formatting from the master document (so you see, some cascading is already here).

But suppose you want to apply formatting to just one element; make one paragraph blue or 14-point. The quickest and easiest way is to amend the enclosing tag for the element you want to change with a STYLE attribute, like so:

```
<P STYLE = "margin-left: 0.5in:
margin-right: 0.5in">
```

This is called an in-line style tag and overrides the styles of both linked and embedded style sheets.

If you find you have lots of different styles, the style sheet standard supports the creation of subclasses of element tags. Put simply, you can have as many <P> tags as you want by appending an identifier to them, such as <P.body> or <P.intro> and then defining the style as for a linked or embedded file.
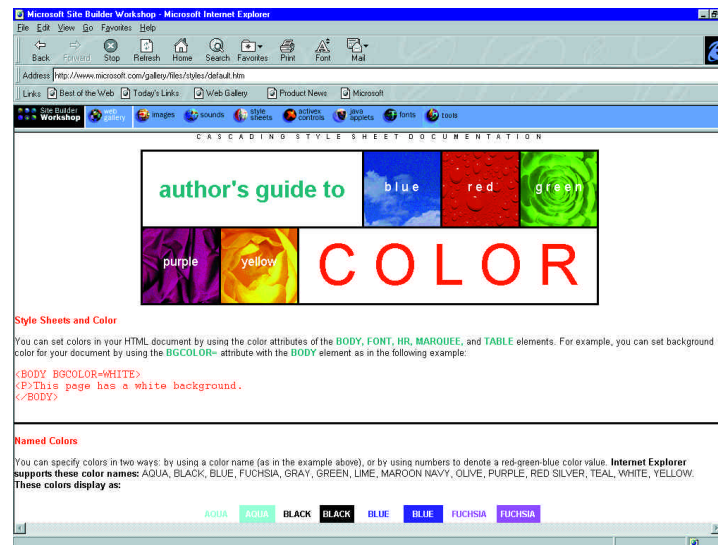
The only trouble with style sheets as they stand is lack of browser support, but I suspect their simplicity and power will win out in the end, particularly when someone produces a professional tool that means you don't have to go rooting around in raw ASCII. After all, anything that can unite the net puritans and its commercial *avant garde*, has to have something going for it.

Mouseover magic

I had intended to leave JavaScript alone for a while after our three-month forced march through its foothills, but a couple of recent developments have forced me to reconsider this policy. The first, and most exciting development is something that probably looks so trivial to everyday users they'll wonder why we're making a fuss about it. The news is this: somebody has figured out a way to do real multimedia highlighting buttons.

It's a basic part of the vocabulary of CD-ROMs: when your mouse pointer moves over a target image, that image changes to highlight the button. Director users will know this as the "on rollover" function. It's such a basic part of CD-ROM multimedia that it's always been a big request from clients. And, until now, we've been unable to oblige in normal everyday HTML: the only alternatives have been to create a Shockwave button, which has its own plug-in-detection problems, or to write one in Java, which has the disadvantage that the button will appear some time after the rest of the page has loaded.

Instead, the current solution uses JavaScript to store images and display them
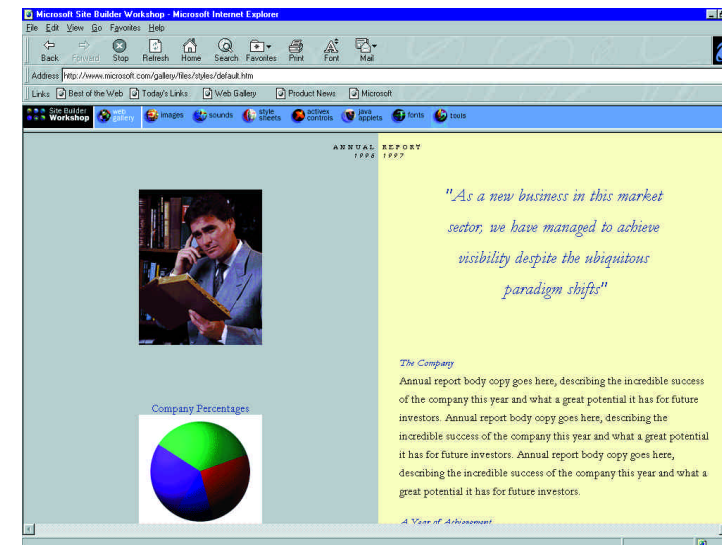
by actively responding to mouse events. There is, of course, a drawback. The mouseover trick currently only works with Netscape Navigator 3.0, because mouseover events don't work in previous versions, and the version of JavaScript found in Internet Explorer is incompatible (but more of that later). Happily, the technique is easily hidden from other browsers and all that non-3.0 users get to see is a set of normal, static buttons.

The key to the technique lies in the way Navigator refers to web objects. As you'll recall, Navigator treats every item on a page as being a property of a master object called a document. A document will have properties for its number of windows, URL, text content and, crucially, images. In order to manipulate these images we need access to them from our JavaScript.

JavaScript lets you reference each portion of the document object as part of an array. Images are placed in the document.images[n] array. What the newly-discovered trick relies on is the semi-documented feature where JavaScript lets you change which image appears if you change the content of document.images[n].

I saw this trick on the Project Cool home page (www.projectcool.com) although I obviously can't say for certain, the web being the free-for-all that it is, whether this was its first appearance. It's since started cropping up all over the place. The Project Cool page caught my attention not only because the button changes, but also because the same piece of code changes an image at the top of the page as well.

When the page loads, the browser automatically loads up the full array of images called in the JavaScript. So it's

the numeric ID of the button in question back to some code that looks up the ID and changes the image selected to the desired button by changing the contents of the document.images[image ID].

Isn't that scarily straightforward? You can even embed animation in the form of animated GIFs so that moving the pointer around makes the page become active, or use the Planet Cool trick to provide tool tip-like help in another part of the screen.

The disappointment is that this trick only works with Netscape 3.0's version of HTML, which supports the mouseover handler. Yet worse is the fact that there are now three versions of JavaScript in existence: the original Netscape version, the version found in Internet Explorer, dubbed Jscript, that Microsoft had to build from scratch when Netscape failed to come up with the source code for the interpreter as it had promised, and a further implementation from Borland. The result is three interpreters for a supposedly open scripting

But all three organisations have agreed to thrash out a unified version of JavaScript, which will probably entail yet another name change, to, wait for it, ECMA Script after the standards organsiation which is leading the discussion. Thank goodness something's being standardised, however. Given the rate standards bodies work at and the speed the browser warlords are pumping out new versions, we'll probably be at Netscape 17 before we see it.
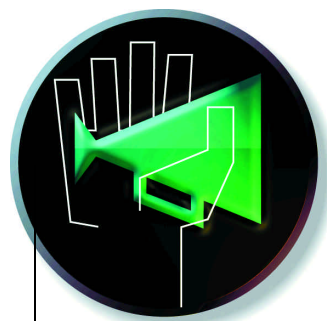
net.news

Around the web world, with news supplied by the VNU Newswire.

AOL's Exciting deal

■ Leading internet search engine, Yahoo, is in danger of being knocked off its popularity perch, following an exclusive tie-up between its rival, Excite, and America Online (AOL).

Under the agreement Excite will acquire AOL's Webcrawler service and become the online service provider's chief search engine and directory service. The exclusivity of the agreement means that Excite's competitors, like Yahoo, will be locked out of AOL for two years.

The new search engine, to be marketed jointly as America Online Search Powered by Excite, is expected to generate substantial increases in traffic — up to 12 million page views a day — and, therefore, increases in advertisement revenue for both companies. According to Steve Case, chief executive of AOL, most of the extra ad revenue from the deal will go to AOL.

Competition among search engines is pretty fierce and the deal signals a bit of a shake-up in market share. The combined market reach of the new partnership will be 44.1 percent, significantly higher than Yahoo's current share.

Excite president, George Bell, said the distribution side of the deal has intrigued him. "This gives Excite a lock on the most important source of distribution in the internet… seven million customers is nothing to shake your head at."

Lucy Ness

www.aol.com

Salutation: A very friendly consortium indeed

Consortium poised to fill the gaping MAW

■ A consortium of hardware vendors is on the verge of releasing products that will fill the gap left by Microsoft at Work (MAW) when that operating system was ditched two years ago.

The Salutation Consortium, which includes companies like Kodak, IBM, Novell, Lexmark, Matsushita, Mitsubishi, Sharp, Toshiba and Xerox, showed technology at Comdex/Fall that provides users with a graphical user interface when printers and other peripherals need attention.

The non-profit group has worked to produce an open standard that the different members can use for their devices, said Mary Hill, chairman of the group. "We started the consortium in 1992/93 to create an open standard for peripheral devices," she said. "Salutation-embedded machines are on the way."

The software core for the Salutation drivers can be implemented on all platforms, said Hill. Drivers are already available for OS/2 and Windows 3.x, with versions for Windows 95 and NT coming online within the next few months.

Although the consortium wanted Microsoft to be a member, it had so far declined, said a source at the group. He added that Microsoft had wanted to create a proprietary standard with MAW and so far had resisted all attempts to persuade it to join.

Mike Magee

www.consortium.org

Virgin launches UK net service

■ Virgin's new internet service, Virgin Net, will be made available on CD-ROM or floppy disk through Virgin Megastores and other retail outlets. A year of preparation has seen Virgin Communications working closely with nine different partners and suppliers, to bring the new service to life.

Virgin chief, Richard Branson, claimed: "It couldn't be simpler and it couldn't be faster, because we've focused on the essentials. Virgin Net is a fast, efficient, simple and easy-to-use, value-for-money service, available to everybody."

Product reviewers point out that the software is geared towards standalone PC users rather than networks. One of the "user-friendly" ingredients is Agentware, a product licensed from software partner, Autonomy, which enables a user to go offline while an intelligent agent searches the web, thereby saving the user money and time.

The Virgin service is run on Oracle's web server and database technology. Other third-party elements built into the server end of the product include Broadvision's "dynamic page" technology, which allows web sites to be perpetually updated. One promise is that Virgin will set up a customised newspaper service to particular customers' specifications.

The access and email technologies are standard: US Robotics modems, which will support 56Kb/sec dial-up from next year and are operable over cable and telephone, Netscape Navigator browser, and Software.com's Post Office for email.

Virgin offers free installation and access to the internet for the first three months.

Andy Favell

www.virgin.net

Internet commerce set to boom

■ European internet commerce will be worth more than $5bn by 2001, according to a report by London-based consultancy, Datamonitor.

The report, *IT in Digital Payments*, claims that European internet commerce is set to sky-rocket in the next few years. It says that by 2001 10.5 million households will be conducting transactions online.

According to the report, "Germany and the UK will lead the growth in shopping activity conducted in the virtual marketplace."

Datamonitor spokesperson, Sophie Smith, said that digital payments were set to alter the bank-customer relationship. "The internet will introduce a level of abstraction between the user and the bank," she said, adding that internet commerce will outgrow all other delivery channels, with a growth rate of 63 percent a year. Datamonitor did not expect growth to be confined to encrypted credit card transactions, which comprise the majority of transactions today. The report stated that "New payment methods for low value purchases will emerge, which demand particular responses from IT suppliers and content providers."

Smith warned that the banking sector must become more innovative to counter the competitive pressures of new methods of payment and profit from digital cash. "Banks will start to look to the digitalisation of commerce as a way of reducing costs and increasing the efficiency of their operations," the report forecasted. And it identifies France as the fastest growing European market, followed by the Netherlands.

But the UK and Germany, which have a higher online customer base, are expected to grow less quickly.

Smith said that to capture the growth, banks must target the home user. "Direct access to the home is a tremendous inducement for the retail banking industry to establish online transactions and make all their services available electronically," she said.

Nick Farrell

Netscape jumps on the intranet desktop…

■ Netscape will unleash a head-on challenge to Microsoft Windows by mid-1997, when it ships its Constellation desktop manager, demonstrated at Comdex.

Constellation manages and organises desktop applications, including Microsoft's, on the intranet, and enables users to get data and documents, from any network, onto the desktop. It will ship as part of Netscape Communicator, the client part of the company's intranet-based groupware product, and is expected to compete head-on with Windows 95.

Constellation is similar to Microsoft's planned Active Desktop. Both focus on pieces of information, rather than windows, as the desktop environment. Communicator will provide the links to applications for Constellation, making Windows or NT just one section on a screen of options.

The software will gather information that is relevant to the individual user such as files, bookmarks and email from different sources and transparently replicate it to the server. This means users will no longer need to update applications on their own desktops because the information will be "pushed" to them. Users will be instantly notified of updates and be reminded of important events.

Jim Barksdale *(pictured, above)*, Netscape's chief executive, said: "While the first two waves of the internet focused on users being able to find information easily, the market for the third wave, which we are entering, is that information finds the user. Our new products will have the intelligence to help you focus on the information you care about." Netscape stated that it aimed to reduce the problems of managing overlapping windows and present users with a full-screen, Java-based, environment.

…and push starts a new design concept

■ Also at Comdex, Netscape outlined a new method of web-site design, called Live Sites. This technology creates sites that offer visitors features such as automatic updating, where information is customised and "pushed" to their desktops. Although push technology exists, Live Sites would be built using generic components so that pushed information services could be more easily integrated. Netscape is working on specifications and software developers' kits, which will be open, but these are some way off.

However, pushed information will be critical to Constellation, and Netscape has individual applications of this type already running.

Linda Leung

www.netscape.com

Hackers, tracked

■ BT has developed a way of closing a loophole that enabled hackers to get free telephone calls by breaking into Meridian voicemail systems.

BT Business Systems' marketing communications manager, Mick Hammond, said hackers had been able to notch up huge free phone bills at a company's expense by breaking into a BT Meridian telephone voicemail system and using it to call out to international numbers. But "Hacker Tracker", which was previewed at the TMA29 show in Brighton, was able to catch the hackers by monitoring the mailbox login and through dialling systems in PBX voicemail.

As soon as there is unauthorised or abnormal usage of a system, a visual alarm is raised on the system administrator's PC, or via a pager. Previously the problem could only be detected through Meridian mail's manual reporting function — long after the hacker had left the system. "By improving the efficiency of voicemail violation detection, Hacker Tracker becomes an important tool for any business using Meridian Mail," said Hammond.

Nick Farrell

www.bt.co.uk
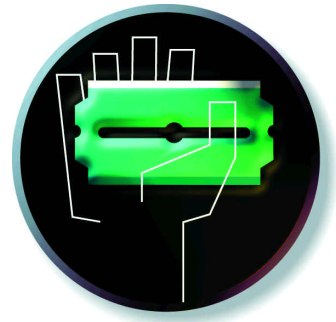
Pass the **cookies**, please

Cookies you get on the web are not the edible, choc-chip variety. Never mind. Nigel Whitfield explains the whys and wherefores of this and other net queries.

Q *"Some web sites I've visited say I need to use a browser that understands cookies. What are they, and what do they do?"*

A. It sounds like you've been visiting some of the web sites like search.com which allow you to customise certain sections of the information. A cookie is a piece of information that can be passed from a web server to a browser. The browser stores the cookies on your hard disk and passes them back to a web server when requested.

The latest versions of both Internet Explorer and NetScape Navigator can understand cookies, so if you have one of these browsers, you'll be able to make use of the facilities on these sites. If you want to see how everything works, look at www.search.com where you can say which areas of the internet you're interested in, and then return whenever you want to see the changes in those areas.

Cookies can also be used to provide custom newspapers, or members-only pages, avoiding the need to type in passwords or user ids. However, there have been some security and privacy concerns expressed over techniques like this and you may want to think hard before using options such as these. Remember that if they're used to make it easier to access a site, especially an overseas one, information collected about you may not be covered by data protection legislation.

Testing, testing…
Q. "I would like to run a dummy web server on my PC to test site structures and CGI scripts properly. Currently I'm running

Windows 3.1 but in a few months I hope to move to NT 4.0. I believe that Microsoft FrontPage has some form of server built into it but I'm not too sure whether it is designed to do what I want."

A. You're right! FrontPage does have a web server built-in, but it's only really designed as a personal server and doesn't have support for CGI scripting. It also has some non-standard extensions and if you're not careful you might find you've written scripts that won't work on another system.

This is the most important thing you have to check. You can test the structure of your site with any web server, or even just by loading the pages from disk with your browser, but when it comes to scripts you need to know what sort of server and operating system is being used, on the system where the web pages will finally be hosted. Your internet provider should be able to tell you that information. Usually it will be a computer running a Unix operating system, which means that your CGI scripts will be written in Perl, which is a fairly simple language to pick up.

Perl also runs under Windows NT (see *Hands On*, page 258) and there's a basic DOS version too, which will allow you to test scripts on whatever platform you like. You may have to alter the start of the script, where the information passed via CGI is interpreted, to account for differences in the way that CGI works with different web servers.

If you're still running Windows 3.1, you can create pages with CGI scripts that can call DOS or Windows programs — which could include Perl scripts — using the Quarterdeck web server. You might also like

to consider looking at win-httpd, which can be downloaded from home.city.net/win-httpd/, where you'll also find a link to download an evaluation version of O'Reilly's WebSite server for Windows 95 and NT.

All these servers support CGI, so you should find you'll later be able to move scripts to a provider's computer with relatively little effort, as long as they're written in a language like Perl, which is very portable. For more information on the language, check www.perl.com.

Mail bonding
Q. "I use both MS Internet Explorer and Netscape Navigator 3.0 and, hence, have both NetScape Mail and Microsoft Internet Mail on my system.

My main client is Internet Mail but I sometimes collect my mail using NetScape Mail when, for example, using a mailto: link in Navigator and it is automatically downloaded.

I was wondering whether there is a way I can maintain a shared message and address list database between Netscape and Explorer. I've found a program that converts IE favourites into NetScape Bookmarks and vice-versa. Do you know whether there is something similar that deals with email?"

A. Unfortunately, there doesn't seem to be a program that does what you want; allowing you to maintain a single file of messages. Unlike on a Unix computer system, where there is a standard format for mail messages, each mail program will use its own format, and moving messages between the programs is going to be difficult.

p223 ➤

But it's not impossible if you're prepared to engage in a little subterfuge. If you download one of the programs suggested for Demon users who have to receive messages via SMTP rather than POP, such as TPOP or SL-MAIL, you'll be able to set up a small post office on your own computer, and then configure one browser to use that for sending outgoing mail. You can then forward messages from one browser to another using your mail server.

It's not the ideal solution but it will allow you to make sure all your messages end up in the same program so you can keep track of them more easily. Information about SL-Mail cab be found at www.seattlelab.com and TPOP is in the windows directory on ftp.demon.co.uk.

Speed trap

Q. *"I recently purchased a 33.6Kb/sec modem. While I always get a connection to my internet provider the first time, the transfer rates seem to fluctuate wildly, even when downloading from the same server.*

I am using a shareware program which monitors activity. While transfer rates have been read at 7,000cps (characters per second), they can drop to as low as 600cps. Is this normal, or should I consider buying a better modem?"

A. There are a number of reasons why you're likely to see variations in the transfer rate and your modem is likely to be one of the least plausible, especially since you are sometimes receiving good throughput.

The first thing to make sure is that you're not running too many other applications on your computer when you download information. Even with a fast serial port, a very busy computer can cause problems. That, however, is about the limit of what you can do at your end.

You may find that trying to download at a different time of day will make a tremendous difference to your speeds. Some systems, for instance, are set up so that connections from people downloading files or web pages can only take up a certain amount of their capacity, or of the line that links them to the rest of the internet. If there are few people on, they're far more likely to receive good performance than if the transfer is "throttled" to make sure that everyone has equal access.

On a machine that doesn't throttle information to help manage the load, throughput can fall off dramatically when more than a certain number of people are connected. Congestion elsewhere on the internet can cause problems. This is less likely but it can nevertheless happen, especially if there is a failure in one part of the network which causes traffic to be routed through another one.

The final thing to check is the type of information you're transferring and make sure you're comparing like with like. Although headline figures of six or seven thousand characters per second look impressive, don't forget that your modem can only transfer data at 3,360cps. All the extra speed is gained by using data compression, and different types of files transfer at different speeds. Text can usually be compressed very well, and so can some types of graphics files, but not a ZIP file.

Ultimately, there is probably not a single cause for the speed problems that you're experiencing; it's far more likely to be a combination of different factors.
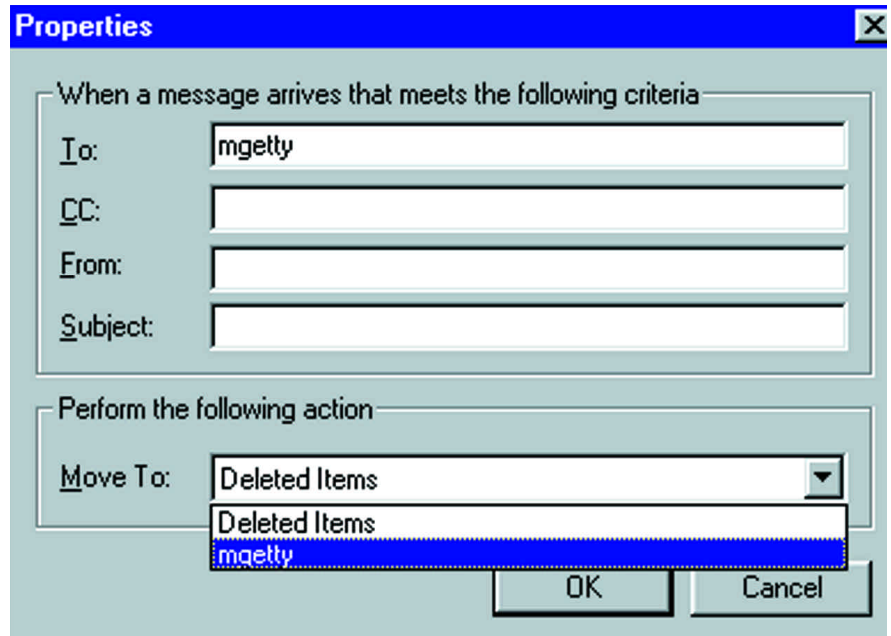
Dump the junk

Q. *"I keep receiving lots of junk mail. I want to know how can I set up my computer to avoid seeing it?"*

A. It depends on which mail program you're using. Many of the mail programs that are given away by internet providers don't provide the ability to filter messages, and some aren't very powerful. However, if you do have a program, like Microsoft Internet Mail, that can examine the headers of incoming messages, you may be able to sort out some of the wheat from the chaff.

If you look at most of the junk mail you've received, you'll see that your address doesn't appear in the To or Cc headers; that's so that other people don't know to whom the message has been sent. You can use this to help filter out information, but remember that if you're on any mailing lists, the headers from those are also unlikely to contain your name or address, so you'll have to put in rules to handle them separately.

For instance, if you're using Microsoft Internet Mail, and you're on a mailing list called "mgetty", you might want a set of rules like this:

■ messages with "mgetty" in the To: field should be put in the "mgetty" folder
■ messages with "mgetty" in the Cc: field are put in the "mgetty" folder
■ messages with "nigel" in the To: field are put in the "real mail" folder

Properties

When a message arrives that meets the following criteria

To: mgetty

CC:

From:

Subject:

Perform the following action

Move To: Deleted Items

Deleted Items
mgetty

OK   Cancel

Microsoft Internet Mail can, just about, help you to filter out some of the mounds of junk mail that infest the internet

■ messages with "nigel" in the Cc: field are put in the "real mail" folder. They won't delete junk mail, but they will put all your other messages in folders of their own, so you can delete the junk more easily.

All the other messages will be put in the default mail folder. Most of them will be junk and can be deleted straight away, but some may be real messages where someone has sent you a message as a BCC (Blind Carbon Copy) recipient.

If you have a more sophisticated mail program, you should first arrange for all messages from mailing lists to be filed, and then for any that don't contain your name in the To or Cc fields to be deleted or filed in a junk folder. Although it may be tempting to set up an automatic reply to junk mail if your email program allows it, it isn't that sensible. Many of the addresses on junk mail are not valid, so you will merely receive an error message to further clog up your mailbox.

If you're looking for a new email program, you should consider taking a look at the commercial version of Eudora which will work with all internet providers and has comprehensive filtering, which will help you cut down on junk mail. Details of Eudora are on www.qualcomm.com.

Linking up to shareware
Q. "I'm creating some web pages for shareware I've written, and I'd like to include a link that will allow people to download the programs. The files will be stored in my space on the Demon HomePagers server.

I've looked at similar pagers, and some seem to use http to transfer files, while others use ftp. Which should I use, and does it make a difference?"

A. There are a number of reasons for choosing one method in preference to another. When you use http to transfer a file, it will be transferred directly by the web browser, regardless of whether or not the browser has been configured for mail. When a file is transferred by FTP from a server, the email address of the user is often used as the password and some servers will refuse to allow people to download a file unless that information is there. So, those who have not set up their browser properly may be unable to access the file.

If you're creating pages that tell people about the files, putting those files in the same place as the pages can make the administration easier because you can upload everything in one go. However, you may find that some users are unable to access the files if they are using a proxy server, because some servers have difficulty downloading large files.

Using FTP is really a better solution for sending large files but not all users have access to it, and again, it may not be possible for some people to use FTP via a proxy server, if it has not been set up to work in that way. In your situation, though, and indeed for most people who have been given web space by their provider, the choice is simple; you don't have one. You
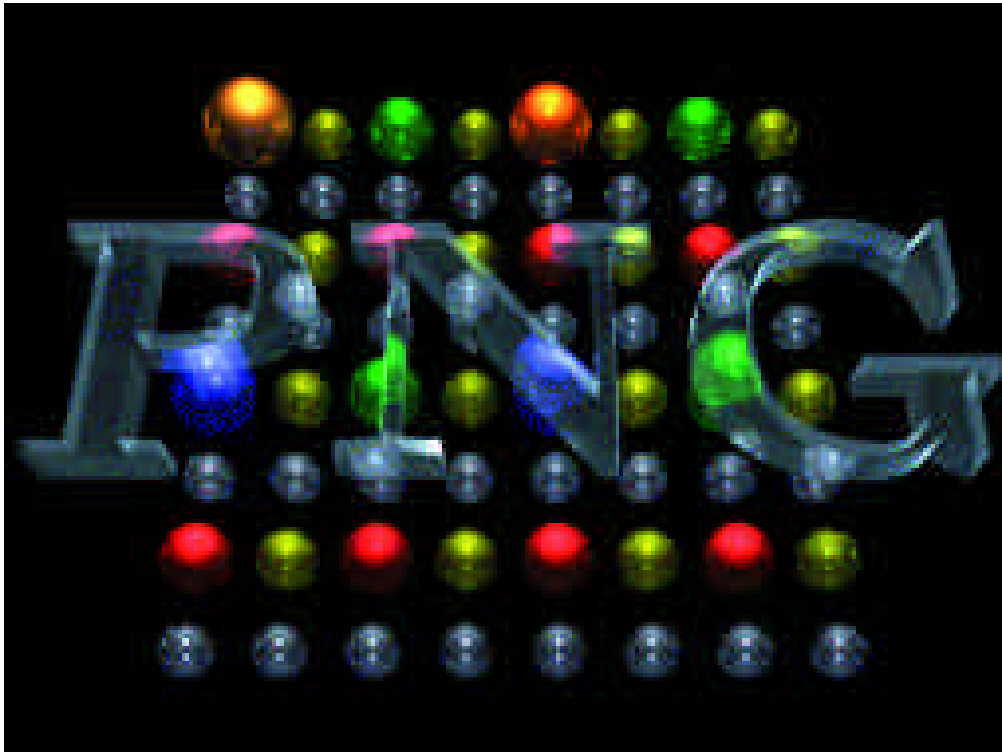
The Portable Network Graphics format looks set to become very popular on the web in the future

widely supersede the GIF files used on the internet. Unlike GIFs, PNG files can be true colour images. They also have several other improvements, including the ability to contain descriptions and display progressively, so you can see what the image looks like before it is all downloaded. Since the files are also smaller, it is likely that they will be used quite widely in the future.

Both Microsoft and NetScape will support PNG graphics in later versions of their browsers, but for now you'll need a plug-in for NetScape, or a different browser if you want to see the new files. You can find out more about the format and which browser supports it on which platforms by looking at quest.jpl.nasa.gov/PNG/.

must use HTTP to transfer files from your web space since the only way to access files from your space is via FTP, which will have been set up with a password allowing you access to update your pages. Since there's no anonymous access, the only way people would be able to download a file using FTP from your own space would be if they knew your password.

You might like to consider, especially if the files you are offering are large, uploading your programs to a public FTP site, such as ftp.demon.co.uk, and including a link to that site on your pages instead of, or as well as, an HTTP link to the file.

New graphic detail

Q. "Some of my friends who practice web design are talking about a new graphics format called PNG. What is it, and is it important?"

A. PNG (or Portable Network Graphics) is a new graphics format, which is intended to

•PCW Contacts

Nigel Whitfield is a freelance writer and maintainer of several internet mailing lists. He welcomes comments and questions via the address **netanswers@pcw.vnu.co.uk**. Please note that a personal response to every query cannot be guaranteed.
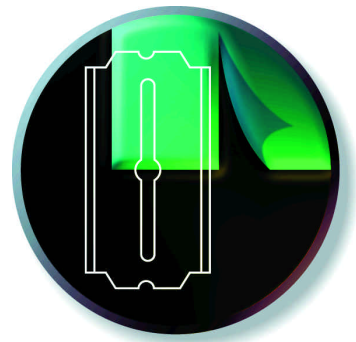
Books

Two views of the digital age are included here: one reminds us that everything in the computer garden is *not* rosy, the other celebrates information technology.

The Trouble with Computers: Usefulness, Usability, and Productivity

The general consensus is that the computer has brought untold benefits to businesses and individuals alike. However, in *The Trouble With Computers*, Thomas Landauer argues that we are suffering from a productivity paradox — the computer is eroding our efficiency.

The book concentrates on how good software should be designed. An excellent example of the dysfunctional effects of computers is word processing. The software tends to multiply the number of drafts of each document, cancelling out any saving in time or materials over the traditional method. "After you have written a letter, memo or report, the tweaking can be endless. Should it be single-spaced or double-spaced? Bold-face or italic for emphasis? Shadow-style section headings?... An online thesaurus is another productivity wrecker" [New York Times, May 1993].

Business is confused. It invests millions every year and sees, according to Landauer, little real return. Business perpetuates the myth of efficiency savings through technology. President of CIGNA Systems: "When it comes to PC platforms we find it very difficult to develop a useful cost-benefit measure. We've taken the position that we shouldn't waste time trying to do it." Dissonance reduction is certainly at work here. When people have invested heavily in a decision, they are reluctant to judge it a failure.

It may be, however, that not enough time has elapsed for evidence to support productivity gains to become apparent. A good example is Watts' steam engine. Installed in 1775, it didn't make a significant impact until 50 years later. By this measure, the computer is only becoming "useful" and not yet essential to modern society. Tell that to the airlines.

Productivity gains are hard to see until at least half the potential users have taken up the technology. Perhaps the net will show us the true benefits of the computer.

Ultimately, the book boils down to one question: Are computer users better off than non-users? Landauer cites many convincing examples of his productivity paradox but what is lacking is conclusive proof. Until that time, it is really for each business and individual to make up their own minds, based on their own specific experiences. *The Trouble with Computers*
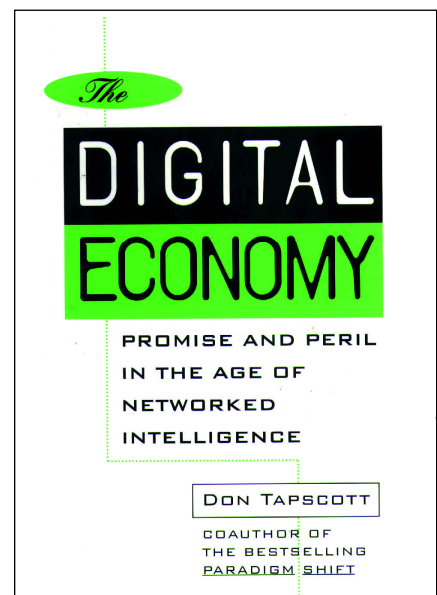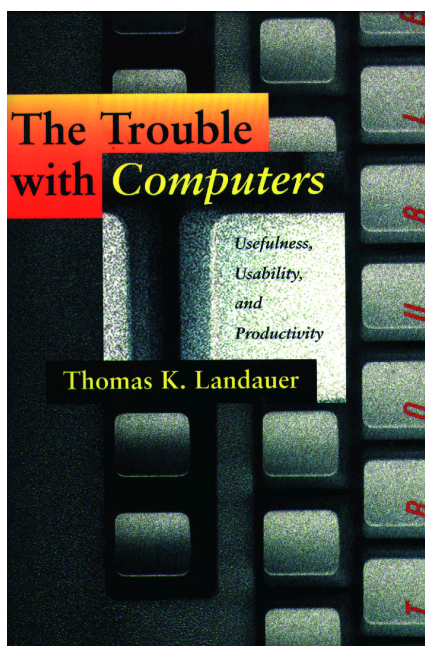
offers a different perspective on the burgeoning information age; one that we might well take note of as we rush to digitise more and more of our lives.

Dave Howell

The Digital Economy: Promise and Peril in the Age of Networked Intelligence

Taking the opposite track to *The Trouble with Computers*, Tapscott's follow-up to *The Paradigm Shift* takes a sweeping look at information technology in our modern economy, without descending into the hyperbole of some of his contemporaries.

Broken down into digestible sections, Tapscott explores the new information age. What it means to businesses and their employees, how our educational and governmental systems may mutate, and

Top Ten Books/CD-ROMs

1	Microsoft Windows NT4 Workstation Resource Kit	Microsoft Press	£64.99
2	Programming Perl, 2nd Edition	O'Reilly	£29.50
3	Inside the Windows 95 Registry	O'Reilly	£24.95
4	Creating Killer Web Sites	Hayden	£41.50
5	Microsoft Windows NT4 Server Resource Kit (boxed)	Microsoft Press	£140.99
6	Microsoft Windows 95 Resource Kit	Microsoft Press	£46.99
7	Java in a Nutshell: Desktop Quick Reference	O'Reilly	£14.95
8	The Internet & World Wide Web: Rough Guide 2.0	Penguin	£5.00
9	HTML: Definitve Guide	O'Reilly	£20.50
10	Visual Basic Programmer's Guide to the Win32 API	Ziff-Davis	£46.99

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how we will become the knowledge workers of the twenty-first century.

The internet is affecting more and more of the population. Tapscott talks of mass customisation, which at first sight is an oxymoron, but when applied to the business model of the information economy it seems an apt description. Companies can now sell directly to their customers. Tapscott believes the internet and its supporting technology can do much more than sell product to a wired consumer base: technology will impact on each and every aspect of our lives. From having more control over our democracy, to how our children will be taught.

Many of the old guard will be the last to re-engineer their companies for the next millennium. "Today, the leader is a collective, networked, virtual force with power flowing from a jointly created and

shared vision," he says. Many businesses will find this a difficult model to adopt.

Universal access to the information economy is definitely not a certainty. Tapscott notes that some industry leaders state: "People should have reasonable access to all and any services which they can reasonably afford." The old axioms of supply and demand, and existing business perspectives, still hold centre stage at this time. Any change will be hard won if business leaders are to enter the new millennium reaping the rewards that the digital economy is promising.

Dave Howell

Going Digital:
How new technology is changing our lives

Originally appearing separately in *The Economist*, this collection of essays covers the usual subject matter of the information age but also discusses in-depth topics often ignored by the press and publishers alike: like retailing, defence and medicine.

Collections of this nature suffer from time lag and this is no exception. Published between March 1992 and September 1995, it discusses events that have already passed into history, such as Apple's ill-fated eWorld, which are of no real interest except to students of digital history. Other essays do transcend the time barrier and hold as much fascination now as they did when they were written.

Many have compared this collection to *Being Digital* by Nicholas Negroponte; but similarities are hard to come by. Negroponte's evangelical character is absent here. Regular readers of *The Economist* will recognise and welcome the lucid style in which the information is

related. Even writers such as Oliver Morton, now editor of *Wired* in the UK, hold themselves in check.

The essays that look at the unconventional uses of information technology are the most interesting by far and are real gems. Want to know how your local supermarket gets stock to its shelves just when you want it? The essay on retailing explains all and is a fascinating look at how information technology can change an industry.

We all know that the defence departments of every industrialised nation have enormous technology budgets, but I have read few better accounts of their use of new technology than here. One wonderful story of stealth technology recounts the experience of one F-117 stealth fighter pilot in the Gulf War. No-one really knew if steal technology would work. The pilot's fears were allayed when he found dead bats near his aircraft each morning: their sonar couldn't detect the plane and neither could the Iraqis' radar.

Read cover-to-cover, this book will give you an insight into how information technology has affected our lives. We are all cohabiting on a daily basis with the "bits" that Negroponte talked about. As with any collection there are hits and misses, but this collection offers an easily-accessible information source.
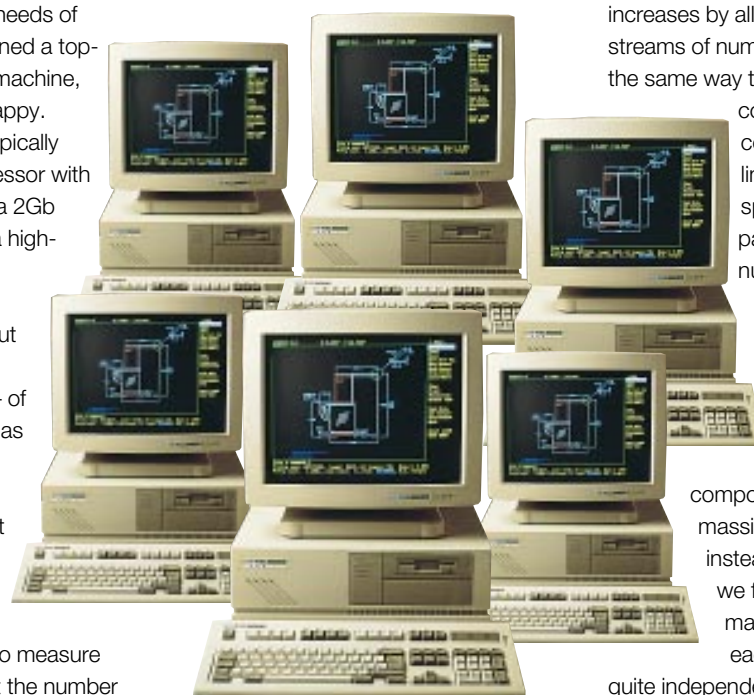
Dave Howell
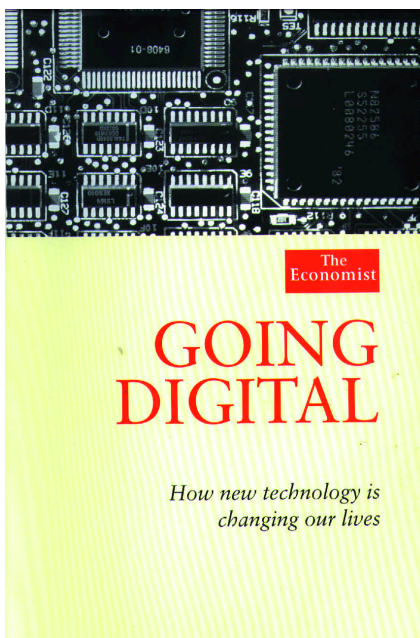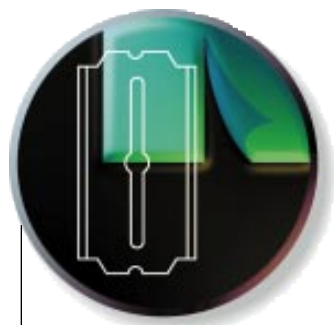
A massive FLOP

What's in a name? Not what you think: TFLOPS is destined to be the world's next supercomputer. Its prime use will be virtual weapons testing, and its unique parallel design philosophy means it can continue to grow more and more powerful. Toby Howard reports.

Given the computing needs of most of us, if we owned a top-of-the-range home machine, we'd probably be more than happy. Today, such a system would typically centre around a 200MHz processor with 32Kb of memory, with at least a 2Gb disk. It's hard to think of such a high-spec system as anything but a self-contained machine to impress the neighbours with, but US researchers are now taking 9,000 — yes, nine thousand — of these systems and using them as the building blocks for a single, enormous machine. It's called TFLOPS, and it will be the most powerful supercomputer the world has ever seen.

One way to express the performance of a computer is to measure its "flops" — not its failures, but the number of floating-point operations it can perform each second. A single 200MHz Pentium Pro, for example, can perform at best about 130 megaflops (Mflops, 10^6 flops). Since the seventies, supercomputers have operated thousands of times faster, measured in gigaflops (Gflops, 10^9 flops). The new TFLOPS machine, based at Sandia National Laboratories in Albuquerque, will perform a thousand times faster again, at a predicted peak of 1.8 teraflops (Tflops, 10^{12} flops).

Although TFLOPS will be available for general scientific research, its *raison d'être* is virtual weapons testing, now a hot research topic as experimental detonations are no longer considered politically or socially acceptable by most enlightened nations. However, mathematically predicting the behaviour of nuclear weapons is an extremely complex problem, requiring enormous computing power to obtain even approximate solutions.

Traditionally, the supercomputer industry has used custom-built designs featuring special architectures tailored to the sorts of problems the machines will be used to solve. For example, many problems arise in fields such as seismic modelling, weather forecasting and fluid flow analysis which involve huge amounts of repeated calculations. One of the earliest special supercomputer architectures to support such calculations was the "vector pipeline processor" which gave huge speed increases by allowing calculations of streams of numbers to be overlapped, in the same way that partially-assembled components pass down a constantly-moving assembly line. This led to enormous speed-ups, but only for this particular type of large-scale numerical problem.

The TFLOPS design philosophy is different, and the idea is to achieve high performance by connecting thousands of off-the-shelf components. TFLOPS is a massively-parallel machine: instead of the single processor we find in most PCs, it contains many thousands of processors, each of which can operate quite independently of the other. If a calculation can be broken down into multiple parts that can be executed simultaneously, and the results later combined, the parallel approach can give huge savings in compute time.

What sets TFLOPS apart is its sheer scale. Its architecture is fearsome, comprising over 4,500 motherboards known as "compute nodes", each of which has two 200MHz Pentium Pros and 64Mb memory. With 2,000Gb of hard disk, this giant occupies 85 cabinets on 1,600 square feet of floor space and will draw 800kW of power. The operating system is Intel's UNIX-based Paragon system, together with a light-weight kernel which runs in each processor. TFLOPS is costing the US Department of Energy a cool $46 million.

One assumes that includes a technical support hotline.

Once you've got a supercomputer, the problem is how to program it effectively to make the most of its power. For a massively parallel machine like TFLOPS, the trick is to structure the program such that pieces of it can be distributed to separate processors which can work on each part of the problem in parallel.

There are two ways to do this. The first is for the programmer to carefully structure the algorithm for the solution of the overall problem, such that it can be expressed as a collection of smaller, independent algorithms. In general this is hard, and relies on the insight and ingenuity of the programmer. The second approach is to write the program as if it were for a single processor, and let the compiler analyse the code and partition it into portions that can execute in parallel. Modern "parallelising" compilers can do an excellent job of this, but the results are rarely as good as a program originally designed with parallel processing in mind.

TFLOPS will be the world's most "super" supercomputer for some years, but an apochryphal law of computing states that eventually usage expands to consume all available resources. Incredible as performance measured in teraflops might seem, research is already underway on machines which will be a thousand times faster still. The next target is the petaflop — 10^{15} flops. At a recent workshop in California, many of the major figures in supercomputer design met to consider petaflop technologies. Key issues included predictions that miniaturisation would have to exceed the nanometre scale, employing biological construction techniques. A peta-computer would need at least 30 terabytes of RAM; and the best chances of success would involve hybrid technologies of superconductors, nanotechnology, optics, and perhaps quantum computation.

The experts predict that petaflop performance will be achieved around 2020. After that will undoubtedly come the next thousand-scale hike towards the exaflop (10^{18} flops) and then the thousand-exaflop (there isn't a name for that yet).

Nobody can possibly know what computing will be like twenty-five years from now. The only sure bet must be that we'll look back and wonder how we ever managed to do anything with 200MHz and 32Kb.

Hybrid **CDs**

Why should direct data delivery spell the end of physical media like CD-ROM, when they could coexist quite happily together and even complement each other? Tim Frost reports.

The whole Web-PC argument hinges on the belief that direct electronic delivery over the telephone line will replace the distribution of software on physical carriers like floppy disk and CD-ROM (or the coming-soon DVD-ROM; see page 134). Inherent in this argument is the view that electronic delivery and physical delivery are in direct competition, and eventually one will win and the other will lose and disappear entirely.

History shows that this view cannot really be taken seriously. It is a bit like arguing that development of the car will destroy the railways, where what happens in reality is that people use different services for different things. The web and the CD-ROM are set to be just as complementary, with the development of the Hybrid CD. The concept of the Hybrid CD is simple and can be applied to any, and every, category of software. It basically builds into a CD-ROM, hooking to the PC's modem so that it can automatically call up a web site or other internet site from within the program itself.

This lets the CD do what it's best at — delivering large files on a disc that costs very little to manufacture — and adds on what a modem link does best — delivering small files of very up-to-date content. Take a reference title: the new Encarta 97 is a good example because we know what it does, and, as it happens, it is a Hybrid.

Until now you would buy the software on CD-ROM and it contains the program's engine and interface which take up a substantial amount of disc space. On top of that is all the reference information you want to access. While most of the information is timeless, current history, politics and science facts do change from year to year. The only way you can be sure the information is not too out of date is to buy a new copy each year, and even then changes in a month or two will make it outdated again.

The hybrid CD-ROM presents a better alternative. Within Encarta 97 there is an Update button. Click on this and the Hybrid finds your modem and calls an internet site

that has been pre-programmed into the software. The site has all the latest information and news updates, and it first interrogates the PC to find out when it was last updated and then sends any new material down the line to be filed on the PC's hard disk. So next time the reference is called up, the program first checks if there is updated material to be used for the hard disk and merges it with the information coming from the CD-ROM.

The main files, the really big 600Mb of content, is delivered on the low cost CD-ROM and the latest small bits are added to it over the telephone line, taking little time and money and keeping the title updated

on a monthly basis.

Hybrids have a huge range of possibilities: personal finance packages with direct links to your bank, links to forums and other related web sites for specific reference titles, say for food and drink or sports, and of course the shopping catalogue on a disc. The pictures, descriptions and demonstrations are all supplied free on a CD-ROM and the ordering happens at a click of a button. From almost nowhere, the hybrid is taking off in a big way. It has moved from a couple of hundred titles last year, to 800 this year and on to over 3,000 next year, and it is likely to account for at least a quarter of all consumer CD/DVD-ROMs by 1998.

And if you still think that telecoms will be able to overtake physical media, just try this calculation. A double-sided DVD-ROM has

a capacity of 9Gb and costs around £1 to make. By the time these are available (later this year) modems will have reached transfer rates of 56Kb/s, taking a mere fortnight and a few hundred pounds of

telephone costs to download the same amount of data. Only when data transfer rates reach 10Mb/s do the sums start to make sense, and by then CD will have leapt further in capacity anyway.

Pioneering **spirit**

Seymour Cray was an innovator, a genius — a man who changed the world. Toby Howard celebrates his life's work.

Seymour Cray, the father of the supercomputer, died recently aged 71, following a car crash. He was one of the most original computer designers the world has ever seen, and a true maverick. Seeking a way to cool the machine he built in 1985, at the time the fastest computer in the world, he chose to immerse it in artificial blood.

Seymour Cray was a legendary figure in the computing world. His designs for supercomputers were ingenious to the point of miraculous, and the machines he designed and built were, for much of the sixties, seventies and eighties, the most powerful, and the most expensive, on the planet.

At his university instructor's suggestion, Cray went to work at a small company building specialised cryptographic equipment for the US Navy. The unlikely home of the company was a converted factory for manufacturing wooden gliders. It was here that Cray designed his first computer, the 1103. "My guiding principle was simplicity," he said, and throughout his career this remained the focus of his design philosophy. He was building RISC machines before IBM coined the term in the seventies.

In 1957 Cray and others left to start Control Data Corporation, and it was here that Cray designed the 1604, one of the world's first fully-transistorised computers. The age of the vacuum tube was over.

He soon became chief architect of the 6600, released in 1963 and regarded by many as the world's first true supercomputer, offering 9Mflops (million floating-point operations per second) of processing power. The 6600 far outstripped IBM's 7094, until then the fastest machine
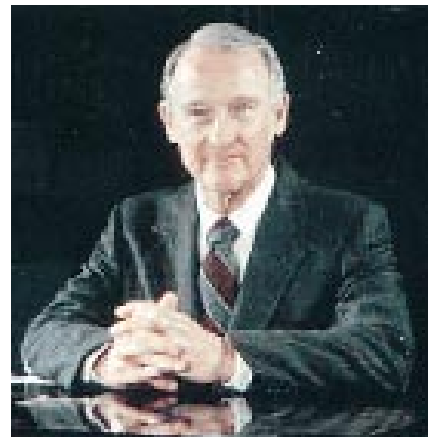
available, and IBM was understandably upset. The story goes that IBM chairman Thomas J Watson berated his staff with a memo asking how it was possible that a giant like IBM could possibly be outdone by tiny CDC, whose workforce numbered only 34, "including the janitor".

CDC maintained its world lead with the 7600, also designed by Cray, running at 40Mflops. In 1971 he broke to form his own company and produced the Cray-1 in 1976. Now using integrated circuits in place of transistors, the Cray-1 delivered 170Mflops. The first Cray-1 was sold to Los Alamos National Laboratory, for nearly $9 million. Sixteen more were subsequently sold, into the scientific number-crunching and intelligence markets.

Because of his insistence on using the latest technologies, which were sometimes not mature enough for the job, some of Cray's designs ran into trouble. For his next machine, the Cray-2, he intended to shift from the usual silicon chips to faster, but unproven, gallium arsenide technology.

Manufacturing difficulties forced him back to silicon and the Cray-2 arrived, delayed, in 1985. Nevertheless, it broke the giga-flop (one thousand Mflops) barrier. This was the machine that was cooled by being completely immersed in an inert fluorocarbon liquid, the same liquid as artificial human blood. Ever stylish, Cray included a decorative fountain in the coolant circulation system.

Cray's last completed machine was the Cray-3, of which only one demonstration model was ever built. After the only customer backed out, the machine, worth $30 million, was given to the National Center for Atmospheric Research in Boulder.

Throughout his career, fellow engineers marvelled at Cray's uncanny ability to hold every tiny detail of a computer design in his head. One story has it that he was called in to fix a baffling problem with a Cray-2. He locked himself in the machine room and after contemplating for six hours, eventually called an engineer. Cray pointed to a single wire and asked for it to be replaced. The machine worked again.

In 1995 Cray's company ran into financial trouble, and the planned Cray-4 was never completed. In the months before his death, at his new start-up company, SRC Computer, Cray was working on a new supercomputer called the SRC-6.

Legends abound about Seymour Cray. John Rollwagen, a colleague for many years, tells the story of a French scientist who visited Cray's home. Asked what were the secrets of his success, Cray said: "Well, we have elves here, and they help me." Cray showed his visitor a tunnel he had built under his house, explaining that when he reached an impasse in his computer design, he would retire to the tunnel to dig. "While I'm there, the elves will often come to me with solutions to my problem", he said.

Cray has been called solitary, uncommunicative, and secretive. Frank Sumner, Professor of Computer Engineering at the University of Manchester, met Cray on several occasions and refutes suggestions that he was a prickly character: "He was a very friendly man, and perhaps the greatest all-round computer scientist ever," says Sumner. Although Cray said of himself in an interview with the Smithsonian Institute in May 1995, "I was one of those nerds before the name was popular," he will always be remembered as the father of the supercomputer, a man whose genius changed the world.

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 pcw@vnu.co.uk

NEW!

Object of the exercise

Tim Anderson takes you through the first in a four-part teach-in about Visual Basic. You'll learn how to get to grips with VB objects and snap together a powerful database application using a few lines of code.

Like it or loathe it, you can hardly avoid it — Visual Basic is the most popular Windows development language. It is also the macro language of Microsoft Office, and with Microsoft now willing to license it to third parties, VB will more frequently appear in third-party products such as the Visio charting package. So time spent learning Visual Basic (VB) soon repays the effort, giving you program control over many powerful applications.

This workshop will show you how to make the most of VB: including data access, automation of other applications like Word and Excel, and using ActiveX components for rapid application development. And along the way you will build a useful application. The software is for managing a sports club but could easily be adapted for a contact manager, book or CD collection, customer database and many other purposes.

Our workshop uses Visual Basic 4.0. It makes use of features introduced in that version so you will not be able to follow the workshop using older editions. A little knowledge of VB is assumed, so complete beginners are advised to become familiar with the product before starting on the workshop.

Objects in focus

Visual Basic makes extensive use of objects. What is confusing, though, is that the word is used in several different ways. Here are three kinds of VB objects:

1. Internal objects and controls. For example, there is a global App object which has useful properties like Title and Path. There are also VB's built-in controls like command buttons and text boxes,
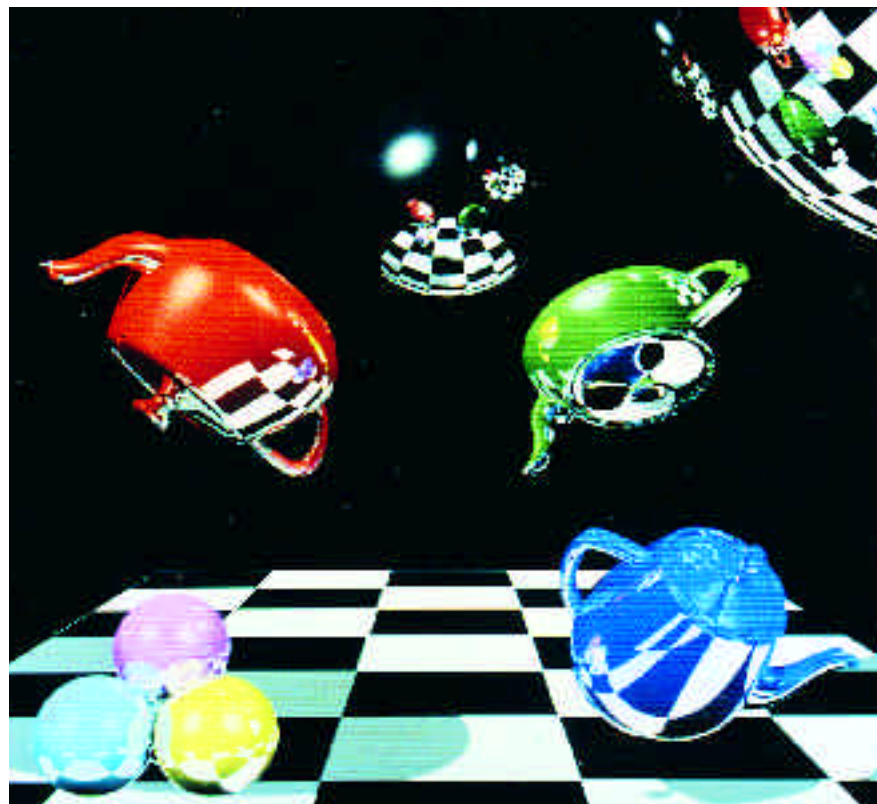
represented by objects with properties, methods and events. These objects are VB's essential building blocks.

2. OLE objects. These include ActiveX controls, also known as OCX controls, and applications like Excel which expose functionality in the form of objects you can access from Visual Basic. The advantage of OLE objects is that they are system-wide and not just limited to one application.

3. User-defined objects. You create these by inserting class modules into your project. You can also customise forms by adding your own properties and methods.

If you have used VB at all, you will already have worked with the first two kinds

of object but may not have used the third. It is possible to write major VB applications without using them, especially if either the application or the developer started in Visual Basic 3.0, where they did not exist. In fact, the Visual Basic environment does not encourage you to use them.

The obvious way to build an application is to draw buttons and controls onto a form, setting their properties and writing code for their events. With that approach you may not see the need to define your own objects. It is worth making the effort. Here are three reasons why:

1. Object-orientated programs are more robust and easier to debug. One reason for

this is that you can avoid global variables, which are notoriously error prone, and use object properties instead.

2. Well-designed objects can be used in more than one application.

3. To exploit the power of OLE (Object Linking and Embedding) you need to define objects that can be made available to other applications.

This workshop will explore how to make use of VB's class modules, which create user-defined objects, in order to derive these benefits.

Building a database application

Anyone can build a Visual Basic database application. Just place a data control on a form, set the databasename and recordsource properties, add some bound text boxes to display the fields, and it's done. There is even an add-in that will do it
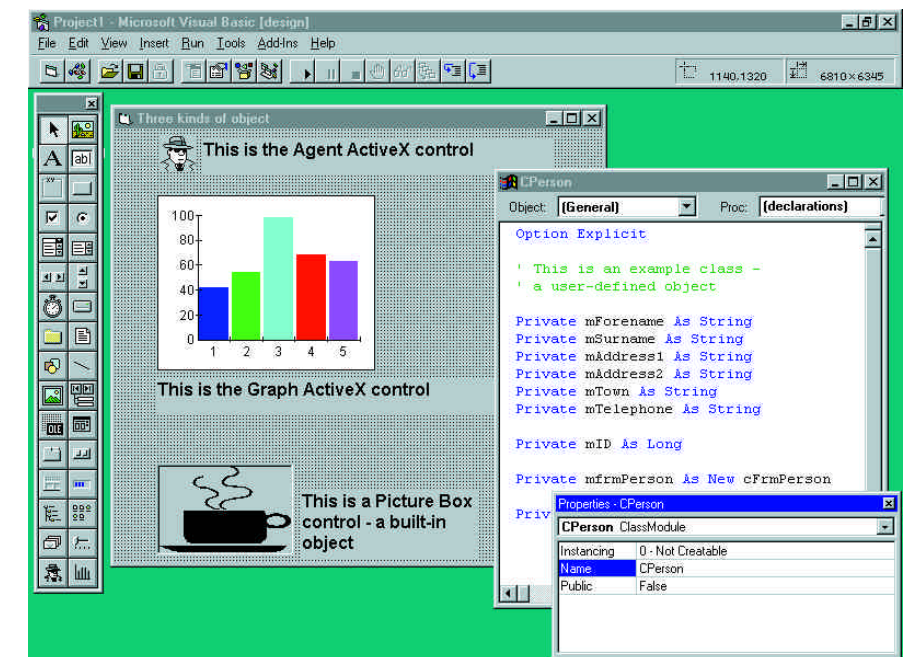

Fig 1 Not all VB objects are the same. This application shows three kinds: built-in, OLE, and user-defined

for you; the data form designer. The typical result is shown in Fig 2.

The speed of development is impressive, but in other respects applications built like this are poor. For a start, a visible data

control is not the world's most stylish graphical interface. Worse, it encourages a navigational approach to viewing data. If the visible record is not the one you want, click Next until you find it. It may work for half a dozen records but it's hopeless for large database tables. It is also fundamentally at odds with the set-based strategy of SQL, the native query language of VB's database engine. Additionally, working with bound controls increases the risk of inadvertently changing the data. All these problems can be overcome by adding code for searching, validation, and so on. Another option is to use an entirely different approach.

A particularly powerful technique uses a listbox and a text box to create a database searcher. The user types one or more letters into the text box and presses Enter. The listbox then fills with all the matching records. By double-clicking an entry in the list, the full details of the record can be displayed. It allows control over the precision of the search, and it is fast, with no need to enter criteria into a search dialogue.

Will the real VB stand up?

Visual Basic exists in various forms. The standalone product comes in three editions: Standard, Professional and Enterprise.

The Standard edition is cheap but not all that cheerful. It is fine for learning the Basic language but data access is limited to the data control. Few custom controls are included and it is unsuitable for creating applications for distribution. It works only on Windows 95 or NT. The Professional edition fills the gaps, includes a 16-bit version, full data access, important OLE features and a wide range of custom controls. For general-purpose work, the Professional edition is all you need. The Enterprise edition adds features for client-server work and team development.

That leaves two other types of VB. Visual Basic for Applications is the version that ships with Microsoft Office and now a number of third-party applications, too. VBA in Office 95 has no forms engine, which limits its power, but VBA 5.0 in Office 97 is almost the same as the standalone version. The main difference is that you cannot compile a standalone executable. VB Script is a stripped-down language for Internet Explorer. Microsoft hopes that other web browsers will adopt VB Script, too, although so far this has not happened.
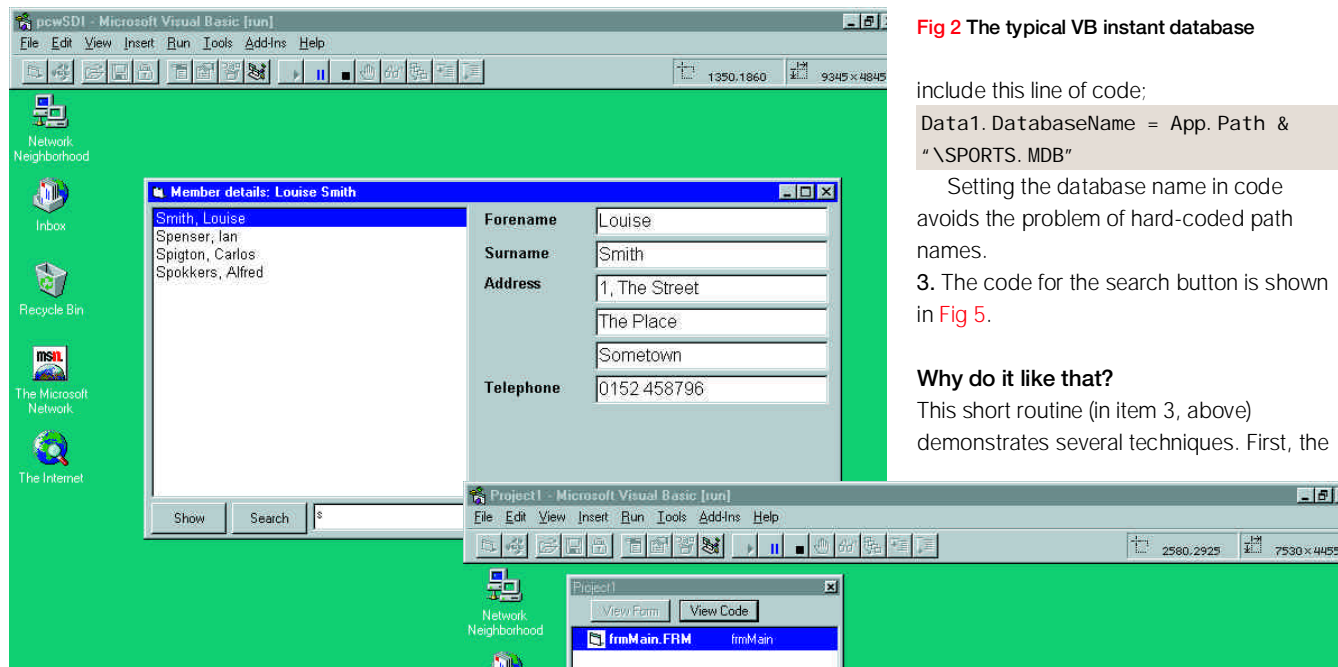
The typical VB instant database

include this line of code:

```
Data1.DatabaseName = App.Path &
"\SPORTS.MDB"
```

Setting the database name in code avoids the problem of hard-coded path names.
3. The code for the search button is shown in Fig 5.

Why do it like that?

This short routine (in item 3, above) demonstrates several techniques. First, the

Fig 3 A more practical database viewer which works on large or small tables

Here are the three steps which make this method work:
1. Start a new project and place a listbox, a data control and an edit box on the form. You will also need text boxes and labels to display field values, and buttons for other functions like searching the data, displaying a record and saving changes.
2. Set the data control's visible property to false. We will not be using its visual interface but as a convenient way to obtain a recordset. In the form, load procedure and
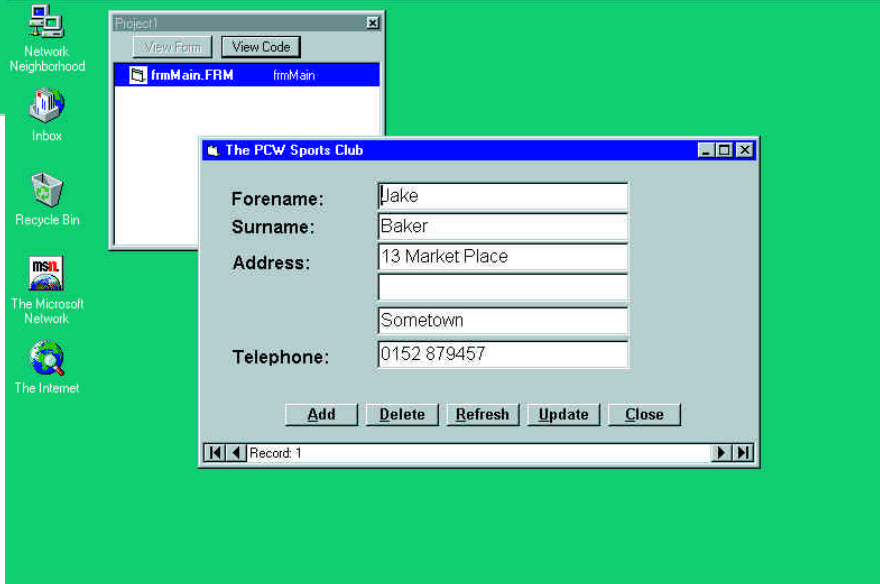
code uses SQL to create a dynaset-type recordset based on the text the user has entered. By adding the star character to the string and using the Like keyword, we find all the surname fields which begin with that string. JET, the Visual Basic database engine, is not case-sensitive, which simplifies matters. A nice feature is that the user can enter wildcards. For example, the string "??i" finds all surnames with a third letter i. Your users will think this is very clever, but it is VB's SQL that has done the work for you.

Second, the code uses a standard list box rather than the databound list box or the bound grid control. Using a databound control would save the few lines of code which fill the list. But unfortunately, the bound list control can only display one field, limiting its use. The databound grid is a viable option but is, frankly, overkill in view of what's required. In version 4.0, Microsoft enhanced VB's list box by adding the ItemData property and this is ideal since it
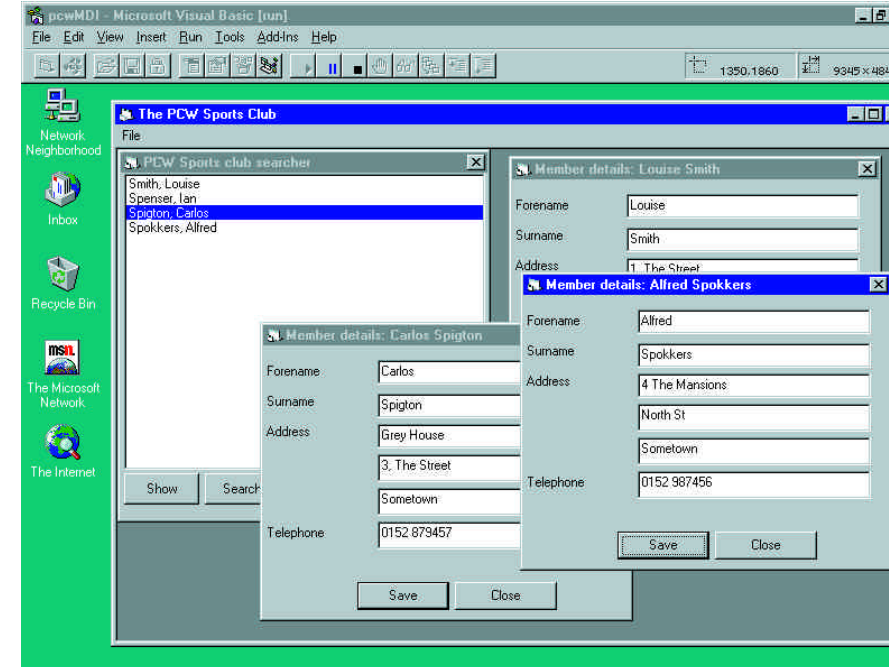

Fig 4 This alternative approach lets you view several records at once

lets you store an ID number against each item in the list. It is then easy to look up the correct record when the user selects the item.

The underlying principle is not to use a complicated ActiveX control where a simple, lightweight VB control will do just as well.

Putting objects to work

Not all the code is shown here (for reasons of space) but if you look at the example project on our cover-mounted CD you will notice a class module, CPerson.

The application maintains an instance of the CPerson class and obtains member details by inspecting its properties. The Save button works by calling the save method of the currPerson object. This approach will bring several advantages as the application develops. For example, a weakness of traditional database forms is that they only show one record at a time. Fig 4 is a database application which uses an enhanced CPerson class that has the capability to display itself. That makes it easy to simultaneously view the details of several individuals.
■ *Next month: A closer look at VB class modules.*

Fig 5 Code for the search button

```
List1.Clear

' now do the search
Data1.RecordSource = _
"select * from members where members.surname like '" _
& Trim$(txSearch.Text) & "*' order by members.surname"
Data1.Refresh

' now fill the list box
If Not (Data1.Recordset.BOF And Data1.Recordset.EOF) Then
' there are matching records

Data1.Recordset.MoveFirst

Do While Not Data1.Recordset.EOF
List1.AddItem (Data1.Recordset!surname & ", " &
Data1.Recordset!forename)
List1.ItemData(List1.NewIndex) = Data1.Recordset!ID_NO
' stores the ID in the list box

Data1.Recordset.MoveNext
Loop

List1.ListIndex = 0 ' select first matching record
cbShow_Click ' show the first record

Else
' add code here to clear the form's fields, report no match, etc

End If
```

Secure in the knowledge

Psst! Want to know the secret of making folders invisible? Lend an ear to what Tim Nott has to say. Plus, making a PC jukebox and entering a new time zone.

Not long ago, we looked at ways of securing a standalone PC from the ravages of multiple users, with System Policies. Many readers have had difficulty getting this to work. Others complain of settings "migrating" between users or getting lost, and how alarmingly easy it is to crack the system. There is a general consensus that Poledit is a fairly horrible utility, with the power of a Reliant Robin and a front-end to match. In my opinion, the biggest failing of Windows 95 is that you can't secure drives or folders.

So let's welcome Magic Folders. This makes any folders you choose, and all the files therein, invisible to others. They can't be deleted, viewed, modified, or run. For all practical purposes (unless you have the password) they don't exist. Install Magic Folders, and you're prompted for a master account password and to make a key floppy disk, which will save your bacon should you forget your password. You can have up to five (or possibly ten, but the documentation is inconsistent on this) other accounts, but only the master can create new accounts or uninstall Magic Folders. The master account, however, can't see other users' private folders unless they uninstall Magic Folders.

It has its drawbacks, the principal one being that it relies on entries in AUTOEXEC.BAT and SYSTEM.INI. The help file suggest you rename the program so that other users don't know Magic Folders is running, or put multiple references to differently-named copies in autoexec.bat (it will only load once but hackers would need to remove every reference). All of which is rather pathetic, but anyway… Another drawback is that you can't use it to stop

**Fig 1** Desert island discs — stick your favourite CD tracks in a folder

others meddling with system files. It won't let you hide the Windows or System folders, because then Windows won't be able to find itself, if you see what I mean. The other big problem I found was that you only get one chance to make the key disk. Sod's law prevailed and although the install program reported this as successful, the disk was corrupt to the point of crashing Windows. So I had to uninstall and reinstall to make another. Had I forgotten my password I would have been in deep doody, and would have had to undertake the scary business of editing autoexec.bat and system.ini.

It also works with Windows 3.1, but don't use Chkdsk or you risk losing invisible folders. Use Scandisk instead. If you're using third-party disk fixing utilities, you should keep them in an invisible folder so they can only be run when all folders are visible. It's shareware, so registration is $29. I cut my 30-day evaluation period to one, but maybe you'll like it better than I did. It's on the CD-ROM in MFD.ZIP. Treat it with caution and read all the documentation.

Now here's a funny thing…
If you're fascinated, as I am, by things that are fairly useless, but which no-one intended you to do anyway, read on.
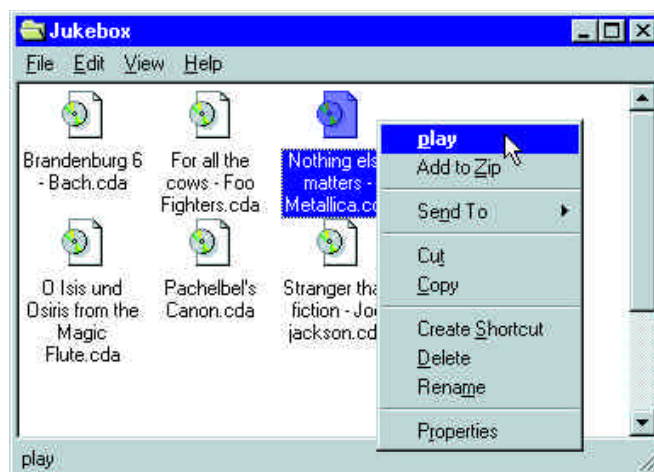
Geoffrey Solomon asked why, when you look at an audio CD in Explorer, all the tracks are 44 bytes long. By a strange coincidence, the same batch of email produced a similar query from Oliver Couzens. I had to admit that even I had never been so perverse as to Explore a music disk, but promptly did so. And they're right. Moreover, all the files seem to have been created on 1/1/95, regardless of whether you're playing Mozart or Metallica.

Geoffrey continues: "*If you try to copy a track to the desktop you only get a shortcut (except it's not really a shortcut) to the track on the CD. I say it's not a proper shortcut because it has no arrow in the bottom-left corner and displaying its properties doesn't give a shortcut's properties. Yet if you activate it with no disc inserted, you are prompted for one. What is the purpose of this? Would a real audio track on computer take up too much space?*"

Well, first bear in mind that audio CD predates CD-ROM, and the designers of the technology weren't really intending

listeners to hack into them with a PC. But Geoffrey is right; despite the wonders of modern data compression, you can't get three minutes of audio into 44 bytes (the .CDA files you see are pointers, or shortcuts) to the actual audio data. And the data itself is huge. If you consider that an audio CD can hold about one hour of music, and a CD-ROM 650Mb of data, then this roughly equates to 10Mb/sec.

What do you want to hear today?
Enough of the boring technical stuff, for here comes my latest invention, the Windows 95 Jukebox (Fig 1).

Create a new folder. I wanted to call mine "What do you want to hear today?" (© Tim Nott Enterprises) but as we all know, you can't have question marks in file or folder names.

Stick your favourite music CD in the drive, open the CD in Explorer, and drag the track you want into the new folder. Rename it from, say, "Track03.cda" to something meaningful like "O Isis und Osiris from the Magic Flute" or "For all the Cows by the Foo Fighters", but keep the .CDA extension. Repeat for other tracks and other CDs.

Keeping the pile of CDs to hand, double-click on a title in the jukebox folder. If the correct CD isn't in the drive you'll get a message telling you to rectify this. I find it adds considerably to the effect if you make whirring noises and jerky arm movements as you load and unload the disks. Once the correct disk is inserted, a double-click will take you straight to the track.

You might find yourself in an argument with the Autoplay feature; if you click too soon it will switch to track one after a few seconds of the chosen track. So either let it start first, or hold down Shift when you load the disk to prevent it Autoplaying.

If nothing happens and you do not get an icon of a CD-on-a-sheet-of-paper for each track, it's probably because you don't have a registry entry for .CDA files. Go to the View/Options/File Types dialogue from the folder and look for "CD Audio Track". If it's not there, you can create it from the "New Type" button.

"Description of Type" should be "CD Audio Track" and "Associated Extension" should be .CDA. Click "New" under actions, and type "Play" in the "Action" box and
`c:\windows\cdplayer.exe -play`
in the "Application used…" box (modify the path if you don't keep cdplayer.exe in c:\windows).

Finally, when you copy the .CDA files, make sure you really do copy them. If you create a Shortcut, this will play the corresponding track (if it exists) on the currently-loaded CD. OK, it's not a very good jukebox, as it continues playing the following tracks and you can't stack up a playlist. But I'm working on it.

Spring forward, fall down?
In Autumn 1995, I was delighted to find that Windows 95 not only knew about putting the clock back, but got it right. Similarly, it sprung forward at the right moment in Spring last year.

Last Autumn, though, it got it wrong. France moved the change date to coincide with the UK. Of course, nobody told *me*, and such is my unshakeable faith in Win95 that I believed it right up until the moment my children turned up an hour late for school the following day. Other European countries have changed, too, thanks to the charismatic Euro-force of John Major.

Nigel Hinton emailed me from Italy with the same problem. Although it's no great hardship to reset the clock manually, it was

Fig 2

Edit time zone settings with a Kernel Toy

Edit Time Zone dialog box:

Time Zone Name: (GMT+01:00) Paris, Madrid

Abbreviation: Romance Standard Time

Offset from GMT: +01 : 00

☑ Automatically set Daylight Saving Time

Start Day: Last ▾ Sunday ▾ of March ▾ at 00:00:00

Last Day: Last ▾ Sunday ▾ of October ▾ at 00:00:00

Abbreviation: Romance Daylight Time   Daylight Bias: +01 : 00

OK | Cancel | Help

---
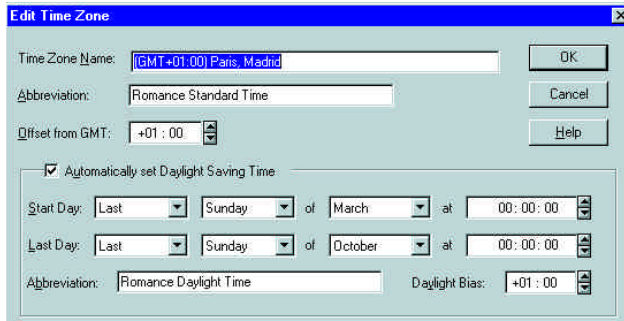
a good excuse to ferret around the registry in an effort to put things right.

There are two lots of settings. The first, which hang out at:

```
HKEY_LOCAL_MACHINE\SOFTWARE\
Microsoft\Windows\CurrentVersion
\Time Zones
```

show a list of settings for each time zone in the world. These reflect the choices you get in Control Panel/ Date/Time /Time Zone.

The second lot, at:

```
HKEY_LOCAL_MACHINE\System\
CurrentControlSet\control
\TimeZoneInformation
```

contains the settings corresponding to the zone you have chosen. Details of the change dates are held in the TZI key for the former, and the slightly more informative StandardStart and DaylightStart keys for the latter. Unfortunately, the values of all of these keys are long hexadecimal strings. Although it looked possible that 0A (ten in hex) might signify October, I really didn't want to mess with that stuff.

Fortunately, there's an easier way. Control Panel only lets you change the zone and switch daylight saving adjustment on or off (you can't change the dates). The Microsoft Kernel Toys, which are like a dull relative of Power Toys, will rectify this with a Time Zone Editor (Fig 2). In addition, you get a Control Panel add-on for remapping the shift, control, alt, caps lock and (if you have it) Windows keys, although I don't really know why you'd want to do this. But I do find it useful to disable the Caps Lock key which I OFTEN HIT BY ACCIDENT. There's a tool to train the MS-DOS configuration Wizard and a thing called WinTop that shows exactly what processes are running through your, er, processor.

More power-anorak stuff comes in the form of CONVMEM.VXD, which "tracks the amount of memory allocated by virtual device drivers (VxDs) in conventional memory" …and as we all know: "Normally, all this memory is reported against the VMM32 device rather than being broken down". Anyway, Kernel Toys is free and on

this month's *PCW* CD-ROM (as KRNLTOYS.EXE) or it can be downloaded from the Microsoft web site. The file is self-extracting, so create a new folder, move KRNLTOYS.EXE into it, run it, and find the README.TXT file.

Le Phoneday fun

France recently had the equivalent of our "Phoneday", when all of us with eight-digit phone numbers were upgraded to ten digits and the code for dialling out changed from 19 to 00. So I spent a few hours changing everything in my address book — sorry, contact management database — dial-up settings and Word templates. All was well, or so I thought, until I wanted to send a fax to the UK. It still dialled 19, not 00. It wouldn't even let me enter the 00 manually. Ha! I thought: open the registry and search for "19". Not a good idea. Do you realise how many times those digits appear next to each other?

I will draw a veil over the next hour or so, but at the end of this I was doing a fairly accurate recitation of the opening dialogue from the film, "Four Weddings and a Funeral". I had also discovered that the dial-out-of-country number wasn't stored in the registry — Oh no!

I eventually found good, old-fashioned TELEPHON.INI except this doesn't contain the number either. But it does contain a reference to a table that is, would you believe, hard-coded into TAPI.DLL. So I did what I should have done in the first place and searched France Télécom's web site.

A handful of quickies

■ Simon Grant wrote: "*I've tried to create a folder called 'CON' and Win 95 told me that it 'Cannot create or rename file. Filename is invalid or too long'. Any ideas what this may be?*"

Yes, "CON" is a reserved word in Windows and DOS. Reserved words are names for system devices. If you open a DOS session and type "COPY MYFILE.TXT CON:" it will output the file to the screen. Other reserved words include LPTn (the printer ports), COMn (the serial ports) and NUL (nothing — *see the next tip*).

Windows won't let you use any of these for a file or folder name, but you get a variety of misleading error messages.

■ Richard Ansdell has a tip for your autoexec.bat:

Calculator window with a right-click tooltip showing:
Calculates natural (base e) logarithm. To calculate e raised to the xth power, where x is the current number, use Inv+ln.
Keyboard equivalent = n

Blinded by science? Right-click any button for an explanation

"*Putting* '> NUL' *at the end of any line which outputs to the screen stops the flickering back and forth between the Win95 startup screen and autoexec messages during bootup. This redirects the output to nowhere. It doesn't work every time, though. The line which invokes my Dr Solomon's virus protector won't go quietly.*"

Well, quite. If you have a virus protector you want to know what it's saying. Turning off "Display the full MS-DOS path in the title bar" from a folder "View/Options/View" box will make Taskbar buttons far more legible as only the final folder name is shown. If you right-click on any button in the Windows Calculator a one-line menu appears: "What's this?" Click for a short explanation of the function.

■ Andy Thilo remembers reading that you can have Control Panel and Printers as cascading sub-menus on the Start Menu, but he can't find the article in which it was originally mentioned… and strangely enough, nor can I. It's much easier to do this with Powertoys, but if you want to do it the hard way, create new folders in the Start Menu folder named:

```
Control Panel.{21EC2020-3AEA-1069-A2DD-
08002B30309D}
Printers.{2227A280-3AEA-1069-A2DE-08002B30309D}
```

The bit before the dot is the text that will appear on the menu, the weird stuff afterwards is the CLSID of the relevant folder as listed under HKEY_CLASSES_ROOT in the registry.

This led to Microsoft and a tiny 6Kb file named MAJTAPI.INF. Having downloaded and right-clicked on this, it added a [CountryOverrides] section to TELEPHON.INI fixing the problem not just for France but for countries ranging from Azerbaijan to the Wallis and Futuna islands.

●PCW Contacts

Tim Nott can be emailed at **Win95@pcw.vnu.co.uk**

Kernel Toys: www.microsoft.com/windows/software/krnltoy.htm
Magic Folders: www.PC-Magic.com
Majtapi.inf: www.microsoft.com/france/products/windows/numero.htm

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Light **relief**

So farewell then, Tim Nott — but only from the 3.1 column. He's going to try his hand at other Hands On highlights, but before he goes he wants to regale you with tales of shareware known and loved. By the way — did you know he cheats at Solitaire?

**M**y goodness, this recursion thing is a popular problem. You may remember this first saw the light of day in last November's column: the contents of a directory also appear in a sub-directory, and so on in an endless recursion.

Tony Hill showed how to replicate the problem with a disk sector editor and said that Scandisk would fix it. Well, I haven't tried this — I might be brave, but I'm not daft. Paul Harrison had it when, as he said, "I tried to run a DOS-only program under Windows" and was "pretty sure" that Scandisk would fix it, but reinstalled anyway. James Mackintosh had it doing something with Linux, Paul Butterwick blamed it on a faulty motherboard and Ray Girling on a faulty power supply. Robert Carrington-Jones encountered it several years ago on XT machines running DOS 3, which, he said, "…precludes any Windows influence and points to something more fundamental going on with DOS."

I'll leave the last word to the oddly-named Satanic Avatar (he seems quite a nice chap, in fact): "I think it may be related to a game installation. Lemmings had a curious pirate security; the HD disk had a directory n times replicated, which made it impossible for pirates to copy. I dunno what your readers have been doing, but…"

Grovel

Several readers have pointed out that the Windows speaker driver which lets you play .WAV sounds through the PC speaker wasn't on last December's CD-ROM as stated. Sorry. It's such a tiny file it must have fallen through a crack in the online continuum. It should be on this month's disk in SPEAKER.ZIP (7,848 bytes).
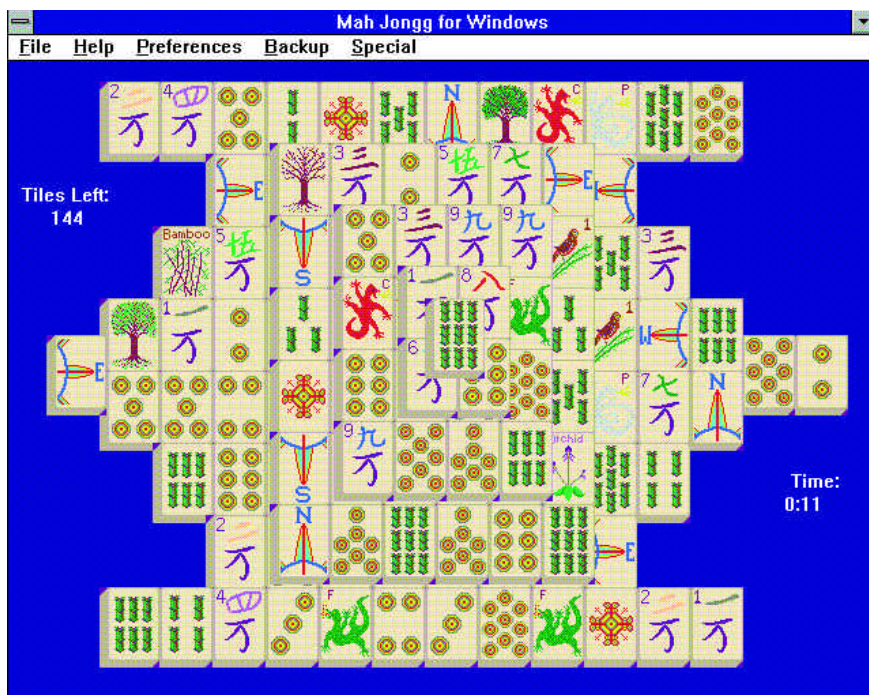
One of my all-time favourite time-wasters

Hands off

Forty-two, besides being the answer to life, the universe and everything, is also the number of Hands On Windows 3.x columns I've written for *PCW*. In that time we've seen two new versions of Windows and covered subjects of fearsome technicality such as DDE, a blow-by-blow guide to the .INI files, and what the various types of memory mean and what to do when you run out of them.

We've done worthy things, such as weeding out redundant files and mastering the Object Packager. Since last April we've been dicing with DOS, too. We've also had a lot of fun customising Windows in ways the manuals don't tell you and playing with
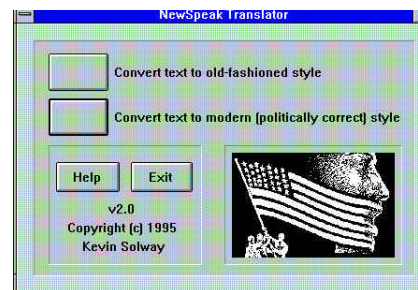
Transform your prose with Newspeak

various shareware utilities and diversions.

Anyway, I'm moving on — not so much to pastures new, as to a field not far away. Business will continue as usual in the Windows 95 column, but as from next month you'll find this one in the capable hands of Panicos Georghiades and Gabriel

Tim's top twelve favourites

And so, to tips. We've had hundreds over the past three and a half years — both from my own investigations and your feedback. So here is my all-time favourite dozen.

1. Starting Windows Change the Windows start-up screen by creating a bitmap (no more than 16 colours or 50Kb) in RLE format — say, newlogo.rle. You'll need something better than Paintbrush; Paint Shop Pro does the job well. Make a back-up of WIN.COM, quit Windows, and from the command prompt in Windows\System type:

```
copy /b win.cnf+vgalogo.lgo+newlogo.rle c:\windows\win.com
```

adjusting paths to suit. If you want an easier way, back up the existing VGALOGO.RLE and save the new file over the original. Use Windows Setup (again from DOS) to change any aspect of the Windows configuration. This rebuilds WIN.COM, automatically. Now run Setup again to change it back; the new screen will stay in WIN.COM.

2. Screensavers To run a screensaver on demand, first edit WIN.INI and add "SCR" to the line PROGRAMS=COM EXE BAT PIF. Then create an icon for the screensaver module with, for example, the command line "MYSAVER.SCR /s".

3. What the .DLL? You can often find out more about a system file (like a .DLL, .DRV or .EXE) from File Manager's "File/Properties…". Alt + Enter is the keyboard shortcut.

4. File and Program Managers Once you have the windows and icons arranged the way you want them, press Alt + Shift + F4 to save the settings. Don't forget to turn off "Save settings on exit" to stop this being overwritten.

5. Program Manager You can restrict users of a PC (providing they don't know this trick) by editing PROGMAN.INI and adding a [Restrictions] section containing the following:
● EditLevel= 1 — can't create, delete or rename groups; = 2 — nor program items; = 3 — as 2, plus can't edit item command line; = 4 — can't make any change to groups or items.
● NoRun=1 — disables the File/Run… command.
● NoFileMenu=1 — removes the entire "File" menu.
● NoSaveSettings=1 — can't save settings.
● NoClose=1 — can't close Program Manager.

6. Control Panel Control Panel can be similarly restricted: add a [don't load] section containing the items you want to restrict. For example:
● fonts=1   ● desktop=1   ● drivers=1
Note that the right-hand side of the equation can be anything you like: "0" or "gerbil" will work just as well.

7. Screenshots Grab your own. The Print Screen key copies a screen image to the clipboard. Alt + Print screen copies the current window or dialogue box. You can paste these into any bitmap program (including Paintbrush) edit, and save them as files.

8. DOS commands For quick help on most DOS commands, type the command followed by "/?". For more information type "help command".

9. Editing System files There's a little-known utility, called SYSEDIT.EXE, which should be in your Windows\System directory. It loads AUTOEXEC.BAT, CONFIG.SYS, WIN.INI and SYSTEM.INI (plus others if you're mail-enabled) for editing and automatically makes backups with the .SYD extension.

10. Your Program Manager Silly, but it works. Create an icon for PROGMAN.EXE itself in a Program Manager (PM) group. In the "Description" box type what you will. Launch it and you'll change PM's title to your chosen description. Stick it in the StartUp group, and it will be there to greet you when you switch on.

11. Control Panel If you need quick and frequent access to a Control Panel item, cut out the middle man by creating items in Program Manager. "CONTROL.EXE MAIN.CPL FONTS" as a command line, for instance, will jump straight to the Fonts section without loading the rest of Control Panel. For an added touch of class, dig out the relevant icon by browsing the .CPL file.

12. Fax Modems It's a pain when you have to close Fax receive standby software to launch a comms session. And even more of a pain when you forget to launch it again afterwards? Try setting up two COM ports (say, 2 and 3) from Control Panel/Ports/ Advanced. Set them both to the IRQ and address used by the modem. Point the fax software at COM2 and the comms software at COM3. It fools my system, anyway.

Jacobs. The Lennon and McCartney of computer journalism, they should need no introduction to regular readers of *PCW*, but I'm giving them one anyway as I can't resist playing master of ceremonies.
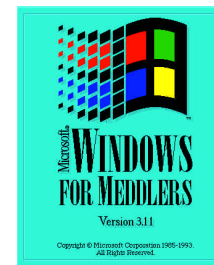
Oh, goodie...

We've seen weird and wonderful shareware and freeware over the past three and a half years. There was the Windows Non-Productivity Pack which contained essential desktop utilities such as the Virtual Cigarette and Elvis Detector. There was Bubba, the picture-based Windows shell for those who found Microsoft Bob too difficult.

For my final 3.1 column, I've included something old, something new, and made an extra special effort to find the ultimate in bizarre shareware.

First, the old. One of the first diversions I ever found for Windows 3.0 was Mahjongg, which I had lost, until today, when I stumbled across it in a shareware collection. It's a patience game based on the Mahjongg tile set: the object being to match pairs and remove them from the board. The tiles are arranged in a complicated pile, and you can only remove those that have a free space to the left or right.

It's quite tricky, very pretty, and has

Aboveleft Roll your own Startup screen

Above Adding a personal touch to Program Manager

loads of different tile sets. If you have a paint program that can save 16-colour .PCX files, you can create tiles using the supplied template and DOS utility. I'm convinced it's a major contribution to not getting any work done. You'll find MJWIN.ZIP on this month's cover-mounted CD-ROM.

A more recent, and considerably weirder offering, is Kevin Solway's Newspeak. This takes input from a plain text-with-linebreaks file and gives you the choice of converting it either to elegant old English or a politically correct version — or, to use the latter form, "experientially enhanced" or "culturally sensitive". On balance, feeding it bits of this very column, I think I preferred the former: "Thee'll needeth something better than Paintbrush — Paint Shop Pro doth the job. Amen!" has a rather fine ring to it that my usual prose lacks.

In *PC* mode, it not only replaces such howlers in the text as "short" or "animals" (with "vertically-challenged" and "non-human beings") but adds disclaimers such as "Of course, the above is only one of many different sides to this question" after every statement.

Do make sure that the line breaks are there, as I found Newspeak crashed without them. Most word processors will "Save as…" with line breaks but if you're

Ah, that's what it is — getting information via File Manager's Properties

using Notepad or Write you will have to put them in manually. The help file (which is actually twice the size of the program) contains several illuminating texts on the subject of political correctness which are both controversial and funny — although I wouldn't presume to cast doubt on the ideas anyone else has had on this issue.

■ *As from next month, Panicos Georghiades and Gabriel Jacobs will be writing about Windows 3.1. Tim Nott will continue to contribute the Windows 95 column. And also from next month, you'll find him writing Hands On Word Processing, too.*
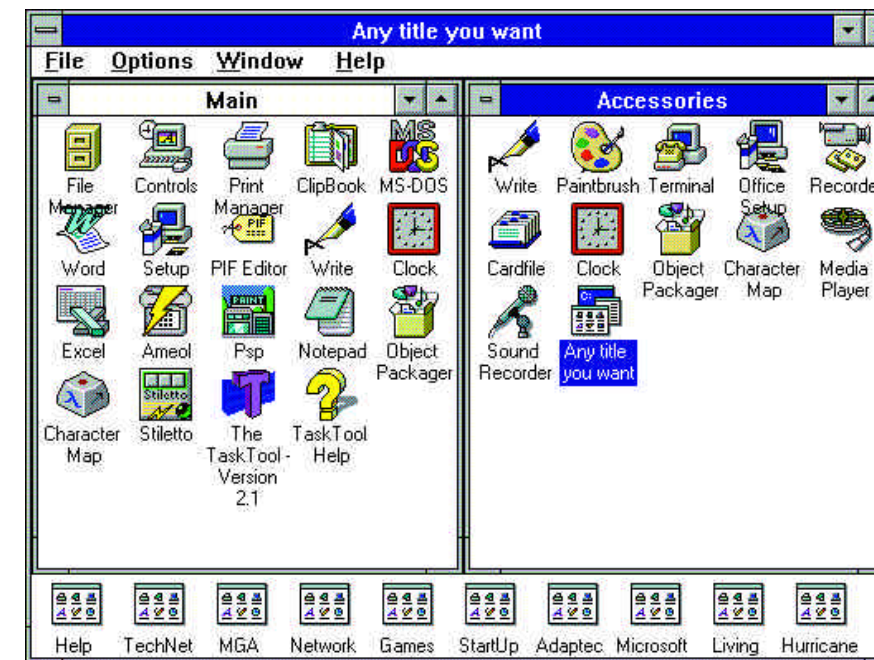
Department of dishonour

Last month we found out how to cheat at Hearts. If you think that's sad, how about cheating at Solitaire?
■ Isn't it annoying when you've elected to turn over three cards at a time and you find yourself stuck with that vital card never making it to the top of the pile. Wouldn't it be nice to, just this once, turn over one card instead of three?
First, make sure no-one is looking. Second, hold down Shift + Alt + Ctrl as you click the deck, which will turn over just one card. Third, wallow in guilt, and if you've never, ever, won a game of Solitaire, persevere as there's a surprise in store.
■ Oh, and just to complete the set, here's the cheat for Minesweeper. Type "xyzzy". Hold down Shift as you waft the pointer around. Watch the top left pixel of the screen — yes, that's the whole screen, not the Minesweeper window. When you're on a safe square, it will light up (set your Desktop to a dark colour to see this better).

Cultured **Perl**

Dale Strickland-Clark extols the virtues of Perl, having decided on it as his batch language of choice. He reopens console windows, and makes some selections from his bookshelf.

Following my first couple of Hands On NT columns, when I covered the mixed delights of the console window and DOSKEY macros, I received a number of emails from people asking how to get the macros to load automatically when the console window is created.

I mentioned at the time that I keep two console sessions running: a small one in the corner of the desktop, and a larger one which spends its time minimised until needed. The larger of the two is started during logon from a shortcut in the StartUp folder. It has the target field set to:

```
%SystemRoot%\system32\cmd.exe /
k cmdinit.bat startup
```

and runs minimised. This console window runs the cmdinit.bat (Fig 1) procedure which opens the second and then waits at the command prompt for something else to do.

It's useful to note that we're starting console windows in two slightly different ways here: one from a shortcut and the other from a Start command. If you adjust the properties of a window started from the shortcut (select the window then press ALT-space, P) the changes can be saved back into the shortcut for subsequent uses. Create additional shortcuts when you need windows with different properties.

On the other hand, console windows started with the Start command have no shortcut, so their properties are stored in the Registry and indexed by the window's initial title. Therefore a console started with:

```
start "Console" cmd.exe
```

can have a different layout to a window started with:
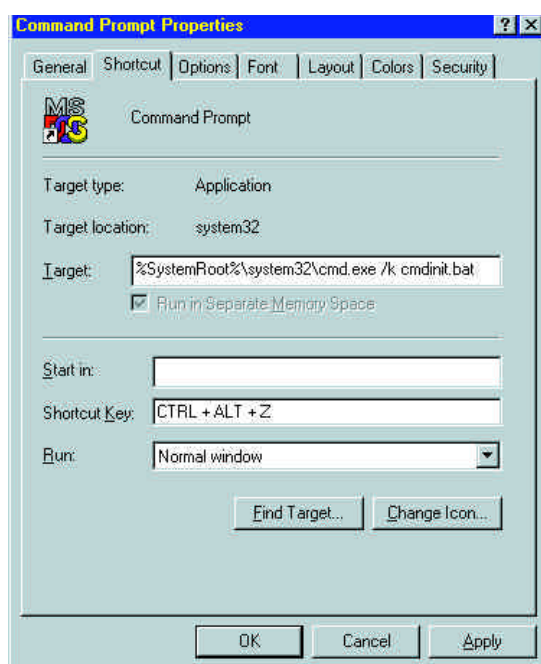
The Target field contains the command and options necessary to start a console window. Use the shortcut key to make it instantly accessible

applications, just press the shortcut-key combination and a console window should spring into view.

Filename completion

While we're revisiting the console window, here's a handy tip that I don't believe Microsoft has documented anywhere so far. (This isn't available on releases prior to NT 4.)

It's all very well having long, descriptive folder and file names but it means you spend half your day typing path names into console commands. Well, no longer — except, don't attempt this if you're uncomfortable about editing the Registry.

Fire-up the Registry editor (type regedt32 into your nearest console window) and switch to the HKEY_CURRENT_USER window. Locate the Software key, and within that, the Microsoft key. If there isn't already a sub-key called "Command Processor", create one (Edit/Add Key —
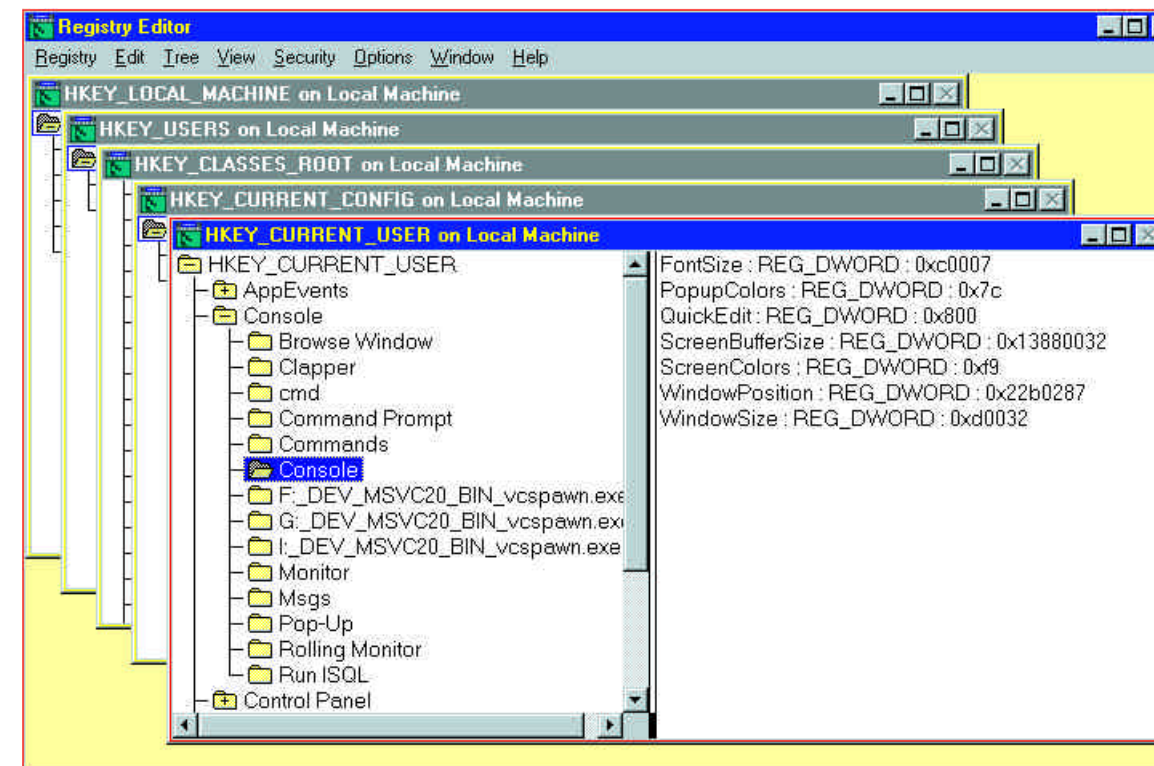
```
start "Demon Status" cmd.exe /
c finger status
@gate.demon.co.
uk && pause
```
(which Demon Internet users might find useful on a DOSKEY macro).

For those moments when you need a console window quickly, drag a copy of the shortcut from the Startup folder onto your desktop. Edit the parameters in the target field if necessary, set the run style to normal and assign a shortcut-key. Now, from most Windows

Fig 1 Cmdinit.bat

```
@echo off
cd \
doskey /macrofile=c:\batch\macros.txt
prompt $T$H$H$H$H$H$H  $P$+$G
if .%1 == .startup start "Console" cmd /k cmdinit.bat
```
This simple batch file sets the current directory, loads the DOSKEY macros, sets a prompt and finally, if it's been passed the startup parameter, starts the mini console window.

leave the key class blank). Then, within that key, create a value called "CompletionChar" of type REG_DWORD and assign it a value of 9. In other words, set

```
HKEY_CURRENT_USER\Software\
Microsoft\Command Processor\
CompletionChar = REG_DWORD 0x9
```

Once that's saved, start a new console window. The tab key will now assist by completing partially-entered filenames. If the filename offered isn't the one you want, just press tab again. Press shift-tab to go back through the list of offered names. A partial filename is only recognised if it is at the start of the command or preceded by a space.

If you prefer CTRL-key combinations instead of the tab key, replace the 9 in the registry with 1 for CTRL-A, or 2 for CTRL-B and so on (tab is the same as CTRL-I).

Alternative batch languages

One of the other improvements tucked away in NT 4 is the ability to use alternative batch languages, transparently. The two most popular languages available are probably Rexx (originally from IBM's VM mainframe operating system, subsequently transferred to OS/2) and Perl (a popular Unix shell language much loved by web-site developers). The NT port of Rexx was commissioned by Microsoft to assist users converting from OS/2, and they funded the Perl port to help attract Unix users and capture the web server market.

Console windows created with a START command have no shortcut so their properties are stored here in the registry

Fig 2 SearchPath.perl

```
# Finds a file in the path and shows the directory in which found.
$target = shift;
print "Looking for $target\n";
for (split /;/, $ENV{'PATH'}) {
    print "$_";
    print "\\$target <=====" if (-e "$_\\$target");
    print "\n";
}
```
SearchPath.perl — If you've ever wanted to know from which directory a program is being loaded, this little program searches your path and points to the program's home.

Both languages have their strengths: Rexx has a clean, logical, syntax and good string manipulation, while Perl has extensive string manipulation wrapped in a rich, powerful, but less readily-mastered (some might say bizarre) language.

After years as a dedicated Rexx user, I switched to Perl and it's now my batch language of choice, so I'll show the steps required to set it up:

1. Install the Perl system. The latest can be downloaded from ftp.perl.hip.com(see www.perl.hip.com for more information) and I've included a copy on the cover CD. Simply unzip it into the directory where it is to live and run the install.bat procedure.

2. Choose the extension you're going to use for Perl files (I use .perl but .pl is also popular). Create a new environment variable called PATHEXT and assign to it the following string:

```
.com;.exe;.bat;.cmd;.perl
```

Use Control Panel -> System -> Environment to do this permanently.

Enter it into the system or user variables depending on your preference. The order of the extensions listed determines the search order. I've just added .perl to the end of the default value but you can juggle it to suit yourself.

3. Register a file type using the FTYPE command:

```
FTYPE perlfile=perl.exe %1 %*
```

4. Associate the file type with the extension by running the ASSOC command:

```
ASSOC .perl=perlfile
```

Note that the FTYPE and ASSOC commands update the Registry and so only need to be run once.

You are now ready to go. Fig 2 is a test program to check your installation and whet your appetite. It scans the directories listed in the search path and shows which contain the file specified as the first parameter.

On the bookshelf

■ Perl 5 by Example
Author David Medinets
Price £37.49
(incl. CD-ROM)
Publisher Que
We've been crying out for a good introductory text to Perl 5 and it has arrived. David Medinets gives the novice and experienced programmer a good understanding of Perl with only an occasional lapse into that irritating, patronising, tone that spoils many similar programming books. He is clear and logical.

This 658-page book is best treated as a course text, being arranged into increasingly complex subjects, each with its own summary and exercises. The final quarter is devoted to web programming and CGI scripts. The index is good enough to allow you to quickly locate a particular topic.

The CD-ROM is a bit of a mystery. Given that Perl is distributed free under the Gnu artistic licence, you might expect to find various versions for different systems on the CD. But no; there are copies of the code samples from the book, plus texts from a couple of other books and a copy of Microsoft's Internet Explorer. There's a copy of MIRC (Internet chat client), too, whose connection with the book's subject-matter is tenuous to say the least.

■ Perl 5 Quick Reference
Author Micheàl Ó Foghlú
Price £18.49
Publisher Que
If this book does nothing else, it at least helps end the debate about what works on NT's Perl and what doesn't. With each function listed, there is a set of compliance icons indicating whether the feature works on versions 4, 5 or NT; the implication being that everything works on Unix.

Overall, it's a bit of a mess. There are a number of typographical errors, the section on pattern matching omits any mention of alternation (the use of the bar, "|" symbol to match either of two patterns), although the information can be found at the back of the book.

But if you have this 345-page book, you will use it. It's a handy reference for your bookshelf. It might have been a handy pocket reference had they not been quite so extravagant with space, which is wasted in abundance. But then it wouldn't have looked like eighteen quid's worth, would it?

Fig 3 ListUser.perl

```perl
# List all users in the domain along with one selected attribute.
# Subroutine to return an array of all the usernames in the domain
sub GetUserNames
{       my $userline = 0;
        map /(\S. {1, 19}?)\s\s{1, 19}/g, grep {
            if (/^-----/)
            {       $userline = 1;
                        0
            }
            else
            {       $userline = 0 if /^The command/;
                        $userline
            }
        } qx(net user /domain);
}
# Retrieve parameter or supply default
$property = shift || "Full name";

# Define output format for report header
format STDOUT_TOP =
   User Id         @<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
$propname
   -------------------    ------------------------
---------------
.

# Define output format for report body
format STDOUT =
   @<<<<<<<<<<<<<<<<<
@<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
$_, $value
.

# Iterate through all the user names extracting the selected attribute.
for (GetUserNames)
{   ($line) = grep (/$property/i, qx(net user "$_" /domain));
    ($propname, $value) = $line =~ /^(\S. +?)\s{2,}(\S*. *)$/;
    write;
}
```

ListUser.perl. Lists all the users in your domain with a single specified attribute. The program is rather simple-minded: if you mis-type the attribute name it won't notice; neither will it produce interesting output. The program demonstrates useful techniques, like capturing the output from commands, filtering and extracting information from them and formatting a simple report.

Fig 3, ListUser.perl, is a bit more complex, demonstrating the ability of Perl to achieve a lot with few statements. It's a post-processor for NT's NET USER command and displays the value of a single attribute for each user in a domain. The program takes a single parameter which should be enclosed in double quotes if it contains spaces. The parameter is the name, or part of the name, of the attribute to display. For a list of all the accepted attributes, enter:

```
NET USER <your id> /DOMAIN
```

into a console window. If you're not logged on to a domain, remove the option from the command and both uses of the NET command in the program.

For example, to list the last logon time for each user, the command is

```
listuser "last logon"
```

The GetUserNames subroutine is self-contained and can be plucked out for use in another program or transferred to a function library. (Both the Perl programs listed here are included on our cover-mounted CD.)

Read between the lines

Chris Bidmead passes on a salutary lesson, gained by trying to install SCO OpenServer without taking enough notice of the documentation.

I had to delay telling you about the new, free, SCO OpenServer (www.sco.com) because of installation problems. Yes, I know I promised a long time ago not to go on about installation problems in this column, but I do know a lot of you spend time struggling in this unfruitful area — as I do, too. I learnt some salutary lessons from (eventually) installing SCO, so I thought it would be useful to provide you with a quick rundown.

Initially, I completely failed to install SCO OpenServer on my trusty old Apricot Xen II 486, which has been a reliable home in the past for various different versions of OS/2 and Linux. SCO OpenServer is snotty about low-end hardware and in particular eschewed the Sony CDU31a proprietary interface CD-ROM drive. It thinks exclusively in terms of SCSI.

Apricot (or perhaps I should now call the company Mitsubishi Electric) stepped swiftly into the breach and sent me one of its LS500 range of desktop machines. This one is a 100MHz Pentium, equipped with a SoundBlaster 16 sub-system and a Cirrus Logic GD543x video chip on the motherboard. No SCSI, but the Triton chipset includes a dual ATAPI interface which drives the 1Gb hard disk and the CD-ROM. ATAPI, as I suppose everyone must know by now, is a recently standardised, simple, parallel interface that vies for performance with the lower end of the more traditional, more costly, SCSI connector.

What I like about the LS550 is its straight up-and-down compatibility. Buy a "bleeding edge" machine and it may turn out to be hard. or even impossible, to find drivers outside the world of Windows for the exotic Wide SCSI adaptor, or the gee-whizz 3-D

Fig 1 SCO OpenServer doesn't have the classy interface of NeXTStep, but the neat icons give a clean, efficient look to the desktop, and they can be cleverly animated

video system. All this stuff on the LS500 is widely supported, and is going to work very nicely with any of the operating systems I'm likely to throw at it.

However, SCO Openserver still refused to come quietly. The problem centred around that requirement for a SCSI CD-ROM. It seems there's a way around this if you read the installation notes buried somewhere on the CD-ROM. (Tip: if you can read the CD-ROM of a new operating system on your old OS, and you usually can, then do so. Scour it for information before you launch into a new installation).

Dave Gurr, market development manager at SCO UK, tells me that SCO realised the growing importance of the

ATAPI interface only after the architecture of OpenServer had been committed to SCSI. SCO's engineers will have thoroughly fixed the problem in the new release which is due out about the time your are reading this. On the version I was trying to install, there is an interim solution; you have to use a kludged loadable driver called wd that talks ATAPI to your system, yet kids the OpenServer that it's dealing with SCSI.

This works fine but confused me no end. The SCO boot disk detects the need for the wd driver, loads it and then invites you to fill in the various "SCSI parameters". You have to go along with the deceit by telling the poor deluded system what your Host Bus Adaptor number is, along with the SCSI

address and logical unit number. ATAPI interfaces don't have these numbers, so you have to follow SCO's arbitrary scheme for translating between ATAPI and SCSI parameters.

An ATAPI system that hangs an IDE hard disk and a CD-ROM off the same interface will run the hard disk as master and the CD-ROM as slave. So I thought I was putting in the right numbers: HBA = 0 for primary ATAPI interface, SCSI address = 1 for CD-ROM as ATAPI slave. But the installation kept coming back to me with: "Can't Find SCSI interface". Fair enough, I thought. I can't lie to you. There isn't one.

Following several attempts I re-read SCO's installation notes and the hardware spec for the LS550. The answer was staring me in the face, but you know what happens in these situations: you don't read it properly because you think you're covering ground you know already. If you ever find yourself getting as stuck as I did with this one, the only thing to do is to throw away everything you think you know and re-learn things from scratch.

I had picked up the idea from the SCO installation notes that the IDE drive and the CD-ROM were hanging off the ATAPI interface as master and slave. But when I had read the Apricot LS550 documentation carefully, I noted that the Triton chipset provides two ATAPI interfaces. The CD-ROM wasn't a slave, it was the master on its own secondary controller. The correct

Fig 2 SCO: The pointing finger icon, which is the mouse cursor, pincers its finger and thumb to pick up objects, and rotates its wristwatch into view while waiting for a job to finish. Here are the icons that SCO's X.Desktop uses to do this

parameters for the wd driver were HBA = 1, SCSI address = 0. After that, the installation found the CD-ROM drive sweet as a nut, and the rest was plain sailing: a totally automated, go-away-and-have-supper, one-hour-and-a-bit data transfer from the CD-ROM to the hard drive.

Sterling work, Carruthers

One of the minor joys of Linux-FT is that when you install it to load the UK keymap and hit the pound sterling sign on top of the number 3 key, you actually get the £ sign. Try this with RedHat or any of the other US Linux distributions and the chances are you'll hear a beep and nothing will turn up on the screen. This is the console screen I am talking about — so let us leave X out of it for now…

One of my early excursions into the bowels of Linux a couple of years ago was an attempt to track down this pesky little problem. It turns out there's no need to do what I did, and start unpicking the source code. But on the other hand, reading chunks of the source during this venture was a valuable part of my Linux education. If you haven't explored the source on your system, why not cd to /usr/src/linux and have a mooch around. This is the one big advantage that the Linux folks have over devotees of, say, SCO. Even though SCO OpenServer is now "free", you won't find any source knocking about.

You'll be asked during the installation of most Linuxes which keyboard you want to use, and thereafter the appropriate keymap will be loaded automatically each time you boot. You can see how this works in

Linuxes such as RedHat that use the System V initialisation scheme (most do these days) by finding a directory called rc.d under /etc. This is where all the initialisation scripts are run, like a kind of glorified archipelago of AUTOEXEC.BATs, every time the machine comes up or whenever you shift from one run level to another. On my RedHat system there's a sub-directory under rc.d called init.d which contains a script called keytable. Find your own keytable script and the related scripts to see how the appropriate keymap gets loaded.

You might think that loading the correct keymap would be enough to set you up with the £ sterling sign. But alas, not so. The keyboard mapping is only part of the story. You will also have to make sure that an appropriate screen font is loaded. This is achieved by a utility called, reasonably enough, Setfont. Setfont should be loading an ISO Latin font such as lat1-16.psf. You can do this manually while testing the system by running Setfont from the command line. See the man pages for Setfont for full details.

So you've set your screen font and your keyboard. What happens if, as I found, your keyboard still fails to deliver a £ sign? Well, frankly, I gave up. I got used to writing "100 UKP". It didn't help that my favourite machine came with a US keyboard that doesn't even have a £ sign, and I've never bothered to change it. I completely forgot about the problem until I ran into a Unix veteran with the splendidly colonial name of Shaw Carruthers in one of the Linux electronic discussion groups running on the CIX conferencing system.

In a lather with Java

I came across a nice little anecdote in the comp.os.sys.be newsgroup, which I reproduce here with the permission of its author, Kurt Glaesemann who is at kurtg@iastate.edu. The discussion was about some of the more unreasonable things people expect of computers and Kurt mentioned a web site he'd visited where nothing seemed to work. He inspected the source code for the page, where he found a section that went something like this:

```
If(JavaScriptExists)then
   ...cool stuff...
  else WriteJavaMessage("sorry
this page needs Javascript")
end if
```

I leave it as an exercise to the reader to work out why this might cause problems with a browser that doesn't support JavaScript. (*Hint for beginners: the script above is written in JavaScript*).
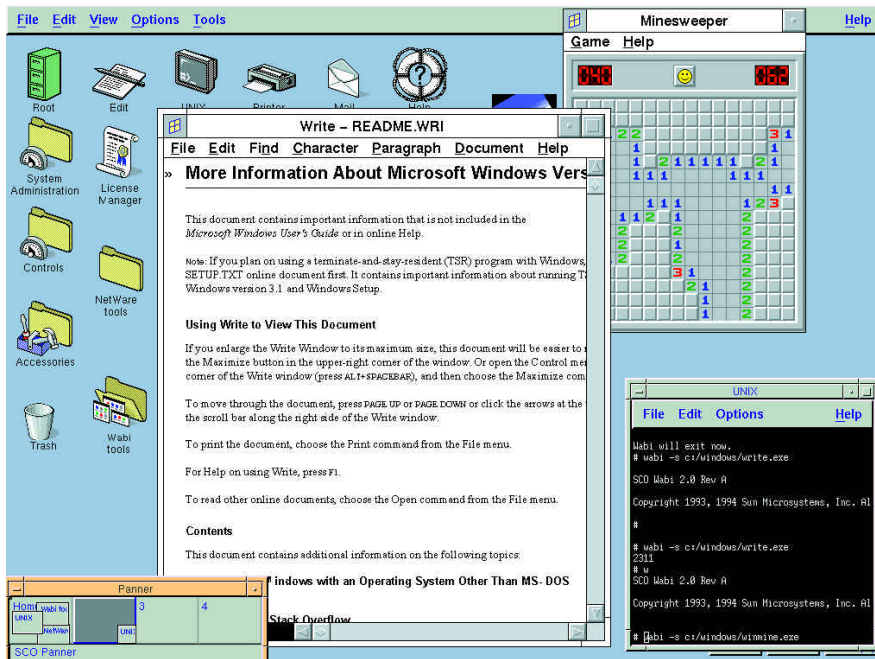
Fig 3 SCO OpenServer comes with Wabi 2.0 (as a cost extra) which I'm using here, somewhat unadventurously, to run Microsoft Write and Minesweeper. You can open Wabi as a Windows environment, or you can run individual Windows apps in their own windows, rather like "seamless" WinOS2 under IBM's Warp

Linux gets Wabi

As I write, Caldera has just announced that it is shipping version 2.2 of the Linux port of Sun's Wabi, the Windows environment for UNIX. If you really must run Microsoft software such as Excel and Word on your UNIX machine, this is certainly one way of doing it.

I'm hoping to take a closer look at Caldera's offering in the near future. Meanwhile, I have the SCO OpenServer version running here (Fig 3), and it certainly does the job, provided you define the job as only running a limited subset of 16-bit Windows applications.

What worries me about all this is the price. Version 2 of Wabi requires 16-Bit Windows, which (on my SCO system at least) you have to install yourself. So add the cost of a Windows licence, to the Caldera price of nearly $200, and you've got yourself an expensive way of running old Windows applications.

Shaw told me that the two other elements you may have to fix are the ability of the application you're running to handle ASCII characters with values over 128, and the behaviour of the console you're using. Don't forget that even if you're only on the command line, you're still running an "application" — the shell.

With current versions of Linux, this shell is likely to be bash (Bourne Again Shell) by default. (You can usually check this by typing "echo $SHELL" at the command line and seeing whether it reports "/bin/bash". If you don't get any output you probably forgot to put $SHELL in capitals). When bash loads it consults (among other settings files such as .profile) a personal keybinding file called .inputrc, which sits in your home directory. Take a look at man bash for the full details. Shaw suggests that you include the following lines in your .inputrc file to make sure that bash can cope with European characters:

```
set meta-flag On
set convert-meta Off
set output-meta On
```

Now let's look at the console behaviour. What you know to be a character-based, memory-mapped screen is, as far as UNIX in this mode is concerned, a dumb terminal sitting at the end of a serial connection. If you enter the command "stty —all" (or "stty all" on older systems), UNIX will tell you all it

knows about the terminal, including its alleged "baud rate". You can also use stty to change the features of the virtual terminal, including its handling of ASCII chars above a value of 127. Shaw suggests that you add the following lines to your .profile script to make sure the console is 8-bit clean:

```
tty -s
if [ $? = 0 ]; then
stty cs8 -istrip -parenb >&0
fi
```

The tty command silently (-s) checks to see if it really is dealing with a terminal and returns 0, tested in the following line, if this is the case. Stty then sets the character size to eight bits (cs8), negates any tendency to clear the high bit on input characters (-istrip) and tells the terminal not to look for parity bits (-parenb). You'll notice the minus sign isn't used here to flag a parameter, as it is in many UNIX commands (like the tty command in the first line), but to toggle a parameter on or off — just one of the delightful inconsistencies which gives UNIX its charm.

Preparation for ISDN

Following our discussion about ppp and dial-up to Internet Service Providers last month, I've taken a bold step forward and installed a base rate ISDN line.

In theory this gives me higher

bandwidth to ISPs (provided they support ISDN, of course) although the speed of the link in practice is dependent on factors like the load on the ISP and the remote servers you are visiting.

There's an immediately discernable benefit in the speed with which you establish the connection, because ISDN dispenses with the dialling tone and the tuneful duet of line speed and communication standards negotiation that can take up to 30 seconds with a ordinary analogue phone line.

As well as the ISDN line you need a terminal adaptor (TA) through which you make the computer connection. It helps if this behaves as closely as possible to a modem, so that your software doesn't have to be completely rethought. Because base rate ISDN is effectively a pair of lines, it's also useful if your TA has an analogue input that you can treat like an ordinary phone line, either for a modem connected to a second computer, or for use as a voice line. P&L Systems, which is run by Paul Lynch whom regular readers will remember as my NeXT guru, has lent me one of its ISDN TAs. It's the ZyXel Elite 2864I "ISDN modem" and it has all these features, and more. Next month I'll tell you more about how I got this going with my UNIX network here.

Cover charge

Terence Green charges *PCW* with negligence over the shoddy representation of OS/2 on our Cover CD. Why not try it with Java, he says. And he gets verbal with Warp 4.

This month's big question is, where did they put the OS/2 stuff on the CD? Congratulations to anyone who managed to find the material on the December issue free cover disc! And sincere comiserations to those who found the Netscape OS/2 beta

CD-ROM team tell me they are working on making the CD directory structure a little bit more logical.

Speaking of which, if anyone has managed to install and run the Cover CD software with OS/2, do tell. It seems to be hard-wired for Windows users. I had the

Adobe Acrobat Reader for OS/2 and Netscape for OS/2 (both beta) installed but couldn't manage to get the Cover CD software to use them, or to install properly in a Win-OS/2 window.

Eventually I found and ran the Windows help file from the CD and discovered that I could use a web browser to access the HTML file RESOURCE.HTM in <cd drive>:\HTML\RES. Sadly this uses frames so it's a no-go area for Web Explorer. And then it turns out that only a fraction of the OS/2 files on the CD turn up in the HTML listing anyway.

I guess the cover CD software works okay in Windows 95 with a late-model
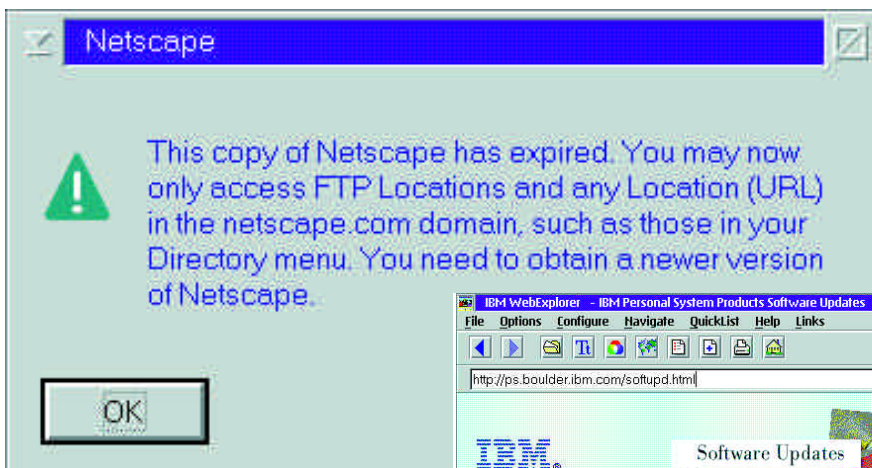
Above Sorry, but the Netscape for OS/2 Beta 1a had a hidden timeout set for 30th November, 1996, which renders its inclusion on the previous cover CD a little pointless
Right Web Explorer lives on! But it's only in maintenance mode now. Still, the Warp 3 versions can be enhanced to automatically install updates

on the January Cover CD, only to discover that it had just timed out. In future I had better read the licence agreement a little more carefully so as not to miss the obvious BLOCK CAPITALS timeout warning.

The location of the OS/2 files for the December issue turns out to be in <Cover CD>:\HTML\RES\RESOURCE\HANDS\OS2. It's obvious really, but the PCW
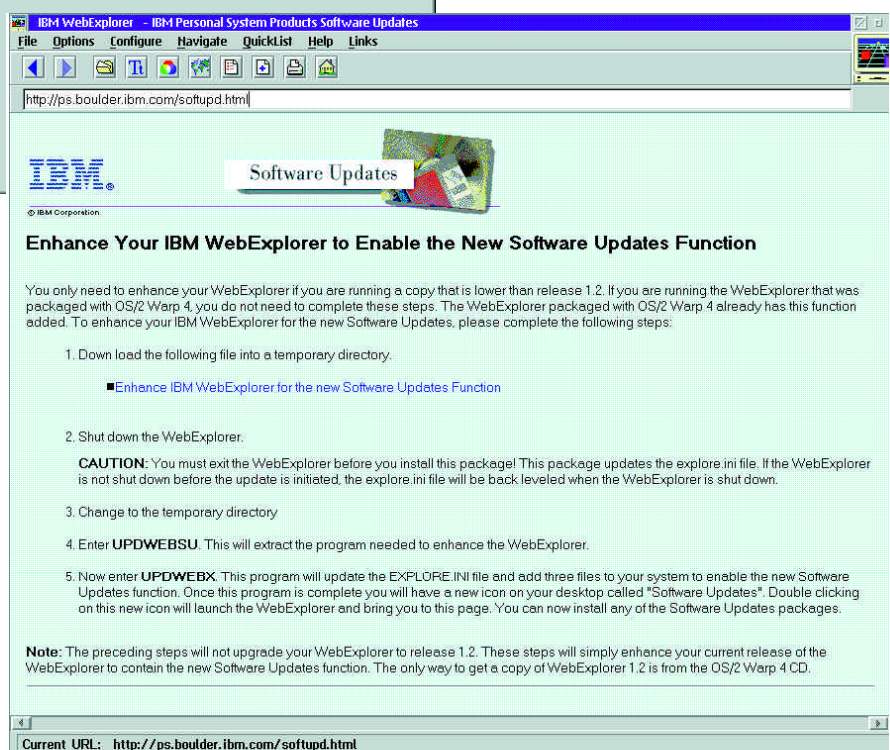
browser, but what about OS/2, Windows 3.1, Windows NT 3.51, Linux, Macintosh, Amiga, Atari, Unix and so on? Isn't this exactly why there's so much interest in Java? One binary executable — many platforms supported.

Java brouhaha
Java doesn't have to be trivial, and trivial doesn't necessarily imply useless. If Corel can build an Office suite in Java, the PCW Cover CD could be given a Java front-end and made accessible to all PCW readers.

Seek out the Corel Office Java suite preview page at http://officeforjava.corel.com/preview/ for a view of more complex Java applications than the usual animations. However, it's pre-release, it's on the other side of the transatlantic pipe, and it really does need a high-bandwidth internet connection, ISDN 128Kbps or better.

But, what about the Cover CD? It's in your CD-Drive on a relatively fast I/O bus and bandwidth would not be a problem. Java-based Cover CD software would make it easier for everyone to enjoy the CD regardless of their chosen browser, operating system or operating system version. Grounds for a new approach?

There are a number of ways of running Java applets in OS/2 Warp 3, none of them obvious and most requiring large downloads. For legal and practical reasons you'll need to download Java support from IBM. Practically speaking, the Java OS/2 situation changes faster than the lead time of the OS/2 column, so check the latest situation at www.ibm.com/java or browse to the IBM Java Centre at http://ncc.hursley.ibm.com/java/ and the IBM Alphaworks site www.alphaworks.ibm.com/ .

The easiest way to run Java applets is to use Warp 4. If you need to use a browser to navigate to and run a Java applet on a web server, you have to use Netscape for OS/2 because the Web Explorer 1.2 in Warp 4 doesn't do Java. Weird or what? The Java-enabled Web Explorer demo has also since vanished from the IBM Web sites. Another possibility might be to run the Java-enabled 16-bit Netscape Navigator for Windows 3.1 which Netscape was threatening to ship around mid-November.

Netscape for OS/2 should be in production by the new year. The unfortunate timeout problem with the cover-mounted Netscape beta is a consequence of the speed of change associated with internet
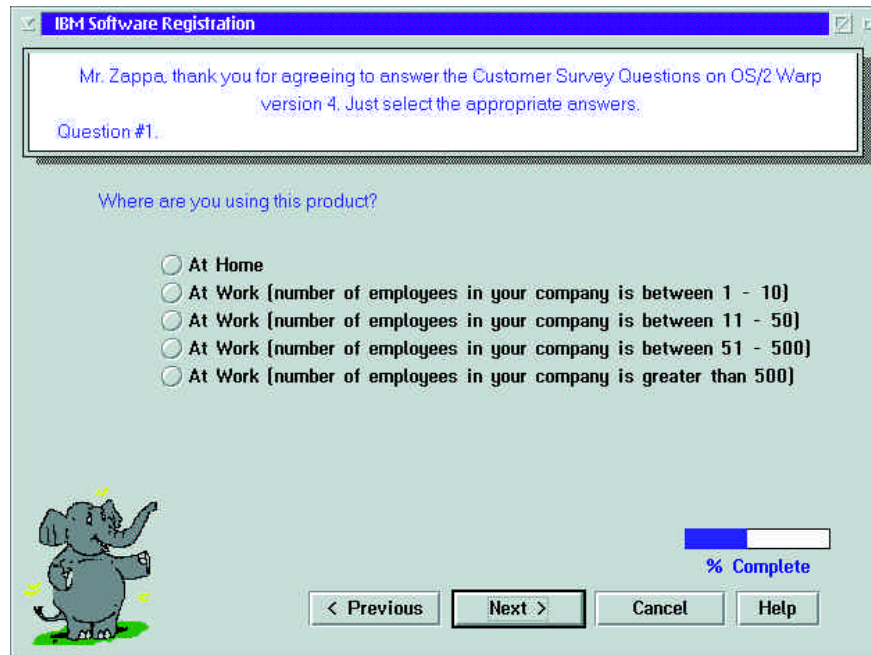
The famous dancing elephant is an old IBM in-joke and has nothing to do with stamping out wild ducks, burning or not

technologies, so while I realise people appreciate the cover software, I'll be more circumspect with beta selections in future.

Speak to me
In early November the UK version of Warp 4 arrived and I replaced the US version I had been running since late September. In an earlier column I waffled on about difficulties with the US speech model in the Merlin beta. To my surprise, the US version handled speech navigation and basic dictation really rather well straight out of the box. Soon I was blithely issuing commands to my computer and receiving an instant response. This system I can heartily recommend to any parents of teenagers.

The one thing that can turn Warp 4 speech enablement into a real drag is insufficient memory. Memory prices have edged up yet again but I reckon I'd still fork out for the extra memory to have at least 24Mb in a Pentium 100MHz system for the voice capabilities.

Warp's Java capabilities are discussed above and the feature set was listed in a previous column where I enthused about the interface, which I really like. The trays on the Status Bar are very useful. Drag and drop anything onto the status bar and it will open or start from there. Add extra trays by right-clicking on the status bar for the popup menu and change trays by clicking on the bar. Click the box to the far right of the status bar to change from time to date to timer. A little clock appears.

Warp 4 networking is much better integrated now and easier to set up too. One thing you need to do during install if you plan to use the internet and you don't have a networked PC with a network card is to be sure to choose the NO NETWORK ADAPTER option when asked to select a card. And if you run any version of Warp on a small network using NETBEUI to peer with other OS/2 and Windows PCs and the login process takes an age, reduce the timeout which is more appropriate to an enterprise network. Open MPTS in System Setup and opt to configure the LAN Adapter and Protocol Support. Select IBM OS/2 NETBIOS in the Current Configuration window and click EDIT. Change the Query Timeout (default 2,000) to 1,000 or 500.

Warp surprises
Warp's not perfect — it can go wrong, and sometimes it's difficult to know where to start. Customer service is always worth a try but you need to register, which is one way of turning off that irritating elephant. The other is to put up with it — it appears five times in the first 40 days, after which it won't return until a year has passed when it presents you with a customer satisfaction survey! Free end-user support covers basic installation issues for the first 30 days from a 24x7 call centre. After that you have to pay, but if you're up and running you can try the internet support. Alternatively there is a HelpFax service. Coverage varies — there are four HelpFax lines covering Europe.

Files for the cover CD

HTMLVB5.ZIP — a small and quick web browser from Sweden.
JR09427.ZIP — a fix for the CHKDSK "Minor System Error" buglet in Warp 4.
WARPINST.EXE — the FixPack #22 level installation disk update. ONLY USE IF UNABLE TO INSTALL WARP 3. Self-extracting file. Place in its own directory before executing.
WEBXV11F.EXE — Latest Web Explorer for Warp3.
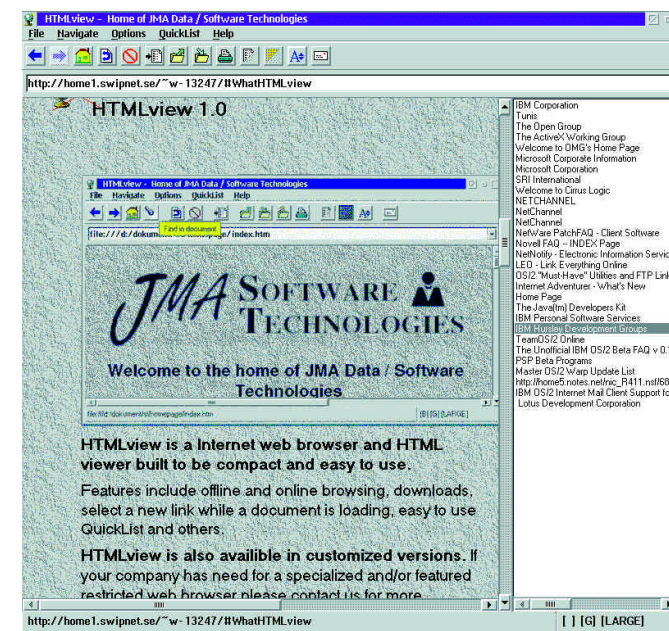
A lightweight, fast HTML viewer (web browser) from Sweden

Some OS/2 showstoppers are quite easy to resolve. Several problems can cause the Warp WorkPlace Shell to hang or to run so slowly as to make no difference. Warp 4 is much better than Warp 3 in this respect, but not immune. Typical problems are installation hangs, driver glitches, and some Windows programs. It's become much easier to troubleshoot OS/2 since Warp 3 and Warp 4 takes it a bit further. The following applies to all Warp versions unless otherwise stated.

If the Warp 4 install program stalls, reboot and press ALT-F1 when the OS/2 block cursor appears. Select F6 to disable Hardware Detection and cross your fingers.

If Warp installs but fails to display, or if it mangles the display, do the ALT-F1 thing and select the return to VGA option. If it works okay in standard 640 by 16 colour VGA, there's a problem with the SuperVGA driver or the selected resolution or perhaps it was incorrectly detected.

If, after working properly, Warp displays the graphic backdrop when rebooted but then hangs, either displaying or trying to display the desktop, there might be a network problem or some other process or thread might have started and hung unseen.

Reboot and wait until the backdrop and clock appear. Then hold down Left-Ctrl and Left-Shift and F1 simultaneously until the desktop icons appear to stop programs from autostarting.

Alternatively, take the long-term option and edit CONFIG.SYS. Reboot and ALT-F1 and this time choose the Maintenance Desktop. Open a windowed OS/2 session and start the E.EXE editor. Load CONFIG.SYS and edit out the word PROGRAMS from the line beginning "SET AUTOSTART=". This stops programs which were running when the system was rebooted from restarting.

A better option is to add the line

`SET RESTARTOBJECTS=`
`STARTUPFOLDERSONLY`

to CONFIG.SYS. RESTARTOBJECTS defaults to YES if the SET command is absent form CONFIG.SYS but this can result in a program being started twice on reboot, once from the Startup folder and once again because it was running when Warp was rebooted.

Finally, Warp 4 has a new feature which enables you to kill a process from the desktop. Add the line

`SET KILLFEATUREENABLED=ON`

to CONFIG.SYS. Now when you encounter a hung program press the Ctrl while clicking on the Window List (the little cascaded window icon on the Start Bar) and a list of running threads will pop up. If you click on one of the threads, you are offered the option to kill it.

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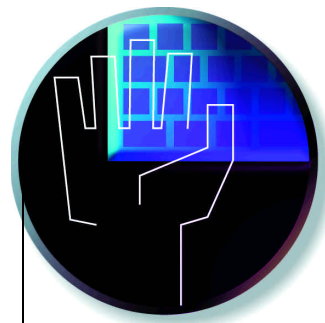
The new WAV

Tim Phillips susses out a new word processor for the Mac, sorts through his email pile and conquers a number of common WP queries.

Some of my less complimentary email during the past year has been from people who were not convinced by my argument in favour of Java. If you've been away, I'll explain: Java is the programming language which is used for applications on the internet. It's platform independent, and doesn't need local storage, so applications can be used by cheap, hard-disk-free terminals called network computers.

Is this the future for applications like word processors, I asked. My, how you laughed. If you still find this mirthful, I suggest you visit www.corel.com where you'll find a demo of the Java version of WordPerfect. If you want to use it for more than a few keystrokes, you'll need ISDN-type bandwidth, but imagine this lodged on your local network server…

More madness come true
Mac users might also want to visit their future at www.dharbor.com, the home page of Digital Harbor. This innovative company contains a lot of the big fish who made WordPerfect what it was. Now they're developing an OpenDoc word processor for the Mac, priced at $49 and downloadable from the site.

WAV, (pronounced with a long "a", like wave) is a mini-application called a component. It works seamlessly with other OpenDoc parts. So when you type in a document, you use the text part of a component. Add a graphic; you use a graphics-based OpenDoc part.

Like Java, OpenDoc is meant to be cross-platform. Instead of the big do-everything software packages, there is do-one-thing components made by many
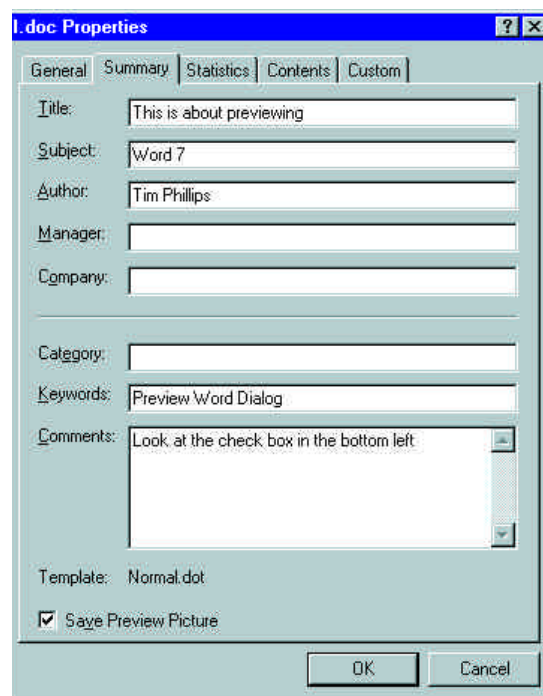
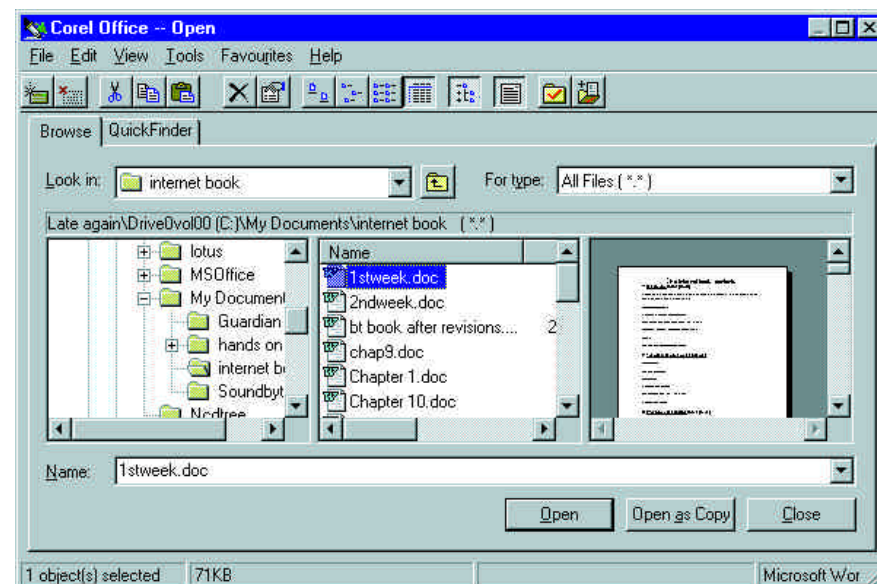Fig 1 (left) Changing the preview so it's much faster in WinWord

Fig 2 (below) Using the tree view and preview in WordPerfect: just disable Tree View for a faster preview!

software suppliers, and theoretically they will all work together.

This is the only OpenDoc word processor so far (there are at least half a dozen spreadsheets). The other catch is that, as yet, there is no OpenDoc for Windows. So if you want to run WAV, you need a Mac or OS/2 Warp 4. However, at the time of writing, you could get WAV on a free time-limited trial. It's fun, smooth and well-designed, like the third or fourth version of a word processor rather than the first. But that's because these guys have been here before.

Sneaky preview tip
I'm always banging on about the benefits of using the preview option in a file open dialogue box but some of you tell me it slows your PC to a crawl. While browsing around the web I found a couple of useful tips to help you get the best from your preview option.

Firstly, Word 7 users who find the preview too slow (that's anyone with less than a Pentium I should think) can speed it up by using the following procedure, replacing a full preview (which opens the document) with an OLE thumbnail view, which just allows you to see an image of the first page:
1. Click Properties on the File menu while the document is open (Fig 1).
2. Click the Summary tab, and select Save Preview Picture check box.
3. Do this for all the files you want to preview (this may take some time). Unfortunately, this property is specific to each document: selecting it does not change all previews to thumbnail previews.
4. Select the Prompt For Document Properties box on the Save tab of the Tools, Options dialogue box. This pops up the Properties dialogue box when you first save a document so you can remember to check this little box.

Before you start saying to yourself, "If I have to go through this every time, I think I'll go and beat up Bill Gates", be advised that the box will stay checked — so you can drop that cricket bat.

Fig 3 SmartQuote options in WordPerfect
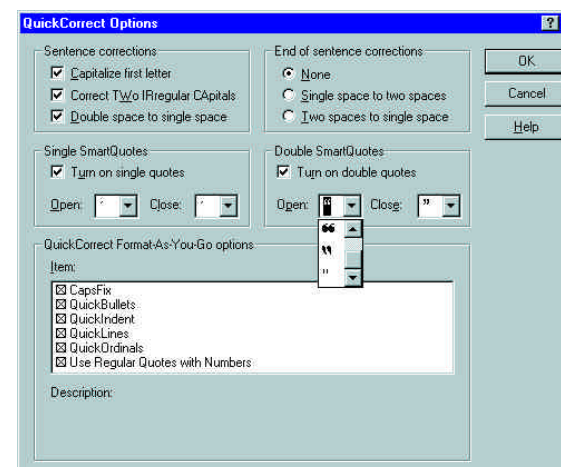
There's only one thing more to tell you: doing this slightly increases your file size but if you're using preview (especially across a network), it's well worth it.

Secondly, if you're suffering the same slowdown in WordPerfect, disable Tree View for extra speed (Fig 2). To do this, click on the tree view button at the top of the Open dialogue box. Unfortunately, there's no way to speed up a slow preview mode although it is quicker at displaying converted file formats than Word.

Problems
This month, I'll try to solve as many of your problems as possible. Here, I've compiled a collection of the most frequently asked, or just the most interesting, of the outstanding problems that sit in my email pile.

Q. "When I save a document as text (or paste it into an email and send it) my quotation marks disappear, or turn into odd-shaped characters. Why?"

A. This is a common problem across all word processors, because they will commonly replace quotation marks with ''SmartQuotes''(tiny 66s and 99s). The smart quotes look great when you print the document but are a nightmare to email or convert to other file formats. Often, you will want to turn them off.

For Word, SmartQuotes is an option in Tools, Options Autoformat. In Word Pro, it is enabled in the SmartCorrect function, and in WordPerfect it is in Tools, QuickCorrect, Options (Fig 3). WordPerfect users can control single and double smart quotes separately and use different SmartQuote styles. Getting rid of SmartQuotes isn't as easy as just turning off the switch, though. Once they are there, they tend to stay there

Highlighting hints

Lotus has never been averse to providing non-standard but very good mouse shortcuts. I find highlighting words awkward in Word for Windows, and no better in Word Pro — unless you use these helpful "extras". (Don't try them in WinWord, they don't work.)
1. Select paragraph: CTRL-double click.
2. Select multiple paragraphs: CTRL-double click-drag.
3. Select text from insertion point: place insertion point at start-SHIFT-click at end of selection.
4. Select sentence: CTRL-click. (Note that this is the same whether you're in Word or Word Pro.)

and you will have to use search-and-replace in order to weed them out.

Q. *"Why can I not print PostScript EPS files properly when they are imported into Word 7?"*

A. Irritating isn't it? Not least because this is a problem that Word 6 did not have. Encapsulated PostScript files should be fault-free but the standard is too loose for that. EPS graphics consist of two components: the PostScript code and a bitmapped header for the screen preview. Microsoft Word 6.x prints the PostScript code, yet for some bizarre reason Word 7 prints both! Unfortunately, the bitmap is usually a low-resolution version of the image, used for positioning on the page, so the printout has a low-resolution, overlapped appearance.

There are three fixes. The first is an easy workaround: when saving the file in whatever package, take the option *not* to save the bitmap header. The second is a harder form of workaround: look for a file called mstiff32.dll which you'll find in Program the Files\Common Files\Microsoft Shared\Grphflt folder and call it Mstiff32.bak. This disables the TIFF filter used to generate the bitmap image. Import the EPS file again, and it will print (although it won't display) as God intended. This, however, messes up your TIFF imports.

If this sounds like it would be too much hassle for you, you'll be pleased to hear that the problem has been fixed in version 7.0a. So the most practical workaround, is to call Microsoft technical support and get an upgrade from 7.0 to 7.0a.

Q. *"My 16-bit Word Pro crashes under Windows 95 when I open a file. Why?"*

A. Lotus users beware if you don't use file extensions! Extensionless files in directories with extensions cause GPFs (General Protection Faults) when you mix Windows 95 and Word Pro 16-bit. Try it: Pick, File, Open and change the type to "all files" so you can see a file without an extension (find one in a directory with an extension).

The bad news is that this will happen whatever the file type. Better news is that the solution is simple; you rename the file, or rename the directory. Especially under Windows 95, there's just no point in using eight-dot-three directory names, so don't. And leave the file extension in place! This is fixed in the 32-bit version but really, I'm surprised that more than one of you have met this problem.

Q. *"When saving files from WordPerfect 7 to WordPerfect 5.1 format, chunks disappear. Am I mad?"*

A. No you're not. Our recent discussions about file conversion faults has uncovered this rather surprising fault, which causes data loss if you're passing files from your swanky Windows 95 Corel Office WordPerfect to good-old-DOS version 5.1.

Much as I hate to say it, this one's another workaround solution. Corel is aware of the problem and it's fixed in the latest versions of WordPerfect, but if you want to make certain, save your documents in version 6 format. Open the version 6 format and save as version 5.1 format. It's probably the least elegant solution this page has ever recommended, but it's better than losing your data.

Q. *"I can't get WordPerfect 7 to finish a find and replace macro. What do I do?"*

A. The facetious answer is to press the escape key. You'll find the macro has terminated with all the replacements complete. This is yet another bug which is known to the engineers at Corel, and so should be fixed in subsequent releases. If you're a WordPerfect 7 user, try the following macro and see whether it completes. If it doesn't, you're affected:

```
Application (WordPerfect;
 "WordPerfect"; Default; "UK")
Label (Top)
PosDocTop()
SearchString (StrgToLookFor: "<put
 your sample text here>")
ReplaceString (RplcStrg: "<put the
 replacement text here>")
ReplaceForward (SearchMode:
 Extended!)
Go(Top)
```

Q. *"I'm a Mac user. How do I use my Word 5 glossaries in Word 6?"*

A. In Word 6.0, the glossaries are renamed as AutoText. Keep your old glossary files, such as Standard Glossary, and do not delete them when you upgrade. Now open the old glossary files in Word 6.0 — Word stores the AutoText entries in the template attached to the active document.

If you have an earlier version of Word, the procedure might be different, so check your help file. But be assured, they can be changed.

Q. *"I'm using Works and it's not WYSIWYG! Are my eyes deceiving me?"*

A. They're not. What you see in Works is sometimes not what you get (at least, before version 4.0). This is frustrating if you use spaces to align text. The text takes up more room on-screen than when it prints, especially when you use italics.

There's a simple solution; always use tab stops to line up columns. It's not only Works users who have this problem, so you lot can stop sniggering. Always use the tab key, because a letter width isn't necessarily the same as a space width in your font (or the same as either, in another font).

Q. *"My Word Pro documents use bullets, and when I convert them they don't appear as bullets any more. Why not?*

A. Another problem, endemic to anyone who wants to perform file conversion routines regularly. It's in the SmartQuotes category and the detailed reason is that the Bullet1 and Bullet2 styles in Word Pro use characters from other fonts that aren't available in the converted file format. Define bullet point styles using commonly available characters if you can.

■ Next month, Tim Nott will take over as our regular *Hands On Word Processing* contributor.

Trading places

Stephen Wells shares his stock of spreadsheet knowledge to help you chart your investments

Paulo Freitas Tavares (MD), emails: *"I have a small problem. It extends for dozens of sheets and many parameters but let us suppose it is only one sheet and one parameter.*

"In column B I have weeks; in C I have weights of patients; in column J I have 'alerts' for a quick visualisation if something goes wrong. Suppose that the criteria for 'going wrong' is losing or gaining more than 10 percent weight in one week. The aim is to get the word ALERT in red or the word OK, in blue, in column J — I can't make Excel 7 do it."

As regular readers know, I am not a big fan of unnecessary macros and always try to find a built-in Excel solution before using them. In this case, Dr Tavares may be able to take advantage of the extraordinary flexibility of Excel's Custom Number format.

In Excel 4, you can enter the following as a Custom Number format:

```
[>1000] [Blue] #,##0; [<-1000][Red]
#,##0; [Green] #,##0
```

Excel assumes that the first section is for positive numbers, the second for negative

ones, and the third is anything else. You can't write IF statements, but you can use a condition value symbol. So in this example, any entry in the cell greater than 1,000 is displayed in blue, less than -1,000 turns red, and anything else is green.

Interestingly, you can enter the same custom format in Excel 7 but it will automatically shuffle the description around to:

```
[Blue][>1000] #,##0; [Red][<-1000]
(#,##0); [Green] #,##0
```

In this example I've added parentheses, so numbers less than -1000 have brackets as well as being in red.

You can also make text appear even though you have entered a number, or the cell contains a formula which produces a number. Let's say the cell A9 contains the simple formula:

```
=C9-C10
```

We can format A9 with this Custom Number format:

```
[Blue][>14] "OK"; [Red][<10] "ALERT";
"Other"
```

If the answer to C9-C10 is 15, the acronym "OK" will display in blue; for 8, it will display "ALERT" in red; for 11, it will display "Other" in black.

Previously, I said that the second section of the Custom Number format is for negative numbers. But there is an exception, as in this example. When the first section is conditional (as it is here because it only applies to numbers bigger than 14) then the second section formats other numbers, whether positive or negative. Here the second section ([Red][<10]"ALERT";) is also conditional. So then the third section applies. In this case, if the number in the cell is between ten and 14, then the word "Other" prints, using the default formatting

for the cell. The only problem here is that Dr Tavares says that there are many parameters in his actual workbook. Other readers may also like to have Excel automatically change the font of a warning word, or the background colour of its cell.

So, for those who need it, I'm providing a macro in VBA for Excel on the cover CD in the workbook file, ChangeColour.xls. See also Fig 1 (page 272). In this instance, the word to be emphasised is decided on the worksheet by an IF function, like this one:

```
=IF(C15<10, "ALERT", IF(C15>=14, "OK",
"Other"))
```

There is a button on the worksheet which runs a macro called Changing( ). This specifies a range, although you could use a Name, and the macro runs through that range looking for words which the IF statement has entered. With a macro, you can have as many keywords to look for as you like. It then uses the IF THEN WITH statement to abbreviate font references.

The ColorIndex statement refers to the standard Excel palette box. If you count colours from left to right, and top to bottom, you'll find that 2 is white, 3 is red, 5 is blue and 27 is an off-yellow. So looking at the listing, you'll see the word OK will appear in white on blue and the word ALERT will be red on off-yellow.

ALERT is in Arial Black Bold Italic. OK is in Roman (not italic). You have to include the instruction

```
Italic.False
```

for the word OK because after the macro has run, the font will be set to italic by the instruction,

```
.FontStyle = "Bold Italic"
```

for the word ALERT.

EXCELlent shortcuts and longshots

1. Worksheets saved in the MSOFFICE\TEMPLATES folder will behave like an XLT file and open as a copy, without having to be saved as a template file.
2. Many useful macros, which you can copy into your workbooks, can be found in the SAMPLES.XLS file located in the MSOFFICE\EXCEL\EXAMPLES folder. They include error trappers and default resetters.
3. You can copy colour palettes between workbooks: open the workbook with the colour palette you want. Switch to the workbook to which you want to copy the colour palette. Choose Tools, Options, Colour tab. In the Copy Colours From box, select the workbook that contains the colour palette you want to copy.
4. Right-click the mouse on the AutoSum feature in the Excel Status bar. Change Sum to Average, Count, Count numbers, or find the Max or Min of a selected range of cells.

Up and down the City road

Chris Pack emails: *"I often need to chart market prices, which involves a long series. Daily prices over two or more years can be some 500 plots. It would be nice to label the months along the x axis but calendar months are not evenly spaced and this seems to make them difficult for Excel to display. I have set a column for these labels, but with so many plots Excel appears to be reserving space for the blanks."* Chris then described all the tricks he's tried, and ended *"…The whole hit-and-miss process seems so time-consuming. I feel sure there must be a*

Fig 2 You can format the labelling for axes of an Excel chart on the data source worksheet

Fig 1 Macro — a few colourful words

```
Function Changing()
  Dim Cell As Range
    Worksheets("Test Sheet").Select
  For Each Cell In Range("D2:D16")
    If Cell.Value = "OK" Then
     With Cell.Font
  .Name = "Arial Black"
  .Bold = True
    .Italic = False
  .Size = 10
    .ColorIndex = 2
  Cell.Interior.ColorIndex = 5
     End With
     End If
  If Cell.Value = "ALERT" Then
   With Cell.Font
    .Name = "Arial Black"
     .Size = 10
   .FontStyle = "Bold Italic"
    .ColorIndex = 3
  Cell.Interior.ColorIndex = 27
       End With
       End If
    Next
 End Function
```

Fig 1 A macro, started with the button, changes the font and background colours for key words
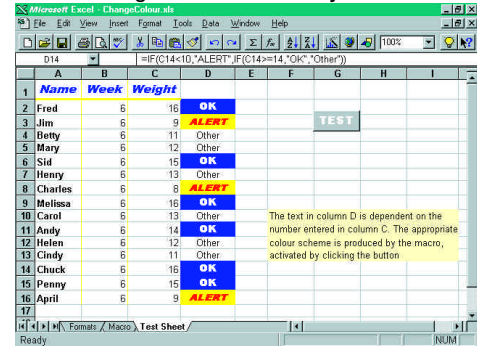

simpler way of formatting such X axis labels. Any suggestions?"

Fig 2 shows a part of one of these charts. It covers just under a year with 233 quoted prices from 18th September 1995 to the following 15th August. Column A just has a list of dates. The adjacent column has the relevant prices. In the worksheet Chris sent me, he had an extra column between the dates and the prices where he had entered the names of the months.

I returned Chris's workbook with an alternative worksheet and chart. First, I eliminated the extra column. Column A still has all the dates but I used the Custom date format mmm. Column B has all the prices. I let the chart wizard make a new chart. Then I opened the Format Axis dialogue box, for the x axis. In the Scale section of this box you can choose individually the "No. of categories between Tick-Marks" and the "No. of categories between Tick-Mark labels". I experimented with different numbers until there was just one label and one tick mark for each month (as in Fig 2). The number happened to be 21, which is probably the average number of trading days each month. I

accepted the defaults for the other four options in this useful box . So now, as required, the x axis is labelled only with the name of each month.

Playing footsie

In my October issue column last year, I encouraged readers to write to me with their experiences of downloading information into spreadsheets and how they used spreadsheets to aid with investments. So I was glad to conduct the above exchange with Chris, as well as to receive an email from Keith Bladon, who downloads share prices via a Teletext card and a package called Updata Teleshares. He uses Excel to analyse the FTSE 100 index. He looks at a 201-day centred average of the FTSE within a channel plus and minus 150.

Investors who use technical analysis, agreeing with Shakespeare that past is prologue, look at historical results. This is opposed to fundamental analysts who keep abreast of things like new products and management changes. Within these two major approaches are multitudes of different theories, often based on the expectations of various cycles.

Keith is a 201-day man. His 1,700-row datasheet records the FTSE for every trading day from 1st January, 1990 to 28th August, 1996. Additional columns make calculations based on percentages and other statistical changes. Another sheet in

the workbook file he attached for me has a graph of these results. And then there is a long VBA macro.

His problem is: *"When I want to look at different periods of time, adjusting the graph's normal facilities is time consuming."* After entering a start and end date, the macro finds the correct cell references and then amends the graph properties.

Keith's question is: *"Because I am using Active-Sheet, the display jumps to the various parts of the graph. I have tried to access the graph's properties without using Active.Properties but have been unable to do this. Is there a way?"*

The objects in Excel spread out much like a tree, going from the trunk to the boughs, to the branches, to the twigs. There is an established hierarchy of the 128 programmable data objects in Excel 5 and the 162 objects in Excel 7. You tie them together using Visual Basic for Applications (VBA), Excel's programming language. A full hierarchical path might read like this:

`Application.Workbooks(1).Worksheets(1).Range("A1").Value = 1`

It is not always necessary to detail the entire object path when setting a property, or calling a method, on a particular object. It depends on the context. To start with, Application refers to Excel, so if you're in Excel you don't need to reference the Application object. But although defaults can often obviate entering any step in a macro, Excel can't get from here to there without traversing the steps between.

However, you don't have to watch all the changes taking place to the objects in

your chart, one by one. Do you recall how, in the old days, we used to avoid seeing DOS batch files running on the screen by using ECHO OFF and ECHO ON? There is an equivalent command in VBA. Near the top of your macro just insert:

`Application.ScreenUpdating = False`

Your macro will run but the results won't display until it's finished and then they will all show at once.

Inspired by Keith's efforts, I wrote the small Excel 7 application, "Bulls 'n' Bears", which is on this month's cover-mounted CD. But it deploys little VBA. The eight charts it includes were made using Excel's charting wizard.

Something in the City

Probably the best news for those interested in the stock market is that Microsoft is in the process of localising Microsoft Investor 2.0 for the UK market. You can view this comprehensive product at www.investor.msn.com. It includes a number of related tools.

The Portfolio Manager helps users to create and track multiple stock portfolios. It recognises stock splits and multiple purchase dates and tracks commissions. You can change columns with right-click menus, or double-click columns to "AutoFit" them, just like in Excel. It offers automatic notification when there is news on any stock in your portfolio.

For those into technical analysis, Investor 2.0 supplies historical charts, for any time period, on every listed stock. They can be overlaid with market indices or compared with other securities and downloaded (Fig 3). The product also provides business and financial news from MSNBC, PR Newswire and Business Wire for fundamental analysts.

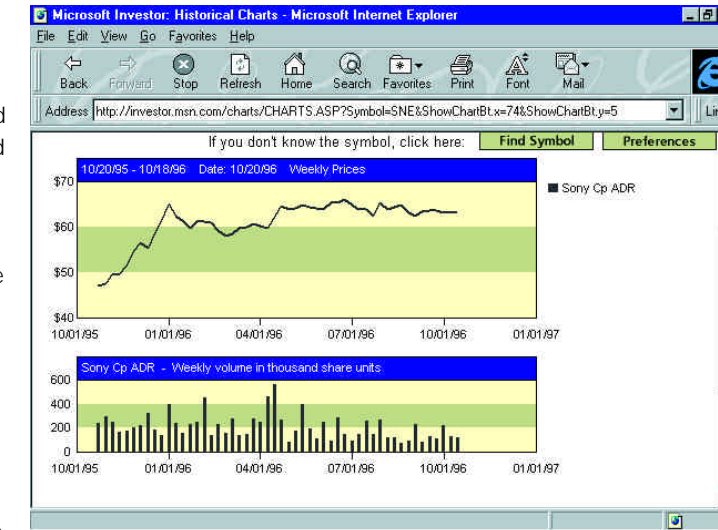The Market Summary feature provides up-to-the-minute information on the leading

Fig 3 Using Microsoft Investor 2.0, you can download historical data on any listed US stock

US and foreign markets and currency rates and displays top-ten lists with the market's best and worst performers. Users can look up prices for specific securities by ticker symbol, company name or fund name.

Although Microsoft stresses the integration of Investor 2.0 with Microsoft Money, much of the data can be just as easily imported into Excel. Roll on the day when Investor 2.0 shows the FTSE 100 and other UK listed stocks.

I think we should be told

You may recall the discussion in past columns about calculating the years and fully-completed calendar months between any two dates. It appeared to be easier to find the required solution in Lotus 1-2-3, using the @DATEDIF function, as Excel doesn't offer an equivalent.

But now comes an email from Paul Bloomfield who points out that although it's not listed in the Function Wizard, nor mentioned in the documentation, Excel will indeed accept and correctly use a DATEDIF function — I tried it and he's right. The only possible reason I can think of for this is that Excel is always keen to be able to import 1-2-3 files and so makes allowances.

On our cover CD-ROM…

■ A small stock-charting application which will run under Excel 7 or above. It displays charts of FTSE 100 closing daily prices for seven years.
■ A shareware program, downloaded from the Excel web page, called Portfolio. The file, Portfo.xlw, will run under Excel 4 or above. A description is in the file Manual.rtf. The program is designed to help you keep track of daily stock quotes that you have downloaded in CSV, WKS or DOS TXT formats. It includes a simple graphing facility. Everything is US-orientated so you would have to adapt it for UK use.
■ The macro illustrated in Fig 1, and examples of elaborate Custom Number formats, are in the file ChangeColour.xls.

•PCW Contacts

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Microsoft Investor 2.0: www.investor.msn.com

Making the **distinction**

Mark Whitehorn on the peculiarities of DISTINCTROW in Access. Plus, if you're developing a large application, see how code and components can be versatile and non-specific.

I've written this before, but it bears repeating. This column has evolved to a state where it is almost exclusively about Access. When I write about general issues (normalisation, SQL, and so on) I try to keep it as generic as possible but the fact remains that, essentially, all the questions I receive (far more than appear on the page) refer explicitly to Access.

There are probably two reasons. Either everyone who reads this column is using Access, or people who are using another RDBMS read the column and think "Huh. That's all about Access. No point in writing in about anything else."

I'm happy to accept any suggestions for the future direction of topics covered and platforms used. So if you want changes please let me know and minority interests can be represented.

Distinctly exact (or exactly DISTINCT)
In my series about SQL (*Hands On Workshop, PCW Oct'96-Jan'97*) I said that "the generic DISTINCT becomes DISTINCTROW in Microsoft's Access". By that I meant that if you build a query in Access using the GUI, then by default it will generate an SQL statement which starts:

```
SELECT DISTINCTROW….
```

In many cases this will return the same record set as an SQL statement which starts:

```
SELECT….
```

or even

```
SELECT DISTINCT….
```

The differences between SELECT and SELECT DISTINCT are explained in my workshop series on SQL, and since that was to do with generic SQL it didn't seem

to be the time or place to go into the peculiarities of DISTINCTROW. But this seems like an excellent place, so we will do so! In order to demonstrate this we need a couple of tables:

CLIENTS

ClientID	Name	Location
1	Fred	Wellington
2	Sally	Wimpy
3	Jean	Halifax
4	Fred	Lancaster

ORDERS

OrderNo	ClientID
1	1
2	4
3	4
4	4
5	3
6	3
7	3
8	1
9	1

Note that we have two clients called Fred and that Sally has yet to place an order with our company.

Both

```
SELECT Name
FROM CLIENTS;
```

and

```
SELECT DISTINCTROW Name
FROM CLIENTS;
```

return four records:

Name
Fred
Sally
Jean
Fred

whereas

```
SELECT DISTINCT Name
```

```
FROM CLIENTS;
```

returns

Name
Fred
Jean
Sally

DISTINCT (as explained in my SQL Workshop) forces SQL to remove the duplicates in the answer table.

In this case (and in all cases where a single table is queried) there is no difference between SELECT and SELECT DISTINCTROW. However, if we bring two tables into the query, the two forms can be distinguished.

```
SELECT Name
FROM CLIENTS INNER JOIN ORDERS
ON CLIENTS.ClientID =
ORDERS.ClientID;
```

returns:

Name
Fred
Fred
Fred
Fred
Jean
Jean
Jean
Fred
Fred

which is one record for each order in the ORDERS table because the join between the tables has essentially generated nine records, of which we have asked to see only the name of the customer. By contrast,

```
SELECT DISTINCT Name
FROM CLIENTS INNER JOIN ORDERS
ON CLIENTS.ClientID =
ORDERS.ClientID;
```

returns only two records:

Name
Fred
Jean

The SELECT statement on its own returns nine records, then the DISTINCT part removes the duplicates.

The "problem" with this answer table is that it implies that there are only two people placing orders, whereas we know it is three because there are two people called Fred. If we expand the SQL statement to include the location field,

Fig 1 (above) The names used for the button-caption example

Fig 2 (left) The query called Find, as both GUI and SQL

```
SELECT DISTINCT Name, Location
FROM CLIENTS INNER JOIN ORDERS ON
CLIENTS.ClientID = ORDERS.ClientID;
```

then we get:

Name	Location
Fred	Lancaster
Fred	Wellington
Jean	Halifax

DISTINCT is very literal; it returns unique records in the answer table, whether or not they come from unique records in the original table.

I used the term "problem" above, but of course this is only a problem if you don't know what DISTINCT is supposed to do. In fact, DISTINCT is doing exactly what it was designed to do.

My guess is that Microsoft felt that naïve users of a database might not appreciate this level of subtlety. If they saw a single name in an answer table, they would expect that it represented a single person. So the default in Access was set to DISTINCTROW which in this case, as you will by now have guessed, produces a separate record in the answer table for each unique customer who has placed an order.

Thus:

Fig 3 The form called PickName and the associated function which calls the query called Find

```
SELECT DISTINCTROW Name
FROM CLIENTS INNER JOIN ORDERS
ON CLIENTS.ClientID =
ORDERS.ClientID;
```

returns

Name
Fred
Jean
Fred

By the way, these tables and queries are

all on our cover-mounted disc as DISTINCT.MDB.

■ I'll leave you with this brainteaser: *If you include the primary key value from CUSTOMERS in all of these queries, does the difference between SELECT DISTINCT and SELECT DISTINCTROW disappear?* As they say in all the best text books, explain your answer!

Hundreds and thousands
Reader, Glenn Rowe, recently contacted me with an interesting database problem: "*I'm developing an application which stores data about many countries. The data is stored in a table, one field of which stores the country code (GB for Great Britain… and so on). The interface will contain many buttons; one for each country. Each button will have the country code as it's caption and, when pressed, will return the records for that country. (These are, of course, arranged hierarchically on many forms, not all on one!)*

The problem, as far as I can see, is that I'm going to need hundreds/thousands of queries and as many snippets of code. Building it will be a nightmare, as will debugging and maintenance. Surely this process can be centralised in some way?"

The question is a good general one

Fig 4 The answer table which appears when the button labelled Penguin is pressed

Fig 5 Cloning the button

about the way in which code and components can be versatile and non-specific. The obvious solution, at first, is to try to pass the button's caption to the query as a parameter.

As far as I know (and I stand to be corrected) this cannot be done. However, we can achieve exactly the same result by building a query which snatches the caption from the button which has just been pressed. In other words, you can't attach a piece of code to the OnClick event property of a button which says "Run a query and pass to it the caption of this button". Instead, you get the button to run a query and get the query to locate the caption of the button which has just been pressed.

In order to do this, we can make use of an object called "Screen" and one of its properties, "ActiveControl". These are defined in the manual thus: the Screen object refers to a particular Microsoft Access form, report, or control; the ActiveControl Property is used to refer to the control that has the focus. Or, to put that another way, Screen.ActiveControl always points to the control which has the focus.

Now consider a button on a form; if you press it, that button, by definition, has the focus. If the button runs a query which has Screen.ActiveControl.Caption as its criterion, then Property will return the caption of the button.

The beauty of this scheme is that when you design the query, you don't have to know which button is going to be pressed. You don't even need to know which form the button will be on. As long as the button calls up the query when it is pressed, the query will seek out the button, read its caption, and use that caption as a criterion.

To demonstrate this, I have used people rather than countries. This choice simply reflects the fact that I don't know enough country codes to fill even a sample table.

The table shown in the screenshot Fig 1 contains names of some individuals and the food they like to eat. The query called Find (Fig 2) has, in the criteria line:

`[Screen].[ActiveControl].[Caption]`

The form called PickName (Fig 3) has a single button with the caption "Penguin". The OnClick property of this button is set to

`=GetButtonCaption ()`

which is the name of a function. The

Round and round we go

In the November issue, I published the following correspondence from Paul le Glassick:

"…Incidentally, to get around the lack of an =Round equivalent, I use the Format$ function. This converts numbers to text, but rounds properly as we know it. With a representative sample of nearly 3,000 records, the following nesting of functions gave correct rounding when calculating VAT:

```
RoundNo = Val(Format$(CCur(Number), "0.00"))
```

where RoundNo is the result and Number is the number or calculation to be rounded."

Paul wanted to know if there was a better way. Simon Hawkins suggested:

```
RoundNo = int (( Number * 100) +1) /100
```

"Whether this is a faster method than using the Format function, described in the article, I am not sure. Also, the above may need altering to deal with negative amounts. Hope this is of some use."

This has the great advantage of elegance. However, when I tested it in the form

```
Function Simon (Number) As Integer
   Simon = Int((Number * 100) + 1) / 100
End Function
```

it returned 1 from 1.49 (which seems right), but 2 from 1.4999 (which seems wrong), and then 2 from 2.49999 (which seems right), and even 2 from 2.499999999 (which is still right, but conflicts oddly with the result from 1.4999!). In other words, it is slightly inconsistent. Or maybe it's my 486 processor. In the form:

```
Function Simon2 (Number) As Double
    Simon2 = Int((Number * 100) + 1) / 100
End Function
```

it returns 1.51 when given 1.5 (which seems wrong).

This reply came from James Talbut: *"I don't like converting things to and from strings. There is an operator in VB that appears to round correctly, and that is the ' \' operator (integer division). Making use of this in a function is simple:*

```
Function Round(dNumber As Double, iNumDigits As Integer) As Double
Dim dFactor As Double
   dFactor = 10 ^ iNumDigits
   Round = ((dNumber * dFactor) \ 1) / dFactor
End Function
```

"This function is simple, quick, and produces the same results as the version using Format$ that you published. Interestingly it gives a different result to that of the ROUND function in Excel. For some reason Round(2.15, 1) does not give 2.2 (as it would in Excel), it gives 2.1 as does the formula you published."

All of these suggestions work, up to a point, but none are perfect (see the form called "Rounding" in Fig 6). So the plot thickens. Anyone got any further thoughts?

By the way, just as we were going to press, Simon came back with: *"OK. Classic case of using my memory instead of looking the code up (and testing it!). The function should read*

Fig 6 The rounding functions in operation. Note the purely fortuitous grouping of biblical names!

```
TxtOutput =
Int((TxtInput *
100) + .5) / 100
```

"This will round to two decimal places. Sorry about the earlier confusion."

function, also shown in Fig 3, is composed of a single line which simply calls the query.

So, the steps are simple: when you press the button, the function is called; the function runs the query; the query looks for the active control (which is the button), captures its caption, and uses that caption as a criterion. The result is the answer table shown in Fig 4.

To keep it short and sweet, there is no error trapping in the demonstration code. It is also rather crude. For example, unless you close the query, pressing a different button won't re-query the table. However, all of this can be cured by expanding the code in the function from its current, rather minimalistic, one line.

Having answered that question, I realised that, essentially, the solution relied on the fact that the function could be called as soon as the button was pressed. This meant that the solution couldn't be applied to a situation where several selections needed to be made. I know there are manifold ways of handling multiple selections and that combo boxes are often the best solution, but I was intrigued to see if an economical solution (in terms of code and number of queries) could be found while retaining the button-caption-snatching idea.

The form MultipleSelections shows this in operation. A little of the elegant simplicity of the earlier solution is lost but much can be retained. Each button runs a function which places the button's caption in the text box above it. This text box is explicitly named in the function, so each button can be cloned vertically but each separate column of buttons is calling a separate function. Thus, if we made ten selections, we would need ten functions. However, by using Screen.ActiveForm (a close relative of Screen.ActiveControl) in the functions, a degree of flexibility has been retained so that forms which are cloned from this one should also work, as long as the same names are used for the text boxes.

The "Go" button fires a query called (rather imaginatively, I feel) "Find2". The query looks at the text boxes in the form, takes the values from there and runs the query. By using Screen.ActiveForm this query should be versatile enough to work with different forms.

●PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column at **database@pcw.vnu.co.uk**

Not numerology but **numeralogy**!

There's a world of difference between the o and the a, as Mike Mudge explains.

Numerology is variously defined as the study of numbers as supposed to show future events or the relationship between numbers and the occult. However, the term *numeralogy*, supplied by P Castini of Arizona, USA, is defined (by him) as "Properties of the Numbers": his proposal for a Numbers Count column includes some 37 sequences each with a rule of generation and some associated queries for investigation.

There follows a (random?) sample of these. Others may be included at a later date depending on the popularity of such research areas.

The **PROBLEM CAS. (n).** is the same in every case, *viz.* implement a computer algorithm to generate the defined sequence and hence, or otherwise, investigate the associated queries.

S(1). Non-arithmetic Progression. General definition: If m_1 & m_2 are the first two terms of the sequence, then m_k for k greater than 2 is the smaller number such that no 3-term arithmetic progression is in the sequence, i.e. we do not find

$$m_p - m_q = m_q - m_r$$

for distinct p,q & r.
e.g. if

m1= 1 & m2 = 2

we generate

1, 2, 4, 5, 10, 11, 13, 14, 28, 29, 31, . . .

Generalised S(1) Same initial conditions, but no t-term arithmetic progression in the sequence for t greater than 3.

Query How does the density of such a sequence, i.e. the fraction of the integers less than N which it contains, vary with N, (m_1,m_2) & t?

S(2). Prime-product sequence Here T_n is one greater than the product of the first n primes with the proviso that $T_1=2$. Sequence begins

2, 7, 31, 211, 2311, 30031. . .

since 2*3*7*11*13+1 = 30031.

Query How many members of this sequence are prime numbers?

S(3). Square-product sequence As S(2) above with primes replaced by squares, viz.

2, 5, 37, 577, 14401, 518401, ...

since

$$1^2*2^2*3^2*4^2*5^2*6^2 + 1 = 518401$$

Query How many members of this sequence are prime numbers?

Generalised S (3) Replace squares by cubes, fourth powers, etc. and investigate the same query. May also be generalised using the products of the factorial numbers

1, 2, 6, 24, 120, 720. . . .

Now let (T_n) be a sequence defined by a property P and screen this sequence, selecting only those terms whose individual digits hold the property P to obtain the S. P-digital subsequence. e.g. the S. square-digital subsequence

0, 1, 4, 9, 49, 100, 144, . .

is obtained from

0, 1, 4, 9, 16, 25, 36, 49, . .

by selecting the terms whose digits are all perfect squares — only 0,1,4 & 9 allowed.

Numbers Count, June 1996

"Sequence of events", Descriptive Number Sequences Part (1), *PCW* June 1996, proved very popular. It is intended to review at length the two parts of this topic in the next issue. Suffice it to announce the prizewinner as Jean Flower of The Mathematics Centre, Chichester IHE, Upper Bognor Road, Bognor Regis, West Sussex PO21 1HR, who used Mathematica on a Pentium 120 and (eventually) was able to find all cycles of length less than 17, with a greater than 1 and n greater than 13. All of this was accompished in about five minutes of processor time and was accompanied by a fascinating alphabetic version of the same problem. Consider the sequence of sentences. "This sentence contains three hundred and seventeen occurences of the letter 'e'", the next term being a sentence which decribes the previous one etc. What about carrying this analysis on a computer?

More to come on this topic.

Similarly for the S. cube-digital subsequence and higher powers.

S (4). Consider the S. prime-digital subsequence

2, 3, 5, 7, 37, 53, 73, . .

Query Is this sequence infinite?

S (5). The S. odd sequence

1, 13, 135, 1357, 13579, 1357911, . . .

Query How many terms are prime?

S (6). The S. even sequence

2, 24, 246, 2468, 246810, . .

Query How many terms are the nth powers of a positive integer?

S (7) The S. prime sequence

2, 23, 235, 2357, 235711, . . .

Query How many terms are prime?

For further study of S(4) through (7) see: Sylvester Smith, *Bulletin of Pure and Applied Sciences*, vol. 15. E (no. 1) 1996. pp101-107. A set of conjectures on Smarandache* Sequences.

All the sequences discussed this month have appeared in print under Smarandache Notions.

For further information on this area of work see Smarandache Notions Journal, vol. 7 no. 1-2-3, August 1996. ISSN 1084-2810. Department of Mathematics, University of Craiova, Romania.

Something totally different

Eric Adler has drawn my attention to the approximate sizes of elements in the Mathematica 3.0 Software Package where "Front end etc. 6.0Mb, Kernel etc. 18,5Mb, MathLink Libraries 0.5Mb and Fonts 4.5Mb total 27.5Mb whilst Standard Add-on Packages at 9.0Mb together with The Mathematica Book of 36Mb, Listing of Built-In Functions at 5.5Mb, Standard Add-on Packages occupying 11.0Mb and Additional Documentation of 15.0Mb (the latter four items totalling 66Mb) yield 74.5Mb. The total size of storage (again approximate) is quoted as 96Mb whilst strict addition yields 106.0Mb."

Eric asks: "How do they get that?" and offers ten IBM format 3.5in 1.44Mb disks as first prize, with 40 IBM-format 3.5in 1.44Mb floppy disks with UBASIC as runners-up prizes. Facetious answers such as "They used a Microsoft Calculator" or "They are measuring using Microsoft Drive Space" will not be eligible for the first prize!

Stop press!

Would Duncan Moore please let me have his address as I have some information for him. Sorry, Duncan, for the inefficiency of my filing system!

Following on from the study of "Golomb rulers" in the August 1996 issue of *PCW,* at least one reader has expressed an interest in the "Circular Golomb Ruler". Here, the problem is essentially the same except that the points are spaced around the circumference of a circle and distances measured along the circumference also. Apparently solutions are known for some n (maximum distance to be measured); it is further known that for certain n, no solution is possible. What happens if the distance is measured in a straight line!?

Any investigations of this month's queries may be sent to Mike Mudge, 22 Gors Fach, Pwll-Trap, St Clears, Carmarthenshire SA33 4AQ, tel. 01994 231121, to arrive by 1st May 1997. All material received will be judged using suitable criteria and a prize will be awarded by *PCW* to the best entry (SAE for return of entries, please).

●PCW Contributions Welcome

Mike Mudge welcomes correspondence from readers 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. Email him at **numbers@pcw.vnu.co.uk**
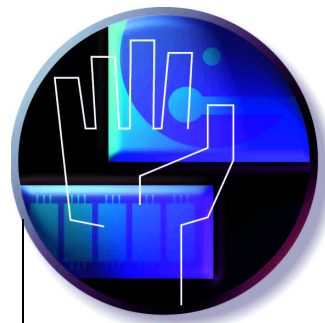
Printer potential

Look at your printer: it's working, right, and it does just the job you want? Maybe; but it could do better. Why not upgrade it? Roger Gann explains how.

The humble printer is arguably the most important computer peripheral you can buy, perhaps second only to the PC itself. Printers have traditionally tended to be fixed-function devices, capable of performing the actions they were designed to and nothing else, and largely incapable of being upgraded. If you had a daisywheel printer (remember them?) you could change the daisywheel or add a cut-sheet feeder, but that was about it. Things weren't much better for dot-matrix printers, either.

Expansion potential increased with the advent of laser printers. Many had at least one slot for a font cartridge, a slot for additional memory or perhaps an interface to the printer's "video" engine. It was now possible to upgrade your printer. Today, most laser printers are built with expansion in mind and feature things like SIMM slots, MIO ports for network interface cards, font card slots and comprehensive paper-handling options. Upgrade options for inkjet printers are less extensive, however. Nevertheless, it's surprising just how far you can upgrade a printer. But why would you want to?

There are several reasons. First in line is cost — it can be cheaper than buying a new replacement printer if all you're missing is a feature that an add-on can provide. And add-ons protect your investment in a printer: you only have to pay for the features you wish to add. You might think it doesn't make economic sense to upgrade an old laser printer, but printers like the LaserJet II and III were built like tanks and even today still have plenty of life left in them.

Printer upgrades neatly fall in to two categories, hardware and software.

Hardware

Memory
Laser printers, or more accurately, page printers, hold a whole page of data in memory before printing it. The amount of installed memory isn't too important when it comes to printing text but it's crucial if you want to print graphics: a 300dpi printer needs a full megabyte of memory to print an A4-sized image. The move to higher resolutions, to 600dpi, actually quadruples the memory requirement, but the application of memory compression technology has kept the amount of RAM required to just a couple of megabytes. Even so, putting in extra RAM will always help when it comes to printing complex graphics, especially if PostScript is involved.

In the past, extra printer memory took the form of expensive proprietary custom memory cards, but most current printers take standard SIMMs so adding more RAM needn't be too painful, especially as

memory is still relatively cheap. Don't forget that if you have a GDI printer you can add more memory to the host PC to improve printing performance, with the benefit that it goes into the PC's general memory "pool".

Some printers, such as the EcoSys range from Kyocera and the LaserJet 5, can take flash memory as well. This special kind of memory is used to semi-pemanently store downloaded print images, e.g. forms or letter headings. Every time you wanted to print a letter you could send a code to the printer to print the scanned-in header first. This way you'd print on plain paper and so wouldn't have to keep stocks of specially-printed headed paper: you'd never run short either. More importantly, it would mean that you could dispense with the need for a second paper tray to hold the headed paper.

Paper handling
It's highly likely that, regardless of what printer you've got, additional paper handling add-ons are available for it, so that you can use different sorts or sizes of paper with

Enhancing your parallel port

This is one of the few printer hardware upgrades that you fit in your PC. I'm not talking about any sort of printer port, I'm talking about the very latest bi-directional (bi-di) parallel port. This is available in several flavours, sometimes called an Enhanced Parallel Port (EPP) or Extended Capabilities Port (ECP). Either way, a "bi-di" parallel port enables a two-way conversation between your PC and the printer, allowing the printer to pass status messages back to the PC, vital things

like "Paper Jam" or "Low toner". These "8-bit" parallel ports are faster than the standard 4-bit parallel port fitted to most PCs, and if you have a GDI printer you'll appreciate a faster parallel port. So, if your printer has a "bi-di" port, it makes sense for the PC to have one as well. The best one I've come across is a VL-Bus multi I/O combo card with an IDE interface plus fast serial ports. Price £29 from Dabs Direct ((0800) 558866) but check the ads in *PCW* for other deals.

Updated printer drivers

The Windows printer drivers that shipped with your printer have most probably been superseded, the ones that came with Windows almost definitely have. Getting the latest driver means you'll be using a less buggy (hopefully!) version that's probably a bit faster and possibly with more controls or features. You can check the version number by opening Printers in the Control Panel, clicking on Setup and then clicking on the "About..." button. The best way to get the latest drivers is to download them from bulletin boards such as CIX, CompuServe or over the internet, from the manufacturer's web site. For example, the latest PostScript driver, v4.1, is available from the Adobe Systems web site at www.adobe.com and this has numerous extra features compared to the plain vanilla Win95 version written by Microsoft. You can also download the latest PPD and INF files for your PostScript printer to ensure it's correctly installed.

your printer. Take the dot-matrix printer — printing sticky labels can be a risky proposition with a push tractor feed that many dot-matrix printers have as standard. Many allow the fitting of a pull-tractor feed specifically for this task. Or you might want to do a lot of mail merges so you need a cut-sheet feeder instead, something a little more advanced than that rudimentary cut-sheet tray that came as standard with the printer.

Most laser printers are now designed with add-on paper tray "stacking" in mind and so can take a second paper tray that fits to the underside of the printer. Fitting a second paper tray allows you to put your letter-heading in one tray and your continuation sheets in the other. Or, if the printer is a busy one, being shared on a network, the second tray can be used to expand the printer's overall paper capacity : such trays typically have a 250-sheet capacity. Some inkjet printers even have a second paper tray option. Most are a doddle to fit — the printer just sits on the second paper tray and once you've made a few changes to the configuration via the front panel or through the printer driver, you're away.

Colour
You may not be able to upgrade your laser printer to colour (though the NEC SuperScript 610/660 can do spot colour) but both inkjet and dot-matrix printers can commonly be upgraded from mono. By far the easiest to convert are inkjet printers: providing they are "colour ready", all you do is remove the black ink cartridge and replace it with a snap-in tri-colour cartridge. You then specify "colour" in the printer

driver (or install a colour driver) and, hey presto, you've got colour, for about £25 or less. If only all upgrades were this simple.
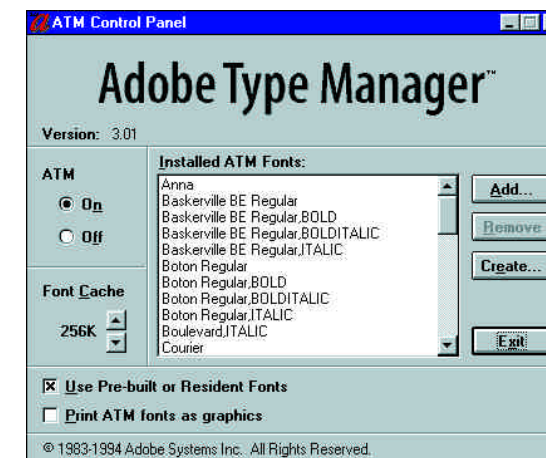
The ATM Control Panel. The create panel allows you to make customised versions of Adobe Multiple Master fonts

Font cartridges
One of the original printer upgrades was to increase its stock of internal fonts. This took the form of a cartridge or card that you plugged into a special socket on the printer.

Expanding the number of internal fonts might not seem relevant to Windows users; after all, scaleable TrueType fonts are a dime a dozen these days. But there's still a compelling reason not to turn your back on resident fonts — speed. When a font resides in the printer, not only is there no time wasted downloading soft fonts, but the print time is also quicker. If you have to do a lot of printing in the same font, then you should consider making that font a permanent, resident printer font.

Pacific Data Products produces one of the best known font cartridges, the 25 in One. This cartridge contains 172 fonts and is available for the II, III and 4 Series printers, plus IBM and Epson laser printers. It's also available as a SIMM for the LaserJet 5.

PostScript upgrades

The ultimate font upgrade has to be the one that installs PostScript on your laser printer as these typically also install the basic "family" of 35 PostScript fonts. You get the exacting typographical accuracy of PostScript , too.

Installation is simple: you just plug in the PostScript cartridge (or SIMM in the case of the LaserJet 4 and 5) to get instant, high-quality PostScript fonts. This is undeniably simple, but there's a price to be paid as most genuine PostScript printers have relatively powerful processors, something lacking in older LaserJets, and this can make for slow printing. You may need to top up printer memory, too. Expect to pay about £200 to £250 for a PostScript upgrade, from Hewlett-Packard. Pacific Data has the PacificPage Level 2, a PostScript Level 2 language emulation SIMM module for the LaserJet 4 and 4 Plus printers.

Pacific Data Products also sells a range of plug-in accelerator cards, designed to speed up sluggish print performance in a LaserJet fitted with a PostScript cartridge. There are two versions: the PacificPage

IIXL, for the LaserJet II, which consists of the PostScript cartridge plus an accelerator board; and the PacificPage PE/XL, which is for the LaserJet IIP, IIP Plus, III, IIID and IIIP.
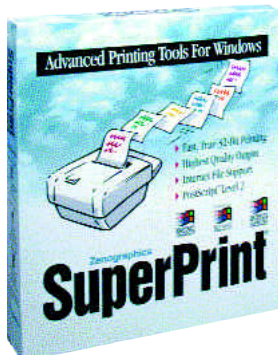
Software upgrades

The software driver plays a significant part in the printing process, having a major influence on both speed and print quality. The drivers that come with Windows are pretty good but, as ever, there's always room for improvement, either adding features that don't exist or doing existing tasks better.

Perhaps the simplest printer enhancement you can buy is to add extra TrueType fonts to your Windows installation — these are available from Microsoft, Monotype, Bitstream.

More sophisticated upgrades fall into two categories — accelerators and print enhancements.

Adobe Type Manager

Adobe Type Manager (ATM) predates TrueType and was the original scalable font manager for Windows. For most Windows users, it carries out much the same function as TrueType — it allows a printer font to be accurately displayed on-screen at all point sizes, thus removing the need for a raft of separate fixed-point screen and printer fonts. ATM also lets you use superior PostScript soft fonts with a non-PostScript printer, and its Multiple Master fonts feature is useful if you want to fine-tune the appearance of a font. However, much of ATM's thunder was stolen by TrueType which has the redeeming virtue of costing zilch. As a result, only those that really need to use genuine PostScript fonts will fork out £30 for ATM, i.e. those submitting work to a print bureau or typesetter.

SuperPrint 4.0

SuperPrint's job is simple — it speeds up Windows printing, especially colour printing, which has always been a relatively slow process. It does this by using highly-optimised 32-bit printer drivers and sending the data to the printer in a special compressed "metafile" format. It comes complete with "SuperDrivers" for Windows 3.1x, 95, and NT 3.51, with controls for sharpness, contrast, lightness, saturation, dot gain and hue matching. Like ATM, it allows you to turn your non-PostScript printers into PostScript devices, but this time for graphics as well.

While you can get speed gains when used in conjunction with low-end colour printers, I guess that the true benefits of SuperPrint only become apparent when used in conjunction with high-end output devices where fine control of the output print quality is important. You will need a fairly well specified PC in order to run SuperPrint; basically, the more RAM you have the better, and I'd start at 16Mb. This amount allows its "SuperRIP" to perform full-frame rasterisation of the entire image to be "printed" in RAM; with lesser amounts of RAM it has to break down the image into bands, which is of course slower.

SuperPrint's comprehensive colour correction options
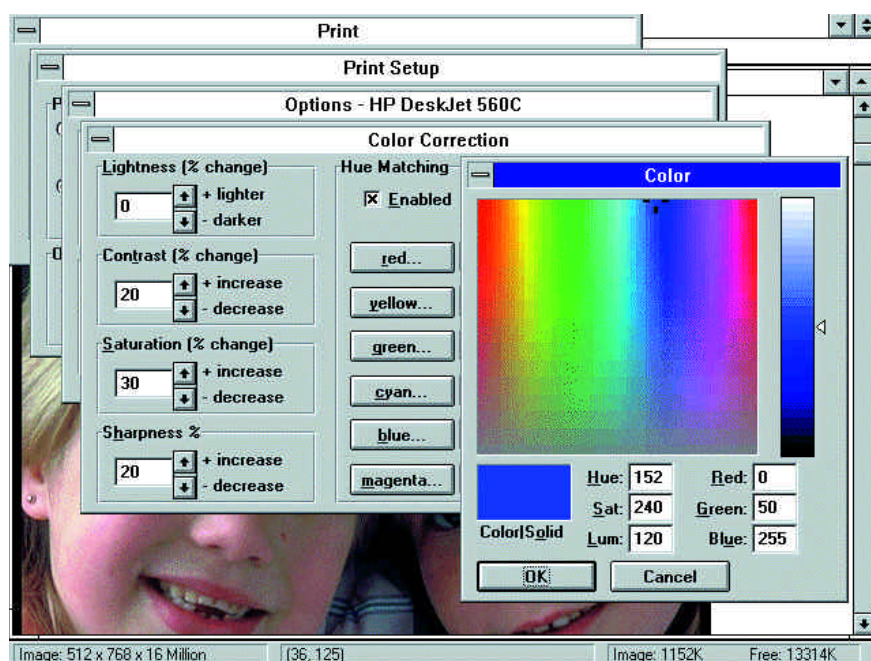
Out of this **world**

The virtual world is huge, and getting better all the time. Benjamin Woolley dons his avatar and goes on tour to produce a rough guide to strange lands.

I know the web is supposed to be a revolutionary new medium, different from all its predecessors, being interactive, using multimedia and all that. But when you think about it, most of the information you get is not so radically different to what you glean from print and TV media: flat pages of illustrated text that look like magazine pages, combinations of sounds, text and video that could pass for designer news bulletins. There is, however, one "media type" the internet can deliver which is really novel: the shared virtual world. By this, I mean a computer-generated space that a number of people can access simultaneously across a network and inhabit via a virtual stand-in or "avatar".

Experimental versions of such worlds already exist: notably the WorldsAway game which you can access through CompuServe, and AlphaWorld from Worlds Inc., which is on the net at www.worlds.net.

WorldsAway is not really a shared "space", since the environment is generated not out of proper 3D models but 2D backdrops upon which avatars and objects are superimposed: AlphaWorlds, by contrast, is more like the authentic article, and one that has been quietly developing a substantial 3D presence since its public launch in October 1995. It was created by Worlds Inc., to showcase the company's interactive 3D technology which it has dubbed, picking up on Microsoft's flavour of the month, Active Worlds.

Last October, the company announced that it would begin shipping an Active Worlds Development Kit (to run on Sun, SGI and Windows NT platforms) so that third parties can create and publish shared spaces of their own.

AlphaWorld is impressive. You access it by downloading Worlds Inc's own client or browser program and "teleporting" to the AlphaWorld co-ordinates. The first time you enter, you are confronted with a void. Slowly, the world takes shape before your eyes, object by object, texture by texture, efficiently "streamed" down the line so you (or rather, your avatar) can begin to wander around (using the mouse or cursor keys) before all the data has been downloaded.

The world is huge and getting better: the full data set for all the models and textures probably runs into tens of megabytes. Thankfully, data is cached to your local hard drive so the more you access the world, the faster it appears on your screen.

Some of the first objects to appear are avatars, represented by virtual mannequins of various sizes, shapes, sexes, species and demeanours. Each one you see will be driven by another person who is sharing the space. They can see you, just as you can see them, and you can interact with them in much the same manner as a text-based MUD, through gestures or "speech" (typed text, displayed as a speech bubble above your head).

When you apply for "immigration" to AlphaWorld, you are given a standard avatar, but you can select another from a whole library of character types, each identified by a suggestive name. For instance: Butch, Helmut, or Shred (the surfer) which is a particularly popular choice, as you can tell from Fig 1; two Shreds are walking past me as I stand in the middle of AlphaWorld.

Another, perhaps more interesting, form of interaction possible in AlphaWorld is being able to shape the environment itself. You can build on any unused section of property by duplicating objects you find elsewhere in the world and dragging them
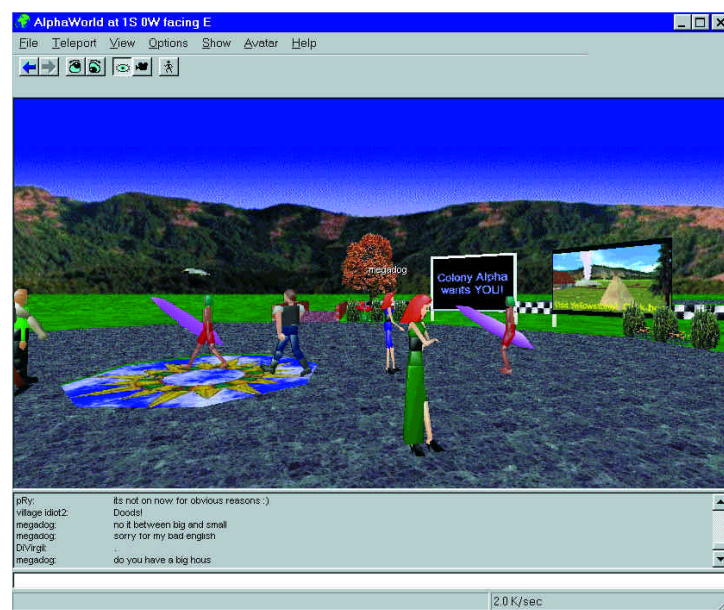

Fig 1
AlphaWorld's crowded central plaza

to your patch. You can alter some features of these objects (although not the basic geometry and look) and even give them behavioural characteristics. For example, your object could play a tune when someone bumps into it.

At the time of writing, a wide assortment of blue chip companies and other organisations were experimenting with Active Worlds technology and building their own spaces for people to explore. These include Visa which is designing a 3D online bank, Yellowstone National Park, and the Nokia phone company which is aiming to bring a little of the Scandinavian spirit to your screens.

One world which I considered to be particularly good was the Cyborg Nation (Fig 2). It was still under construction when I visited, and sparsely populated but given that what you see is being rendered in real time, I think it looks lovely. The sky and background are beautifully realised, and it is a delight to wander aimlessly around, awaiting some new object to spring up before you. I encountered the facade of a terraced house, a hovering metallic doughnut, a room with golden walls and a wireframe dome — it was rather like being in a Dadaist painting.

Although Active Worlds uses standard data file formats (such as RenderWare's RWX), which means third-party tools can be used to develop content, the system is proprietary. You will need the Development Kit to assemble worlds and publish them. This strategy has resulted in the steady evolution of an extremely effective product, but one that cannot rely for its future development on the same level of collaboration and competition as a technology relying on open standards. For that to happen, another approach is called for — one that is embodied in the new Living Worlds proposal.

Living Worlds

The idea behind Living Worlds is to use VRML 2.0 (see *Hands On 3D Graphics*, *PCW*, Dec'96) as the basis of a standard that allows the creation of the same type of shared virtual spaces which the Active Worlds technology already provides, but can be built, published and accessed using VRML-compliant tools and browsers.

Like HTML, VRML is totally public. Anyone can use it to create 3D objects and scenes that can be distributed across the web. Unfortunately, although it does allow
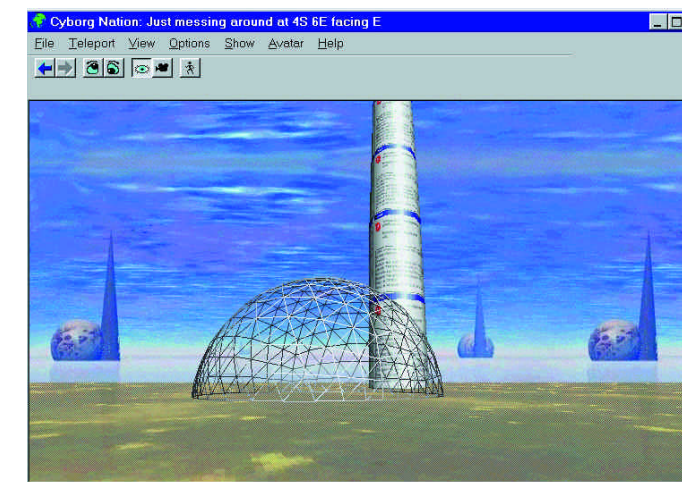
the building of avatars and interaction with virtual spaces, these mechanisms are not standardised in a way that ensures true "interoperability", to use the term adopted by the Living Worlds team (a consortium of representatives from Sony, Paragraph, Worlds Inc., and others).

To illustrate the problem, the team dreamt up a series of scenarios: suppose someone called Art is at "home", suggest the Living Worlds team (in other words their avatar, or virtual presence, is in a 3D model of a living room realised using VRML): Art has recently "redecorated" his room, and there is new artwork on the walls that is automatically updated each month from some sort of interior design server.

This scenario shows how even the simplest of virtual spaces can quickly blur the distinction between authoring and using, and can come to rely on a variety of different sources and developers which update it, dynamically.

The Living Worlds team then imagine Art has some virtual visitors called Betty and Chuck (very American). They knock on the door. He opens it, sees them and greets them. This is the first point when some of the key interoperability questions are raised. How do Betty and Chuck "find" Art and how do they interact with him. Remember, there is no standard mechanism under VRML for words or gestures. Can they speak to each other, gesture, touch, sniff, hit… *mate*? — none of these points are unambiguously dealt with by VRML 2.0.

There are other, more subtle, issues the Living Worlds authors consider. What if you were able to exchange or buy virtual objects with behaviour characteristics? Suppose such objects could be delivered to you as complimentary gifts. What if the object were able to do some damage to your scene (perhaps a virtual puppy that bounces around Art's room, ruining the furniture and staining the carpet)? As the authors put it: "If this is beginning to sound like a virus,

we've made our point. Multi-user apps in VRML, like those in any other language, will need some reliable way to protect themselves from inappropriate access."

Living Worlds is already coming up with answers to these questions, and in particular to the issue of avatars. There has already been an attempt by one team to create a "Universal Avatar" standard (you can find their discussion paper at www.chaco.com/avatar/avatar.html), and Living Worlds takes this a step further by refining the definition of an avatar and distinguishing it from other types of objects that would be expected to populate a shared space.

Avatars are usually defined as "transient and arbitrarily mobile" objects because they come and go, and are driven by humans. In contrast, other objects are "persistent and predictable" because they are driven by programs. However, most expect shared spaces to be populated by "bots" which are, essentially, program-driven objects designed to behave as if they were avatars, so any future standard will have to embrace their behaviour, too.

These are early days for shared spaces and the technologies that will create them. It remains to be seen whether it will be the proprietary approach (via Active Worlds and any emerging competitors) or the open standards approach (via Living Worlds) that will set the agenda and deliver the goods. Either way, it must surely be the area where 3D and the internet can create something truly unique.

Digital **doings**

Using his personalised Christmas card as an example, Gordon Laing shows you how to digitally recreate a stained glass effect. And, the ins and outs of using digital cameras.

I urge all readers of this column to check out our digital camera group test on page 176 — the first undertaken by *Personal Computer World*. My colleague, Adele Dyer, and I decided it was best to visit a well-stocked distributor for the day and try them all out under the same controlled conditions. So we popped down to Guildford to visit the Digital Camera Company, which was packed with more models than we'd ever seen gathered together in one place.

In this month's column I'll cover the subject of using digital cameras, but first a few extra details on how last month's Christmas card image came into being.

Return to the stained glass
Last year I shocked many readers of this column, who turned the page to see a festive photo of myself peering back at them — scary stuff. I printed out a batch of them as Christmas cards, and rather than getting lynched, as I'd first expected, most people asked what I would do next year. That's setting a precedent for you!

Those lucky enough to have a copy of last month's *PCW*, will already have sampled the full force of "Laing's Christmas image" but, unfortunately, I ran out of space in which to fully describe how it was achieved. So indulge me for a while and I'll divulge the gory details to you.

I have always had a fascination with stained glass windows, and fancied making one of my own — digitally, of course. So I hung out around numerous religious establishments and I browsed art books for research. I must admit to also having looked carefully at Christmas cards already on sale, to gain inspiration. Two definite styles emerged: the oldest stained glass windows

had wavy strips of lead and quite intricate detail, while the more modern designs were clean, almost Conran-esque.

In all cases, faces and areas of detail too complex to create with whole strips of lead, were hand painted, inscribed or drawn directly onto a clear pane of glass. I kept this in mind for the time when I would finally add my face to the rest of the composition.

Look closely at lead on stained glass windows and you'll see that it's nowhere near solid black. There are various textures and shades of grey running along the lines. This posed a problem which was resolved by an issue of style. I didn't want anything too fussy, so I decided on solid black lines for my lead. This would be an ideal application for a vector drawing package, especially when it came to filling in the gaps with stained glass-like colours.

However, I'm not great with vector drawing apps and, in the absence of a graphics tablet, I decided to draw the basic outlines by hand. Once pencilled out and correct, I went over the lines with a jet black, thick marker pen. Looking closely at existing windows, I noticed the weld marks filling in the areas where one strip of lead crossed or joined another. I ended up placing blobs of inks in the corners of every join on my page to simulate this effect.

Of course my so-called jet black lines were actually as uneven in shade as genuine lead. I quickly rectified this by scanning the page in black and white line art mode. In this mode, a threshold level is set, whereupon anything too light is blanked out as white, and anything darker becomes pure black. Perfect.

At this point I had to make an important decision which I'd neglected last year: how big did I want the picture to be and, equally

important, what shape? Last year I chose dimensions, off the top of my head, forgetting to take into account the size of the envelope. And guess what? Correct; I had to buy envelopes which were way too big, so my precious work rattled around inside and got severely mangled.

No mistakes like that this year. So, as a hot tip for anyone considering this kind of thing: make sure you know envelope and printer sizes before you begin! Consider where you're outputting. I started working in CMYK colour space immediately, thereby avoiding any nasty surprises when converting from, say, RGB colour space.

Once that had been worked out and scanned in, I had the job of filling the gaps with colour. I considered solid or graduated fills but decided it would look too child-like and simple. Instead, I reached for the superb Autodesk Texture Universe CD and pulled off several scans of real stained glass windows. A little fiddling with colour balance and I had six or seven pieces of coloured, textured "glass" with which to play around.

The next part was simple; I just copied the glass scans to the clipboard, selected the areas to fill and pasted them in (from the edit menu). I dragged it around to where I wanted it, and Bob's your uncle… (actually, he is my Uncle, so here's a big hello to My Uncle Robert!).

But now I had the potentially tricky task of putting my face onto the head and shoulders I'd drawn. I dug around my photo collection for a full face picture of myself (I had considered taking a digital camera original, but found a suitable print instead). One quick and dirty scan later I had to reduce it to a scribbly level of detail. Fortunately, I'm pale anyway, but I upped the brightness and contrast until I was left

Monotype has launched a package of three handwriting fonts, and last month we featured the lovely Pablo typeface, based on Picasso's signature. This month it's the turn of John Handy, based on British designer Tim Donaldson's own handwriting. In a future column I'll explain how to make a font out of your own scrawls.

with an outline, with faint marks for my eyes, nose and mouth. A couple of Photoshop filters later — particularly the Photocopy filter from Adobe Gallery Effects (now included with Photoshop 4) — and I had the desired effect. A copy, resize and paste later and my masterpiece was finished — for this year anyway!

Digital cameras
In this month's group test we've looked at digital cameras for the first time, and discovered there's more than meets the eye when taking electronic photographs. They are all very different — as different as the multitude of compact and SLR film cameras on the market. Being perfect electronic gadgets, digital cameras are just asking to be abused: imagine over-zealous designers popping mysterious buttons with unidentifiable icons.

During our test, I and my colleague, Adele, took pictures of the same composition from approximately the same distance and angle with every digital camera we could lay our hands on. While many produce images designed for on-screen use only, printing the sample output from each would at least indicate the relative quality of each model.

In theory this is great and, in practice, as you'll see elsewhere in this issue, it worked out reasonably well, but one of the most infuriating things, on certain cameras, was being unable to perfectly compose the images. The trouble is that all the budget digital cameras to date are not SLR designs; instead relying on one lens for the viewfinder and another for the image-taking. Anyone who's ever used such a design on

a compact film camera will know the pitfalls of accurate framing, particularly when photographing close up. So parallax error is our perfectly good excuse for not getting the same angle and framing in every shot.

An SLR optical design is, of course, one way to solve the problem, and while many higher-end digital cameras employ this trick, they are, for now, only for the very wealthy. Digital cameras, with their electronic images, offer the LCD screen alternative for budget models.

Casio started the trend with its budget QV-10a digital camera, which was not only cheap but also dispensed with the viewfinder altogether in favour of a small, colour, LCD screen at the rear. Many people criticised the power drainage as well as the undeniable fact that the screen was difficult to see in direct sunlight. But what it did allow, was a precise view of what you were going to get. Even better, LCD screens can be used to view images in memory to verify that you have indeed captured exactly what you were after — a kind of electronic Polaroid.

LCD screens are becoming more commonplace, but I would like to see budget cameras with both a screen and conventional optical viewfinder, for those occasions either when the sun is out, or the batteries are about to die.

Utility is also an issue when it comes to transferring images from camera to PC. Most models offer some kind of lead (usually serial) as a physical connection. Admittedly, you don't have to wait long, but in many cases it's like visiting a particularly slow and image-intensive web site. Far better, in my opinion, are those cameras

In this month's digital camera group test, we photographed the same composition with each model set to its highest quality, and printed the results alongside each other. Although it's unfair to compare the output from products costing ten times as much as its neighbour, or compare those geared up to go into print against those designed for electronic publishing only, it does indicate the relative quality of each camera. Here I've enlarged a portion of the image to really bring out the differences of three different cameras: the lowest resolution Casio QV-10a (top), the mid-performing Agfa (middle), and the high-end Minolta (bottom), which is the only model of the three designed to go into the demanding world of high-resolution printing

which offer card-based storage, usually conforming to the PC Card standard (although sometimes requiring an adaptor). In these cases, you can simply whip out the card and slot it straight into your PC for almost instant access; but of course the average desktop PC owner will again curse the fact that PC Card slots never caught on, outside of portables.

A final word on the subject, for now, regarding software. Like the myriad of hardware controls, the software situation is no different in terms of standards. While some cameras use industry-standard

TWAIN drivers, others feature a proprietary solution. There's nothing wrong with this, unless you're a reviewer faced with a thousand varieties.

Fortunately, this writer possessed NBA's PhotoWallet package from The Digital Camera Company. Seemingly designed for poor souls like myself, or companies owning more than one type of digital camera, PhotoWallet will talk to, and extract images from, virtually any digital camera — suffice it to say that updates become available as new cameras appear on the market.

●PCW Contacts

Have you had a digital camera experience you'd like to share? Write to me at the usual *PCW* address, or email me at **graphics@pcw.vnu.co.uk**

Digital Camera Company 01483 452100
Monotype 0800 371242
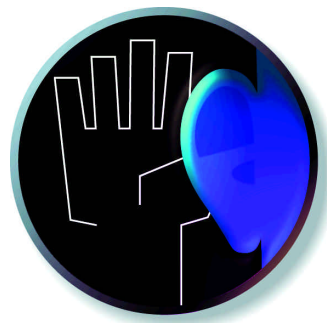
Rhythm demon

Steven Helstrip moves to that toe-tapping, hip-swinging beat as he advises on the best way to include drum sounds in your work. Plus, some tasty multimedia titles, and something exotic to get all you ravers, er, raving.

Drums and percussion have never been as important in music as they are in today's dance-orientated market. They set the pace, determine the groove and generally drive a track along, providing it's done carefully. Later we'll be looking at ways to beef up

Left Here's how your PC makes music, allegedly
Below Left That's the box it comes in
Below Enter the land of keyboards, from early spinets to the latest synth technologies

kick drums and add interest to hi-hat patterns. First, though, news of two new software packages.

Unlike the internet, which I consider to be still in its infancy, multimedia has finally reached the stage where it can be used to get results, quickly. I say this because it is only now that rock solid titles are surfacing, and the hardware needed to run them is no longer confined to the workstations they are

created on. I don't want to rant on too much about the M word but I thought I should let you know about a new title I recently came across, called Discovering Keyboards, from Voyetra.

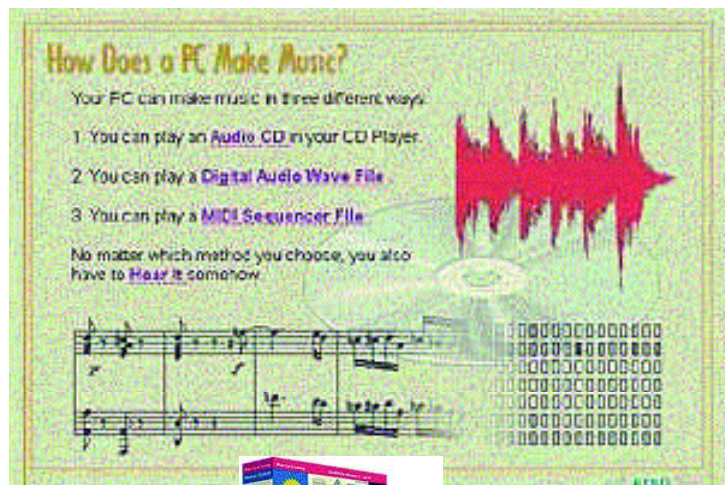If you're not content with just playing them, and are interested in what makes

them tick, how they evolved, or just want to improve your playing, Discovering Keyboards could help out. The package comprises five categories, including a detailed tour of keyboards right back to early spinets, a section on understanding MIDI and synthesis, keyboard lessons, a songbook, and, for when you just can't take any more, three arcade-style games to test your knowledge and playing abilities.

The keyboard lessons make use of video footage and varied exercises to introduce music notation, theory and playing technique. With a MIDI keyboard connected to your PC, your progress can be monitored as you work your way through three courses. In the songbook you'll find tunes that range from classical, through to folk music. If there's nothing to your liking there, you can import your own or someone else's MIDI files. Songs can be viewed as traditional notation and later printed as sheet music.
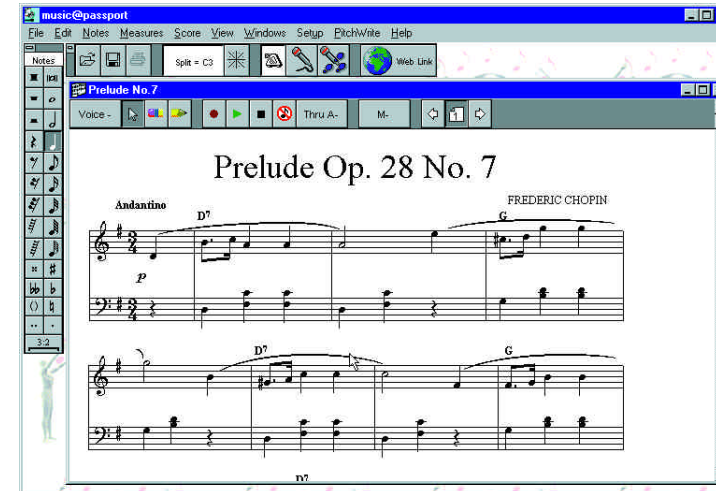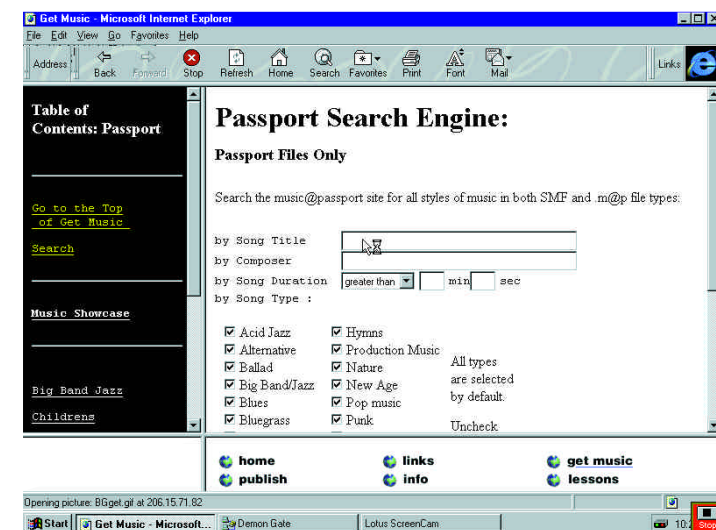
At a shade under 80 quid, Discovering Keyboards might strike you as an expensive hobby. But it's great fun and works out cheaper than paying for five hours' worth of private lessons. I wish it had been around 15

Have your music published on the net within minutes with Music@Passport

Passport's internet search engine doing its stuff

years ago when I was just getting started.
Discovering Keyboards £79.95 (incl VAT)
Contact Turnkey (see "*PCW* Details" box, page 294)

Music@PassPort
One of my biggest hopes for the internet is that one day it will be able to cope with sufficient chunks of data so that music of CD quality can be transmitted in real time. It might just be another 15 years, though, before this comes along. Until then, we'll have to make do with noisy 8-bit files, which take an eternity to download.

An alternative way to get hold of music on the net is to download MIDI files. They're not difficult to find, and files exist even for tracks that haven't been written yet. Passport Designs has launched a new site to coincide with the release of its new notation package, Music@Passport. The idea is that, at the click of a button, you can have your music published on the net as soon as you've finished it. The site contains

a detailed MIDI file search engine, so if you're looking for a particular song, it shouldn't take long to come up with the goods.

Music@Passport is essentially an upgrade to Music Time, and in addition to its internet links, has some neat new features, the best of which is PitchWrite. This enables practically anyone to record and sequence music, since it converts any incoming audio signal (someone singing, playing guitar, etc) into MIDI data. I haven't had a chance to check it out yet, but I'm assured it works well, assuming you can sing in tune. Music@Passport comes with its own microphone and a copy of Microsoft Internet Explorer, all for just £99.95 (incl VAT).
Contact Turnkey

Creating better rhythm tracks
Simple, uncluttered rhythms tend to work best in dance music. Listen to Robert Myles' Children: it's the perfect example. At the busiest times, all that comes through is a four-on-the-floor kick drum, an off-beat

hi-hat pattern and a hand clap. The best place to start when programming rhythm tracks is with the kick drum. Don't simply opt for the one featured on your last track, though: go out and find or create a new one. Fresh sounds inspire new ideas.

The 909 kick drum has dominated dance music for the past decade. However, it is seldom used without being treated. Try doubling it up with a sub-bass note, tuned to the key of the track — this will add considerable depth. Be careful, though, not to have the sub-bass too high in the mix. For more punch, combine it with, say, a kick drum tuned to two or three octaves above. Again, spend time getting the balance right between each element.
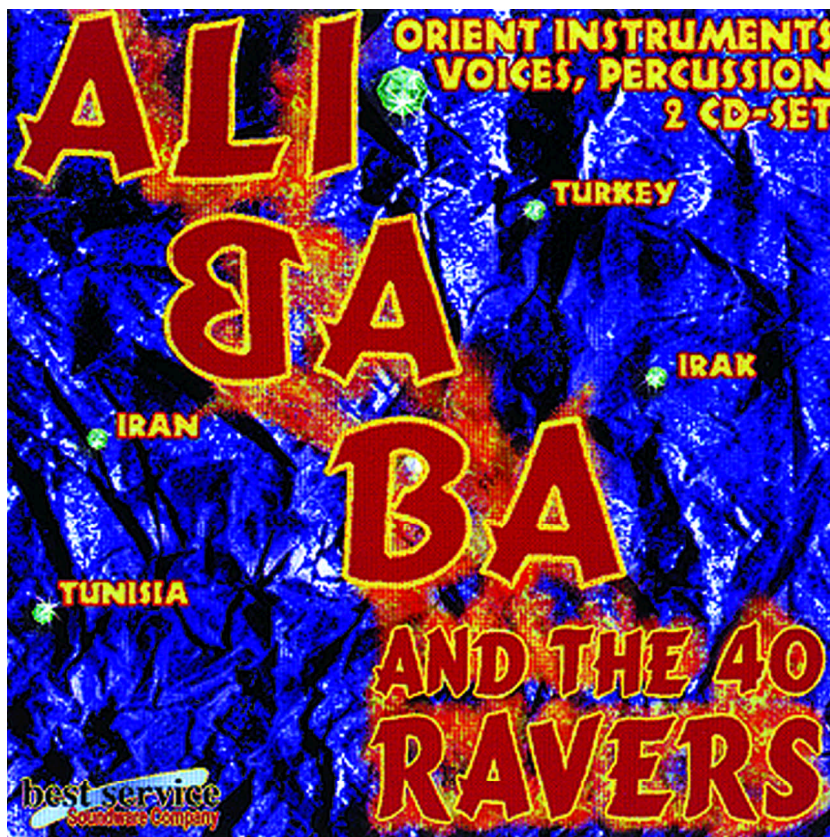
Only when you're happy with the sound should you think about EQing. To give the sound a hard edge, try boosting at around 1kHz. If you have a compressor in your setup, give your kick drum (and bass) priority. Compression tightens up low frequencies to provide "professional" studio results.

There's always a danger with hi-hats to just simply play in a semi-quaver (16ths) pattern. Try to avoid this; it's been heard a million and one times before. Give the listener something interesting to listen to: for example, choose two, or three closed hat sounds (it could even be the same sound with different filters, or pitch) and alternate between them. Play around with their velocities to create a groove, and even offset the odd note so that the pattern isn't too metronomic. At the end of an eight-bar pattern, trip the listener up by introducing a skip in the pattern, or by accenting a particular note. Hi-hats cut through better when positioned slightly off-centre in the stereo field. If you have two hi-hat patterns going, it is sometimes effective to have them panning in opposite directions.

Next month we'll be carrying on with drum production tips and looking at ways to extract individual hits from drum loops. Until then, happy sequencing.

Sounds on the net

• Several issues back I mentioned some of my favourite audio utilities that I have collected over the years; the one I still use most frequently is a simple tempo/delay calculator. Since then, I have discovered an even better version that calculates delay settings in dotted and triplet note values. It can be downloaded from www2.cybernex.net/~jonwitte/ddtc.html
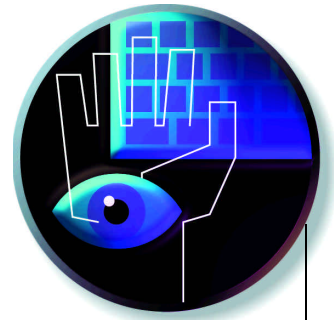
• Another site worth visiting, providing you're an AWE-32 owner, is hanna.lysator.liu:7576/awe32/wav. There you will find stacks of samples ready to download to the card.

• If you're running low on effects units, you can now use your PC to produce real-time effects such as reverb, choruses, etc. You do need, of course, a sound card and a copy of Realtime. This can be downloaded from www.glue.umd.edu/~bmarinar/realtime.html. Realtime also has a 64-band graphic EQ and the ability to save samples (post-effect) to disc.

Alibaba and The 40 Ravers

Instruments from the orient abound on this two-CD set from the Best Service Soundware Company. Having recovered from the giggles induced by the title and made some sense of the poorly-translated introduction in the booklet, I sat myself down for over two hours of intense foot tapping, fingers poised by the sampler.

On track one there's a demo of what's to come, followed by another 197 tracks, grouped into a myriad of unpronounceable musical genres based on geographical location. Many of the instruments, likewise, don't roll too naturally off the western tongue.

The quality of playing and the recordings of instruments on this CD is highly impressive, most of which are stereo. You might have difficulty making use of tunes played on some of the more obscure instruments, but on the whole the standard is high. I do feel that the CD could be more flexible in providing single-shot samples of individual instrument samples. Although there is a huge range of authentic melodies and percussive grooves, it never hurts to have a go yourself at creating loops.

Whether it's Turkish Orchestras, ethnic choirs or just some good old bongo samples, you won't go far wrong with this CD which promises to add a touch of Eastern spice to your tracks.

Alibaba and The 40 Ravers
Price £59.95 (incl VAT)
Contact Time + Space (see "*PCW* Details")

Active service

Tim Anderson investigates the Active Platform – is it really new? Plus how to use resources in Delphi, new books reviewed, and a preview of the Visual Basic control creation edition.

I 'm sitting here looking at a sheaf of press releases and a stack of CDs which comprise the Microsoft Active Platform in its current, beta guise. The papers are an intricate display of verbal gymnastics: there are generous sprinklings of key buzzwords like open, standards-based, scaleable, multiple operating systems, and so on. The name Active Platform itself is a political statement. Sun calls Java a platform; Netscape Communications calls its browser a platform; others see the Network Computer as a platform. At stake is the question of who will be at the centre, and who will be satellites. Like all the best prima donnas, none of the main industry players wants to be anywhere less than centre stage.
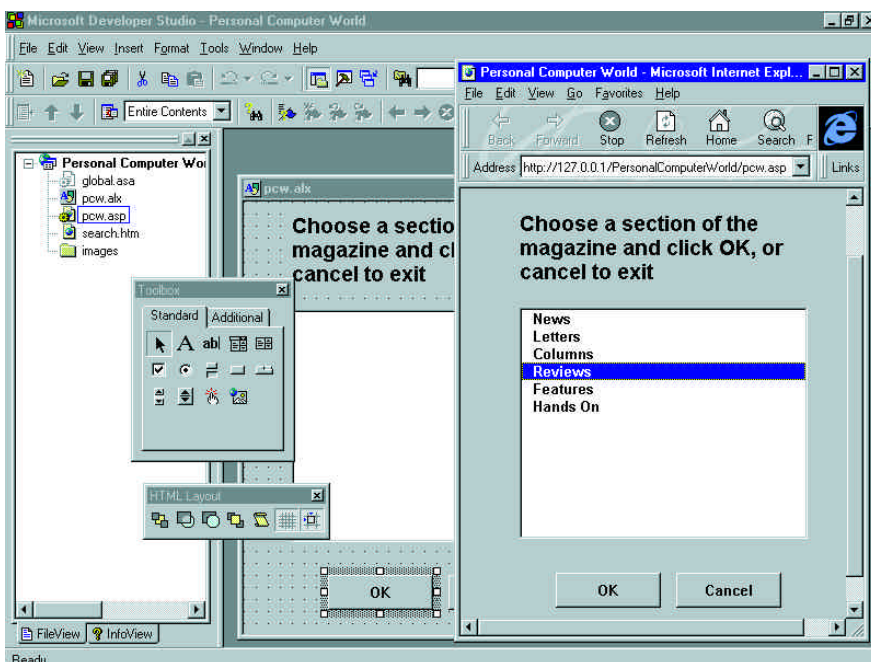
Where there's an O there's an A
You might be forgiven for wondering where this new Active Platform comes from. Microsoft's publicity implies that a range of new technologies, such as the Active Desktop, the Active Server and Dynamic HTML, have emerged brand new and sparkling from a magician's black hat somewhere in Redmond.

The truth is more prosaic. For years Microsoft has been promising to rebuild Windows on an OLE foundation, and that strategy has not changed. In many cases Microsoft has simply replaced the word OLE with Active. So, ActiveX controls are OLE controls, OLE automation servers are now Active Servers, and similarly the OLE object model once known as Data Access

Objects has become the ActiveX Data Object or ADO. With that in mind, here's a plain English summary of what is in the Active Platform.
1. Active Desktop This is essentially a web browser with support for HTML, VB Script, Java applets and ActiveX controls. In other words, it is Internet Explorer. Full implementation is in the forthcoming version 4.0, which is fully-integrated into the Windows shell.
2. Active Server This means that Internet Information Server can be controlled through what used to be called OLE automation.
3. Active Server Pages Here, Microsoft is referring to the ability to embed scripts, typically written in Visual Basic, into HTML web pages. Previously such scripts could only be executed by Internet Explorer on the client's PC. Now, a new tag lets you run the script on the server. Web sites have been doing this for years using CGI scripts, but this new approach is easier and removes the need to compile the script into a binary executable.
4. Dynamic HTML Code-named Trident, this is a set of extensions to HTML which implement much-needed features like layering and exact positioning. It provides an enhanced object model with more control over frames, tables and scripts.
5. Active Data Object Like Data Access Objects, this is a COM object model for database access. It hooks into ODBC for connectivity to a broad range of database servers.
6. Design-time ActiveX These are add-ins for Internet Studio which typically generate HTML and VB Script in response to user input while authoring a web page. You can

The Internet Studio project browser in file view (left), an ActiveX layout being designed (centre), and the resultant form at runtime in Internet Explorer

The ActiveX Control Pad

Released without fanfare onto Microsoft's web site, the ActiveX Control Pad is an essential tool for authoring ActiveX applications. It combines a simple text editor with a VB-like form designer. The idea is that you open an HTML document in the editor, design a form known as an HTML Layout, and then insert it into the document. The HTML layout is itself an ActiveX control, but exists only as a container for other components. You can also insert ActiveX controls directly, without using a layout. The control pad generates a bit of HTML code using the OBJECT tag, including the long alphanumeric CLASSID which uniquely identifies each ActiveX component.

The control pad does not only handle the placement of controls. Using the script wizard, you can also write code to bring the form to life. The scripting language can be either VB Script or JavaScript, although the two cannot be mixed on one page. In list view, the script wizard will write code for you based on your response to dialogs, or you can choose code view and bang out code in the old-fashioned way.

There are many advantages to using the control pad. One is that you can position controls precisely within the layout, something which you cannot do with pure HTML. Controls have a z-order too, so you can position one in front of another. The other plus is that a control's properties and methods are listed in the property editor and script wizard, so you do not need to look them up. Visual Basic programmers will soon feel at home. A similar tool is in Internet Studio, where it is called the HTML layout editor.

The biggest problem is that the control pad does no syntax checking and has no debugger — a sure sign of immaturity. Internet Explorer will report errors in your code, but otherwise you are reduced to tricks like throwing up message boxes to check the status of variables. The other problem is that ActiveX layouts currently work only with Internet Explorer 3.0. No surprise there.

Unmistakably a platform; but with the ActiveX Platform, things are less clear cut

think of them as web page wizards. They are ActiveX controls but are not used at runtime and do not need to be downloaded to the client's computer.

7. HTML layout One of the most useful ActiveX controls is the HTML layout component, simply a container for other controls. Using the Active Control Pad or Internet Studio's layout editor, you can build forms which include scripts, much as you would with standalone Visual Basic.

The ActiveX control pad, showing an HTML document, a layout, and the script wizard
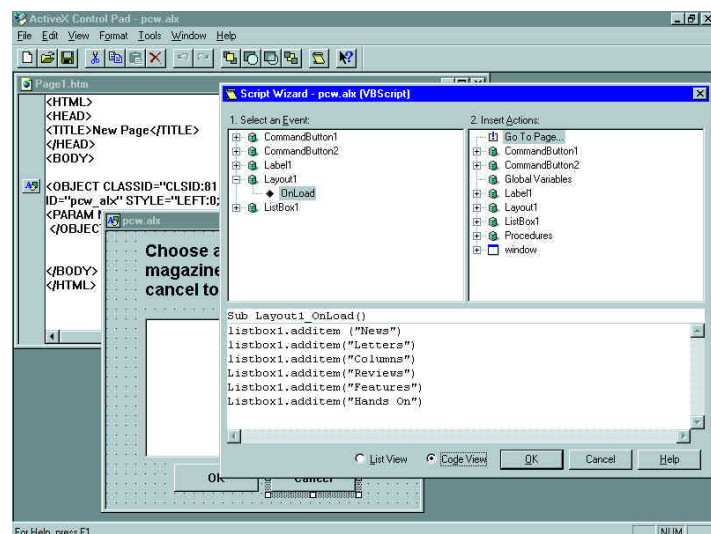
Will it work?

The usefulness or otherwise of Microsoft's new web initiative depends on which hat you wear. For general Windows developers, this is significant. Internet Studio, the tool that brings all these gizmos together, is a viable alternative to Visual Basic and Access. You can design forms, write VB code, and simply have your final application run within Internet Explorer rather than directly from the Windows desktop.

As Windows evolves, that last distinction will become increasingly blurred. The advantages are that your application can be Intranet-ready and database independent. On an Intranet, you have full control over whether code is executed on the client or on the server. Assuming Windows remains popular, I see this kind of approach as gradually replacing existing development techniques.

What about Web developers? It is these that Microsoft is courting most visibly, with its "site builder" initiative. But success is far from assured. Microsoft can do what it likes with Windows, but does not own the web. The grave weakness of its Active Platform is that, despite noises to the contrary, it is not a cross-platform initiative. There is no problem with the server-side aspect, since the server can do what it likes as long as it delivers HTML that the browser can understand. The problem is with the Active Desktop. ActiveX controls, remember, are binary executables which run natively on the client's computer. If you want to create an ActiveX control which runs on, say, Windows, the Macintosh and Unix, then you must create three separate executable files. Even if Microsoft delivers what it promises, versions of Internet Explorer for these

platforms, it is hard to see this strategy working.

By contrast, a Java applet runs on any platform for which a Java Virtual Machine exists. That means Sun's Java Beans model holds all the cross-platform aces. Java applets can accomplish many of the same tasks as ActiveX components. Performance can be poor, but just-in-time compilers and eventually Java-based operating systems will crack that problem. Microsoft is making it enticingly easy to create web sites built with ActiveX controls, but such sites will to some extent shut out non-Windows browsers. If that drives more people to use Windows, Microsoft wins. But if these factors lead to Java rather than ActiveX dominating the Internet, the popularity of Windows itself will inevitably decline. The stakes are high.

Visual Basic Control Creation Edition

Unlike Internet Studio or the ActiveX control pad, the VB Control Creation Edition is not just for web development. As its name implies, it is a tool for creating ActiveX controls in Visual Basic, and these controls can then be used in any Windows development tool or document capable of hosting ActiveX, formerly known as OCX controls. In its determination to reinforce the ActiveX standard, Microsoft is making the control edition a free download, both the beta and final versions. Incidentally, it also offers a preview of what the VB 5.0 interface may look like when it emerges.

Since version 4.0 Visual Basic has been able to create OLE automation servers. You can declare an object class in a VB project, and then have other applications create objects of that class. Borland's Delphi 2.0 is similarly capable. The one piece missing in both products is the ability to create OLE objects that have a visual interface, or in other words, ActiveX controls. That gap has now been plugged. With the control creation edition, you can develop ActiveX components that can be installed on the component palette in products like Visual Basic, Access and Delphi. It is a great step forward, the main snag being that in this version, compilation to native code is not possible, so performance will not match ActiveX controls written in C++. VB controls can be very small, but require a substantial runtime library which makes distribution awkward. Microsoft now calls this the VB Virtual Machine. The implication is that a VM for Visual Basic may be implemented on more than one platform, although Microsoft has not stated this explicitly. Such a move would make ActiveX a more plausible cross-platform contender.

To test the control creation edition, I built a simple control. Using an image control and a timer, I displayed the *PCW* logo on a form. With one line of code I made the logo's background colour change whenever the timer event fired. Next, I used the Interface wizard to choose which properties and methods to expose, including a custom
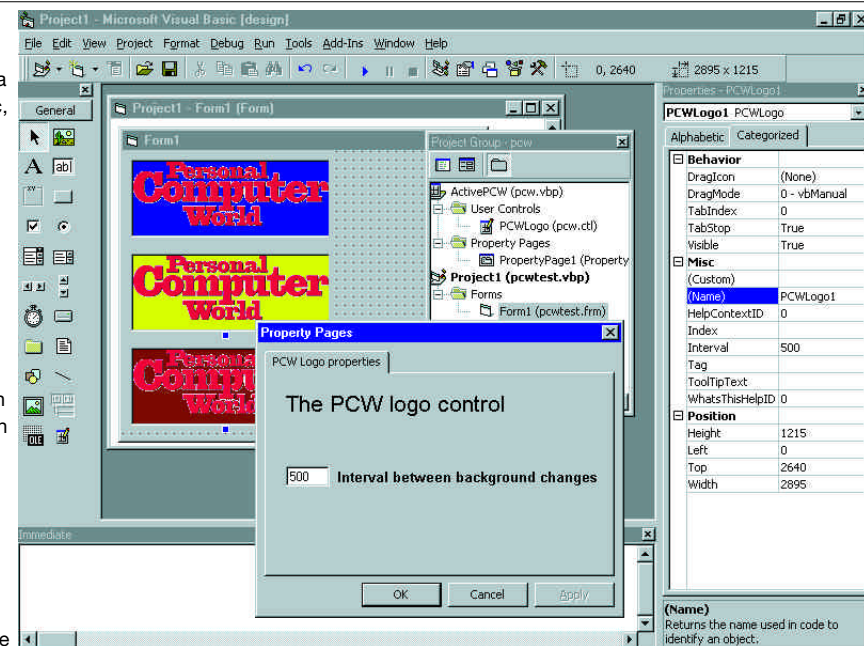
A preview of Visual Basic 5.0. The Control Creation Edition at last makes it easy to write ActiveX components

property to set the timer interval. The property page wizard created a standard property page, and finally Make OCX built the control.

Nobody can now say that creating an ActiveX control is difficult. The main flaw in the VB control creation edition is not technology, but human fallibility. Creating a control is easy; but creating a good control still requires skill. The documentation observes how important it is to maintain a consistent interface when controls are developed, and warns that a poorly-implemented control can be a security risk even without malicious intent on the part of its developer. For example, if a method is exposed that enables a named file to be created on the user's hard disk, the control is not safe for scripting. Considering the number of VB developers, both professional and hobbyist, mistakes are inevitable.
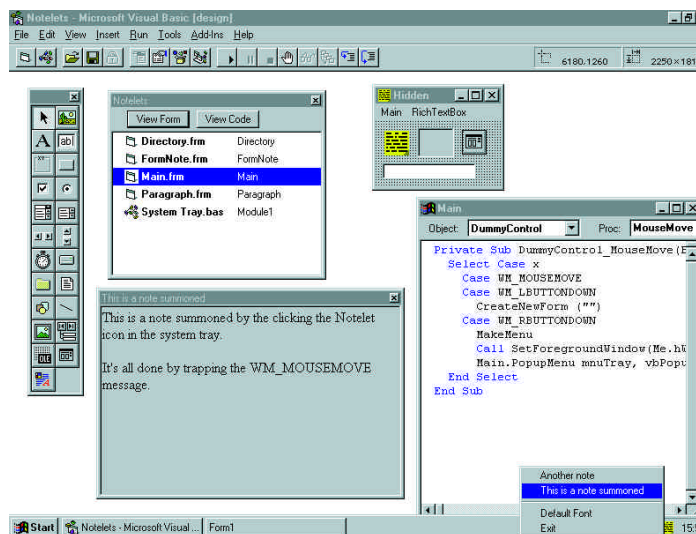
Creating full system tray apps with native Visual Basic 4. See the full code on the cover CD

Delphi can use standard Windows resource files (with a .RES extension) and indeed there are occasions

Delphi

Delphi and Windows resources

when this might be essential: creating a screensaver for Windows NT, for example. It is yet another of those areas which Borland has scarcely bothered to document. Bizarrely, there is

documentation in WINAPI.HLP, supplied with Delphi, that covers the Microsoft command-line resource compiler, but not for the Borland resource compiler actually supplied. You didn't know Delphi comes with a resource compiler? It does, and it is the executable called BRCC.EXE or BRCC32.EXE, the 16- and 32-bit versions respectively. The versions called BRC.EXE and BRC32.EXE are shells which are able to call both the resource compiler and the resource linker, RLINK, to bind a resource to an executable — but you do not need to know this since Delphi will do it for you.

To find out how these programs work, run them from a command line without parameters and the options are displayed.

What Delphi does not have is a resource editor. Simple resource scripts can be created by hand, otherwise you will want to use an editor such as the one distributed

with Borland's C++ products. Using resources in Delphi takes several steps:

1. Create a resource script and compile it to a .RES file.

2. In your Delphi application, include the compiler directive:

```
{$R MYRES. RES}
```

where MYRES.RES is the name of your resource file. A good place to put it is in the project source below the similar directive {$R *.RES} which Delphi includes by default in all projects. The reason is that the application icon is stored in a .RES file of the same name as the project. It is best not to edit this generated resource file, since Delphi may overwrite your work.

3. Your Delphi code can now load these resources using API functions. Here is a simple example. The following resource script contains a string table with one string:

```
STRINGTABLEBEGIN1, "I wandered
lonely as a cloud" END
```

Save this as TEST.RC, compile it using BRCC to TEST.RES, and then include it in a Delphi project. Now you can retrieve the string in your Delphi application as follows:

```
lpzTest := stralloc(26);
LoadString(hInstance, 1, lpzTest, 25);
```

where lpzTest is declared as a pChar. LoadString's second parameter is the ID of the string to load, often replaced with a constant for clarity, and the last parameter is the maximum length of the string to retrieve.

Visual Basic

More about the System Tray

James Talbut writes:

"You mention the usage of the Shell_NotifyIcon function and state that it is not possible to use the messages without additional software. But you can. Essentially you create a hidden control on your form and use an unrequired message for controlling it."

The system tray is controlled by an API call Shell_NotifyIcon, which takes a pointer to a NOTIFYICONDATA record as one of its parameters. This record includes fields for a window handle and a message identifier, the idea being that Windows sends that message to the specified window when the user clicks on an icon in the tray.

In C++ or Delphi you would use a custom message handler, but VB does not offer that facility. The workaround is to hijack an existing message handler, and

James suggests using a hidden picture box and the WM_MOUSEMOVE message. Then, you can write code in the MouseMove event that will respond to system tray events.

It works, and James has written an example notelet application, which is on the cover CD. It lets you store notes which pop up when you right-click an icon in the tray. Thanks, James – you have won a book token for your efforts.

Books for Visual Programming

### Using ActiveX by Brian Farrar

This is nearly very good. Aimed at those considering doing the web the Microsoft way, it presents all the main elements clearly and concisely, with examples. The book covers VB Script, ActiveX technology, the Control Pad, the Internet Control Pack, Internet Information Server and its ISAPI interface, and CGI scripting. It is fine as an introduction and overview, but does not go into enough depth to merit the "using" part of its title. For example, ActiveX security issues are skated over in a couple of pages. To be fair, Microsoft's ActiveX SDK, included on the supplied CD, does give the required detail; but most readers will have it already from another source. Buy this for an excellent overview, but expect to need further help very soon afterwards.
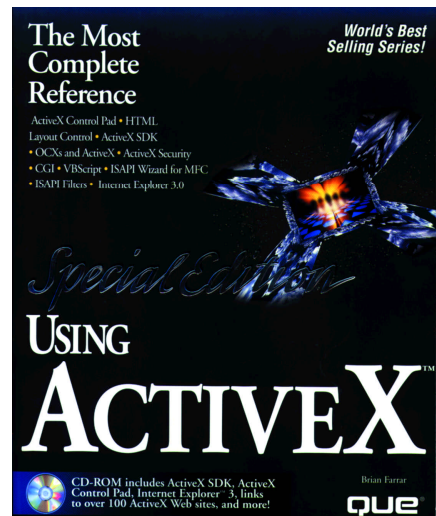
Using VBScript by Ron Schwarz and Ibrahim Malluf

This title is both longer and more tightly focused than its companion, Using ActiveX, in the same series. Without assuming much prior knowledge, the authors show how to program web pages using VB Script, touching on related areas like ActiveX and SQL Server web extensions. Considerable space is given to HTML itself, including an appendix documenting all HTML tags supported by Internet Explorer 3.0. There is a CD with all the examples from the book, and as a bonus, the full text of another Que title, Using Visual Basic 4.0. It is a nice extra, but ironically none of the web pages on the CD are well designed. Overall, it is a good introduction to VB Script, but do not expect it to answer all your Web queries.

Programming Windows 95 with MFC by Jeff Prossie
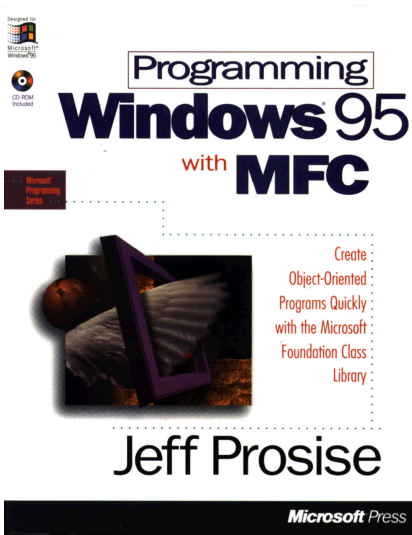
You have to respect someone who knows his limitations. Jeff Prossie is not a database programmer, nor is he an OLE enthusiast. "Certain parts of OLE are promising," he says, "but the OLE documents protocol is overly difficult to implement and of limited value in the real world." That explains why his book on Microsoft's Foundation Classes, the leading C++ Windows class library, covers neither MFC's database classes, nor OLE in any form. Instead, he gives a nuts-and-bolts description of how to program with MFC, starting with "Hello World" and progressing to documents, views, common controls and multi-threaded development. It is a valuable book, since most other tutorials focus more on using Visual C++ and its wizards, than on MFC itself. Look elsewhere for ActiveX, web development or database work, but buy this book to learn the fundamentals of Windows development using MFC.

•**PCW** Details

Tim Anderson welcomes your Visual Programming comments and tips. He can be contacted at the usual *PCW* address or at **visual@pcw.vnu.co.uk**

Programming Windows 95 with MFC by Jeff Prossie (Microsoft Press), book and CD, £49.95 inc VAT.
Using ActiveX by Brain Farrar (Que), book and CD, £37.99 inc VAT.
Using VB Script by Ron Schwarz and Ibrahim Malluf (Que), book and CD, £46.99 inc VAT.

Transmission
without tears

Mark Baynes tackles the serious subject of organising communications for his own business. He eases himself into ISDN, and gets to the nub of some networking basics.

T he more networking I do, the more I realise how little I know. While many networking professionals can specialise in their particular area (Banyan Vines, routers, ISDN, and so on), I feel that I am more akin to those lucky people within companies throughout the UK who have had responsibility for networking thrust upon them — in other words, you have to be a "Jack of all trades". Yet what this person becomes, however, is a master of one subject; delivering the right mix of PC networking technology which is right for their company.

At the moment I am in the early stages of establishing my web design company, Ant Web at www.ant.uk.com, and am therefore considering the basics of what myself and my business partners need in terms of networking. For the past few months, while we have been in the brainstorming and planning stages, we have been able to work at home, meet up on a regular basis and communicate via email and the telephone, but as we now have some real sites to build, we soon realised that we needed to be in the same place at the same time.

Home truths

There is an awful lot written in the various magazines and IT sections of the national newspapers about home working and telecommuting but a lot of it is complete nonsense. The first thing is that the people who write this stuff frequently get seduced by the technology (I, too, have been guilty of this in the past) and forget the obvious; like the fact that it is much simpler to collaborate on a project with a person who is in the same room as you. Yes, if that person is on the other side of the world and you cannot be in the same room then technology may be the answer, but it is still nevertheless second best. Videoconferencing, groupware, email, whiteboarding and all the other wonderful techno-goodies are really useful but we should remember that these are substitutes.

The reason I raise this is that, for the last few weeks, I have been meaning to get around to establishing a remote access server to which we can all dial in, but fortunately, like most of my bright ideas, I never quite got down to it. But I will, at some time or other, because there is no doubt that we will have a need to access centrally-held data, either from our homes or while on the road. But it is not the priority it once was.

The basic jobs I have to do are: (a) establish a LAN in our office; (b) ensure that shared resources such as fax, email and web access facilities are available; and (c) devise the world's best data backup system for the LAN.

To a certain extent, I regard the provision of a basic LAN as pretty straightforward in terms of connecting four PCs together, as I will simply hook them up using 10BaseT via an Ethernet hub and attach further resources such as a server, printer and ISDN router, straight off the hub.

For the past couple of years I have been able to configure my own LANs just as I want them, but this is a bit different as I have to cater for the tastes and needs of three other people, so no doubt you will be hearing a lot about this on a regular basis.

Into ISDN

Last month, as regular readers will remember, I was due to have my Basic Rate ISDN installed. This has now been achieved with a lot less fuss than I thought. You can read a feature on ISDN basics elsewhere in this issue [page 106] so I won't bore you with the details again here; suffice it to say that there is more to ISDN than mere speed and I am carefully considering just how I can make the best use of ISDN's flexibility for my business.

One of the many different ISDN access devices that came my way was a beautifully-built 3Com OfficeConnect Remote 530 ISDN router. Within minutes I was fiddling around, unsuccessfully, trying to use this to connect to Pavilion Internet, my ISP. One of the main reasons I could not get it to connect was that to use a router for ISDN access you need rather more than one dynamically-allocated IP address.

For a network ISDN connection you need a bunch of 16 "class C" addresses. The first and last of these addresses are reserved. You will need one for the connection to your ethernet LAN so you

Baynes on books

■ Nets and Intranets with Win95
**Author** HD Radke
Price £37.49 (CD included)
Publisher Abacus
ISBN 1-55755-311-4

For those who are new to networking, a single source of the most basic information is frequently hard to find, but *Nets and Intranets with Win95* might fit the bill. This 319-page book provides a basic approach to networking small LANs without talking down to the reader.

The first chapter, entitled "What Should Your Network Look Like?", is concerned with planning and deciding what type of network you should aim for: direct cable connection, Ethernet with Win95, a Dial-Up system or a server-based LAN; and provides you with "what you need to know" to get you started. Another chapter moves on to upgrading PCs and the basics of installing network cards. Although the accompanying photographs are not very clear, they are adequate. A useful flowchart, which guides you through the installation process, is a great help. Elsewhere, the book moves on to the subject of configuring Win95 networking and installing Microsoft Exchange.

The basics of sharing resources across a LAN, how an office works using a LAN, and mobile computing are also covered. The only weak part of this book is the final chapter, providing only a cursory explanation of intranets, but this doesn't really detract from the overall usefulness of the book. The focus on Microsoft products such as Exchange and MSN can also be forgiven. Recommended for the first-time networker.
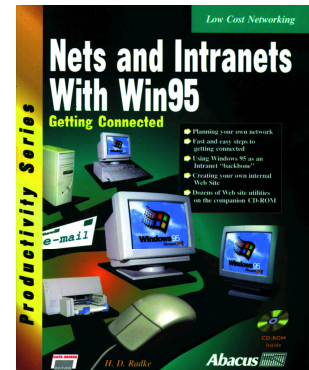
■ Using Windows NT Workstation 4.0 Special Edition
Author Paul Sanna *et al*
**Price** £46.99 (CD included)
Publisher Que
ISBN 0-7897-0673-3

This is a monster 1,198-page book with a price to match. NT Workstation 4.0 is gaining popularity as a robust OS with the ease of use of Win95 and none of the hassle of Unix. But Microsoft's documentation is not extensive (although there is a lot of on-line help) so you are really going to need a book like this one, to be able to make the most of Workstation 4.0.

The first chapter is the usual introductory stuff and it is not until you get into chapters two and three that the really useful information is provided, which will give the Win95 user a reasonable understanding of why NT Workstation 4.0 could be described as "Windows for Adults v1.0".

The networking section is okay and a reasonable description of TCP/IP configuration is provided, prior to the chapter on using Windows NT with the internet. Using Internet Explorer, Mail and News is covered in succeeding chapters, although only v2.0 of Explorer is dealt with. The accompanying CD is stuffed with useful shareware and some sections will also be of use to advanced Win95 users. This book is worthy of consideration if Workstation 4.0 is becoming a part of your network.
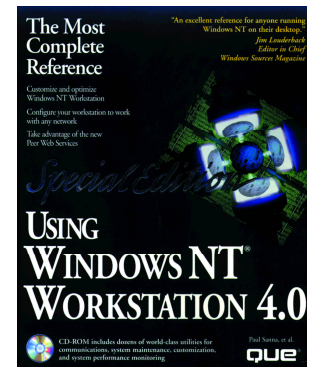
Review books supplied by Computer Manuals. Telephone 0121 706 6000

have 13 remaining which you can allocate to users. Some vendors are advertising these small ISDN routers as being ideal for the home worker, but quite how it can be economical to supply one homeworker with an ISDN router costing £800 when a TA or card will do the job for £200 is rather beyond me. But then, what do I know?

Transmission threesome

But before I get carried away with the delights of routing let's get down to some networking basics. Why not start at the bottom of the OSI stack with the actual physical transmission media itself?

There are essentially three different types of transmission media. The first of these, and the most common, is a conductive metal such as iron or copper. The second type is optical fibre and the third type is not physical at all but, literally, wireless.

Apart from the actual costs of installing and using different network media types there is the all-important issue of bandwidth. To be really technical you should talk about the data rate of a particular media as being the number of bits (not bytes, remember) that can be transmitted per second, and the bandwidth as being the difference between the highest and lowest frequencies that can be transmitted, the frequencies being measured in hertz (Hz).

In practice, the data rate of a network: 128Kb/sec for two, bonded, ISDN B channels; 10Mb/sec for Ethernet; and

Different types of datacommunications — an overview

	Twisted Pair	Coaxial cable	Optical fibre	Microwave	Satellite
Data rate	Dependent on cable run length	10Mbps	400-500Mb/sec up to several Gigabits/se.	200-300Mb/sec	1-2Mb/sec
Susceptible to interference from:	Nearby wires and monitors	Well-shielded. Not much of an issue but use common sense	Immune to electrical interference	Solid objects, so line of sight is required	Atmospheric conditions
Maximum theoretical distance	Up to one mile between repeaters but dependent on data rate required	2-3 miles between repeaters	20-30 miles between repeaters	20 - 30 miles between microwave towers but dependent on positioning of antenna	Worldwide
Typical use	10Base-T/server-based LANs	Peer-to-peer LANs	Network backbone	Where laying of cable is not a practical option	Primarily used for broadcast and telephony systems
Practical benefits	Very flexible in terms of topology	Simple to install. Reasonably robust	Very high data rates	Good for links between sites where disruption of environment is an issue	Worldwide communications
Practical drawbacks	Easily damaged	Not very flexible in terms of topology	High costs	Needs line of sight	Not cheap

A short guide to datacomm terms

■ **Asynchronous transmission** A scenario where the data stream is sent, typically one byte at a time, and the receiver does not know when it will arrive. A start bit and stop are used to indicate the beginning and end of the data transmission. It is typically used where high speed is not an issue.

■ **Synchronous transmission** Where much larger quantities of data need to be transmitted and so, instead of sending characters separately, they are sent in groups known as data frames or frames.

■ **Simplex communication** Where communication occurs only in one direction; your TV, for instance.

■ **Half-duplex communication** Where data devices at either end of the network link can both send and receive but *not* simultaneously; a two-way radio, for example.

■ **Full-duplex communication** Where a data device can both send and receive *simultaneously* (say, a computer) and, as it can become more than a little complicated, this is where protocols come into their own.

155Mb/sec for ATM is usually referred to as its bandwidth.

Twisted pair is one of the most common and certainly most flexible (in all senses of the term) varieties of cabling media used for LANs which are our primary concern here. It is so called because insulated copper wires are twisted around each other and then encased in a protective shield. The twisting reduces the interference and good-quality network cabling actually consists of several pairs of wire (e.g. "four-pair"). You will find twisted pair in your telephone socket as well as in any big computer network.

Coaxial cable (or "coax") comprises of an inner copper or aluminium core which is the actual conductor of the signal, an insulating layer around this, then a wire mesh shield and an outer protective shield. Coax can transit information in either baseband mode (where the whole cable is devoted to a single data stream, which is what happens on a LAN) or in broadband mode where several different data streams are carried simultaneously (cable television is an example).

Optical fibre is something that is much talked about but rarely seen as it is typically used as the backbone of a network. That is, the main network from which the other, smaller networks (typically using twisted pair) feed into. As such, it is usually hidden in the very structure of a building or run down a lift shaft.

One of the main benefits of fibre-optic is that because it uses light (rather than electricity) to transmit data, it is immune to electrical interference. And because of this it can transmit huge amounts of data. When you first see a fibre-optic network cable it's slimness is quite awe inspiring, especially when you realise that most of its bulk is just a plastic shield. In an ideal networking world all cable would be fibre-optic and then we would all be able to enjoy the benefits of immense bandwidth. But there is a cost hit with fibre because the equipment required to convert an electrical signal to light and back again is the expensive part, rather than the cable itself.

Satellites and microwaves

Wireless networking has often been hyped as the answer to all problems. The reality is that it is only cost-effective in specific scenarios, typically where there is the need for a short-distance network link and it is not feasible to install a permanent cable: between two buildings, for instance, or where great distances need to be covered and it is not known where one end of the network will be situated (say, a mobile link).

For short distances, microwave links are used where two or more microwave devices are installed in line of sight of each other. For greater distances, the wireless link is established using a satellite to act as the signal repeater. However, *PCW* readers are advised to forget about using satellite links as part of their standard network installation — it is not cheap and not that practical either.

Next month we will take a look at how Ethernet and fast Ethernet work.

●PCW Contacts

Mark Baynes is a web developer and IT journalist based in Brighton. He can be contacted at **networks@pcw.vnu.co.uk**

Choosing a **printer**

Eleanor Turton-Hill covers what you need to know before you buy an inkjet or laser printer — the differences, the technologies involved and the latest trends in the market.

Buying a printer is not a simple business these days. Even on a small budget of about £300, there's a whole range of products from which to choose.

The first thing you need to know is whether you want a laser printer or an inkjet. Laser printers produce much better quality black text documents than inkjets, and they tend to be designed more for the long haul — that is, they turn out more pages per month at a lower cost per page than inkjets. So if you need an office workhorse, the laser printer may be the best option. Another factor of importance to offices is the handling of envelopes, card and other non-regular media — and in these terms, too, laser printers have the edge over inkjets.

But inkjets have one massive attraction over lasers; they produce colour, and that is

what makes them so popular with home users. The down side is that although inkjets are generally cheaper to buy than lasers, they are more expensive to maintain. Cartridges need to be changed more frequently and the special coated paper required to produce high-quality output is very expensive. When it comes to comparing the cost per page, inkjets work out about ten times more expensive than laser printers.

Colour printing
Since the invention of the inkjet, colour printing has become immensely popular. Research in inkjet technology is making continual advances, with each new product on the market showing improvements in performance, usability, and output quality. As the process of refinement continues, so the price of an inkjet printer falls, resulting in

better deals for consumers.

Although colour inkjets hold more appeal for the home user than do laser printers, the way prices are going at the moment it's not completely out of the question to have one of each. You can get hold of a colour inkjet now for under £200, and the cheapest lasers start at about £280 (see our inkjet printer and laser printer group tests in the November '96 and January '97 issues, respectively).

How an inkjet works
There are several forms of inkjet technology but the most common is "drop on demand". This works by squirting small droplets of ink onto paper through tiny nozzles. The amount of ink propelled onto the page at any time is determined by the driver software that dictates which nozzles shoot droplets, and when.

Most inkjets use thermal technology whereby heat is used to fire ink onto the paper. Using this method, the actual squirting is initiated by heating the ink to create a bubble until the pressure forces it to burst and hit the paper.

Epson's printers work using a slightly different method called piezo-electric technology. This achieves the same end of squirting ink onto paper but instead of using heat to propel the ink, it uses a piezo-electric cell to mechanically displace and pump the ink through the inkjet head.

There are several advantages to the piezo method. Unlike normal bubblejets the ink does not have to be heated and cooled between each cycle. This saves time and the ink itself is tailored more for its absorption properties than its ability to withstand high temperatures. This allows more freedom for developing new chemical properties in inks.

The nozzles used in inkjet printers are hair fine and on early models they became easily clogged; a frustrating and messy business. This is rarely a problem on modern inkjet printers although changing cartridges can still be messy on some machines. Another problem with inkjet technology has been the tendency for ink to smudge immediately after printing, but this, too, has improved drastically over the past few years with the development of new ink compositions.

Inkjets have a number of clear advantages over other printing technologies. The most obvious is that they have become incredibly cheap to buy and run. Another advantage, which has developed over the past few years, is their ability to produce colour output as well as near-laser quality text. As the technology is fairly simple, inkjets require very little maintenance and are more environmentally friendly than lasers because cartridges are more compact and easier to dispose of.

Colour
Creating colour accurately on paper has been one of the major areas of research in colour printing. Like monitors, printers use just a few primary colours to mix into the many printing colours required — a process known as dithering.

Monitors and printers do this slightly differently however because monitors are light sources, whereas the output from printers reflects light. So, monitors mix the primary additive colours, red, green and blue
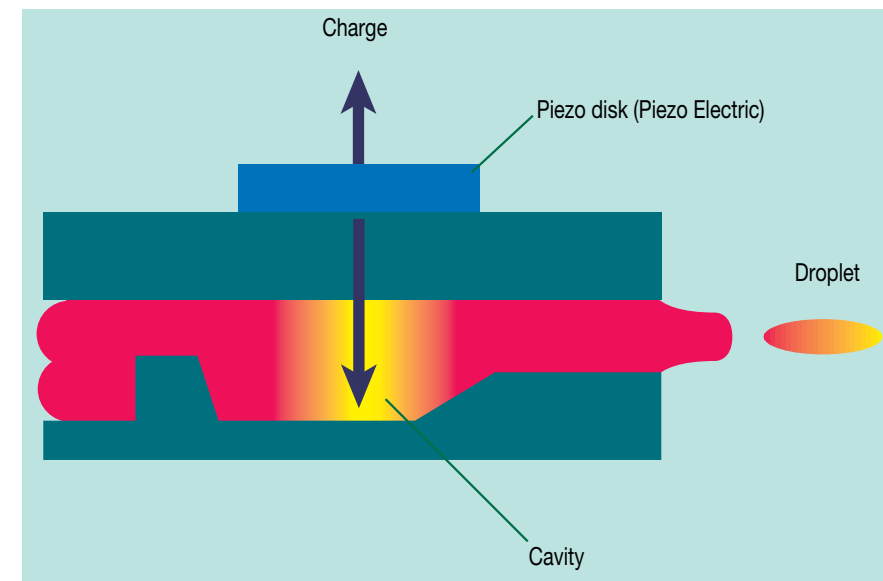
Epson's inkjet technology does not use heat. Instead, ink is forced out of the cavity using a piezo-electric cell

(RGB) while printers use the primary subtractive colours, cyan, magenta, and yellow (CMY). In each case, the basic primary colours are dithered to form the entire spectrum. Dithering breaks a colour pixel into an array of dots so that each dot is made up of one of the basic colours or left blank.

The accurate reproduction of colour from the monitor to the printer output is also a major area of research, known as colour matching. Colours vary from monitor to monitor and the colours on the printed page do not always match up with what you see on your screen. Also, the colour generated on the printed page is dependent on the colour system used by the particular printer model, not by the colours shown on the monitor. Bear in mind that there are some colours generated on-screen in the RGB colour model which simply cannot be reproduced on paper using CMY inks, so what you see on screen is not necessarily what you get on paper.

CMYK
Colour is now a standard function for inkjets. There are still a few monochrome inkjet printers on the market but most of the new models which have appeared over the past year offer colour functionality. Most inkjets these days are able to print in colour and in black (for plain text) but the way they switch between the two modes varies between different models.

The basic design is determined by the number of inks in the machine. Printers containing four colours — cyan, yellow, magenta, and black (CMYK) — can switch

between black text and colour images on the same page with no problem. Printers equipped with only three colours cannot.
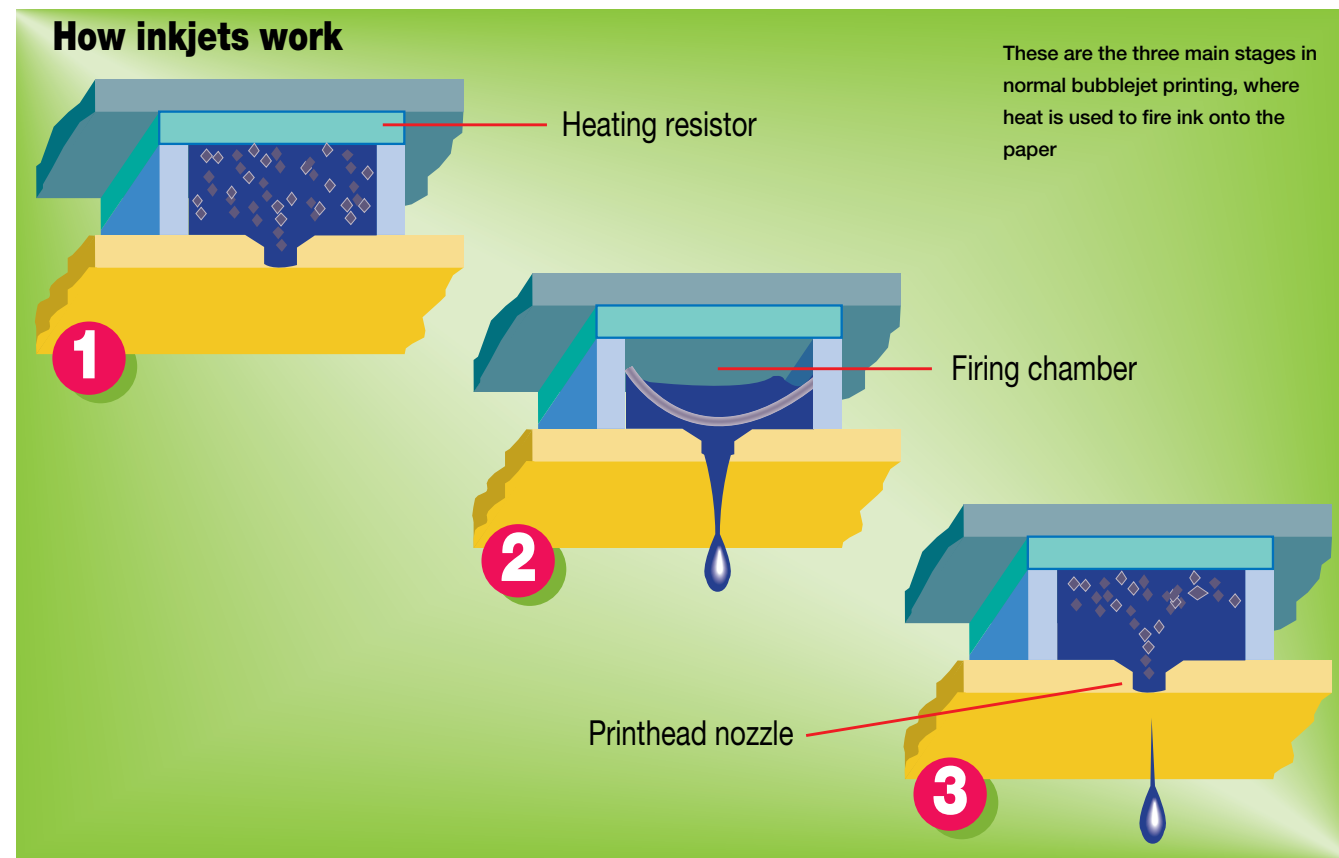
Many of the cheaper inkjet models have room for only one cartridge. You can set them up with a black ink cartridge for monochrome printing, or a three-colour cartridge (CMY) for colour printing, but you can't set them up for both at the same time. This can be very annoying. Each time you want to change from black text to colour, you must physically swap over the cartridges.

When you use black on a colour page, it will be made up of the three colours, which tends to result in an unsatisfactory dark green or grey colour, referred to as composite black. The composite black produced by current inkjet printers is much better than it was a few years ago due to the continual advancements in ink chemistry. The big bonus of the swappable cartridge printer is its incredibly low price tag.

Ink
Whatever technology is applied to printer hardware, the final product consists of ink on paper, so these two elements are vitally important when it comes to producing quality results. The quality of output from inkjet printers ranges from poor, with dull colours and visible banding, to excellent when approaching photographic quality.

Two entirely different types of ink are used in inkjet printers: one is slow and penetrating and takes about ten seconds to dry, and the other is fast-drying ink which dries at about 100 times this speed. The

How inkjets work

These are the three main stages in normal bubblejet printing, where heat is used to fire ink onto the paper

Heating resistor

Firing chamber

Printhead nozzle

former is generally better suited to straightforward monochrome printing, while the latter is used for colour.

When colour printing, because different inks are mixed, they need to dry as quickly as possible to avoid blurring. If slow-drying ink is used for colour printing, the colours tend to bleed into one another before they've dried.

The ink used in inkjet technology is water-based and this poses other problems. The results from some of the earlier inkjet printers were prone to smudging and running, but over the past few years there have been enormous improvements in ink chemistry. Oil-based ink is not really a solution to the problem because it would impose a far higher maintenance cost on the hardware. Printer manufacturers are making continual progress in the development of water-resistant inks, but the results from inkjet printers are still weak compared to lasers.

One of the major goals of inkjet manufacturers is to develop the ability to print on almost any media. The secret to this is ink chemistry, and most inkjet manufacturers will jealously protect their own formulas. Companies like Hewlett-Packard, Canon and Epson invest large sums of money in research to make continual advancements in ink pigments, qualities of lightfastness and waterfastness, and suitability for printing on a wide variety of media. They each now produce models which will print onto fabric. The ink in these models has been refined to survive exposure to light and washing.

The Epson Stylus Pro XL is ideal for small graphics bureaux which need accurate and fast colour printing for pre-press work

This BJC 240 from Canon is a three-colour swappable cartridge model selling for a street price of around £169

Inkjet printers have a long way to go if they are to become completely media independent, yet continual advances in ink technology are bound to find their way onto the desktop within the next few years.

Paper

Most of the current generation of inkjet printers require high-quality coated or glossy paper for the production of photo-realistic output, and this can be very expensive. Because one of the ultimate aims of inkjet printer manufacturers is to make colour printing media-independent, the attainment of this goal is generally measured by the output quality achieved on plain copier paper. This has vastly improved over the past few years, but coated or glossy paper is still needed to achieve full-colour photographic quality. Some printer manufacturers, like Epson, even has its own proprietary paper which is optimised for use with its piezo-electric technology.

Inkjet printers can become expensive when printer manufacturers tie you to their proprietary consumables. Paper produced by independent companies is much cheaper than that supplied directly by printer manufacturers, but it tends to rely on its universal properties and rarely takes advantage of the idiosyncratic features of particular printer models.

A great deal of research has gone into

the production of universal paper types which are optimised specifically for colour inkjet printers. PLUS Colour Jet paper, produced by Wiggins Teape, is a coated paper produced specifically for colour inkjet technology, and Conqueror CX22 is designed for black ink and spot-colour business documents and is optimised both for inkjet and laser printers.

Market trends

Another trend which is now emerging is the home user market for photo reproduction. This has been made possible by two major technological advances. The first, and major one, is that affordable inkjet printers are now capable of producing photo-realistic output. But secondly, and more interesting, is the birth of the digital camera. Pictures from a digital camera can be sucked directly into your PC, retouched and manipulated using image-editing software and printed out directly, in glorious high-quality inkjet colour.

Linked to this enthusiasm for photo reproduction is the recent emergence of affordable large-format printers. The vast majority of inkjets are tailored to produce output up to A4-size paper, but recently, as the market has become more developed, affordable A3 printers have begun to make an appearance.

The Epson Stylus Pro XL+ and the Tally 7070, for example, both sell for street prices between £700 and £800 (plus VAT). Epson's model is an A3 (full bleed) printer providing optional PostScript emulation software as well as an AppleTalk interface for the Macintosh (see our review in the October '96 issue).

The Tally 7070 prints up to A2-size output, which is impressive considering its price. But even more so is the new Canon BJC-4550 (reviewed in *PCW*, November '96) which you can obtain for around £399. This model can also handle envelopes and A5 paper but the disadvantage is that, unlike the Epson, its separate black cartridge must be used independently of the CMYK colour cartridge, especially if
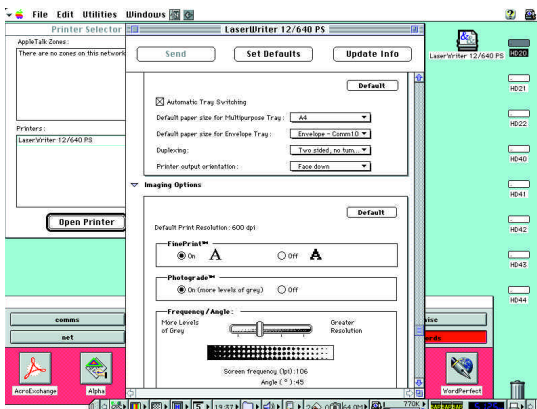
Worth the wait

Just like buses, you wait ages for one, then they all come along at once — new products, that is. Howard Oakley basks in the embarrassment of riches he thought would never come.

Just as a watched pot never boils, the moment I write that I'm still waiting for products, they turn up. Just after completing last month's column, my dealer (or maybe I should call them a reseller now?) rang to say that my Apple LaserWriter 12/640PS duplex laser printer had arrived. It came in three large boxes: one for the printer, a second for the duplex unit which sits below the printer, and the third for the 500-sheet feeder which goes at the very bottom. Assembly and installation of the 8Mb of extra memory to support duplex printing was straightforward, and I soon had the printer and my Power Mac 9500 powered up and networked.

The first snag came when I tried to find and configure the 12/640 using a copy of the Apple LaserWriter Utility, and the more recent Apple Printer Utility. Although both could see the printer and connect to it, they quickly came to grief when trying to print test pages. I reached for the stack of floppy disks which shipped with the printer and installed LaserWriter 8.4 (already superseded by 8.4.1). Its newer version of the Apple Printer Utility worked fine,

Full of the joys of spring cleaning

As the dark nights drag on, with Christmas and Hogmanay memories fading fast, set a few hours aside to start spring cleaning your Mac. Focus on these software topics:
1. Make a full backup of everything.
2. Run Disk First Aid to repair any problems which might have cropped up.
3. Run Norton Utilities for Macintosh (or an equivalent) to repair any glitches which Disk First Aid may not have dealt with.
4. Examine the allocation of disk space on each volume, ideally using the shareware DiskSurveyor.
5. Archive little-used files and applications which are wasting a lot of space.
6. Huck out redundant files in your Preferences folder; the shareware tools Prefs Cleaner and Yank can be quick and effective ways of doing this.
7. Clear out unused and unwanted System extensions and control panels; be ruthless!
8. Empty Netscape Navigator's cache folder.
9. Work through folders in which you store documents, archiving those which are inactive.
10. Use the Finder's Find... menu command to look for large files which can be compressed or thrown away altogether, files which have not been modified for more than a couple of months, and so on.
11. Run Disk First Aid and Norton again, and finally defragment each volume if you wish to.

DiskSurveyor maps selected volumes or folders to display how much space each folder and file occupies — a superb tool when you are performing housekeeping

The Apple Printer Utility from LaserWriter 8.4 gives full access to the LaserWriter 12/640 PS facilities, including multiple paper trays, duplex printing, and text and graphics smoothing

showing me the duplex option, Photograde picture enhancement controls and so on. It was then I discovered that I could not use text and Photograde enhancement at the same time as duplex printing, without adding still more memory. A few days later, my dealer was visibly pleased at supplying me with a single 32Mb SIMM. I had a total of 40Mb of memory in the printer, and could make full use of all the options.

The 12/640 has performed faultlessly ever since. By the time I had added the duplex and 500-sheet feeder options, it is rather tall at 42cm, with a further 20cm or so being allocated for the opening top section. It has also printed two copies of the same letter back-to-back on the same

single sheet of paper, when common sense would have suggested that was pretty dumb. Otherwise, it is a beautifully effective printer of high-quality double-sided A4 pages.

Apple's Net Kit

Apple Internet Connection Kit version 1.1.5 arrived at more or less the same time. If you have a CD-ROM drive but have not yet got onto the internet, it is a cheap, polished and thoroughly sound basis for getting started. If you already know where to look for the latest version of Eudora Light (just released at 1.5.5, by the way) and can't wait for the next round of the Microsoft/Netscape browser battle, you will probably not find much on it to set your modem alight, apart from a limited feature edition of Claris Emailer, of course.

Free Lisp

I am delighted to be able to add another excellent free Mac programming language to the list started last month. Admittedly it is only a demo version of a commercial product, but this is fully-functional and runs for a limited time before quitting. Mac Common Lisp 4.0 (for Power Macs) is a mature, complete and impressively quick implementation of modern ANSI Common Lisp, from a software house just down the road from MIT, Digitool.

If you still believe that Lisp is slow, ungainly and impractical, MCL should be a revelation. It is also a reassuring piece of Apple history: its original incarnation, Macintosh Allegro Common Lisp, was developed by a small but brilliant third party company called Coral, until Apple bought the product and personnel by mutual agreement. MCL then went on to sell hundreds if not thousands of Macs into MIT and other US universities, where Lisp remains the key language for much of artificial intelligence. Apple's bright minds in Massachusetts fathered the Dylan language too, but a couple of years ago the group was broken up, MCL going back out to a third party, Digitool, who are clearly bearing the torch with pride.

DAVE not Bob

Software which uses personal names always makes me cringe, more so than inadvertent linguistic blunders in names such as Publish It! After Microsoft's Bob, perhaps it is only appropriate to welcome DAVE, an obviously American product as it
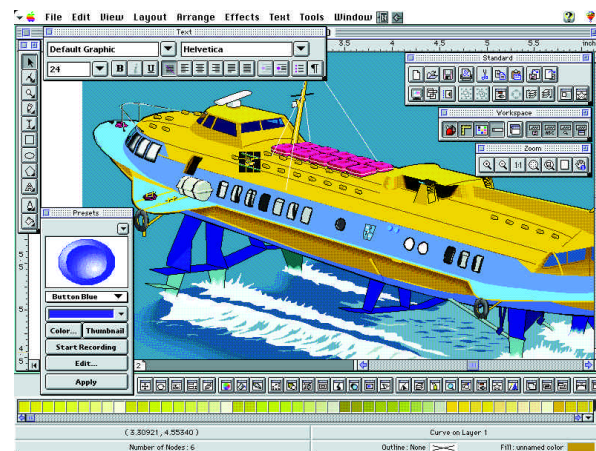
Left CorelDraw 6 is a most tasteful port which makes full use of the Mac OS environment but sacrifices none of the power it enjoys on the Windows platform

Below Corel Artisan is a combined painting and image-editing tool with more features than the majority of users will ever use

is either in capitals or some hideously contrived acronym. But beneath the name, DAVE sounds like the first item on a lot of wish-lists. By dint of TCP/IP protocols, it enables you to make Win95 and NT files and printers available to networked Macs. Thursby Software Systems claims that it integrates fully with NT Services for Macintosh and supports messaging, and I will report further once I have had a chance to try it myself.

Corel Classic

After a shaky start, and in spite of some nasty bugs, Novell WordPerfect 3.1 always struck me as being much less irritating than Microsoft Word. Acquisition by Corel worried me greatly, and I confess that I retreated to Word even if it now does everything but highlight the right words and characters. Corel's track record in porting (or rather, failing to port) CorelDraw to Mac filled me with gloom. But I take it all back — the three CD-ROMs which make up the new CorelDraw 6 Suite are exceptionally good value (about £100 for a cross-grade from almost any Mac graphics application) and reveal a true understanding of the Mac interface on the part of the programmers.

On the CDs you'll find the massive suite of Corel graphics software including CorelDraw itself, CorelDream, a 3D modelling application, CorelArtisan, a bitmap image editor, CorelTexture, for bitmap texture creation, CorelTrace, CorelChart and WordPerfect 3.5.1. These are not cheap-and-cheerful tools but are competitive with products from Adobe and Macromedia. Installation of the whole suite, less clip-art and other goodies, will require a
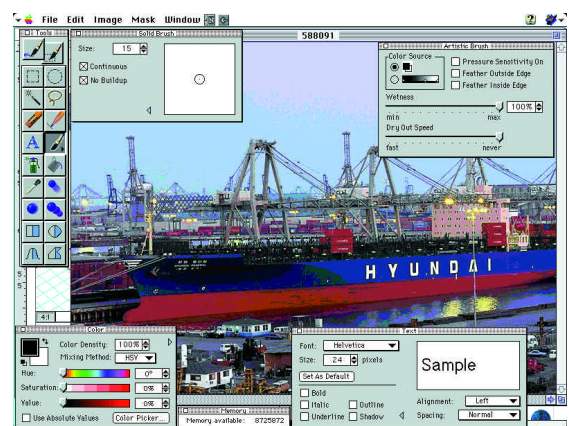
mere 250Mb of disk space, but it is easy to install single components in order to decide whether you want to use them. The price? An astonishing £100 or so provided you are cross-grading from any of a long list of other products. If you have a CD-ROM drive CorelDraw Suite 6 is an essential purchase, even though you may only ever use one or two of the applications.

Brainteasers

Quickie

What number, consisting of 5 different digits, increases by 78,633 if you read it upside down?

This Month's Prize Puzzle

A puzzle in logic this month. It shouldn't prove too difficult, I'm sure.

Annie, Beryl, Celia and Daphne are all friends, and two of them are mother and daughter. Recently they went to a second-hand book sale to see if they could pick up any bargains. Every book Annie bought cost £3, every book Beryl bought cost £4, every book Celia bought cost £6, and every book Daphne bought cost £8. The mother bought the most books, and spent £72 altogether. The daughter bought the fewest and spent £24 in total. The total amount spent by all the women was £161. What are the names of the mother and daughter?

Send the solution to: PCW Prize Puzzle February 1997, P.O. Box 99, Harrogate, N. Yorks HG2 0XJ, to arrive not later than 20th February 1997. Good luck!

Winner of November 1996 Prize Puzzle

Well, we thought that the problem about my ancestor's army would be too difficult for most of you, but we were wrong, as the 113 entries showed — with over 100 of them correct.

We had a bit of a panic when it turned out that one of our most trusted regulars had a different answer from ours.

This usually means that our answer is wrong or the wording of the problem is ambiguous. However, this time I think we're okay and our faithful reader has made an almost unheard-of mistake.

The answer we wanted used the first prime after 19 that satisfied the conditions and gave the result of an army size of 9,669,688, in rows of 29.

The winning entry came from Mr C.C. Edwards of Bristol. Congratulations, your prize will be with you shortly.

Meanwhile, to all the others — keep trying. You could be the next winner.

JJ Clessa ∎

Computations

Soaring on tax dollars

Is aerospace subsidised? If so, how can it square with GATT? US federal spending on major companies' aerospace programmes nearly doubled in the 15 years running up to GATT. Official figures show a weekday's spending at $125.6 million in 1975, and $233.3 million in 1990.

Success in the glamour end of the business, space exploration, was patchy, with a 12.6 per cent failure rate overall: out of 1,154 US spacecraft to 1989, 144 failed to achieve orbit.

Now, Boeing is planning to cash in by launching up to 1,000 satellites from a converted oil-rig in the mid-Pacific. Should it not first be paying back out of its huge annual turnover — bigger than Egypt's — some of the huge amount of public funding it has received? Why does it seem so improbable that GATT will issue even the smallest squeak on the topic?

A chilling thought

As controversy raged over global warming, industrial statistics were being assembled which show that in 1985 Americans bought 2.9 million air conditioner units, rising to 4.9 million in 1989. Perhaps those professors denying the crisis were among the purchasers. The 70 per cent partly reflected vast building programmes in the sun-belt, but also demonstrated the vicious circle of electrical cooling: air conditioners export heat to the outside, causing warm towns and cities to become even warmer, prompting more people to install air conditioning. They also boost demand for coolants, most of which are ozone-layer destructive, and increase electricity consumption, which forces the very climate change that people are seeking to escape.

Heat exchangers and adaptive architecture are the only way to redevelop sustainable sunbelt suburbs.

Power surge

The Air Resources Board in California has calculated that 10 per cent of smog-forming non-automotive hydrocarbons

come from personal consumer products. About 2,600 products are involved, including cleansers, fixatives and aerosol insecticides. Electrical appliances are subject to no controls at all, with the result that their use is, er, out of control.

The annual rates of increase of US consumer purchases of power-guzzling appliances are alarming. For example, sales of electric shavers are set to double in 11 years, electric coffee makers in 15 years, electric toasters in 11 years, electric food processors in 16 years, electric can openers in 11 years, electric hair dryers in 11 years, lit make-up mirrors in 17 years, and vacuum cleaners in 12 years. The only small energy-consuming appliance US consumers are not buying more of every year is the electric corn popper.

By the way, that's just small appliances: another 130,000 major electrical appliance units are sold in North America every day, a stack about 90 kilometres high.

Statellite

If the British Film Institute ever raises the £20 million it wants from the lottery funds and manages to put its 275,000 archived movie and TV titles on-line, a film student will be able to watch a different clip every five minutes of the working day for 13 years.
∎ Source: BFI

News

Stuck in the jam

Just when you thought Britain's sports traditions were safe, out comes yet another American sporting game to take over our world.

NBA Jam Extreme, from Acclaim Entertainment, is due to be released this month, and pits the best and most famous basketball players in the NBA (National Basketball Association) against each other, in teams of two.

The "all new" 3D engine is supposed to give new levels of realism to the gameplay. Acclaim used motion capture technology to record every move of the NBA's Juwan Howard and digitally transferred this information to animate the other players in

Ooh! Watch the Pros do some serious slam dunking

the game.

But it does not stop there. For those of you who have spent some time in the USA, you will also hear the familiar commentary of Marv Albert, the American equivalent of our very own John Motson.

£34.99 (Incl VAT)
Acclaim 0171 344 5000

Deadly G-NOMEs

3D game action is on the way in G-NOME. It uses 7th Level's 3D engine Top Gun, Microsoft's DirectX technology and a new sophisticated Artificial Intelligence, providing an "adrenaline rush of man versus machine." Taking the role of a Union Federation sergeant, you lead a mission to locate and destroy the deadly bio-weapon, the G-NOME. You face evil Scorps, Darkens and Mercenaries, all armed to the teeth with modern killing machines. Release is expected in late January.

£39.99 (Incl. VAT)
7th Level 01932 355 666

Bounty hunting, for the boys

Sex sells! Or at least the promise of sexy-looking young women does if the new game, Takeru: Letter of the Law, is anything to judge by.

Scheduled for a late January release date, this Japanese transplant, from Sun Soft, should get any imaginative young man with a brain excited.

Takeru is a Manga role-playing game which involves a violent world where magic, technology and martial arts are needed to survive the evil exploits of the powerful sorcerers.

You are Takeru, part bounty hunter part Ninja who is the only one capable of defeating the evil forces. You'll face many obstacles including, according to Sun Soft, "the most beautiful (and long legged) women ever to be found in a videogame."

Sexy young women can be an obstacle to your progress in this game

With hours of speech and sound effects, plus a rocking soundtrack by Rory McFarlane, Sun Soft hopes Takeru will make the cultural leap into the UK.

£34.99 (Incl. VAT)
Contact Sun Soft 0171 374 2766

Realms of the Haunting

A perfect game for the inquisitive mind.

The first thing to strike you about this game is the four accompanying CD-ROMs; when I saw this I knew I was in for a long haul.

In Realms of the Haunting (ROTH) you are Adam Randall, a young man drawn to the Cornish village of Helston. There you enter a spooky house where you meet "your" dead father Charles Randall, a one-time preacher, who tells you that his soul is trapped in this evil place and you are the only hope for his soul's freedom. And from there the journey into evil begins.

The gameplay in ROTH is incredibly intricate. Similar to Doom or Quake in feel but lacking in non-stop action gore, this is game is perfect for the inquisitive mind. As you progress you must collect all sorts of items, like orbs, letters and magic potions to use along the way. But don't fret, there's still plenty of action to be had. As you travel from room to room and from realm to realm

Break out that Colt 45. You're gonna need it!

you will still need to use the Colt 45 handgun or grenade launcher you've picked up to help battle plenty of evil foes.

Gremlin has done a good job of creating a complex and interactive game. The graphics are about average, but you can adjust it to run to a maximum of 320 x 400. According to Gremlin, it should take a dedicated player about 100 hours of game play to crack ROTH. The addition of full motion video sequences introducing you to the various characters (who provide essential clues and advice) make this game fun to view, as well. Roth is aimed at the gamer who likes to think, play and shoot, all in one go. And as I'm one of these, I'll give it both thumbs up.

Dylan Armbrust

•PCW Details

Price SRP £44.99 (Incl. VAT)
Contact Gremlin 0114 275 3423
System requirements 486/66 DX2 or faster, 8Mb RAM (16 recommended), Windows 95, 2X CD-ROM, SoundBlaster compatible soundcard, VGA graphics or better, mouse.

★★★★

The Neverhood

Brain-bending puzzles with 'Plasticine' people.

Once you get a grip on The Neverhood, you won't want to let go. You take the role of a character called "Klaymen", a strange-looking being.

It took three tons of clay to create the dozens of photo-realistic environments in the game (eat your heart out Wallis and Gromit!). The characters and storyline were created with over 50,000 frames of stop-motion animation and although this makes the game fairly slow, it is not a problem.

The object is to save The Neverhood from the King's conniving, evil, assistant by guiding Klaymen through a series of puzzling levels. Try to crack the twisted puzzles while picking up video tapes along the way, which give you essential clues to completing the game.

Whoops! Klaymen has taken a wrong exit

Neverhood is not a game for people who expect lots of action, or violence. It is by no means an easy game to play. Instead of being up against a mean beast, you face brain-bending puzzles and mysteries, making this game unsuitable for someone with a short attention span.

I spent hours playing The Neverhood, because it was such a cracker. I would compare it to a book you cannot put down — I just had to get to the end of it. The Neverhood is ideal for bright children or those over 17 years old. Bend over backwards to play it.

Etelka Clark

•PCW Details

Price £49.99 (Incl. VAT)
Contact Microsoft 0345 002000
System requirements Pentium 75MHz, 8Mb RAM, quad speed CD-ROM drive, SVGA monitor, 8-bit Windows compatible sound card and speakers, 10Mb hard disk space, Win 95

★★★★★

Daytona USA

Put your foot down but remember to ease up for those hairpins

As you can probably guess, this is a racing game from Sega. In fact, you could probably guess most of what I'm about to say because this game breaks no racing games traditions nor does it come up with anything new.

Your vehicle is a stock car. Without the worry of finances, injury or a telling-off from the pit crew, you can thrash your car around three tracks. Beware of the repetitive voiceover, telling you to keep away from the wall but apart from that, the competitors, their cars and the terrain surrounding the track is all yours.

There are two modes — PC and Arcade. The fun started when I switched to Arcade mode as the game seemed to flow smoothly, the pace quickened and the whole experience was transformed.

The game is good with impressive graphics although it suffers from pop-up problems. Pop-up is when the landscape

Oh dear! I've lost it… again

pops up as you approach it, rather than being redrawn. You can choose your view and select manual or automatic gears.

At the end of each race, during which you take your car into the pits for an overhaul, you get placed out of 40 racers. Sadly, I can't say what happens if you reach the giddy heights of medal positions or even the top 20.

The choice of three tracks leaves me wondering how much challenge or

playability exists for racing game aficionados. But I doubt many die-hard racers would turn to the PC platform anyway. The appeal of games like this remains in the arcades where people can race against others. That appeal is lost on the PC. After playing on even a 32-bit console, this seems a bit tame.

Sega admitted it had rushed this game on the Saturn, although it has transferred well to the PC. Sega Rally promises to be a better game so maybe it is worth waiting for that to be released.

Rachel Spooner

●PCW Details

Price £39.99 (Incl. VAT)

Contact Sega 0181 995 3399

System requirements Pentium 90 or higher, four-speed CD-ROM drive or higher, 50Mb hard disk space, 8Mb RAM, 16-bit soundcard, SVGA graphics, Windows 95.

★★★

Archimedian Dynasty

Your own sub, 30 weapons and World War III to fight.

As supplies of raw materials came to an end in the 21st century, nations were driven to the seas to uncover new resources. Some found work as engineers in deep-sea stations and built huge empires. Back on the Earth's surface conflict became commonplace, alliances fell apart and later, well, let's call it World War III began. The new underwater world became known as Aqua and the struggle for power began.

In this game, you take the role of an independent submarine pilot. What you do and who you work for depends on the missions you accept. Plotting the downfall of huge corporations, working as a double agent and taxiing important people around is all in a day's work.

Having spoken to the right people, picked up a few hints and armed your submarine, the action begins. Your sub is

Yup, that's definitely a hit!

controlled in much the same way as the ships in Descent. There are, however, a load of new keys to learn that operate sonar, tracking devices and, when you can afford them, auto-seeking turret cannons.

On completion of lucrative missions, you can look up arms dealers and upgrade to a super-sub kitted out with up to 30 different weapons. You communicate with other

characters using an advanced dialogue system and soon establish contacts all over the globe. Be careful what you say, though: you don't need any enemies.

Once you get stuck into this game, it's loads of fun. The 3D engine is slick and the high-resolution graphics are in a league of their own. The gameplay can be a little slow at times and you find yourself wondering what you're supposed to do next. Lucky then, that you can just go off and explore the murky depths.

Steven Helstrip

●PCW Details

Price RRP £44.99 (plus VAT)

Contact Blue Byte 01604 259090

System requirements 486DX/100 (Pentium recommended), 8Mb RAM, 35Mb hard disk space, 16-bit soundcard, and the fastest CD-ROM you can lay your hands on.

★★★★

Enterprising ideas

The Elan Enterprise broke new ground with high screen resolutions and stereo sound. Simon Rockman laments its death as the last of its generation.

There was a time when every new computer was different. Completely different. Each new computer had to show real progress over its predecessor. Today we get excited if we see an identical computer to yesterday's but with a ten percent faster clockspeed. Imagine how it would be if someone announced a computer which wasn't just a progression but which was miles ahead of anything available today. Such was the excitement when the Elan Enterprise was first talked about. The CPU was industry standard stuff, a Z80A, but otherwise this was a very special machine.

There were custom sound and graphics chips — one of which had been designed by a chap who had become famous through a *PCW* competition to build an intelligent robot mouse. In those days a micromouse wasn't a pointing device. The machine even looked special: one commentator called it the "melted" computer because the edges were rounded, and a joystick was built into the top.

The name caused a problem. The Elan courier company objected and the name had to be changed. For a week it was rumoured it would be called the Flan — it meant doctoring the E in the name — but finally the machine became the Enterprise, named after the company which had designed it.

Despite having been shown at some computer shows — the important one at the time was the *PCW* show — the Enterprise was late. Delays in producing the custom chips meant that by the time the machine shipped it wasn't streets or even minor lanes ahead of the opposition and

the disappointing performance coupled with a high price (over £300) meant that its 64K was the greatest memory people have of it. The screen resolutions available were high for the day; up to 672 x 512 with up to 256 colours, although as this was in interlaced mode it flickered like crazy unless you had a long-persistence monitor. The Enterprise was ground-breaking in that it had stereo sound. As no monitors had speakers this meant wearing headphones, and a networking port was needed. But this wasn't working on any of the review machines and it's very likely it never actually met the specification. Worst of all the machine was very slow, which after a year of waiting was a huge disappointment.

BASIC as a programming language was *de rigueur* and the Enterprise had an advanced dialect complete with indenting and long variable names. There were some interesting keywords like the BANH (V), BOOM(V). POP(V) and PING(V) sound-effect commands where V specified the volume and PAINT (X,Y) filled an area. Users keen on sound could define the
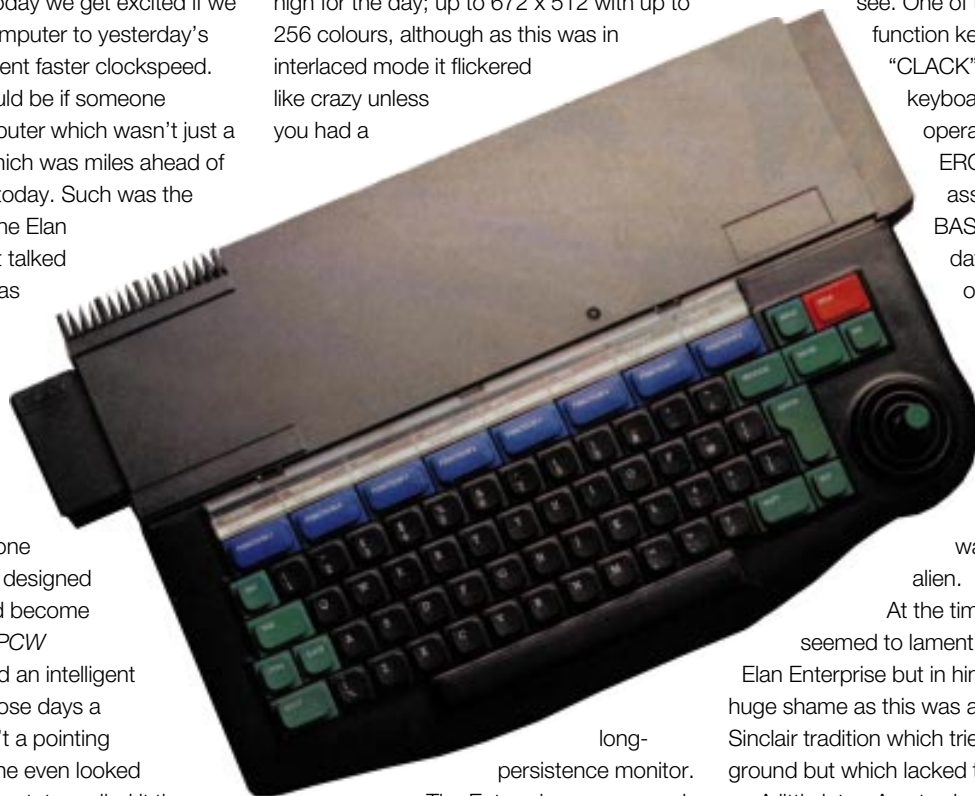
envelope. A row of eight function keys was provided with a simple legend, but they were easy to re-program and, thanks to the bright blue pigment, easy to see. One of the default function key settings was "CLACK" which turned the keyboard sound on. The operating system, EROS, was closely associated with the BASIC. This pre-dated proper operating systems on mass-market micros and the thought of multitasking on anything you would have at home was completely alien.

At the time, no-one seemed to lament the death of the Elan Enterprise but in hindsight it was a huge shame as this was a computer in the Sinclair tradition which tried to break new ground but which lacked the backing.

A little later, Amstrad stole a march with a much less ambitious computer but with a better price and an ability to hit the deadlines. The Enterprise had virtually no software and, despite a good review in *PCW*, failed to sell. Even people with long outstanding orders cancelled them.

All this makes the Enterprise the ideal target for a modern collector of retro computers. Unloved back then they are much sought after now. I once let one go and still regret it.

In the meantime, Commodore built on the success of the 64, which had some excellent games and Acorn on the BBC Micro so there was no scope for the Enterprise. The PC arrived and killed off the innovative computers, thereby making the Elan Enterprise the Last Generation. ∎

Software and printer **bonanza**

Win £1,500-worth of Microsoft products! Win an NEC laser printer!

Microsoft £1,500 product give-away bonanza

Those of you who have just unwrapped that new Christmas PC won't want to pass on this month's competition.

Microsoft is offering a once-in-a-lifetime chance for a lucky *PCW* reader to win £1,500-worth of Microsoft products. You'll get the smart new Intellimouse, the comfy Natural Keyboard and the super SideWinder Pro 3D joystick.

Then there's the famous Microsoft reference software including Encarta 97, Encarta World Atlas, Cinemania 97, AutoRoute Express, games and more! Just take a look at the list below.

Grab that pen and send us your entry to win this fabulous prize, consisting of: • Flight Sim 6 • Golf 3.0 • Close Combat • Monster Truck Madness, • Hellbender • Deadly Tide • Football • Full Court Press • GEX • Encarta 97 • Encarta 97 World Atlas

•Bookshelf •AutoRoute 5.0 GB •AutoRoute 5.0 Europe •Cinemania 97 •Music Central 97 •Wine Guide •3D Movie Maker •Nickelodeon 3D Movie Maker •Creative Writer 2.0 •The Neverhood •Publisher 97 •Money 97 •Picture It! •Greetings Workshop •Side Winder Pro 3D joystick •Side Winder Game Pad •Natural Keyboard •IntelliMouse.

A long list of fabulous Microsoft software titles is waiting to be won

■ To enter, just tell us who founded the Microsoft Company. Was it:
a) Norman Bates and Paul Gasgoine?
b) William H. Gates and Paul G. Allen?
c) Bill Gates and Steve Jobs?

SuperScript 860 printer

NEC is offering its superfast SuperScript 860 laser printer to win in the second part of this month's *PCW* competition. This is a laser printer that anyone would be proud to own. It was the winner of our coveted Highly Commended award in last month's laser printer group test (*PCW* Jan '97).

The Superscript is capable of printing 8ppm in true 600dpi resolution. The driver software incorporates the powerful Adobe Print Gear, making print options incredibly versatile. It's also capable of working from one PC or in a network environment. With "stunning" output quality and speed, this is certainly a printer worth going for.

■ To enter this competition just tell us what is the name of the special software incorporated into the drivers. Is it called:
a) Head Gear?
b) Adobe Flint Gear?
c) Adobe Print Gear?

How to enter

Write your answer(s) on a postcard or on the back of a sealed envelope. *Mark each answer as "Microsoft" and/or "NEC".* Include your name, address and daytime phone number and post to: PCW February Competition, CMS Ltd, P.O. Box 11312, London WC2H 0DJ. Entries must arrive by 14 February 1997.

If you do not wish to receive promotional material from companies other than VNU Business Publications, please say so on your competition entry.

Rules of entry

This competition is open to readers of *PCW*, except employees, and their families, of VNU Business Publications, Epson and Adobe. 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.

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● See opposite page for details
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