Personal Computer World

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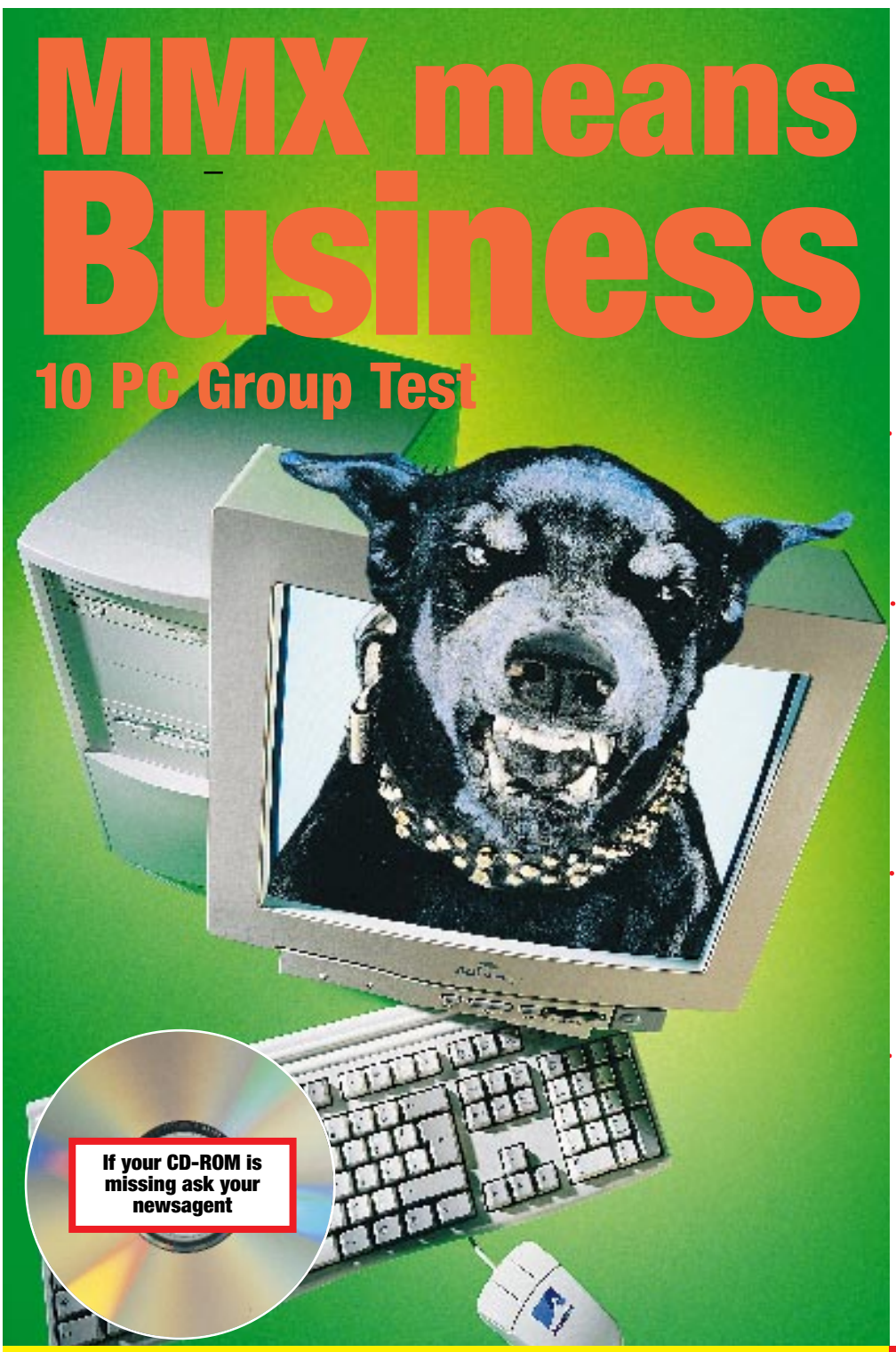

If your CD-ROM is missing ask your newsagent

EXCLUSIVE

Intel's Klamath revealed!

Looking Good

17in Monitor Giant Test

GROUP TEST

Desktop Publishing Packages

£3000

Apple Competition p339

Reviewed: LivePix, MMX notebooks, Flow Charter 7, Fractal Dazzler

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On the CD: Serif PagePlus, RedHat Linux 4.1, Dreamworks Neverhood, JDK 1.02

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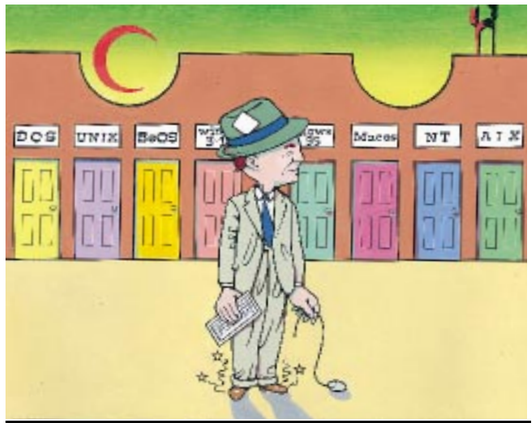

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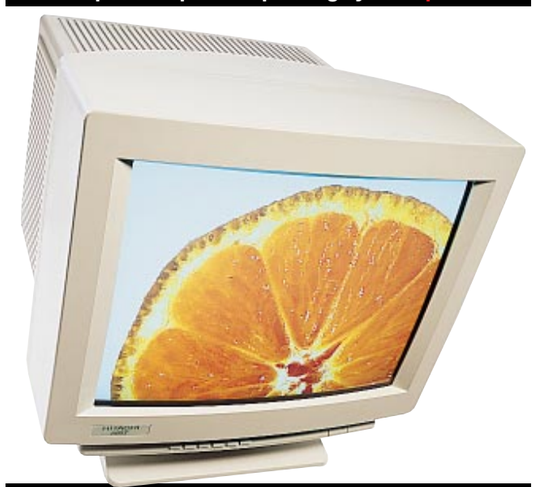

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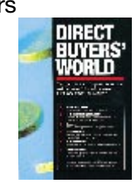

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Direct Buyers' World

The place in *PCW* where you can compare prices on a wide range of hardware and software. The card insert at page 341 marks the start of the section.

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Personal Computer World

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Editorial

Intel's Andy Grove is reported as being a paranoid man. He's even written a book on the subject: *Only The Paranoid Survive*. For a multi-billionaire he certainly never looks very happy. Despite running one of the world's richest corporations, he knows that success can never be taken for granted. Intel was once brought to the brink of bankruptcy after aggressive Japanese interlopers wiped out its core memory chip business. It got out of that and into the burgeoning high-tech processor chips, something the Japanese knew nothing about. It was a brilliant move. Most PC buyers know that Intel dominates this business like a colossus, its rivals tiny in comparison. But one, Cyrix, can still get Grove's paranoia rising. As Tim Bajarin reports *(News Analysis, page 41)* the arrival of $999 Compaq Presario with a Cyrix Media GX chip onboard is a prime example. The key is cost: Cyrix has produced a 133MHz chip with graphics acceleration and onboard audio (no sound card!) for less than $80. This compares with over $300 for an equivalent Intel chipset. This may cause Grove's heart to miss the odd beat, but for the rest of us, the presence of Cyrix in Intel's backyard can only be good news. We look forward to evaluating the new Compaq as soon as possible and hope that Compaq keeps the price as competitive here in the UK.

But there's no doubt that what Intel does drives the market. The MMX architecture has already been accepted as the new standard and it is not just about making games look and run better. MMX has a deserving place in business too and this month's group test *(page 126)* looks at ten MMX machines ready for business.

Looking further ahead we reveal the secrets behind Klamath, now officially known as the Pentium II and designed to replace the poor-selling Pentium Pro. Turn to page 98 to see whether Intel can succeed, especially as NT starts to achieve critical mass. Intel has been, even by its own standards, amazingly quiet about Pentium II, but first indications are that it will be nothing less than state of the art. For those who need the ultimate in processing power, it looks like Pentium II will be the way to go. Is paranoia the mother of invention?

PJ Fisher, Managing Editor

Next Month

High-end workstations, sound cards and PIMs get the VNU European Labs treatment.

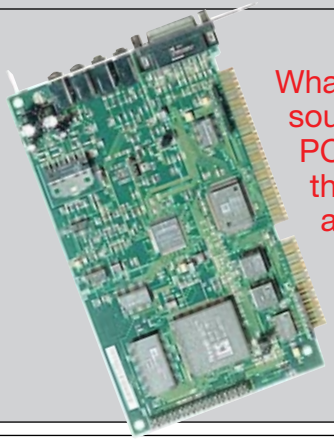
NT Workstations

Should you go for Pentium Pro, dual processors or even RISC? We hit the high-end in search of NT nirvana.

PIMs

Which one will organise your life the best?

Sound cards



What's the "in" sound on today's PCs? Includes the latest music and sound software.

NEW!

Network Computer World. *PCW*'s new regular network section débuts next month.

June '97 issue
■ On sale Saturday 26th April

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

Personal Computer World

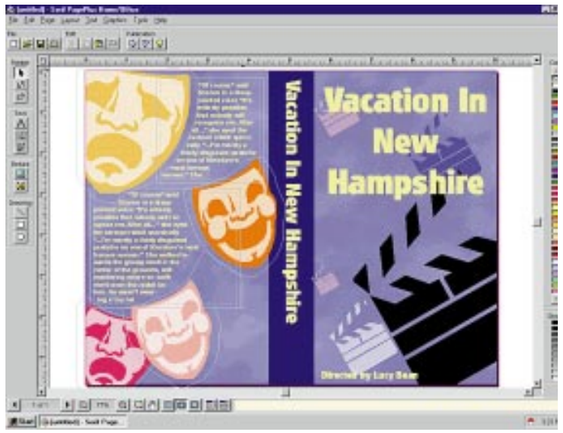
May Cover disc

This month we had so much to squeeze onto the CD that we haven't included the main interface. Instead, when you run PCW.exe a large dialog box appears showing the main programs on the CD.

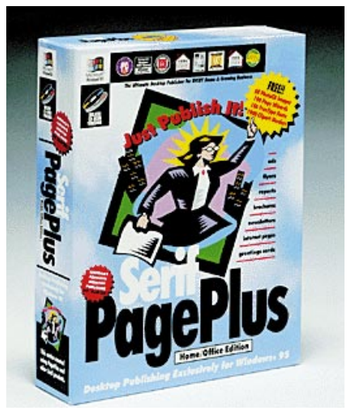
Serif PagePlus 4

First on the list is Serif PagePlus 4. It's the latest in the award-winning PagePlus line. Serif has added the professional features needed for high-end publishing to the ease-of-use of the highly successful PagePlus Home/Office Edition in a powerful 32-bit application designed exclusively for Windows 95.

PagePlus 4 can do it all with over 200 automated Page Wizards, or let you do it yourself with total control and professional-level features. ToolHints, QuickHelp, Wizards and Interactive Demos provide



total ease-of-use. WritePlus, provides integrated word processing with word count, search and replace, spell-checking, thesaurus and proof reader. LogoPlus is built-in to produce powerful text effects and



logos. Precision typographical features, direct TWAIN scanning and versatile printing capability mean you can produce professional quality results in colour or black and white straight from your PC. It's the complete desktop publishing package for your home, school or growing business.

• The recommended retail price is £99.95 (Incl VAT) but in conjunction with Serif we're able to offer *PCW* readers an exclusive price of just £29.95 — a saving of 70 percent on the standard price.

Serif DrawPlus 3

DrawPlus 3 is the latest in the DrawPlus line from Serif and is designed for Windows 95 only. Powerful creative and ease-of-use tools have been added while keeping the simplicity of Serif software.

Over 150 Design Wizards provide instant designer drawings and publications, tailored to your requirements, for all kinds of business and home-based tasks.

Can't draw — won't draw? Well Quickshapes are the answer! Working like intelligent clipart they provide the most powerful set of drawing tools you've ever imagined. Even complex shapes like spirals, petals and webs are simple to draw and customise.

Logo Wizard makes it simple to add eye-popping text effects to a drawing. Adding abstract or themed backgrounds is easy with Background Wizard. If you need to create a difficult effect, Watermark Wizard makes it simple and there's a wide range of designs on hand. The very flexible Border Wizard instantly adds borders to the page or to individual objects.

From the fun stuff (cartoons, masks, monsters and games) to professional standard drawing features (envelopes, automatic shadows, layers and multi-colour fills) DrawPlus does it all!

• The retail price is £59.95 (Incl VAT) while the exclusive *PCW* price is £19.95.

Serif ArtGallery

(*Only available when purchasing PagePlus 4 or DrawPlus 3*). At a recommended retail price of £49.95 (Incl VAT), it has all the creative resources you'll ever need… and then some! The Serif ArtGallery contains: 17,000 stunning clipart images, 500 professional photos, 400 high-quality TrueType fonts.

Special bundle deals available at upgrade prices

Serif PagePlus 4 *and* Serif ArtGallery — ONLY £39.95

Serif DrawPlus 3 *and* Serif ArtGallery — ONLY £24.95

Serif PagePlus 4 *and* Serif DrawPlus 3 *and* Serif ArtGallery — ONLY £59.95

To order any Serif products at these special prices, call 0800 376 7070, quoting reference RO/PCW/0597.

■ To install the programs onto your desktop from the floppy, put the disk into the drive.

Windows 95: Click on START\RUN from the taskbar. Type into the box a:\PCW0497. Click OK.

Win 3.11: Go to FILE\RUN on PROGRAM MANAGER. Type into the box a:\ PCW0497.EXE then click OK.

Floppy disk

This month's floppy contains Free the Music. It lets you explore all the midi music features of your computer just by pointing with your mouse. There's also an entertaining desktop game called Bombs.

Neverhood

The demo we've included on this month's CD includes a big, playable, chunk of the full game. Neverhood is an adventure game produced as a joint effort by Dreamworks Interactive and Microsoft. It's an original clay-animated adventure from Doug Tennapel, of Earthworm Jim fame. Through our hero, Klaymen, players find themselves in the Neverhood, a land of fierce creatures, extraordinary machines and mysterious artefacts. Long ago the king of this world was betrayed by his trusted (yet evil) assistant. To defeat the enemy, players must save the Neverhood by navigating Klaymen through a plot of ancient secrets, witty inventions and puzzles.

Over three tons of clay were used to create the animated characters, with over 50,000 frames of stop-motion animation,

p18

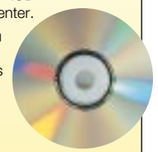
How to use the CD-ROM

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 autoload, 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, Video for Windows or Acroread with search plug-in 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 problems

CD-ROM

■ If you get a message such as "Not ready reading drive D:", you may have a dud CD.

Return the disc to: TIB plc, TIB House, 11 Edward Street, Bradford DB4 7BH, for a free replacement.

■ For other problems concerning the CD, call 0891 715929. (All calls cost 50p/minute).

FLOPPY

■ If you have problems with the floppy, such as the message "cannot read from drive a:", please return the disk to TIB plc, TIB House, 11 Edward Street, Bradford BD4 7BH, together with an 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 software on a networked PC without having checked it first.

more than 60 puzzles and a Dixieland Jazz/Blues musical score.

F22 Lightning II

Novalogic's flight simulator lets you take control of one of the latest US Air Force F-22s and jet off around the world on missions to face deadly adversaries. The new Polygon engine, with high-density texture-mapped polygons, ensures realism.

PrintMaster

Perhaps games aren't your bag. In which case the PrintMaster suite from Mindscape could be for you.

It's designed to make light work of printing letterheads, business cards, posters, news sheets, calendars, fax sheets, certificates and greeting cards. You can choose from any one of hundreds of predefined templates. The demo version we've included on the CD copes with cards only but will provide you with some idea of the possibilities.

Dr Solomon's Find Virus

A fully-working, but time-limited version of this virus detection package is available for you to try out. Click on the button for details of a competition: the first ten correct answers picked at random will each win the sender a copy of Dr Solomon's Homeguard software .

CompuServe Access Software

All the software you need to access CompuServe's online service plus ten hours' free trial.

Linux 4.1

We have a full installation of Red Hat Linux 4.I UNIX operating system on this month's disc. Linux comes with a serious health warning. If you're not reasonably technically competent you should leave it well alone. And before you even think of installing it on your computer make sure you back up your PC.

Red Hat Linux 4.1 is a complete modern distribution of Linux that you can install on as many computers as you like, free of charge. We don't have space here to describe the whole installation but you'll find it all in a text file on the CD. Just use any text editor to open and print out the file linux.txt in the linuxtxt directory. It describes the installation process in detail and is the best place for beginners to get started.

We've also included Linux resources in HTML format: the Linux How-To Index by Greg Hankins and the Linux Installation and Getting Started guide by Matt Welsh. Because these resources have come from the internet, not all the links will work. They nevertheless contain a wealth of information on all things Linux.

Also included with Linux is a copy of the Java Developers Kit, version 1.0.2. Use of the JDK is subject to the Binary Code License terms and conditions shown below. Read the license carefully. By using the JDK you are agreeing to be bound by the terms and conditions of this license from Sun

Neverhood Competition

PCW has arranged an exclusive Neverhood competition. Three lucky winners will receive an original framed pencil drawing of the Neverhood plus a full copy of Neverhood and a Neverhood T-shirt. Seventeen runners-up will get a full copy of the game and a T-shirt.

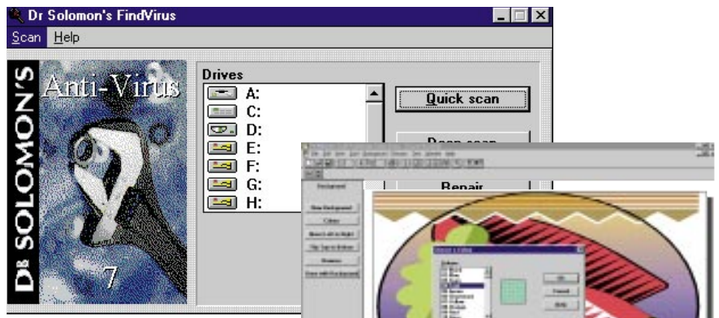
To enter the competition just answer the following question:

Which of the following people are part of the Dreamworks Interactive team?

A Laurel and Hardy
B Torville and Dean
C Steven Spielberg and Bill Gates

Send your answer on a postcard, with your name and address to: PCW-CD Neverhood Competition, 32-34 Broadwick Street, London, W1A 2HG. Closing date for receipt of entries is 16th May 1997.

(If you do not want to receive promotional material from companies please specify this on your entry).



Above Fight those bugs!
Right You don't have to be a master printer to take advantage of our PrintMaster demo

Wanted: material for *PCW* cover CD-ROMs

We are always looking for material for our cover-mounted CD-ROMs. If you have something that might be suitable, such as software, fonts, demos etc., email Steven Rogers at stevenr@vnu.co.uk or write to him at CD Development, New Media, VNU Business Publications, 32-34 Broadwick Street, London W1A 2HG. *Please note that Steve cannot deal with technical support.*

Information

The UK Unix Users group was formed to represent users of UNIX and Open Systems (now including Linux) in the United Kingdom. It is celebrating its 25th Anniversary this year. It caters for the needs of people in this area and, being totally funded by membership subscriptions, is completely independent of specific hardware and software vendors. All profits are used to further the activities of the organisation.

Membership is drawn from the information technology, commercial and research/academic sectors in fairly even proportions. The importance of the UKUUG is underlined by the fact that every major supplier of UNIX is a member of the group.

The group organises conferences and talks, including a very successful talk on high speed networking by Matt Welsh (the author of *Running Linux*) at the Institute of Education, in London.

Membership Categories and Fees Institutional Membership are commercial, research or academic institutions. They may send their employees to both UKUUG technical meetings and EurOpen conferences at substantially discounted membership rates of £165 (ex VAT); or individual membership £65 (ex VAT); or student membership £25.00 (VAT exempt).

If you would like to join the UKUUG or just want more information phone the UKUUG Secretariat on +44 (0)1763 271894 or fax on +44 (0)1763 273255. Email office@ukuug.org. Or visit the web page www.ukuug.org/k.

And if you get stuck, the Unix User group have set up a fax-back service. If you call 0336 413 143 you will receive a list of frequently asked questions and an ordinary-rate fax number on which to send further questions and feedback to the Unix user group. Calls to the 0336 number cost 50p per minute at all times.

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p20 ➢

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Win a trip for two to New York with AOL! This month AOL and *Personal Computer World* bring you an exclusive reader offer. Try AOL this month and not only do you qualify for an unprecedented FREE 99-hour AOL trial but you could also win a trip for two to New York! The winner will receive their prize as £1,000-worth of Thomas Cook Travel vouchers, so if New York's not your scene you can wing your way to a holiday destination of your choice.

But that's not all. We're also giving away five AOL accounts FREE * for a year! Or you could be the lucky winner of a year's subscription to *Internet World* magazine; there are 25 to be won! All you have to do to enter the competition is sign on to AOL for FREE * using your AOL disk on this month's cover. Click on K for Keyword (on the menu bar), type PCW WIN, then follow the simple instructions online. Note that the closing date is 15th May, 1997.

AOL is the world's biggest internet online service provider (OSP) with over eight million members throughout the globe. AOL has developed a fun, easy-to-use, interface designed to suit internet novices and webmasters alike, all at a speedy 33.6K connection nationwide. AOL has a breadth of content that has something for everyone — news, sport, games, education, "chats" with celebrities like David Bowie and Rosie O'Donnell — it's all here. In fact, there are 14 separate channels of information and fun as well as full access to all the AOLs in the world (USA, Canada, Japan, Germany, France) via the "International" button! And thanks to this month's exclusive deal with *PCW* you can explore them all for free: one month's free membership including 99 free hours online!

For a constantly changing and fast-moving world of information, connection to the internet is fast, easy and reliable. AOL provides the industry standard search engine, Microsoft's Internet Explorer 3, to help you find what you want in the simplest way possible. AOL is constantly reviewing sites old and new to give you pointers to the best areas, from Jean-Paul Sartre's cookbook to Bras Direct, they're all available via AOL. And with up to 10Mb of free web space, plus an easy-to-understand "how to" guide, you could be building your very own home page to put up on the web within minutes.

AOL offers a real sense of community. For keeping in touch with friends and family, create a "friends list" and address book; you can send email or pop an Instant Message like an interactive post-it note that arrives on your friend's screen, or invite everyone to a private chat room. And with five screen-names per account, the whole family can enjoy joining the world's most exciting online community. So even if your friends are scattered from Washington DC to Wellington, or from New Zealand to Wolverhampton, you can "talk" to them all for the cost of a local call.

If you want to make new friends, the chat rooms on AOL offer a world where over 8,000 different parties are going on every day. And you can join in. This is a place where it's safe and fun to meet people from different backgrounds, different cultures and share views, opinions, information or just some daft jokes. Choose according to your interests from the genealogy forum to the saucy chat in the Love Shack.

The way content is organised on AOL is rather like that of a magazine stand; categories of information grouped according to subject. The sports channel is fully comprehensive.

Whether your game is golf, rugby or even keeping an eye on the NFL over in the US, it is all on AOL. ClubCall keeps you fully updated on your favourite football team, the statistics, the fixture reports and the team members' biographies.

And when summer comes around, the Wimbledon area is buzzing. The players' background details are in place as is the chance to take part in online interviews with some of the finest players in the world as AOL organises chats with the stars during this most important tournament in the tennis calendar.

Thorough coverage of Grand Prix motor racing moves up a gear on AOL as we bring you reports all the way from grid to chequered flag.

AOL users can keep in touch with what's happening in the world of sport, be it motor racing, football, tennis, or whatever. Or why not join a chat room and "talk" with like-minded people on the web? You can do all this and much more. Readers of PCW can take advantage of AOL's exclusive trial offer.

If you want to plan a trip in the UK, AOL has everything you need to know: from the state of the roads with AA Roadwatch, to accommodation guides (youth hostels to grand hotels), to the five-day weather forecast, to advice on what to do and where to eat courtesy of the Digital Cities and *Time Out* guides.

So if you want to join AOL and surf the Net, chat, run your business, help with your child's education or just see what all the fuss is about, insert the disk and get online today. And remember, this month *Personal Computer World* readers get an EXCLUSIVE trial offer: one month's FREE membership including 99 FREE hours online! Why not try it for yourself, now.

* *Excludes telephone connection costs. Free trial and competition are available only to UK residents. To enter the competition by post send your name and address details on a postcard, marking your entry PCW Competition to: AOL, 20 Fulham Broadway, London SW6 1AH.*

Competition Rules

All entries must be made by midnight on 15th May, 1997. Only one entry per household. Paid employees of AOL, VNU, and their immediate families and agents are not eligible to enter. All winners will be selected at random: the first randomly-drawn entry will win £1,000-worth of Thomas Cook travel vouchers; the next five randomly drawn entries will each win an AOL account free for a year (excluding telephone connection costs); and the remaining 25 winners will each receive one year's subscription to *Internet World* magazine. No cash alternatives will be substituted for the prizes. Winners will be notified by post or phone within three weeks of the closing date. A list of winners can be obtained by sending a SAE to the promoters after the closing date. Promoted by AOL, 20 Fulham Broadway, London SW6 1AH

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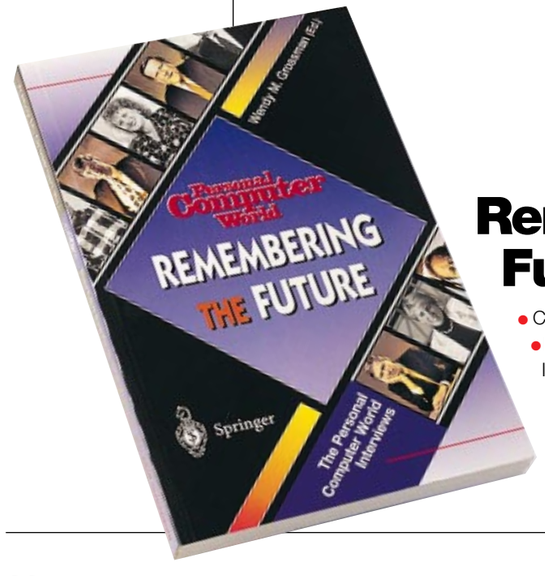

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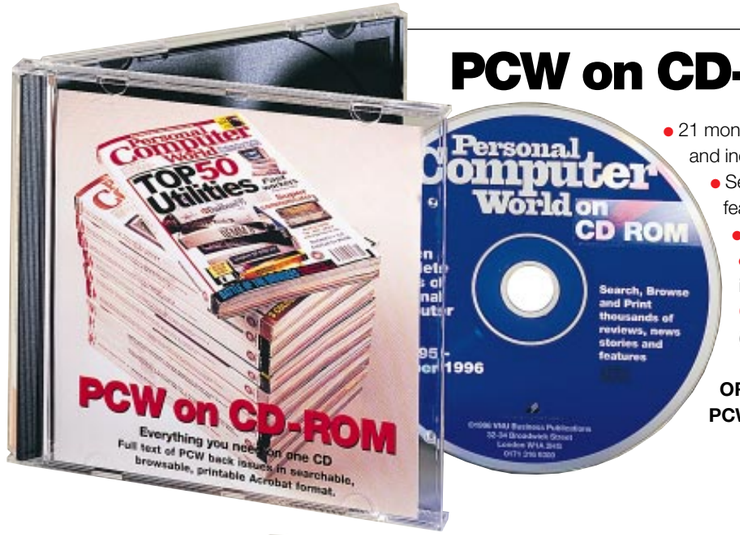

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Newsprint

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

CD rewrites set to ship

■ At least three CD rewritable drives were showing at CeBit and all are set to hit the market in the next couple of months.

Yamaha claimed to be the fastest: four-speed write, two-speed rewrite, and six-speed read.

Philips and Mitsumi also have models. Prices are likely to start at around $900.

The CD-RW disks can only be read by CD drives with "multi-read" capability — about three percent of those sold now. They are fully compatible with DVD drives.

The new CD-RW discs are said to have a lifetime of a respectable 10,000 rewrite cycles.

Intel silent on P2 as cloner hits out

From Clive Akass at CeBit in Hannover

Intel allowed a waiting world a glimpse of its next generation P2 processor at CeBit — but the only people who would talk about it openly were rival chip makers.

Sixteen PC vendors were showing P2 machines, publicly or privately. But all had been sworn to silence on peformance, and virtually all showed the same unenlightening multimedia demo.

Intel would only say that the chip will ship before July and that it will be targeted first at the corporate market, where it is expected eventually to supersede the Pentium and Pentium Pro.

However, chip cloner AMD criticised Intel for dumping the well tried Socket 7 used by Pentiums in favour of the P2's proprietary slot-in card. Marketing manager Dana Krelle said this helped Intel get round limitations in its design but was of no benefit to the customer. "We do not believe the change is necessary to get the next generation performance," he said.

AMD announced its own support chipset, the AMD-640m, designed to prolong the life of Socket 7 and allowing a massive 2Mb of Level 2 cache. AMD will also provide motherboard reference designs to "ensure manufacturers have a low-cost alternative".

The 640 chipset, costing just $30.50, can be used with both AMD's current K5 and its next generation K6 chip, due to launch in the next quarter. Krelle pledged that the K6 will match the P2's performance.

Brendan Sherry, UK MD of rival cloner Cyrix, made a similar claim for its M2 processor which is also expected to launch before July.

More CeBit news on page 34

IE bugs cast new doubt on Microsoft security

■ Two major security holes were exposed in Microsoft's Internet Explorer browser only days after German hackers showed how the company's ActiveX controls could be used to defraud users of online-banking services.

Microsoft quickly posted fixes for the IE3 bugs but many users are likely to be unaware of problems and will remain vulnerable. The three scares on the trot raised questions about Microsoft's security strategy. Its attitude to ActiveX, and the similar issue of macro viruses, is that you cannot have both power and security. If you allow web pages or macro-bearing documents to use the full power of your computer, they can do more or less anything you can do with it. You can either "sandbox" that power by, for instance, preventing disk access, as is done with Java applets; or you can give it free rein and ensure that you only accept files from trusted sources. Microsoft has adopted the latter course by backing a system of certificating downloads so that their sources are traceable. The IE3 bugs all bypassed this system.

Details of bugs page 32
IE 4.0 unveiled page 36
Office 97 snag page 31

Bug fixes or not, the problem is not going to go away. Far from insulating the browser from the operating system with all its power, Microsoft is marrying the two.

Security-conscious corporates will not be slow to note that the IE 3.0 bugs did not seem to affect rival Netscape's browser.

Virgin looks to the airwaves as 56K frustration continues

Virgin Net is to trial two-way microwave multi-megabyte net links using the old ITA aerial network.

The same MMDS (multi-channel multipoint distribution system) is used in the US and Canada to deliver TV and video at speeds as high as 10Mb/sec.

"We don't even know yet whether it will be feasible for us — especially the two-way link," said Virgin Net publishing director Alex Dale.

MMDS is just one of several promising technologies for curing bandwidth starvation on the net.

The furore over conflicting standards for 56K connections is concentrating minds on alternatives.

Motorola and USR have both released what they describe as 56K modems, but as we went to press USR had still to deliver a necessary firmware tweak, and Motorola had not found a UK service provider to support its model.

Most providers have publicly committed to USR but most will probably be forced to have lines supporting the two main contenders.

Bill Pechey, technical director of Hayes UK which, like Motorola, backs the Rockwell standard, said manufacturers fear users will stop buying modems until a standard is agreed.

Motorola's 56K net kit, at £169 inc VAT, is cheaper than USR's

As a result, all companies are offering some kind of upgrade path. Motorola even provides the option to upgrade to ISDN.

● *Beyond 56K — page 42*

Short Stories

Pirate DIR deal

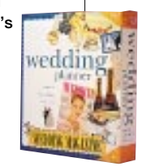
■ The £20 UK Info pirate DIR CD is no longer on sale after an out-of-court deal between BT and the German publisher Topware. But UK distributor CD Direct said a similar product "is rumoured to be coming out in April. No price has been confirmed".

CD Direct 0800 317864

Hi-tech wedding

■ The £20 Wedding Planner CD helps your modern bride and groom draw up guest and present lists, print invites, place cards and seating plans. Who said the age of romance is dead?

GSP 01480 496600



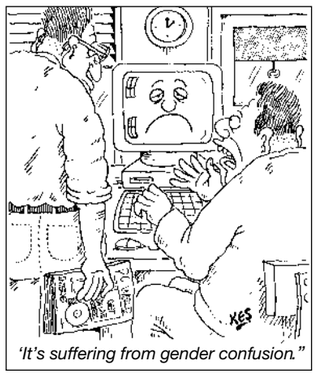
BT invents sexes to screw Gates

■ Biocoding breakthroughs will make Microsoft-style programs obsolete by 2005 and lead to a new, natural way to interact with computers, BT researchers say.

There is nothing new in genetic algorithms which breed code objects that mutate from generation to generation and compete until an optimum is found for a particular task.

But Dr Chris Winter, of BT's Martlesham Heath labs, said his group has made so much progress that self-programming computers could be commonplace within ten years. They may even replicate improved versions of themselves using programmable analog circuits and gate arrays.

One of the new techniques involves inventing a new set of sexes. The idea was first explored when lab director Dr Peter Cochrane asked why nature stuck with just two. Researchers tried evolving code using up to six sexes. "The results have proven fascinating. Depending on the problem and the environment, four or even six sexes can work much better," Winter said.



'It's suffering from gender confusion."

This does not mean nature is "wrong" in using two, because this number appears to favour resilience which, in living systems, is more important than the speed of evolution.

Breaking nature's rules works in other ways too. One of BT's fastest new algorithms, called virtual children, involves parents killing their offspring until they achieve the perfect child. BT said that details of another productive algorithm could not be revealed as it had not yet been patented.

The new biological software will bear more relation to cellular organisms than today's programs, so that computer crashes will be as likely as brain crashes.

Traditional linear computers will live on for the kind of number-crunching work they are good at. The new machines will have a different order of intelligence. "It's like, if I throw a ball to you, you don't go off and try to solve a set of differential equations to calculate its motion. You just catch it," Winter said.

Clive Akass

p30 ➢

Short Stories

Friendly corner site

■ Commercial web sites can adapt to the needs of individual customers, in the way of small

BROADVISION

shopkeepers, using a suite of software from Broadvision, the company claims. The software, targeted at major installations, can also be used for tailored information delivery on intranets.
Broadvision 01753 701067

Law unto itself

■ You can get legal documents without the expense of a lawyer using the Contracts & Agreements package, developer PlanIT says. It covers litigation, employment contracts, electronic Companies House forms and share holders agreements.
PlanIT 0181 875 4444

Wizard show

■ The Thompson Partnership has released Algebra Wizard 2.1, a £19.95 graphical calculator designed for GCSE and A-level maths students. It lets them produce graphs and solve complex quadratics.
Thomson 01889 564601

Smart guard

■ Evaluation copies of Smart Security 1.1, which permits access to floppy and CD drives only to authorised users of NT workstations, are available at www.smartcom.com. Single-user versions cost £17.50.
Oakley Data 01889 565064

MS Outlook grim for small business nets

A new Small Business Edition of the Office 97 suite has raised questions about Microsoft's commitment to small network computing. It includes Outlook, which is far more versatile than the earlier Schedule+ save for one crucial function: simple workgroup file sharing.

Outlook serves as an email client, organiser and scheduler. But it will not let you access a calendar over a network unless you use Microsoft Exchange Server as the mail service, at an extra cost of around £2,000 in hardware and software.

Many Office 97 users who need to share an office calendar will have to revert to Schedule+. The new edition, the first to be targeted at the small business, includes Word, Excel, Autoroute and Small Business Financial Manager.

The bundle is based on exensive market research in the UK and the US, according to small-business product manager David Bennie. He claimed: "Most small businesses did not rate workgroup file sharing as a high priority."

Outlook calendaring looks similar to Schedule+, but how much code is common is unclear. Cynics will claim the file sharing was removed to push sales of the new Exchange Server 5.0, which is being hyped as the ultimate intranet and internet technology.

It serves as a back end for messaging and scheduling but also as the basis for workflow and document-management functions. Outlook product manager Phil Cross refused to comment on a rumour that some workgroup functions may be restored to Outlook.

"It's certainly not something to be discounted as a possibility," he said, "but I've no idea whether there are definite plans."'

Eleanor Turton-Hill

Rock solid

The 620, at the high end of Rock's Mentor range, costs £3,299 (ex VAT) complete with a 13.3in TFT screen capable of 1,024 x 768 resolution in 64K colours, 48Mb of RAM and a 200MHz MMX processor. Other configurations range from £2,699 (ex VAT).
Rock 01026 832291

OpenDoc 'on a drip' as IBM goes for Java

■ IBM is making strong moves towards becoming an independent software supplier. Its VisualAge cross-platform family of products include Smalltalk, C++, Basic, Cobol, 4GLs and VA for Java, which had its first public demonstration in London recently.

With 80 percent of business data on mainframes, John Slitz, vice-president of IBM's Software Group, sees Java products as a quicker and more efficient cross-platform way of creating what he calls "infinite information" across a three-tier model consisting of an enterprise level, a middle tier and desktops.

The simple two-tier client/server model does not scale sufficiently, Slitz said. IBM does not see Java as a panacea however, and recognises that it still has to mature.

Slitz did concede that Java allows the creation of components more easily than OpenDoc. OpenDoc is an open, distributed component architecture developed primarily by IBM and Apple.

Although it is, in effect, a superset of Microsoft's proprietary OLE desktop application integration APIs that were renamed last year as ActiveX, IBM and its collaborators were late to the party so OLE won the prize of wide acceptance.

Much of what IBM had learned about containers and cross-platform development from OpenDoc will be used again.

"OpenDoc is not dead, but it is on a drip," Slitz admitted, saying, "it will still do some things it is uniquely capable of doing."

He dismissed Active Group (Microsoft's move to put ActiveX technology with the Open Group) as "a crass PR grab . . . There was nothing open other than willingness of the staff of the Open Group to play along with Microsoft". The Open Group was acting like a work-for-hire organisation rather than a standards body and IBM was "not terribly pleased with their behaviour".

Graham Lea

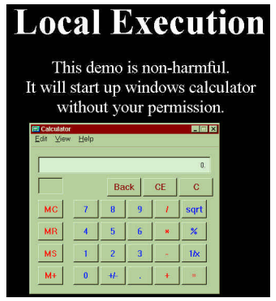
'Snot secure, student hackers warn Internet Explorer users

The students who found two gaping holes in Internet Explorer 3.0 rubbed Microsoft's nose in it with their choice of a site to post the news: www.cybersnot.com. The humour was undergraduate but the news from the University of Maryland was serious. The site shows how a web page can do virtually anything with a Win95 or NT PC using IE 3.0.

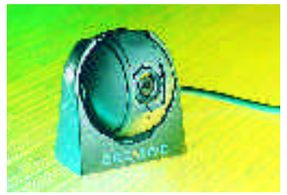
By default, IE 3.0 screens any downloaded code for certification that it is from a trusted source. The students showed how a rogue hyperlink can send .LNK or .URL pointers to launch a program on the home machine. Potentially worse, it can stick a .BAT file into the IE 3.0 cache and run it to trash your disk.

No sooner had Microsoft posted a fix at www.microsoft.com than students at MIT demonstrated a security hole opened simply by accessing a web page. It exploits Win95's Internet Wizard and an .ISP file normally used to sign up with service providers. Demos at web.mit.edu/crioux/www/ie/index.html use the trick to:

- Download a file from the Microsoft ftp site. This could as easily have been a virus.
- Create and delete directories. This could of course junk your hard drive.
- Run the Windows calculator *(left)*. It could easily run Deltree to trash a disk.inv*.*inv*.*



Short Stories



■ Creative Labs and VLSI Vision have struck a deal to provide internet video conferencing using Vision's CMOS camera and Creative's VideoBlaster. WebCam lets you capture and transmit still and live video.
VVL 0131 539 7111

Iterated gets Real

■ Iterated Systems added Real Video support to its flagship video publisher ClearVideo. This now supports http (using Video for Windows and QuickTime) and internet streaming (using RealVideo). For £295 you can buy ClearVideo 1.2 and upgrade free to version 2.0 when it ships.
Iterated Systems 0118 988 02261

How e-cash will bring back the milkman

Caroline Swift reports from Silicon Fen

Online shopping could become much easier if plans by Peter Dawe to set up an e-cash business are successful. He's the man who became a multi-millionaire after founding Unipalm, the Cambridge-based internet service provider.

Last year Unipalm merged with UUNet Pipex, taken over by MFS which now has joined forces with WorldCom.

"People have been going on about 'home' shopping but the office is the most important area to start with. It completely stuns me that more of the office stationery people have not put catalogues on the internet," Dawe said.

"As things work out, we are going to see logistics companies as the main beneficiaries. The great unsung hero here is going to be the milkman: it is only a matter of time before someone will cotton on to using his rounds to deliver more goods to the home."

But the main issue that has slowed down online shopping, he says, is the misconception that home deliveries would have to be during the daytime.

"Most people are at work then. When supermarkets such as Sainsbury and Tesco do real online shopping services, I believe products will be delivered to the office during the daytime. Ninety percent of the problems of how and where to deliver disappear if you deliver to the office."

And they'll pay for it with e-cash, bought from Dawe's e-cash. (When you have £30 million or so at your fingertips, you can make this kind of plan). Says Dawe: "Until now there hasn't been an effective electronic cash system and a lot of potential shopping online is not realised. My concept will enable two individuals to exchange a small amount of money anywhere in the world.

"I am looking to set up an e-cash company and am looking for a managing director."

He explained how the e-cash will work. "You pay me £100 for e-cash, I issue electronic tokens on the internet. You transfer some of those funds to Sainsbury, for instance, which also transfers some to its suppliers.

"The key thing is to engender confidence in your tokens so that people will trust them — that is critical. The electronic cash we will be issuing will first of all be used for data-based services: things like downloading pictures and software and exchanging money by individuals across the web.

"It will also allow people to have their own poker schools," he added. Boy, the sceptics will have a field day. "Maybe," says Dawe. "It will be a way for gambling in cyberspace and it will be frowned on, but it's on the way." There is a culture in Cambridge which lets the aspirations of men like Dawe take off. And remember, when he started Unipalm ten years ago, few people outside academia had heard of the net.

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Ce-Bits and pieces

■ A report in Cebit's newsheet of the death of the cathode ray tube turned out to be slightly exaggerated. It referred to a deal between Sharp and Sony to develop screens of up to 50 inches using a technology called PALC (plasma-addressed liquid-crystal). PALC does have the potential to be cheaper than TFT screens. But Sony mouthpiece Udo Freidaldenhofen said it was unlikely to make any impact until the millennium and even then prices will not drop anywhere near CRT levels.

By way of compensation Sharp showed a very impressive 40in TFT colour screen with an 800 x 600 resolution in 16.7 million colours.

■ US Robotics, hot from its success in pre-empting the 56K modem market, took off on another comms tangent by showing what it claimed is the world's cheapest ADSL modem which can get megabits per second out of a standard phone line *(see, page 42)*.

First generation prices worked out at $775 for two ports at the exchange end and $495 at the home — a total cost of around $900 a user. Ronald Westernik, assistant marketing VP, said the home-end cost could be halved very soon and prices could plummet if a mass market develops.

He said European telcos had been very enthusiastic. BT's view, however, is unknown.

■ Intel and Microsoft released the first specification for the NetPC, the cut-down PC that is their answer to the network computer. Features include:
- The NetPC, and all attached devices, can be configured and managed remotely.
- To ensure the above, there are no expansion slots capable of taking unknown devices.
- The case is sealed as an added precaution against unauthorised modification.

■ Corel gave a preview of WordPerfect Suite 8.0, with increased internet capabilities and DTP-like features in the word processor. It also showed its Java version of the suite, beta copies of which can be downloaded from www.corel.com. Both products will ship in the next quarter.

USB set to conquer the PC - but not yet

The fast USB serial port that is starting to appear on new PCs at last has something to do. Several USB devices were on show at CeBit though they do not yet amount to the flood which is expected to sweep away the venerable but sluggish RS232 serial port.

ALPs was showing a USB gamepad and a Win95 keyboard; Fujitsu and SUH also had keyboards.

Intel showed a USB video camera with its ProShare videoconferencing software and there were USB monitors from Philips and Nokia (the video signal goes in as normal and the USB is used for control signals). Philips also showed USB speakers, which do not require a sound card, and Universal Access had a USB ISDN adapter.

No-one had an all-USB PC running because this will only be possible with the driver support expected in Windows 97.

But the USB is expected to do away with all the different ports at the rear of today's PCs — if only because it will be cheaper.

Digital product marketing manager Jukka Pokkinnen said: "I reckon it will take three years. The slower ports, the serial, keyboard and mouse, will be the first to go. Then it will be the faster ones, the parallel port and the monitor."

The USB provides a 12Mbit/sec link to up to 127 daisy-chained devices; it can also deliver power. The faster 1394 serial link is expected to get a toehold this year for faster tasks such as digital video.

Acorn boxes clever

Acorn showed what it claimed is the most advanced set-top box in the world and the first to combine ATM25 interface, MPEG 2 decoding and Java-ready net browser. An ethernet port is optional, making the STB22 box suitable for intranets as well as homes, where it is designed for interactive TV.
Acorn 01223 725005

Hitachi claims double first on DVD

■ Hitachi unveiled what it says is the world's first double-speed DVD drive at CeBit. The GD-2000 has a peak transfer rate of 2.76Mb/sec with DVD media and reads CD-ROM and CD-R discs at up to 20x speed (3.0Mb/sec). "This is the real start of the DVD-ROM business with a fast, flexible and compatible drive," commented Nick Sundby, Hitachi product manager.

The drive uses a dual-wavelength laser that operates at 780 nanometers to read CD-ROM, resulting in access times of 150ms with DVD media and 100ms with CD-ROM, CD-R or CD-RW media.

The interface is EIDE, and the drive has

the same dimensions as a CD-ROM drive. It is fully backward-compatible with CD-ROM discs, as well as forward-compatible with future multiple-layer DVD-ROM media.

With a suitable decoder, the GD-2000 is capable of playing back MPEG2 compressed video and audio material.

Cyrix all-aboard GX chip promises cheaper PCs

British off-the-page vendor Elonex is following Compaq's lead in developing a low-cost multimedia PC around the Cyrix Media GX chipset.

The GX promises a new class of low-cost home PCs *(see Tim Bajarin, page 41)* because it offers sound and graphics processing at a quarter of the price of Intel's MMX chips (though it is not an MMX clone). And GX machines do not need conventional sound and graphics cards.

Elonex technical marketing manager Demitri Cheras said the company may price its system "significantly under" £700, but would not cut the specification just for the sake of a few pounds.

"For that money all you get now is a boring old PC with no CD-ROM drive," Cheras said. "There's definitely a market for a fully specified system for under £700."

North-London based Elonex has been developing a machine based around the two-chip device for a year. Unlike many PC vendors, Elonex makes its own mother-boards using an architecture which lets almost any PC processor to be inserted, claiming this provides its customers with wider choice of configuration and some future-proofing.

But the two-chip Cyrix Media GX set has needed new motherboard designs. One chip is a conventional Pentium-equivalent with integrated audio and graphics processing; the other manages I/O.

Compaq's new GX-based Presario is reviewed on page 68. Microsoft's reference platform for the Simply Interactive PC specification is based on the Cyrix chips.

Cyrix has already released 120MHz and 133MHz versions of the MediaGX family, and in the next quarter it will release 150MHz chips and 200MHz, the quarter after that, said Brendan Sherry, European managing director of the chip company.

Cyrix sells the GX for about $80 to PC makers. Intel 166MHz and 200MHz MMX chips cost $407 and $550 at January prices.

Andrew Charlesworth

Printing in the round

Short-run CDs can be given a professional look with labelling equipment from Neato. New software called CD-Face includes graphics suitable for CD labels and jewel-case inserts.

Jewel Case Pac is for designing four-page inserts, and a Labeller Kit includes an applicator and an assortment of CD label sheets. Prices range to £40.
Neato 0181 932 0540

Short Stories

WebPhone pioneers H323 standard

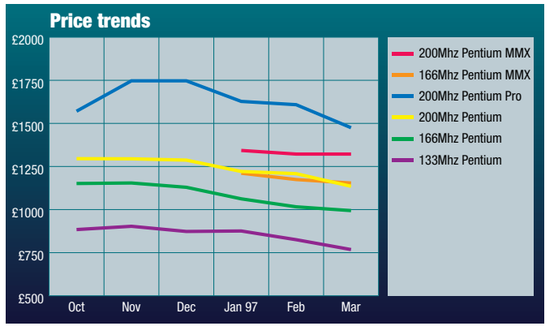
■ The latest 32-bit version of Netspeak's Internet telephony package WebPhone claims to be the frst to use the H323 standard which uses sophisticated compression to enable the use of video and audio on the net.

Netspeak includes real-time video communications and firewall proxy support. Users of WebPhone 3.0, which provides duplex-encrypted point-to-point voice and data communications on the internet, can save snapshots from video comms without dedicated hardware.
Dricom 01491 832744
Sales@dricom.co.uk

■ Dr Solomon is shipping HomeGuard which claims to protect home PC users against disk- and wire-borne viruses. For £29.99 it includes 24-hour emergency support and lets you subscribe to quarterly updates.
Dr Solomon's 01296 318700

Upgrade path

■ Upgrading a 486 to a DX2, DX4 or AMD 586 133MHz for around £70 ex-VAT can be done using the Semi-Dice SDX42x-1 smart socket and adaptor.
Interconnect Systems
01494 714010



PCW price check

Price Check

These charts, based on average prices from major vendors, show the downward trend of older (by a few months) system prices although systems using the new MMX chip have hardly had time to enter the product cycle. We have dropped the 120MHz prices as only two vendors in our survey offer machines at that speed, so 133MHz seems to be established as entry level.

Chart based on figures supplied by Dan, Viglen, Mesh, Dell, Evesham and Carrera.

■ SYSTEM DETAILS: 133MHz prices include 1Gb disk, 16Mb RAM, 14in monitor; 166MHz, 200MHz Pentium and Pro same with 15in monitor; MMX machines, 2Gb disk and 15in monitor.

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Windows 97: a quick look

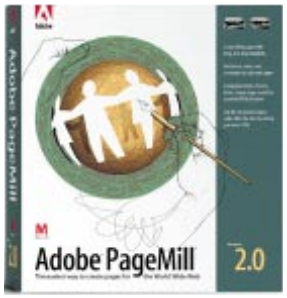
■ Bob Voit, creator of Paintshop Pro, one of the most famous shareware programs, visited the show but was keeping quiet about a version 5.0, other than to say it will appear this autumn.

But the 32-bit version 4.0 was selling well at £49.95 (plus VAT). You can download it on a shareware basis from www.digitalworkshop.co.uk.

UK dealer Digital Workshop was also showing its Videotrope video and animation editor which costs £39.95 (plus VAT).
Digital Workshop 01295 258335

Notes on Visioneer

■ Visioneer announced six new modules for passing information from its PaperPort document management software to Notes-based systems. It also cut prices of its keyboard scanner to a suggested £199 and its PaperPort Vx standalone to £179 (both ex VAT).
Visioneer 0118 970 1717



■ Adobe announced a pre-release version of PageMill 2.0, its web-authoring software for Win95 and NT. It can be downloaded from www.adobe.com and is expected to ship in May.

It also announced what it described as a major upgrade to its Publishing Collection for 95 and NT. For a recommended £785 it bundles the latest versions of Photoshop, PageMaker, Illustrator and Acrobat.
Adobe 0181 606 4001

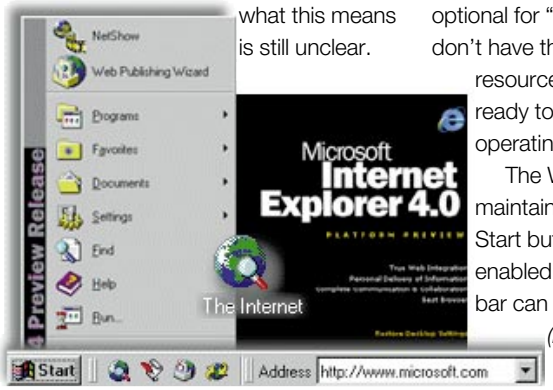
View more

■ Inso showed the latest version 4.0 of its file viewer Quick View Plus, which includes support for more than 100 new formatting features including hyperlinks.
Inso 0181 947 1122

Web weds Windows in new-look IE 4.0

A preview version of Internet Explorer 4.0 should be available at Microsoft's web site by the time you read this.

Journalists at Windows 97 in London were given a sneak preview of the browser, which is the first to be integrated into the operating system. Exactly what this means is still unclear.



There have been rumours that Microsoft had problems hooking the code into Windows 95, and that full integration will only be possible with Win 9x, the next release.

IE 4.0 also seems likely to need high-spec hardware. Microsoft says full web integration is optional for "users who don't have the system resources, or aren't ready to upgrade their operating system."

The Win95 look is maintained, but the Start button is web-enabled and the task bar can launch a site *(left)*. The most obvious difference is that the Windows Explorer and Internet Explorer boxes have married, so the web becomes an extension of your hard disk.

You also get cut-down versions of Office 97's Outlook messaging system and FrontPage, and facilities for receiving broadcast material tailored to your interests.

The new Explorer will also be fully integrated into Office 97 applications. The first version to be posted is called a Platform Preview for developers and vendors. A beta version will follow within weeks and the official launch will be in the autumn.
www.microsoft.com

Windows coders CE the light

■ UK developers are already creating applications for palmtops using Microsoft's new Windows CE operating system.

Windows specialist Advance Systems showed ASL-Connect, which helps CE-equipped staff sychronise data remotely across a network.

One of the claimed advantages of CE is that it allows Windows developers to create programs for it using their existing skills. CE uses a subset of the Windows application programming interface. However, Visual Basic skills can also be used to program non-CE Psion palmtops.

● *Psion, Palm fight back — page 39*

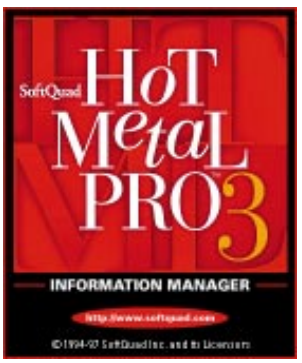
Advance Systems 0117901 5000; www.asl.com

Hot stuff for net publishers

■ Web specialist SoftQuad showed WebFiler Interactive, a traditional desktop database which has been given a web front-end for use on both intranets and the internet.

The launch follows SoftQuad's purchase of database specialist Alpha and is said to be fully integrated with its HoT MetaLPro HTML editor and Intranet Publisher products.

SoftQuad also announced Information Manager, a free upgrade to HoT MetaL Pro 3.0 to help you manage and control your site.
Softquad 0181 387 4110; www.softquad.com



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New Pilots fly in as CE models get a UK airing

Windows CE palmtops from six manufacturers were given their first official UK airing at the Windows Show last month, but they will not ship here until summer.

Psion responded to the challenge with a couple of announcements (below) and US Robotics launched two new models of its Palm Pilot, the first pen-driven palmtop to find a mass market.

The new Professional model has 1Mb RAM and email facilities via a new optional plug-in modem *(see picture)*. Another option is the ability to synchronise data across a TCP/IP network. A Personal model has 512Kb RAM. Both have a backlit screen and a suite of organiser software.

Meanwhile, news that 3Com plans a $6.6 billion merger with USR (promptly dubbed RoboCom) caught many analysts off-guard, *writes Tim Bajarin in Silicon Valley.* 3Com, Cisco and Bay Networks are all trying to be a one-stop supplier for internet connection and this is the biggest merger yet in this field.

USR and 3COM each have facilities in Silicon Valley, the Boston area, Ireland and Israel which will undergo some rationalisation with job losses. In the long term, 3Com will be stronger with a more rounded product line-up. It will benefit from USR's stellar retail and distribution. The Pilot is out of 3Com's mainstream business but more than 500,000 have been sold.

Sources say a Pilot with a type II PC Card will be out by summer, so that it can use a standard modem card. A wireless modem could turn it into a powerful messaging system — and, incidentally, fit 3Com's business model.

USR 01734 228200; 3Com 01628 897100

Psions see the backlight as users await next generation

■ The long-awaited internet access software for Psion 3 series organisers, PsiMail Internet, will ship shortly after Easter.

"Yes, it's been delayed, it's just one of those things," said a Psion spokeswoman. The £59.95 software comes on PC diskette for download to the Psion and provides browsing and internet email capabilities.

Psion users have been moaning about the lack of backlighting on 3c models sold outside the US. A new backlit 3c has now been launched in Europe, six months after the original launch. Psion has also come under fire from analysts for failing to meet the challenge of CE machines *(see above)*.

Psion has written a white paper arguing that its organisers are superior compared to any CE models.

Market opinion says that what is needed to win the fight is a next-generation Psion 4, not a technical debating paper. However, delivering net access software will at least take some of the pressure off Psion.

● CE devices have been delayed in Europe until May or June due to internationalisation problems. Sources at Microsoft said applications including Pocket Word and Pocket Internet Explorer were not available in UK versions and that the keyboard on existing CE devices needs modifying.

Andrew Charlesworth

Psion 0171 262 5580

Tim Bajarin reports from the US

■ There is good and bad news coming out of Silicon Valley. The good news: the Valley is booming. The bad news: there's a shortage of skilled workers.

The number of computer-science degrees awarded in the US fell by 42 percent between a 1986 peak and1994, and the number of engineering degrees dropped by 18 percent. At least one in ten technology jobs goes unfilled, leaving an estimated 200,000 vacancies — about one third of them in Silicon Valley. Companies like Cisco and Bay Networks are so desperate for workers that they run job fairs almost weekly. When Apple lays off an expected 5,000 worldwide later this month, the 3,000 or so in the US will be snapped up almost immediately.

The Valley is pushing to recruit students into high-tech jobs but interest in the web is expected to attract them back. College leavers with a bachelor degree join the likes of Intel and HP in Silicon Valley at a salary of about $45,000. A masters degree can attract $65,000 or more, product managers earn at least $75,000 and a VP commands about $100,000. Not too bad for an industry that uses sand as its raw material and is fuelled by brain power.

■ Intel has introduced a set of tools called Infinite CD that automatically hook a CD-ROM to the internet to grab pictures or text from a web site. It sees this as a way of getting round the scarcity of bandwidth.

A Myst CD, for instance, gives you 12 rooms and 13 levels to explore and you could use these to play more stories, games or levels that you download from a web site. Or, using web broadcasting technology from Marimba or Backweb, you could have these new games or stories "pushed" to a Myst folder on your PC.

Intel sees the technology as an important extension of MMX. This summer it will introduce a demo CD-ROM that uses web broadcasting from Marimba and animation from Macromedia. Infinite CD should be available by autumn.

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Short Stories

■ For some of us, the idea of a speaker in each ear blasting out 25 Watts is close to hell, but there's no accounting for taste. If you really want to go deaf before your time, you can buy these for £54 (inc VAT).
Typhoon 01732 362212

New WinFax

■ Symantec has released a 32-bit version 8.0 of WinFax Pro, which for the first time supports NT as well as Windows 95. New telephony features allow it to act like an answering machine.
Symantec 01628 592222

Revision revised

■ MathSoft has launched a new version of its best-selling £24.95 CD-based revision aid *Pass Your GCSE Maths*, covering the 1997/98 national curriculum.
MathSoft 01276 452299; Int-info@mathsoft.co.uk;www.mathsoft.com

Lucky break

■ A bug in an Intuit package for US taxpayers caused some to get a greater refund than expected.

Bannerbridge

■ The number for Bannerbridge in April's Newsprint should have read 01268 419101.

Sage leaves home banking to rivals

Sage, leading provider of UK accounts software, seems to have dropped out of the huge home-banking market.

It is building links between its business packages and three banks: Lloyds, Midland, and NatWest. It has dropped its MoneyWise home package, which it launched to fight off Intuit's successful Quicken range.

Microsoft made a $1 billion-plus bid for Intuit in what was widely seen as a move to capture the home-banking market. But it pulled out after threatening noises by anti-monopoly officials. Instead, Microsoft revamped its Money package, which now has the contract to front Barclays' home-banking scheme.

Sage online product manager, Colin Bradshaw, said that Sage Sterling's Payroll module was now linked to the Lloyds and Midland electronic banking service and a NatWest link is being piloted. Other modules will also go online. Bradshaw said Sage still supported Moneywise, even though it is no longer on sale. "It was not a core strategic product," he said.

But Sage has launched a new net-enabled edition of its £99 Instant Accounting package, which claims to provide an off-the-shelf answer to the accounting needs of small businesses. It requires no in-depth knowledge and lets you download web information.
Sage 0191 255 3000

Brand new worry for Jot-It

Looks harmless enough, this box for a £25 (inc VAT) package that offers a computer version of those yellow stick-on notes. But, er ... isn't 3M suing Microsoft for millions over the merest mention in Office 97 of its trademark Post-It? Nick Brown, managing director of UK distributor Cross Atlantic, told us he assumed the US developer Jot-It has sorted that one out. He added quickly: "But we are checking."
Cross Atlantic 0171 228 6992

Top 10 Windows software

			Last month
1	Win95 U/G with Internet	Microsoft	1
2	Office 97 Pro UPG +INT	Microsoft	-
3	Internet Utils 3.1 (OEM)		-
4	MS Office/Pro 97 B/Shef+Mouse	Microsoft	3
5	MS Encarta 97 (CD)	Microsoft	2
6	Partition Magic 3 v3.5	POW	20
7	Master Clips 101,000 CD	IMSI	5
8	MS Office 97 STAND V/COMP	Microsoft	13
9	MS Office Pro 97/Book V/UG	Microsoft	14
10	MS Flight Sim 6.0 (95) CD	Microsoft	4

Top 10 CD-ROMs

1	Star Wars Trilogy	One Stop	1
2	Babylon 5: Limited Edition	One Stop	3
3	Encarta 97	Microsoft	6
4	Star Trek Voyager	One Stop	4
5	Return of the Jedi	One Stop	-
6	Inside Independence Day (HMV Exc.)	EA	7
7	The Empire Strikes Back	One Stop	5
8	Cinemania 97	Microsoft	8
9	Encarta 97 World Atlas	Microsoft	-
10	Kai's Power Goo	Principal	10

Top 10 DOS software

1	System Commander v3.0	POW	1
2	MS-DOS v6.22 Upgrade	Microsoft	3
3	Total Insanity CD	Europress	4
4	DOS 2 Win95 UG with INTER	Microsoft	5
5	Command & Conquer (Red Alert)	Virgin	2
6	MS WFWG 3.11 Base	Microsoft	21
7	Turbo Pascal v7.0	Borland	13
8	Formula 1 Grand Prix 2 v1	-	99
9	Quake Full Release v1	GEM	9
10	TAS BOOKS 1	Megatech	12

Top 10 peripherals

1	33.6 EXT with voice	Tashika	8
2	USR 33600EXT voice/fax/modem	USR	2
3	33.6 Int with Svoice 2.2	Tashika	5
4	PNP 16-bit pnp ASOUND	Enta	1
5	Primax 4,800 Direct	Primax	3
6	Evergreen 486/586 proc UG	Mid	9
7	8x MultiMedia Kit	Tashika	10
8	33.6 EXT/no VOICE	Tashika	19
9	Sound Galaxy Waverider 32	Aztech	18
10	33.6 INT fax/modem no voice	Tashika	4

The price is right

In partnership with Cyrix, Compaq has stolen a march on the NC initiative with a low-cost, full-power PC. Tim Bajarin thinks they have a hit on their hands.

Larry Ellison's network computer (NC) has, if nothing else, pushed vendors into finding ways to make PCs cheaper and easier to use. Microsoft has come up with its cut-down NetPC specification. Now Compaq has partnered with chip cloner Cyrix to offer a full-power, low-cost PC.

The Compaq Presario 2100 uses the new Cyrix Media GX chip and delivers an amazing amount of computing power for $999. The Presario 2100 comes with a 133MHz version of the Cyrix Media GX chip, 24Mb of DRAM, 2Gb hard drive, eight-speed CD-ROM, 33.6Kbps modem and a 3.5in floppy, and sells for $999. Add the 15in SVGA monitor for $249 and, for a combined price of $1,250, you have quite a PC.

The reason Compaq can deliver a serious system for so little cost starts with the GX chip. This was originally designed for laptops that needed an extra graphics boost. When the concept of the NC started floating around in late 1995, Cyrix decided to tune it for use on a low-cost PC. At heart it is a Pentium clone, with three extra features:

- XpressGraphics adds processor acceleration and uses an exclusive compression technology.
- XpressRAM adds memory control direct from the CPU and delivers high performance without Level 2 cache.
- XpressAudio gives the chip premium multimedia audio, MIDI and Gameport control with no sound card.

More importantly, Cyrix sells this chip to a PC vendor for less than $80. A chipset using an Intel processor and all the extra silicon needed for the multimedia features would cost more than $300.

This new computer could be pretty hot since there is a whole new generation of users who want to buy a PC but cannot spend the $2,000 or so necessary to get a higher-priced Intel-based system. Around 20 million families in the US have a combined income of $32,000 to $45,000 and are likely to go for low-priced models like this if they decide to buy.

Intel is bound to hit back by saying that the Cyrix GX is not as powerful as its own multimedia-enhanced MMX systems. That may be true, but it has a lot of graphics capabilities that rival MMX systems, and at half the cost.

Actually, Intel could cut the prices of its chips to go after this low-end market as well. But Intel sources say its strategy is to resist efforts to go low as long as it can. That gives Cyrix a rather interesting position that should make it a hero to the price-conscious PC buyer. Compaq is the first major player to use the Cyrix GX media chip. Compaq is the world's the leading PC vendor and clearly wants to stake its claim on a large portion of the new low-end market as it develops.

Compaq and Cyrix tell me that they also expect traditional PC buyers to purchase these systems in big numbers as second computers for the home — perhaps for the kids as an educational tool. And schools that have standardised on PCs will also be interested.

Over the next twelve months Cyrix will enhance this chip by bringing out versions that run at 150MHz and 166MHz, as well as one MMX clone chip in early 1998. Compaq says it will use this chip in other versions of its Presario line over time and I expect Cyrix to announce that at least two other top-five vendors will create similar low-cost PCs that use its chip by the autumn.

With prices this low, a stripped-down NC at any cost may seem obsolete. Although an NC can be priced lower and could gain some steam in vertical markets, Cyrix and Compaq's approach to a low-cost, full-function PC that is very powerful could end up with the lion's share of Larry Ellison's vision. And it could even nullify Microsoft's NetPC initiative.

This new Presario looks like a real winner and one that will get a lot of attention over the next twelve months. ■

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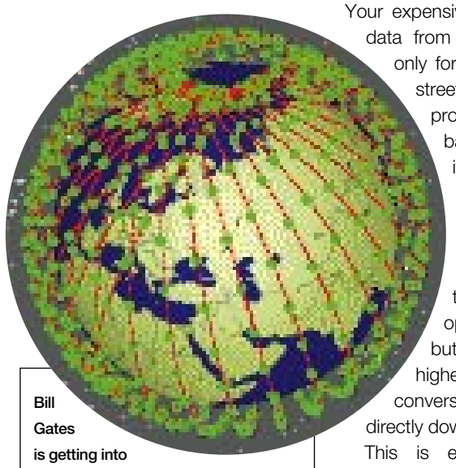
Beyond 56K...

Emerging high-speed services make 56K modems look obsolete. In a two-page special, Clive Akass reviews the options as datacomms changes gear.

Satellite digital TV services due to be launched this year by Rupert Murdoch will push data communications through perhaps its biggest transformation since the invention of Morse code. They will be able to deliver web pages, or hybrid Web-TV pages, at speeds that make the emerging 56Kbps modems look risible, though interactivity, the ability to control what you see and respond to it, will still be via a slow phone line. How fast interactive satellite services will develop is uncertain, but digital TV is sure to force the pace at which alternative high-bandwidth technologies emerge from cable and phone companies who fear being outflanked. The 56K modems seem quaint, even absurd, by comparison. Some of the finest minds in telecoms are working on them, fighting to cram more and more data past obstacles that, like rocks in the road, could simply be removed.

The PC is digital. Some 98 percent of the British telephone network is digital. But because we still use analogue phones — Victorian technology — the network is forever having to switch between analogue and digital. Your expensive modem changes data from digital to analogue only for the benefit of BT's street-level modem, which promptly changes it back to digital so that it can be sent to the exchange. The 56K modems cleverly exploit characteristics of the return conversions to optimise data rates; but speeds can be far higher if you dump the conversions and pump data directly down the line.



Bill Gates is getting into the sky-delivery act by backing a $9 billion Teledesic plan to put 288 satellites (above) into low orbit to provide high-bandwidth links worldwide by 2002. Alcatel has a similar scheme to launch 64 satellites. www.teledesic.com; www.alcatel.com

This is exactly what ISDN adaptors do, offering two 64Kbps channels without even trying. They cost much the same as modems, but BT still charges £300 for an ISDN connection, pricing it out of the market for most home users. So the *raison d'etre* of 56K modems is financial (and perhaps political) rather than technical. Even 64K is slow: whatever BT salesmen tell you, you need at least ten times that rate for half-way decent video links and more still for TV quality. You can aggregate several ISDN channels to get the bandwidth, but each is charged as a separate call.

More promising for home use is ADSL (Asymmetric Digital Subscriber Line) which is being field-tested by BT as a way of delivering home video. This piggy-backs a high-frequency, high-bandwidth data stream onto the voice line to deliver 8Mbits/sec downstream and 64Kbits/sec up. Filters separate the two streams so you can use your standard phone on the same line at the same time. BT currently charges companies thousands for this kind of bandwidth so its pricing and revenue structure will undergo a cataclysmic transition. Also, its options are limited by the fact that it is as yet forbidden to provide entertainment, under legislation designed to allow cable companies to find their feet.

You would think the cable companies would be sitting pretty after spending years pushing optical fibre with huge bandwidth to millions of homes. In fact they have been slow to respond to the growing interest in interactive services. This is partly because they have the mind-set of the entertainment rather than telecoms industry: they saw themselves primarily as deliverers of TV programmes. Yet they are strongly placed, especially in Britain where operators have allowed for a back channel. Several cable companies are field-testing cable modems, which put data onto a very high frequency wave in much the same way as a traditional modem uses an audio signal. There is a big difference, though. Cable, in the words of Hayes chief technology officer Bill Pechey, is a "modem-maker's dream", providing a near perfect path with virtually no noise and huge bandwidth.

Cable modems cost about as much as standard ones but will probably be rented rather than sold. The first generation will offer a disappointing 10Mbits/sec, the speed of most office networks. This is no coincidence: a cheap ethernet card will be used for the PC interface. As on a network, you will have to share the bandwidth.

A cable-modem link will cost rather more than a standard one — perhaps £30 to £40 a month, with hardware — so standard modems will live on. But cable modems could be deployed as soon as this year, while manufacturers are still trying to agree a 56K standard. By the time that is ratified early next year, 56K modems could already be approaching their sell-by date. ■

News Analysis special:
The new comms

...and it's here **now!**

The DirecPC system delivers web data to your PC at up to 400Kbps, although its improved bandwidth does highlight the limitations of the internet. Still, it's a sure taste of things to come.

My personal toy-of-the-month has been a DirecPC satellite Turbo Internet system that UK distributor Satellite Digital Systems lent me to show what real bandwidth can do. It is available now, at a price *(see margin, right)* within the budget of a small company or moneyed enthusiast. For the rest of us, it is an excellent pointer to the future.

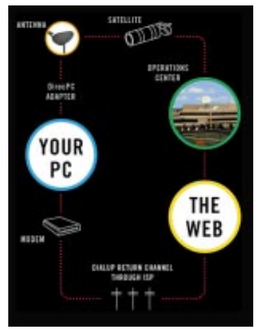
DirecPC began as a video-on-demand system in the US where, like UK cable companies, it has been hard-pushed to compete with video shops and TV. Developer Hughes has teamed up with Olivetti to bring DirecPC to Europe, offering not movies but high-speed data delivery and a fast internet link. You are given a 60cm satellite dish, a 16-bit PC ISA expansion card and some software, and the whole caboodle is set up for you by a specialist team from subcontractor Granada.

You still need a link to a land-based service provider for the upchannel, which is thus only as fast as your modem, but download speeds are up to 400Kbps.

DirecPC uses a trick called IP Tunnelling. Each data packet you send is wrapped in extra routing instructions which cause your service provider to pass it on to the Network Operating Centre (NOC) in Germany. This then sends the packet on to its destination and reroutes the return path via the satellite to your home *(above right)*.

The results are disappointing if you expect instant pages: pushing up your bandwidth makes you realise just how slow and spasmodic the internet has become. You still have delays stoking up sites and few will deliver data consistently at high speeds. But you really see the difference once you start downloading big files.

After an initial hiccup, caused by using a slow disk for cacheing, I regularly got speeds of between 240Kbps and 350Kbps — that is 2Mb and more a minute. Still, on the functions of Turbo Internet alone, given the cost and the fact that the high speed works only one way, DirecPC is hard to justify as an alternative to basic-rate ISDN which offers 64Kbps-per-channel in both directions. (Though it would be good in remote areas where ISDN can be prohibitively expensive.)



Internet in the sky: How DirecPC delivers your data

Turbo Internet is just part of DirectPC's act, however. You can download at up to 4Mbits/sec direct from the NOC's own servers, bypassing the internet altogether. You can upload data to the server, and schedule a broadcast to specific sites or authorise sites to download at will. It can be used to send bulk data, distribute or sell software, or as a network-computer data store, allowing you to download your system in much the same time as you boot from disk.

In the long term we are likely to be faced with a variety of data paths like DirecPC, and software in our communicating devices may decide which is best for the purpose at hand. Prototype dishes have been made which can receive both Murdoch broadcasts *(see opposite)* and Direct PC signals, so you might respond to an advert on one satellite and receive an order form via another. Prices are likely to drop as the number of users rises. But as a testbed for the new satellite age, DirecPC is invaluable. ■

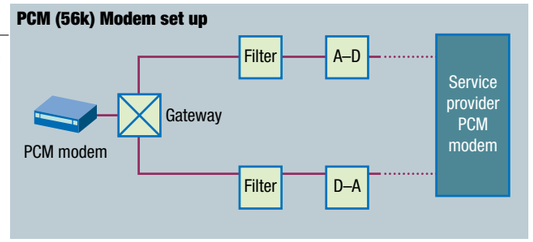
DirecPC prices **£1,150 for dish, card cables, software and installation. Monthly subscription of £15 plus 95p per megabyte above 30Mb; or £52 plus 83p per megabyte above 130Mb. Packet delivery 50p-80p per megabyte depending on time. All ex VAT.** Contact **Satellite Digital Systems 01494 455466;** www.sat-dig.co.uk

The 56K PCM trick

A 56K modem only works with a compatible service provider, not modem to modem, and achieves full speed only on downloads. This is because its analogue output has to go through a gateway (which sorts out up and down streams) and a filter before it is translated into 8,000 digital (i.e. two-level) pulses a second for the phone line.

By contrast, the provider has a digital link, with direct control over the digital-to-analogue conversion on the return path. It sends pulses in 256 levels (i.e. 8 bits) instead of two, giving a theoretical data rate of 8 x 8000 or 64Kbps.

In practice, this modulation is non-linear (and different in Europe and the US), getting fuzzier as levels drop so that fewer than 256 can be seen. Still, rates of 60Kbps are possible, hence the preferred term PCM (Pulse Code Modulation) modem. The K56Flex camp has used limited PCM to achieve 45Kbps upstream.



Sounding Off

Michael Hewitt

If Michael Hewitt can't go to the exhibitions, why can't they come to him — and everybody else? We have the technology and you know it makes sense.

I have in my hand a piece of paper… well, two, actually. They are invitations to minor events at the forthcoming Internet World and Windows 97 shows (of course, when I write "forthcoming", by the time you read this they'll probably have already forthed and come).

A year ago, when I lived in the South East, only the most sensitive scientific instruments could measure the time delay between this type of press release landing on my doormat and then hitting the bin. Today, though, I find myself slavering over their contents. Never mind that according to *The Sunday Times*, the Internet Commercial District resembles a virtual Toxteth; mostly boarded up and bankrupt. Never mind that whenever I try to run more than three programs concurrently under Windows 95, my PC falls over as regularly as a dipso on lighter fluid. No, such is my isolation from all things technical, marooned here in darkest Penwith, that I yearn to get in among the VDUs and buggy software products once again.

Yet much as I might yearn, I shall have to remain frustrated. From here, it takes over five and a half hours and £60 to get in to London. Unless Microsoft tells me it's announcing the elixir of eternal youth, it simply isn't worth my while making such a long trip. But whingeing aside, in this day and age, what the hell are major computer trade shows doing up in London or Birmingham? I don't mean why aren't they here in Penzance, or maybe up in Manchester or Grimsby, but why are they necessarily *anywhere* in particular?

Take Internet World, for instance. The PR blurbs I have here are hyping the internet as *the* major marketing tool of the next century, putting businesses in touch with thousands of potential customers, irrespective of distance. But in order to see a practical demonstration of how irrelevant distance has now become thanks to information technology, we've got to travel all the way to London. Even if you live in London, Earl's Court can be a pig to get to. Its tube station features regularly in the LRT Points Failure Roll of Honour. Then, having queued for half an hour to get into the Exhibition Centre itself, you can find yourself jostled by pipe-smoking nautical types who think the London Boat Show is still on. And what happens if you finally manage to elbow your way through to a stand? You discover that most of the action, such as it is, is actually happening on a computer monitor.

For me, at least, this seems to beg a question: why can't it appear on *my* computer monitor back in the office? *Why can't the whole exhibition*? Then I could save the train fair. Admittedly, I'd have to forego the complimentary drinks, the company spokesmen and the models jiggling around in company logo T-shirts, but I could live with that. The point is, the technology exists to allow a major showcase of internet technology to be exhibited where it ought to be exhibited — on the internet. This doesn't just go for Internet World, but for all shows that are mostly software-orientated. It's all very well wining and dining the business community in London or at the NEC and showing them the marvels of the communication age, but surely it would be far more convincing for them, far more of a selling point, if those marvels could be made to appear on their own hardware. Or, if they haven't yet got it, on a computer near to them in, say, a local internet café or business centre specially hired for the occasion. Or better still, in a pub with one of those big-screen TVs they use to show Sky Sports. Then everyone would know that email, the use of search engines, intranetting, getting the latest Stock Market news, downloading girlie .gifs and so on, was something they could do for themselves and that they wouldn't always have to hire someone in a Hugo Boss suit to do it for them.

Okay, I know London is the country's commercial centre and so you have to hold your shows and exhibitions in and around it. But what I'm saying is simply this: by all means have your junket up in London, but make it half its usual size. You'll save several million pounds that way. Do away with the complimentary booze for journalists and you save another million, too. With that money, distribute (free of charge) idiot-proof software that displays a prominent "Click Here" button on your screen when loaded. When you do click there, it automatically dials into an internet provider and contacts the exhibition. No messing around with www.whatever.com. Once in, you see a virtual representation of the exhibition and click on the stands that interest you to see a demo. Or leave the software on auto-pilot and it will visit each in turn. All the product announcements, press releases and so on are relayed to your PC as they happen, complete with audio links and the rest. In other words, the exhibition effectively comes to you, thus demonstrating the power and versatility of the technology. Any chance of that for the Internet World 98 and the Windows 98 shows, I wonder?

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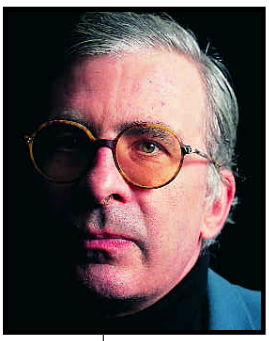
Homefront

When Figeac's Club Cyber holds a netfest, Tim Nott attends the opening. He learns nothing new apart from a couple of dodgy jokes, but it's all good fun.



Tim Nott

Living in Figeac, a small town in southern France, has its drawbacks, but then, it also has its compensations. True, I don't get to power-breakfast with captains of industry in London hotels, or get force-fed canapés and alcohol at press launches. On the other hand, it takes me about 30 seconds to get to the office and, thanks to the time difference, I can be pounding out words before my *PCW* colleagues at Broadwick Street have arrived at their desks. Then there's the view from my window, the weather, *and* the wonderful food and cheap wine. Despite all this, I do manage to get some work done.

On Saturday I woke up with a clear conscience to take the day off. The sun was shining, the market in full bustle and lunch was so good that I needed a brief kip to recover from it. All in all, it's a lifestyle that can't have changed much since Pepin the Short (king of Aquitaine and father of Charlemagne) founded the place in the 8th century. So, you might think we're a little backward here; but no. I know at least one person with a mobile phone (which curiously never seems to ring) who this year has brought local-call access to the internet. This (although in my case it reduced my phone bill from the unbelievable to the merely astronomic) hasn't made a great deal of difference to the average man or woman in the boulevard as they are less likely to own a PC than their UK counterparts.

One of the reasons for this is the feeling of *déjà vu*. The French did all this online stuff over a decade ago when Minitel terminals were offered to all telephone subscribers. The big problem with the Minitel is the cost. Although France Telecom practically gave the terminals away, online costs for commercial services start at around 1.19 francs a minute. Result? A cosy cartel for FT and the information providers, and an entrenched wallet-wariness among the public for all things online.

This Saturday was destined to change the life of the non-PC-owning classes. With sponsorship from a bank and a local computer company, the Club Cyber was launched with a 12-hour netfest in the town's Centre Culturel. Six PCs, with a team of experts on hand, were available for surfing the web. When I arrived, things weren't looking too encouraging. One of the machines was being fiercely monopolised by a child experiencing the joys of Windows Paintbrush, while another had been taken over by an enterprising group of youths who had installed their own copy of Quake. A further machine had just "planted" itself, as they say in France, and two of the experts were gazing anxiously at the blue screen of death as the machine failed to recognise the Windows installation CD.

In the main auditorium, the organiser of the event had rigged up a PC to a giant projector and was expanding the vocabulary of a gaggle of young children who were hanging about as he struggled with the ISDN connection. The pressure was on because in one hour the auditorium would revert to its customary role as a cinema, and 300 people would be queuing up to see Depardieu's latest blockbuster.

At last everything worked: the mayor, various suits and the public took their seats and we were given a guided tour of Infonie (the service provider), email and the web. I'd already clocked this guy as something of a risk-taker, judging by the way he left shortcuts to the Windows Registry Editor on the Desktop of the try-out machines, but I still think his guided tour of Usenet could have done with more rehearsal.

For some reason (I suspect sabotage) the news server kept homing in on alt.sex.bondage. Having hastily clicked off this, our presenter had great trouble in finding a newsgroup with any postings in at all, but eventually struck gold with rec.humor.fr — a place to read and tell jokes in French. Now, call me over-cautious, but personally I wouldn't click on a header that started: "There were these three blokes in a bar…" Not in public, anyway. Hopefully the audience didn't have time to read all the way to the punch line, which was, as I recall, something about "mine's the size of an elephant's and I painted it blue." The next joke was, I think, about this little accountant who goes to jail, and… well, I think we'll skip that one, too. Goodnight Usenet. Any questions?

The audience adjourned for compulsory free drinks and snacks, by which time all the public PCs were connected and up and running. Eager first-time surfers were perusing the National Library, playing online games and, thanks to the wonders of ISDN, listening to Serge Gainsbourg recordings in real time. Then at last, the two techno-wizards mended the last PC and up came the ISP log-in screen. "OK, I've got it all back. We're connected! What's the password?" said wizard one. "Oh… it was five stars, I think, when the boss did it," replied his colleague. The festivities went on until 2 a.m. and it was all free. Next week, the club starts in earnest. You can turn up, buy a smartcard for a one-off charge of 40 francs, and pump it full of cash. Stick it in a PC and, as you surf, the cash will dribble away at a reasonable 20 francs per hour. Drinks, however, will be extra.

■ Timn@cix.co.uk

Straight Talking

Barry Fox bursts in with no-nonsense advice on buying PCs and CD-ROM drives. Beware of dealers taking you unawares by selling you outdated stock.

Barry Fox

I have shelved my planned column for this month, to bring you a couple of urgent health warnings. If you are buying a new PC or a new CD-ROM drive, or both, there are two important features to look for if you want to guard against obsolescence. The PC should have USB sockets on the rear. The CD-ROM drive should be of Multiread standard.

USB, the Universal Serial Bus, is a standard agreed by Intel, Microsoft, Digital, Compaq, NEC, IBM and Philips and backed by over 300 other companies. It lets up to 127 peripheral devices plug into a PC, in daisy-chain fashion, with "hot plug and play".

The Windows OS works with a chip on the mother-board to detect each device as it is connected, load the software driver and provide control access without the need to juggle IRQ/DMA settings. So there are no conflicts. Devices can be plugged in and out while the PC is running. There is no need to re-boot between connections.

The devices can be a mouse, keyboard, monitor, scanner, joystick and printer, with data transfer rates of up to 6Mb/sec per device. A single socket on the PC feeds a hub which has four sockets: three of these connect to separate devices and the fourth connects to another hub, which has another four sockets, of which one connects to another hub and another three connect to more devices, and so on up to a total of 127 devices.

USB also rewrites the rules for hi-fi on a PC. With conventional sound-card systems, the digital audio is converted into analogue stereo and amplified inside the PC, and then fed out to the loudspeakers. The high-frequency digital hash that envelopes the motherboard adds buzzing noises to any low-level signal, so even the best sound cards produce sound which is poor by hi-fi standards. USB carries the sound out to the speakers in digital code. The speaker contains its own digital-to-audio convertor and amplifier.

Around mid-1996 Intel started putting USB control chips on all the motherboards it makes for PC manufacturers. In some cases these chips are not connected: there is no socket on the chassis. This is clearly an absurd situation. The sockets put a few pence on the factory cost, but anyone with a socketless PC must pay a disproportionately high price for an authorised service agent to retro-fit them. Often, the owner will not even know there is a USB chip on the board.

It should be possible to add an adaptor card to a PC, which converts it to USB operation, but it will need its own configuration so the motherboard solution will be far easier. Of course, USB will only work with new devices, which are USB-ready. I don't doubt the promises for USB will turn out to be overblown. Nothing in the Windows world is ever that easy. But I would not now dream of buying a new PC unless it had a working USB connector on the rear of the chassis. Likewise I would not now dream of buying a CD-ROM drive, unless it carried the magic word "multiread". So just as dealers will be busy flogging off non-USB PCs, you can be sure that they will now be off-loading non-Multiread ROM drives to unwary customers.

Hewlett-Packard, Mitsubishi, Philips, Ricoh, Sony and Yamaha have agreed a standard for CD-ReWritable. CD-RW discs record, play back and erase on CD-RW recorders. They also play back on a new generation of CD-ROM drives. Unknown to owners, some have purchased CD-ROM drives which contain "multiread" circuitry which self-adjusts for CD-RW playback.

The CD-RW discs work on the phase change principle. CD-RWs don't need a protective caddy and can fit any conventional CD drive. CD-audio players and CD-ROM drives have a light sensor designed to read pressed or write-once discs which reflect 70 percent of the laser light from the lands between the data pits, and around 30 percent from the pits. It's possible to make a phase change alloy matching these optical characteristics, but the recording laser has to be powerful to melt the alloy. The system is then too expensive for consumer use.

Six months ago Philips and HP agreed a standard for CD-RW with 20 percent reflection from the alloy in its crystalline state and five percent in amorphous state. The recorder can use an inexpensive laser, but the player must have a more sensitive sensor, so the CD-RW standard also defines a Multiread player with automatic gain control in the circuit which amplifies the signal from the light sensor. If the disc is a pressed CD or CD-R, the amplifier gain is turned down; if the disc is a CD-RW with lower reflection, the gain automatically increases.

The Multiread standard has now been endorsed by all the major manufacturers of CD-ROM drives. Around one third of the latest models in the shops, known as 12-speed drives which run at 12 times normal speed, already have AGC. Once makers have sold off their old stock, all new drives will conform. Don't buy the old stock unless you do not want to play CD-RWs.

■ Barry Fox is at 100131.201@CompuServe.COM

Business Matters

Brian Clegg

"People simply weren't designed to sit in front of PCs." Brian Clegg looks to the future at some alternatives to the conventional PC user interface.

Using a computer is an unnatural act. I'm not talking about the sort of thing you find featured in the more dubious internet newsgroups, it's just that people simply weren't designed to sit in front of PCs. We could change *ourselves* to make the interface with the technology easier, but the point at which Microsoft gets a plug straight into my brain is the point at which I get out of this business. Alternatively, we could change computers. Perhaps it's time for a total overhaul of human/computer interaction.

Frankly, things didn't start off well. Early computers were so fussy that users had to force their applications into the computer's format. Everyone's heard of punched cards but they were a dream compared with the programming methods of some early machines. Take, for instance, the Powers-Samas Program Controlled Computer of the late fifties; probably the only computer designed specifically to work in pre-decimal sterling. This brought a very real meaning to the term "hard coded": programs were set up on circuit boards using rivets, making the principal debugging tool a very satisfying hammer-and-punch combination.

Even as late as the seventies, the height of sophistication for controlling a computer was a teletype, or a screen equivalent, where a few lines of text provided the only communication channel between you and the software. The keyboard was derived directly from that of a traditional typewriter, allegedly designed to avoid jams by slowing down typing on early mechanical devices, and is neither an ideal layout nor particularly comfortable for the wrists and arms of those who have to use them.

For some time, computer interfaces stagnated. It took the PC to turn everything on its head. Looking back at the Altair, the first real personal computer, it's hard to see it as a trendsetter for human/computer interaction. It had neither screen nor keyboard. Information was input on binary toggle switches at the front of the machine, while the result was flagged up on a row of lights. It was only a few years later that Apple lifted the work on GUI (graphical user interface) and SRI and Xerox started with mice, thus changing the face of commercial computing.

The Apple Macintosh was launched 13 years ago; since then, there has been another hiatus. I'm not one of those people who think the Mac was the ultimate — in fact, I prefer the Windows 95 interface — but since then, there has only been refinements. The way the interface works has not fundamentally changed. Probably the only real advance has been the introduction of those strangely shaped ergonomic keyboards (do try one, they're superb).

I don't want to underplay what the PC and the graphical interface have done. They haven't just brought computers to the masses, they have transformed all business computing. The PC now sits routinely between the user and the inhospitable mainframe to make interaction more natural. Yet it's not the end of the story. There has to be a next big step in interfaces and for once, the internet doesn't provide the impetus. Although the web has started a revolution in our attitude to information and communication, it doesn't represent anything significant in terms of user interface; it's more of the same.

Conventional wisdom suggests that voice and handwriting will provide the next milestone in user interface. Certainly voice control, automatic dictation and handwriting recognition have improved to the extent where they're almost useful, suggesting that they will be entirely practical in a few years. The trouble is, we're employing them timidly. As long as we try to fit them into the old GUI framework, there isn't a major step forward, just an incremental improvement. A GUI structure of menus and toolbars simply isn't made for voice control. Similarly, the pen feels wrong on current hardware and is not suited to tightly regimented dialog boxes. If these technologies are to drive the next generation of interface, someone needs to take a step back from the problem and come at it afresh. Business software designers could learn a lot from their games-writing colleagues. If you take a look at my current favourite, Electronic Arts' The Darkening, I can navigate effortlessly through 3D space, finding and following other ships with minimal effort. A breakthrough business interface would provide the same ease of navigation and action in the world of documents, databases and email. I don't envisage a literal, virtual reality approach where I would fly around my data and shoot up the business problems. Rather, the new business interface should be as cleanly and tightly suited to requirements as is the space flight simulation in The Darkening. I don't know what the next generation will be, I don't know whether it will happen in the next few years or not. But you can be sure that, in the words of Al Jolson, "You ain't seen nothing yet".

■ BrianClegg@msn.com

Letters

Letters

Send your letters to:

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What's in a name?
The glossary accompanying your Video Capture Cards review *(PCW, March)* stated that the French SECAM TV system uses 819 lines per frame. Like the guillotine, this 819-line black & white TV system belongs to the past. The SECAM colour system uses 625 lines per frame, like PAL used in the UK.

In addition to the proper names in the glossary, the following were popular when the choice between TV colour systems was a hot topic: NTSC Never Twice The Same Colour; SECAM Something Essentially Contrary to the American Method; PAL Peace At Last.
Justin Underwood
junderwd@friend.win-uk.net

Net overkill
I buy a copy of *PCW* each month and notice that the editorial content is becoming more internet-orientated.

I'm not on the net, so I don't want to find that your magazine is swamped with articles about it every month. Those who are interested should buy one of the specialist magazines which cover internet topics. Please don't continue to fill half your magazine with information that many readers do not want.

This applies to other PC magazines as well. The coverage of the internet is increasing each month and soon there will be insufficient space for computer news. While I appreciate that you have *some* readers with an interest in the internet, you should allocate far more editorial space to computer news than at present.
Joe McGregor
Rochester

The internet is where computer technology is going. We're still convinced that sooner or later just about every PC user will be connected to the internet. That said, it is a constant dilemma for computer magazines to decide how much space we should devote to old technologies. We faced the same problem when Windows replaced DOS and when Windows 95 replaced Windows 3. We like to think we've got the balance about right between net news and general PC news. But if any readers think otherwise, we'd be happy to hear from them.*

One foot in the past
I have been a keen user of CP/M based software for the past ten years or so and realise that this leaves me somewhere in outer space in terms of mainstream information technology. I have just begun to get to grips with a Windows 95-driven machine, and I am stunned and staggered beyond belief by the sheer uselessness of the DOS software provided. (I must run DOS because I have installation problems.)

What is the use of a Type program that cannot pause at each screenful? If you cannot read the first few hundred lines of a file, how can you be sure that all the required information is in the last screenful? Why should it be necessary to delete the *entire* command line to correct a typo at the beginning of it? (Even doskey is no longer provided.)

Having acquired a couple of thousand pounds' worth of computer, I find that the only way to read its files under DOS is to copy them to a floppy disk, use a PD program to convert that disk to CP/M format and read them on my old CP/M computer. Brilliant!
Stephen Younger
100014.661@compuserve.com

Isn't it time you joined the late 20th century and edited text files using something like the WordPad text editor supplied with Windows 95? If you're determined to keep one foot in the eighties you could use the DOS edit utility that's supplied with Windows 95 — just typing "edit" *from the DOS prompt usually does the trick.*

If you're determined to stay rooted in the seventies, you can. Just type
`type textfile.txt | more`
and enjoy reading your text file screenful by screenful.

Hull hath no fury
We use BT's awful PhoneDisc software for computerised telephone number searches. This package not only costs a fortune, but it is also seriously flawed. For example, the whole of Hull is excluded. What we would really like to do is automate the process so that we can look up phone numbers based on information kept in our database, but PhoneDisc won't do it. Despite BT's "policy of continual improvement" (and its claim to always welcome ideas and suggestions) it has not considered this idea as yet.

Do you know of a computerised phone directory which includes domestic and business numbers for the *whole* of the UK and will also allow automated searches? There must be a big market out there. We would be one of the first in the queue.
Paul Smith
mcrtask@ibm.net

Unfortunately, everyone is still waiting for a decent, reasonably priced, computerised directory of UK telephone numbers. Hopes were raised in November '96 by the launch of the £20 UK Info from Topware. However, this company has since agreed with BT to stop selling the product because it allowed reverse searches (so you could match numbers to addresses). We also heard that the data was badly flawed. Topware is now planning a new CD, without the reverse searches, which should be available soon. CD-Direct has the latest details; phone 0800 317864.

Any small change?
I refer to the News Analysis item ("Banking on it") in your April issue. The death of cash has been predicted many times before, but I didn't believe it then and I still don't. High-denomination bank notes, maybe. Coins? Never.

The bedrock of a healthy economy is the small business and the small buyer. Cash is an essential part of this: how else can you give a six-year-old his pocket money, go to a car boot sale, pay for the *Big Issue*, give to a charity street collection or gain entry to toilets at Waterloo station? I could go on. I find credit and debit cards invaluable, but when a colleague asks me to pick up a copy of the "Daily Grumble" when I go up the high street at lunch time, it's not much good if he can't offer me cash on my return. Dream on.
Sue Hall
Surbiton

Ben Tisdall replies: The article wasn't intended to suggest that cash would disappear, but it will certainly become a smaller part of the mix of payment methods used. Indeed, there's no reason why you shouldn't give a six-year-old his pocket money on a smartcard in the future. And it may be just as easy for your colleague to credit your smartcard with 40p, as it is to sort out the correct change for a copy of the "Daily Grumble".

Out of style
A "Short Stories" item *(p35)* in your Newsprint section last month stated: "More than 1,000 stylish ways to get cancer can be found at…" (a certain web site was cited).

Two years ago, at the age of 33, I was diagnosed as having breast cancer, and I can assure you that there is absolutely nothing whatsoever *stylish* about mutilating surgery, highly toxic chemotherapy, large doses of gamma radiation, subsequent discrimination by insurers, and coping with the not unreasonable chance that I will not be around long enough to see whether the so-called Millennium Bug will be as big a problem as everyone claims.
Lynne Marie Stockman
London

News editor Clive Akass replies: I apologise if this item caused you distress. I would be the last person to suggest that cancer is anything but awful, having seen my own brother die of it. The site in question advertised fashionable cigars and the news item was aimed at discouraging people from smoking them, in the belief that humour is more likely to put the message over than dire warnings.

Millennium? No problem
Karen Smith *(Letters, April)* has put her finger on the key to the Year 2000 hype. Unfortunately, the line "All the world's computers will crash at 00:00 on January 1st 2000" is a much juicier news story than "A large number of very important database systems may well crash because of seventies' programming practices".

Karen Smith is also right in her assumption that the majority of PCs will be unaffected by the change in century. After all, how many programs, which most people run on PCs, use any date information?

The mistake has probably come about because most data stored on computers is date-sensitive. But to assume from this that the majority of computers will be affected is nonsensical, because practically all such data is of course stored on a relatively small number of mainframe and minicomputers. The problem will certainly be serious for such systems, but most computer users will not be affected in the slightest.

Media coverage of this subject is mushrooming and it does not help solve the problem when the approach taken is so demonstrably untrue.
Keith Williamson
Keith@scss.demon.co.uk

RAM battering
What rubbish about RAM is Microsoft going to sell us now? The three main ingredients for the computer industry over the past few years is: hype, more hype, and disappointment.

The computer I am using to write this email is a P60 Escom mini-tower with 8Mb RAM. We were originally going to buy a 486 DX4 100 but the assistant told my Dad we should buy a Pentium because we could upgrade it at any time with minimal cost. What total rubbish. It has a motherboard that warns you in the manual not to use a P66.

I recall the time when Windows 95 was still called Windows 4.0 and Microsoft was telling us that we would have fast, crash-proof, 32-bit applications flying in 4Mb of

p57 ➢

RAM. This is also rubbish. This system, when running Windows 95 and System Monitor alone (with no virus scanners, MS Office side bars, or wallpaper) tells me that *14.7Mb* RAM has been allocated.

Many companies aiming their products at inexperienced users tell people that 16Mb of RAM will allow you to use multitasking and cut and paste between applications. I load some wallpaper, a background virus scanner, the MS Office side bar, MS Word (without a document) and MS Encarta '95 (a typical set-up) and am now told that about *28Mb* RAM has been allocated and I have almost no free RAM.

A very sensible journalist once wrote that you should always treat the recommended system requirements as the minimum. Now, did Microsoft suggest 8Mb as the recommended RAM or was it 16Mb? I think that it would be a nice idea for magazines to quote in their reviews just how much swapfile usage there is on a PC. Similarly, why don't PC manufacturers upgrade their ranges to a minimum of 32Mb and tell you that you need 32Mb for good multitasking?

Alex Helfet (aged nine years, going on ten)
helfet@globalnet.co.uk

Cold comfort and desperate measures

Can't stand the heat?

I read with interest Bethan Davies' letter in last month's *PCW*. I bought a P166+ last December and since then have experienced a similar problem on an almost daily basis. When my computer is switched on from cold it always locks up at the "Starting Windows 95" prompt. Additionally, it stops just after I have switched it on, stating that the floppy drives are not ready. Yet if I hold down the delete key and get the BIOS page up and leave it for a few minutes, then exit without making any changes, it runs first time.

The temperature of the room where the computer is kept is about 14°C during the day and 22°C in the evening. When I had an Olivetti 486 SX25 PC it worked fine no matter what the temperature; even a chilly 5°C one winter's morning.

What is it with these new PCs? It seems to be a case of sacrificing reliability for speed. Manufacturers ought to concentrate on quality rather than making their previous model obsolete in as short a time as possible. I was the owner of a 48K Spectrum since 1982 and 48K remained the maximum memory for the next eight years. Yet I now own a PC which needs an extra 16 meg about every six months. It's about time something was done to prevent manufacturers lining their own pockets with our money, all for the sake of getting a piece of software to run.

Andy Davis
Alchemist@emarkt.com

Hard drives under the hammer

In response to Bethan Davis (*Letters*, April), I work at a computer shop and have "fixed" two HDDs for data recovery — with a hammer! As in her case, the drives worked long enough to get the data off. Six months later, one of them (in a laptop) is *still* working.

P.S. This is an extreme cure and it is not recommended to other people.

David Cresswell
Ceefax@compuserve.com

Which chip?

As a user of what is now considered old technology, a DX2 66MHz PC, I am hoping to purchase something more advanced and wondered if you could advise me? There is a lot written in *PCW* about the MMX chip and how it has replaced the standard Pentium, but has it replaced the Pentium Pro? As a user of standard office products, internet access and some games, I don't know whether to opt for the MMX or the Pro. Alternatively, should I wait twelve months to buy a network computer with a super-fast modem?

Richard Auger
R_Auger@msn.com

For general home and office use the MMX processor is a better choice than the Pentium Pro. See our Pentium II (Klamath) preview (p98) for the latest information on Intel chip developments.

OS shortfall or demo drama?

I have subscribed to *PCW* for some years and appreciate the cover discs as a useful bonus. Until recently I was struggling with an ageing 486/33 which always had trouble handling your cover CDs: it ran very slowly and quite often crashed. So I decided to bite the bullet and purchase a whole new system, which I am now using. It's a 200MHz Pentium Pro, with 12x CD ++.

At the time of buying I was offered the choice of Windows 95 or Windows NT 4.0 on the system. As many of my colleagues were struggling with

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upgrading to Windows 95 (it seems it won't work until at least the third complete re-installation) and the general advice (including *PCW*'s) was that NT was the future, I decided to opt for the real operating system.

At one point I was planning to buy and install Windows 95 as a second boot option, but in discussions with Microsoft's sales team I was assured that there was no point in shelling out on Windows 95 as all software would run just as well under Windows NT 4.0. I am somewhat disappointed that having paid out a large sum of money for state-of-the-art technology (which of course is now obsolete, due to MMX), I am still experiencing problems with your cover CDs.

OK, so most things run fine and at great speed, but several of the demos refuse to run on my system. This month, both the Sega Rally and the G-Nome demos give the message "Sorry, but X will only run under Win95". Is this really true? Did Microsoft tell me a porkie when they said everything for Win95 will run under Windows NT 4.0?

As the NT user base is increasing rapidly, I'm sure that software producers would want to tap into this market. But if their demos don't work, nobody is going to have the confidence to pay for the full product.

I would like to know whether the problem is with the operating system (if so, I'd like to have another chat with Microsoft) or a problem with the demos themselves (in which case, I'd like to talk to the software suppliers).

Duncan Kendall
dfk@bdksol.co.uk

Sadly, whatever Microsoft says, NT driver support languishes behind simply because Windows 95 ships on far more PCs. Manufacturers still write Windows 95 drivers first. Eventually NT will catch up, but for general use, and particularly for games, Windows 95 is still a safer choice.

A wine about Microsoft

My wife kindly bought me the Microsoft Wine Guide for Christmas, but when I tried to install it, Windows failed to restart.

I talked to Microsoft Support: "Ah, yes," the man said. "It's written in a non-compatible video driver. I'll send you a fix later as I'm very busy right now." So I agreed. No fix arrived. I called Microsoft Support again (with all the attendant waits and costs). At the end of an hour's talk-through, the Wine Guide was still not working; my nice SVGA driver had been lost and I was forced to work under VGA. The Microsoft Support person promised to send me some new drivers. The drivers eventually arrived, and after four calls to Microsoft I got to speak to the guy who had promised to contact me. After a further hour's talk-through, the Wine Guide still didn't work, I was still running VGA and had lost all my program groups! He promised to sort it out the following day. The next day arrived, and my Support man told me that Microsoft was not really in the business of video drivers; I should ask the manufacturer for a replacement driver.

So there you are. Thank you, Microsoft, for all your help. The Wine Guide *still* does not work and I am running a degraded VGA system. Microsoft has washed its hands of the whole affair. "Oh," said the man from Microsoft. "We can give you a refund on your Wine guide." Once again, thank you, Microsoft, for all your care and attention.

Harvey Jay
ramehols@aol.com

Gadgets

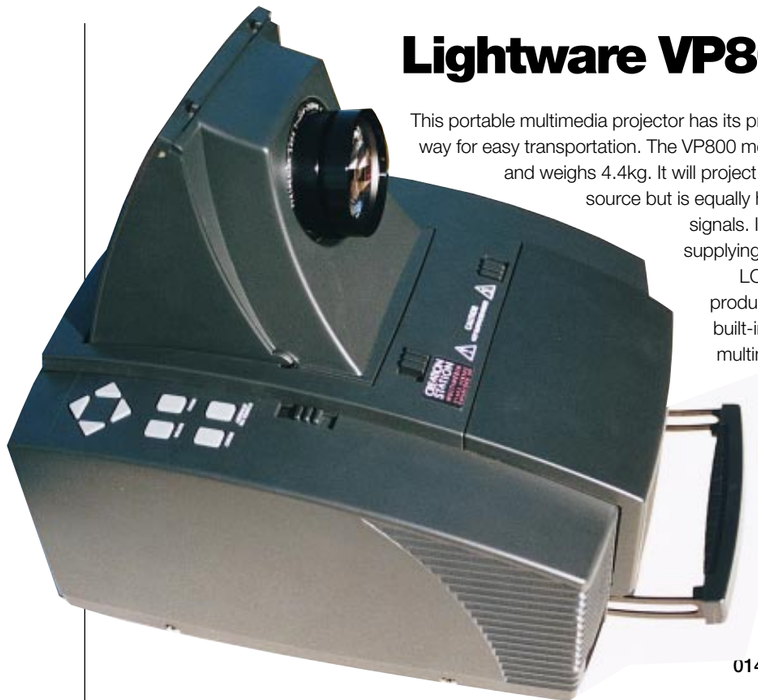
PCW Gadget Photography by David Whyte

Logitech Digital Wingman Extreme

This joystick is the reason serious games players don't have pin-ups of the Spice Girls: it's just as sexy and has more curves than an entire bagful of teen pop idols. In fact, the grip is so gorgeous, you may never want to let go. This new digital stick, while compatible with old DOS games, is designed to work with Windows 95. The digital interface makes it possible to have six buttons (count 'em) and a throttle, all working at the same time. The buttons are completely programmable using some clever software which remembers the configurations for different games and different users.

Price: £49.99 (£42.55 ex VAT)
Logitech 0181 308 6582

Lightware VP800



This portable multimedia projector has its projection head and lens folded out of the way for easy transportation. The VP800 measures a compact 317 x 259 x 162mm and weighs 4.4kg. It will project up to 800 x 600 pixels from a computer source but is equally happy with NTSC, PAL or SECAM video signals. It uses a low-priced 400W halogen lamp supplying 270 ANSI lumens output, a single 6.5in LCD panel, and a 9x zoom lens which can produce images from 40in to 200in. There are built-in stereo speakers, too, for the complete multimedia experience. UK supplier, Creation Station, generously throws in a GyroPoint Pro with the VP800 (it can also be supplied separately): it is a wireless mouse guided by a miniature internal gyroscope. Remarkable.

Price: £4,993.75 (£4,250 ex VAT); GyroPoint Pro costs £440.63 (£375 ex VAT).
Creation Station 01483 458585

Nokia solar powered battery

Nokia may finally have got around the problem of your mobile phone's juice running dry on you at the most inconvenient moment: a solar powered battery. Yes, that's right, a battery with a solar panel on the back which can recharge itself when left in sunny places. Nokia suggests a handy window ledge: we suggest a different country! Anyway, a solar powered battery is a brilliant idea in anyone's book and we look forward to trying it out. The first model to support the solar powered battery is Nokia's new 1611, an updated version of the 1610 which already offers an impressive three-and-a-half hour talk time or 100-hour standby with its standard (non-solar) battery.

Price: Solar powered battery price, n/a. Nokia 1611 phone, about £10 with subscription to Cellnet or Vodafone GSM.
Nokia 0990 002110

Ericsson GF-788

Wow! Ericsson's latest mobile phone, the GF-788, measures a waif-like 105 x 49 x 24mm and weighs a paltry 135g with its standard battery. In fact, this is the only battery available for the 788 and lasts for three hours of talktime or 60 hours in standby mode. It is Ericsson's first flip-phone in the UK and despite Motorola's patent, preventing anyone else from using their flips to make or break calls, the 788 uses its flip to protect the keypad and help channel your voice to the microphone located near the hinge. The 788 is expected to sell for around £200 with a connection to either Cellnet or Vodafone GSM digital networks. A mobile fax and data PC Card will be available soon.

Price: Around £200 with subscription to Cellnet or Vodafone GSM.
Ericsson 01483 305433

Portrait PageMaster LCD

The most common document size is A4 with portrait orientation, yet in order to display it life-size on a traditional landscape screen you need a large, expensive, 21in monitor. Portrait Displays figured out that a 17in monitor turned on its side could display A4 portrait documents, life size, at a fraction of the size and cost of a larger monitor: the inevitable evolution was a pivoting LCD monitor. Enter Portrait's PageMaster LCD, a 15in DSTN panel (equivalent in viewable size to a typical 17in CRT monitor) which can rotate through 90 degrees to display an A4 document at life size. Maximum resolution is 1,024 x 768 pixels and the display benefits from low power and low radiation. The PageMaster is due for release later this year, but at the time of writing we have no UK contact number or expected price. Meanwhile, check out our group test on page 152 for *our* 17in CRT recommendations. **PageMaster** www.portrait.com

First Impressions

First Impressions fixes on power with a **Mesh PC** (p62) with TX technology, and a foursome of notebooks (p67-68). Write wicked web pages with **MS FrontPage 97** (p77) or **BackStage Internet Studio 2** (p80). Is your PC a pain or causing you heartache? Then consult **First Aid 97** (p84).

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VNU European Labs

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

Our tests closely simulate real-world use. For example, 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. The tests, mainly Windows-based, are used to isolate specific components like hard disks, graphics cards and CD-ROM drives.

● To make them easy to read, 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.

Ratings

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

Hardware

Mesh Elite 200TX Plus

A tasty MMX machine with a souped-up TX chipset, taking pole position in the speed stakes.

TX is likely to become the *de facto* successor to the 430HX and VX chipsets, as it is specifically designed to complement the Pentium MMX, and MMX looks set to become the new standard for the Pentium architecture quite rapidly. At the time of writing examples were exceedingly scarce, but we managed to track down a UK-built TX system from London-based PC manufacturer Mesh Computers.

As soon as the machine arrived it became apparent that Mesh had concentrated on speed in all aspects of the configuration, which married a 200MHz Pentium MMX with a SCSI hard disk in a mix seasoned with a liberal 64Mb of RAM, 512Kb of pipeline burst cache and, of course, the TX chipset itself.

The midi-tower case had a plain, fairly functional fascia bearing the necessary minimum of indicator lights and a reset button. The system was supplied with a Microsoft mouse and a keyboard with a clattery but reasonably positive action.

The monitor was a 17in Diamondtron-based unit from Iiyama, the VisionMaster Pro 17. For a full review of this monitor, see this month's monitor group test *(p152)*.

Despite the fact that the Asustek motherboard is fairly "cutting edge" thanks to its TX chipset, it follows the standard rather than the revised ATX format. As a consequence, the two free PCI expansion slots are cut to half length by the processor cooling fan, although the three ISA slots lower in the case are unobstructed. There isn't an enormous amount of room in the case, but the build is tidy and working on the machine will be as easy as it can be given the available space.

RAM expansion is provided by three 128-pin DIMM sockets, one of which has been left free for an upgrade, although with 64Mb already present hopefully this won't be needed. Mesh has used SDRAM rather than EDO RAM, as the TX chipset allows faster CPU-to-memory timings with the former, a factor which was reflected in the overall performance.

Something else that had a direct impact on speed was the 4.3Gb Seagate Cheetah hard disk which connected up to an Adaptec AIC-7880-based Ultra Wide SCSI controller manufactured, like the motherboard itself, by Asustek. The drive runs at a phenomenal 10,000rpm, so fast that Mesh has taken the precaution of fitting a small internal fan beside it to keep it cool.

The SCSI controller also hooks up to a 16-speed Teac CD-ROM, audio processing was being done by a Creative Labs Vibra 16 mounted on the controller board itself. Sound is fed out to a pair of Altec Lansing ACS5 speakers, which are pretty good as they stand but can be used as satellites with an optional subwoofer if you want a really beefy tone.

Everything was rounded off with a 4Mb Matrox Millenium graphics adaptor well suited to demanding high-resolution, high-colour work, and, unsurprisingly, overall performance was most impressive, setting a new marker at the top end of the 200MHz MMX spectrum.

Dominic Bucknall

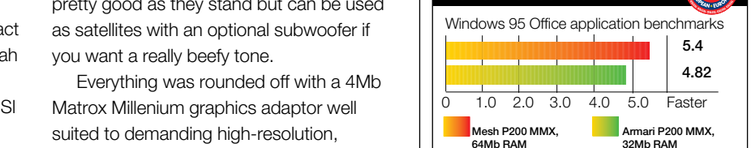
PCW Details

Price £3,284.13 (£2,795 ex VAT)
Contact Mesh Computers 0181 452 1111
System Reviewed P200MMX, 512Kb L2 cache, 64Mb RAM, 4.3Gb SCSI hard disk.
Good Points Outstanding performance. Good peripherals.
Bad Points A bit pricey.
Conclusion If you want a top-end system but not a Pentium Pro, this is a strong candidate.

★★★★

Performance results

Windows 95 Office application benchmarks



p65 ➢

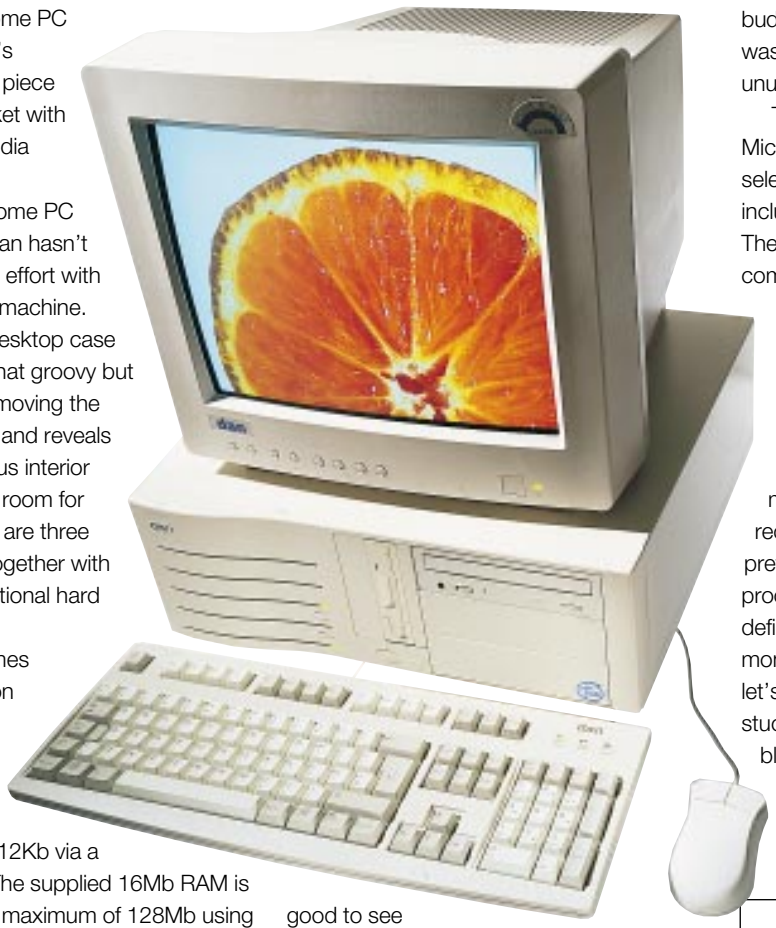
Hardware

Dan Home PC

Home is definitely where this impressive budget PC is, especially as it can double as a TV.

The name says it all: the Home PC is Dan's attempt to take a piece of the family market with a budget multimedia machine.

Unlike other home PC manufacturers, Dan hasn't made any special effort with the styling of this machine. The big chunky desktop case may not look all that groovy but it is functional: removing the case is a doddle, and reveals a tidy and spacious interior with quite a bit of room for expansion. There are three drive bays free, together with space for an additional hard drive. The ASUS motherboard comes with the Intel Triton 437VX chipset and 256Kb of secondary cache, upgradeable to 512Kb via a COAST socket. The supplied 16Mb RAM is upgradeable to a maximum of 128Mb using the DIMM slot and the four 72-pin SIMM slots. The three spare PCI expansion slots are all capable of taking full-length cards — a sign of a well designed system.



Where this home PC scores over similar contenders is in the addition of an ATI TV card which allows you to use your PC as a normal television. You can view teletext, MPEG-1-encoded sequences, and (this is the exciting bit) capture images and sequences from television and video input.

You can even watch TV in a corner of the screen while working on something else, but keep an eye on any children saying they're doing their homework on the PC. This feature adds immensely to the desirability of this machine and it's strange more manufacturers aren't doing the same with their home PCs, especially since TV cards aren't too expensive these days.

Given that this is a budget system, it's good to see that Dan has opted for a speedy 33.6Kbps faxmodem. There's no real compromise with the storage either, with a 1.6Gb EIDE hard drive and 12-speed CD-ROM drive. The sound system is a bit of a disappointment, however. The cheap Sound Conductor 16 PnP card has no wavetable, although there is a daughterboard connector if you want to upgrade at a future date, and the less said about the speakers the better. Dan mistakenly sent two mice: a nasty cheap thing and a decent Microsoft mouse. We were relieved to hear that it's the latter which comes with this system.

The graphics card is an ATI Video Xpression with a healthy 2Mb of EDO RAM. This drives a decent Dan-badged 15in monitor which is capable of a 75Hz refresh rate at 800 x 600, and 85Hz at 1,024 x 768. The image is steady and solid, and the slight lack of precision is to be expected in a budget system like this. What I didn't expect was for Dan to forget the monitor stand, an unusual oversight for this company.

The impressive software bundle features Microsoft Works 4, Quicken, and a selection of eight Microsoft reference titles including Encarta 97.

The user manual supplied with the PC is comprehensive, but considering this is very much a home machine, the setup guide could do with being considerably more idiot-proof.

The machine I received had a number of vital upgrades from the basic Home PC configuration, with the memory, video card and monitor all receiving a boost. These contribute to pretty impressive test results for a 133MHz processor-based machine: this model is definitely up there with the best from last month's group test of budget PCs. And let's not forget the TV tuner — when you're stuck on Quake or suffering from writer's block on the last chapter of your novel, click a button, put your feet up and veg out to some no-brain telly.

Adam Evans

PCW Details

Price £1,298.37 (£1,105 ex VAT)

Contact Dan Technology 0181 830 1100

System Reviewed Pentium 133, 256Kb cache, 16Mb EDO RAM, 1.6Gb EIDE hard disk.

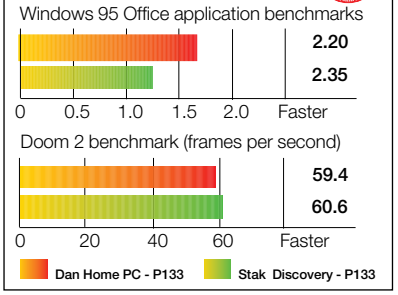
Good Points Well-designed and built. Good performance. TV tuner.

Bad Points The missing monitor stand.

Conclusion A great budget system

★★★★

Performance results



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Hardware

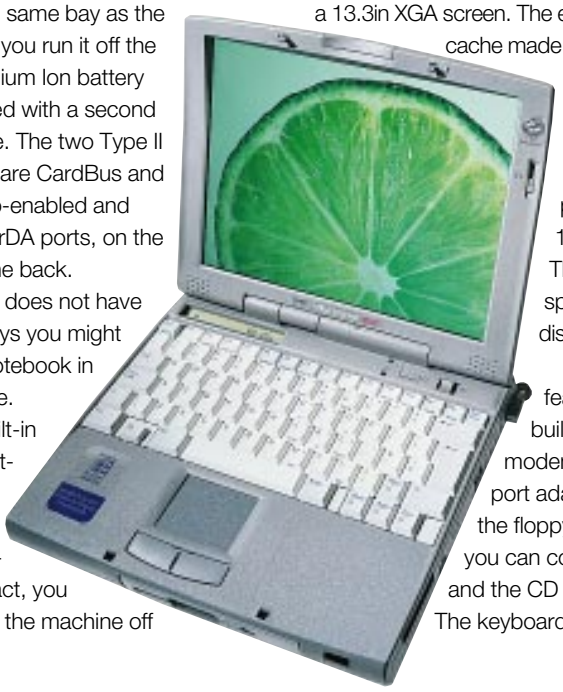
NEC 6050MX *vs* Choice Systems Ultra Lite Pro2000

Cool running: Two notebooks that are MMX enabled and equipped with mobile chips.

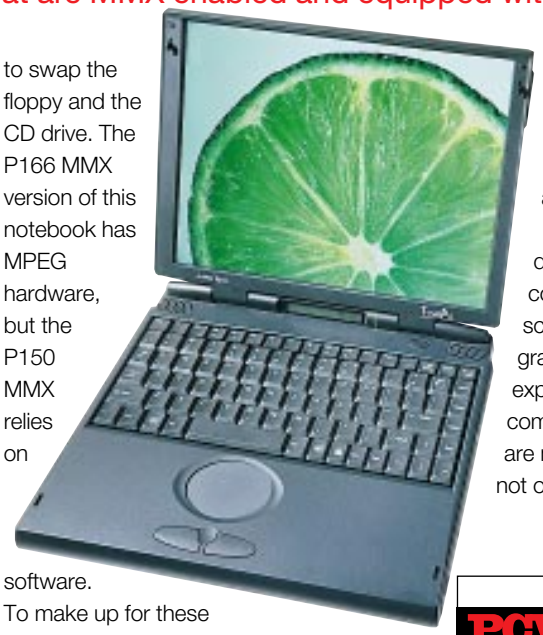
Every man and his dog is now trying to put together a 200MHz MMX notebook. Yes, that's right, 200MHz: trying to put a desktop chip into a notebook and, into the bargain, making the whole thing run hotter than a heatwave in hell. As yet, the number of genuine mobile TCP MMX chips are few and far between, and even some big players are unable to get hold of these in large enough quantities to ensure they can meet demand. The mobile chips are, of course, engineered to run at a lower voltage to conserve power and to keep burn to a minimum.

These two notebooks use mobile chips. The NEC had the 150MHz MMX processor and 16Mb of RAM, while the Choice Systems was powered by a P166 MMX with 32Mb of RAM. NEC also has a P166 MMX which matches the spec of the Choice Systems machine more closely, with 32Mb of RAM and a 13.3in screen as standard.

The NEC 6050MX is part of NEC's 6000 series, launched last year as top-of-the-range desktop replacement machines. The screen is an excellent 12.1in XGA 1,024 x 768 TFT with 2Mb of EDO video memory to support it. The CD drive is ten-speed and swaps into the same bay as the floppy, while if you run it off the mains, the Lithium Ion battery can be replaced with a second 2Gb hard drive. The two Type II PC Card slots are CardBus and Zoomed Video-enabled and there are two IrDA ports, on the front and on the back.



However, it does not have some of the toys you might expect on a notebook in this price range. There is no built-in modem or built-in AC adaptor and the bays cannot be hot-swapped. In fact, you have to switch the machine off to swap the floppy and the CD drive. The P166 MMX version of this notebook has MPEG hardware, but the P150 MMX relies on software.



To make up for these shortcomings, useful software has been bundled, including LapLink and McAfee VirusScan and WebScan.

The Choice Systems Ultra Lite Pro2000 is an AMS notebook, manufactured in the States. AMS is one of those names highly respected across the Atlantic, but is practically unheard of here.

The Ultra Lite is well specced, with a P166 MMX, 32Mb of RAM, 512Kb of L2 cache and a 13.3in XGA screen. The extra RAM and cache made a difference in our tests — an extra 16Mb RAM can more or less double the performance of a 16Mb machine. The CD drive is ten-speed and the hard disk 2Gb.

Other good features include a built-in 33.6Kbps modem and a parallel port adaptor lets you run the floppy externally, so you can connect the floppy and the CD at the same time. The keyboard is full size, including the function keys: one pay-off of a large 13.3in screen is the entire notebook is larger, so allowing more space for keys and a bigger wrist rest.

There were two minor downsides to this notebook. A common problem with 13.3in screens is that they can look a little grainy and lack the sharpness you expect. And the fan is a little noisy: it comes on periodically to ensure things are not getting too hot, and while it is not overly annoying, you do notice it.

Adele Dyer

PCW Details

NEC 6050MX

Price £4,694.13 (£3,995 ex VAT)

Contact NEC 01753 831944

System Reviewed P150MMX, 16Mb RAM, 256Kb cache, 12.1in TFT.

Good Points Screen. IrDA ports front and back.

Bad Points No built-in modem.

Conclusion A very well buil but marginally under-specced machine.

★★★

Choice Systems Ultra Lite Pro2000

Price £4,287.58 (£3,749 ex VAT)

Contact Choice Systems 0181 993 9003

System Reviewed P166MMX, 32Mb RAM, 512Kb cache, 13.3in TFT.

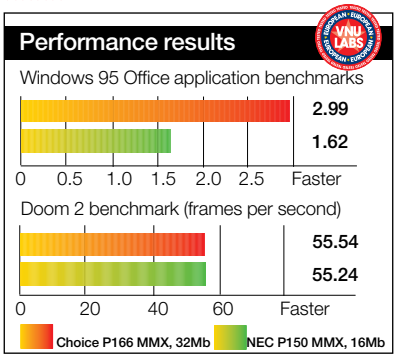
Good Points Extremely powerful.

Bad Points Screen could be sharper.

Conclusion Excellent machine at a decent price.

★★★★

Performance results



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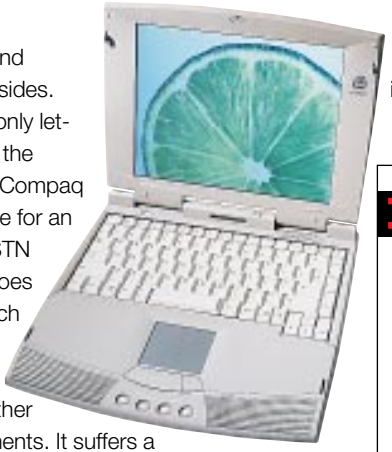
Hardware

Compaq Presario 1060

An easy-to-use all-rounder. It looks nice and it sounds great, but shame about the screen.

Manufacturers have previously designed notebooks with corporates in mind, but they now recognise a market of home and one-man-band businesses who want a notebook because it is mobile and because it takes up far less space than a desktop.

The spec Compaq has come up with nicely covers all grounds, from multimedia right through to home office use. The basic machine is a Pentium 120 with 16Mb of RAM and a 1Gb hard disk. The CD drive and floppy are both in the notebook, so no need to waste time swapping them in and out. However, the other features and the styling are Presario to the hilt. It has the Easy Access Buttons on the front to work the CD, and has big, powerful speakers to whack out the impressively clear sound. Even the screen surround is styled like the desktop Presarios, with those rounded-off edges and slanted sides.



The only let-down is the screen. Compaq has gone for an 11.3in STN which does not match the quality of the other components. It suffers a lack of sharpness, but worse, it bleeds badly, leaving the screen looking like a ghostly chess board if you have too many windows open. The other omission is a built-in modem. If you are to have a well equipped all-round machine, you can do without a PC Card modem.

However, the sound is nearly the best we have heard from a laptop. The styling is great, and the price is competitive.

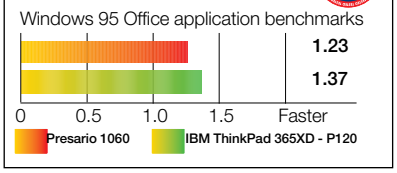
Adele Dyer

PCW Details

Price £1,999 (£1,701.28 ex VAT)
Contact Compaq 0990 134456
System Reviewed P120, 16Mb RAM, 1Gb HD, 11.3in STN screen.
Good Points Office 97 bundled.
Bad Points Lousy screen. No modem.
Conclusion Good notebook spoilt by the screen.

★★★

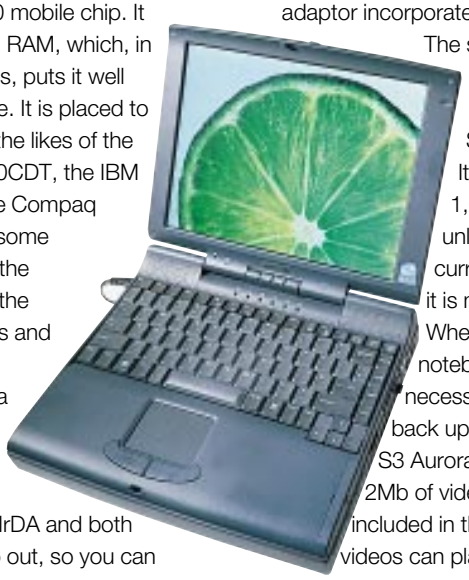
Performance results



Sharp PC-9090

A power-packed, good-looking notebook with an aura of professionalism. Great features, too.

The Sharp PC-9090 is the highest-specced of Sharp's notebooks. It is not MMX-enabled, but is instead powered by the older Pentium 150 mobile chip. It comes with 24Mb RAM, which, in performance terms, puts it well ahead of the game. It is placed to compete against the likes of the Toshiba Tecra 730CDT, the IBM 760 series and the Compaq LTE 5400. But in some respects, it beats the opposition. It has the expected CardBus and Zoomed Video compatibility and a ten-speed CD-ROM drive. It has two useful components: 1.1 IrDA and both video in and video out, so you can connect it to a TV to show your presentation, but it can also be used to download still images or video from a VCR or camcorder. Another nice touch is an AC adaptor incorporated into the notebook.



The screen is beautiful, benefiting from Sharp's Super High Aperture + Super View technology. It is still a 12.1in XGA 1,024 x 768 screen, unlike the bigger 13.3in currently on the market, but it is more than adequate. When you are talking notebook screens, size is not necessarily everything. To back up the screen there is an S3 Aurora 64+ graphics chip with 2Mb of video memory. MPEG1 is included in the software bundle so videos can play smoothly with just the odd glitch. All this adds up to a professional machine, from the styling down to the excellent features.

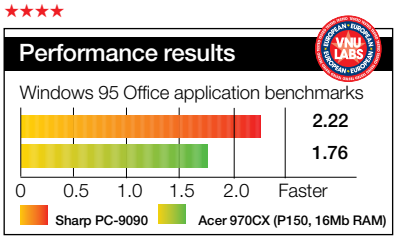
Adele Dyer

PCW Details

Price £4,576.63 (£3,895 ex VAT)
Contact Sharp 0800 262958
System Reviewed Pentium 150, 1.8Gb HDD, 256Kb L2 cache, 24Mb RAM.
Good Points Great screen. Powerful machine.
Bad Points No built-in modem.
Conclusion A worthy rival to the Tecra 730CDT.

★★★★

Performance results

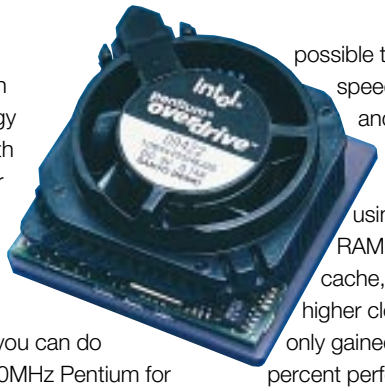


p70 ➢

Hardware

Intel MMX OverDrive

Funkadelic funtime if you're into a fast life: slam an overdrive into your PC and make haste.



Two OverDrive processors with MMX technology are currently available, with a 200MHz version due for release later this year.

One MMX overdrive upgrades either a P75 or a P90, to 125MHz and 150MHz respectively, or you can do as we did and swap a 100MHz Pentium for a 166MHz MMX. Both overdrive chips have a built-in heatsink, preconfigured bus-to-core speed ratio, and the voltage is regulated, making the whole package easier to install than a standard processor.

The OverDrive worked off the same jumper settings as the 100MHz. But difficulties may arise if your BIOS isn't compatible, so Intel has provided a test disk. If you change your board settings, it's possible to increase the board speed from 60MHz to 66MHz and upgrade a P90 or P120 to 166MHZ.

We tested the overdrive using an IBM PC with 16Mb RAM. With its 32Kb of L1 cache, bigger registers and higher clock speed, the OverDrive only gained a disappointing 29 percent performance increase over the P100. Is it worth the extra outlay? Increasing RAM significantly improves performance: go from 16Mb to 32Mb and you can almost double your PC's performance. Two 8Mb RAM SIMMs, at around £44, would have sufficed. Klamath machines are coming, so if you're keen on performance why not wait until later before buying a new PC?

Lynley Oram

PCW Details

Price 166MHz, £386.58 (£329 ex VAT); 150/125MHz, £316.08 (£269 ex VAT)

Contact Intel 01793 403 3000

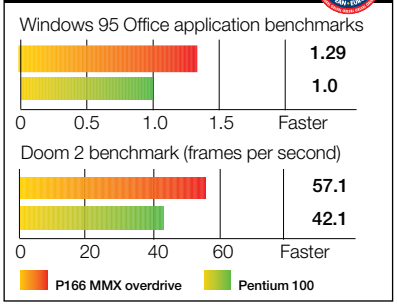
Good Points A doddle to install.

Bad Points Cheaper to up your speed using extra RAM.

Conclusion A simple way to increase performance and make use of MMX technology.

★★★

Performance results



HP ScanJet 5p

A fitter, slimmer, flatbed scanner for the home or small office. And it's easy to give it a workout.

Hewlett-Packard (HP) has replaced its entry-level single-pass flatbed scanner with a trimmer, cheaper model which is easier to use. The ScanJet 5p is aimed at the SoHo market and those who've never used a flatbed before. So HP has taken the scariness out of scanning by placing a green button (labelled "scan") on the front panel: pushing this button automatically launches the necessary software.

The ScanJet 5p is cheaper than its predecessor. Its footprint has been reduced by 40 percent, to 300cm wide by 480cm long. Recessed SCSI and power cables mean it can be placed directly against a wall to save space.

It's a 24-bit 300dpi optical device capable of up to 1,200dpi interpolated resolution, and supports TWAIN and OLE-compliant applications. Interpolation improved the end result when scanning small line-art images. The scanner easily resolved many shades of grey, but had trouble picking up details in the darker shadows.

The ScanJet 5p averaged 13 seconds to preview an image. Line-art, at 150dpi, took 23 seconds to scan, while an A5 colour image at 100dpi took 24 seconds.

The PC version we looked at came with a plug-and-play 8-bit HP SCSI card. The software bundle is easy to install and includes all the packages you'll need, including an image editor and text recognition. HP has licensed PaperPort from Visioneer, which launches automatically during scanning operations and includes Caere OmniPage integrated OCR software. Adobe Photoshop Limited Edition has been included for the Mac, and PCs get Corel PhotoPaint for Windows.

Lynley Oram

PCW Details

Price £339.58 (£289 ex VAT)

Contact Hewlett-Packard 0990 474747

System Requirements Windows 3.1x, Win 95.

Good Points Lots of hand-holding. Copy, fax and email options.

Bad Points Rather limited for experienced users.

Conclusion Excellent value.

★★★★

p72 ➢

Hardware

Panasonic PanaFlat LC40 and Hitachi DT3130E

Hey, flat-face! Two TFT LCD super-screens to choose from. (They strike a good pose, too.)

From the first appearance of an LCD monitor about two years ago, these expensive but impressive alternatives to the traditional CRT have become increasingly common.

The latest Panasonic and Hitachi products are typical of the kind of LCD monitor now being released. Both are 1,024 x 768 XGA TFT screens which connect directly to the analogue output of a traditional graphics card. Although there is a significant difference between their prices, they are of a comparable specification.

The advantages of LCDs are immediately apparent. They have a smaller footprint and power consumption; about half that of an equivalent CRT. They do not suffer from a loss of resolution at the edge as on a CRT and so are great for work where you have to view a lot of information on the screen at once. The big criticism thrown at them is that they are extremely expensive; but LCD panels are not meant for all uses. Mostly they are intended for City dealing rooms where desk space is at a premium, and for anywhere you may want to create an "impression".

Above **The Panasonic PanaFlat LC40**
Below **The Hitachi DT3130E**

The PanaFlat LC40 has the slightly larger screen of the two, 14.1in on the diagonal, which clearly qualifies it as a 15in CRT replacement. At 1,024 x 768 it is able to run at 75Hz but is a touch shaky. It is more stable running at only 70Hz. And, unusually for a TFT, it is uncomfortable and flickery when running at 60Hz. The screen itself looks distinctly grainy, and you can see the pixels lined up horizontally and vertically. It may be that 14.1in is just a little too large for a 1,024 x 768 screen; the pixels look too widely spaced compared with a 12.1in screen. Or it may be that a screen of this size actually demands a higher pixel ratio of 1,280 x 1,024.

There were a few other minor problems. We ran our normal CRT monitor tests on the LCD panels more to judge colour, contrast ratios and focus than to try to test for moiré. Although problems like uneven luminosity and misconvergence were not present, we did notice a little streaking on the panel, but this was not immediately apparent when simply viewing Windows.

The Hitachi DT3130E is more expensive than the PanaFlat LC40 and at 13.3in it's slightly smaller, which brings it closer to a 14in CRT than the claimed 15in. Unlike the PanaFlat LC40 it plugs directly into the mains (without an AC adaptor) and, like the Panasonic, it takes an analogue input from your standard video card.

The Hitachi runs most comfortably at 1,024 x 768 at 70Hz. Try and run it in this resolution at 72Hz, though, and it will tell you that this refresh rate isn't supported; run it at 75Hz and it goes AWOL. However, it is equally stable at 70Hz or 60Hz. Apart from this, the screen could not be faulted. Its focus was extremely sharp and the clarity was exceptional. As on the Panasonic, its viewing angle was a wide 70 degrees.

Overall, both panels are of an excellent quality. The Hitachi just has the edge in this department, but is more expensive for a smaller visible area. The final choice depends on how much you can afford and how large a screen you want.

Adele Dyer

PCW Details

Panasonic PanaFlat LC40
Price £2,931.63 (£2,495 ex VAT)
Contact Panasonic 0500 404041
Good Points Large screen.
Bad Points Focus not as well defined as it might be.
Conclusion The bargain solution.
★★★

Hitachi DT3130E
Price £3,466.25 (£2,950 ex VAT)
Contact Hitachi 0181 849 2000
Good Points Excellent focus and luminosity.
Bad Points Will only run at a maximum refresh rate of 70Hz at 1,024 x 768.
Conclusion An excellent screen.
★★★★

p74 ➢

Hardware

Tektronix Phaser 600

This wide-boy printer is a bit of an oddball: it can print 15 metre-long paper at high quality.

What has a 50MHz RISC processor, a one-gigabyte hard drive, 40Mb of RAM and weighs over 100kg? A Phaser 600 printer. It is 914mm wide and handles a maximum page length of 15m. Its phase-change solid ink technology produces clean, solid images and is not particularly fussy about what it adheres to. Cartridges take the form of crayons which melt as required. Like a traditional inkjet, a small head moves the full width of the paper. Not needing to wrap the paper around a drum or move it back and forth makes it ideal for poster work and means it will print double-sided. Tektronix sells special papers on a roll, although A3 paper can be sheet-fed.

Results are waterproof and robust, with three types of finish: "standard" for laminating, "cold fuse" to improve dot gain, and "hot fuse" for a smooth, waxy feel.

The Phaser is available in two configurations: the introductory version has 8Mb RAM, the enhanced version has 40Mb; the latter option adds a repeat print function and a 5in-wide check print. Both versions print at an enhanced 300dpi. You can upgrade using Tektronix proprietary SIMMs. Both have a 1Gb hard disk cache for the picture; a sensible way to avoid tying up the machine which is doing the printing. Communication is via a bi-directional parallel connector or ethernet option. The cost per copy of an A0 print is less than £5 and takes around 12 minutes to complete, although moving to enhanced print doubles that time.

Simon Rockman

PCW Details

Price Introductory unit £11,156.62 (£9,495 ex VAT); Enhanced unit £13,277.50 (£11,300 ex VAT)

Contact Tektronix 01628 403601

System Requirements PostScript Level 2 drivers for Windows 95, NT, Macintosh and UNIX.

Good Points High quality. Cheap prints. Will print on a wide variety of papers and fabrics.

Bad Points Big. Expensive. Doesn't have the clever printhead of the Phaser 350.

Conclusion You'd probably make a profit if you borrowed the money and sold one print per day.

★★★★

Teac CD-C68EK

Doing the jukebox jive: this eight-speed juggles your CD-ROMs from six separate drives.

Some reference works have been so successful on CD-ROM that they have reduced the sales volume of their printed equivalents. The reason is clear: while books are more pleasant to use, they cannot compete with electronic indexing. However, you still have to find a CD when you need to look something up, and a CD is easier to lose than a book. So Teac's eight-speed jukebox, which holds six CDs for quick reference, could be a useful item.

From the front it looks identical to an ordinary drive except that there are six eject buttons and it fits into a standard full-height bay. Be warned, though; it is about an inch longer than a normal drive and on my machine it snagged on power cables.

Windows 95 spotted it immediately and configured it as six separate CD drives, even before Teac's own driver was loaded. So bear this in mind if you need to load the drivers over a network, because you may need to remap your drives.

The Teac software gives you the option of disabling Win95's audio and CD-ROM autoplay facilities, which can be confused by the jukebox. It also lets you choose whether to address the device as six drives or one: the former option seems preferable as you can see all the CDs in Explorer, but the second saves drive letters. The Teac takes several seconds to locate each CD and we had trouble with a couple of discs that refused to work when they became confused about which drive they were on. One worked when we lowered its drive to "E" and the other CD is temperamental even on standard drives.

Otherwise, the CD-C68EK looks a good buy, although with DVD coming along, the future of all CD devices seems uncertain.

Clive Akass

PCW Details

Price Dealer price £163.33 (£139 ex VAT)

Contact Teac 01923 225 235; Tekdata (dealer) 01782 577677

Good Points Cheap. Useful.

Bad Points Some CDs get confused.

Conclusion Excellent value.

★★★★

p77 ➢

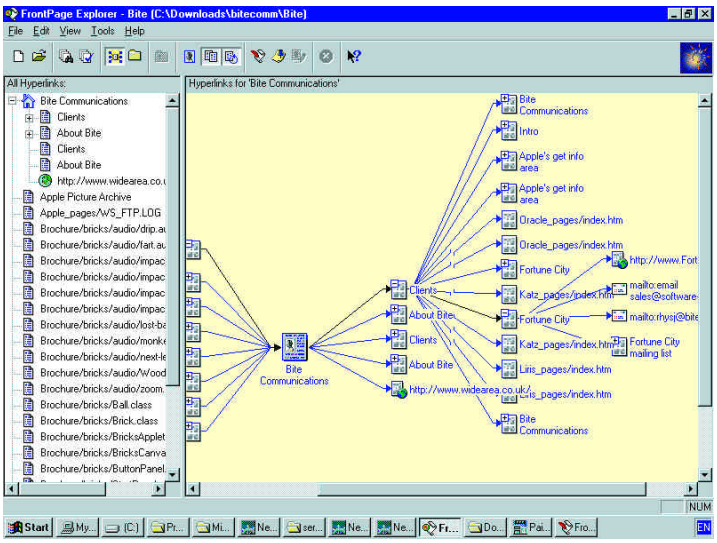
Software

Microsoft FrontPage 97

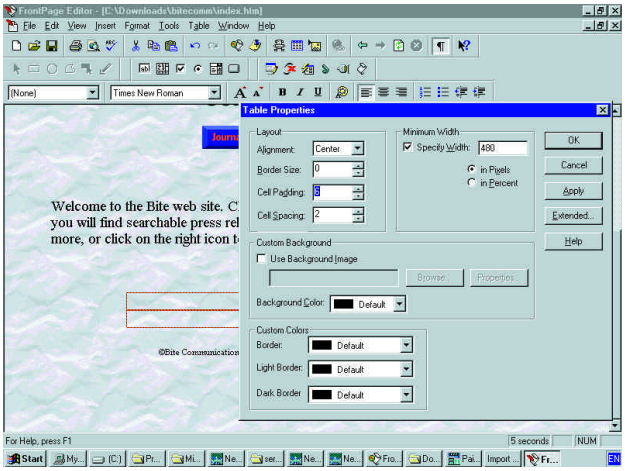
Hold the FrontPage! Hot news here is new features and enhancements that are hard to ignore.

FrontPage 97 boasts some significant enhancements which make it hard to ignore, whether you're looking for a web page editor or a complete site creation and management package. The Bonus Pack includes Microsoft Image Composer, the Microsoft Personal Web Server, a Web Publishing Wizard to help you upload the web to a remote server, and Internet Explorer 3.

FrontPage comes as two basic components; the Editor, and the Explorer. You use the Explorer to create your whole web site. Its graphical layout means that it's easy to see the overall structure of your site and it will automatically spot broken links for you; it will even update links if you move pages around. The Explorer can deal with page updates from different people so it can be used as a central manager for a site being worked on by a team of webmasters; something that's becoming more common.



FrontPage Editor is a fully featured web page editor. Shame there are no floating palettes though, and its support for displaying framesets isn't perfect either



Explorer presents a graphical view of your web site, allowing you to spot broken links and get an overall view of the site's structure

The Editor is the web page editor which works either in conjunction with Explorer, if you're creating an entire web, or in a standalone manner if you want to create individual pages. The Editor has undergone a number of enhancements for this new version, including drag and drop, support for Microsoft Office and several other file formats (indeed, the same set of converters for text and spreadsheets as are available in Office 97, and a table creator very similar to that used in Word). A spelling checker and thesaurus are also part of the package.

Plenty of new HTML tags are supported in the Editor, including Marquee Text, background sounds, and table and cell background colours and images. The package supports ActiveX and Java components and there's even a JavaScript Wizard to help you add your own JavaScript to the page. But to aid hand-coding, and to add support for more bizarre HTML tags, the package now allows you to edit the HTML code directly (hooray!).

Not everything in the Editor is perfect. For instance, there could be more floating palettes so performing an action like changing a table cell's properties didn't require a new dialog box to be opened each time. But all in all, the Editor is up there with the best of the rest.

There are plenty more features within FrontPage such as WebBots, essentially server-side scripts, which can be accessed from within your web pages by a simple command. These include some nice features (like the ability to search your web site for a given keyword) but depend on your web service provider supporting the WebBot Server Extensions on its server — which many don't, especially since they are only available for some types of server. Anyway, perhaps this will change in the future as user pressure builds.

There remain a few niggles with FrontPage 97 but overall, whether you are building an HTML page yourself or as part of a team creating an entire web complex, it's hard to ignore and hard to beat.

Ian Wrigley

PCW Details

Price £157.64 (£134.16 ex VAT); upgrade £96.54 (£82.16 ex VAT)

Contact Microsoft 0345 002000

System Requirements Windows 95 or NT.

Good Points Easily creates entire webs. Editor supports most new HTML commands.

Bad Points No floating palettes means too many menu accesses for some jobs.

Conclusion A great way to create web pages and sites, with only a few minor usability niggles preventing it from being really superb.

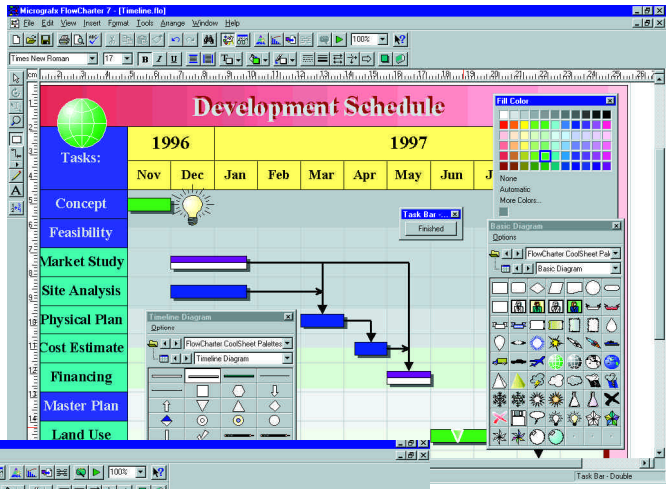
★★★★

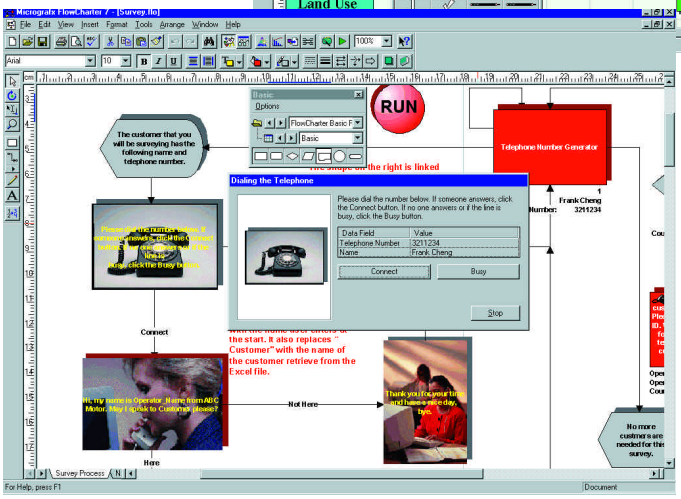
p79 ➢

Software

Micrografx FlowCharter 7

Let the power flow; for flowcharts and diagrams, plus interactive business decision-making.





(Left) Drag'n'drop from a wide range of shapes and symbols (Below, left) A Living Flowchart

While flowcharting packages differ greatly in their functionality, FlowCharter 7 is basically a vector drawing package aimed at creating not only flowcharts but all sorts of business diagrams. To this end you have a palette of conventional drawing tools as well as specific flowcharting tools. Besides the normal line tools, smart "Connector Lines" will stay attached to objects when the latter are moved, and automatically route around objects to which they are not connected. A formatting bar above the work area governs text styles, colours, line attributes, fills and 3D effects, and above this, the usual file, print, clipboard and undo buttons are supplemented by some specialist tools. The latter include inserting links, which can jump to other charts, run applications or connect to internet sites; worksheet view, for attaching data values to objects; and controls for CoolSheets and Shape Actions.

The bulk of the drawing is done from the Shape Palettes. Here, arranged in Explorer-style nested folders, you have everything from basic flowchart shapes, through network symbols, speech bubbles, pictograms, buttons, ticks, pointers and clipart. You can have multiple palettes open at once and combine the shapes with the connector lines: select, say, an "action" shape from the palette, drag away from a "decision" shape and the former will appear in place, automatically connected.

The two big new features are CoolSheets and Living Flowcharts *(see screenshots)*. The former are an extension of templates: choose from a dozen types including timeline, spoke charts, process maps and checklists. All you have to do is drop in the shapes, connect them, and type in the text; sizing and positioning is automatic. Living Flowcharts provide interaction between the end-user and the chart. Instead of following the path on-screen or from the printed page, users can click the Run Flowchart button to produce a series of question-and-answer dialogues. The user's response dictates the next shape dialogue that will appear, but if data fields have been attached to a shape, the value of that data can also affect the decision-making process. An investment advisor, for instance, could set thresholds for different actions based on the capital available and this can be done with the Shape Action Wizard. More advanced customisation can be achieved with the built-in Visual Basic Script Editor. It's a powerful feature in the hands of an expert, offering many possibilities for training, troubleshooting or information-gathering. At present, the snag is that the end-user needs FlowCharter installed on their machine, which limits its value as a training or support tool, but Version 7.1 will be available free to registered users of 7.0 and will include a run-time viewer.

Version 7.1 will also include Visual Basic for Applications support, allowing integration with Microsoft Office 97, HTML output and an import filter for Visio drawings. The patches will also be available from the Micrografx web site. With the current version there's a separate WebCharter program which will retrieve a map of a web site, then create a hierarchic chart in FlowCharter containing links to each page.

Despite a wealth of aid it's an extremely complex package, so it pays to work through the tutorials in the printed manuals.

As well as the Win95 or NT version, you get version 4 (for Windows 3.1), 200 TrueType fonts and 35Mb of clipart. FlowCharter is Office 97 compatible.

Tim Nott

PCW Details

Price £233.83 (£199 ex VAT); upgrade/crossgrade £116.33 (£99 ex VAT)

Contact Micrografx 0345 089372

System Requirements Windows 95 and NT (version 4 for Windows 3.1 included in bundle).

Good Points Everything you need for business diagrams, including interactive decision-making.

Bad Points Rather intimidating for beginners.

Conclusion An application for dedicated users.

★★★★

p80 ➢

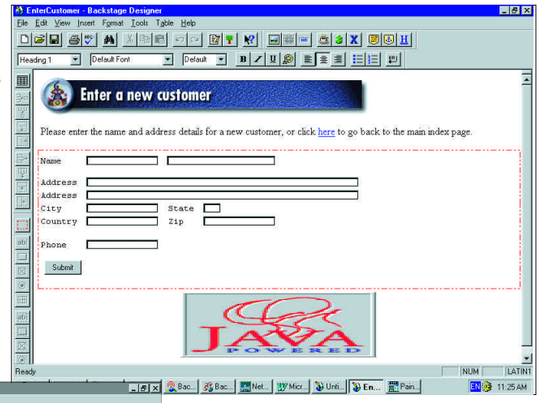
Software

Macromedia Backstage Internet Studio 2

Weave your web site and incorporate an integrated database, without getting into a spin.

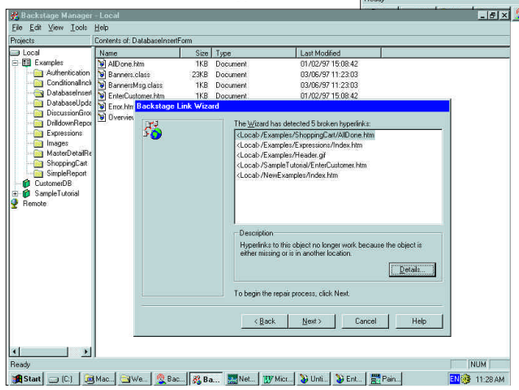
Backstage is an all-in-one web site creation package. It is designed to allow you to create complete web sites, including the hard stuff like connecting into databases, with the least possible fuss. To do this, it needs server-side components; the software that actually does the database connectivity work. And here's where the main problem with any such system comes to light.

The package contains O'Reilly's WebSite server, which runs on Win95 or NT. Macromedia says Backstage is compatible with any "popular" Windows web server. To use it, then, you need a service provider running sites on NT boxes and who can install Backstage for you. Or, you could run it in-house via a dedicated leased line.



Right Backstage Designer is an HTML page editor. It integrates well with the rest of the system but lacks many standard web editor features like support for frames

Below The Backstage Manager is a web site management system. It includes Wizards for things such as fixing broken Hypertext links



Neither solution is likely to be appealing to many people. True, there are some service providers who are running Backstage already and others who are willing to site your computer at their premises, on their leased line. But if you take the latter route you are unlikely to get technical support from the provider, so you should be clued-up before you start. At present there are few ISPs advertising the fact that their systems are Backstage-compatible, since most serious providers use Unix, rather than NT, as their preferred environment.

How does Backstage perform? Well, the software splits into four components. First off is the Designer, which is a web page editor integrated into the rest of the suite. In order to use some of the powerful features of Backstage you need to use Designer to create your pages, which is a shame since it's woefully inadequate as an HTML editor. There is no support for frames or client-side image maps, and the HTML generated by the application has some quirks. Those creating cutting-edge sites would have to resort to a lot of hand-coding of their pages before they would be satisfied.

The Backstage Manager is a site manager and seems to work well. It will automatically update hyperlinks if you drag pages to different locations and will identify broken links for you, which is mostly what people want out of a site manager.

The Object Server is the part of the package that works in conjunction with the web server to actually create your pages for you, and implements the Backstage Objects, the fourth part of the package which includes features like a threaded discussion group, database connectivity etc, which can be easily incorporated with your pages via the Backstage Designer. This works well within the constraints of only running on Win95 and NT servers. It's relatively easy to access a database but expect a fairly steep learning curve at first.

If you are hoping to create a database-driven web site and can persuade your service provider to install Backstage on one of their servers, this is a fairly easy to use, comprehensive package. Many will find it ideal for intranets. But remember that it must run on a Windows machine and that the page editor is a bit of a liability.

Ian Wrigley

PCW Details

Price Desktop Edition £321.33 (£299 ex VAT) integrates with databases including Access, FoxPro, Paradox. The Enterprise Edition £915.33 (£779 ex VAT) integrates with client-server databases like Oracle 6, Sybase, Microsoft SQL.

Contact Computers Unlimited 0181 358 5857

System Requirements Win95, NT 3.51 or 4.0.

Good Points Fairly easy database integration. Decent site manager. Good range of add-ins.

Bad Points Ropey page editor. Must run on a Windows 95 or NT server.

Conclusion A fairly easy way to create web sites incorporating database access, let down by a limited web page editor and the requirement that it runs on a Windows server.

★★★

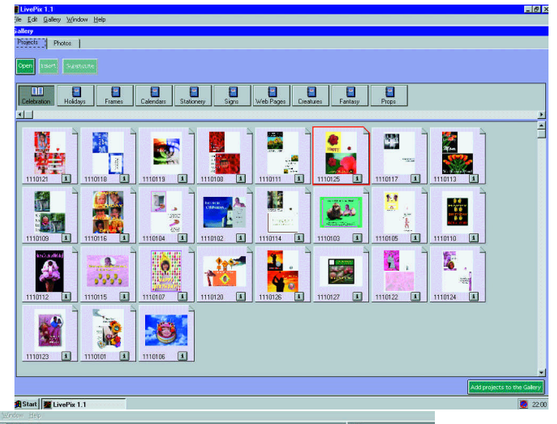
Software

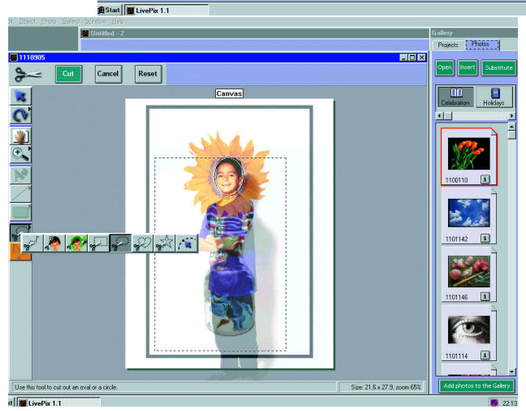
Broderbund Livepix

A simple image editor for home users, those perplexed by pixels and turned on by templates.

Livepix is one of a new breed of image editors aimed at the home market for whom Photoshop is too costly and complex, yet nevertheless want to scan holiday snaps and make the sea bluer and the sand, er, sandier.

Livepix's big brother, Live Picture, startled the digital graphics industry some years ago by stealing a huge performance edge on Photoshop. It stores images in a multi-resolution format based on a 64 pixel square grid. This greatly reduces processing times because images can be viewed on screen at the lowest resolution required, and only those grids affected by an edit are selectively processed. The drawback is that if you want to save files in a standard bitmap file format like tiff, eps or jpg (for inclusion in other documents on a web page) they must be rendered into a raster format. For an average file this takes only a couple of minutes, so compared with the time you save it's a small price to pay. Live Picture initially cost more than £2,000; now you can have the same technology for less than £50.





Left Plenty to choose from: you can toggle between project templates and images in each category, from birthdays to barmitzvahs

Below, left The best cut-out tool since scissors. It automatically hugs the edges so you can get really sloppy. Then soften up the edges

Livepix treats elements of a picture as objects so you can select, move and otherwise manipulate parts of an image as discrete entities. Conventionally, image editors see a picture as a collection of pixels. If you place yellow text on a blue background, what you have is a collection of yellow and blue pixels. In other words, once the text has been placed, it's no longer possible to edit it. Photodeluxe and others have overcome this problem by using layers, which make it easier to return and make changes, but images with lots of layers grow rapidly in size and are slower to work with.

The Livepix interface is a bit basic, even for the home. A gallery palette provides thumbnails both for entire projects, which can be used template-fashion, and for picture images which you can use in your designs. Basic tools include text, outline and filled shapes, basic transforms, a cut-out tool and an effects button. The well-designed cut-out tool looks for a contrasting edge in close proximity and then hugs it, simplifying the job of following intricate paths. It also offers opacity and soft-edge options. The effects button can be used to remove the red-eye effect seen occasionally in amateur snaps. More interestingly, there is a Kai's Power Goo-like distort feature which allows you to stretch pictures of your friends' (or enemies') faces into weird contortions. And there is a drop shadow option which lets you position the shadow and apply edge feathering; it does an excellent but basic job, quickly.

The lack of decent image enhancement tools is a big drawback. There's contrast and brightness adjustment but, other than in extreme cases, it is difficult to obtain a worthwhile improvement without some sort of curves tool to allow you to adjust selectively across the tonal range. There are colour balancing and saturation tools but no filters or retouching tools, so there's no means of sharpening blurred images or removing scratches and hairs.

At the high end, where it's common to work on 80Mb files and a simple edit can take five minutes on a very fast machine with lots of RAM, speed is an issue. When you're making a simple birthday card for output to your inkjet printer, it isn't. With its object approach, Livepix has the chance to score with users perplexed by pixels, but it needs more features if it's to stand comparison with the competition.

Ken McMahon

PCW Details

Price £50 (£42.55 ex VAT)

Contact Broderbund 01429 890873

System Requirements Windows 95 and Mac.

Good Points Fast. Good selection of templates. Simple interface. Object-based. Good price.

Bad Points Low on features: no retouching tools or effect filters. Images need to be rendered to standard file formats.

Conclusion Easy to use but lacks features.

★★★

p82 ➢

Software

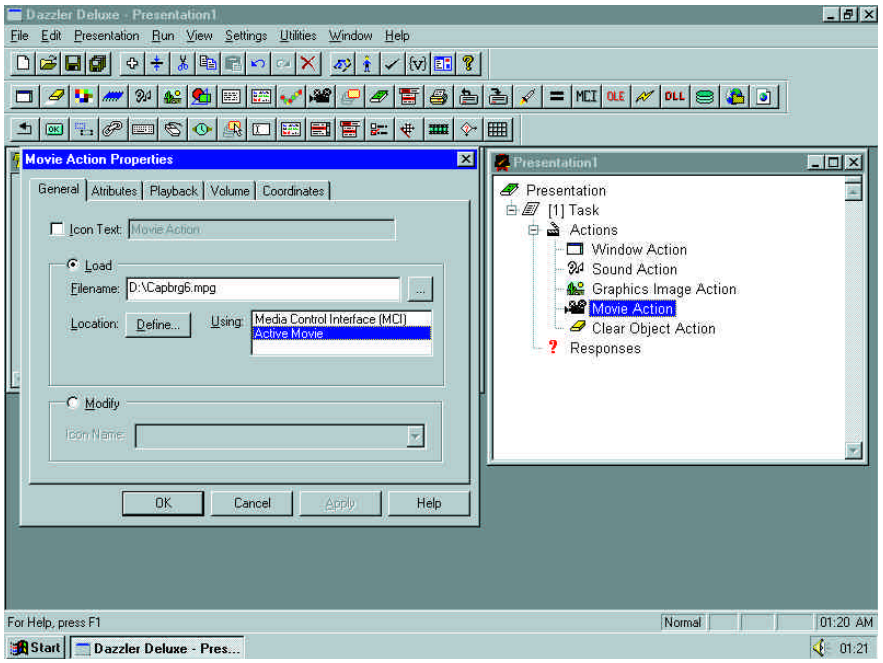
Linotype Dazzler 4.0 Deluxe

BETA

Shades on! An authoring package for bobby-dazzler interactive multimedia presentations.

Multimedia authoring packages enable you, with little or no programming experience, to combine text, sounds, still pictures and video into an interactive application which you can use for presentations and teaching (and many other things, too).

Dazzler is one such UK package and is an updated re-release of a program (originally from ICS) called Multimedia MasterClass. This received a very good response from customers and was well reviewed in computer magazines. It was sold last year to Linotype-Hell which has released this new version in both entry-level and deluxe versions. We have been looking at the final beta release of this product in its deluxe version, which was not entirely stable.



Dazzler's design interface is not only very iconic but it is extremely easy to use, too

The interface is highly visual, resembling packages like IconAuthor and Authorware Professional. Essentially, you drag so-called Actions from a toolbar into your worksheet and create a tree-type structure for your application. Actions are for displaying pictures, adding text, playing sounds and video, connecting to specific internet pages, and so on.

Once you've created the basic structure of your application, you can zoom in on the individual Actions (represented by icons) and provide details about them such as the filename of the picture you want displayed and where on the screen it should go. All these details are filled in by using dialog boxes.

The program makes extensive use of drag-and-drop, and there are screen layers for setting up permanent backdrops, lockable objects and other design enhancements such as style sheets. There's also a new Dual Window development mode for viewing the design and the presentation simultaneously. And, of course, there's an Undo feature.

Interesting enhancements in version 4 include support for the MS Word file format as well as Rich Text Format (RTF). And words or phrases which are hotlinked now keep their links when they are moved to a new position.

Support for the internet now goes both ways. You can link to specific net pages to get more up-to-date information and download files off the net using the specific FTP Dazzler button. What's more, a supplied Java runtime player, which you can incorporate into web pages, allows you to run Dazzler applications over the net.

Most of the features mentioned so far can be found in similar products, but if you want to be just that little bit ahead of the game, one feature in Dazzler will certainly interest you: it's one of the first multimedia authoring packages to include ActiveMovie support. This is Microsoft's new media-control playback device which plays a wide range of sound and video file formats, including MPEG-1 files, without the need for special hardware. ActiveMovie is multi-platform and will eventually replace MCI (the present media playback standard). Additionally, a Frame Response tool in Dazzler lets you trigger actions at given frames during the playback of video or sound files so you can synchronise events better; for example, bringing up a specific picture while a certain word is spoken during a video-clip interview.

Dazzler offers other, less common, features, notable among which is support for fractally transformed pictures (FIF files) which can be compressed with little loss of quality at very high ratios (even at 100:1). And finally, also worth a mention is a Packager Wizard which enables you to make distribution versions of your application.

Dazzler 4.0 is a 32-bit program and it's specific to Windows 95/NT, so if you only have Windows 3.1 you'll need the previous version of the package.

Panicos Georghiades and Gabriel Jacobs

PCW Details

Price £1,169.13 (£995 ex VAT)
Contact Linotype-Hell 01242 222333
System Requirements Windows 95/NT
Good Points A wealth of features.
Bad Points Not an established product.
Conclusion Easy to use and versatile, too.
★★★★

p84 ➢

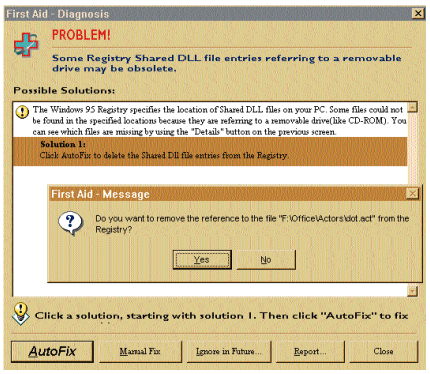
Software

First Aid 97

A rescue service to fix your computer wounds with sticking plasters and invasive surgery.

First Aid rescues non-technical PC users from computer nightmares by automatically detecting and fixing problems. This is the latest incarnation with its improved user interface and enhanced "crash protector".

Several useful facilities strike you on installation. First, the physical check-up scans your machine for possible hardware and software problems. It uses a massive knowledge base which throws up a list of potential fixes to all sorts of irregularities which may have occurred in your machine's configuration. Redundant entries in the Registry, for example, are weeded out, as are known software incompatibilities and driver conflicts. For each problem, you're presented with the Autofix button which fixes the glitch according to the solution you choose. The scanning process is very thorough but not entirely idiot-proof,



First Aid automatically clears out redundant references from the system's Registry

especially when it comes to picking your way between several different fixes. First Aid's other major facility is its Windows Guardian which constantly monitors your system, intercepting crashes and hard disk failures before they happen. There's also a BackTrack monitor which creates copies of critical system files whenever you make changes to them, so you can always roll back to your previous configuration.

Updates to the product's knowledge base, provided on the net, make First Aid as much a maintenance tool for the power user as it is a support tool for the novice.

Eleanor Turton-Hill

PCW Details

Price £34.95 (£29.75 ex VAT); Deluxe version £49.95 (£42.51 ex VAT).

Contact Cybermedia 0800 973631

System Requirements Windows 3.1 or Win95

Good Points Useful maintenance tool, packed with information. Invaluable when troubleshooting.

Bad Points Not as novice-user orientated as it makes itself out to be.

Conclusion Essential kit for any PC owner.

★★★★

Personal Navigator

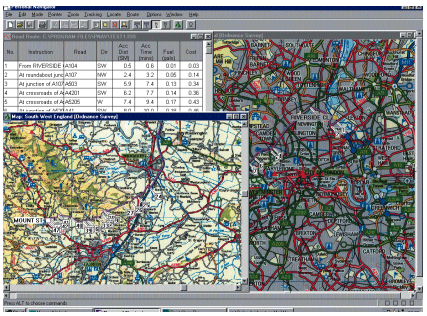
Sling out that sextant, chuck that compass and keep track of where you're headed with GPS.

This route planner incorporates satellite navigation by using the Global Positioning System (GPS) to help you pinpoint your location, from within your vehicle, as you go.

Along with its point-to-point route-planning features, Personal Navigator incorporates various route optimisation and recording features, plus hotel, restaurant, petrol station, postcode locators and more — a nice touch, particularly if you're in need of a convenient restaurant along the way.

Installation is quick and easy with three options from which to select. The Typical installation, advised for most users, loads all the route planning, address/postcode and restaurant features onto the hard drive, leaving the maps to be accessed via the CD-ROM. But you'll need 172Mb of extra hard drive space when using this option.

In use, Personal Navigator seems a bit cumbersome. To plan a route you have to



Personal Navigator uses the standard OS maps to provide clear directions

create a New file, open the appropriate map, enter the correct postcode, address or town and add it to the route. You must repeat the process for your destination or any way-points *en route*. After this, you can select the type of route calculation you want: shortest, quickest, cheapest, or delivery. The calculation is fairly quick and we waited about 15-20 seconds for a 200-mile, multiple way-point journey to be processed using a Pentium 150MHz PC with 32Mb of RAM. It will also record your route and location in conjunction with a GPS device, so you can track everything from position, to speed, to altitude, up to 30,000 records per recorded file.

Dylan Armbrust

PCW Details

Price £116.33 (£99 ex VAT)

Contact Software Ltd 0700 784662

System Requirements 486 or higher, 8Mb RAM, CD-ROM drive, VGA monitor or higher in 256 colours, Windows 95 or NT.

Good Points Informative guides and quick route calculation.

Bad Points Cumbersome route-planning interface.

Conclusion A helpful and versatile route planner that's perfect for GPS anoraks.

★★★

p87 ➢

Software

VideoCraft 3.6

Morph for your money; over a quarter million video effects.

This inexpensive and versatile digital video effects package is the 32-bit reincarnation and expansion of a program originally known as PhotoMorph. This latest version will work with Windows 3.1 as well as Windows 95.

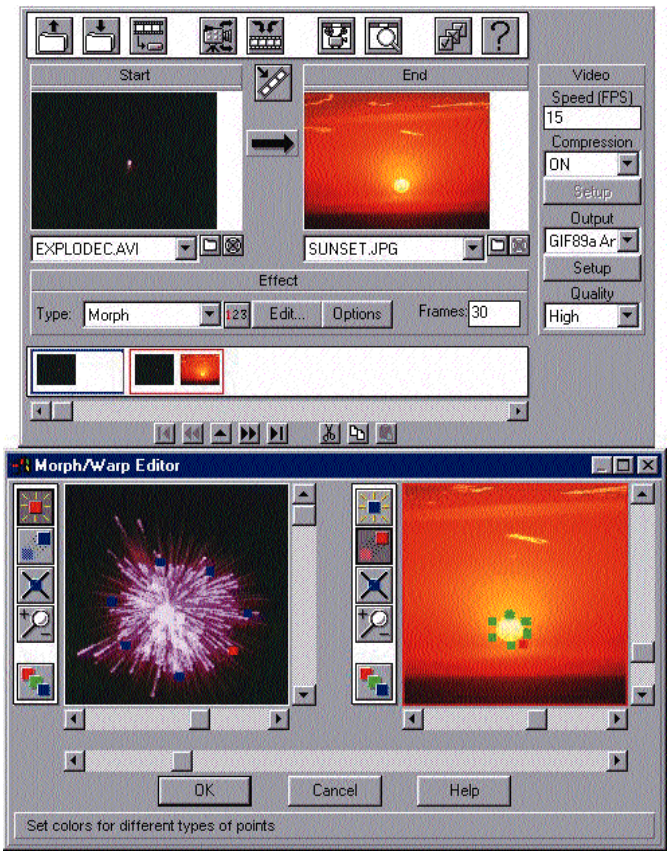
Among its new features is support for the internet. The program can now export GIF89a animations, widely used for animated graphics on the net. But the real strength of VideoCraft lies in the sheer number of available effects. You can do overlays, alpha channel, luminance keying, morphing and dynamic styling, and as for transitions there's a staggering 256,000 combinations.

As you would expect from a program originally designed for morphing, facilities in this area are excellent and include point-to-point motion multi-frame morphing, as opposed to the simple two-frame morphing provided by many other applications.

Most effects can be applied dynamically. For instance, you can begin with just a little of the effect and then gradually increase it. Sequential effects can be chained together using a storyboard and there are customisable A-B rolls with 50 prepared examples. In fact, there are examples of most of the possible types of effect so you just load the video clips and see what each does. There's a good tutorial, too.

In addition to the effects, a Video Action ED utility enables you to carry out simple non-linear editing using four video and four audio tracks with about 20 transitions. Here, you can add synchronised sound to your video.

VideoCraft accepts most common formats for source material (both moving and still) and outputs 24-bit video (including large frame sizes) so that it can be used for professional work.



Setting up a firework turning into a sunset using VideoCraft 3.6

Panicos Georghiades and Gabriel Jacobs

PCW Details

Price £92.83 (£79 ex VAT)

Contact LTS on 01386 792617

System Requirements Windows 95, Windows NT, Windows 3.1.

Good Points Easy to use. Relatively fast. Rich set of video effects.

Bad Points Preview options could be better.

Conclusion Good value video effects editor.

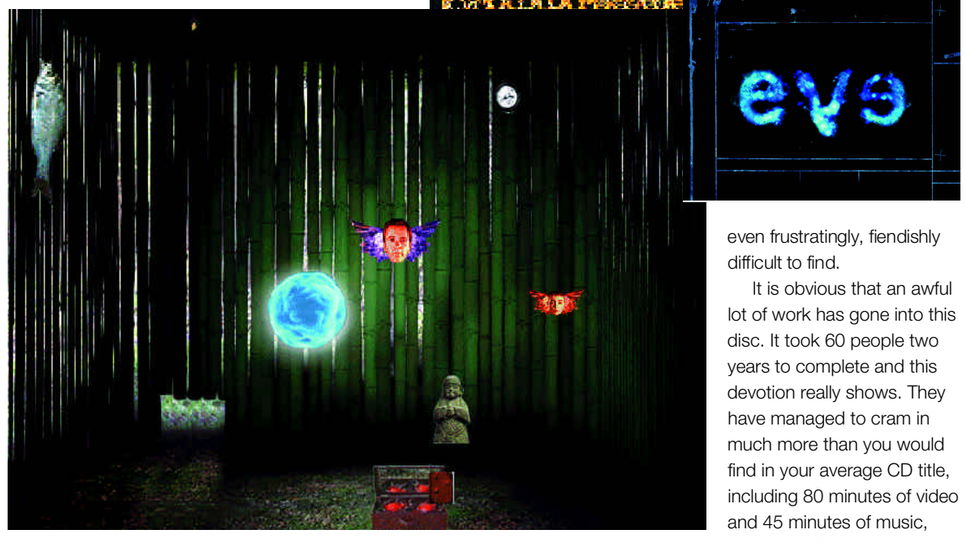
★★★★

Peter Gabriel's Eve

No, it's not a reference CD on the world's First Lady. It's Peter Gabriel's multimedia mix.

Xplora 1, Peter Gabriel's first interactive product, was hailed by many as little short of a masterpiece. With Eve, he is trying to push the boundaries of multimedia still further. But as Peter Gabriel is, after all, known for his little eccentricities, it comes as no surprise that Eve is not your common-or-garden CD title. The main thrust of the CD is the gameplay, although this is no shoot-em-up. It is more of a quest or a puzzle, as you try to return Adam and Eve to Paradise from where they have been separated and banished. You have to guide Adam through four evolutionary worlds in his search for Eve and for absolution — hence the title.

The CD has the two basic themes of human relationships and the environment behind it, so there are a few sections where you have to listen to various people, described as being in and out of love, talk about their most intimate relationships. If you think you can handle these revelatory and hippy-skippy elements to the disk, there are definite plus points.



This is one of the few CDs produced with the sole intention of stretching the medium. It encompasses music, art, video and "new technology", so there are tracks by not only Gabriel himself, but also from Sinead O'Connor and Youssou N'Dour. Four contemporary artists were also involved in the project: Helen Chadwick, Cathy de Monchaux, Yayoi Kusama and Nils-Udo. Each artist spent some time with Gabriel, working with him on the project, so the art does not feel forced but is an integral part of the CD.

By far the most innovative aspects of this CD are centred around the "new technology". Eve is based not around a database of facts but invites you to explore the possibilities, creating as much yourself as just passively watching what has been made for you. You can make "musical toys" by mixing music samples, or put together your own interactive videos to accompany three of Peter Gabriel's songs.

The only criticism of the disc is that its intricacy can sometimes make it hard to navigate without substantial help notes. You need to spend a lot of time with the CD to get much out of it, and can end up more confused that enlightened. Things are hidden in unusual places so you will be forced to rummage around, but sometimes the unusual becomes the obscure and even frustratingly, fiendishly difficult to find.

It is obvious that an awful lot of work has gone into this disc. It took 60 people two years to complete and this devotion really shows. They have managed to cram in much more than you would find in your average CD title, including 80 minutes of video and 45 minutes of music, and it is well worth a look. Some may find it confusing, but it is still the most innovative product we have seen in the last year.

Adele Dyer

PCW Details

Price Street £39.99 (£34.03 ex VAT)
Contact RealWorld Multimedia 01225 743188 (mail order)
System Requirements Windows 95 or Mac.
★★★★

After Dark 4.0

While your PC's idle, it might as well do something interesting, funny or pretty. Here's how..

After Dark 4.0 takes over from the last, rather sick version of After Dark, and is essentially more of the same cutesy flying toasters and underwater scenes. "Bad Dog", the pooch who digs up your desktop, makes an appearance, and there are 20 new displays.

Some of the screensavers are quite amusing, like the hula twins — two little girls with red plaits who play with their hula hoops, each trying to outdo the other with their stunts and sticking their tongues out when the other one does a better trick. Others are just beautiful, such as the psychedelic swirling patterns of Psycho Deli and the ever-changing pinpoint patterns of Points of View. There are even a few games, like Rodger Dodger — nothing too sophisticated, just along the lines of Nibbles although not as good.

There have been one or two additions to this version. They have added the vital words "Internet Ready" to the box and this basically takes the form of downloading pages from the web and viewing them as screensavers. The pages are mostly from American journals such as the *Wall Street Journal*, *USA Today* and *Sports Illustrated*.

If anything on the screensaver catches your interest, you can click on it and After Dark launches your browser and goes straight to that page. One word of warning, though: downloading all the various pages took more than seven minutes over a leased line. You might want to limit your exploration if you are using a modem. Another problem is more pressing if you are short of space on your hard disk: it takesa whopping 30Mb to install the full package, so if you can't live without flying toasters, be selective in your installation.

Adele Dyer

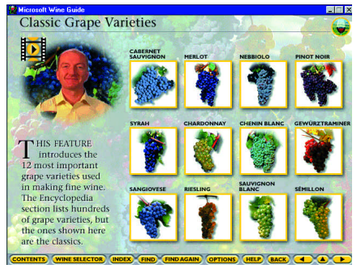
PCW Details

Price £19.99 (£17.01 ex VAT)
Contact BMG Interactive 0171 384 7500
System Requirements Windows 95 or Mac.
★★★★

Microsoft Wine Guide 2.0

From plonk to fine wine, if the grape is your poison, this CD is for you. Hosted by Oz Clarke.

It took some effort to find out the difference between the first and second versions of the Microsoft Wine Guide. The box didn't proclaim anything and there was nothing in the help files or in the readme files. In truth, there isn't anything strikingly new about version 2.0. It does everything version one did and does it in the same way.



The content has changed. It has been updated and is the first of what Microsoft hopes will be a series of annual updates, keeping you fully informed about changes in the world of wine. The most notable additions are in the annual vintage reports. The first version didn't extend beyond 1993, when rain spoilt what might have been a good year for French Bordeaux. 1994 was a rainy harvest but the wines are better than those from 1993. And 1995 was a bit of a bummer, producing wines which in some cases were "lacking in charm".

Charm isn't lacking with Oz Clarke, who hosts the Wine Guide. He imparts his store of knowledge and strips away the mystique and snobbery surrounding wine. "Wine is fun," says Oz, and with the Wine Guide to hand you feel inspired and adventurous.

If you haven't encountered the Microsoft Wine Guide, it covers nearly 6,000 different wines and provides detailed entries on regions, producers, vintages, grape varieties and more. There are 12 maps of wine-producing countries, 45 regional maps, 27 vintage charts, 47 maturity charts, and 343 glossary definitions of wine-related terms. You get the idea — simply *loads* of information.

Online you can connect to Wine Guide updates on the internet and MSN (the Microsoft Network), which has a wine appreciation section called Vinsight, also hosted by Oz Clarke.

Paul Begg

PCW Details

Price £29.99
Contact Microsoft 0345 002000
System Requirements Windows 3.1.or 95 or NT.
★★★★★

p90 ➢

DK Encyclopaedia of Science 2.0

Don't be blinded by science: this CD takes the fuss out of physics and the mess out of maths.

What a pleasant surprise — not an instruction manual in sight. Not that it was forgotten; just that this package is so easy to use. Instead, DK included a pocketbook on science facts which served as a handy reference while using the CD, and there is a help section within the software.

On loading up the CD you are presented with a home page with four main sections: Physics, Chemistry, Mathematics and Life Sciences. Each title contains information that is easy to access and which relates to the chosen topic. There is a variety of topics to explore, ranging from the Earth and the Universe to genes, DNA and chromosomes. Select the topic you would like to learn about and a detailed explanation will appear in writing. You can either read this yourself or click on the narrator who will read it aloud for you. You can then view videos clips about the subject or study satellite pictures. Many clips like this can be seen in the video selector section.

One particularly impressive section was the Periodic Table, an incredibly complex subject simplified for children. Select a symbol and the narrator will tell you what it is and the contents within it, such as the type of element, the relative atomic mass and the density.

After browsing around your favourite areas, you can test your knowledge in the Quiz Master section or trace the history of the world's famous scientists.

Etelka Clark

PCW Details

Price £39.99 (£34.03 ex VAT)
Contact DK Multimedia 0171 753 3488
System Requirements Windows 3.1 or 95.
★★★★★

Guitar Hits Vols 1& 2

If your fretwork amounts to no more than a few feeble twangs, here's how to play like Hendrix.

You want to play "Hey Joe" just like Hendrix did? OK. Start Guitar Hits, plug your axe into the sound card and tune up with the on-board electronic tuner. You can then learn some basic techniques, such as hammering on and bending notes, or dive straight into a song – there are six others including "No Woman No Cry" and "Sweet Home Alabama", but by some monstrous oversight, no "Stairway to Heaven". In the main screen for each song you have the musical stave and tablature, the chord diagrams and a video of actual fingering, with a set of buttons below for playing part or all of the song. Click on the video and it will expand to full screen, click on the chord diagrams and the chord is played. The best way to start is to play the song all the way through a few times to get the feel of things, then take the step-by-step tutorial — chords, riffs and solos. You don't have to stick to the prescribed order, so if you get stuck on a difficult chord change you can console yourself by perfecting a flashy riff.

Volume 2 is all Beatles songs, which is good news for anyone driven near to madness by members of their family trying to work out the chords to Blackbird. It justifies the higher price by having a "map" of your progress through each song and a record facility, so you can compare your own efforts with the tutor's. Beware, there's an installation bug in volume two, as some programming genius has assumed your CD-ROM drive is D:. If it isn't, don't throw away that little piece of paper describing the workaround. Like volume one, the interface is slick but simple and, although there are only eight songs, the lessons and exercises build up your confidence and inspire you to forge ahead on your own.

Tim and Henry Nott

PCW Details

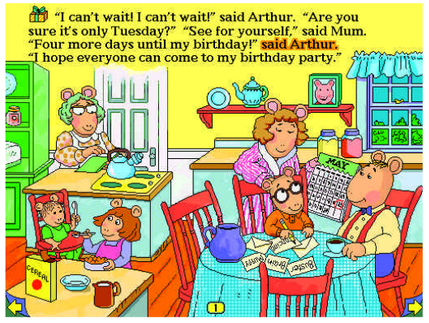
Price Vol 1 £19.99, Vol 2 £39.99
Contact Ubisoft 0181 944 9000
System Requirements Windows 3.1 or 95.
★★★★

Software

Arthur's Birthday

Animation, singing and dancing will keep very young children amused, but it's a tad lightweight.

Arthur will be familiar to anyone who has seen Marc Brown's books or the cartoon series being shown on TV at the moment. On this CD, the cute mouse with specs throws a birthday party. Everything goes wrong when one of his classmates decides to have her party on the same day. The girls agree to go to one party, while all the boys swear to go to Arthur's party. Arthur has to do some nifty moves to keep everyone happy.



There are a few different ways to use the CD. You can either read the story straight through, with the words highlighted as they are read aloud, or you can choose to play. If you opt for the latter you get to hear the story, but can then play with the various screens, sparking off animations. There is plenty of singing and dancing in this section, which is just the kind of thing the three-to-seven-year-old age group it is aimed at will love.

Alternatively, you can read the story in either French or German. This does, of course, extend the life and the age range of the product as you can use it as a total immersion language-learning package. Other than this, there is very little to this disk. It would have been nice to have some games in here or at least some little learning exercises to make you feel you had a longer-lasting product. While this CD has more to it than Goldilocks and the Three Bears from Europress *(also reviewed this month, page 96)*, Arthur's Birthday is three times the price of that package, making it look a bit overpriced.

Adele Dyer

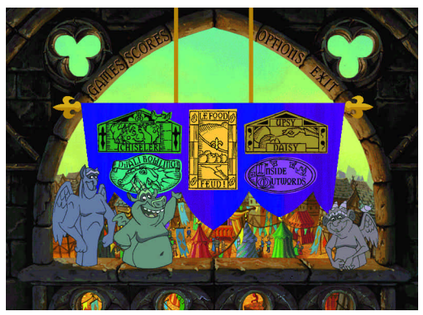
PCW Details

Price £29.99 (£25.52 ex VAT)
Contact Living Books
System Requirements Windows 3.x, Windows 95, Mac.
★★★

Five Festive Games

The Hunchback of Notre Dame has fun in medieval France. Watch out for the flying food!

If you considered Disney's version of Notre Dame de Paris little more than a spoof, Hunchback of Notre Dame Five Festive Games will seem a travesty. But if you want something your children can play with, which is not dissimilar from the average kids' games console challenge, it fits the bill. The five games are set in medieval Paris. How Disney manages to turn Notre Dame, with its extremes of grotesque gargoyles and magnificent stained-glass rose windows sitting majestcally on the Ile de la Cite, into any old medieval town scene, is beyond me.



One of the most popular games with my five-to-ten-year-old testers was guiding a billie goat to knock over people arranged as skittles in a bowling alley. If this proves too challenging, you can play Food Fuel where you fling a succession of dishes (we played with snails, chicken legs and vichysoisse) at fools who dash across the screen hoping to avoid your aim. The children played this game for hours. I suppose it satisfies some tomato ketchup psychology.

The other three games are popping balloons in an aerial duel, a target game where you chip away at stone in competition against a friend or the computer, and a riddle game. As with most games, you can select the difficulty level.

The package includes 40 screensavers from Disney's animated film which you can adapt using 20 different transition effects. For adults caught playing Food Fuel, Disney has included a "panic button" which replaces the game with an educational picture of a pigeon. Disney's promise to "knock your tights off' with Five Festive Games shows there's nothing educational in the package.

Debbie Davies

PCW Details

Price £39.99 (£34.03 ex VAT)
Contact Disney Interactive 0181 222 1413
System Requirements Windows 3.1, Windows 95, Mac.
★★★

Software

Toy Story Activity Centre

Older children will get the best out of these games played with Andy, Buzz and their friends.

Toy Story Activity Centre combines two of Disney's big hits — Toy Story the film, and the activity centre format. Developed and animated by Pixar, creators of Toy Story, the 3D animation is second to none. You can interact with the characters, especially when you ask for advice or make mistakes in any of the games.

You choose to play in Andy's bedroom, visit Pizza Planet or risk going to Sid's house, and have eight activities to choose from in all. Disney claims its games will "smuggle simple learning skills into kids" and the counting card game which you play against Ham or an opponent certainly gets children subtracting. There are also games which test children's ability to remember sequences, and logic skills are needed to solve puzzles and games based on Pelmanism. My favourite was playing five in a row against the Green Army Men — the animation is superb. Making toys from arms, legs, heads and bodies dismembered by evil Sid appealed to kids.

You can set difficulty levels for games and opt to play against one of the animated characters from Toy Story. When you win, there are achievement certificates which can be printed out and feature the player's name. These are bound to be popular given that some are awarded by Buzz Lightyear and have credible text and graphics.

If your kids are hooked on Toy Story but you have yet to buy a Toy Story CD, the talking book released last year probably offers better value for money although the activity centre will appeal to older children. Of course, you could decide to really spoil someone and buy them both.

Debbie Davies

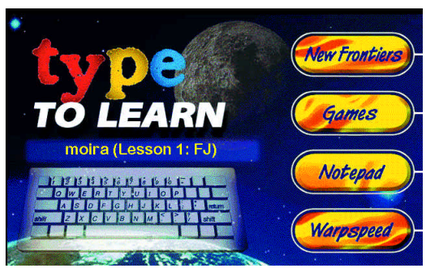
PCW Details

Price £39.99 (£34.03 ex VAT)
Contact Disney Interactive 0181 222 1413
System Requirements Windows 3.1/95, Mac.
★★★★

Type to Learn

This typing tutor teaches keyboard skills using alphabet games and on-screen demonstrations.

Typing packages can be a throwback to school. Just as you're getting into the swing of things, the ghosts of teachers past come tapping on the screen to remind you of their obsession with dotting i's and crossing t's. Type to Learn avoids correcting you every other word by teaching letters two at a time. You can start playing games with a handful of letters, rather than having to learn the entire alphabet first.



Each lesson starts with hands placed correctly over the keyboard, and then on-screen fingers over the keyboard demonstrate the move each finger has to make to type the chosen keys. This encourages you to learn from the screen rather than reverting to hunting around the keyboard to find the right key. (Of course, this is the whole point of learning to type.)

As you master each set of letters, more games become available, and once you have completed the lessons, you can test your speed and accuracy.

Designed for learners from the age of eight, practice starts with short words. And although the program records your progress and restarts where you left off, it does allow you to go back for more practice.

Type to Learn includes its own word processor. Having spent time on lessons and games, children can complete homework using the word processor, a habit which the educationalists behind the Type to Lean package claim improves spelling, vocabulary and writing skills.

Although it is primarily aimed at children, Type to Learn can teach all the family equally well, and at less than £20 it is excellent value for money. It comes highly recommended by the British Dyslexia Association, whose members value computers, keyboards and spellcheckers more than most.

Debbie Davies

PCW Details

Price £19.95 (£16.98 ex VAT)
Contact Iona Software 0181 296 9454
System Requirements Windows 3.1/95, Mac.
★★★

p96 ➢

Software

Goldilocks and the Three Bears

A charming, traditional children's story about three bears and some porridge. Oh, and a sheep.

This may be a multimedia Goldilocks and the Three Bears, but none of the more traditional elements have been forgotten. The focus of this CD is still reading skills and the narrator is none other than that stalwart of Listen with Mother, Daphne Oxenford.

The main part of the CD is taken up with reading the story: the words are illuminated in a halo of yellow as Oxenford clearly enunciates each phrase. Each part has its own cartoon screen and there is a fair amount of animation to accompany the narrative. Goldilocks is shown tasting the porridge, turning bright red when it is too hot and sticking out her tongue when it is too cold. The bears themselves are quite cute as they blink uncomprehendingly at the chaos caused by one little girl.

Once the story has been read on each page you are left with lots to click to see if anything reacts, and unlike on other CDs of this ilk, the results are for once quite lively and imaginative. The most amusing thing is the sporadic appearance of a mad sheep who keeps leaping in from nowhere, grinning maniacally before disappearing again in a puff of smoke.

Otherwise, there isn' much on this CD. There are a few jigsaw puzzles where you fit cut-out shapes back into a picture, which works quite well as a shape-sorter game. There is also a section of information on bears, the history of the story and the history of porridge, but these are all a little advanced for the three-to-six-years-old age range the CD is aimed at. However, to compensate, you do get a free packet of porridge oats. Bizarre but true.

Adele Dyer

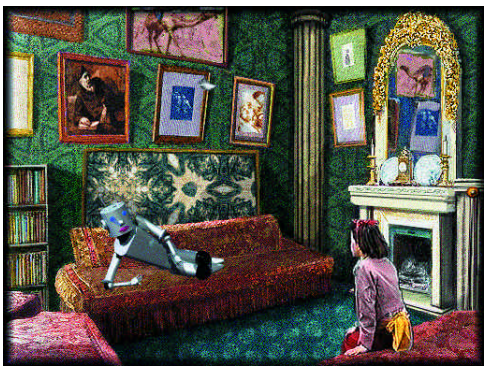
PCW Details

Price £9.99 (£8.50 ex VAT)
Contact Europress 01625 859333
System Requirements Windows 95 or 3.1.
★★★★

Lulu's Enchanted Book

A multimedia feast of breathtaking beauty and imagination, this CD is worlds apart from the pack.

To call Lulu's Enchanted Book an interactive story would be technically accurate but woefully inadequate. It *is* a story: Lulu is a ten-year-old princess who lives in a book. Her parents are rich, beautiful and kind but she has nobody to play with. One day a flying saucer crashes into the garden and she meets Mnemo, the robot pilot. Their adventures take them to the Sahara and the North Pole. Enriched by their encounter, they return to their respective homes.



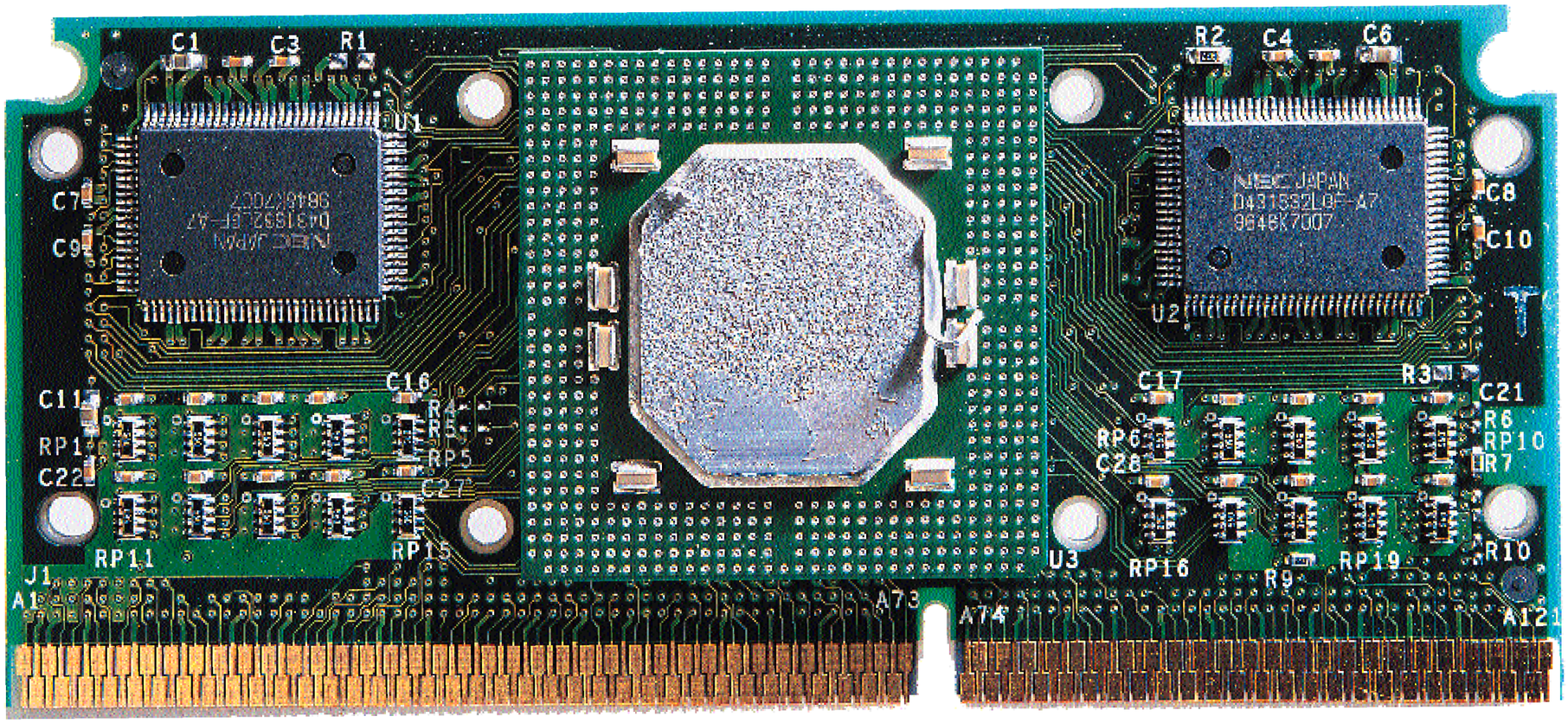
It's also interactive, but much more than that. The creator, Dada Multimedia, has created a richly sensous multimedia feast, with hand-painted scenery, live video, and ray-traced 3D animation blended into a seamless whole. The music and narration are hypnotic and the attention to detail, such as the tiny, full-colour animated cursors that change with each scene, and the crisp sound of the pages turning, is astonishing. You can read, or be read, the story, and explore as you go along. The illustrations come to life, and clicking on them reveals a multitude of surprises and things to play with. Clicking on the text, too, produces more treats — the illustrations might change, the dialogue be spoken, or you might be whisked off through a sequence spanning several pages.

Apart from a few navigation and sound controls which you have to click out of the book to access, there is no interface as such and no rules: even Mnemo breaks the book convention at one point by leaping out of it to turn the pages. We've waited a year for the English version (the French original was narrated by the author, Romain Victor-Pujebet) and it's been well done, with Ray Brooks narrating and British actors doing the dialogue. Explore, and let yourself become, like the book, enchanted.

Tim Nott

PCW Details

Price £39.95 (£34 ex VAT)
Contact Wayland Multimedia 01273 722561
System Requirements Windows 3.1 or 95.
★★★★★



Pentium II: Klamath cometh

Pentium II is a complete chip redesign that spells the end of the Pentium Pro and attempts to eliminate Intel's competition. Dylan Armbrust takes an exclusive first look.

Once codenamed Klamath but officially known as Pentium II, Intel's newest and fastest chip has finally been revealed. *PCW* managed to get an exclusive first look at the new processor before its semi-official début at CEBIT in Hannover, Germany.

Pentium II, the successor to the Pentium Pro, is the first Intel chip to break the 200MHz barrier. The official launch has been scheduled for 5th May 1997, but there is rumour of a further delay. Intel has been very quiet about what the chip looks like and what speeds it will run at, but we can confirm that the Pentium II, which also incorporates MMX technology, will start in 233MHz and 266MHz versions. From there, it is said that Deschutes, the next generation of CPU, will run at 300MHz, 333MHz and 366MHz and is expected to be released in late 1997 or early 1998.

The Pentium II's overall design is a radical departure from the current Pentium and Pentium Pro we all know and love. We have been used to seeing the familiar Socket 7 and 8 Zero Insertion Force (ZIF) sockets found in all PCs today. The old chips were encased in a ceramic cover with a series of 296 or 387 pins protruding from the bottom. To change one, all you had to do was pull a small lever and lift out the processor.

The Pentium II design, however, is a complete departure from the pin-out style of the Pentium. Intel has opted for a slot technology, known as Slot One, which looks very similar to that of any add-in card you find in your PC today. The card sits upright in a vertical position on the motherboard and can easily be removed, just like an add-in card.

And this is where the similarity ends. There are 242 pins, or contacts, in the slot. The processor itself is mounted in the centre of a Printed Circuit Board (PCB) with Level Two (L2) cache chips surrounding it. This is a departure from the current Pentium Pro architecture which has an on-chip L2 cache running at the same clock speed as the processor. The Pentium II L2 cache only runs at half the speed of the processor which means the performance of the Pentium II L2 cache is less than the Pentium Pro, but the Pentium II's higher clock speed should overcome any overall performance loss.

Along with MMX capability, Intel has improved the Floating Point Unit (FPU) performance and increased the Level One (L1) cache (used for data and instructions) from 8 to 16Kb, making a total L1 cache of 32Kb. The increase in L1 cache compensates for the removal of the on-chip L2 present on the Pentium Pro.

Intel is sticking with the 66MHz bus so there will be little change, except for the Slot One design, to the basic motherboard spec. The Pentium II samples in circulation have made use of the Pentium Pro-optimised 440FX chipsets which lack support for advanced features such as SDRAM and Accelerated Graphics Port (AGP) *(see Hands On, Hardware, page 292)* but the Pentium II-optimised 440LX chipset should include all the expected advanced features including Ultra DMA. The 440LX chipset can only support a maximum of two processors on the bus, compared with four for the Pentium Pro. Worse, the chipset won't be ready, according to industry sources, until August.

Power consumption is another issue with the Pentium II. The Pentium Pro demands three separate supply voltages from the motherboard: 2.45v for the GTL+ interface between the CPU and cache die, 3.3v for the logic and 5v for the system bus I/O. The Pentium II is reported to be more demanding, requiring multiple voltages for the core. According to industry analysts, the Pentium II will require power sources to accept a five-bit voltage ID code from the processor. This code will transmit the voltage requirements needed by the CPU core. The requirements can vary in clock speed, wafer sort, and, in some cases, board by board. In essence, the power supply must deliver anywhere between 2.1v to 3.5v to the core so that it can deliver on its expected performance spec.

And where there's electrical current, there's heat. The chip we looked at was a 266MHz model with 512Kb cache attached, and judging by the size of the passive heat sink on our sample, the Pentium II runs very hot. And herein lies one of the main weaknesses of the design. According to our source, the Pentium II processor has been ready for market for months. The only thing holding back its release was the actual mechanical design of the slot. Because the chip sits in its own slot in an upright position, without any independent support (add-in cards are fastened to the case), the whole unit is vulnerable to gravity's downward pull (by our estimate, the heatsink weighs at least a pound). This is particularly the case with the heatsink fitted to only one side of the card. This downward pull to one side has been reported to be one of the major causes of chip failure, especially in tower cases where the chip sits horizontally with the heatsink, pulling it down. One industry source said that the chips have been known to fall out of the slot in tower models. Vendors have been instructed to ship the Pentium II separately to avoid damaging the chip or the PC's internals if it does fall out. Apparently, Intel has overcome this design flaw by using a series of V-clips that fasten the chip firmly to the motherboard, but they are currently difficult to obtain.

Regrettably, due to the short time we had to examine it, we did not get a chance to run any labs tests on the chip, but we *can* say that the Pentium II provides

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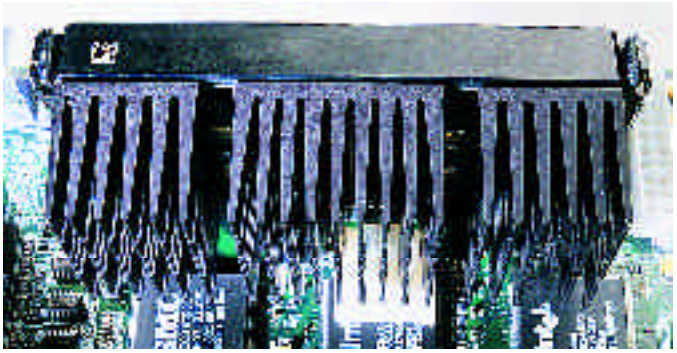

Top This massive heat-sink casing needs to be properly secured or the whole chip can fall out
Above Note how the Pentium II has the look and feel of an add-in card

anything from moderate to astounding performance gains. According to the German computer magazine, *c't*, a 233MHz Pentium II shows performance gains ranging from four percent to as much as 139 percent on the BAPCo32 benchmark, depending on which processor it is compared to. The performance gain is even greater when examining *c't*'s Intel Media benchmarks: judging by these results, it would be logical to assume that the 266MHz chip we had would outstrip the results of the 233MHz chip *(see table, below)*.

But why has Intel decided to create a whole new chip design and not continue with the Pentium Pro? The answer appears to be money. It is well known that the Pentium Pro has been an expensive chip for Intel to produce. The presence of the on-chip L2 cache has apparently caused Intel a great deal of heartache in terms of yield percentages, as it is difficult and expensive to produce. It is estimated that due to severe shortages, there are fewer than ten million Pentium Pro chips in use worldwide — and that's after more than a year on the market. Compare that to sales of over 60 million Pentiums, and the Pentium Pro picture looks bleak.

The move to the Pentium II design eliminates, in one fell swoop, the on-chip L2 cache manufacturing problem. By removing the cache, Intel has reduced its costs dramatically and has shifted the delicate manufacturing of cache back to third-party chip manufacturers like NEC. This can only be good news for the customer, but it's bad news for the Pentium Pro. A recent report in *Computer Reseller News* in the US said that Intel planned to price the Pentium II $250 below that of the Pentium Pro in an attempt to shift the market rapidly over to the new chip. With a Pentium Pro 200 with 512Kb of cache officially selling for $1,035 in quantities of 1,000, a $250 price difference should be enough to kill the Pentium Pro. But a price difference of $250 may not be enough to lure customers, particularly large corporations who will have to invest in whole new motherboards if they plan on upgrading to Pentium II.

This is where the competition, such as Cyrix and AMD, comes in. Intel holds the patent on the Slot One technology so it is unlikely that, as with the Socket 7, it is going to allow the competition to participate in this new development. Cyrix has no plans at this stage to follow the Slot One route. Cyrix's newest chip, the M2, will still be Socket 7 compatible. The same is true of AMD's K6. Both the M2 and the K6 are reported to have MMX technology plus some other multimedia enhancements. And the M2 could pose a serious challenge if, like Cyrix's 6x86 chip today, it provides comparable performance, is still compatible with current motherboards, and is aggressively priced. However, because of Intel's patent holdings, Cyrix and AMD face some heavy technological hurdles, especially with AGP, because of the limitations of the Socket 7 pin-out structure.

Intel has been the driving force behind the market, but its foray into the Slot One universe is an obvious attempt to eliminate competition. It has to overcome mechanical problems and convince the market that it's worth the money to upgrade, as the first systems won't be cheap. Can the competition come up with something to challenge the Pentium II? Because Intel is, yet again, leading the pack. ■

Pentium II Benchmarks: Scores/percentage gain
Source: *c't* magazine 2/97

Test	Pentium 200	Pentium 200MMX	Pentium Pro 200	Pentium II- 233
Application Benchmark: BAPCo 32				
-Win 95	159/100%	180/113%	201/126%	223/140%
-WinNT 4.0	169/100%	195/115%	228/135%	234/139%
Intel Media Bench				
-Total	155/100%	257/166%	206/133%	300/194%
-Video	149/100%	272/183%	179/120%	308/207%
-Image Processing	159/100%	746/469%	221/139%	972/611%
-3D	153/100%	161/105%	213/139%	214/140%
-Audio	165/100%	333/202%	242/147%	338/205%

Illustration: KEVIN O'KEEFFE

Systems analysis

The operating system is at the heart of every computer system. Here, *PCW* profiles the history, function and future prospects of the main contenders.

Most of us take the operating system for granted — it came with the computer. But what is it? Why do you need it, and do you have a choice? At basic level, the operating system controls the use of hardware resources such as disk drives, memory, output devices (monitor, printer) and input (keyboard, mouse) at machine level. Complementing this is the "shell" — the interface between the user and the machine that lets the former run programs and manage files. This can be a command line interface (CLI) where you type commands, or a graphic user interface (GUI) where you achieve the same ends by clicking or dragging objects on the screen.

In the pioneering days of personal computing, the OS was either proprietary or non-existent: you built the kit then sat down and programmed in machine code. The idea of a portable OS, which could cope with a range of machines with the same processor architecture but different components such as disk drives and displays, really starts in 1976 with Gary Kildall. His company, Intergalactic Digital Research, created CP/M, which split the generic operating system from the BIOS (Basic Input/Output System, stored in ROM). The OS was portable but the BIOS was configured to the particular hardware, much the same as in today's PCs. The motherboard has a BIOS chip that holds details of memory and the number and size of disk drives, which enables the computer to load the generic OS from disk.

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Things began to heat up in 1980. Apple, Tandy, Atari and others were offering personal computers to a market worth $1billion, and IBM decided it was time to get in on the act. With a target launch of one year there was no time for in-house development, so the company went shopping for an operating system and a programming language for the new PC. The story goes that when the men from IBM arrived, Gary Kildall decided to go and fly his plane, leaving his wife and business partner, Dorothy, to negotiate. Dorothy took one look at the IBM non-disclosure agreement and sent them packing. Bill Gates, whose company, Microsoft, was already earmarked to provide the BASIC programming language for the new PC, didn't have an OS, but he knew where to lay his hands on one. He bought the rights to Seattle Computer Products' QDOS and relabelled it MS-DOS, which IBM would in turn market as PC-DOS. Gates retained the right to licence MS-DOS to other parties, and when the PC developed from an IBM-proprietary machine to an industry standard, a legend — and a fortune — was made. Kildall's company later got serious, dropped the "Intergalactic" and started to market DR-DOS. But in spite of offering a better product (DR was first with disk compression, memory optimisation and DOS task-switching) it failed to make a significant dent in Microsoft's sales.

Windows, launched in 1985, wasn't the only OS to offer multitasking and a graphic user interface. The Apple Lisa had been around for two years, closely followed by the Macintosh. Digital Research's GEM offered a folder-and-icon interface remarkably prescient of Windows 95, and utilities such as Quarterdeck's DesqView brought a task-switching, windowed shell to the character-based DOS screen. Despite the rise and rise of the PC, Windows didn't really take off until May 1990, with the launch of version 3. The next three years saw the addition of built-in scalable fonts, OLE and multimedia, workgroup support for peer-to-peer networking, and a separate version, Windows NT, aimed at the corporate market. Finally, as you may have noticed, 1995 brought a brand new interface which filtered through to the NT product the following year.

We'll be looking in more detail at DOS, Windows 3.11, Window 95 and NT in this article, but despite the inevitable dominance of Microsoft, users do have other choices. The traditional solution for those who don't want to tread the Microsoft way is to buy an Apple Macintosh, and we'll be taking a close look at the Mac OS. The emergence of the Mac clone market means you no longer have to buy hardware from Apple, and the development of the IBM/Motorola PowerPC chip offers a wider choice, with the same system capable of running Windows NT, Mac OS, AIX (IBM's Unix clone), or Jean Louis Gassée's BeOS.

Back in the land of Intel-based machines, we'll look at what OS/2 Warp 4.0 has to offer. We'll also be looking at Unix: although you may never have come across this on the desktop, if you access the internet you'll have been using Unix commands and conventions. Unix is a multi-platform OS, with a variety of implementations, and we'll take a further look at its free Linux incarnation. We'll also be looking at the desktop of the future, in the light of Java, and Microsoft's plans for the next version of Windows.

Whatever happened to DOS?

Despite the proliferation of GUI-based operating systems, there remains a sizeable community still using MS-DOS for whom a command line represents the most efficient way of working. DOS has been developed and refined over the years, but it always suffered from the same basic limitations. First, and most important, although DOS was arguably a suitable OS for the early 8088, it clearly became inadequate for the 80286 (or above) systems as it made no use of the improved hardware on offer. DOS supports a single user running a single program in real mode using only 640Kb of memory, regardless of how much memory the machine has. It uses no virtual memory, no multiprogramming and no swapping — all perfectly reasonable facilities to have in an 80286-based machine.

Despite the many technical limitations of DOS, it has stayed with the industry for a long time. The PC became a huge commercial success, and despite Microsoft and IBM's joint effort to develop a new, superior operating system (OS/2), DOS had already got a strong hold on the PC user base. As late as 1990, the vast majority of computer programs were based on DOS. The leading word processor was WordPerfect, the leading spreadsheet was Lotus 1-2-3.

Although DOS is now effectively a discontinued operating system, its gross limitations still haunt us. Windows 3.1 was designed to run "on top of" DOS, and despite many of its interface improvements, the Windows environment was always hampered by its dependence on the existing 16-bit layer. Windows 95 attempts to resolve this architecture problem by running a new generation of Win32 programs; but it has also been designed to maintain compatibility with old 16-bit software. DOS has not been eliminated from Windows 95 — all the DOS components are still sitting in the system. All that has happened is that DOS has lost its separate identity and packaging. And as any PC gamer will tell you, it will be a long time before games run under Windows as well as they do under DOS.

Eleanor Turton-Hill

p104 ➢

Windows 95

The 32-bit bandwagon hit the road in 1995 with the Rolling Stones on board.

What were you doing on 24th August 1995? Hopefully, you were sane enough not to be queuing up outside your local computer shop; but many did, for what must be the most hyped event in personal-computing history. Even the Rolling Stones, not usually known for their interest in matters PC, were recruited onto the bandwagon. All to launch a new, 32-bit version of Windows.

Behind the scenes

So what's so great about 32 bits? First, it isn't new. Windows 3.11 has 32-bit disk and file access, and with the Win32s extensions it will run some 32-bit applications. Secondly, Windows 95 isn't completely 32-bit: there are still chunks of 16-bit code retained to maintain compatibility with Windows 3.x applications and to economise on memory requirements. What is new is a far more integrated system. Windows no longer has to "sit on top" of DOS, and device drivers for such things as networks, disk cacheing and CD-ROM drives are integrated — you don't need to load these from the CONFIG.SYS and AUTOEXEC.BAT files any more.

Two more advantages of the 32-bit architecture are stability and performance. Each 32-bit application runs in its own "address space" with its own "message queue": 16-bit applications share these. What this means in practice is that although applications still crash, they do so in a far more graceful way, and it's usually possible to terminate an errant program without bringing down the system. 32-bit applications generally run faster but performance is further enhanced by pre-emptive multitasking and multithreading. Windows 3.x uses co-operative multitasking — applications are required to check the message queue regularly to see if another application needs control of the CPU. Ill-behaved applications can hog CPU cycles and prevent the system from switching to another task. Pre-emptive multitasking puts the OS in charge, allotting control on an "as needed" basis. For the user, this means that background tasks have less impact on the foreground task: if you're typing while printing or downloading files, you'll notice far less keyboard-to-screen lag. 32-bit applications can also multithread, which means they multitask within themselves. A word processor, for example, can be taking keyboard input, checking spelling and automatically saving as three separate threads — all pre-emptively multitasked.

Plug and play — brilliant when it works

Two long-standing features of Windows are the cache and virtual memory (a "swap file" that enables the system to use disk space as if it were memory. A frequently asked question with Windows 3.x is: "To what size should I set my cache and swapfile?" The answer is, it depends on installed RAM, free disk space, what applications are run, and more. You need a computer to work it out, and Windows 95 does this, optimising the settings to cope with the demands placed on the system.

More automation comes in the form of "plug and play". Windows 95 will automatically detect any new hardware connected to the system, install the drivers (prompting for any disks needed) and configure the intricacies of ports, interrupts and DMA channels automatically. At least, that's the theory. In practice, when it works, it's brilliant. When it doesn't work, especially with some modems and scanners, it can be a nightmare, and users frequently have to fight the system to configure the settings manually.

A radical improvement is the death of the resources bug. Windows 3.x users often get "Out of memory" errors when working with several applications, irrespective of the amount of physical RAM installed on the machine. The cause of this is the exhaustion of resources — the User and GDI heaps that store objects such as buttons, cursors, menus and other controls. The problem is that these areas of memory are of a fixed size. With too many objects, the heaps fill and resources become exhausted. When this happens, buttons and scroll bars start to disappear and the system grinds to a halt. Some applications leak resources (they don't give back their share when closed down) and the only solution is to close and restart Windows. Although Windows 95 has limited resources, they are managed in a better way, and the bug, although not eradicated, is far less of a problem.

Interface

The most radical impact is the change of interface. Windows 95 Shortcuts, the equivalent of the old Program Manager icons, can be stored not just on the Start menu but in any folder on the system, including the Desktop. Windows 95 uses the Taskbar to show running programs as buttons and the Desktop shortcuts serve to launch programs or open folders. Similarly, whereas File Manager is a self-contained affair, Explorer is more flexible as you can open any number of instances as separate windows.

New users shouldn't find this a problem, but DOS die-hards shouldn't seek too hard to map folders to the old directory structure. The Control Panel, for example, appears as a folder at the same level as the disk drives, but doesn't exist as a DOS directory. The Desktop is the highest level in Explorer, one step above the network and two steps above the disk drives on the local machine, but at the same time holds the contents of the DOS directory of the same name, situated five levels below.

Finally, the advantages of long file names should need no explanation, but those wishing to upgrade should note that you need 95-compatible applications. Old Windows 3.x programs will be limited to the old eight-plus-three character format.

Connectivity

As with Windows 3.11, 95 is network-enabled, supporting all the major protocols such as NetWare, NetBEUI and IPX, and is internet-ready, either through Microsoft's own provider (MSN) or via a third-party provider. However, Dial-Up Networking is notoriously tricky to set up for the non-expert user, although an Internet Jump Start kit provided in the optional Plus! pack makes this a lot easier, and third-party providers generally have similar setup aids.

Microsoft Exchange offers an integrated interface for sending and receiving faxes and email. Many critics, including this one, regard it as slow and poorly documented, and it's particularly cumbersome, for example, to have to load the entire lumbering majesty of Exchange just to enable standby fax reception. Since the original launch it has been upgraded and rebadged as Windows Messaging, which addresses some, but not all, of these failings. We will probably have to wait until Windows 97 for this to be sorted out.

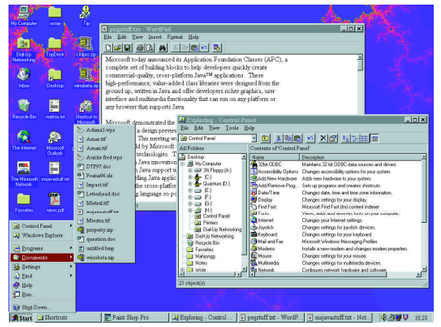
Customisation

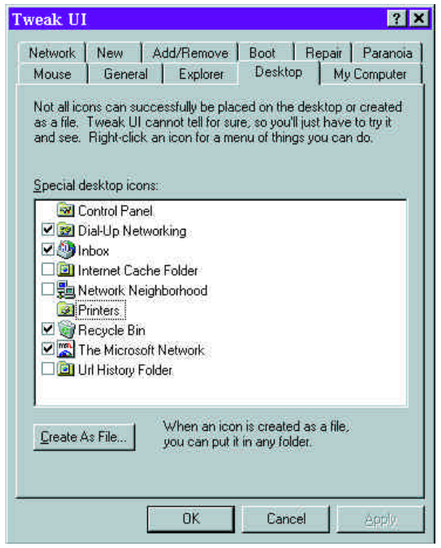
There are more customisation options than with previous versions, but there are several "gotchas". The most frequently heard complaints are that Windows places icons you don't need on the desktop, but you can't get rid of them. It also rearranges icons, seemingly at random, but won't save the settings you want, such as folder display options. Worse, it will save those you don't want, such as re-opening all folders left over from a previous session. Frankly, it's a mess, and a badly documented one at that. A free utility, TweakUI, from Microsoft goes some way to addressing these shortcomings, but still not far enough.

Further confusion comes when you set up multiple users. This, like plug and play, is a wonderful idea in theory. Different users can log in to the same PC with different interface settings and options. On a network, the same user can log on to any machine and download their customised settings from the server. Different users can be given more or fewer privileges by means of the System Policy Editor. But there are two glaring errors in the security implementation. One is that there is no provision for restricting access to individual folders or files on a single machine. The other is that the restrictions are poorly documented, difficult to set up and frequently don't work.

The Registry

Another development, rather than an outright change, is the promotion of the Registry. Windows 3.x stores its configuration settings in a variety of .INI files, with third-party applications adding more. The Windows 3.x Registry contains information linking file types, programs and OLE automation. Add to this the CONFIG.SYS and AUTOEXEC.BAT files needed on bootup, and the result is an unholy mess. Though the .INI files and the DOS boot files are still supported for backward compatibility, the Registry now provides warehousing for all hardware, software and interface settings. The up side of this is a far tidier system, but the down side is that all eggs are in the same basket. If the Registry files are damaged, then everything can collapse. There are safeguards, but it's still a vulnerable area.





Top The new look of 95
Above Microsoft's unofficial "must have" for taming the desktop

Conclusion

The advantages of Windows 95 outweigh the shortcomings. What seems to deter upgrades is the memory requirements of Windows 95, and the need, for business at least, to retrain users. This is probably overrated: Windows 95 may seem radical to Windows 3.x users but it is surprisingly easy to pick up. There will be a time when Microsoft says enough is enough and refuses to support Windows 3.x any longer. When that time comes, users should remember that Windows 95 represents the best general-purpose OS Microsoft has made. Its replacement, due soon, can only be better.

Tim Nott

PCW Details

Price Street: Windows upgrade £69.33 (£59 ex VAT); DOS upgrade £135.13 (£115 ex VAT)
Contact Microsoft 0345 002000
www.microsoft.com

p106

Windows NT Workstation 4.0

A secure, reliable computing environment with some measure of future-proofing.

Windows NT is Microsoft's attempt to address the shortcomings of Windows 3.x and DOS. It was designed from the start to be a complete operating system, free of the limitations of its predecessors. Users needed a system that demanded less expertise, gave them a secure and reliable computing environment, and offered a degree of protection against future changes in technology.

To broaden its appeal, Gates, whose baby NT was, also made sure the team gave it multiple personalities: the ability to run applications created for other systems. This matters less now that Windows software is so prevalent, but in addition to any properly written 32-bit Windows application, NT will still run most 16-bit Windows and DOS applications plus a number of 16-bit OS/2 and POSIX-compliant programs too. Consequently there's a broad range of application software, making NT suitable for a wide range of roles.

Earlier versions of NT were sluggish and resource-hungry, but the introduction of the Windows 95 user interface and the dramatic improvement in graphics performance in NT 4.0 has rid it of handicaps. Under the covers, however, it's very different from Windows 95.

NT takes over complete control of all system resources. That includes memory, devices and the allotment of processor time. All user applications and most system processes run in a protected environment, immune from the poor behaviour of each other. And, because NT is tracking and allocating all resources, it can clean up completely if a process fails, recovering all the memory and closing files. This tight control over resources has put NT in the top league for reliability, and busy servers or workstations can run for months without needing to be rebooted. In fact, with the current generation of power-saving desktop computers, it's quite normal to simply log off at the end of the day and leave the PC to go to sleep. In the morning, a tap on the keyboard is all that's required to bring the system back to life to log on again.

Although NT doesn't generally need any help, you can take some control over how it organises itself. You can move or split the swap file to take advantage of free disk space or faster drives and adjust the relative priority of programs. The Task Manager can help you identify a looping process or one gobbling memory and terminate it, and the performance monitor produces figures for specific system components, subsystems and some server applications. You can view performance monitor information as graphs in real time or store it for later analysis.

Files and NTFS

Crucial to the success of any operating system is its ability to recover from sudden failures without losing data. NT's ability to keep its files in order, whatever happens, owes much to its own purpose-built filing system, NTFS. Database specialists borrowing techniques from the database world designed NTFS and they incorporated a transaction log to ensure data integrity. During a system restart the log is examined, and unsuccessful or incomplete updates are rolled back (reversed) or rolled forward (completed) to preserve consistency. The inevitable performance overheads associated with maintaining a transaction log are more than compensated for by the use of a lazy writer. The lazy writer keeps the user data on the disks up to date but goes about its business in a relaxed way. It doesn't attempt to write each block on demand but buffers data in memory until it can be written efficiently. The buffer might be updated several times before it is eventually committed to the drive, and because the system doesn't hold up programs while disk writes are completed, file operations appear to be much quicker.

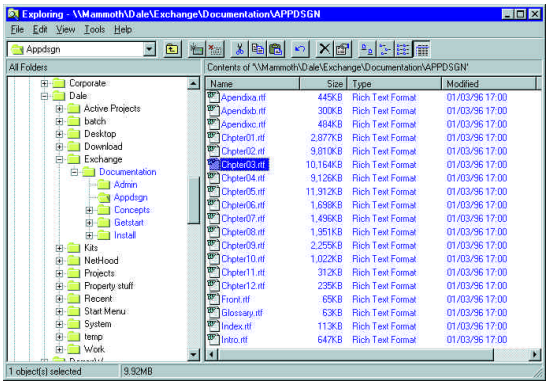
NTFS also allows thrifty data management by selective use of data compression, which you can apply at file or directory level. It is particularly effective on sparse files (files with long strings of binary zeros where data has been written non-sequentially) often used by database programs, where it removes the sparse regions completely. On most other types of data, it compresses less effectively than a zip archive but will decompress a great deal faster — quickly enough to be unnoticeable on most systems. On the surface, NTFS offers standard filing features: a hierarchical directory structure, filenames of an arbitrary length and a truly staggering maximum file size of 17 terabytes.

The face of Windows NT: It suffers from "multiple personalities" — the ability to run applications created for other systems

Security

Security features strongly throughout NT and nowhere is it more obvious than within NTFS. Each file and directory has associated with it a security descriptor specifying who owns the object and who can do what

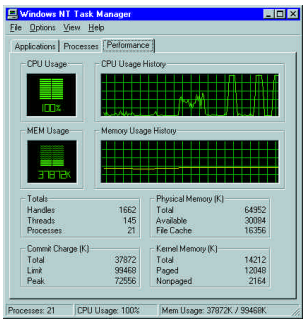
p108 ➢



Windows Explorer offers a number of different ways of viewing

to it. The owner of the object controls such authorisation but may delegate this responsibility to other users. While this has obvious benefits in a business environment, it has unexpected uses in the home where parents can create user IDs for the kids and restrict them to their own directories. In addition to securing the operating system from accidents, it also offers a degree of protection from most types of virus (although they can still spread if administrator IDs run programs stored in the unprotected areas).

NT hasn't been the first choice for a home system because of its inability to run DOS games but with Microsoft pushing DirectX as the way to get DOS-like performance out of Windows games, NT-compatible titles are appearing.



The Task Manager: The load on your system is shown in a scrolling chart

Because security is an all-embracing concern, there's no single part of the system from where it is controlled. You use the User Manager application to add and organise users and groups, and Windows Explorer or the old File Manager to protect files. Beyond that most applications include their own security controls, but if they're properly written for NT they will base a user's authority around their logon ID. This avoids the inconvenience of having to enter a user ID and password into every secure application. The object-level approach for access control makes it easy to identify who can get at what, but you can't quickly identify what a given user can do without checking each part of the system where security is applied.

The internet and networking

The internet features strongly in the latest release of NT. It's always been there to some degree, with full TCP/IP support and built-in FTP client and server software, but now even the workstation edition boasts a web server. Browsing, of course, is handled by Microsoft's Internet Explorer which comes as standard, but other browsers will run quite happily too, as will most 16- and 32-bit Windows internet client applications. Getting online is easy, by virtue of NT's built-in dial-up networking (DUN). Connecting to an internet service provider is normally no more complex than entering a few TCP/IP parameters into the DUN phonebook and clicking the Dial button. You need no additional software from your service provider.

The other side of DUN is Remote Access Services (RAS). While you use DUN to make out-bound connections, RAS provides the support for in-bound links. A Windows NT or Windows 95 system running DUN can connect-in with a modem to make a fully capable, if slow, network connection.

Managing the system

Undoubtedly, one of NT's attractions is its ability to look after itself. The filing system needs checking so rarely that you can probably forget about it, although if you start running low on space, NT will warn you. Backups and virus checks are still a regular housekeeping task that you'll have to take care of, and while NT provides software to handle the former, the latter is left to your own initiative.

The system records unusual events in the event log and this is the first place to look if you suspect the system to be unwell. The Event Viewer application allows viewing of not only logs on your own system but also other systems on your network, as long as you're authorised. The log doubles as a security audit trail allowing you to monitor logon and file access.

Weaknesses

NT has weaknesses, and the most frustrating for potential new users with existing systems is the lack of driver software for much common peripheral hardware. Printers are reasonably well supported, but the less popular items such as scanners and CD writers demand careful selection before buying to ensure you're not left with an unusable piece of kit.

Mobile users may find that NT does not suit them perfectly. Power management is still missing so battery life will suffer, and the absence of full plug-and-play support means you are unable to swap PC Cards while the system is running. Microsoft is addressing these limitations, but in the meantime, third-party applications bundled with systems from some notebook manufacturers provide a rough stopgap.

Conclusion

Windows NT has grown in power and stature. Its future was not assured, but Microsoft's constant improvements and marketing pressure have ensured it will be around for a while. Corporates are investigating NT as an alternative to UNIX boxes, especially in the server arena. And for individuals, NT Workstation offers a reliable, robust, Microsoft-alternative, lightyears away from DOS.

Dale Strickland-Clark

PCW Details

Price £252.63 (£215 ex VAT)
Contact Microsoft 0345 002000
www.microsoft.com

p112 ➢

Windows 3.1/DOS

Despite the attractions of Windows 95, there are still millions of users who have yet to upgrade. The cost, both in terms of licences and retraining, is one reason. And that's assuming that the hardware is up to the job. Despite the official minimum of a 386DX and 4Mb RAM, if you're going to use the 95 product as intended (with 32-bit applications), the sensible minimum is a 486DX with 16Mb RAM. And since Windows 95 and a business suite will leave little change from 500Mb, you might also be shopping for a new hard disk.

Windows 3.1 will run, although not very well, on a 286 with 1Mb of memory, and a 386 with 2Mb will run older applications such as Word 2 or Excel 4 adequately. DOS, in its various versions and proprietary forms, needs just 512Kb and a 8088 processor, and this modest entry level will give you access to software classics like WordPerfect 5.1 or Lotus 1-2-3. On generously endowed machines, DOS is still the platform of choice for fast-action games.

The advantages of Windows 3.x over naked DOS are legion. Let's start with the obvious: the GUI means you never have to remember complicated command lines where one slip of the finger can screw up the entire operation. Secondly, you get immediate visual feedback when you copy or move files. Thirdly, you have a reasonable expectation that what you see on the screen will be what you see on the printed page, complete with graphics, fonts and formatting.

But there are other advantages beside user-friendliness and pretty wallpaper. Windows provides an easy way of multitasking and task-switching. You can open a word processor and spreadsheet side by side, and copy data between them. You can undertake file management chores without having to exit other programs. It permits the use of "virtual" memory. By creating a swapfile, hard-disk space can be used as if it were RAM.

The other great benefit is in the sharing and centralisation of resources. DOS programs are traditionally insular. If you want to print documents from a word processor you need to have that program's own fonts and printer drivers installed, but they don't work with other programs. Some DOS software needs extended memory, some expanded memory, again requiring different setups. Windows dispenses with this diversity and duplication. Memory is seen by Windows applications as one seamless tract. Fonts are available to any application once installed on the system. Printer, other peripheral and multimedia drivers are again held in common.

Tim Nott

A Window on the future

Windows 97, codenamed Memphis, is now in beta testing. The march of technology means it must address certain hardware advances, like support for DVD-ROM and the Universal Serial Bus. Plug and play will be improved, as will power-saving. It will be possible to put the PC on standby, so you can switch on without going through the boot procedure and still respond to scheduled system events or incoming mail and fax messages. A new set of tools, DirectX, Direct3D and ActiveMovie, will provide the means for games and multimedia developers to "hit the metal" in pursuit of the twin goals of full-screen, broadcast-quality video and Windows games that match the speed of DOS.

Following Windows 95, with its built-in launch of the Microsoft Network as the putative centre of the online universe, Microsoft achieved one of the speediest about-turns in its history. The company is now concentrating on integrating the net with the desktop. A lot has already happened: you can put shortcuts to web sites on the desktop, and business suites from Corel, Lotus and Microsoft let you insert live web links into documents.

Windows 97 will go further. You'll be able to use the standard Windows (rather than Internet) Explorer to show a tree-like map of a web site alongside your local drives and network. Click on a branch, and the right-hand pane that shows the folder contents will display the relevant page. Another option will be to use the browser metaphor as the shell. Your local computer and network will appear inside the web browser, and clicking the back and forward buttons will take you from web pages to local folders. With ActiveX you won't even have to leave Internet Explorer to work with applications. It's possible to edit MS Office 97 documents from within IE3, but not, perversely, the other way around.

A live area on your desktop will be available for displaying custom news feeds, say stock prices, weather forecasts or sports results. On a company network, the system administrator might reserve certain channels for information like the latest price list, leaving each user to pick other channels. Smart agents will update the information automatically as and when bandwidth becomes available.

Finally, industry rumours suggest that Windows97 might contain some compression of the source code to lessen the impact on exisiting RAM resources.

Tim Nott

OS/2 Warp 4

A desktop system at the forefront of the shift to a more open world of networked computing.

IBM OS/2 Warp 4 is a 32-bit, multi-threaded, multitasking operating system which serves both as a network client for desktops and as the foundation for Warp Server local area networking software. Early versions of OS/2 never replaced DOS as IBM and Microsoft had hoped, but by version 1.3 OS/2 had become a reliable base operating system for IBM's LAN Server and Microsoft's LAN Manager network software. It wasn't until April 1992, when IBM delivered OS/2 2.0, that things started to look up for OS/2 as a desktop operating system. By then, IBM was the sole owner of OS/2 as Microsoft had departed to concentrate on developing the Windows family of operating systems.

With OS/2 version 2.0, users could run OS/2 applications, DOS applications and Windows applications. That OS/2 2.0 had Windows support was quite impressive as many people had not believed it possible, but it was limited to standard mode support at that time, and flaky. The underlying DOS sessions were solid, but Windows sessions were prone to graphics and device-driver problems. Windows support on OS/2 didn't really come into its own until OS/2 version 2.1, with support for Windows 3.1 Enhanced Mode shipped in May, 1993.

The best part of OS/2 2.0 was the WorkPlace Shell and it has grown with each release. Although grey and unattractive, the current iteration of the WPS is colourful and the easiest way of organising a PC desktop and user data for a productive working environment. The WPS keeps track of desktop objects without using hardwired shortcuts as the Windows 95 user interface does, but is as easy to use as MacOS folders.

At that time (1994) OS/2 2.1 Windows 95 was still under construction, and Windows NT had heavy resource requirements and was much more expensive to buy and set up. OS/2 2.1 was inexpensive by comparison with Windows NT, more reliable than Windows 3.1, and it supported OS/2, DOS and Windows applications.

With the usability and performance updates, OS/2 2.1 was an excellent choice for desktops on which to integrate a variety of applications. It would have been a more obvious choice had IBM not shipped it without network client support other than for NetWare file servers. Networking with OS/2 was still a separate chargeable item only available as part of LAN Server.

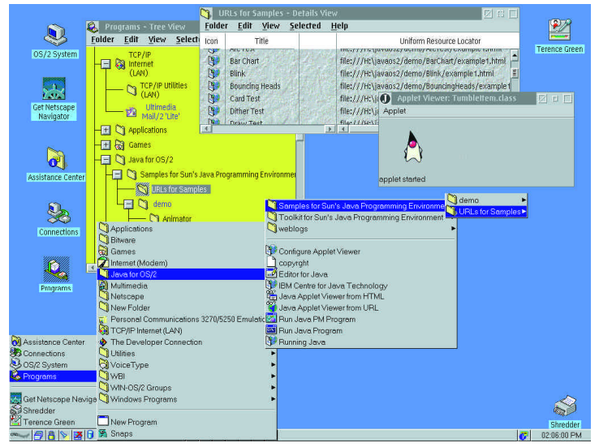
In November 1994 IBM introduced OS/2 Warp 3, adopting the development codename "Warp" as the brand name. Warp 3 improved the user interface, reduced the memory requirements to improve performance, and greatly improved the device-driver support. It was also the first affordable desktop operating system to include internet access software.

Built-in network client and peering support arrived with Warp Connect in February 1995. The Warp Connect feature set became the basis for Warp 4 which further improved the user interface and added Java, speech navigation and dictation to the Warp mix. Warp 4 also fully supports power management and plug and play, something Windows NT 4.0 Workstation has yet to manage and which is particularly important for mobile users.

Tried and tested

The history of OS/2 Warp is one of steady improvement and growth over several years in the marketplace to where it has an excellent reputation for reliability. It's not bug-free and it's not perfect, but with practice most problems can be fixed or worked around. The payback from a well set up Warp 4 system is being able to take advantage of the latest technology. Speech navigation has been around a long time, but the navigation capabilities in Warp 4 go beyond simple navigation while the dictation system is high quality.

With Warp's speech navigation and the freely downloadable Netscape Navigator 2.02 for OS/2,



users can even surf the web through speech control. It isn't technology for the sake of it but a real advance that reduces the amount of mouse manipulation, addressing the same ergomomic issues that prompted Microsoft's new "wheelie" mouse.

By far the best aspect of Warp's speech is the dictation system. Unlike navigation which you can just jump into, dictation works best after some initial preparation and familiarisation. Warp's dictation

The WorkPlace Shell and the WarpCenter task bar make the Warp 4 user interface powerful and easy to configure and use

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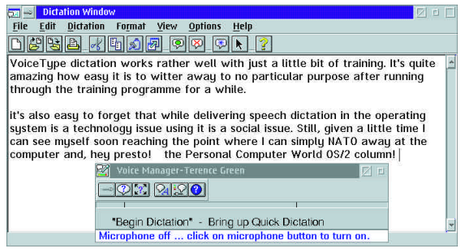
capability is tuned towards bulk dictation where you don't want to be looking at the screen all the time. Whether you take to it depends on the type of speech-enablement your job requires, but if you dictate large chunks of ad-hoc text, Warp does that.

Java support which enables a standard Warp 4 desktop system to run Java applets and applications without having to trigger them from a web browser is at version 1.02. Java version 1.1 is scheduled to ship as soon as Sun ratifies Java 1.1 in the autumn. Java is still an emerging technology but there's no doubt it is perfectly suited to networked computing where the focus is on what the computer does rather than how it does it.



Speech navigation needs a Pentium with 24Mb RAM but works well. The speaker model means that it improves the more you use it

Warp 4 is suited to networked computing because it supports the network computer model as well as traditional client/server computing. There's also a middle path between the two, with Windows applications servers. Products such as Citrix WinFrame run Windows applications (16-bit Windows 3.1 and 32-bit Windows 95/Windows NT) on a Windows NT server. Then they provide an X-like display of the Windows application on OS/2 (and other) "terminals" but one using less bandwidth than X.

The one thing you can't do with Warp 4 is to run Windows 95/NT Win32 applications. In practice this means you can't run Office 95/97 on your PC although you can use the Citrix solution. However, there are native OS/2 applications covering most users' needs and sample versions of many of them are on an Application Sampler included with Warp 4.

As far as performance goes Warp runs fine on the current crop of Pentium boxes with 16Mb RAM or more. The more functionality you use, the more memory it needs. About 32Mb is required to run all the new functionality including speech dictation and Java applications, and to connect to a variety of network servers and peers including Novell NetWare and the Windows family — Windows 3.1, Windows for Workgroups, Windows 95 and Windows NT.

The networked computing model means that Warp can be used to take advantage of older 486 systems with less memory, as Warp's performance is less affected by the amount of memory over 8Mb than is the case with Windows 95 and Windows NT.

Warp's next

Keeping up with the speed of developments on the internet is becoming a tough job requiring frequent updates, and that's hard on OS developers who are used to development cycles measured in years. Accordingly IBM froze the development of the Warp kernel about a year ago. At the time this triggered yet another round of reports that Warp was dead, but OS/2 users have over many years become immune to mistaken reports of the death of OS/2 and on this occasion it was no different.

The idea behind freezing kernel development work was to have a stable base to which new components could be added automatically over the internet. Warp has always supported automatic network installation and upgrades under the control of a network administrator, but the plan for Warp 4 was to enable automatic unattended upgrades over the internet. To achieve this successfully the upgrade source has to assume a known quantity at the user end.

During 1997 IBM plans to deliver over a dozen enhanced component modules, and Warp users who install all of these will end up running Warp 5 which is scheduled for release early in 1998. Initial delivery will be on a fee-paying basis from an internet store.

The upgrades include support for symmetric multiprocessor systems, Java 1.1, a Lotus Domino web client and TCP/IP 5.0 along with new and enhanced internet protocols like LDAP and SSL 3.0, but Warp users can choose to take only those upgrades which apply to their working requirements. Networked-computing users will want the Java and internet components, while traditional LAN users will be looking for the client/server enhancements such as improved connectivity with other servers and network peers.

Conclusion

The road to OS/2 Warp 4 has been a bumpy one but it's been a worthwhile journey so far. It's a robust and reliable desktop system with many years of development behind it, and it's still nicely timed to be in the forefront of the shift from PC-centric computing to a more open world of networked computing in which a wide variety of systems can run the same applications.

With its open acceptance of competing platforms and advanced technology including Java support in the operating system, Warp can integrate into most systems and scenarios. It costs less than Windows NT 4.0 Workstation and is more reliable than Windows 95 on the same hardware. It's cheaper than a Mac and more user-friendly than Unix.

Terence Green

PCW Details

Price £191.53 (£163 ex VAT)
Contact IBM 01329 242728
www.ibm.com

Mac OS

Unrivalled in its consistency and clarity, the oldest GUI is now showing signs of age.

The common claim that the current MacOS has not changed from the original (1984) or perhaps System 7 (1989) ignores the obvious. The myth that the first mass-market graphical human interface has not kept pace with progress is easily countered by examining its achievements in integrating multiple media and, most recently, in moving away from the application as a centre of interest, with OpenDoc. But there are certainly some nooks and crannies which have changed little in 13 years and these can cause the user problems.

The core of MacOS was written in the early eighties for the first Macs, which sported slow (by today's standards) 68000 processors from Motorola, less memory than a modern pocket calculator and no hard disks. It had a flat-file system, later rejigged to support hierarchical directories, and internally became organised into "managers", each concerned with a different suite of functions. Apple's recent difficulties in rewriting it to become Copland bore witness to the ramshackle internal structure of MacOS.

One of Apple's major goals is to offer the developer, hence the user, an environment independent of the underlying hardware. Prior to the launch of System 7 in 1989, Apple had to create a new release of MacOS each time a new Mac was launched. Although System 7 was designed to make the System more extensible, thus easier to patch and support new models, in practice it has become progressively more complex. Apple has not helped by releasing buggy upgrades which then had to be patched to support the variety of versions of System 7.0 in use.

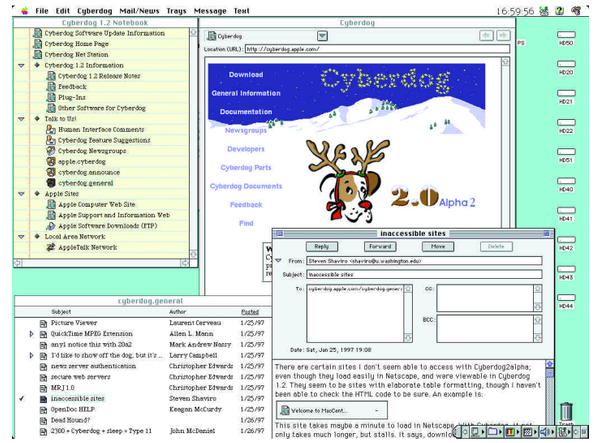
Plug and play

At its best this hardware independence is so successful it is unnoticeable. Plug in new hardware, install the software extension to support it and it plays away. However, variations in standards such as the SCSI bus, and a profusion of potential software problems, have eroded this enviable position. PCI-equipped Power Macs can be notoriously fussy about devices connected to their SCSI chains, and Motorola's new StarMax systems cannot use some networking stacks due to hardware incompatibility.

Perhaps the greatest threat to plug and play has been the proliferation of operating-system extensions (formerly known as "INITs" due to their file type). Prior to System 7 these tended to be dispensible or fairly stable, but System 7's new architecture has invited developers to create more extensions which attempt clever tricks and, in doing so, clash with others. The release of Power Macs has created a new industry devoted to shared libraries, roughly the equivalent of Windows DLLs, to compound the problem.

Support for networking, both local and with the internet, has improved in leaps and bounds with the advent of Open Transport. This rationalises all communications, down serial cables or via network adaptors, into simple control panels, supporting switching between different custom TCP/IP settings with the greatest of ease. Unfortunately, applications have yet to take advantage of these new features, although Open Transport's backwards compatibility ensures that it still supports their older ways.

Using a Mac is like slipping on a pair of old slippers — comfortable and familiar. Unless you have coaxed a handful of dodgy extensions to do otherwise,



Cyberdog is a remarkable demonstration of OpenDoc's sea change in computing. A single notebook contains web links, news, mail, and more

MacOS remains the model of clear, unambiguous, efficient design that graced the original Mac. Floating toolbars have invaded — if you want them — in the Launcher and the Control Strip (now usable on all Macs, not just portables) but you'll still see jsut the single menu bar at the top of the screen, and uncomplicated windows.

If you're used to a more modern and complex interface, this might seem rigid and old-fashioned. Certainly, some power-users can make other interfaces operate more slickly, but for the vast majority of us, MacOS protects us from painful error. The consistent extension of the OS "look" into applications may look boring, but it greatly reduces the time taken to learn and become productive with an application. The average user can thus pick up a program which they last used a year ago without re-learning interface quirks. One of the few remaining inconsistencies in the MacOS human interface was the handling of printers through the Chooser. Since

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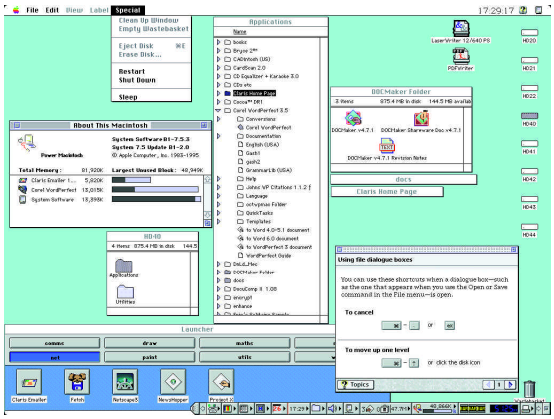
the advent of the LaserWriter 8.4 printer driver, printers are installed on the Desktop, making them easier to use and more powerful in configuration.



MacOS presents a sober and traditional approach to the human interface. Note the desktop printer devices, a recent innovation

Efforts to develop a more sophisticated imaging system for printers (and other output devices) using QuickDraw GX have not been so successful. QuickDraw itself is the fundamental graphics system on which windows and their contents depend, but it still remains ignorant of the expectations of the typographer or the popularity of PostScript printers. QuickDraw GX goes beyond PostScript Level 2 in offering a very sophisticated imaging model allowing amazing typographic tricks, for instance. To date, one outstanding publishing program, UniQorn, takes full advantage of it. Most other Mac applications, at best, ignore GX, and some are incompatible.

OpenDoc

The greatest changes in recent versions of MacOS are potentially the most fundamental of all. OpenDoc is not just a challenge to OLE (and ActiveX) but a bold attempt to change the face of computing. Instead of running an application to create and edit a document, OpenDoc sees the document as the centre. You thus use a template document into which you embed component parts. Each component may be created using a different editor — perhaps you need a large table laid out, for which you use a dedicated table editor. Instead of the document contents being determined by a single monolithic application, you work in a dynamic environment centred on the document, calling in specialists as and when you need them.

Mac OS 7.6 is the first time Apple has released OpenDoc in integral form, although OpenDoc has seen considerable use as an extension. While there are plenty of good component editors available now, it is not yet possible to throw all your conventional applications away, making OpenDoc an enhancement rather than a substitute.

OpenDoc's potential can be seen best in its internet application, Cyberdog, which started life as a renegade demonstration of the future. Instead of using a single huge application extended only by plug-ins, or a handful of different specialist programs, Cyberdog offers its integrated notebook containing web links, news, mail, FTP archives; indeed, anything for which you have a component. The effect is as remarkable as it is hard to describe — a radically different approach which quickly becomes compelling. If other work areas can be tackled similarly, OpenDoc should have a bright future, even if it continues to be studiously ignored by some of the larger software houses.

NeXT, please

Not everything in the garden is rosy. If you get your extensions snarled up, patching one another's patches, your Mac becomes infuriatingly fragile. You then discover a dark secret of MacOS: its file system is far from bomb-proof. The wondrous illusion of the Desktop and Finder relies on many files being kept open. Because Mac software (and the OS itself) does not use the processor's protected mode, it can trample over anything at will. And because all these files remain open and accessible, they and the disk's structural information can easily get corrupted in a crash. This entails messy repair using Apple's Disk First Aid. One related issue, which Apple has addressed successfully now, is virtual memory. Prior to System 7.5.5, the built-in implementation was an embarrassment, being stunningly slow and dumb. Although it still swallows up a horrifyingly large amount of disk space, performance is now similar to that of third-party offerings, making its use feasible at last.

Until late 1996 MacOS 8, codenamed Copland, was being developed to sort these legacies out. Apple's surprise purchase of NeXT, and the announcement of Rhapsody, its new vision of the future, seem to have supplanted those intentions. While Copland seemed clear and simple, Rhapsody sounds more radical and indefinite. There will be a series of improvements to 7.6, and this traditional line may have a longer future too, but there are bound to be further changes in plans through 1997.

Conclusion

Mac OS 7.6 may no longer stand head-and-shoulders clear of all competition, but it remains an outstanding operating system for the user. Unrivalled in its consistency and clarity, it is probably the most productive and cost-effective environment for the average user. If innovation in feel has yet to appear, OpenDoc's break from massive monolithic applications has much promise. Deep down inside it creaks and groans from long heritage: Apple cannot delay the release of a new implementation for too long, or it will stifle its many great virtues.

Howard Oakley

PCW Details

Price System 7.6 to be decided
Contact Apple 0800 127753
www.apple.com; www.euro.apple.com/uk/

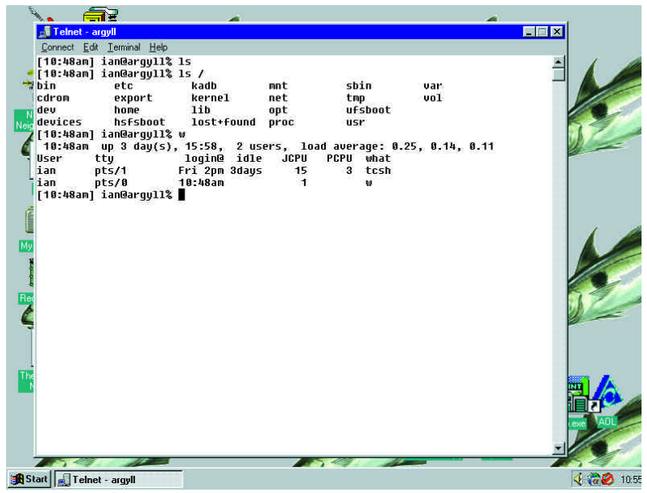
p118 ➢

Unix

The venerable Unix is truly multitasking, hard to crash, and a techie's heaven.

Unix is different to any of the other operating systems evaluated in this feature. For a start, it's far older — the roots of Unix go back to the early seventies at Bell Labs in the United States. Yes, it's an operating system that was originally written by a telephone company. Rather than being created and maintained by just one company, as is the case with, say, Windows, Unix has grown "organically" over the years. There are many different variants around: some are expensive, some are free. There's almost certainly a version of Unix available for whatever hardware platform you own, whether it's an Amiga or an IBM mainframe.

Unix comes — or came — in two main flavours. When Bell Labs divested itself of the project, two different groups of companies worked on competing versions: one became known as BSD 4.3, the other as System V. These days, BSD-based Unix is definitely on the wane, as System V Release 4 encompasses most of the useful bits of BSD while keeping much of its own character. However, there is still a great deal of support for BSD Unix, and it certainly does have its own appeal.



You can connect to a Unix system from anywhere on the network. Here, we're logged in to a Unix box via a PC

The basic benefits of Unix over many other operating systems are easy to enumerate. For a start, it's a truly multitasking OS. It was originally written that way, so it has excellent support for memory protection — in other words, when one program crashes it really can't bring the whole operating system to its knees. Although other OSs make the same claim, Unix really makes good on it: it's difficult for a program, or indeed a user, to crash a Unix system. This makes it a great operating system for application areas where robustness is required, such as file serving. And since Unix is a multi-user OS too, one central machine can service many different people simultaneously, all connected via a network.

Networking is, indeed, another area where Unix really wins out. Unix machines use TCP/IP, the networking protocol on which the internet is based, which is one reason why the majority of the world's web servers are Unix machines. The operating system was built very much with networking in mind, so one person can log in to another Unix box and run commands on it easily.

This can be something of a double-edged sword: its multi-user capability, and the fact that it has been around for a long time, mean that Unix machines are a prime target for hackers, who can use known loopholes in the system's security to gain super-user, or "root" access, and trash the machine.

User interface

Unix has a reputation for being a complex, unwieldy operating system with little in the way of user-friendly features. And to an extent, this is a well deserved reputation. The OS was added to by many people over the course of its first few years, and many of the resulting utilities are still around today, despite having been hacked together to solve one particular problem with little thought as to how other people might want to use them.

Also, Unix is basically a command line driven OS, so in order to get anything done you need to learn some pretty esoteric commands. If you're used to MS-DOS you'll have a head-start, but there are enough subtle, and less than subtle, differences to keep you on your toes. This command-line base immediately puts many people off the operating system, but in fact any decent version of Unix will have support for the X windowing system. And some manufacturers' implementations put dedicated GUI-based operating systems to shame.

Sun's Solaris is a good example of a reasonable Unix-based GUI. X is a basic windowing system, on top of which a manufacturer can build its own look and feel. Sun's is called OpenWindows and provides everything you would expect from a desktop OS like Windows, including a file manager to help you move around, duplicate and delete files and programs, and a Help system. You can also run graphical programs from OpenWindows like word processors, web browsers, spreadsheets, and scientific applications. Since much of Unix is still based around the command line, OpenWindows also includes support for one or more "terminal windows" into which you can directly type commands.

Because of its history (the fact that Unix was originally the work of many people, including several hackers (in the true sense of the word) who just wanted to increase the power of this cool operating system), there is a remarkable amount of high-quality free software around. However, much of this is supplied in source code format: you need to compile it yourself before it will run. The reason for this is that there are so many different flavours of Unix, running on so many different hardware platforms, that it would be impossible for an author to compile and test the program on all the possible variants. Instead, you receive the program code and some hints as to how to make it work on different systems.

If you have a "standard" Unix such as Linux (a popular free version which runs on PCs; see page 120), Sun's Solaris or Silicon Graphics' Irix, compiling the program is often just a case of running the compiler. The programmer has built in all the code necessary to deal with your particular flavour's foibles, but even then, things don't always go as planned. So if you have an aversion to program code, you're going to struggle with much of the free software around.

Software and applications

There are plenty of commercial software packages available for different versions of Unix, covering the entire gamut of application areas. Some systems are suited to one type of program, so for instance if you have a Silicon Graphics workstation, you will find plenty of high-end graphics packages capable of any kind of image manipulation. If you have a Digital Alpha Workstation, on the other hand, you will find that high-end database-type programs abound, since the Alpha is an incredibly powerful platform well suited to that kind of work.

Where there is a slight shortage, though, is in the productivity application area. Unix systems are fairly high-end and tend to be purchased for people who need high-power solutions to problems, rather than as desktop workstations for people whose main job will be word processing and spreadsheeting: you won't find Microsoft Word, FileMaker Pro or Quark XPress running on Unix systems. However, there are workarounds available if you really do need to run PC or Macintosh-style applications on your Unix box. Solaris, for instance, ships with Windows Application Binary Interface (WABI), basically a Windows 3.1 emulation package tailored for specific applications like the MS Office suite. A more general solution is Insignia's SoftWindows which runs in several different Unix flavours and provides full Windows 3.1 or Windows 95 compatibility. Of course, you won't get the same sort of performance you can expect from a Pentium system running Windows natively, but SoftWindows provides a perfectly acceptable level of performance if you just need to run that Windows word processor or whatever.

If you need to use Macintosh applications, you are slightly more limited; there is only one solution available, MAE from Apple. MAE (Mac Application Environment) only runs on Sun and Hewlett-Packard machines but it provides full Macintosh compatibility. If you have an occasional need for FileMaker Pro or Quark XPress and you can live with the fact that it won't be nearly as fast as a dedicated Power Mac, MAE is a decent, reasonably priced solution.

Conclusion

So, would Unix be a useful operating system for you to run? That really depends on what you want to do. Unix users tend to fall into two distinct camps. The first are the people who need its power and flexibility for a specific application area: they either buy an off-the-shelf program or, in the case of larger companies, have software written specifically for them. Because of its robustness, Unix is used by many large corporations who can't afford their central database or customer support system to crash. Its power means that design houses creating graphics and special effects for film and TV use Unix as standard, despite the fact that graphics designers are not normally the most techie people in the world. Companies like Silicon Graphics have built windowing systems sophisticated enough that the normal user will seldom or never need to go near the command line if all they want to do is run a few standard programs. Then there are the geeks; the people for whom Unix is appealing simply because of its complexity and power, and who aren't afraid to roll up their sleeves and hack at someone else's program code in order to make it work. Linux is extremely popular with the techie community, although it does have a good number of commercial business and scientific programs now available, too.

If you need a powerful, multi-user, multitasking operating system that can be persuaded, with a little work, to do just about anything you need, Unix is well worth checking out. But if you just want to run a word processor eight hours a day, there are almost certainly better alternatives available. Not that a true Unix fan would dream of using any of them.

Ian Wrigley

PCW Contact

Prices and contacts cannot be supplied as Unix comes in many different flavours. Solaris can be contacted at www.sun.com and Linux at www.linux.org

p120

Java OS

Sun Microsystems' Java OS is in a category all of its own. Although it fits the description of an "operating system", its goals are very different from the other mainstream OSs included here. The Java OS is a lightweight portable operating system based on Java and designed to power a new generation of network PCs.

The move towards the Java language has been driven by an increasing dissatisfaction with bulky office software. The underlying idea is to cut down the cost of ownership associated with the PC by providing limited features to the end-user and simplifying administration by centralising the whole network model. Users are left with a "thin" client which allows them access only to the applications which they require.

The tower model of Sun's JavaStation

The Java OS is an extremely small and fast operating system designed for a single purpose: to provide just enough functionality to run the Java Virtual Machine (JVM) which can take the form of a browser. It is the JVM which provides the development layer for Java applications, and this is the key to understanding the new hardware model which Java makes possible. Because Java sits in a development layer all of its own and not directly on the operating system, it is completely platform-independent. The JVM separates the development environment from the operating system. Put another way, the browser is something of an OS in itself, and it becomes almost irrelevant what platform is used underneath. All the Java OS does is to provide a basic layer to support the JVM.

The Java OS consists of little more than a small Java kernel, Java windowing and graphics primitives, and a suite of networking protocols and device drivers. It is radically different from traditional operating systems because it does not have (or need) a file system, a virtual memory subsystem, multiple address spaces or support for multiple language programs.

We got our hands on the Java OS two months ago when we looked at Sun's JavaStation. The JavaStation, like other NCs, resembles a dumb terminal. Its entire operating system and browser (itself written in Java) is downloaded from a server and condensed into just 5Mb RAM. Applications are downloaded on demand and executed locally within the browser.

Despite these radical differences from the traditional OS model, the Java OS does share some important characteristics with more conventional operating systems. It supports a password-protection login feature, for example. It is multithreaded and can run several applets simultaneously, it incorporates device drivers, and communicates using standard network protocols. But that's as far as the similarities go. The primary goal of the Java OS is to be small enough to support internet appliances or terminals as an alternative to the fully loaded PCs which currently serve users with web surfing, email and simple word-processing capabilities. The new Java-driven architecture has been described by many industry observers as the beginning of a new computing paradigm, but others are deeply sceptical of its market success, believing that most consumers will not settle for less horsepower and functionality than a PC, even at a lower price.

Eleanor Turton-Hill

The rise of Linux

In 1990 a student called Linus Torvalds was doing a computing course at the University of Helsinki in Finland. As an aid to study, and for fun, he began experimenting with a cut-down UNIX-like operating system called Minix on his home 386. Torvalds was dissatisfied with Minix, so he set out to build an experimental UNIX-like kernel of his own.

Towards the end of that year Torvalds put out his code on the internet as Linux 0.02. He was looking for help with some of the problems he'd run across, but this simple kernel was good enough to attract the attention of other developers, who began to contribute drivers for popular PC hardware. By the following year, the modest student exercise had suddenly become the fastest-growing operating system on the planet.

A key component of its success was undoubtedly Torvalds' decision to place his code under the same open and free licensing arrangement as GNU, another free UNIX-compatible OS. Today, Linux is still free, downloadable over the internet or available on CD for little more than the cost of distribution. The terms of the GNU licence allow third parties to add value in the form of installation utilities and other software.

What you get for your money, however much you pay, is a highly efficient, robust, modern, multitasking, multi-user, 32-bit operating system. Designed initially for Intel PCs, Linux has also been successfully ported to other processors like the DEC Alpha, Sun's SPARC and the Motorola 68K series.

Although not technically entitled to be called "UNIX", Linux complies with the basic UNIX standard known as POSIX and can run many applications written for other UNIX-on-Intel platforms, like SCO. Standard distributions of Linux like Slackware and RedHat come with complete TCP/IP networking, NetWare connectivity, the X Window System and a number of compilers and development environments.

■ *The latest version of Red Hat Linux is on this month's cover CD.*

Chris Bidmead

www.caldera.com
www.redhat.com

Interview: Matt Welsh, author of *Running Linux*

PJF *Why is Linux important?*

MW "The way to answer that is, why is it not? There are a lot of people who want to put Linux into the enterprise to replace Windows machines. They are mostly enthusiasts who say, why can't we use this to take on Microsoft? But this is fitting a square peg into a round hole. Linux is just not catered towards normal personal computer use. It's for specialised use and important in education. It's important for the reason that UNIX is important, for mathematicians, physicists, database people and software engineers. It's important for all of them, but even better is the fact it runs on cheap PC hardware that's probably better and faster than a Sun workstation. I worked for a long time in front of a Sun SPARCstation 5 with a 24-bit display. It was so slow – they must have worked hard to make it *that* slow! My PC sitting next to it, a third of the price, was faster. I am not, however, a Linux fascist. I spent the last few months using NT."

PJF *So do you see Linux taking over in areas where other flavours of UNIX already exist? Are we beginning to see everything we want from this and it won't cost us an arm and a leg for the hardware?*

MW "Yes. Take SCO: it's popular because it's commercial. It has a company behind it: someone you can attack when things go wrong. But in terms of features and functionality it has little that Linux doesn't. SCO requires you to buy extra stuff whereas Linux bundles it all. There is no licence issue: you can buy a single Linux CD and install it on a thousand machines. But I'm not going to say that it is robust. It is *quite* robust, but there is a big difference between an OS developed by hackers on the internet and one developed by professional development teams."

PJF *The OS world is quite interesting just now, what with Apple and NeXT and of course Linux. What's your take on all this?*

MW "It will be Windows NT across the board within a couple of years. And it's too bad. I don't think homogeneity is the ultimate goal of the industry. That's why Linux is a good thing for some people. I don't run Linux out of rebellion, that's a dumb thing to do. But my own feeling is that NT will prevail, but because of its power and because Microsoft is behind it. It will be by far the largest operating system running out there within a couple of years. I'm not really sure how far attempts to build new operating systems like Apple is doing will succeed, because it needs a hardware base. It's very difficult to just go and build an OS with the kind of hardware and application support NT has."

Welsh: Dedicated to Linux but resigned to the fact that, in a couple of years, Windows NT will be the dominant OS

PJF *And Java?*

MW "What about it? It's a language. It's not going to kill Microsoft: *millions* of people buy Microsoft. You have to be realistic. Java is nothing really new except that no-one's done it right before. Sun managed to get the surfboard on the crest of the wave. Java is just going to be integrated into whatever is out there and that includes NT. At the end of the day, you have an application that does something for you. Whether it's written in Java or not doesn't matter."

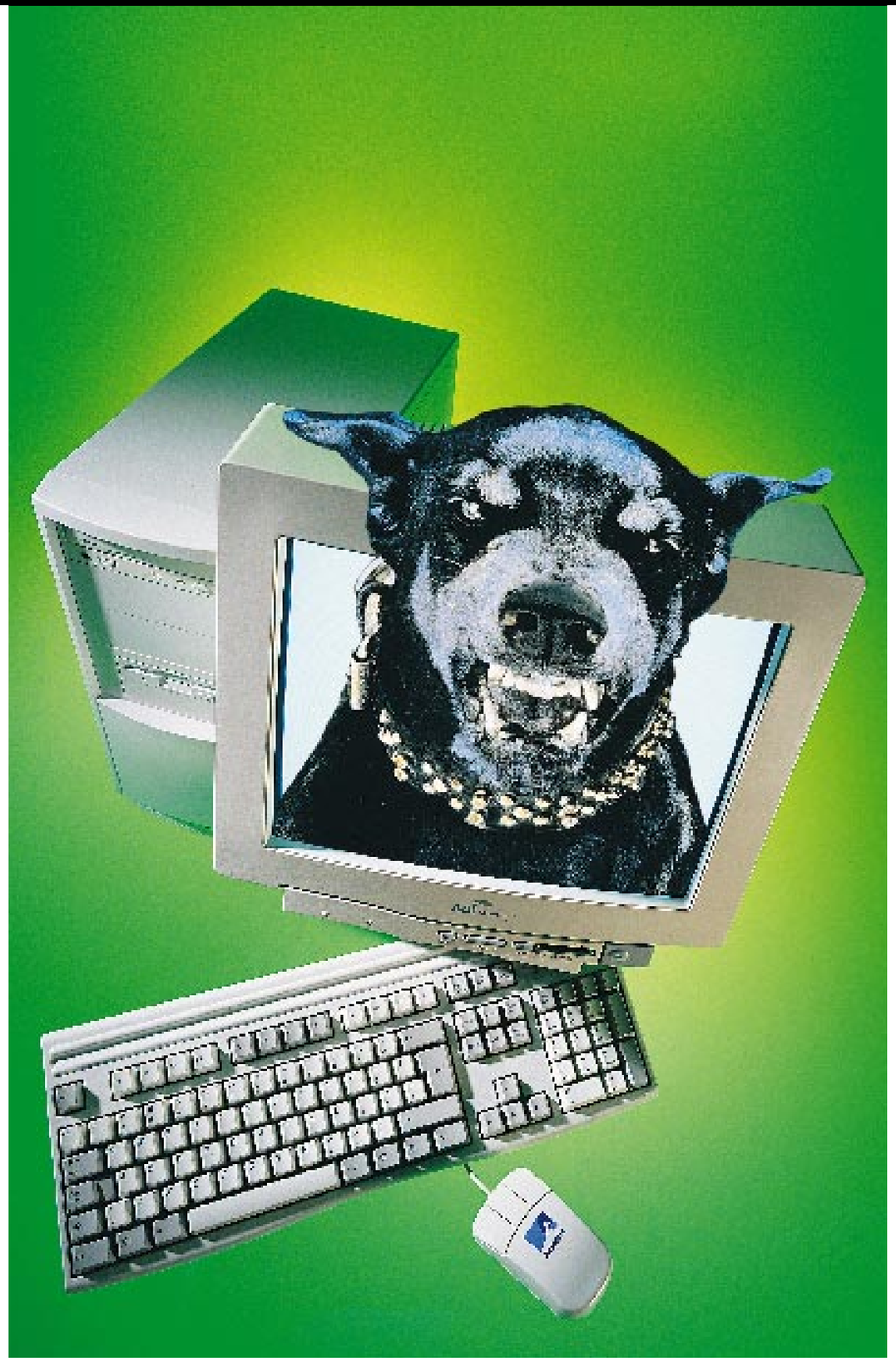
PJF *What would you say to someone thinking of installing Linux without any UNIX knowledge?*

MW "The interesting thing about Linux users is that most of them *are* new to UNIX and end up usually knowing more about UNIX than most Sun Workstation users who have a system administrator to fall back on. Linux users get to learn how to rebuild the kernel. Talk to most UNIX users — they don't even know what the kernel is."

■ *Running Linux is published by O'Reilly & Associates at £18.50. ISBN 1-56592-151-8.*

PJ Fisher

Group Test: Entry Level PCs



ENTRY-LEVEL PC Photography by David Whyte

Mean machines

These new 166MHz PCs come enabled with MMX technology that snarls in the face of existing processors. They will have you straining at the leash.

With the speed of technological development today, it seems that you can never manage to keep up with what's new, what's hot and what's going to still be around tomorrow. And this has never been more true than with the PC industry. Today's hot new chip is tomorrow's legacy of obsolesence. Remember when the 286 processors came out? Or how about the 386 and 486? What about the first Pentiums? With each new chip came a sense of awe at the speed and power of the "next generation", but also a sense of frustration because that great "new" chip you bought was fast out of date and unable to cope.

Well, it's happened again. With Intel's release of its new chip, the Pentium Processor with MMX technology, the cycle has returned. The fabled Pentium, the beast of burden to hundreds of milllions of PCs, looks like it's finally on its last legs. The question is, where does this leave you, especially if you're looking to buy a new PC that you expect to have around for a couple of years?

Here we take a look at what we consider to be the best entry-level PC for you to buy.

Whether it's for the home or the office, you're going to want to spend your money on something that's going to keep up with the times, and that's why we feel the best start for a future-proof PC is a 166MHz PC with MMX technology. With MMX, combined with the excellent performance of a 166MHz chip, you should be on safe ground for many years to come.

We asked ten PC manufacturers, small and large, to supply us with their best entry-level model. To even things up, we asked for a multimedia PC with a basic spec of 32Mb of RAM, 2/3D graphics card, Level 2 cache, 15in monitor and a minimum 2Gb hard drive. Any extras were at the discretion of the manufacturer.

What we found was impressive. Excellent performance, cutting-edge components, internet readiness, USB ports, were all present and, for the most part, reasonably priced.

We've also revised our all-encompassing features table to help you compare the competitors. So if you're in the market for a new PC, read on. You might just find yourself drifting to a new level.

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***Compiled by** Dylan Armbrust*

Adams Technology M-Pro 166

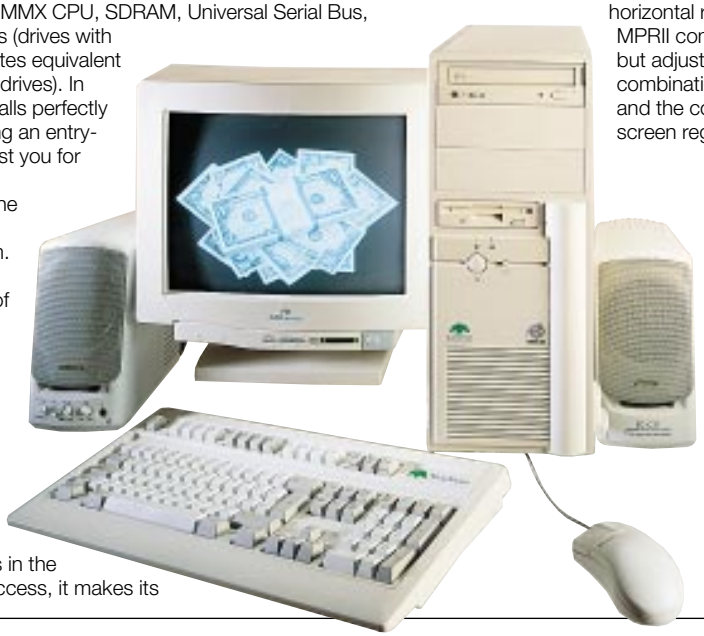
The M-Pro was the first PC in this group test to come with Intel's new 430TX chipset, the successor to the 430VX and 430HX, and its presence appears to have made an impact. On the performance side, the Adams came in an impressive third in both the Doom 2 and PC performance tests with only a couple of points separating it from the top.

A lot of this boost can also be attributed to Adams' use of the new Tyan Titan Turbo ATX S1572 motherboard. It is one of the new breed of motherboards optimised to take advantage of emerging and existing technologies such as the MMX CPU, SDRAM, Universal Serial Bus, and Ultra DMA hard drives (drives with increased data transfer rates equivalent to or greater than SCSI 2 drives). In essence, the M-Pro 166 falls perfectly within our goal of reviewing an entry-level PC that's going to last you for quite a few years.

Adams has gone for the current favourites for the make-up of its subsystem. A Matrox Mystique with 2Mb of SGRAM fills one of the PCI slots, while a Creative Labs SoundBlaster 16 occupies one of the ISA slots. Adams has opted for the IBM DAQA 33240 3.2Gb hard drive with 9.5ms access time, instead of the omnipresent Quantum Fireball in most other PCs in the test. But with its 9.5ms access, it makes its mark. The presence of 512Kb of L2 cache also helps. We shouldn't forget the Toshiba eight-speed CD-ROM drive, which is good, but were a bit disappointed that it wasn't a twelve-speed like many of the others in the group.

The inclusion of Microsoft's new Office 97 suite alone makes the software bundle impressive, but Adams has also added MS Bookshelf and Tel-Me business software.

• **Monitor** A 15in ADI Microscan 4V. It has a 13.8in viewable area, a vertical frequency range of 50-100HZ and a horizontal range of 31-64kHz. It is EnergyStar and MPRII compliant. There's no on-screen display but adjustment is controlled through a combination of four buttons. The focus is crisp and the colours vibrant, but it lacks a little in screen regulation.



PCW Details

Software Bundle Microsoft Office 97, Tel-me, Microsoft Bookshelf.
Price £1,761.33 (£1,499 ex VAT)
Contact Adams 0161 282 8822
Good Points It's quick, with future features like USB and Ultra DMA built in.
Bad Points A bit pricey, especially without a twelve-speed CD-ROM or modem.
Conclusion Well assembled with good performance. If you drop Office 97, it could be attractive price-wise.

Build Quality ★★★★
Sound Quality ★★★
Performance ★★★★
Value for Money ★★★
Overall Rating ★★★

Atlantic Systems ATX Pro 97

Personal Computer World Highly Commended

Atlantic Systems has come a long way since it first started participating in our group tests. At first, its PCs came across as fairly average, with standard motherboards and components, but they have matured in design and build quality.

The ATX Pro 97 comes in a distinctive midi-tower case with the word "Atlantic" firmly moulded onto the front of the case (and over time into your subconscious, after seeing it so often). There's plenty of room for expansion at the front, with the extra two 5.25in and one 3.5in bays, so you'll be able to add a tape backup or Syquest/Zip drive for extra storage capability if you choose.

The ATX Pro 97 comes with the usual I/O port configuration of one parallel and two serial, but Atlantic has also incorporated two PS/2 ports for the keyboard and mouse. In addition, there are built-in sound ports for line-in, speaker-out and microphone plus a joystick and monitor connection. These connectors come built-in to the PC instead of needing to be added via the expansion slots, so Atlantic has bypassed add-in cards. One weakness of the ATX Pro 97 is the relative cheapness of the Trust mouse and Mitsumi keyboard. The mouse was quite narrow and small, while the keyboard was lightweight with slightly sluggish action.

The interior of the Atlantic was impressive. Using Intel's Tuscon ATX motherboard was a good move. With the video capability handled by an S3 Virge 2D/3D on-board graphics chip and sound managed by a Yamaha 16-bit wavetable OPL-4 integrated chip, there's no worry when dealing with add-in cards. In addition, the ATX Pro 97 comes with a Supra 33.6 data/fax modem that occupies only one ISA slot, so you are internet-ready from the word go.

But what you get with one hand you lose with the other, and sadly, the Atlantic came in last on performance on both the Doom 2 and *PCW* Labs test.

• **Monitor** A 15in ADI Microscan 4V. It has a 13.8in viewable area, a vertical frequency range of 50-100Hz and a horizontal range of 31-64kHz, and is EnergyStar and MPRII compliant. There's no on-screen display, but adjustment is controlled through four buttons. The focus is crisp and the colours vibrant, but it lacks a little in screen regulation.

PCW Details

Software Bundle Lotus SmartSuite 96, Claris Works 4.0, CorelDraw 4, World Atlas, World Book Encyclopaedia
Price £1,350 (£1,149 ex VAT)
Contact Atlantic Systems 01639 822222
Good Points Good build. Has modem. Good price.
Bad Points Poor performance. Cheap mouse and keyboard.
Conclusion An affordable, well built PC with future-proof potential. Shame about the speed.

Build Quality ★★★★
Sound Quality ★★★
Performance ★★
Value for Money ★★★
Overall Rating ★★★

p132 ➢

CIC Computers Sigma 166MMX

With each group test, *PCW* tries to bring in a new name to give you a greater market perspective. This month we welcome CIC to the fold, whose main market tends towards the business and corporate area.

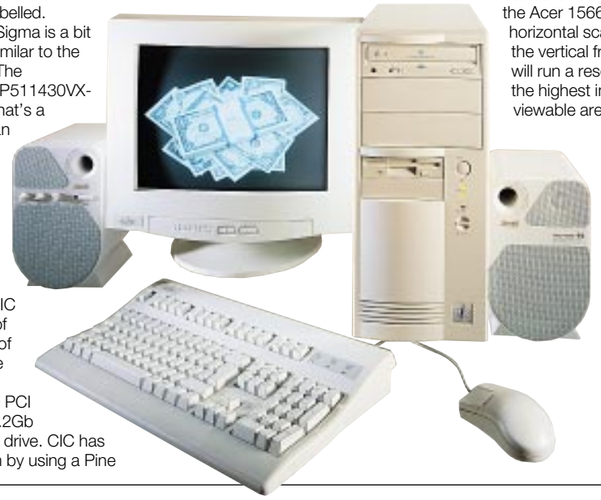
The Sigma 166MMX looks, to all intents and purposes, like your typical mini-tower PC. The case is standard, as are most of the other external elements. A pair of Juster AT 95 speakers (which are adequate but lack bass), a Microsoft mouse and a Keytronics keyboard are included. The I/O comprises two serial and one parallel port which, like other add-in card connectors such as the monitor, are well labelled.

The interior of the Sigma is a bit disappointing and is similar to the Dabs and PCS units. The motherboard is a QDI P511430VX-250DM (whew! Now that's a mouthful) but it's not an ATX board. This means the CPU is positioned at the top of the motherboard and near the ISA slots, which could cause obstruction with full-length ISA cards. Nonetheless, CIC has done a good job of clearing a tight space of overrunning wires. The Sigma comes with a Matrox Mystique 2/3D PCI graphics card and a 3.2Gb Quantum Fireball hard drive. CIC has swayed from the norm by using a Pine Megawave sound card instead of the SoundBlaster AWE 32 we're used to seeing. There's also a Pine 33.6 fax/modem and a Samsung eight-speed CD-ROM drive.

The Sigma's showing was in the middle of the group for the overall performance test and fourth for the Doom 2 test. Considering the motherboard isn't your average household name, such as Intel or Micronics, this is a respectable place for a first group test.

CIC did let the side down, however, with its failure to include the CD-ROMs for the bundled Microsoft Works 4.0 and Microsoft sampler.

• **Monitor** CIC hasn't skimped in this area. Included is the Acer 1566, which is MPR II compliant and has a horizontal scanning frequency of 30-66kHz while the vertical frequency is an excellent 50-110Hz. It will run a resolution of 800 x 600 at 100Hz, one of the highest in the group. Regrettably, it has a viewable area of only 13.6in.



PCW Details

Software Bundle MS Works 4.0, MS Home Sampler
Price £1,408.83 (£1,199 ex VAT)
Contact CIC 0181 965 5151
Good Points 33.6 modem. Excellent monitor. Good assembly.
Bad Points Forgot to include software disks.
Conclusion An average PC which is internet-ready, at a respectable price .

Build Quality ★★★
Sound Quality ★★★
Performance ★★★
Value for Money ★★★★
Overall Rating ★★★

Dabs Direct Challenger MMX 166

We haven't seen a Dabs PC for a while and it's interesting to see how a company has progressed over a long absence. The Dabs Challenger MMX 166, at first glance, looks like your bog-standard PC. Its midi-tower case is the same as many to have passed through the *PCW* lab. At the front there's one free 5.25in and one 3.5in bay. The normal power and reset buttons are present, as is a non-functional turbo button, which is a bit silly as they are completely irrelevant. To be fair, though, Dabs wasn't the only one to persist with this feature. At the rear were the usual I/O ports plus a pass-through power supply. A Cherry keyboard and a Microsoft serial mouse complete the external package.

The desktop of the Challenger was fairly standard. Dabs uses a single, FAT32 partition of the hard drive, thus creating a "single" drive C. This is perfectly acceptable, for FAT 32 formatted hard drives are meant to avoid fragmentation and unused clusters; the price you pay, however, is reduced performance. There wasn't much software loaded with this PC (only Windows 95 and the games that came with the Matrox graphics card), but Dabs will include MS Works 4.0, to come in line with the rest in the group, for an extra £10.

The Dabs subsystem components consist of the well known brands you expect to find: a Quantum Sirrocco 2550A 2.5Gb hard drive, a Matrox Mystique 2/3D PCI graphics card with 2Mb of SGRAM, a Panasonic CR-584 twelve-speed CD-ROM drive, and a Creative Labs AWE 32 ISA sound card. All of these plug into an Abit SM5 motherboard — and here lies the weakness. The layout of the Abit is not in the ATX form factor, so the CPU sits above the ISA slots. Its presence could block the use of some full-length ISA cards. Access to the SIMMS is difficult, even with the cables well folded.

• **Monitor** A 15in ADI Microscan 4V. It has a 13.8in viewable area, a vertical frequency range of 50-100HZ and a horizontal range of 31-64kHz. It is EnergyStar and MPRII compliant. There's no on-screen display but adjustment is controlled through four buttons. The focus is crisp and the colours vibrant, but it lacks a little in screen regulation.

PCW Details

Software Bundle Matrox games pack. MS Works 4.0 for £10 extra
Price £1,488.75 (£1,250 ex VAT)
Contact Dabs Direct 0800 674467
Good Points Respectable subsystem components. Decent monitor.
Bad Points Interior very tight. Poor access to SIMMS.
Conclusion An average PC all the way.

Build Quality ★★★
Sound Quality ★★★
Performance ★★★
Value for Money ★★★
Overall Rating ★★★

p135 ➢

Gateway 2000 P-5 166

Gateway 2000. The mere mention of that name conjures up notions of a mammoth company with, naturally, a mammoth PC. And, yes, that's exactly what we were sent. Not that it's a bad thing. In fact, it's a plus if you're looking to upgrade your PC many times, in your home or in your office. But sadly, Gateway sent one of its old-style cases instead of the nice new curvy one we've seen in the ads, and we were a little disappointed.

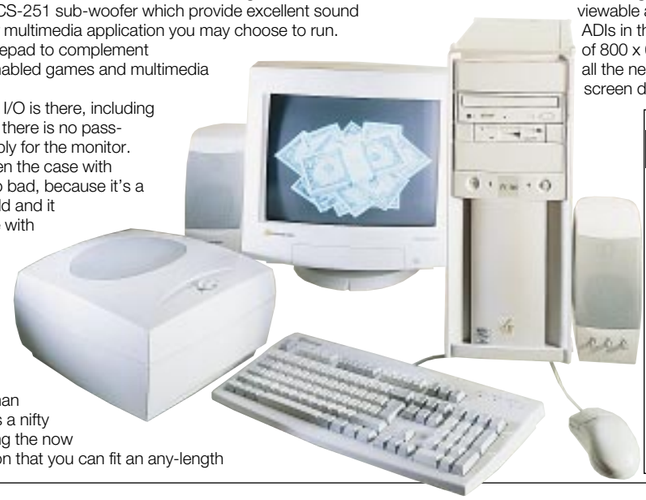
However, we weren't disappointed with the P5-166. Externally, it has plenty of room for expansion, with two spare external 5.25in bays. Other extras included are a serious set of Altec Lansing ACS-41 speakers and an ACS-251 sub-woofer which provide excellent sound for any audio CD or multimedia application you may choose to run. There is also a gamepad to complement Gateway's MMX-enabled games and multimedia software package.

All the expected I/O is there, including two USB ports, but there is no pass-through power supply for the monitor. This has always been the case with Gateway, and is too bad, because it's a simple feature to add and it would bring it in line with what most PC vendors are offering today.

The Gateway is impressive inside, as always. No cables impede access to slots or bays. The Intel Hitman ATX motherboard is a nifty design, incorporating the now standard expectation that you can fit an any-length add-in card without worrying about the CPU blocking it. The Hitman makes use of the Intel 430VX chipset, which means that it also uses the newer 168-pin DIMM memory modules. However, with only two DIMM slots, the P5-166 has a maximum memory upgrade capacity of 64Mb, the lowest in the group.

The subsystem is respectable, comprising an Ensonique Vivo sound card, a Matrox Mystique 2/3D graphics card, a twelve-speed CD-ROM drive and a 2.5Gb Western Digital hard drive.

• **Monitor** Gateway ships the Crystalscan 500 15in monitor as standard now. It's MPRII and EnergyStar compliant and has a 13.6in viewable area, which is slightly less than the ADIs in the group. It will handle a resolution of 800 x 600 at a rock-solid 85Hz and has all the necessary image controls, via an on-screen display, that you require.



PCW Details

Software Bundle MS Works 4.0, MMX Multimedia pack
Price £1,553 (£1,824.78 inc VAT)
Contact Gateway 2000; 0800 552000
Good Points Includes modem. Great speakers. Respectable performance.
Bad Points No pass-through power. Only 256Kb of cache.
Conclusion A PC with all the right things. A fair buy.

Build Quality ★★★★
Sound Quality ★★★★★
Performance ★★★★
Value for Money ★★★
Overall Rating ★★★★

Hi-Grade Solutions Axion PV 166

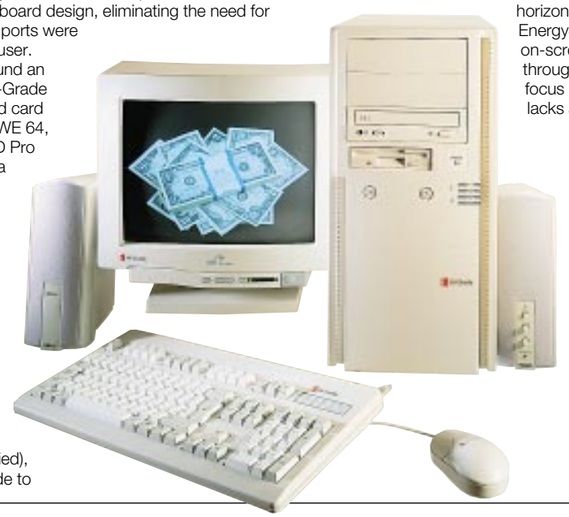
Personal Computer World Editors Choice

It's been a long time since we've had Hi-Grade in a *PCW* group test, so we were curious to see what they would submit. We weren't disappointed. The Axion is one of the more impressive PCs of the group. Externally it is similar to the rest: it comes in a rather wide, midi-tower case, with two spare 5.25in forward-facing expansion bays. The Cherry Windows 95 keyboard was about average in action and build, but the cheap and tiny Mitsumi mouse was a definite let-down. To the rear were the usual two serial, one parallel, keyboard and mouse ports, all of which were integrated into the motherboard design, eliminating the need for internal cable runs. All the ports were labelled to assist the end-user.

Inside the Axion we found an impressive subsystem. Hi-Grade included the newest sound card from Creative Labs, the AWE 64, as well as the ATI Rage 3D Pro Turbo graphics card with a hefty 4Mb of SGRAM. Added to this was a Toshiba XM 5702B twelve-speed CD-ROM drive, a Fujitsu 1.7Gb hard drive (although 2Gb will be standard, at the same price, at press time), and a US Robotics Sportster 28.8 internal modem. Also present was 512Kb of pipeline burst cache and four SIMM slots (two of which were occupied), allowing a memory upgrade to 256Mb of RAM. The interior did have more cabling than most of the others in the group, but it was all well strapped up and clear of the SIMM slots and bays.

The software bundle included MS Works 4.0, a multimedia games pack and an ATI 3D games bundle. In terms of performance, the Axion turned in a well rounded result, topping the Doom 2 scores and placing in the middle of the pack on the PC performance test.

• **Monitor** A 15in ADI Microscan 4V. It has a 13.8in viewable area, a vertical frequency range of 50-100HZ and a horizontal range of 31-64kHz. It is EnergyStarand MPRII compliant. There's no on-screen display but adjustment is controlled through a combination of four buttons. The focus is crisp and the colours vibrant, but it lacks a little in screen regulation.



PCW Details

Software Bundle MS Works 4.0, MS Home Sampler, ATI games pack
Price £1,445 (£1,697.88 inc VAT)
Contact Hi-Grade 0181 532 6111
Good Points Top-of-the-line subsystem. Respectable performance.
Bad Points Very cheap mouse.
Conclusion A good, future-proofing PC, with the right components, at a fair price.

Build Quality ★★★★
Sound Quality ★★★★
Performance ★★★
Value for Money ★★★★
Overall Rating ★★★★

p137 ➢

Mesh Computers Elite Plus 166MMX

We've seen a lot of Mesh lately, and its presence in the market seems to be taking quite a hold. It has even taken a coveted *PCW* Editor's Choice award in the past (August 1997) but came up a bit short this time around.

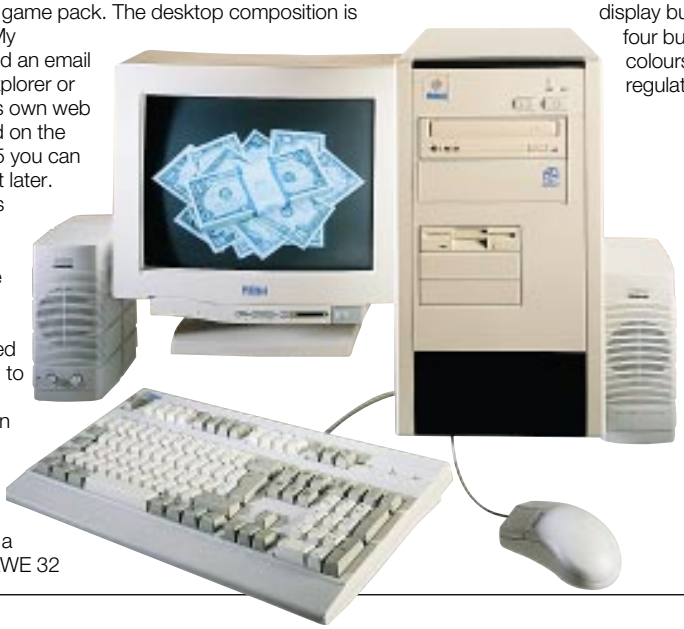
The Elite Plus has the typical Mesh look of patches of black mesh wire integrated into the case. The I/O comprises the standard two serial and one parallel port, but it was well labelled, as was the monitor and sound-card connectors.

The Mesh has a respectable software offering. Along with Lotus SmartSuite 96 (with free upgrade to SmartSuite 97 included), it also comes bundled with ATI's 3D game pack. The desktop composition is particularly sparse, with only My Computer, the Recycle Bin and an email In-box present. No Internet Explorer or specific shortcuts, like Viglen's own web address shortcut, are included on the desktop, but with Windows 95 you can easily add any icon or shortcut later.

The Elite Plus subsystem is made up of an Asustek XP55T2P4 motherboard with the Intel 430HX chipset. There is 512Kb of on-board cache and four SIMM slots, two of which are occupied. If you need to, you can upgrade the Mesh to 64Mb of RAM by adding two more 16Mb SIMMs, or you can replace the whole lot and upgrade to a maximum 512Mb of RAM. A Quantum Fireball 2.1Gb hard drive, a Teac twelve-speed CD-ROM, a Creative Labs SoundBlaster AWE 32 sound card, and an ATI Rage II OEM 2/3D graphics card complete the system. Mesh has left the option of a modem to the customer — at additional cost.

In the PC performance test Mesh did not do as well as it has in the past, with its third-to-last-place showing. However, the company has included all the software and a complete set of easy-to-read technical manuals for all the components.

• **Monitor** A 15in ADI Microscan 4V. It has a 13.8in viewable area, a vertical frequency range of 50-100HZ and a horizontal range of 31-64kHz. It is EnergyStar and MPRII compliant. There's no on-screen display but adjustment is controlled through four buttons. The focus is crisp and the colours vibrant, but it lacks screen regulation.



PCW Details

Software Bundle Lotus SmartSuite 96 (with free upgrade), ATI 3D games bundle
Price £1,467.58 (£1,249 ex VAT)
Contact Mesh Computers 0181 452 1111
Good Points Good build quality with decent subsystem.
Bad Points Low performance. Speakers a bit weak compared to most.
Conclusion A solid PC at a reasonable price, but a modem would have been a nice touch.

Build Quality ★★★★
Sound Quality ★★★
Performance ★★
Value for Money ★★★
Overall Rating ★★★

PCS Direct Multimedia Pro P166 MMX

With an overall price of £1,238 (including delivery), the Multimedia Pro was one of the cheaper PCs in the group, which makes it attractive for a family looking for their first PC that won't go out of date for a couple of years. But if it's a family looking for top performance, this PC won't fit the bill when compared to the rest in this group. Next to the Atlantic, the Multimedia Pro was the second slowest PC in both *PCW* tests.

The system itself exudes budget. From the rather tacky branding to the awful, cheap-and-nasty, ergonomic keyboard, you know the Multimedia Pro is aimed at the home and not business. We couldn't understand why PCS would choose such a keyboard, with a wrist-rest that wobbles and never stays in place, except to save a few pounds. Otherwise, the other peripherals, such as the Trust 3D Sound Dimension speakers and the Genius Clix-Pro mouse, impressed us.

Another interesting feature was PCS's use of a removable hard-drive bay. With the simple turn of a key you can unlock the drive and take it with you. PCS says it has this option so that the end-user can have multiple drives, so that everyone's data is secure from everyone else. Also, PCS offers a free reformatting and software-loading service, if your hard drive is corrupted. All you do is remove it and send it back.

The subsystem consists of a Matrox Mystique 2/3D graphics card with 4Mb of SGRAM, a Quantum Fireball 2.1Gb hard drive, an Aztec twelve-speed CD-ROM drive, and 512Kb of Level 2 pipeline burst cache.The Multimedia Pro also came with Claris Works and a large shareware games bundle.

• **Monitor** A 15in Daytek DTC-1564 with a 13.9in viewable area. It can easily handle a resolution of 1,024 x 768 at 70Hz but drops to 60Hz when running at an eye-squinting 1,280 x 1,024. It is EnergyStar-compliant, but has a maximum vertical frequency of 72Hz, so it's not the best in the group.

PCW Details

Software Bundle Large shareware games bundle, Claris Works
Price £1,454.65 (£1,238 ex VAT)
Contact PCS Direct 01423 323386
Good Points Good speakers. Removable hard drive.
Bad Points Dreadful keyboard. Tight interior. Poor performance.
Conclusion Intended for the home user wanting power at an affordable price.

Build Quality ★★★
Sound Quality ★★★★
Performance ★★
Value for Money ★★★
Overall Rating ★★★

p138 ➢

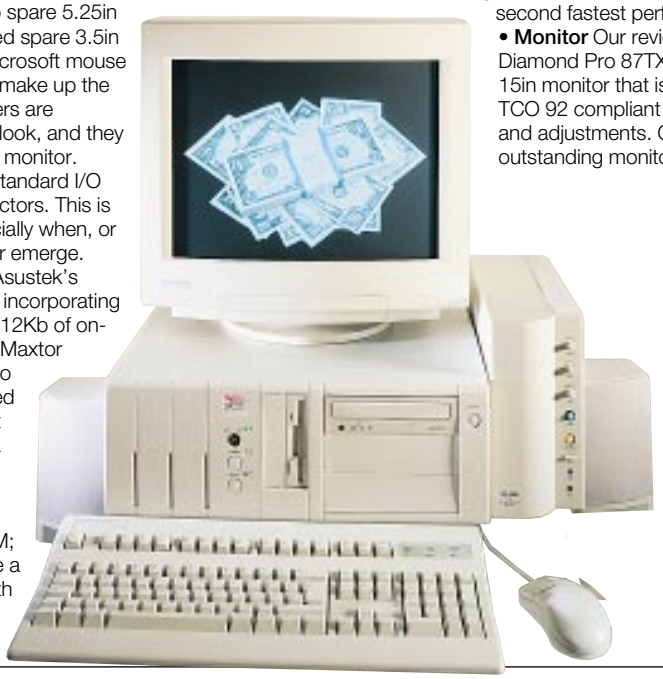
Red Box Winstation 166MMX Pro

Red Box is distinguished by its tilt toward the high-performance, business-orientated PC — but at a price, and this time it's no different. The Winstation is by far the most expensive of the group, with a price tag of £2,005 (ex VAT), but that includes the 17in monitor we were sent. With a 15in monitor it will cost £1,745 (ex VAT). Regardless, it is still the most expensive.

The Winstation was the only desktop PC in the group, which was a welcome change. There are two spare 5.25in bays and one vertically positioned spare 3.5in bay. A Keytronic keyboard, a Microsoft mouse and Labtec LCS2612 speakers make up the external peripherals. The speakers are impressive in sound quality and look, and they are designed to clamp on to the monitor.

At the rear you'll find all the standard I/O ports as well as two USB connectors. This is handy for future-proofing, especially when, or shall we say if, USB devices ever emerge.

The Winstation comes with Asustek's newest motherboard, the TX97, incorporating Intel's new 430TX chipset and 512Kb of on-board cache. A stonking 5.1Gb Maxtor DiamondMax hard drive was also included: far above our requested spec, but Red Box said the cost difference between a 2Gb and a 5Gb hard drive is only £40 and that 5Gb is now the standard. Oddly, it has only included a Panasonic eight-speed CD-ROM; at this price, we expected to see a twelve-speed. A Diamond Stealth 3D 2000 PCI card and a Creative Labs SoundBlaster AWE 32 complete the internals.



This interior is tight, but all cables are well folded and inobtrusive. A nice design touch is the removable internal 3.5in drive bay that sits above the DIMM slots. You can easily add an extra hard drive and not worry about blocking access to the memory.

All of the above components, from new motherboard and chipset to Diamond graphics card, combined to give the Winstation the second fastest performance score of the group.

• **Monitor** Our review model came with a 17in Mitsubishi Diamond Pro 87TXM, but Red Box will include an Iiyama 15in monitor that is less expensive. The Mitsubishi is TCO 92 compliant with full OSD functions for all settings and adjustments. Colour is crisp and focus is clear. An outstanding monitor.

PCW Details

Software Bundle Only Windows 95.
Price £2,355.88 (£2,005 ex VAT) with 17in monitor; £2,050 (£1,745 ex VAT) with 15in monitor
Contact Red Box 01480 405541
Good Points Innovative design. Modem. Excellent performance.
Bad Points No extra software bundled.
Conclusion A real powerhouse with a huge hard drive, but it's VERY expensive.

Build Quality ★★★★
Sound Quality ★★★★
Performance ★★★★
Value for Money ★★★
Overall Rating ★★★

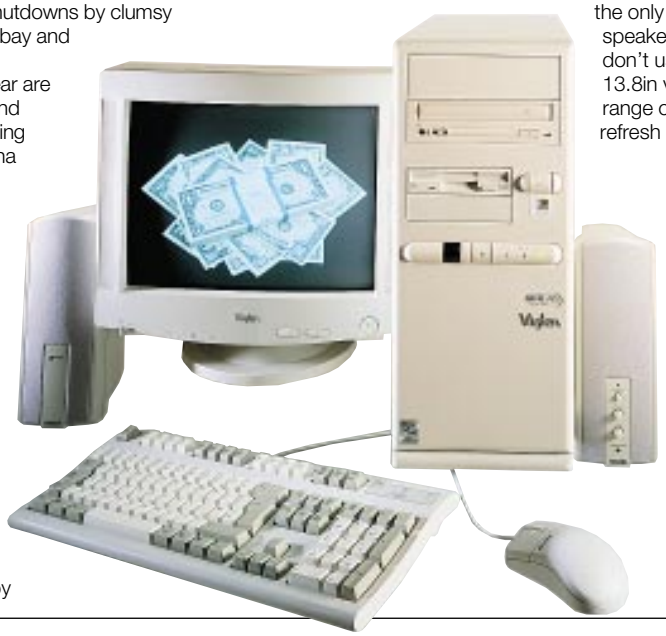
Viglen Genie ATX P5/166M

Personal Computer World Highly Commended

Once again, Viglen has come up with the goods — the Genie ATX has a lot to offer. The first strong point for Viglen comes with its performance. It had the highest score of the group, edging out the Red Box, with a score that rates 4.5 times faster than our benchmark PC.

The second strong point is the overall build quality. Even though the case design is nothing new, and it's not the most attractive, it does stand out. The power button is flush with the case design and you'll need a ballpoint pen to initiate a reset. These little touches are nice, and they help prevent accidental shutdowns by clumsy fingers. There is one free 3.5in bay and one free 5.25in bay for any necessary expansion. At the rear are all the usual, well labelled I/O and add-in card connectors, including two USB ports. A set of Yamaha YST-M15 speakers, which produce clear, static-free sound, is a welcome addition. The only down side, which hasn't changed for years, is the Viglen keyboard. It is thin, too lightweight, and a bit rickety for our liking.

The interior is a dream. There is so much free space it reminded us of the American Frontier. The ATX design of the Intel Tucson motherboard really highlights the Viglen's strengths. The connectors leading to the hard drive, floppy and CD-ROM drive are perfectly positioned near the bays, avoiding any need for folding and strapping long ribbon cables.



Also on-board are all the I/O, 512Kb of cache and 16-bit sound using Yamaha chips. A Maxtor 82560 2.5Gb hard drive, a Dataflex Comms 33.6 fax/modem and a Diamond Stealth 3D 3000 with 2Mb of VRAM round out the rest of the subsystem. In addition, Viglen has bundled MS Works 4.0, an MMX multimedia/games pack (including the first MMX game, POD) and a MS multimedia software bundle.

• **Monitor** The Viglen Envy 15DS Multimedia was the only monitor in the group to have built-in speakers, but you won't miss anything if you don't use them. The Envy has OSD controls, a 13.8in viewable area, and a vertical frequency range of 50-100Hz allowing a non-interlaced refresh rate of 75Hz at 1,024 x 768.

PCW Details

Software Bundle MS Works 4.0, MS Multimedia Pack, MMX multimedia/games pack
Price £1,799 (£1,531 ex VAT)
Contact Viglen 0181 758 7000
Good Points Super interior design. MMX software. Fab performance.
Bad Points Just the keyboard.
Conclusion A great PC that really zooms, although it's a bit expensive.

Build Quality ★★★★
Sound Quality ★★★★
Performance ★★★★★
Value for Money ★★★
Overall Rating ★★★★

p142 ➢

Editor's Choice

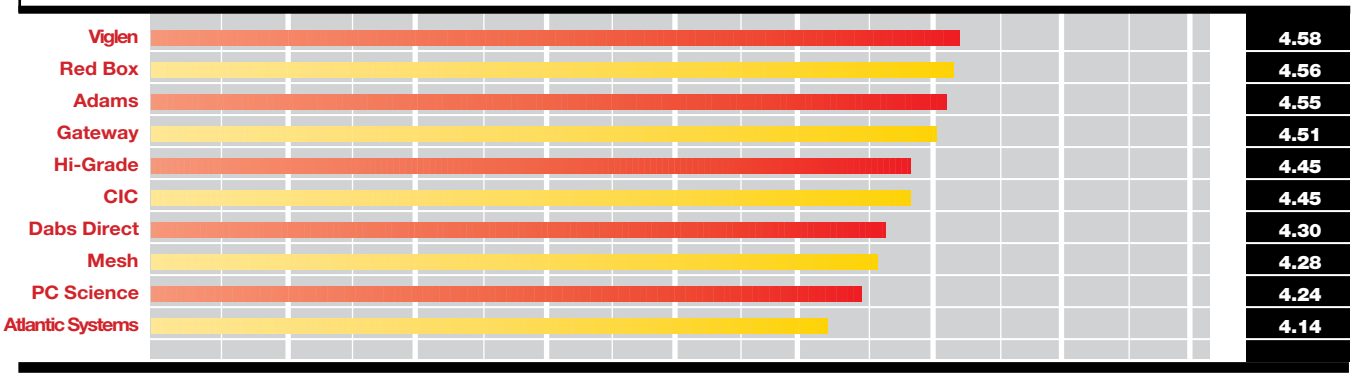
In terms of power, price and quality, we have to admit that we've been more than impressed with this month's group test participants. Normally we expect to have a few bad apples in the barrel, but not this time. All the manufacturers showed care and attention to build quality, and not one of these PCs can be considered below average.

Prices ranged between a very affordable £1,149 from Atlantic to the extravagant £2,005 of Red Box. We also found that six out of ten manufacturers included modems and twelve-speed CD-ROM drives. With the *PCW* Labs test, the performance margin was about ten percent between first and last. However, when comparing even the last-place Atlantic with previously tested Pentium 166MHz PCs without MMX, it still comes up twice as fast: a truly outstanding performance ratio.

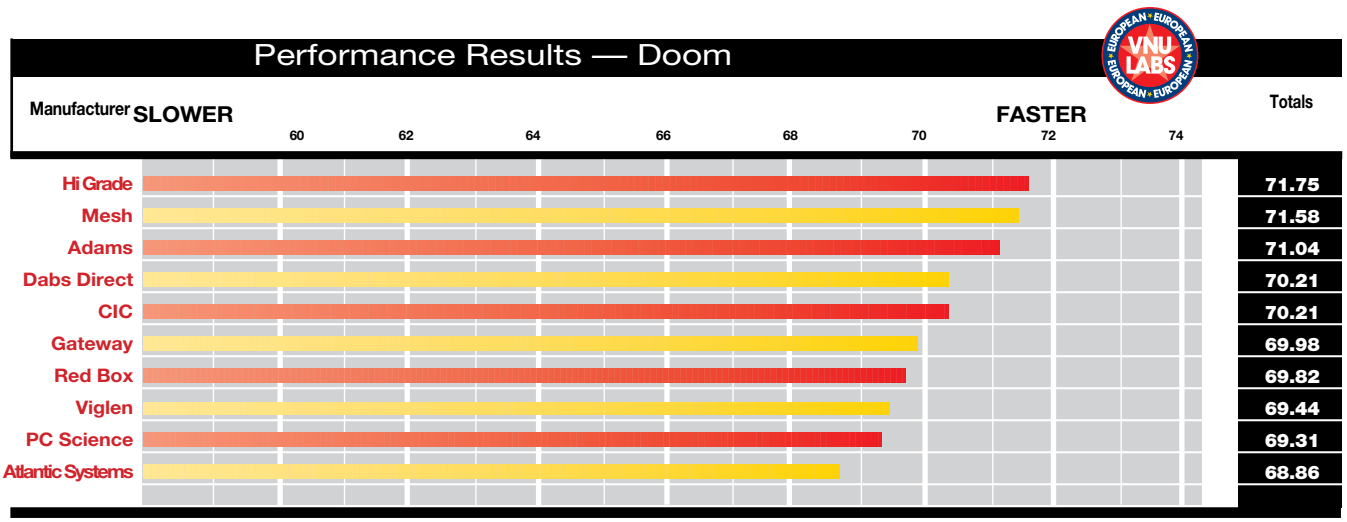
When it came down to selecting a winner of the *PCW* Editor's Choice award, we tended to favour the well-rounded PC that managed to include a quality subsystem, performance and build quality at a good price point. This month, the Hi-Grade Axion PV 166 takes the prize. With a Fujitsu hard drive, a Creative Labs AWE 64 sound card, an ATI Rage 3D Pro Turbo graphics card with 4Mb of SGRAM, twelve-speed CD-ROM, and a US Robotics 28.8 modem, Hi-Grade excelled itself. It represents the best of future-proofing as it is today, and at £1,445 it is affordable for most offices or homes.

Our runners-up, and winners of the *PCW* Highly Commended award, are Atlantic Systems and Viglen. The Atlantic ATX Pro 97 wins with its offering of a full, well assembled multimedia system, including modem, at the low price of £1,149. The Viglen wins with its outstanding interior design, blistering performance and top-of-the-line subsystem.

Performance Results — Labs



Performance Results — Doom



p144 ➢

Table of Features

Personal Computer World Highly Commended

Manufacturer	Adams Technology	Atlantic Systems	CIC Computers	Dabs Direct	Gateway 2000
Model Name	M-Pro 166	ATX Pro 97	Sigma 166MMX	Chalenger MMX 166	P5 - 166
Price (excl. VAT)	£1,499	£1,149	£1,199	£1,250	£1,553
Price (inc. VAT)	£1,761.33	£1,350.08	£1,408.83	£1,468.75	£1,824.78
Telephone	0161 282 8822	01639 822222	0181 965 5151	0800 674467	0800 552000
Fax	0161 283 1001	01639 821300	0181 965 3243	01942 798081	N/A
Standard Warranty	1 yr on-site, 2 yrs RTB	1 yr on-site, 4 yrs RTB	1 yr on-site	1 yr on-site	1 yr on-site, 2 yrs RTB
Warranty options	3 yrs on-site	3 yrs	2nd and 3rd yr on-site	5 yrs labour	3 yrs on-site
Technical support	8:45-6 Mon-Fri.	9-6 Mon-Fri	9-6 Mon-Fri	9-5 M-F, 10-3 Sat	8-10 M-F, 9-10 Sat
Online tech support	●	●	●	●	●
Hardware Spec					
Processor	Intel Pentium 166MMX	Intel Pentium 166MMX	Intel Pentium 166MMX	Intel Pentium 166MMX	Intel Pentium 166MMX
RAM/Max RAM	32Mb/256Mb	32Mb/128Mb	32Mb/128Mb	32Mb/128Mb	32Mb/64Mb
RAM type/pins	SDR DIMM/168 pins	EDO DR/72 pins	EDO DR/72 pins	EDO DR/72 pins	SDR DIMM/168 pins
Hard disk	IBM DAQA	Quantum Fireball	Quantum Fireball	Quantum Sirrocco	Western Digital Caviar
Model Name	33240	TM3200A	TM3200A	2550A	32500
Size(Gb)/Access time(ms)/Interface	3.2Gb/9.5ms/EIDE	3.2Gb/11ms/EIDE	3.2Gb/11ms/EIDE	2.5Gb/11ms/EIDE	2.5Gb/11ms/EIDE
Motherboard Components					
Motherboard Manufacturer	Tyan	Intel	QDI	Abit	Intel
Motherboard Model	Titan Turbo ATX S1572	Tucson	P514430VX-250DM	SM5	Hitman
L2 cache/max cache (Kb)	512/512 pipeline burst	256/512 pipeline burst	512/512 pipeline burst	512/512 pipeline burst	256/512 pipeline burst
Chipset	Intel 430TX	Intel 430HX	Intel 430VX	Intel 430VX	Intel 430VX
Expansion and I/O					
Spare bays 3.5in/5.25in	2 x 5.25	2 x 5.25in 1 x3.5	3 x 5.25 1 x 3.5	1 x 5.25 1 x 3.5	2 x 5.25
PCI slots/ISA slots/shared slots	4PCI/2ISA/1 shared	3PCI/3ISA	3PCI/2ISA/1 shared	2PCI/3ISA/1 shared	3PCI/2ISA/1 shared
USB/serial/parallel/PS/2	2USB/1P/2S/2 PS/2	2S/1P/2 PS/2	2S/1P	2S/1P	2USB/2S/1P/ 2 PS/2
Multimedia					
CD-ROM Model	Toshiba XM-5702B	Hitachi	Samsung SCR 830	Panasonic CR-584	Mitsumi FX-1207
CD-ROM Speed	8X	8X	8X	12X	12X
Sound Card Manufacturer	Creative Labs	Yamaha on-board chip	Pine	Creative Labs	Ensonique
Sound Card Model	SoundBlaster 16	Yamaha Wavetable — OPL4	Megawave 3D	Awe 32	Vivo 90
Speakers	Aiwa SC-C77	Trust Soundwave 20	Juster AT 95	Labtec LCS-1020	Altec Lansing ACS 41
					Altec Lansing ACS 251
Graphics & Monitor					
Graphics Card	Matrox Mystique	S3 Virge	Matrox Mystique	Matrox Mystique	Matrox Mystique
RAM Type	SGRAM	SDRAM	SGRAM	SGRAM	SGRAM
RAM/Max RAM	2Mb/4Mb	2Mb/2Mb	2Mb/4Mb	2Mb/4Mb	2Mb/4Mb
Monitor Model	ADI Microscan 4V	ADI Microscan 4V	Acer 1566	ADI Microscan 4V	Crystalscan CS500
Monitor Size/View area	15in/13.8in	15in/13.8in	15in/13.6in	15in/13.8in	15in/13.6in
Monitor Max Refresh Rate at 1,024 x 768 (Hz)	75	75	85	75	75
Other Information					
Modem included	❍	●	●	❍	●
Modem model & speed	N/A	Supra 33.6	Pine 33.6	N/A	CPI Euroviva 33.6
Other extras	N/A	N/A	N/A	N/A	N/A
Software supplied	MS Office Pro 97	Claris Works 4	MS Works 4.0	Mech Warrior 2,	MS Works 4.0
	MS Bookshelf	CorelDraw 4	MS Home Sampler	Destruction Derby 2	MMX multimedia pk
	Tel-me	Lotus SmartSuite 96		Scorched Planet	
		World Atlas, more			
Annual company turnover	£2.2 million	£22 million	£5.5 million	£35 million	£3.6 billion (1995)
Number of employees	12	160	18	75	13000

●YES ❍ NO

Cache Cache is where the processor stores data that it will frequently use, so as to access it more quickly. It is made up of Static RAM (SRAM) and is much faster than regular memory types.
PC cache comes in two sizes, 256Kb or 512Kb, and can be found in a CELP socket or soldered on to the motherboard. The most common cache is synchronous pipeline burst. It can provide a 3-5 percent increase in PC performance because it is timed to a clock cycle. To have synchronous cache you must have a chipset, such as the 430HX , to support it.
Chipsets PCI chipsets control the CPU to memory I/O and IDE bus mastering regarding hard disk access and multimedia performance. Older chipsets, such as the Triton FX and the Opti Viper, supported memory configurations of standard and EDO RAM up to 128Mb. The newer 430VX, HX, and TX now support memory configurations up to 512Mb RAM, and the 430VX and TX also make use of the newer 168-pin SDRAM for improved performance. The data transfer rate for these chipsets is 100Mb/sec, 15 percent more than the FX chipset. The TX is mostly optimised for MMX processors.
RAM An impermanent area of data storage that holds information fed to it by the hard drive for the CPU to access and process at quick speeds, typically 40-60 nanoseconds.
Windows 95 and many current applications are extremely memory-hungry and gobble up RAM. To run Windows 95 you need a minimum of 8Mb RAM but 16 to 32Mb is ideal. 72-pin Extended Data Out (EDO) DRAM is now the standard and clearly

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Table of Features

Manufacturer	Hi-Grade	Mesh Computers	PCS Direct	Red Box	Viglen
Model Name	Axion PV 166	Elite Plus 166MMX	Multimedia Pro P166 MMX	Winstation 166MMX Pro	Genie ATX P5/166M
Price (excl. VAT)	£1,445	£1,249	£1238 (incl. delivery)	£2005 with 17in monitor	£1,531.06
Price (inc. VAT)	£1,697.88	£1,467.58	£1454.65 (incl. delivery)	£2355.88 with 17in monitor	£1,799
Telephone	0181 532 6111	0181 452 1111	01423 323386	01480 405541	0181 758 7000
Fax	0181 532 6101	0181 208 4493	01423 323370	01480 471687	0181 758 7080
Standard Warranty	1 yr RTB	1 yr RTB	1 yr on-site, 4 yrs RTB	1 yr on-site	1 yr RTB
Warranty options	1 yr on-site	1 yr on-site	3 yrs on-site	2nd and 3rd yr on-site	1 or 2 yrs on-site
Technical support	9-5:30 Mon-Sat	9-5 M-F	8:30-6:30 M-F, 10-4 Sat	9-6 M-F, 9-1 Sat	9-5:30 M-F, 9-1 Sat
Online tech support	yes	yes	yes	yes	yes
Hardware Spec					
Processor	Intel Pentium 166MMX	Intel Pentium 166MMX	Intel Pentium 166MMX	Intel Pentium 166MMX	Intel Pentium 166MMX
RAM/Max RAM	32Mb/256Mb	32Mb/512Mb	32Mb/128Mb	32Mb/128Mb	32Mb/128Mb
RAM type/pins	EDO DR/72pins	EDO DR/72pins	EDO DR/72pins	SDR DIMM/168pins	EDO DR/72pins
Hard disk	Fujitsu MDA	Quantum Fireball	Quantum Fireball	Maxtor DiondMax	Maxtor
Model Name	3017AT	TM2110A	TM2110A		82560
Size(Gb)/Access time(ms)/Interface	1.7Gb/11ms/EIDE	2.1Gb/11ms/EIDE	2.1Gb/11ms/EIDE	5.1Gb/10ms/EIDE	2.5Gb/11/EIDE
Motherboard Components					
Motherboard Manufacturer	Asustek	Asustek	Chaintec	Asustek	Intel
Motherboard Model	XP55T2P4	XP55T2P4	5VGM	TX97	Tucson
L2 cache/max cache (Kb)	512/512 pipeline burst	512/512 pipeline burst	512/512 pipeline burst	512/512 pipeline burst	512/512 pipeline burst
Chipset	Intel 430HX	Intel 430HX	Intel 430VX	Intel 430TX	Intel 430HX
Expansion and I/O					
Spare bays 3.5in/5.25in	2 x 5.25in	1 x 5.25in 2 x 3.5in	1 x 5.25in 1 x 3.5in	2 x 5.25in 1 x 3.5in	1 x 5.25in 1 x 3.5in
PCI slots/ISA slots/shared slots	3PCI/3ISA/1 shared	3PCI/2ISA/1 shared	4PCI/3ISA	3PCI/3ISA/1 shared	3PCI/2ISA/1 shared
USB/serial/parallel/PS/2	2S/1P	2S/1P	2S/1P/1 PS/2	2USB/2S/1P/ 1PS/2	2USB/2S/1P/ 1PS/2
Multimedia					
CD-ROM Model	Toshiba XM 5702B	Teac CD-512E	Aztec CDA-1268	Panasonic CR-584	Teac CD-512
CD-ROM Speed	12X	12X	12X	8X	12X
Sound Card Manufacturer	Creative Labs	Creative Labs	Aztec	Creative Labs	Yamaha on-board chip
Sound Card Model	Awe 64	Awe 32	Waverider 32	Sound Blaster 32	Yamaha Wavetable
Speakers	Yamaha TST-M15	Altec Lansing AC 55	Trust 3D	Labtec LCS2612	Yamaha YST-M15
			Sound Dimension		
Graphics & Monitor					
Graphics Card	ATI Rage 3D Pro Turbo	ATI Rage II	Matrox Mystique	Diamond Stealth 3D 2000	Diamond Stealth 3D 3000
RAM Type	SGRAM	SGRAM	SGRAM	EDO DRAM	VRAM
RAM/Max RAM	4Mb/8Mb	2Mb/4Mb	4Mb/4Mb	4Mb/4Mb	2Mb/4Mb
Monitor Model	ADI Microscan 4V	ADI Microscan 4V	Daytek DTC-1564	Mitsubishi 87TXM	Viglen Envy 15DS
Monitor Size/View area	15in/13.8in	15in/13.8in	15in/13.9in	17in/16in	15in/13.8in
Monitor Max Refresh Rate at 1,024 x 768 (Hz)	75Hz	75Hz	70Hz	110Hz	75Hz
Other Information					
Modem included	Yes	No	No	Yes	Yes
Modem model & speed	US Robotics 28.8	N/A	N/A	Motorola 28.8	Dataflex Comms 33.6
Other extras	N/A	N/A	N/A	N/A	N/A
Software supplied	MS Works 4.0,	Lotus SmartSuite 96	Large shareware		MS Works 4.0,
	games/multimedia pk	Mech Warrior 2	games bundle		MS Multimedia pk
	Mech Warrior 2	Assualt Rigs, WipEout	Claris Works		MMX multimedia pk
	Assault Rigs, WipEout				
Annual company turnover	£18 million	£30 million	N/A	£8 million	£106 million
Number of employees	105	102	60	20	300

●YES ❍ NO

performs better than standard DRAM, but is limited to a 66MHz bus. However, the new 168-pin Synchronous DRAM (SDRAM) is beginning to emerge. It is optimised for the 430HX,VX and TX and VIA chipsets. All input and output signals are synchronised to the system clock (bus bandwidth), similar to cache memory, and handle bus speeds up to 100MHz. It can give up to a five percent performance gain over traditional RAM.

Peripheral Component Interconnect (PCI) This is the newer 32-bit local bus standard from Intel that has been universally adopted by PC manufacturers. It connects peripherals, such as graphics cards, on an optimised electrical pathway to the CPU. Up to ten devices operating at 33MHz can run on the bus.

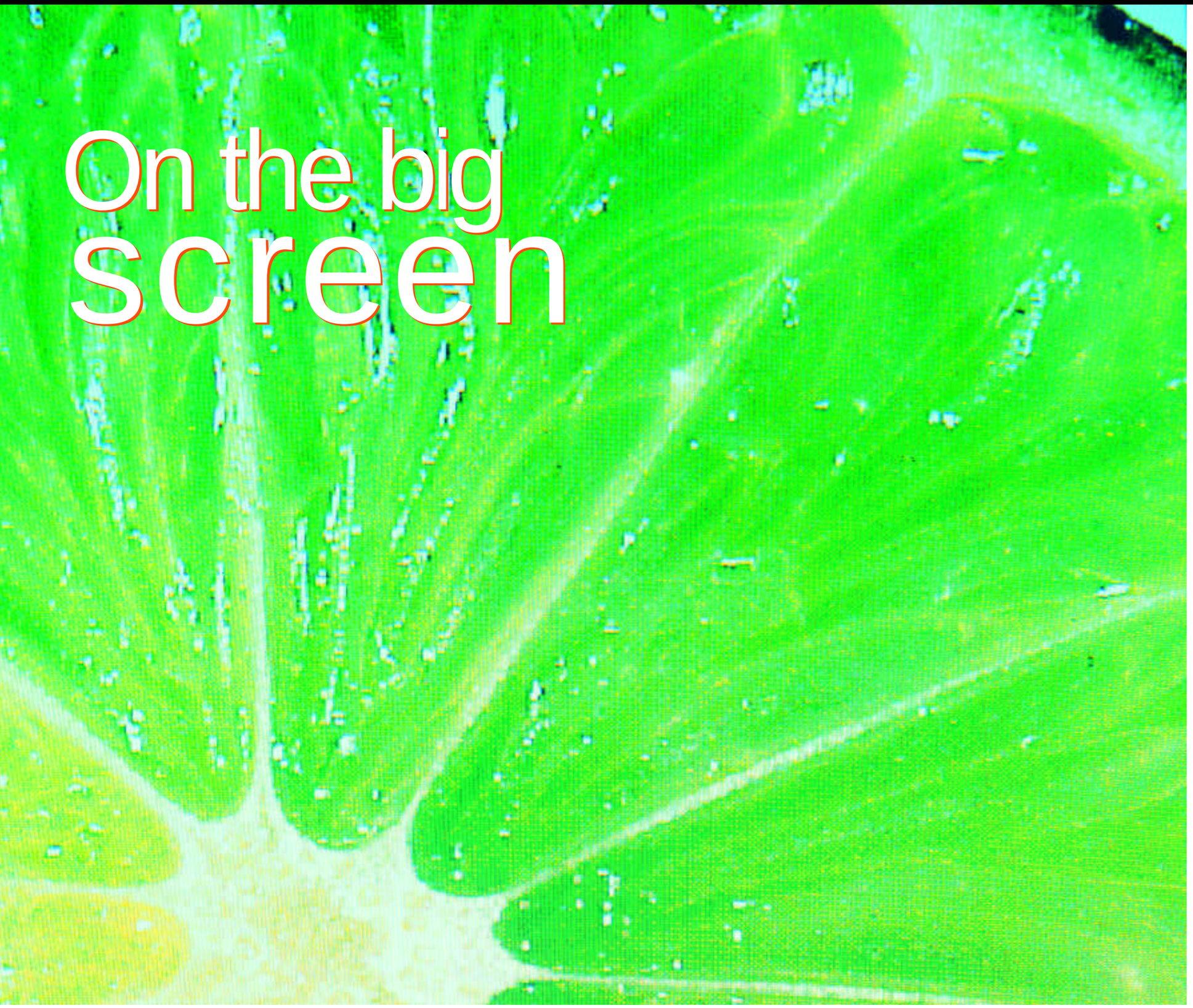
Industry Standard Architecture (ISA) The original bus architecture, also known as the AT bus, for 286 PCs. It operates at a maximum of 8.33MHz and is much slower than the PCI bus.

Refresh rate This refers to the vertical refresh rate of a monitor. The number of times a complete screen is drawn per second is the refresh rate, measured in Hertz (Hz). The higher the refresh rate, the less flicker on the screen, to a point where the brain perceives it as steady. A non-interlaced refresh rate above 70Hz is generally considered to be flicker-free.

MMX A new acronym from Intel that, technically, stands for nothing but has come to mean multimedia extensions. It refers to 57 new programming instructions that enhance and accelerate multimedia functions such as audio and graphics.

Group Test: Monitors

On the big screen



Showing now at a group test near you: a double-bill of entry-level and high-end 17in monitors. Sit back and relax — it's going to be a flicker-free ride.

The monitor is perhaps the most important computer peripheral in a system, simply because it is used at all times. It is the primary means of communication between computer and user. It conveys all your precious information. Poor or unsuitable displays could reduce productivity, give you headaches or even emit harmful radiation.

But choosing a monitor ideal for your application can be as tough as buying the computer itself. What size should you go for? Is the conventional cathode ray tube the right choice, or should you opt for an alternative technology?

The 17in CRT monitor is now the most popular model for upgrading or discerning first-time buyers, so this year we've rounded up no less than 26 of them. This group test is split between 12 entry-level and 14 higher-end 17in monitors. The former should be able to display the popular resolution of 1,024 x 768 pixels, while the latter should go one step higher to a resolution of 1,280 x 1,024 pixels, both in steady flicker-free modes.

As we put together this feature, many manufacturers were releasing brand new models, allowing us a unique opportunity to compare the models which will be sold during the rest of this year. Along with in-depth reviews, we've looked at how they work, where the market is going, highlighted alternative technologies, and discussed the important power saving, safety and radiation standards.

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164 Philips 107B
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High End

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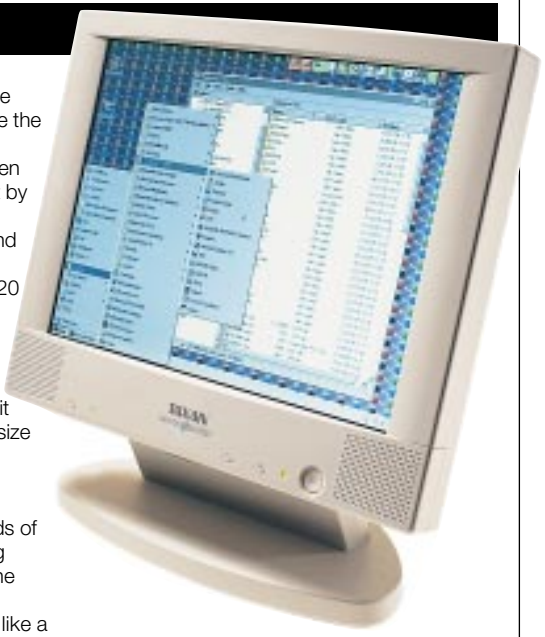
Choosing a monitor



The reviews which follow concentrate entirely on 17in CRT monitors, which make up the bulk of monitor upgrade sales. However, there are many other types of displays and technologies which may better suit your needs.

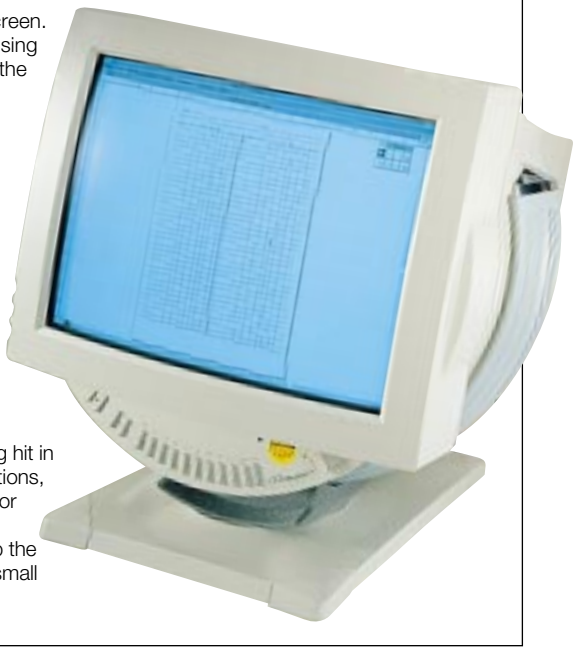
Most obviously, there are different sizes of CRT monitors, typically ranging from 14in to 21in. It is important to remember that these sizes refer to the internal tube dimensions, and not what you can actually see and use on-screen, which is always about ten percent less. An average 17in monitor may only have a viewable diagonal of 15.5in. We have measured the viewable diagonal of all the monitors and quoted them in the features table *(p176)*. Interestingly, due to recent legal action in the US, all monitor manufacturers are beginning to rename their products to avoid the numbers 14, 15, 17, 20 and 21.

As graphical user interfaces such as Windows have become increasingly dominant, users have realised the benefits of using higher display resolutions. You simply fit more on the screen, which not only increases productivity, but is a much more pleasant way to work. But the higher the resolution, the smaller the details, hence the need for a physically larger screen.

The VGA 14in monitor has finally been toppled from its number one sales spot by 15in models, while 17in monitors are becoming increasingly popular. High-end graphics, design, pre-press and CAD users frequently go one step further to 20 or 21in displays, where A4 and sometimes even A3 documents can be displayed life-size. Some companies have developed rotating 17in monitors which allow you to display an A4 portrait document life-size, without the cost or size of a 21in model.

A 21in monitor may seem large to a single user, but if you're making a presentation to several or even hundreds of people, you're going to want something bigger. Beyond 37in CRTs, you enter the realm of projection systems.

A video projector works very much like a film projector. You darken a room and project a large image onto a distant screen. Video projectors allow you to do this using computer or video signals, perfect for the huge presentation or home cinema experience. When considering a projector, bear in mind that even the brightest models ideally require darkened rooms.



If space is at a premium, a flat LCD panel display could be the answer. A 15in 1,024 x 768 panel display has an image similar in size to a 17in CRT but costs around four to five times the price. On the plus side, they're only an inch or so thick, consume much less power and emit far less nastiness. These size, weight and low power interference advantages have made panels a big hit in scientific, space and military applications, and they're also popular with those for whom looks or size are paramount: City trading rooms can easily absorb the cost of panel displays, and find their small footprints invaluable.

Safety and emission standards

We all spend hours in front of a computer without giving a second thought to our safety. Just consider for a moment the monitor, which consists of extremely high-voltage electron guns, firing streams of electrons sufficiently hard at a target of phosphors that they glow brightly enough to produce an image. Those same guns are pointed directly at your face typically for several hours a day, and are understandably of great concern. Over the last few years, monitor manufacturers have conformed to a whole range of safety standards. First is the now ubiquitous Swedish MPR-II of the early nineties, which reduces electrostatic emissions. Stricter is the (also Swedish) TCO 1992, which demands stiffer levels for emissions, along with meeting the EN60950 international standard for electrical and fire safety. The most recent and strictest of all, TCO 1995, also addresses environmental and recycling concerns. Each system adds more to the cost of a display.

Other monitor technologies

A 17in CRT monitor typically consumes at least 100W of power. VESA's DPMS system allows a compliant video card and monitor to automatically power down to around 25W in standby, then below 8W in suspend mode. EPA's Energy Star system powers down to below 30W. Both systems are in wide circulation, and automatically act on user-definable periods of inactivity. On-screen display (OSD) adjustment controls are becoming increasingly common. These are superimposed graphics which appear on the screen, similar to modern TV sets superimposing, say, a bar when you're adjusting the volume. There are no OSD standards, so style, facilities and ease of use vary considerably.

VESA has come up with several standards for plug-and-play monitors. Known under the banner of DDC (Display Data Channel), they should in theory allow your system to figure out and select the ideal settings, but in practice this very much depends on the combination of hardware. *(See Hands On, p294.)*

Gordon Laing

MONITOR Photography by David Whyte

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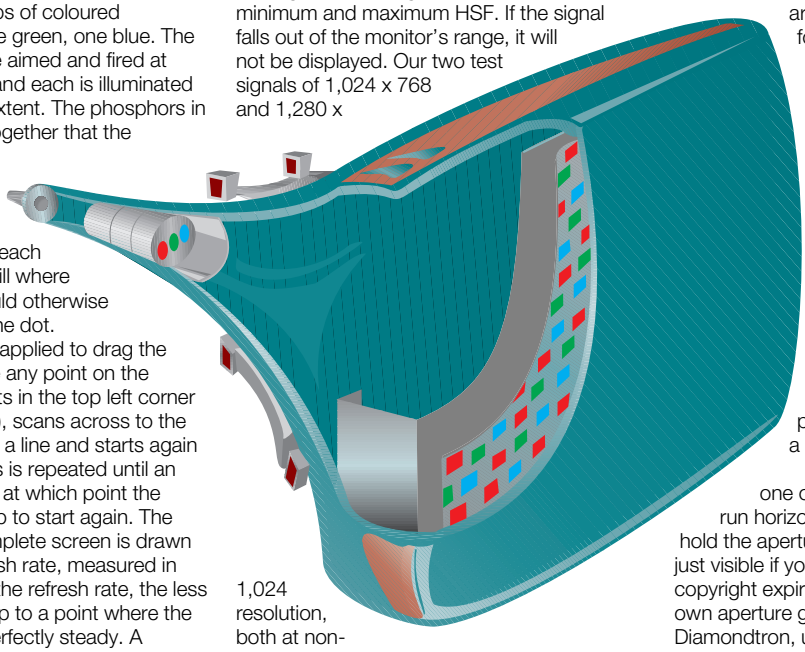
How a CRT works

A colour cathode ray tube (CRT) is like a huge glass bottle with electron guns in its neck which fire at the screen in the bottom. The screen is covered with a matrix of dots, each consisting of three blobs of coloured phosphor: one red, one green, one blue. The three electron guns are aimed and fired at their respective blobs and each is illuminated to a greater or lesser extent. The phosphors in a group are so close together that the human eye perceives the combination as a single coloured computer pixel. A metal mask separates each dot to minimise overspill where the electron beam would otherwise illuminate more than one dot.

Magnetic fields are applied to drag the electron beam to strike any point on the screen. The beam starts in the top left corner (as seen from the front), scans across to the right, then drops down a line and starts again at the left. This process is repeated until an entire screen is drawn, at which point the beam returns to the top to start again. The number of times a complete screen is drawn per second is the refresh rate, measured in Hertz (Hz). The higher the refresh rate, the less flicker on the screen, up to a point where the brain perceives it as perfectly steady. A refresh rate above 70Hz is generally considered to be flicker-free.

Some monitors draw every other line, say one, three and five, until the screen is full, then return to the top to fill in the even blanks, say, lines two, four and six and so on. This process is known as interlacing and results in an unsteady image. Non-interlaced is where every line is drawn before returning to the top for the next frame, resulting in a far steadier display.

A computer's graphics circuitry creates a signal based on the Windows desktop resolution and refresh rate. This signal is known as the horizontal scanning frequency, HSF, and is measured in kHz. When you raise the resolution and/or refresh rate, the HSF signal increases. A multi-scanning monitor (such as all those tested here) is capable of locking on to any signal which lies between a minimum and maximum HSF. If the signal falls out of the monitor's range, it will not be displayed. Our two test signals of 1,024 x 768 and 1,280 x 1,024 resolution, both at non-interlaced 75Hz refresh rates, produce an HSF of around 60kHz and 80kHz respectively. The cheaper monitors we tested support a maximum HSF up to around 65kHz, while the more expensive ones support a maximum between 80kHz and 96kHz, allowing higher resolutions and refresh rates.



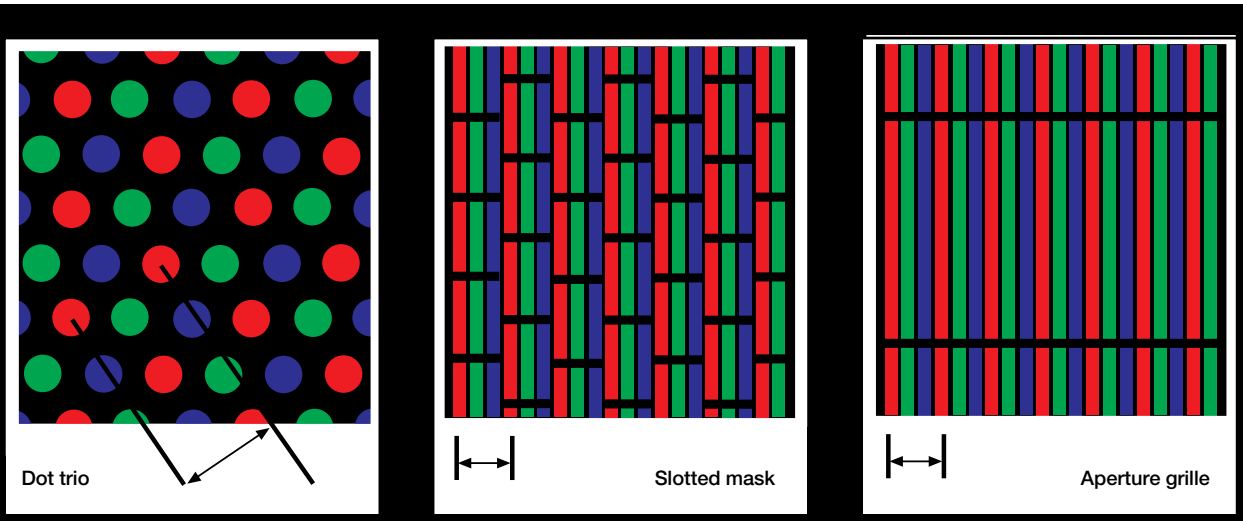
The maximum resolution of a monitor is dependent on more than just its highest scanning frequencies. It is also limited by the physical distance between adjacent groups of phosphors. This is known as the dot, grille or slot pitch, and is typically between 0.25 and 0.28mm. Since each phosphor group represents the smallest pixel the monitor is physically capable of resolving, trying to address anything finer will result, at best, in a blurred image.

The vast majority of computer monitors use circular blobs of phosphor and arrange them in triangular formation. These groups are known as triads, and the arrangement as a dot-trio design using a shadow mask, but there are alternatives.

In the sixties, Sony developed a tube technology known as Trinitron where the coloured phosphors are layed down in uninterrupted vertical stripes. The mask separates entire stripes instead of each dot, and is known as an aperture grille. Since less of the screen area is occupied by the mask, more of the phosphor can glow, resulting in a brighter, more vibrant display. The downside is that either one or two very fine wires must be run horizontally across the display to hold the aperture grille in place, and they are just visible if you look closely. When Sony's copyright expired, Mitsubishi developed its own aperture grille technology, called Diamondtron, using a similar aperture grille mask but three electron guns instead of Sony's one.

NEC has recently taken the slotted mask technology employed by most TV sets and developed it for higher resolution computer displays. Known as ChromaClear, it employs elliptically shaped phosphors grouped vertically and separated by a slotted mask. The slotted mask design falls in-between aperture grille and dot trio shadow masks in terms of brightness and mechanical stability. A good compromise, but still quite a young technology for computer displays.

Gordon Laing



A simplied close-up of three CRT phosphor and mask arrangements in common use today: dot trio, slotted mask and aperture grille. It is clear which designs expose the most phosphor, resulting in a brighter display, although often at the risk of mechanical instability. The distance (shown in each diagram) between each like-coloured phosphor is the dot pitch

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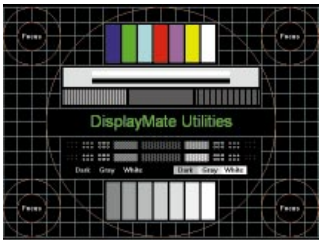
VNU Labs Report: How we did the tests

Measurement of colours may seem the realm of fine art, but there are well-defined units to express both colours and brightness. Colour spaces enable the mapping of tristimulus (red, green and blue) values into a 2D graph. In 1931, the Commission Internationale d'Eclairage (CIE) proposed a colour model as an international standard for colour measurement. This model was further refined in 1976. Our measurments are made in CIE 1976 colour space *(see this month's Hands On Graphics & DTP, p294)*.

Brightness, or luminosity, also has its own units of measurement. Again, the actual level of luminance is unimportant, provided that it is even enough across the entire screen area. All monitors are affected to some extent by ambient electromagnetic fields, such as those emitted by neighbouring items of electrical equipment, from the earth's magnetic poles, and also from steel-framed buildings. VNU Labs' test bed was set up to minimise these effects: screens were tested away from other electrical equipment, and in the centre of the room.

Starting from an ambient temperature of 18C, the monitors were switched on to warm up for an hour and a half before being tested,



and were degaussed prior to measurements being taken. It's a general rule that analogue circuitry reaches greater stability at its operating temperature, so the colour analyser was also calibrated after being warmed-up for an hour.

A Minolta CA-100 colour analyser was used to measure evenness of colour across the edges and in the centre of each screen. This device is a colorimeter, which produces x and y CIE colour co-ordinates independently of hues and brightness, using a hand-held photodiode sensor probe. A PC running DisplayMate for Windows — with a Matrox MGA display adaptor — provided the test images. Entry-level monitors were tested at 1,024 by 768 pixels, and higher-end monitors at 1,280 x 1,024 pixels, both in 16-bit colour at a 75Hz vertical non-interlaced refresh rate.

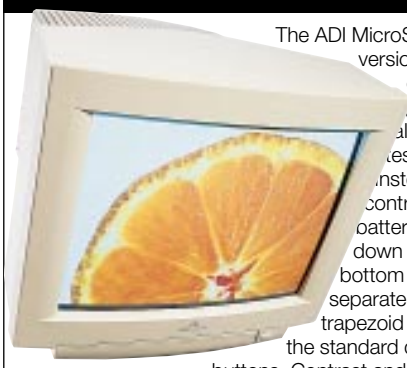
The first test measures the maximum brightness of a monitor displaying a plain white screen. This reading gives a good indication of the monitor power supply unit's (PSU) capacity. The PSU is one of the most important components of a good monitor, and affects many other facets of display quality like screen regulation and transient responses. After the first test, all monitors were adjusted to give a luminance reading of roughly 50cd/m^2 on the white screen.

Next, readings figures were obtained for white, red, blue and green screens, generated at their maximum saturation levels. The tests render two sets of measurements — colour and luminance — for each of the five points mentioned, and the overall monitor performance is calculated by taking the deviation from the screen centre's values. Many monitors now allow adjustment of the colour temperature, and doing this affects the absolute colour space readings, but not the relative colour purity, which is mostly affected by poor internal shielding and poor screen degaussing.

Colour purity and luminosity give a good indication to the quality of a monitor. These results do not take into account dot focus and misconvergence, which were judged subjectively by a panel of users. On-screen controls were again shown to a panel who commented on presentation and ease-of-use.

ENTRY LEVEL

ADI MicroScan 5V



The ADI MicroScan 5V is the 17in version of a monitor shipped on many an OEM PC (the MicroScan 4V). It's also one of the few in the test not to have an OSD. Instead, the screen is controlled via a positive battery of buttons which drop down in a section from the bottom of the monitor. There are separate controls for pincushion, trapezoid and rotation, as well as the standard degauss and reset buttons. Contrast and brightness have their own separate controls, with plus and minus buttons for each, but here the lack of an OSD is at its most telling as there is not even a sliding scale to show how far you have pushed the capacity of each.

This was not the most powerful of monitors. It was quite capable of running our test signal of 1,024 x 768 at 75Hz, but its HSF is a lowly 64kHz. The screen is a little bulbous compared to other models in the test. It becomes most irksome around the edge of the screen, where there is a lack of sharpness.

This monitor suffered slightly from streaking, which was more noticeable than in most of the other monitors. However convergence and moiré are not a problem, which is just as well, as there were no controls to correct this.

PCW Details

Price £359 ex VAT

Contact ADI Systems UK 0181 236 0801

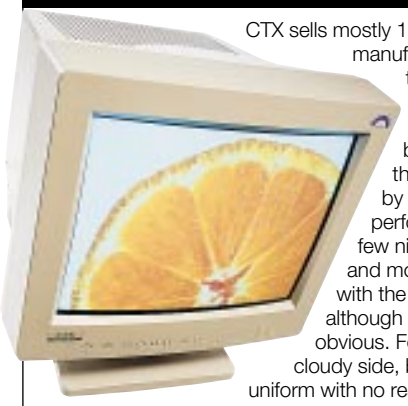
Good Points Manual controls.

Bad Points Focus not as sharp as it could be.

Conclusion Not faultless, but good value nonetheless.

★★★★

CTX 1765S



CTX sells mostly 15in monitors to OEM PC manufacturers to bundle with off-the-page deals. The 1765S is a step above these 15in monitors, not only in size, but also in quality. Overall the screen wasn't bad, but by running our suite of performance tests we noted a few niggly problems. Shadowing and moiré are minor problems, with the stress on the minor, although misconvergence was less obvious. Focus was a little on the cloudy side, but at least it is pretty uniform with no real dropping off towards the corners. The screen tends to pull a little in the corners, which leads to a tiny amount of distortion, although not enough to bother you in the normal course of events. Again, the screen has a little banding due to the grainy texture of the shadow mask screen. It should be stressed, however, that none of these problems were acute and overall the CTX performed reasonably well.

The OSD is quite good, using a single menu and four buttons to control the functionality, so speeding up operations such as the sizing of the screen. Contrast and brightness are controlled separately, but there is no on-screen display to show how far you have cranked them up, so you have to depend on look and feel alone.

PCW Details

Price RRP £399 ex VAT, Street £349 ex VAT

Contact CTX Europe 01923 810800

Good Points Good OSD.

Bad Points Many minor faults.

Conclusion Good choice at the bargain end.

★★★

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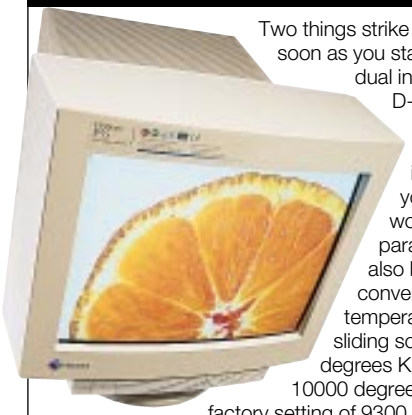
Eizo FlexScan F55



Two things strike you about this monitor as soon as you start to set it up. First is the dual input modes: both BNC and D-SUB connections are at the back. The other is the excellent OSD. Not only is it easy to use and gives you all the controls you would expect, including parallelogram, but there are also buttons for moiré and convergence reduction. Colour temperature can be adjusted on a sliding scale at intervals of 500 degrees K from 4000 degrees K to 10000 degrees K, with an additional factory setting of 9300 degrees K. You also have the option to upgrade the OSD to a Windows interface for around £25 extra, which lets you save to disk as many user profiles as you need. In other ways, the quality of this monitor also comes through. The focus is extremely sharp at the centre of the screen, and although it does drop off towards the edges, it is still better here than on many others in this test. The colours are deep and vibrant, really kicking back in your face, although the brightness of the screen as a whole cannot be pushed up as far as some might like. It is even TCO 95 compliant, a feature almost unheard of in this category of monitors.

PCW Details

Price Street £489 ex VAT (Eizo won't quote an RRP)

Contact Professional Display Systems 01483 719500

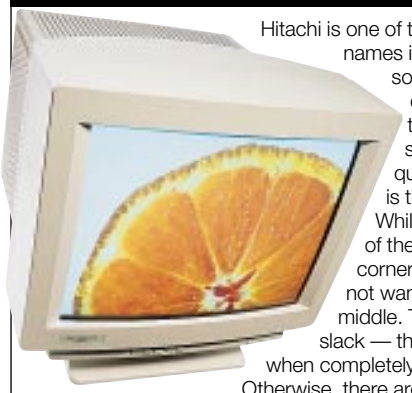
Good Points BNC and D-SUB connections. Sharp focus.

Bad Points Not overly bright.

Conclusion A little more expensive than others in this class, but worth it.

★★★★★

Hitachi CM600ET



Hitachi is one of the most respected names in the world of monitors, so it was a bit of disappointment to find this model less than stunning in its clarity and quality. The main problem is the softness of the focus. While you expect the quality of the picture to drop off at the corners of the screen, you do not want a soft focus in the middle. The regulation is a little slack — the picture jumps badly when completely redrawing the screen. Otherwise, there are no specific grumbles. There is no real moiré, but this is just as well as there is no control of correct it. The OSD is big and bright and reasonably easy to use. It is controlled from a simple row of six buttons along the front and the level readings are shown in large, clear bars. There is no parallelogram control, only trapezoid and pincushion.

There are no preset colour temperatures and instead you have a sliding scale for red, green and blue. This is fine if you know what they ought to be set at, but it would be all too easy to disrupt the balance. But all is not lost, as you can get back to the factory default by hitting the recall button.

PCW Details

Price RRP £469 ex VAT, Street £419 ex VAT

Contact Hitachi Business Systems 0181 849 2092

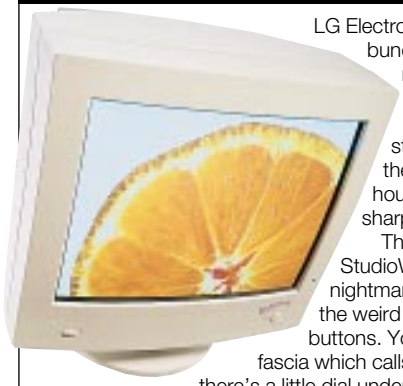
Good Points No moiré or misconvergence. TCO 92 compliant.

Bad Points Focus could be sharper.

Conclusion Not of the usual Hitachi standard.

★★★

LG StudioWorks 76i



LG Electronics is another of the great bundlers. The StudioWorks monitors are one step up from the usual bundled 15in monitors. One of the strangest things about it is the strange shape of the housing, which narrows sharply just behind the screen. The OSD on the LG StudioWorks 76i is a bit of a nightmare to operate, mainly due to the weird arrangement of the buttons. You have one button on the fascia which calls up the OSD and then there's a little dial under the bezel which controls how you move through the OSD and how you alter the controls. It takes some time to work out how it works and then to get used to the feel of it. There are two separate dials for brightness and contrast, with an on-screen bar to show how far up and down you have gone. The OSD's most annoying habit is that it disappears while you are considering your next move. The overall texture of the screen is a tiny bit grainy. There was noticeable, and the colours lack distinction and depth; not so much wishy-washy as just plain ill-defined and lacking in any real conviction. Worst of all, the focus isn't perfect at the centre of the screen, but it drops off significantly at the corners.

PCW Details

Price RRP £489 ex VAT, Street £410 ex VAT

Contact LG Electronics 01753 500400

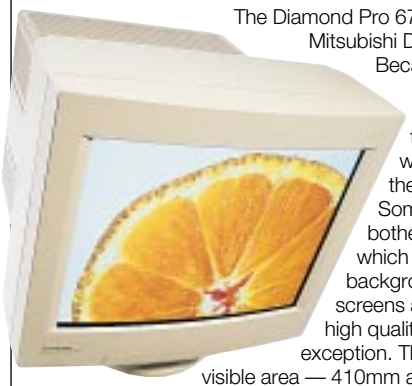
Good Points Very little misconvergence.

Bad Points Grainy texture, washed out colours.

Conclusion Not the best price/performance compromise.

★★

Mitsubishi Diamond Pro 67TXV



The Diamond Pro 67TXV is based around a Mitsubishi Diamondtron tube. Because Diamondtron, like Sony Trinitron, uses aperture grille technology, two damping wires are needed to hold the whole thing together. Some people may be bothered by these wires, which can just be seen on the background, but aperture grille screens are well known for their high quality and this is no exception. The monitor has a large visible area — 410mm across, and although you might think this does not make so much of a difference, the advantage is apparent as soon as you get it out of the box.

The OSD is reasonably easy to use, but it looks messy and is not as clear as it might be. It does have extensive controls, including bow amplitude as well as the usual pincushion, trapezoid, parallelogram and rotation. Brightness, contrast and everything else are controlled from the OSD, which in turn is controlled by six buttons in a panel which drops down from the front of the bezel. A little bit of streaking wlet down an otherwise very good machine. There was very little moiré, misconvergence could not be less of a problem, and the colours were vibrant, strong and deep.

PCW Details

Price RRP £499 ex VAT, Street £425 ex VAT

Contact Mitsubishi Electronic 01707 278684

Good Points Large visible screen area, strong colours.

Bad Points Some slight streaking.

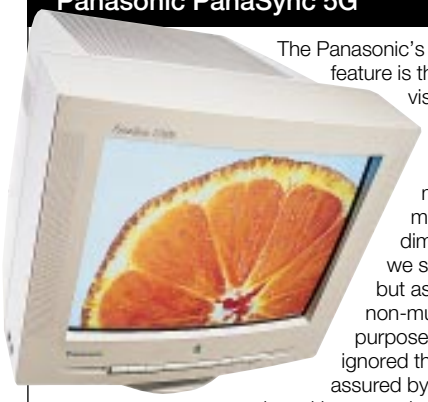
Conclusion Good-value Diamondtron.

★★★★

p164 ➢

Panasonic PanaSync 5G

Personal Computer World Editors Choice



The Panasonic's most immediately striking feature is the size of its screen. The visible size of the tube is around 10mm larger than most monitors in this test. Admittedly, the monitor we reviewed was much larger in overall dimensions than the others we saw due to the speakers, but as we had requested a non-multimedia monitor, for the purposes of this review we ignored the speakers. We are assured by Panasonic that the version without speakers has the same tube.

When it is off, the screen is a good deep black, which is always a good sign. Similarly when it is on, the colours are vibrant and deep. One word of warning about the colour: there are two preset colour temperatures, 9300 degrees K and 6500 degrees K, and one user-defined colour temperature setting. Once you have messed around with the latter you cannot return to a default by pressing the recall button, so make a note of the settings before you start to play. The regulation isn't too bad, although it does jump a little. There are no other real problems with moiré, flicker or misconvergence. The focus, meanwhile, is excellent from the centre of the screen right to the edges.

PCW Details

Price RRP £499 ex VAT, Street £385 ex VAT

Contact Panasonic Business Systems 0500 404041

Good Points Large viewable area. Well balanced.

Bad Points User-defined colour temperature will not default.

Conclusion Excellent all round. Editor's choice.

★★★★★

Philips 107B

The 107B is just one in a whole range of Philips 17in monitors. There is a multimedia version of this monitor, and this model still had the audio input jacks in the back of the monitor and a headphone jack, volume control and microphone on the front bezel. Overall the quality was very good. There was a tiny bit of streaking, but to counterbalance this, the clarity was almost perfect, even to the edges. The colours were vibrant and strong and the screen had good luminosity.

The OSD is entirely verbal — that is, it has words not symbols to choose from. Only in describing which way to adjust the control do you actually have any graphical help, which does make it a little more difficult to control. Otherwise, the OSD is reasonably well arranged, albeit over a main screen and then several subsidiary screens so you will have to do a fair amount of ferreting around to get at what you are looking for. There is a full hierarchy in the manual.

The monitor itself is surprisingly mobile on its stand, turning through 270 degrees. It has an up and down tilt of around 30 degrees and is very light to move.

PCW Details

Price RRP £494 ex VAT, Street £419 ex VAT

Contact Philips Information Products 0181 689 4444

Good Points Excellent clarity and luminosity.

Bad Points OSD hard to navigate.

Conclusion A good monitor, but for slightly more expansive pockets.

★★★★

Smile CA6736SL

Smile is the first manufacturer to licence NEC's ChromaClear technology *(see page 159)*. However, unlike the NEC models, this monitor was unable to run non-interlaced 1,024 x 768 at 75Hz in full-screen mode, so for testing purposes we dropped the refresh rate to 70Hz when the picture was able to fill the screen to the edges, rather than hovering just inside the edges at 75Hz. This monitor suffered from problems not apparent in any other ChromaClear monitors. The screen was badly streaked, with huge smears leading from the active window bars, making it look more like an STN notebook screen than a CRT. The screen itself was bulbous and the picture was hard to square up properly. The OSD is relatively easy to use, although it is set to disappear very quickly and there was no way of keeping it longer on the screen. This means you have to constantly recall it to the screen before you have finished your adjustments. All controls are operated from the OSD including the brightness and contrast and even the degauss facility. Most of the usual controls are there, including pincushion, trapezoid and rotation, but there is no parallelogram control. There are no colour temperature controls, just the factory preset.

PCW Details

Price £389 ex VAT (no RRP)

Contact Smile 01923 211155

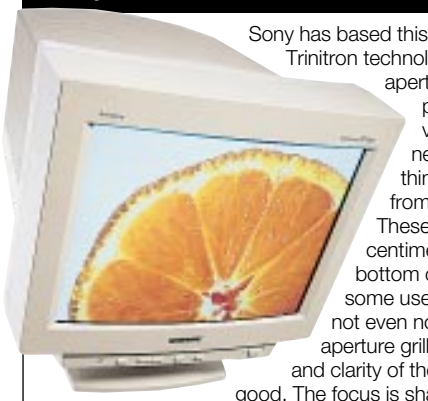
Good Points Relatively inexpensive.

Bad Points Bad streaking. Low refresh rate.

Conclusion If you want a ChromaClear tube, go for an NEC.

★★

Sony MultiScan 200sx



Sony has based this model around its own Trinitron technology. As this uses an aperture grille to arrange the phosphors, two barely visible damper wires are needed to hold the whole thing together and protect it from knocks and shocks. These wires, located about six centimetres from the top and bottom of the screen, may annoy some users, although others will not even notice them. As with most aperture grille screens, the quality and clarity of the picture is exceptionally good. The focus is sharp even to the corners and there is minimal moiré and misconvergence. The colours are vibrant and strong, although there are no options for different colour temperatures. You are stuck with the default.

The OSD is controlled by just three buttons but the menu system makes it arduous to scroll through. There are all the geometric controls you would need, including parallelogram, although no moiré reduction control. There was a slight problem with the pincushion control: get it right at the edges and any window in the middle would be concave. Put that right, and suddenly the edges of the screen are convex once again. The brightness and contrast have separate controls and so are much faster to adjust.

PCW Details

Price RRP £475 ex VAT, Street £445 ex VAT

Contact Sony IT Group 0181 760 0500

Good Points Excellent sharpness.

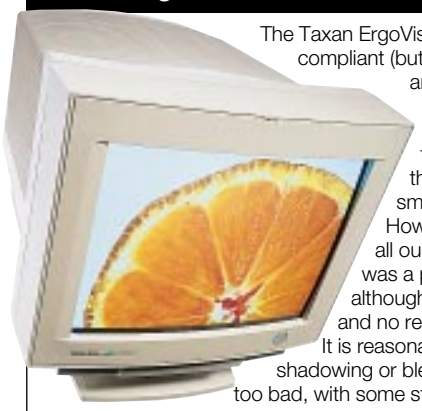
Bad Points No colour temperature adjustment.

Conclusion An excellent monitor let down by the OSD.

★★★

p167 ➢

Taxan ErgoVision 730TCO



The Taxan ErgoVision 730TCO is TCO 92 compliant (but not TCO 95 compliant) and looks a bit dated. Its visible screen size is almost 10mm smaller than most of the others in this test, and almost 20mm smaller than some others. However, it did perform well in all our standard tests. There was a problem with moiré although nothing to worry about, and no real convergence problem. It is reasonably stable, with no shadowing or bleeding. The colours aren't too bad, with some strength and depth to them, although they're not as vibrant as they could be.

The screen suffered slightly from banding, like many of the shadow mask monitors in this test. And the contrast couldn't be pushed as hard as we would have liked.

The OSD is controlled from a row of five buttons. There are all the controls you would expect, including rotation, trapezoid, parallelogram and pincushion. The OSD controls span a total of five pages, so you may have to do a lot of scrolling to find what you need.

PCW Details

Price RRP £504.08 (£429 ex VAT), Street £479.40 (£408 ex VAT)

Contact ADI Systems 0181 236 0801

Good Points Stable. No moiré or misconvergence.

Bad Points Small visible screen area.

Conclusion On the expensive side for its quality.

★★

ViewSonic 17GS

While the aperture grille ViewSonic PT775 was one of the better monitors we saw in the higher-end category of this test, the same cannot be said of this shadow mask 17GS. The screen suffers from several problems: it is on the bulbous side and extremely indistinct towards the edges. The colours are washed out and the screen itself is extremely grainy, something which only becomes less obvious when the contrast is pushed right up. Shadowing was a problem, as was moiré, and although the clarity is good at the centre of the screen, it is shocking at the corners. By far the most serious fault was a serious decline in colour at the top left of the screen; the red faded almost to a flesh colour here. On the plus side, there was not even the faintest whiff of misconvergence.

The 17GS is bundled with Opti-Green for Windows 3.1 and DOS, a power management utility, and there is also a Win95 version on the same disk which includes the information your PC will need to get plug and play to work properly. The OSD has all the functionality you need, but is slow to react to change.

PCW Details

Price RRP £527.58 (£449 ex VAT), Street £504.08 (£429 ex VAT)

Contact ViewSonic Europe 0800 833648

Good Points TCO 92 compliant.

Bad Points Grainy. Colour drop-off in one corner.

Conclusion Better deals available elsewhere.

★★

HIGH-END

ADI MicroScan 5G

Personal Computer World Editors Choice

It really is remarkable what you can get for your money these days. This brand new ADI MicroScan 5G boasts an impressive maximum HSF of 94kHz, TCO 95 compliance and a picture that delights. For your money you get a 17in monitor which can display 1,280 x 1,024 non-interlaced at high refresh rates, and you can even have a fair stab at 1,600 x 1,200 while not polluting the environment.

Like Iiyama, ADI has become a well known name by producing decent goods. The 5G represents the top of the range, although you wouldn't think so, going by its price. The case is plain, with the controls under a fold-out panel. There's no adjustment for moiré or convergence but everything else is present, including three colour temperatures. There may be more buttons than normal, but it's immediately obvious which does what.

The picture is unblemished. The convergence is slightly out in the extreme corners, but this is unnoticeable in general use, where the image appears very well focused.

True, the more expensive models offer an ultimately crisper and cleaner image, but you'd be hard pushed to notice unless they're all side by side.

PCW Details

Price Street £504.08 (£429 ex VAT)

Contact ADI Systems 0181 236 0801

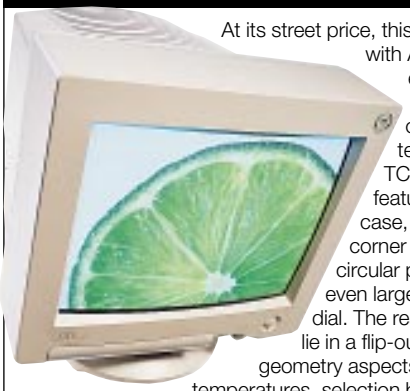
Good Points High spec, low price.

Bad Points Image beaten by the very best.

Conclusion Unbeatable value nonetheless.

★★★★★

CTX 1785XE



At its street price, this CTX is joint cheapest with ADI's 5G in this higher-end category. Its maximum HSF of 85kHz could easily handle our test signal and the tube is TCO 92-compliant. It features a slightly unusual case, with the lower right corner dominated by a large circular power button, and an even larger analogue brightness dial. The rest of the digital controls lie in a flip-out panel, and cover all geometry aspects, four colour temperatures, selection between the DSUB or BNC video inputs, and contrast adjustments. There are no moiré, reduction or convergence alignment controls, though. The clear OSD is a refreshing change however, being more colourful and of higher resolution than most.

If you're being picky, convergence is slightly out, and the picture is a little soft overall. The tube is slightly more curved than average. Anyway, the well-focussed image and decent spec are certainly good for the price. The CTX 1785XE would normally receive a high recommendation had it not been for the ADI 5G, which offers similar quality, but a maximum HSF of 94KHz and TCO 95 for the same price.

PCW Details

Price Street £504.08 (£429 ex VAT)

Contact CTX 01923 810800

Good Points Cheap. Fair specification.

Bad Points Image slightly soft.

Conclusion Remarkable value.

★★★

p168 ➢

Eizo FlexScan F56

Eizo has always been associated with high-end displays. The F56 (and the cheaper F55 reviewed elsewhere in this feature) have much in common, including TCO 95 certification, probably the best on-screen display we've yet seen and a case with unusual details.

The OSD is easy to operate with a large square button which can be pressed up, down, left or right to adjust, or in the middle to select. The graphics are high resolution, intuitively detailed and even animated to ensure you know what's going to happen if selected. Then there's the enormous array of functions, including six languages, moiré and convergence adjustments, and the best colour control of all the monitors, where the colour temperature can even be continuously adjusted in 500K increments.

The tube is excellent, boasting a bright, clean, sharp image which suffers from no misconvergence and only the very slightest of ghosting. The F56 has a maximum HSF of 86kHz which will support 1,280 x 1,024 non-interlaced at 80Hz.

It may be possible to find the F56 cheaper than the typical buying price quoted, but it's only a tad cheaper than our most expensive monitor, the ViewSonic PT775.

PCW Details

Price RRP and street price £703.83 (£599 ex VAT)

Contact Professional Display Systems 01483 719500

Good Points Great image and the best OSD.

Bad Points Relatively expensive.

Conclusion Great, but pricey.

★★★★

Hitachi CM611ET

Hitachi is one of biggest names in monitor manufacture, and has recently demonstrated a 19in model for those who yearn for larger than 17in, but can't afford the money or the space for a 21in. Meanwhile, this is its higher-end 17in model, with a maximum HSF of 92KHz and TCO 92 compliance. At 92KHz you'll be able to display a resolution of 1,280 x 1,024 non-interlaced at a high refresh rate of 85Hz.

Unusually for a higher-end model, particularly with an above average maximum HSF, the 611 is fitted with a captive DSUB video cable only. The bright and chunky OSD is easy to use with a set of six function and adjustment keys. The range of controls are fairly basic, but include a choice of three colour temperatures; two preset and one user-defined.

The image suffers from no convergence and minimal moiré problems, which is fortunate since there are no controls to sort these out. Streaking is non-existent, although slightly poor regulation let the side down a bit.

Where the image disappoints is in its overall softness: a slight blur and lack of focus all over, particularly in the corners. The image is bright, clean and pleasant, but this overall softness holds back the 611.

PCW Details

Price RRP £703.83 (£599 ex VAT), Street £628.63 (£535 ex VAT)

Contact Hitachi Business Systems 0181 849 2092

Good Points Higher than average scanning rate.

Bad Points Slightly soft image.

Conclusion Okay, but let down by softness.

★★★

Iiyama Vision Master Pro17

Personal Computer World Highly Commended

Thank goodness for Iiyama, getting so many decent monitors sold as standard with upmarket systems from clued-up PC manufacturers so you can at least enjoy a top monitor when you buy your PC.

The plain Vision Master is a fine monitor using an FST, but it's the TCO 92 Diamondtron-based Vision Master Pro model we're looking at here, which is well worth the extra pennies. The maximum HSF of 92kHz can display 1,280 x 1,024 at higher refresh rates than our test signal and if you're feeling really ambitious, the Pro17 can just about handle 1,600 x 1,200 non-interlaced at 69Hz, although at this setting on a 17in everything is getting a bit too small. A disk with specs for Win95 is supplied.

Round the back is a choice of BNCs or a DSUB and Iiyama generously includes cables for both (video connection with separate BNCs offers a better image). At the front are a mere three buttons used to navigate the informative OSD.

The VisionMaster Pro17 boasts all the usual Diamondtron traits of a bright, vibrant, clean, crisp image, but do remember the two damping wires across the screen. The Pro17 has recently been reduced in price and should be strongly considered.

PCW Details

Price RRP £680.33 (£579 ex VAT), Street £599.25 (£510 ex VAT)

Contact Iiyama UK 01438 745482

Good Points High spec. Decent image.

Bad Points Three-button control is a little fiddly.

Conclusion Not faultless, but good value.

★★★★

LG Electronics Studioworks 78T

LG Electronics was formerly known as Goldstar, and the parent company has decided to stick with the LG name across its product range. The 78T is its higher-end 17in model, offering a maximum HSF of 85kHz, and some interesting design features. The case is much narrower at the back than many, which could be an important consideration for those who may be short on space.

The most uncommon aspect of the 78T is its OSD and control system. The brightness and contrast controls are recessed under the case on the right-hand side and feel like dials at first: they are, in fact, rocker switches and should be held either to the left or right to adjust the settings which appear on-screen. On the left-hand side, equally recessed, *is* a genuine dial which is used to activate and cycle through the OSD options. The large oval button on the front bezel at the left is used to confirm.

The image is okay, but it was nothing special at our test settings. There was a little streaking, misconvergence and moiré, without the controls to adjust it, and a there was a slight striped effect.

The 78T is a fair, reasonably-priced monitor, but cannot compete with the several superb models we've tested this year.

PCW Details

Price RRP £668.58 (£569 ex VAT)

Contact LG Electronics 01753 500400

Good Points Interesting controls.

Bad Points No TCO. Average image.

Conclusion Fair, but unremarkable.

★★★

p170 ➢

Mitsubishi Diamond Pro 87TXM

Personal Computer World Highly Commended

Mitsubishi is the only manufacturer to have come up with its own aperture grille tube technology based on the original Sony Trinitron principles. Its Diamondtron tube design has been refined over the years and now offers excellent performance at a decent price. All aperture grille tubes employ two fine (but visible) horizontal wires across the screen to dampen shocks or vibrations. This 87TXM uses the same specified 86kHz tube, controls and OSD as the Taxan ErgoVision 750 TCO95, but Mitsubishi has left its 87TXM meeting TCO 92 regulations, whereas Taxan has gone to TCO 95.

The image on the 87TXM is identical to that of the Taxan 750, sharing the same bright, vibrant colours, good convergence, but ever-so-slightly ghosted shadows when pushed to its limits. Mitsubishi has placed its controls under a discrete panel, away from prying fingers. Inside are four selection and two adjustment buttons, which cover the wide range of corrections. The moiré reduction facility is effective and, like the Taxan 750, the power supply and regulator are extremely stable.

The 87TXM and Taxan 750 are likely to carry similarly low street prices.

PCW Details

Price RRP £821.33 (£699 ex VAT), Street £558.13 (£475 ex VAT)

Contact Mitsubishi Electric 01707 278684

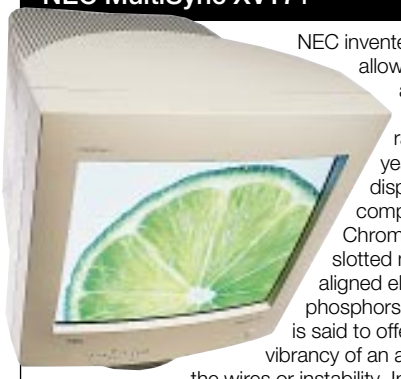
Good Points Great image at a good price.

Bad Points Very slight ghosting when pushed.

Conclusion An excellent choice.

★★★★

NEC MultiSync XV17+



NEC invented the technology which allows a monitor to automatically lock on to any signal within a set range of frequencies. Last year it came up with a new display technology for computer monitors. Called ChromaClear, the tubes feature slotted masks with vertically-aligned elliptically-shaped phosphors (*see p159*). ChromaClear is said to offer the brightness and vibrancy of an aperture grille tube without the wires or instability. In reality, ChromaClear is certainly brighter than a standard shadow mask FST and, although still sensitive to shocks, it is more resilient than an aperture grille.

The XV17+ is NEC's entry-level 17in monitor upgraded to feature a ChromaClear tube. The image is bright and clean, does not suffer from streaking or misconvergence and is eerily paper-like. It's not quite as in-your-face as an aperture grille and the power regulator lets the side down a little, but the image is excellent (no damping wires either).

NEC has fitted its high resolution, colourful OSD, although there are no controls for moiré, convergence, rotation or colour temperature; it must be said however that none needed adjustment. The case is simple but attractive, and the system is TCO 95 compliant. Definitely one for the shortlist.

PCW Details

Price RRP £856.58 (£729 ex VAT), Street £611 (£520 ex VAT)

Contact NEC 0645 404020

Good Points Good image performance.

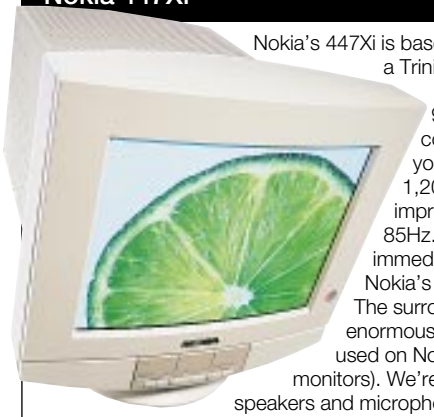
Bad Points A bit pricey.

Conclusion Fine alternative to aperture grille.

★★★★

Nokia 447Xi

Personal Computer World Highly Commended



Nokia's 447Xi is based on a Trinitron tube, with a maximum HSF of 92KHz and TCO 95 compliance. With 92kHz you can display at 1,280 x 1,204 non-interlaced at an impressive refresh rate of 85Hz. The Trinitron tube is immediately captivating but Nokia's case grabs you first. The surrounding bezel is enormous (the same as the ones used on Nokia's multimedia monitors). We're not just talking speakers and microphones either: Nokia offers a version of this monitor with a built-in video camera. Strangely, there are no BNCs on the 447Xi, just a captive DSUB video cable.

Nokia's OSD, too, is more impressive than the standard Sony offerings, with clear graphics and tons of options, including convergence but sadly no moiré control. There is a choice of seven languages, no less than seven pre-set colour temperatures and two user-definable ones as well. Nokia supplies a disk with Windows 95 details and a CD to help get the most from your monitor.

The picture is very bright, vibrant and clean. The 447Xi also boasts crisp details, which are sharp and well-focussed right into the corners. Remember the two faint wires running across all aperture grille tubes, though.

PCW Details

Price RRP £809.58 (£689 ex VAT), Street £628.63 (£535 ex VAT)

Contact Nokia 01793 512809

Good Points Superb image quality.

Bad Points Huge case.

Conclusion Great choice with unique optional extras.

★★★★

Panasonic PanaSync/Pro 5G

This is Panasonic's top 17in monitor, sporting a maximum HSF of 86kHz, two sets of video inputs and TCO 92 compliance. The case is neatly designed with a slimmer-than-average bezel around the screen and a simple row of four control buttons. The OSD features blocky, but colourful and recognisable icons, which cover a wide range of adjustments, including user-definable colour temperature, signal level selection and separate vertical and horizontal moiré, which successfully eliminated our undesirable test patterns. You can also select from five on-screen languages.

The image is clean, crisp and free from problematic artefacts. Close inspection reveals slight ghosting and streaking, but nothing to worry about. Convergence and focus were fine which, along with a decent power regulator, make for a decent picture overall. It's not as in-your-face as the aperture grille models, but bright and sharp enough to compete.

It is a good monitor but even at its reasonable street price it's up against tough competition from Sony, Mitsubishi and Taxan. It is a matter of personal preference whether you plump for the virtues of a shadow mask or an aperture grille tube. The Pro 5G is a fine representative of shadow mask technology.

PCW Details

Price RRP £821.33 (£699 ex VAT), Street £586.33 (£499 ex VAT)

Contact Panasonic Business Systems 0500 404041

Good Points Nothing too remarkable.

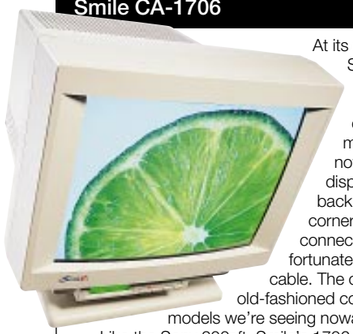
Bad Points Focus not as sharp as it could be.

Conclusion Worth considering.

★★★

p174 ➢

Smile CA-1706



At its estimated street price, Smile's CA-1706 is one of the cheaper models to be featured in our higher-end category. It is the only monitor in this entire feature not to use an on-screen display; opting instead for a backlit LCD panel in the lower left corner. At the back are BNC connectors only, although fortunately Smile supplies a suitable cable. The overall case design looks a bit old-fashioned compared to many of the models we're seeing nowadays.

Like the Sony 200sft, Smile's 1706 features a maximum HSF of 80kHz, only just being able to lock onto our test signal of 1,280 x 1,024 non-interlaced at 75Hz. The overall picture is fairly bright and clean. However, unlike the Sony, the image at this setting lacks resolving power and suffers from quite noticeable streaking.

Convergence is okay, which is a good job since there are no controls to adjust it, nor moiré for that matter. But then, no moiré was seen in our tests due to the 1706 simply not resolving the troublesome patterns. Power-saving can be activated at preset times by the monitor itself if so desired. The 1706 may be cheap, but it's only a few pounds less than excellent models by Mitsubishi, Sony and Taxan, and in fact a few pounds *more* than the excellent ADI 5G.

PCW Details

Price Street £527.58 (£449 ex VAT)

Contact Smile 01923 211155

Good Points Cheap. BNC cable included.

Bad Points Poor image. No TCO.

Conclusion There are better models out there.

★

Sony Multiscan 200sft

The Multiscan's maximum HSF of 80kHz means it's capable of displaying our test signal of 1,280 x 1,024 non-interlaced at 75Hz, but no higher. Curiously, Sony chose to fit a captive D-SUB video cable rather than the D-SUB or BNC plugs more commonly found on this type of product. Also unusually, Sony hasn't bothered to offer trapezium, moiré or convergence adjustments to its basic OSD. It is annoying not being able to minimise the slight moiré present on some patterns, but at least the convergence is perfect.

The 200sf boasts the cleanest and most crisp image of any of the already highly capable aperture grille monitors we tested; even the edges are incredibly sharp (and bear in mind that it was pushed to its very limits). Sony's Trinitron tube offers unrivalled colour and brightness uniformity across the screen. There are no shadows or ghosting, and the power supply is perfectly happy. The 200sf is TCO 92 compliant. Remember that all aperture grille tubes have two fine but visible wires running horizontally across the image.

Even with basic controls, a captive video cable and a maximum HSF of 80kHz, it's hard not to get enthusiastic about the 200sf as soon as it's switched on.

PCW Details

Price RRP £645.08 (£549 ex VAT), Street £586.33 (£499 ex VAT)

Contact Sony IT Group 0181 760 0500

Good Points Incredibly crisp, bright display.

Bad Points Basic controls; one input and maximum 80kHz HSF.

Conclusion An irresistibly clean and sharp monitor.

★★★★

Taxan ErgoVision 750 TCO 95

Personal Computer World Highly Commended

Its street price makes this ErgoVision one of the cheaper higher-spec 17in monitors we have tested in this feature. It's impressive for a Mitsubishi Diamondtron tube running up to an 86kHz HSF, which meets TCO 1995 requirements. These consist of the stringent terms of TCO 1992 for low emissions and power-saving, and encompass environmental and recycling issues too. It's good to see Taxan featuring the latest standards without a high price tag.

The Diamondtron tube is bright and vibrant and, like all aperture grille designs, has two very faint wires running horizontally to hold it steady. The image is sharp, clean and does not suffer from misconvergence. Only the slightest ghosting could be seen in some circumstances. The power supply and regulator are excellent, and were unfazed by our tricky tests.

The OSD is controlled by four selection and two adjusting keys on the plain front bezel. The myriad image controls include horizontal and vertical convergence, three adjustable colour temperatures and an effective moiré reduction facility.

The image may be ever-so-slightly lacking the ultimate sharpness of the highest-end models, but at its price, the 750 makes an excellent choice.

PCW Details

Price RRP £609.83 (£519 ex VAT), Street £579.28 (£493 ex VAT)

Contact Taxan 01344 484646

Good Points Great spec, image and price.

Bad Points Very slight ghosting when pushed.

Conclusion An excellent choice.

★★★★

ViewSonic PT775

This new Professional Series monitor boasts the highest video specification of all those we tested. Its maximum HSF of 96kHz is more than capable of displaying our 75Hz non-interlaced test signal and can cope with resolutions of 1,280 x 1,024 non-interlaced at an impressive 85Hz. Its 200MHz video bandwidth and 0.25mm aperture pitch ensure that even at this highest resolution, all details are crisp, clear and well-focussed.

The TCO 92 Mitsubishi Diamondtron tube displays its typically high brightness and vibrancy without compromising resolved details. The image suffered no misconvergence, streaking or ghosting and the PT775 also has a good power regulator, which was virtually unperturbed by our tests.

The case is plain, with only four buttons on the front panel, operating the straightforward OSD. Among the usual controls are those for moiré, horizontal and vertical convergence, three preset colour temperatures and a user-defined setting. At the back is a choice of a DSUB or BNCs for video connections.

The PT775 is the best performing model here in terms of raw video specifications, although this is reflected in its above-average price tag (the highest of all in this group test).

PCW Details

Price RRP £757.88 (£645 ex VAT), Street £722.63 (£615 ex VAT)

Contact Viewsonic 0800 833648

Good Points Highest video specification.

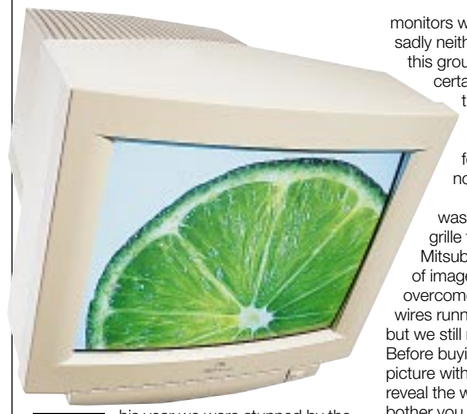
Bad Points Pricey. Only TCO 92.

Conclusion Choice for higher-end users.

★★★★

Editor's Choice

Personal Computer World Editors Choice



This year we were stunned by the superb quality and value offered by most of the 17in monitors we tested. Virtually all models, including the higher-end ones, will give you change from £500 (ex VAT) and offer excellent performance; well worth your consideration either as a first time, or upgrade purchase.

Several trends other than low price were quite apparent. First is that almost all manufacturers have adopted on-screen controls and many have added sophisticated options to eliminate undesirable moiré patterns and precisely adjust colour temperature, all in one of several languages.

Safety and the environment have been a much stronger consideration this year, with many models meeting the strict TCO 92 and the even stricter TCO 95 specifications on emissions and packaging. All models supported power-saving too, while VESA DDC plug and play was considered standard.

We expected to see several monitors offering the Universal Serial Bus (USB) and act as the system's hub, but all the manufacturers in this feature commented that they were holding on to see how the market develops before committing themselves. Philips and Samsung have recently demonstrated new monitors with optional USB support, but sadly neither could get any to us in time for this group test. LCD panel displays are certainly arriving *en masse* and despite the high cost are already finding comfortable niches. We will be rounding up several models for a feature in the very near future. But now, our CRT recommendations.

As with last year's group test, it was those monitors featuring aperture grille tubes, from either Sony or Mitsubishi, that most impressed in terms of image quality. Some people cannot overcome the two fine, but visible, damping wires running horizontally across the screen but we still rate the overall image very highly. Before buying, make sure you see a still picture with a plain white background to reveal the wires and consider whether they bother you.

Lower end

The budget 17in monitors we tested all varied enormously in price from just £349 (ex VAT) on the street for the CTX 1765S, to a massive £489 (ex VAT) for Eizo's superb FlexScan F55. However, the difference in price was often matched by a wide variation in features. Many of the cheaper models were not TCO 92 compliant and had limited features on the OSD (on-screen display), while the Eizo was TCO 95 compliant and had one of the most complete OSDs.

We particularly liked the Eizo. It had everything you would expect from a good high-end 17in but on the down side it was priced more like a high-end 17in. Take one step down in price and the next best performer had to be the Mitsubishi Diamond Pro 67TXV, so this is highly recommended choice. Its Diamondtron tube lends a real edge to the performance both on focus and on strong, vibrant colours, and it also has a large visible area. At the other end of the scale, our second highly recommended monitor has to be the ADI MicroScan 5V. This is not quite the least expensive in the test, but for the price it offered by far the best performance at the lower end of the scale.

One monitor stood out, however, and is our Editor's Choice for entry-level monitors: the Panasonic PanaSync 5G had by far the best all round performance and, with a low street price, can be snapped up for under £400. It has a huge visible screen area, is TCO 92 compliant and has excellent focus right up to the edges of the screen.

Higher end

The 15 higher-end monitors we tested ranged from as little as £429 (ex VAT) to £615 (ex VAT) on the street. Maximum horizontal scanning frequencies varied from 80KHz up to a high 96KHz. All but two featured TCO 92, while five went the whole hog to TCO 95. Most manufacturers will offer upgrades at the time of purchase at little extra cost.

Virtually all delivered superb image quality, making the task of selecting the best extremely difficult. In some cases it came down to as little as a few pounds' difference in price, slightly more sophisticated yet easy to use controls, or compliance with stricter standards.

Just barely missing out on an award, but nevertheless very highly recommended are the following models: Sony's beautifully imaged 200sft (but only TCO 92, basic controls and 80kHz), ViewSonic's highest specified PT775 (yet the most expensive and only TCO 92) , NEC's ChromaClear XV17+ and Eizo's very capable F56 (both slightly expensive compared to others, however).

With the slightest edge over these four models and earning *PCW* Highly Commended awards are Taxan's 750 TCO95 and Mitsubishi's 87TXM which are essentially the same monitor apart from the former costing a few extra pounds. Also Highly Commended and slightly higher performing are Nokia's 447xi and the ubiquitous Iiyama VisionMaster Pro 17; all four interestingly using aperture grille tubes, three Mitsubishi Diamondtrons and one Sony Trinitron.

Yet despite the closeness of these eight models, one other stood out. Our Editor's Choice of high-end monit ors goes to the ADI 5G, which may not offer quite as brilliant an image as the eight mentioned above, but does offer a high 94kHz horizontal scanning frequency, TCO 95 compliance, and best of all, the lowest price of the lot: £429 (ex VAT).

Personal Computer World Highly Commended

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Table of Features

Entry-level models

Manufacturer	ADI	CTX	Eizo	Hitachi	LG Electronics	Mitsubishi
Model	MicroScan 5V	1765S	FlexScan F55	CM600ET	Studioworks 76i	Diamond Pro 67TXV
Visible diagonal	401mm	406mm	398mm	402mm	412mm	409mm
Tube type	shadow mask	shadow mask	shadow mask	shadow mask	shadow mask	Diamondtron
Horizontal frequency	30 - 64KHz	30 - 70KHz	27 - 70Hz	30 - 64KHz	30 - 65KHz	30 - 69KHz
Vertical frequency	50 - 100Hz	50 - 120Hz	50 - 120Hz	47 - 104Hz	50 - 110Hz	55 - 125Hz
Dot / grille / slot pitch	0.28mm	0.28mm	0.28mm	0.28mm	0.28mm	0.25mm
MPR-II	●	●	●	●	●	●
TCO emissions	❍	❍	TCO 95	TCO 92	❍	TCO 92
Max consumption	110W	120W	95W	115W	110W	115W
Suspend consumption	<15W	<10W	<10W	<15W	<15W	<15W
Off consumption	<8W	<6W	<5W	<8W	<5W	<15W
On-screen display (OSD)	n/a	●	●	●	●	●
Size and centering	●	●	●	●	●	●
Barrel / pincussion	●	●	●	●	●	●
Trapezoid	●	●	●	●	●	●
Rotation	●	●	●	●	●	●
Moiré reduction	n/a	❍	●	❍	❍	●
Preset colour temperature	1	3 / plus user	14 / plus user	1 / plus user	2 / plus user	1 / plus user
Video connectors	captive DSUB	captive DSUB	DSUB / BNC	captive DSUB	captive DSUB	captive DSUB
Dimensions mm (whd)	416 x 402 x 435	418 x 438.5 x 417	410 x 413 x 439	412 x 402 x 426	412 x 428 x 431	410 x 409 x 425
Weight	17.5Kg	20Kg	23.5Kg	21Kg	17Kg	21.5Kg
RRP incl VAT	£534.63 (£455 ex)	£468.83 (£399 ex)	£574.58 (£489 ex)	£551.08 (£469 ex)	£574.58 (£489 ex)	£586.33 (£499 ex)
Street price incl VAT	£421.83 (£359 ex)	£410.08 (£349 ex)	£574.58 (£489 ex)	£492.33 (£419 ex)	£481.75 (£410 ex)	£499.38 (£425 ex)
Contact	ADI Systems UK	CTX Europe	PDS	Hitachi	LG Electronics	Mitsubishi
Telephone	0181 236 0801	01923 810800	01483 719500	0181 849 2092	01753 500400	01707 278684

Table of Features

Personal Computer World Editors Choice

Entry-level models

Manufacturer	Panasonic	Philips	Smile	Sony	Taxan	Viewsonic
Model	PanaSync 5G	107B	CA-6736	200sx	EV 730 TCO	17GS
Visible diagonal	411mm	401mm	405mm	402mm	392mm	406mm
Tube type	shadow mask	shadow mask	ChromaClear	Trinitron	Shadow Mask	Shadow mask
Horizontal frequency	30 - 69Khz	30 - 66Khz	30 - 69Khz	30 - 70Khz	30 - 69Khz	30 - 69Khz
Vertical frequency	50 - 160Hz	50 - 130Hz	50 - 120Hz	50 - 150Hz	50 - 120Hz	50 - 160Hz
Dot / grille / slot pitch	0.27mm	0.28mm	0.25mm	0.25mm	0.28mm	0.27mm
MPR-II	●	●	●	●	●	●
TCO emissions	TCO 92	TCO 92	❍	❍	TCO 92	TCO 92
Max consumption	110W	110W	110W	150W	120W	110W
Suspend consumption	<20W	<15W	<25W	<8W	<5W	<15W
Off consumption	<8W	<5W	<3W	<8W	<5W	<8W
On-screen display (OSD)	●	●	●	●	●	●
Size and centering	●	●	●	●	●	●
Barrel / pincussion	●	●	●	●	●	●
Trapezoid	●	●	●	●	●	●
Rotation	●	●	●	●	●	●
Moiré reduction	❍	❍	❍	❍	❍	❍
Preset colour temperature	2 / plus user	2 / plus 2 users	1	1	3 / plus user	2 / plus user
Video connectors	captive DSUB	captive DSUB	captive DSUB	captive DSUB	captive DSUB	captive DSUB
Dimensions mm (whd)	410 x 416 x 444	417 x 426 x 450	420 x 430 x 420	411 x 462 x 424	411 x 424 x 462	410 x 416 x 444
Weight	17.5Kg	18.5Kg	17.5Kg	20Kg	18Kg	17.5Kg
RRP incl VAT	£586.33 (£499 ex)	£580.45 (£494 ex)	n/a	£558.13 (£475 ex)	£504.08 (£429 ex)	£527.58 (£449 ex)
Street price incl VAT	£452.38 (£385 ex)	unknown	£457.08 (£389 ex)	£522.88 (£445 ex)	£479.40 (£408 ex)	£504.08 (£429 ex)
Contact	Panasonic	Philips	Smile UK	Sony IT Group	Taxan Europe	Viewsonic Europe
Telephone	0500 404041	0181 689 4444	01923 211155	0181 760 0500	01344 484646	0800 833648

● Yes ❍ No

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High-end models

Manufacturer	ADI	CTX	Eizo	Hitachi	Iiyama	LG Electronics	Mitsubishi
					Highly Commended		Highly Commended
Model	MicroScan 5G	1785XE	FlexScan F56	CM611ET	VisionMaster Pro17	Studioworks 78t	Diamond Pro 87TXM
Visible tube size	406mm	406mm	398mm	402mm	404mm	410mm	406mm
Tube type	shadow mask	shadow mask	shadow mask	shadow mask	Diamondtron	shadow mask	Diamondtron
Horizontal frequency	30 - 94KHz	30 - 85KHz	27 - 86KHz	25 - 92KHz	27 - 92KHz	30 - 85KHz	30 - 86KHz
Vertical frequency	50 - 120Hz	50 - 120Hz	50 - 160Hz	50 - 120Hz	50 - 160Hz	50 - 120Hz	50 - 130Hz
Dot / grille / slot pitch	0.26mm	0.26mm	0.26mm	0.26mm	0.25mm	0.26mm	0.25mm
MPR-II	●	●	●	●	●	●	●
TCO emissions	TCO 95	TCO 92	TCO 95	TCO 92	TCO 92	❍	TCO 92
Max consumption	135W	130W	110W	110W	130W	120W	130W
Suspend consumption	<15W	<10W	<10W	<30W	<10W	<15W	<30W
Off consumption	<8W	<6W	<5W	<5W	<6.5W	<5W	<15W
On-screen display (OSD)	●	●	●	●	●	●	●
Size and centering	●	●	●	●	●	●	●
Barrel / pincussion	●	●	●	●	●	●	●
Trapezoid	●	●	●	●	●	●	●
Rotation	●	●	●	●	●	●	●
Moiré reduction	n/a	❍	●	❍	●	❍	●
Preset colour temp	3 / plus user	4 / plus user	14 / plus user	2 / plus user	3 / plus user	2 / plus user	3 / plus user
Video connectors	DSUB / BNC	DSUB / BNC	DSUB / BNC	captive DSUB	DSUB / BNC	DSUB / BNC	DSUB / BNC
Dimensions mm (whd)	416 x 402 x 470	418 x 438 x 444	410 x 413 x 439	410 x 429 x 465	412 x 422 x 420	411 x 429 x 432	410 x 409 x 425
Weight	20Kg	21.5Kg	19.5Kg	21Kg	23Kg	18.7Kg	22Kg
RRP incl VAT	n/a	£527.58 (£449 ex)	£703.83 (£599 ex)	£703.83 (£599 ex)	£680.33 (£579 ex)	£668.58 (£569 ex)	£821.33 (£699 ex)
Street price incl VAT	£504.08 (£429 ex)	£504.08 (£429 ex)	£703.83 (£599 ex)	£628.63 (£535 ex)	£599.25 (£510 ex)	unknown	£558.13 (£475 ex)
Contact	ADI Systems UK	CTX Europe	PDS	Hitachi	Iiyama UK	LG Electronics	Mitsubishi
Telephone	0181 236 0801	01923 810800	01483 719500	0181 849 2092	01438 745482	01753 500400	01707 278684

Table of Features

High-end models

Manufacturer	NEC	Nokia	Panasonic	Smile	Sony	Taxan	Viewsonic
		Highly Commended				Highly Commended	
Model	MultiSync XV17+	447Xi	PanaSync/Pro 5G	CA-1706	200sft	EV 750 TCO 95	PT775
Visible tube size	396mm	398mm	406mm	405mm	406mm	406mm	406mm
Tube type	Chromaclear	Trinitron	shadow mask	Shadow Mask	Trinitron	Diamondtron	Diamondtron
Horizontal frequency	31 - 82KHz	31 - 92KHz	30 - 86KHz	30 - 80KHz	30 - 80KHz	30 - 86KHz	30 - 96KHz
Vertical frequency	55 - 100Hz	50 - 150Hz	50 - 160Hz	50 - 100Hz	50 - 120Hz	50 - 130Hz	50 - 160Hz
Dot / grille / slot pitch	0.25mm	0.25mm	0.27mm	0.26mm	0.25mm	0.25mm	0.25mm
MPR-II	●	●	●	●	●	●	●
TCO emissions	TCO 95	TCO 95	TCO 92	❍	TCO 92	TCO 95	TCO 92
Max consumption	110W	150W	120W	100W	130W	120W	130W
Suspend consumption	<30W	<30W	<15W	<8W	<13W	<15W	<15W
Off consumption	<8W	<5W	<8W	<20W	<10w	<8W	<8W
On-screen display	●	●	●	LCD panel	●	●	●
Size and centering	●	●	●	●	●	●	●
Barrel / pincussion	●	●	●	●	●	●	●
Trapezoid	●	●	●	●	❍	●	●
Rotation	❍	●	●	●	●	●	●
Moiré reduction	❍	❍	●	❍	❍	●	●
Preset colour temp	1	7 / plus 2 users	2 / plus user	1	2 / plus user	3 / plus user	3 / plus user
Video connectors	captive DSUB	captive DSUB	DSUB / BNC	BNC	captive DSUB	DSUB / BNC	DSUB / BNC
Dimensions mm (whd)	407 x 424 x 450	430 x 438 x 478	410 x 416 x 444	420 x 410 x 420	406 x 427 x 451	410 x 409 x 433	415 x 427 x 457
Weight	20Kg	22Kg	17.5Kg	20Kg	19Kg	22Kg	21Kg
RRP incl VAT	£856.58 (£729 ex)	£809.58 (£689 ex)	£821.33 (£699 ex)	n/a	£645.08 (£549 ex)	£609.83 (£519 ex)	£757.88 (£645 ex)
Street price incl VAT	£611 (£520 ex)	£628.63 (£535 ex)	£586.33 (£499 ex)	£527.58 (£449 ex)	£586.33 (£499 ex)	£579.28 (£493 ex)	£722.63 (£615 ex)
Contact	NEC UK	Nokia Display	Panasonic	Smile UK	Sony IT Group	Taxan Europe	Viewsonic Europe
Telephone	0645 404020	01793 512809	0500 404041	01923 211155	0181 760 0500	01344 484646	0800 833648

● Yes ❍ No

Publishing rights

Illustration: JOHN BATTEN

Ten top DTP packages, to suit most needs and pockets, displayed, dissected and rated by Tim Nott.

The coining of the term "Desktop Publishing" is widely attributed to Paul Brainerd, founder of Aldus and possessor of probably the most wonderful name in computing history. Whereas the practice of typesetting had hitherto been an arcane and laborious art, involving costly equipment and painstaking "get-it-right-first-time" techniques, the advent of DTP, as it has become known, meant that anyone with a personal computer could play.

The techniques were, and still are, stunning. You don't have to scale pictures by photo-reduction; just drag a corner of the frame. If that's not quite right, try again; no materials have been wasted and little time has been lost. No more half-used sheets of stick-on type; you can choose any typeface and any size with just a few mouse clicks. No more erasing, no more Cow gum, no more correcting fluid. You want to cut a paragraph? No problem; the text will automatically be flowed to fill the gap. You want to contour a text block around a graphic? It's a few clicks' work. You want to add page numbers, index a book, or check the spelling? All taken care of by the software.

DTP has come a long way in its short life, and this has been a particularly exciting year. We've got new releases of Microsoft Publisher, Ventura, PageMaker, PressWorks and PagePlus, together with a brand new contender in the page layout stakes: Canvas, which combines vector drawing, image processing and painting all in one application. The trend is firmly towards electronic publishing: four of the ten products reviewed here will produce HTML output for web pages, and five offer other forms of electronic output. There are lots more new features: Ventura, PageMaker and PagePlus have all had a drastic interface-lift. Word-processing features such as automatic correction of typos and background "on-the-fly" spelling checks have surfaced in PagePlus and Ventura, and Microsoft has added a mail-merge feature to Publisher. But more interesting is the wide price range. You can start at under £30, or pay over 20 times that amount. Here, you'll find a package and a price to suit you.

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204 Adobe FrameMaker 5.11
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205 PFS Publisher 1.1

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Ratings

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

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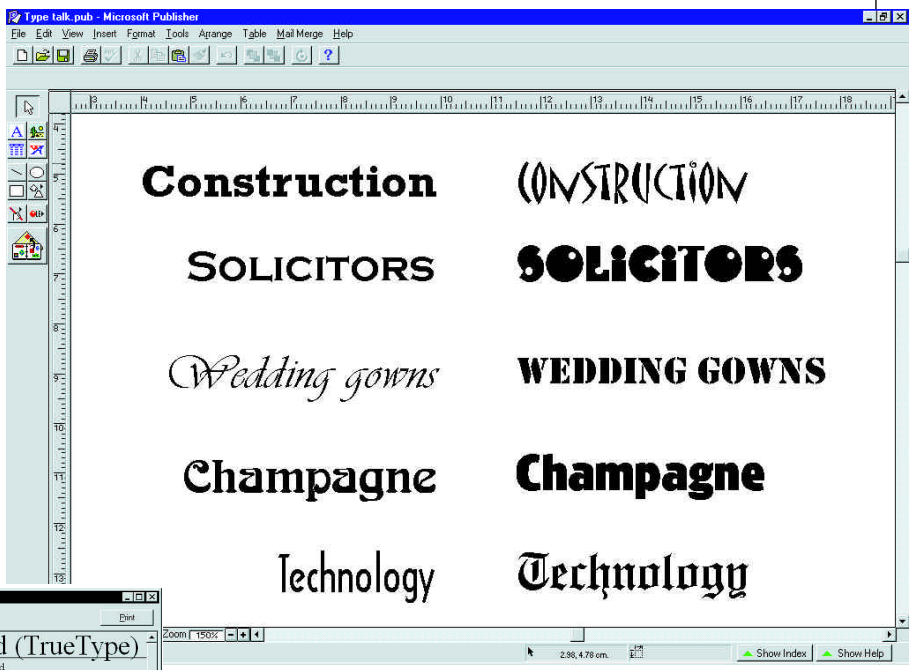
Fonts and clipart

Can you ever have enough fonts or clipart? Taking fonts first, the overwhelming answer is yes. Unless you're working as a jobbing designer, taking work from a variety of clients each with different house styles and typefaces, you don't need thousands. In general, a few well chosen, high-quality fonts are better than a host of indifferent ones. High-quality fonts are well formed and spaced, have no unnecessary control points and are hand-hinted to look correct on-screen at all sizes. Look in the Windows font viewer for the maker's name: Adobe, Bitstream, URW, ITC and Monotype each produce quality fonts. "Own brand" fonts, such as those bundled with some budget packages, can be less reliable and can cause problems in matching if you are sending work to be printed commercially.

The key to successful layout is to use few fonts well. Try not to use more than two (okay, three at the most) different typefaces on the same page. For variation, use different weights or sizes of the same family. Don't set long text in a Sans Serif font like Arial, unless it's laid out in columns. Serifs (as seen in Times Roman) help lead the eye across the page. Keep decorative fonts for short headlines and avoid using all-capitals, particularly in script-style faces. For publicity material and logos, let the font "talk". An elegant script can sell perfume; a heavy slab-serif is more suitable for a welding shop.

Software houses fall over themselves to offer massive clipart libraries. They are great fun to browse and use for home or in-house business publishing, but professional work usually demands original artwork. No client wants readers of their advertisements saying "Hey look, that picture's from the PagePlus clipart collection".

There are, however, essentials: common symbols, outline maps, insignia, flags, credit cards, international standard signs, and so on. And don't forget that many standard items like stars, map and weather symbols and musical notes are available as fonts. ■



Above Let the typeface do the talking — who'd get your custom?

Left Double-clicking a font file in Windows 95 presents a handy preview

Glossary

Ascenders, descenders The parts of a letter that extend above or below the x-height.

Colour The visual density of text. Well-set text has a consistent colour, avoiding "loose" or "tight" lines and "rivers".

Crop and registration marks Both lie outside the final page. Crop marks show where to trim the paper after printing. Registration marks are used to line up successive print runs in different colours.

Drop caps The large first letters of a paragraph that extend into the lines below.

Greeking Most DTP applications will "Greek" text — displaying it as grey blocks — below a certain size. This speeds up display redrawing.

Kerning Changing the spacing between letter-pairs. The letter V, for instance, needs to be closed-up to look balanced, especially in large sizes.

Knockouts Removing underlying colours. If yellow, say, is printed over black, the black needs to be "knocked out", as if with a pastry cutter, below the yellow areas, or a muddy brown would result.

Leading The spacing between lines, measured base to base. Usually expressed either in points or as a percentage of the point size of the text.
(*Bluffers note: it rhymes with heading, not reading*.)

Master pages Non-printing pages which act as templates, containing column guides, page numbers and other common "page furniture".

Pantone An industry-standard range of printing colours, specified by library and number. Other systems, such as Trumatch and Focoltone, also exist.

Points, Picas Type is traditionally sized in points, about $^{1}/_{72}$ of an inch, measured from the tips of the lowest descender to the highest ascender. A pica is 12 points.

Process colour Produced by mixing dots of different-coloured inks, usually Cyan, Yellow, Magenta and Black, each from a separate printing plate.

Rivers Snaking areas of white space seen running down badly set, justified, columns.

Spot colour Solid colour produced by a separate printing plate.

Tags Codes that can be included in plain text files and interpreted as formatting commands when imported by the DTP software.

Tracking The overall spacing between letters in a block of text.

Trapping Generating a small overlap between adjoining colours, to avoid white lines caused by slight misalignment between print runs.

Widows and orphans Not a printers' charity but the first or last line of a paragraph breaking over a page.

x-height The height of the body of a lower-case letter, as measured from the letter "x". Arial, for example has a much larger x-height than Times New Roman, at the same size. ■

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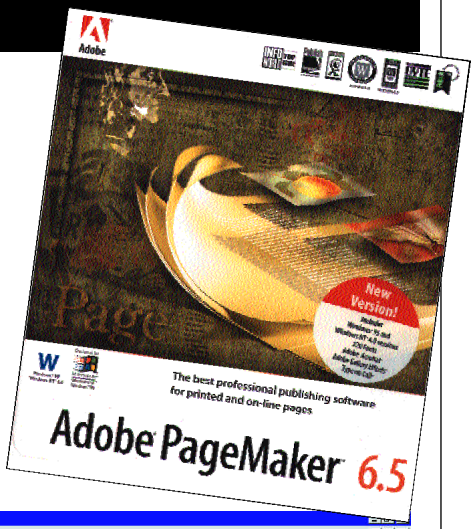
Adobe PageMaker 6.5



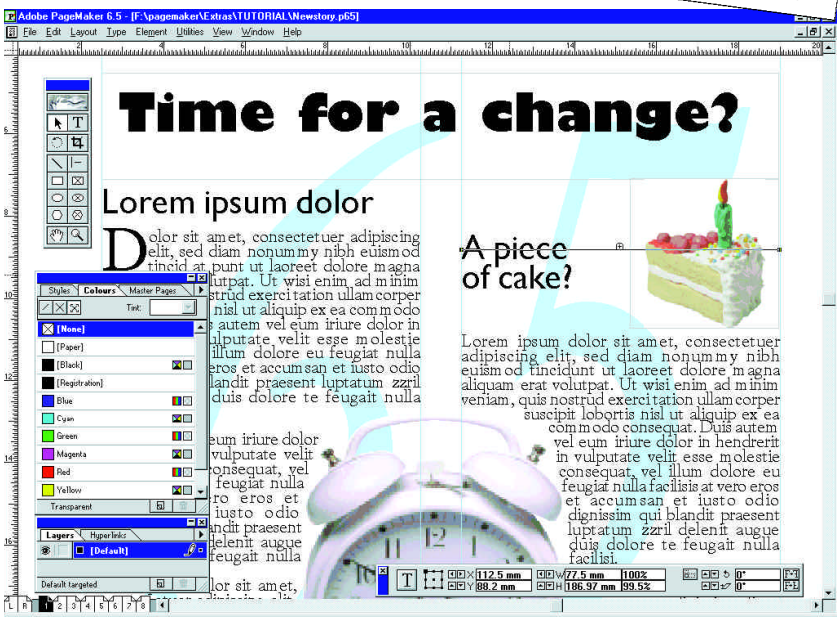
It has taken PageMaker several years to recover from being knocked off the number one slot by Quark XPress. Version 5 brought free rotation, a Control Palette to match Quark's Measurement Palette, better colour support and "Additions", offering a third-party development platform to compete with Quark's Xtensions. The next year saw the Adobe's acquisition of Aldus, the other half of the DTP revolution that brought PostScript and scalable fonts to the desktop. Version 6 renamed "Additions" to "Plug-ins", offered better pre-press facilities, better drawing and graphics support, HTML output and multiple master pages.

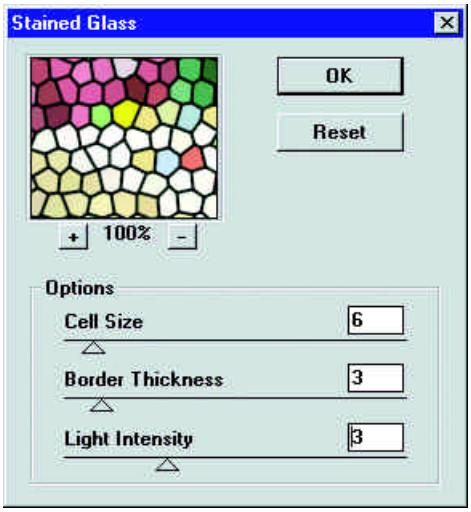
Adobe is being rather modest in the point-five version increase, as there have been some radical improvements. The interface, which hitherto seemed to have carried a 1980s preservation order, has had the Adobe look thrust upon it. The palettes for master pages, colours, styles and so on, can now be stacked into one tabbed box, which tidies up the screen considerably. The formerly ugly Control Palette has also been given a facelift and at last the Windows version has shaken off its Mac ancestry by giving the right mouse button a useful role. Formerly relegated, like Quark, to zooming in and out, it now produces a Windows 95-style context menu, offering shortcuts to editing and formatting objects.

The toolbar sports four new additions. A hand tool has appeared, for dragging the visible area of the page around the screen, but more importantly, the three shape tools (rectangle, ellipse and polygon) have been complemented by corresponding frame tools. These serve as containers in much the same way as Quark's boxes, except one type fits both text and graphics. The former flows to fit the shape of the box, while the latter are cropped to it. You can still use the text tool to place "free-range" text anywhere on the page, and the built-in story editor remains available for longer passages. The table editor has been updated but still doesn't offer the features you'd see in a top-range word processor. And there's still no button bar for the usual save, open, print and clipboard commands. Despite the interface enhancements, I found it awkward to select and manipulate objects on the page, and there were problems with the display. Using a Matrox Millenium card (a popular choice) I found I had to zoom in and out to update and get rid of spurious artefacts on the page.

Another brand-new feature is document layering. Any object on any page can be assigned to a layer and each layer can be made visible or hidden. This has a number of uses: for instance, you can create different versions within the same document, you could publish a commercial flyer, say, with different addresses for regional branches, or an instruction manual with the same illustrations but text in several languages. Another use could be for in-house annotations that don't get printed in the final version.

Auto-reformatting is another potential time-saver: if you change the page or margin size, graphics will be adjusted and text re-flowed to suit the new format. In keeping with Adobe-isation, there are more Plug-ins, and you can now apply Photoshop filters "in-place" to imported TIFF images.





Above About time, too: PageMaker gets a new Adobe look

Left In-place Photoshop effects

Version 6 brought us an HTML Plug-in, and 6.5 goes further down the road to electronic publishing. For web design there is a hyperlinks palette and both enable import and export of HTML files directly to and from a browser. Further enhancements mean it's now also possible to export multi-column layouts to HTML, and convert images directly to GIF or JPEG format. There's a direct export to PDF format so you can create documents, complete with hyperlinks, in Adobe Acrobat format.

Finally, there's a good assortment of extras: a "light" edition of Photoshop, Acrobat Distiller and Reader, Adobe Type Manager, ODBC and PostScript drivers, 220 fonts (you have to register the product before you can unlock these from the CD) and 17 spelling-check languages. Finally, a stunning multimedia tour and tutorial contains a gallery of examples of professional work.

PCW Details

Price Street price £468.82 (£399 ex VAT)

Contact Adobe Systems 0181 606 4000

Good Points Long-awaited interface improvements, direct HTML and Acrobat output.

Bad Points Display problems on test machine. Poor tabling.

Conclusion Starting to out-feature Quark, but still lacks the latter's elegance.

★★★

p192 ➢

Corel Ventura 7

It will come as no surprise to Corel connoisseurs that this package is huge. I'll keep the roll-call brief, but besides Ventura there's PhotoPaint, WordPerfect, Depth (3D-Logos), Multimedia Manager, Web Builder, CD Creator and Database Publisher. Support acts include tools for colour management, scripting, screen-grabs, sound editing and multi-lingual proofing. Installing the lot will set you back 260Mb of disk space and that's before you copy any of the 1,000 fonts or 30,000 clipart and photo images.

Traditionally, the key powers of Ventura have been managing long, complex documents and reducing its users to wrecks with its intransigent interface. Following its acquisition, Corel's developers enriched the latter with their own profusion of button bars and roll-up palettes.

This version starts off with six toolbars on the screen, but it's far less intimidating than that might suggest. At the top you get the usual file operations, four flavours of print, a 99-level undo, a small colour palette, proofing tools, text and graphics import, and buttons to open the Navigator and Library palettes. The Navigator shows a tree-like view of a document structure with chapters shown as sub-folders, and text items, graphics and stylesheets shown as files. The Library is a multi-format scrapbook which can also hold text, graphics and stylesheets for re-use.

At the left of the screen are the main page layout tools, with zooming and navigation below. On the right are outline and fill toolbars, the latter giving access to the rich Corel collection of gradients, patterns and fractal-generated bitmaps. Below the top button bar is the Property Bar which is context sensitive: with text selected you get the usual font formatting, buttons to insert page numbers, dates, tables and URL links. Similarly, you get size and position controls with frames or drawn objects, paragraph attributes when using style tags, and so on. One clever feature is that "mode" changing is automatic: you don't have to select a tool to edit text, for example, just click inside its container and type.

The drawing and frame tools are excellent, with a range of "containers" for text, illustrations or fills such as stars, polygons and the like, and purpose-made "callouts"; text boxes with arrows for annotating pictures. You can fit text directly to curved paths and even convert it to editable shapes for node editing. Similarly, you can node-edit imported vector graphics in-place and do basic image-processing tasks on bitmaps. Colour management is everything you would expect from a top-end package, with copious colour libraries, automatic trapping and separations to six as well as four process colours.

Ventura's paragraph style tags can now include drop capitals, conditional tagging for creating different versions within the same document, and even text rotation. On a more fundamental note, this release addresses two former shortcomings: you can now have more than one document open at a time, and you can also have multiple master pages in the same document. Text editing can either be done in place or via the Story Editor; either way, you have on-the-fly spelling correction and an ever-open thesaurus. There's an excellent table editor, too, with spreadsheet-style formulas, text rotation and the facility to add the full range of graphics and fills to cells.

Corel has embraced electronic publishing with a vengeance. First, you can produce Envoy files, Corel's own portable document format, in direct competition with Adobe Acrobat. Since this is done via a printer driver outputting to a file, you can create Envoy documents with other applications. Second, you can output vanilla HTML for producing standard web pages, and there are tools for inserting hyperlinks and converting graphics to GIF or JPEG format. Third comes Barista, another Corel-developed standard that adds Java-assisted support for multiple columns and fonts, animation and interaction.

Top Multiple documents and web publishing
Bottom Managing publications with the Navigator, and checking spelling on-the-fly

PCW Details

Price £816.62 (£695 ex VAT)
Contact Corel 0800 973189
Good Points Loads of everything and a much-improved interface.
Bad Points Huge, complex and expensive.
Conclusion Undoubtedly the best Ventura ever.
★★★★

GSP PressWorks

Although you don't get a lot of resources, just 35 fonts (and a font manager) and 104 clipart images (with a browser), you do get a fair sprinkling of extras. The disk contains both Windows 3.1 and 95 versions, a browser for Photo CDs (but no images), and utilities for inserting symbols, and screen capture. There are 30-day trial versions of Border Creator, PhotoEdit and DesignWorks, and a plentiful supply of templates and "PagePilots" (GSP's version of Wizards). Although not quite as plentiful as Microsoft's they are more UK-orientated, and cover publications ranging from compliment slips to children's books.

Once you start, either with a Pilot, from a template or from scratch, there's plenty of help. Cue cards stay on-screen to guide you through various processes, and brief "Getting Started" explanations pop up when you first select a tool; both of these can be turned off as you progress. In addition, the status line prompts you for action and, most usefully, informs you what action the Ctrl, Alt and Shift keys will have as you drag with the mouse. Even though you can't customise the various button bars, there are options to show more or fewer controls, which can simplify things for beginners.

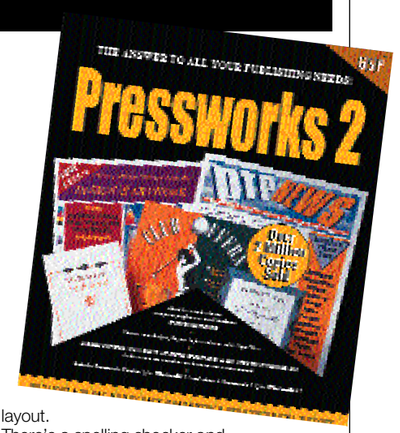
The left tool bar selects the "Mode" to in which to work: creating and moving frames, editing text, formatting paragraphs or drawing. There are also buttons for inserting clipart, PowerText, OLE objects and links to any other GSP software you might have.

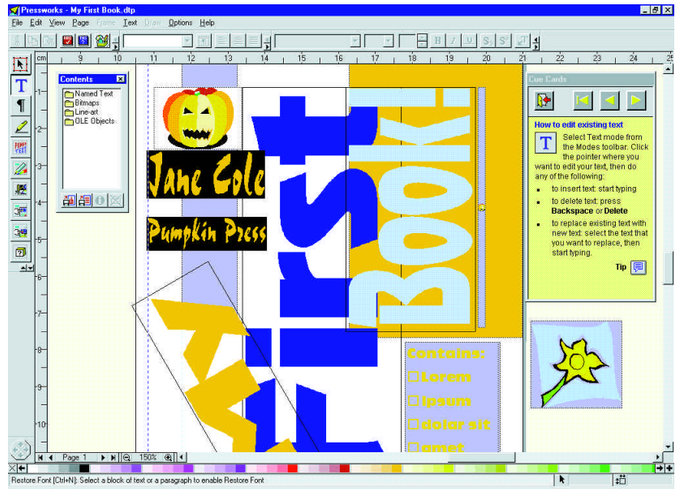
As you switch modes, the top toolbar changes to suit, with border, stacking and text wrap controls for frames, a word processor-type formatting ribbon for text, a set of line and shape tools for drawing, and so on. At the bottom of the screen are page navigation and zoom controls, the colour palette and a rather redundant-seeming "nudge" keypad which duplicates the keyboard arrow keys. With the exception of the colour palette, you can drag all the boxes around the screen or dock them at the edges. One further control is the "Contents" box, which lists all the imported (or named) stories in a publication, as well as graphics and OLE objects.

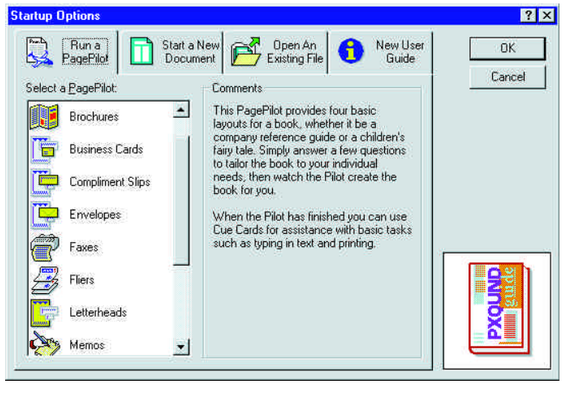
Typographic control is adequate, if not up to Serif's standard of precision, and you can set rules for the letter and word spacing of text. You can wrap text around graphics and pour it into shaped containers, but there's no drop cap style. An improvement on previous versions is that you don't have to create a frame explicitly to hold text or a drawing object. Although you can't rotate standard text or drawn objects, you can use the PowerText type-shaping feature to rotate to any angle, include a variety of background shapes and apply other special effects. It's much faster than Microsoft's WordArt and offers more alternatives, such as spiralling text. For an inexpensive package, the colour support is impressive. You can produce both process and spot colour separations with knockouts (but no trapping), and a set of Pantone swatches is included.

Document handling is good in parts: you can have left and right master pages and "autoflow" imported text; extra pages and frames are created automatically. You cannot, however, reserve empty frames for headings or side panels; the text will flow through every frame available. The way around this is to put some dummy text into any master page frame you want kept free. A bigger flaw is that changes to the master page only affect pages added subsequently: so you can't make global changes to page layout.

There's a spelling checker and thesaurus, and the Contents box will give you a word-count of each named text. There's no table of contents or index generator but there's a good range of import filters, and you can "tag" text files with Pressworks' formatting codes.







Above Cover story — publish your own book in Pressworks

Left Pressworks' pilots prepare to take off

PCW Details

Price £46.95 (£39.95 ex VAT)
Contact GSP 01480 496789
Good Points Easy. Powerful. Cheap.
Bad Points Few fonts. Not much clipart. Master pages poorly implemented.
Conclusion A worthy alternative to Serif or Microsoft at a much lower price.
★★★★

p194 ➢

MS Publisher 97

Publisher's target market has always been the beginner and its philosophy is to keep things simple and provide lots of help. Publisher 97 is no exception. With the 97 version, I'd expected the "new look" of Office 97 and Internet Explorer 3, but the appearance and feel is much the same as before. I'd also hoped for a new set of tools, like the suite-wide drawing tools seen in Office, but these, too, remain unchanged. You have basic line, rectangle and ellipse tools and a set of "smart" custom shapes like stars and arrows. If you want to go further you have to use the WordArt OLE applet (for shaping text) or the rather tired old Windows Draw applet, which still hasn't achieved the OLE2 heights of in-place editing.

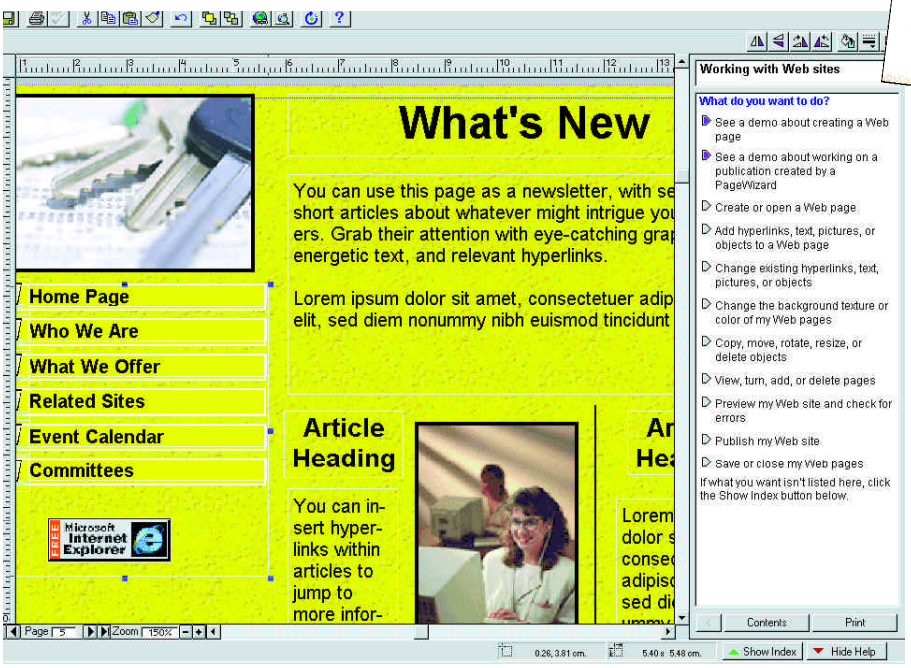
On a brighter note, you don't have to do much low-level creative stuff as there is a profusion of ready-made artwork. A huge range of Page Wizards offer everything from newsletters to origami, in a variety of styles. There are 5,000 clipart images, a design Gallery of ready-made headlines, ornaments and other page furniture, and other PageWizards to set up things like coupons or small-ads. You have the usual tools for creating and linking text frames, and a helpful touch is that a "smart" cursor shows when you're about to move, resize or link objects.

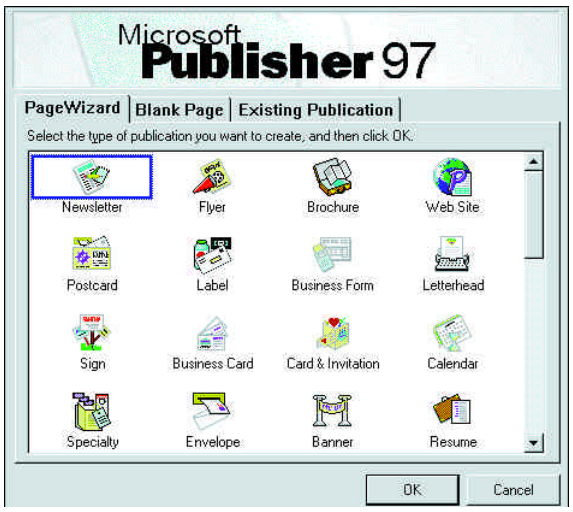
So what's new? Well, there is more clipart, more fonts and more Page Wizards. The drawback is that it's very hungry in terms of disk space: a standard installation takes over 100Mb, including 28Mb just to gain access to the gallery of clipart on the CD. If you want even more clipart, there's a link to the online gallery at the Microsoft web site. There's a new mail-merge facility so you can now individually address each copy of a newsletter or invitation, say. You can create an address list in Publisher, or import one from a variety of sources including Works, Word and Access, but not, rather annoyingly, Microsoft Exchange or Outlook.

Predictably, the main thrust of development appears to have gone into web page design. There's a load of web-ready clipart in the form of buttons and bars, a set of web templates for company and personal use, and tools to insert hyperlinks and format text links automatically. Again, Publisher is ever-helpful, and will warn of problems such as overlapping graphics and text blocks or fonts that may not display properly in viewers' browsers. You can preview pages and test links in your own web browser, then export the publication to HTML. You can't open an HTML file, though, so to change it you'll need to edit the Publisher file and re-export, which rules out editing the raw HTML source code. You can also publish directly onto the web, but you'll need to download the Web Publishing Wizard from the Microsoft web site first, as it isn't included on the CD-ROM.

Apart from this, the feature list and limitations, remain much the same. You can still only load one file at a time and the appearance using a 256-colour display is still horribly dithered; the Internet Explorer preview shows a far better colour display when previewing web pages. There are no industry-standard colour libraries, and though Publisher will produce separations, you are limited to two spot colours.

On-line help is copious and the Publisher Companion provides essential reading on typography and page design. The book also has a catalogue of all the clipart and fonts, as well as more sound advice on when and where to use the latter.





Above Web page design with Microsoft Publisher

Left Let Wizardry commence...

PCW Details

Price £99.99 (£85 ex VAT)

Contact Microsoft 0345 002000

Good Points Ease of use. New web page support.

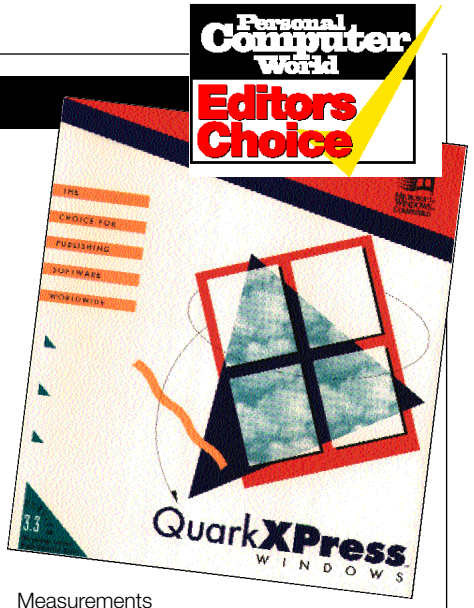
Bad Points Heavy on disk space. Few radical improvements from the previous version.

Conclusion A painless start for wannabe publishers, but more ambitious users will prefer Pressworks or PagePlus among the budget packages.

★★★

p196 ➢

Quark XPress 3.32



It comes with no fonts, no clipart, no on-line tutorials, templates or other goodies. It has seen little in the way of upgrade since the first Windows version appeared in 1992, and at £895 (ex VAT) is the most expensive product reviewed here. Yet walk into almost any editorial production department and you'll see it being used, usually on Apple Macs.

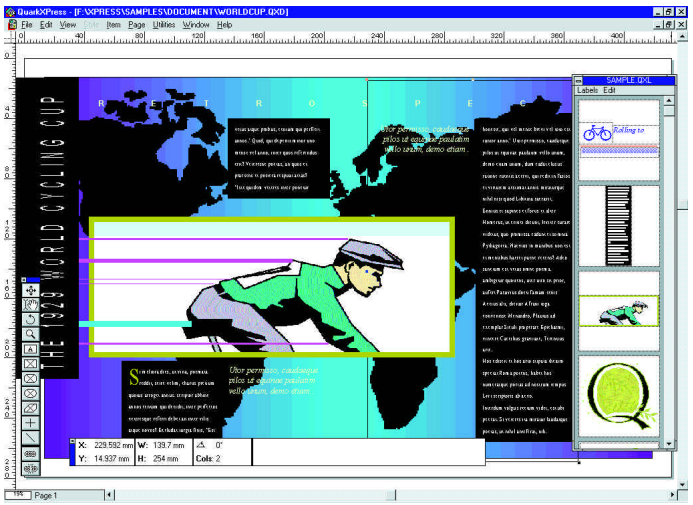
Although Aldus PageMaker was the pioneer of Mac DTP, in the late eighties it lost out to Quark XPress, with its killer features for professional publishers. With its multiple master pages you could have templates for a variety of page layouts in the same publication. Free rotation meant you could place text and graphics at any angle. The real clincher was the facility for third-party developers to create add-ons ("XTensions") which can extend general features like the colour balance between monitor, scanner and printer, or collecting all the font, graphic and other files needed for a publication. They can offer "vertical solutions", too, such as automatic importing and laying-out of classified ads from a database.

Quark's precision is legendary. You can position objects to 0.001 mm and 0.01 degrees. You can set type in one thousandth-of -a-point steps up to 720 points (250mm). You have total, fine control over tracking and leading, and can even create tracking tables for different sizes of the same font. Kerning is completely controllable, either on a one-off basis or by editing the kerning table for each font. There is comprehensive hyphenation control, to enable narrow-column justified text to maintain a good "colour" without tight or loose lines, or rivers of white space. Colour support is strong, with eight Pantone and other libraries, plus process and spot colour separation with automatic trapping.

Despite the power, the interface is simple and a 13-button toolbar provides most of the creative muscle. This contains a zoom tool and basic line and arrow drawing tools, but the key feature is the box tools. The text box tool creates frames to hold text. The picture box tools, which come in rectangular, elliptical, rounded-corner and freeform, are used to hold pictures, but as you can give all boxes a coloured outline and a solid or graduated fill, these also serve as shape-drawing tools. Although you can only create rectangular text boxes directly, you can subsequently change the shape to any of the picture box options.

Having created the boxes, the top two tools on the bar toggle between editing the container (resizing and moving, or its contents) typing and formatting text or importing pictures. This is where the Measurements Palette comes in. Depending on the selection and the mode, you have control of nearly every aspect. With the contents of a text box selected, you have all the font and other typographical controls to hand. With a picture box selected, you can scale and rotate the contents. Further palettes offer colour, trapping information and stylesheets, and two essentials are the Document Palette, which lets you manage pages (re-ordering and assigning master pages) and the Library Palette, which lets you store text and graphics for re-use.

Despite its reputation and the elegant simplicity of the interface, XPress is starting to show its age. There's no HTML or other electronic output support in the PC version, and the interface needs some of the features we take for granted in Windows applications. There's no recent file list, no button bar for common commands like saving, and no right-button context menu. Version 4 is being developed for release "later this year".



Above All change: one-stop formatting with Quark's Change Bar

Right A trip to the library — storing images and text

PCW Details

Price List price £1,051.62 (£895 ex VAT). Street price around £600 ex VAT

Contact Quark Systems 01483 454397

Good Points An industry standard with phenomenal precision available on both Mac and PC.

Bad Points Expensive. Beginning to look dated.

Conclusion That new version is long overdue.

★★★

p203 ➢

Serif PagePlus 4

Personal Computer World Highly Commended

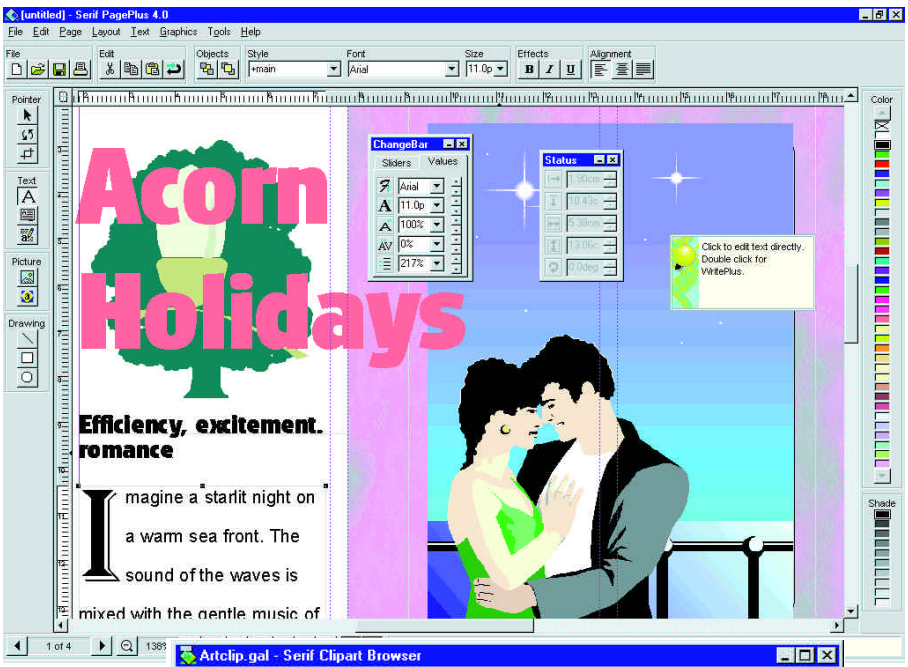
Serif continues the tradition of offering value for your money by including 400 fonts and 17,500 photographic and clipart images. The latter come with both a browser and a printed catalogue, and other goodies include a trial version of DecideRight (the software for those who can't make up their minds). All this can take up over 100Mb of hard disk, but you have the option of leaving items like the 50Mb of Wizards on the CD.

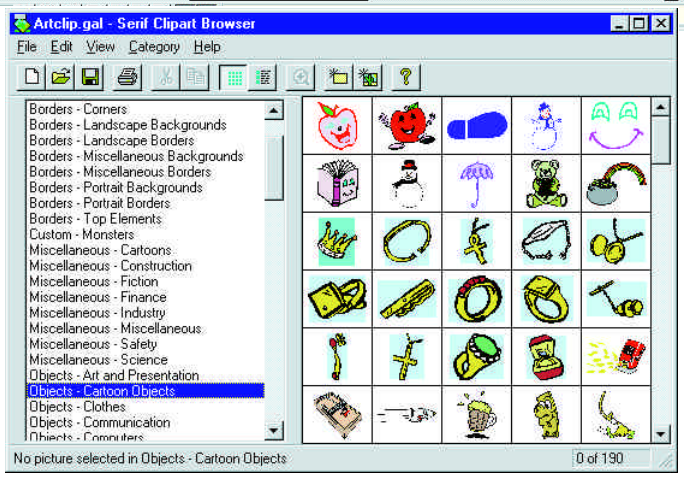
The first noticeable point in this new, Windows 95 version is a change of interface. The floating toolbox is gone and instead, the basic tools are grouped and fixed to the left of the screen. Up above are the usual file and clipboard tools, again grouped, and a context-sensitive set that changes with the selected tool. As each group is labelled, it's very simple and logical, but wastes quite a bit of screen area. Down below are the navigation and zoom tools and, to the right, the colour palette. This is ingeniously split into two, with ten shades of the selected colour showing below the main swatches. The ingenious, but awkward, Change Bar (as seen in Mini Office Publisher) has also had an overhaul. Two tabs switch between slider and numeric value control and all the available options are visible at once. Although this works better than the old method of paging between font name, size and so on, it's still flawed in parts. The font menu, for instance, shows only the first few letters of each name alhtough you can access the full font names from the WP-style ribbon, above. The Status Bar can be turned on and off (like the Change Bar) from buttons beside the zoom controls, shows the size, position and rotation of selected objects, and you can edit the values with real-time screen updating.

There is plenty of help. In addition to the multitude of Page Wizards, which help you create anything from corporate newsletters to a trivia quiz, there are task-specific versions to deal with the likes of placing frames and importing files. Other aids include tooltips, and a floating Quick Help panel which gives a longer explanation of the control under the mouse pointer. A further hint panel pops up from time to time, which offers a variety of sensible and "fun" advice, and also serves to detect the presence of Elvis and Bill Gates. You can turn any or all of this off once you become familiar with the program.

You get a high degree of precision and very advanced colour features. There are two Pantone libraries and full spot and process separations with automatic knockout and trapping. You get fine control over kerning and spacing, and can rotate "free" text to any angle. For more adventurous text effects, the LogoPlus applet is almost like a drawing program in miniature. You can "warp" text or fit it to a curve, and add shapes and pictures in layers, to create complex logos and special effects.

There is not much in the way of long document support. You only get one pair of master pages, and there are no indexing or contents features. But you can import text files from a variety of sources and "Autoflow" them: if you've already created text frames, PagePlus will first ask whether you want them filled; or you can accept the default to create new frames and pages on the fly. The Story Manager will keep track of separate text items, and allow you to edit them in the built-in word processor, WritePlus. This features a grammar checker, a spelling checker, and an autocorrect feature to fix common mistakes like typing "teh" for "the".





Above Take a flyer — Page Plus will separate for commercial printing

Right If you don't like these, there are 17,470 other images

PCW Details

Price £99.95 (£85 ex VAT)

Contact Serif 0800 924925

Good Points Lots of help. Powerful features. Plenty of clipart.

Bad Points Space-wasting toolbars. Few document management features.

Conclusion An excellent balance between power and user-friendliness.

★★★★

p204 ➢

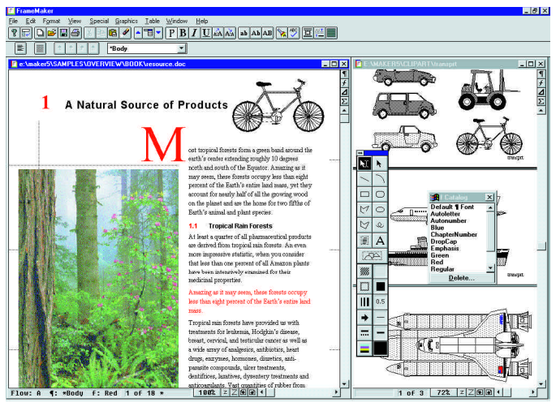
Adobe FrameMaker 5.11

Another Adobe acquisition, FrameMaker has always been outside the mainstream of DTP. An innovator in electronic publishing, it was designed not just for paper publishing but as a corporate-wide document production tool, operating on a variety of platforms. Documents could have "hyperlinks", rather like a Windows help file, long before Adobe Acrobat came on the scene or HTML became widely used. Indeed, FrameMaker shows off its capabilities by having all its online documentation in its own format.

The interface is beginning to look dated: to change fonts, for instance, you need to use the menus, although ultimately it's more efficient to create a series of styles which can be applied direct from the palette. There are good page layout, typography and drawing features, including a set of equation-editing tools, and colour support includes Pantone libraries and separations. Unlike the other top-enders, however, trapping has to be done manually, a laborious business.

FrameMaker's strong point is the management of long documents, with automatic indexing and contents tables and "conditional" text that can be used to create different versions within the same document. You can break a document into chapters, listed in the book palette, and open several chapters in separate windows. As well as its native electronic format, there's HTML and "Acrobat ready" output, but the latter still needs the Acrobat Distiller program (not included) to produce PDF files.

You don't get much in the way of extras — just 13 fonts and 750 clipart items; but then, it's not really intended as a "fun" application. A new version is expected later in the year, but pending that it's hard to see a direction for FrameMaker. It doesn't compete creatively with the other heavyweights, and its price makes it an expensive one-per-desk application in its perceived role as a corporate document panacea.



In the frame — own-brand electronic documents

PCW Details

Price £881.25 (£750 ex VAT)

Contact Adobe 0181 606 4000

Good Points Multi-platform. Strong on electronic documentation.

Bad Points Expensive and dated, with an eccentric interface.

Conclusion A niche product that's rapidly losing status with the popularity of Acrobat and HTML.

★★

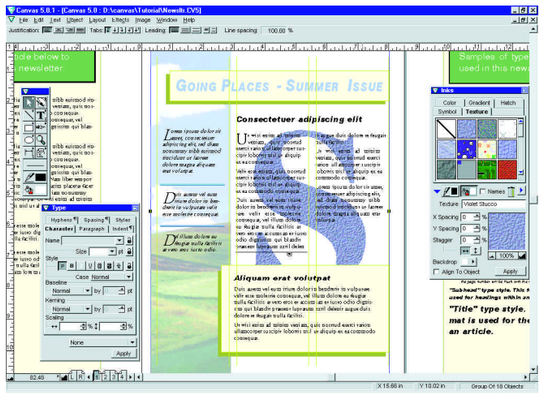
Canvas 5

Canvas attempts to offer all things to all users, encompassing page layout, drawing and bitmap editing. But unlike conventional graphics suites it does it all in the same application. It's Windows 95 only and has 2,000 fonts and a 20,000-piece clipart library. The interface is uncluttered, with just one small toolbox. Most buttons, however, expand into further toolbars or palettes that can be "torn off" and parked anywhere on-screen.

Typographic control is excellent, with text wrap, text shaped to paths and containers, kerning and precise hyphenation control. Drawing is similarly well-endowed, with special tools for spirals, stars and polygons, plus a variety of shaded fills. The line options are especially good: you can draw calligraphic lines, multiple, multicoloured lines and "neon" effects. Bitmap editing is probably the best here: it supports Photoshop standard plug-ins but there is also a comprehensive selection of brushes and retouching tools.

It scores poorly with large quantities of text. It won't, for some bizarre reason, import plain text files; it's RTF or nothing. Nor will it import text directly into a frame, or series of frames: you must use a temporary container, then copy and paste. There's only one set of master pages and no indexing or contents facilities. Canvas should be viewed as a page-design rather than document-production tool.

Like PageMaker and Ventura you can have "layers". Colour support is extensive, with Pantone, Trumatch and Toyo libraries, process and spot separations, and automatic trapping. Perhaps because it tries to do so much, it's rather slow, and the developers haven't provided Windows 95-style right mouse button menus. There's no HTML support, but you can export to Acrobat format and create on-screen slide shows containing QuickTime movies.



All-in-one graphics and page layout

PCW Details

Price £468.82 (£399 ex VAT). Competitive upgrade £135.95 for a limited period

Contact POW! Distribution 01202 716726

Good Points One-stop shopping for image editing, drawing and page layout.

Bad Points Poor text import and placement.

Conclusion Better for short documents, rather than books or magazines.

★★★

Mini Office Publisher

This bears an uncanny resemblance to last year's PagePlus, and is in fact that very thing rebadged. You get 200 fonts and a 2,000-piece clipart collection, complete with browser and an extensive set of home and business templates. For the first-time user, it's packed full of help with pop-up page hints on the templates, a "sticky note"-style help panel and a simplified interface option. Although there are no printed manuals, there's ample documentation in the form of Acrobat documents, with a reader supplied.

Experienced users can move up to the full set of menus and buttons, when it soon becomes apparent that this is a remarkably powerful product for its price. You get colour separation and trapping, precision placement and sizing to within 0.01mm and 0.01 degrees for objects and 0.1 point for text, and a single pair of master pages. Again, it's more suitable to short publications rather than books (there's no indexing or contents) but there is a built-in word processor, WritePlus, and a Story Manager to help you keep track of individual texts in a publication.

Creating and editing objects is done with a set of palettes. First, the toolbox provides the usual drawing, frame creation and text tools. Second, the Changebar (as its names suggests) changes to suit the selected tool. Click on the button at the top right of this and the Property palette pops up, with a series of buttons that, in turn, change the contents of the Changebar. With the text tool selected, for example, there are separate buttons to set the font, size, colour, style and so on. It's ingenious and space saving, but it does make changing several attributes rather tedious, as you click back and forth between the two.

Last year's PagePlus... reborn

PCW Details

Price £29.99 (£25.52 ex VAT)

Contact Europress 01625 859333

Good Points Easy to learn. Powerful to use. Cheap.

Bad Points ChangeBar makes formatting long-winded.

Conclusion Why pay more?

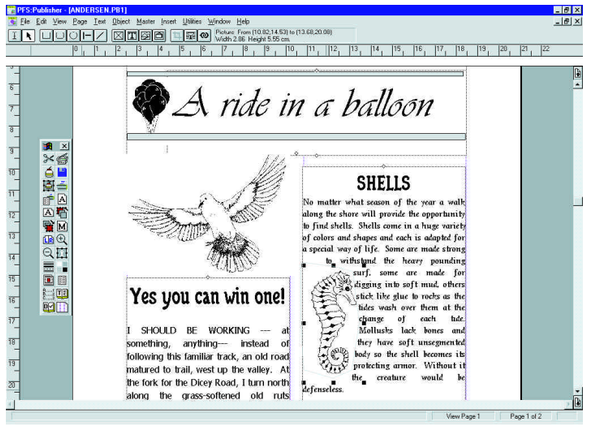
★★★★

PFS Publisher 1.1

The white heat of competition at the lower end of the market seems to have passed by PFS. It hasn't seen an update since 1993, and compared to the other budget products, is fairly spartan. You can have any colour you like, but only if it's in an imported graphic as there is no built-in colour support. You get just 12 fonts (which get installed to the wrong folder) and a small clipart collection, which being mostly bitmapped, doesn't scale well.

But let's look at its positive points. Not everyone has the latest in PC technology and the unique selling point of PFS is that its hardware demands are minimal. It takes up just 6.5Mb of hard disk and will run on a 2Mb 286. Although there are no Wizards or online tours, you do get a good range of templates, a real paper manual, and it's remarkably easy to use.

A single row of buttons sit at the top of the screen, and you can have an additional, customisable palette. The two leftmost buttons (or a right mouse-click) toggle between drawing or creating frames, and editing text; the rest of the bar changes to suit. Though the page design features are fairly limited (you can't rotate text or objects) you do get basics like formatting styles and master pages, and luxuries like dropped capitals, text wrap-round graphics, and manual kerning. You can load multiple documents, create indexes and tables of contents, and link frames to flow stories between pages but you have to create and link each frame manually, which makes the creation of long documents tedious. There's a spelling checker and thesaurus (but no word counter) and you can import OLE objects: like imported pictures, these will display and print in colour.



The black-and-white world of PFS

PCW Details

Price £29.99 (£25.52 ex VAT)

Contact The Learning Company 0181 246 4000

Good Points Runs on any Windows 3-capable PC. Easy to learn.

Bad Points Limited to black and white. Hasn't been developed since 1993.

Conclusion Ideal for those with old equipment on a tight budget, like churches or voluntary organisations, say.

★★

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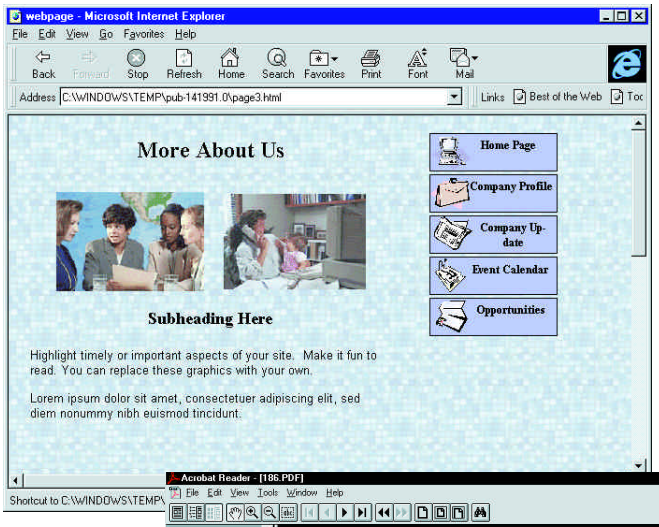
Electronic Publishing

Electronic publishing falls into three categories. First, web page production. Here, you're severely limited in terms of typography, page design and graphics. You have a very limited choice of fonts and you can't wrap or overlap text and graphics, with the exception of coloured or textured backgrounds. You can't use vector drawings in standard HTML — everything has to be bitmapped to GIF or JPEG format. You are also constrained by bandwidth: if you use large graphic files they are going to take so long to download that most users will leave the site in frustration.

The situation is, improving, though. More fonts are becoming available for web design, as is text set in columns. Frames, Java applets and technologies such as Shockwave add more design options, but these aren't really concurrent with the capabilities of traditional DTP applications. Check out Microsoft FrontPage or SoftQuad HotMetal Pro for dedicated products that won't break the bank.

Second comes "Portable Documents" which can be viewed on a range of platforms without needing resources such as fonts installed on the machine. Unlike web pages, these are designed to be installed locally and offer far more page-design creativity as well as hyperlinks and multimedia. FrameMaker pioneered cross-platform electronic documents, but its proprietary format leaves it somewhat out on a limb. The current number one is Adobe Acrobat although you need to buy Acrobat Distiller, or use the built-in capabilities of PageMaker or Canvas to create the PDF file (the viewer is freely available). Following closely is Corel's Envoy, which again produces layout-rich and multimedia-enhanced documents. Envoy has the advantage of better compression, and the ability to create self-running executable documents: in other words, you don't need to install any reader software on the viewing machine. A further benefit is that it installs itself as a printer driver on the originating PC, so you can create Envoy documents from any application.



Left Previewing a Microsoft Publisher web page

Below Adobe Acrobat's format is ideal for electronic publishing. You can even get two years' worth of *PCW* on a CD-ROM !

Finally, for all-singing, all-dancing multimedia applications such as CD-ROMs or product demos, you really need specialised authoring software. Conventional DTP, however electronically enhanced, simply isn't up to the job. Macromedia Director and Asymetrix Toolbook are the favourites for pros, but both are expensive. For a budget solution, try Digital Workshop's Illuminatus. ■

Printing

Unless you are solely electronic, the time comes when you have to consign your creation to paper.

Desktop printers are fine for a short print-runs for in-house or home user publications such as business reports or party invitations. The quality of the current crop of colour inkjets means that the latter will also look absolutely stunning, and everyone will want to come to your party.

For longer runs, you are limited by the cost of consumables and the time it takes to print. Small desktop lasers are cheaper to run than inkjets, but they will still only manage around eight pages per minute. Ultra-fast lasers exist, both for black and white and colour, but if you are thinking in terms of thousands of copies then you are in for a five-figure spend.

For black and white work in quantities of hundreds of copies, it can be cheaper to take a good-quality print down to your local instant print shop. For high-quality, high-volume and colour printing you're going to have to visit a repro bureau, which will turn your files into the film from which printing plates are made. For black and white work this is fairly simple, but check with the bureau as to what file formats they accept and whether they can reproduce the fonts used in your publication. Greyscale images are screened to a pattern of dots: the larger the dots, the darker their appearance from a distance and vice versa.

Life becomes more complicated when it comes to colour. The simplest way to add colour to a publication is to use "spot" colour — having the main text in black, say, and the highlights in another colour. Each spot colour involves a separate print run where solid colour is laid on the page. The fewer the colours, the fewer the films and print runs, so it's expensive to use a lot of spot colours.

Process colour uses screened film and four print runs that build up any colour from an overlapping pattern of black, yellow, cyan and magenta dots. Look at any of the photos or screenshots in this magazine through a magnifying glass and you'll see the individual dots. Many publications use both process and spot colour because the latter is far more vibrant in solid blocks, and ultra-high quality work can use six process plates. A bureau can also make high-resolution scans of any photographs you might use in your publication: you can use low-res "positionals" in your artwork (or leave the frames empty) and they will "strip in" the final scans. ■

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Group Test: Desktop Publishing

Editor's Choice

The flavour of the year seems to be HTML. But before we get carried away in an orgy of web-worship, we should ask how appropriate this is. Do the technologies of paper and electronic publishing converge as much as the software houses would have us believe?

On the one hand, you don't need typographic control to hundredths of a millimetre on web pages. Nor do you need colour separation, Pantone libraries, shaped text wraps or many of the other high-end DTP features.

On the other hand, there's a lot you can do on the web that you can't do on paper: animation, multimedia, scrolling frames, electronic forms, Java and ActiveX applets, and so on which conventional DTP doesn't support. Whereas it's doubtless comforting to be able to knock up a personal web page with the same tools you use to create your party invitations, there are no applications here which professional web designers would find adequate, with the possible exception of the huge Ventura package.

So let's get back to the real world. Despite the talk of the impending demise of the printed word, there is more paper being printed than ever. Newspapers, books, magazines, packaging, promotional flyers, posters and other mass-produced documents crowd our lives. And they all have to be written, typeset and produced by someone, somewhere, on the Mac and the PC, often using the software reviewed here.

Let's take a brief look at hardware. Traditionally, the Apple Macintosh has reigned supreme as the DTP platform. It was first with an effective what-you-see-is-what-you-get interface, so developers wrote DTP and graphics software for it. Users bought Macs because they had the best software (PageMaker, Photoshop, Illustrator and Quark XPress) so the process snowballed. Although the PC had a much larger user base, there wasn't a lot going for it graphically, with the exception of Ventura Publisher, until the arrival of Windows and PageMaker. Even then it took several more years for the Mac "killer" applications to be ported to the Windows platform. Now, although most production is still done on the Mac, this is largely because of the installed user base: production departments with Macs will continue to buy more for the sake of compatibility. But starting from scratch there's little to choose, in terms of available software, between the two although the Mac has the edge on the number of Quark XTensions available.

Whatever the platform, you're going to need a reasonably powerful machine and for professional work a lot of storage capacity, both in terms of hard disk and removable media for transferring files to the bureau. Most important of all is a good, large monitor. Ideally, you should be able to see a two-page A4 spread as near full-size as possible, so a 21in monitor is really a must for full-time work. Then, even if you're using an outside printing service you'll need a printer, preferably colour, to produce proofs. And unless you're going to rely on the bureau to fill empty frames with scans of your own photos, you'll need a scanner or will require pictures to be put onto PhotoCD.

After all that, paying several hundred pounds for the software doesn't seem too bad. The question is, which software? Do you really need colour? Do you want to print in-house or commercially? Do you need to produce HTML files or other electronic documents? For top-end commercial DTP, where Quark has reigned supreme during the past few years, the choice is becoming more difficult. Both PageMaker and Ventura have leapfrogged in the feature list, and of the two, Ventura is undoubtedly the most capable package especially if you want to combine paper and electronic publishing. But for traditional high-end printing, neither is quite ready to topple the king: although Quark's interface is looking rather dated, it never gets in the way of the user — an essential for full-time professionals. So, once again, Quark XPress is our Editor's Choice.

Down among the budget packages, the choice is even more difficult, with MiniOffice offering a remarkable bargain, and Microsoft, GSP and Serif each offering strong products. Then again, if you need a web-and-paper solution, Microsoft Publisher must be the best choice. But for sheer paper-based printing muscle, Serif PagePlus is our Highly Commended choice. ■

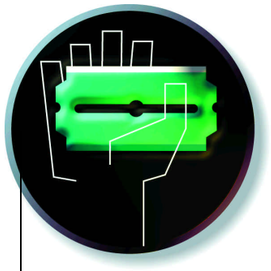
Table of Features

Product	XPress 3.32	PageMaker 6.5	Ventura 7	PagePlus 4	Publisher 97
Supplier	Quark Systems	Adobe	Corel	Serif	Microsoft
Telephone	01483 454397	0181 606 4000	0800 973189	0800 924925	0345 002000
Price	£1,051.62 (£895 ex VAT)	£468.82 (£399 ex VAT)	£816.62 (£695 ex VAT)	£99.95 (£85 ex VAT)	£99.95 (£85 ex VAT)
Windows version	3.1/95	95	95	95	95
Min/recommended RAM	4Mb	8/24Mb	8/16Mb	8Mb	6/8Mb
Min/full disk space	9Mb	26/67Mb	70/269Mb	25/65	9.5/116Mb
Fonts included	0	220	1000	400	150
Font format	TT/ PS	PS	TT/ PS	TT	TT
Clipart included	0	0	30,000	17,500	5000
Master pages	Multiple	Multiple	Multiple	Single	Single
Multiple documents	●	●	●	❍	❍
Table editor	●	●	●	❍	●
Table of contents	●	●	●	❍	❍
Indexing	●	●	●	❍	❍
Kerning	Auto/Manual	Auto/Manual	Auto/Manual	Auto/Manual	Auto/Manual
Process colour separations	●	●	●	●	2
Spot colour separartions	●	●	●	●	❍
Shaped text wrap	●	●	●	●	●
Text rotation	●	●	●	●	●
Text distortion	❍	❍	●	●	●
Bezier drawing	❍	❍	●	❍	❍
Blended fills	●	❍	●	❍	●
Object libraries	●	●	●	❍	❍
Hyperlinks	❍	●	●	●	●
HTML output	❍	●	●	❍	●
Other electronic output	❍	Acrobat	Envoy, Barista	Acrobat	❍
Add-on support	●	●	●	❍	❍

Table of Features

Product	PressWorks 2.5	FrameMaker 5	Mini Office Publisher	PFS Publisher 1.1	Canvas 5
Supplier	GSP	Adobe	Europress	The Learning Company	POW! Distribution
Telephone	01480 496789	0181 606 4000	01625 859333	0181 246 4000	01202 716726
Price	£46.95 (£39.95 ex VAT)	£881.25 (£750 ex VAT)	£29.99 (£25.52 ex VAT)	£29.99 (£25.52 ex VAT)	£468.82 (£399 ex VAT)
Windows version	3.1/95	3.1	3.1	3.1	95
Min/recommended RAM	4/8Mb	8/12Mb	4Mb	2/4Mb	8/16Mb
Min/full disk space	7/22Mb	10/30Mb	5/40Mb	3.5/6.5Mb	16/35Mb
Fonts included	35	13	200	12	2,000
Font format	TT	PS	TT	TT	TT/ PS
Clipart included	104	750	2,200	112	20,000
Master pages	Single	Multiple	Single	Single	Single
Multiple documents	❍	●	❍	●	●
Table editor	❍	●	❍	❍	❍
Table of contents	❍	●	❍	●	❍
Indexing	❍	●	❍	●	❍
Kerning	Manual	Auto	Manual	Manual	Auto/Manual
Process colour separations	●	●	●	❍	●
Spot colour separations	●	●	●	❍	●
Shaped text wrap	●	●	●	●	●
Text rotation	●	●	●	❍	●
Text distortion	●	❍	●	❍	●
Bezier drawing	●	●	❍	❍	●
Blended fills	❍	❍	❍	❍	●
Object libraries	❍	●	❍	❍	❍
Hyperlinks	❍	●	❍	❍	❍
HTML output	❍	●	❍	❍	❍
Other electronic output	❍	FrameMaker	❍	❍	Acrobat
Add-on support	❍	❍	❍	❍	❍

● Yes ❍ No



Secret of my success

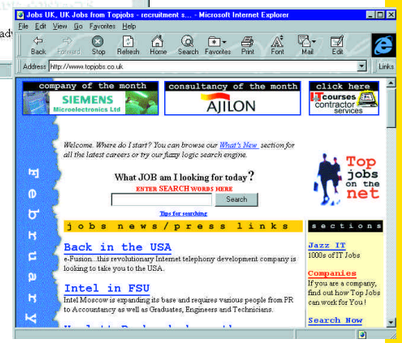
The internet is a new and effective place to look for the job of your dreams. From au pairs to secretaries to vice presidents, there's a site out there waiting for your CV. Tim Phillips reports.

Illustration: EDWIN MAPPNEY

Fancy being an au pair in China? Perhaps you could get on a management course with Sainsbury's or, if not, a telecommunications company is looking for a vice president. It's all hush-hush: only 50 million people can find out about it. If you think you're up to it, why not apply to be a fighter pilot?

These are a few of the week's vacancies on the internet. With a laptop and a long modem cable, you don't even have to get out of bed to get a job any more. Companies from Accessorize to Zeneca are recruiting employees from the net: whether you're an overlooker in Alfreton or a manager in Manchester, there's a site with the job you want.

It's not that simple. The net hasn't yet found a way to replace the interview, so you'll still have to put on that dodgy suit and the clip-on tie eventually. The majority of jobs on the net are the ones you'd expect to be there: programmers, computer-support staff and web-site developers



Left Media Contacts is the web site for budding media sales executives. All that's missing is advice on how to drink too much, smoke too much and shout a lot in pubs
Below TopJobs actively looks for skilled people to work overseas

feature prominently on the recruitment sites.

But this is changing: increasingly, recruitment consultancies, magazines and newspapers are using the web to put up an electronic list of their situations vacant, including non-technical jobs. More complex services which computer-match you to jobs, email you opportunities or profile your personality, have sprung up alongside them. According to International Business Network (IBN), a US-based recruitment consultancy, in December 1996 the web offered one million CVs, 1.2 million jobs, 3,500 web sites based around recruitment, and a further 5,800 firms recruiting staff from their own web sites. "The percentage of jobs outside hi-tech areas is moving to 50 percent in 1997," says IBN's chief executive, John Sumser. "The web will save hundreds of hours of research and head scratching."

That's the incentive for employers, who routinely pay up to 30 percent of the first year's salary of a recruit to an agency to avoid the hassle of sifting CVs, compiling a shortlist and checking references. If companies can automate this process, they stand to save thousands.

Finally, jobseekers can use the web to search for jobs abroad. You can get advice from web sites on how to apply for visas or get the qualifications you need. You can jump to the company web site to find out if it's somewhere you want to work, before firing in an application that beats the post by at least a day. And sometimes you can leave your details at a recruitment site, so you don't even have to look for vacancies: the vacancies will come to you by email.

You can do all this without slinking off to the quiet office at work to use the phone, too. Perhaps it is no coincidence that IDC has found that work-time internet access doubled in 1996, from 25 percent of total access to 47 percent.

According to media recruitment specialist Media Contacts, the web is not about to replace print advertising. "It just provides a broader response base for us," says managing director Hugh Joslin. "Anything that shows we're at the sharp end of the market. We do get a lot of response, but I admit it's mainly for the techhead jobs at this stage."

Unusually for net-based communication, the quality of email Joslin gets is extremely high. "We're getting a response from South Africa, New Zealand, Australia, even the US for our jobs. People in the media have access to the internet and they're using it."

The days when a director gave the PC to his or her secretary are gone, according to the grandly titled Top Jobs On The Net site. This high-roller site is a discreet way for the fat cats of corporate UK to jump ship and find a better job. General manager Alan Smith is the first of many to claim the title of the UK's number one recruitment site, with 1.9 million hits in the previous month. "We attract people because of our design concept. Our advertisers need to sell themselves to applicants, and we do that with a site that's easier to navigate than others," he sniffs. "We

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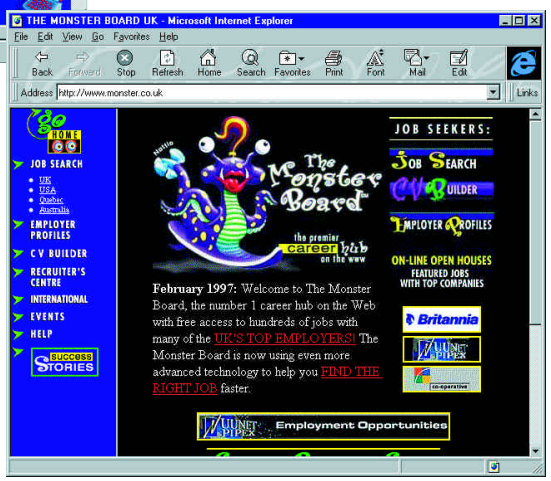

Above Reed, one of the biggest names in recruitment, has a professional web site
Left The Monster Board offers jobs worldwide

started with IT companies: Intel, Siemens, Fujitsu. But now 60 percent of our jobs are non-IT," explains Smith.

Those jobs tend to be for banking, insurance, sales and marketing posts: the sort that newspapers love to carry. Does Smith say his advertisements can replace a newspaper advertisement? Er, no. "You still need an advertisement in the paper, but what we say is take a centimetre off the ad across four columns and you pay for our advertisement. Ads in The Telegraph cost £120 per column centimetre! We can offer colour, a bigger advertisement, and 99.9 percent of people visiting our site are interested in finding a job," he adds.

Surely though, 99.9 percent of the 1.8 million hits will also be unsuitable? You know what internet users are like. Smith counters that as long as the post is filled, it doesn't matter. The European Patent Office recently found a boss (salary £90,000) in three weeks. The job wasn't even advertised in newspapers. The Patent Office may one day approve a way to make Top Jobs a replacement for recruitment pages. Until then, Smith concludes, technology is a barrier. "We only complement newspapers. You can't sit on the toilet and read our ads," he adds.

Not everyone wants a Top Job. Many of us would be happy with a Middling or Bottom Job. Sites like Reed's recruitment pages fit that bill better. It also claims to be the largest site in the UK. "Reed has 16 recruitment divisions and they're all up there. In accountancy for example we have hundreds of jobs at the moment. The largest section is probably offering temporary jobs in the NHS." Those jobs are popular with Aussies and Kiwis travelling through the UK who picked up Reed's site by word of mouth. Reed now offers advice tailored specifically for them. "They're under no obligation, but we tell them what certificates and qualifications they need before they come," says Nicholson. "Recently we found a job for an occupational therapist from New Zealand who wanted to work in Newcastle, before she left New Zealand. It's just a fast, convenient way to do things."

For some recruiters, it's a monster business too. Monster Board is a worldwide recruitment service with a claim to be the biggest: it has sites in the US and Australia too, with a worldwide brief to find the right people. It also has a bevy of cartoon monsters to help.

Gradunet brings the people business of recruitment to students on the internet. And if you've ever used the internet, you know there's a lot of students there. Recently it held its first live "recruitment fair" on the internet, with eight companies from Reuters to Research Machines answering questions from undergraduates, in real time. "It was really surreal at times," admitted Adam Bass, managing director of Gradunet. "We had all these recruiters typing away in a cybercafé, pitching for the students who turned up."

The attendance was disappointing — only 91 registrations from students. Bass claims not to be disappointed. "The majority of us had what I'd call British expectations," he says, and he's undaunted. Gradunet's

What's the government doing?

The biggest employment opportunity for all of us would be if the government put JobCentres online. Imagine 1,050 JobCentres filled with people browsing the millions of vacancies they handle every year — 2,446,553 in 1996, to be precise. It sounds too good to be true.

Which is exactly what it is. A spokesperson for the Department for Education and Employment told us: "It is something that the Employment Service is considering at the moment." In that case, when will we wire the labour exchange? "There are no immediate plans to do so." So, if you're a government artist (you draw dole) you'll be puling cards off orange boards and taking them to the front desk for a while yet.

There are immediate plans to enhance the use of National Vocational Qualifications (NVQs). This government initiative, designed to provide people who would otherwise be students with some practical learning, has, in the words of Information Providers' Paul Carpenter, been a poor relation. "Because the NVQ comes from government, no-one bothers using it. It's just something you put at the end of a CV. But because the government is providing database training resources for NVQs, you can access a database and fill it in to define your competencies."

Carpenter isn't just in the business of finding homes for Swedish au pairs. Alongside JobMatch, Information Providers runs WorkWeb, a huge database of 10,000 jobs a day provided by hundreds of local sources. The jobs aren't glamorous but they're local, the database is easy to search, and he's working with the DfEE to incorporate NVQs in the database. Eventually, he wants to be able to email NVQ holders automatically when a job fitting their profile comes up.

"It should encourage small agencies to put their jobs on the net," he explains. "Eventually our cluster of 10,000 jobs will get linked to other clusters. Then everyone advertising jobs will use the net." At which point, we won't need the JobCentre at all — which will probably be about the time they put their vacancies online.

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permanent site now has 40 companies including Sears, Sainsbury's and the Civil Service recruiting graduate trainees. Some recruiters like Unisys allow candidates to fill in an online application form, and use Java to process them on the net.

"The obvious audience for recruiters on the internet is students," says Bass. "They've got free access." Only ten percent of Gradunet's applicants are now computer studies students.

The biggest investor in this people business is PeopleBank, which, according to managing director Bill Shipton, doesn't have anything in common with sites like the Monster Board or Top Jobs. "We've been going for six years in different forms, but on the net, only for one year. Instead of just carrying jobs, we set about building a database of candidates. Others are a straight copy of newspapers, and one fundamental thing doesn't change. An advert still requires you to find it, read it and respond to it. We're a recruitment consultancy operating on the internet."

PeopleBank's database of candidates allows employers to "fish in a pool of people", and a big pool it is too. There's 94,000 of you registered with PeopleBank so far, many of whom aren't even on the internet. "We populate 73 percent of the candidate database terrestrially," says Shipton gnomically, explaining that if the database was compiled from net users, it would be too small, too technical and too biased to the AB upper-class net user.

Perhaps the ultimate middle-aged male executive's dream — looking for an au pair on the web

Instead, people are invited to fill in paper-based forms enclosed in newspapers and magazines. The net users are the employers, who pay to pluck out the CVs that match their requirements.

PeopleBank is unusual because it is backed by proper money: last year, Associated Newspapers bought it and invested £2 million. That's £20 for everyone on the database. Obviously, the publisher of the Daily Express isn't confident that newspaper-based job advertising will be popular indefinitely. Its main areas for recruitment are secretarial jobs and middle management, but it also won the high-profile job to help find the thousands of retuners needed to visit our living rooms and prepare our sets for the launch of Channel 5. If your TV picture has gone to hell, you know who to blame.

Unlike many recruitment sites, PeopleBank doesn't mind putting numbers to its success rate. "We don't oversee the whole interview process," says Shipton. "We step out after the employer accesses the CVs. But we can say that in the last year, we have provided 4,122 candidates for interview."

Four thousand interviews is the start of something big, according to Shipton. "We want to do to recruitment what Direct Line did to insurance: cut out the middleman. Filling jobs through an agency costs thousands, rather than the £220 it costs on average to find staff through PeopleBank."

Recruitment through the internet also has the potential to break down barriers and prejudice. Nowhere is this more apparent than Priority 2000, which is working with PeopleBank to give equal opportunities to disabled people. "We want to create opportunities and raise awareness," says Chris Baber, practice manager at the association that funds Priority 2000. "PeopleBank is an agency with a difference, because employers can jump straight from their database to our web site and learn more about us."

Employers can get a good candidate from the disabled community, Baber claims. On average, a disabled person is more

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reliable, more committed and works harder. Agencies like PeopleBank make it easier for them to register for work, and puts them on an even footing with able-bodied candidates. And, he says, "Disability advisors at the JobCentre have limited use. People don't get much out of them when it comes to the practical aspects of finding a job."

If you're thinking, "This is all very well, but I'm in Sweden and I want to come and work as an au pair", JobMatch is more your plate of pickled herring. A service that performs job-matching by questionnaire across a number of job areas *(see box, below)*, its highest-profile service is finding au pairs across continents. "It's being used consistently, with two queries a minute," says Paul Carpenter, director of Information Providers, who built the site in their spare time from developing database systems for corporate clients. "The site is in English, German, French, Italian, Spanish, Portuguese and Swedish, and China's a growing area," he chuckles.

This is another way the internet scores over conventional media: it gives au pairs direct access to prospective employers, who find their details on the site, and make contact by telephone. Carpenter enjoys the success of the site, but the nominal registration fee that families pay isn't going to make him rich. "Give it two years," he jokes. '"We might even cover our costs."

That's the problem with recruitment on the net: there isn't any profit for the agencies yet, because sites are too small and too fragmented for advertisers to pay the £120 a centimetre that The Telegraph can justify. When we're looking for a job on the net, we don't know where it will be advertised, and we have to go to too many sites to find it. But it can't be long until more employers wake up to the advantages that sites like PeopleBank and JobMatch provide. Until then, there's a lot of au pairs, retuners and even the odd vice president who considers internet recruitment the well-kept secret of their success.

The robot recruitment consultant

If you ever used the school's career profiling software that told "Fingers" McNeish that he'd make a good police officer and "Dumptruck" Daley that she should consider ballet, you might be wary of technology that matches you with the right job. But some agencies are doing more than just showing you adverts: they're lacing their sites with sophisticated ways to sort candidates too.

PeopleBank leads the way with its personality profiling questionnaire which, since its launch only a few weeks ago, seven out of ten of its applicants have completed. The results rate applicants for attitude, cultural integration, management style and negotiation technique. PeopleBank's software produces a frighteningly complete report, which recruiters access with the candidate's CV.

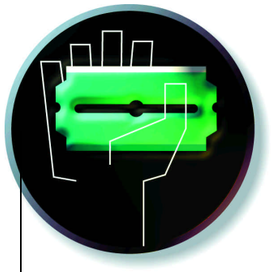
"If you want a sales manager, you might want someone to lead a team, build a team or make a team work better. That's three different people," Shipton explains. JobMatch is also attempting to profile its candidates. If you're applying to be an au pair, you go through a process akin to computer dating, filling in a questionnaire covering everything from location to smoking habits. You are only matched with families whose responses tally.

Information Providers, who built JobMatch, build corporate databases for a day job. "At the moment we're only scraping the surface of the sort of sophistication we could employ. We will be weighting the responses — is smoking more important than whether you drive, for example? — and then you begin to develop an expert system that will match the applicants precisely. We have built databases that use expert systems for our customers. This is just letting them dial in from the internet rather than accessing it from a computer terminal."

All sites use simple CGI scripts to help you search a database. Look for jobs in London with a salary of more than £20,000, for example; without more sophistication, this type of site can only tell you which jobs are available. They can't tell you whether you have any chance of getting the job.

PCW Contacts

www.reed.co.uk
www.media-contacts.co.uk
www.monster.co.uk
www.gradunet.co.uk
www.topjobs.co.uk



Perl's a zinger

Perl is an extremely powerful, versatile way of programming, simpler to learn than C and used by most web sites as their primary CGI language. Ian Wrigley introduces you to it.

For the past two months we have been using C to produce CGIs; the software that is normally used to create "dynamic" web pages that change each time you access them. This month, though, we'll use a different language, called Perl. It stands for Practical Extraction and Reporting Language (or "Pathologically Extreme Rubbish Lister" if you prefer).

Perl is extremely powerful, and its basic features are much easier to learn than a programming language like C. Furthermore, it performs some tasks in one line that would otherwise need hundreds of lines of code in any other language. And perhaps best of all, it's available on several different platforms. So whether you are writing CGIs to run on a Unix box, a Microsoft NT server running Internet Information Server, or even a Mac using WebStar, your Perl scripts should, with just a little bit of tweaking, perform exactly the same job on each.

So what is the downside of Perl? Well, it's an interpreted language. This means that unlike C, for instance, you don't compile your source code for a particular platform. Instead, the main Perl interpreter reads in the source each time the program is run and converts it to machine-code, on the fly, every time.

Interpreted languages have many advantages (for instance, you can take your Perl source running on a Unix machine and immediately have it running on a Windows box). But there is a significant disadvantage, too: quite simply, interpreted languages just aren't as fast as their compiled cousins. If you are not expecting a massive number of hits to your site, CGIs in Perl will be perfectly adequate, and if you are running a high-power server, then even popular sites can get away with Perl as the primary CGI language. But if you're intending to write scripts that will receive tens of thousands of hits a day, the chances are that Perl just won't be able to hack it and you'll have to resort to a compiled language like C.

Hello, world

This is not a programming tutorial, so the intention here is not to teach you how to program in Perl. However, because it's so powerful and many people don't seem to have come across it yet, our first few programs will be simple, to give you a flavour of the language.

The first point to note is that we are using Perl 5 throughout. This is a relatively recent upgrade to the language, and while some of the programs will run quite happily on earlier versions, most won't — especially those that use the CGI.pm module we'll be looking at. So if you only have Perl 4 on the machine you intend to use as your server, now would be a good time to upgrade.

Fig 1 shows the Perl version of that perennial programmer's favourite, "Hello world", with the relevant HTML tags to make it appear in a web browser. Even if you're not familiar with the language, you should see that it follows some fairly standard programming conventions; lines are ended with semi-colons, for example. Notice that comments are denoted by the hash (#) symbol.

Fig 1 Perl version of "Hello world"

```
 !/usr/local/bin/perl
#
# Listing 1. By Ian Wrigley
#
# The first line tells the system where to find
# the Perl interpreter. Edit for your
# particular system
#
print '<HTML><HEAD><TITLE>Hello, world</TIT
print '</HEAD><BODY><H1>Hello, world</H1></BODY></HTML>';
```

In order to run Fig 1 as a CGI, just place it in the standard cgi-bin directory on your server (or in the Scripts directory if you are running Internet Information Server on a Windows NT machine).

It's worth pointing out, since we've had a couple of questions on this point, that you can only run CGIs via a web server. Merely accessing the file locally from your web browser won't work.

Fig 1 is not particularly exciting but it's a good point at which to start if you are new to Perl, or even new to CGIs. Because it's so simple, it should run whatever version of

Perls of wisdom

Perl is a very powerful language and runs on many different operating systems — including just about all flavours of Unix, Windows, and Macintosh. Even better, Perl interpreters are freely available for all those platforms. For a comprehensive list of where to find Perl on the web, look at www.perl.org.

If you intend to learn to program in Perl, probably the best book is *Programming Perl* (2nd Edition), published by O'Reilly and Associates. The book is co-authored by Larry Wall, the creator of Perl, so you can be sure that it is technically accurate.

Fig 2 Customising the page

```
#!/usr/local/bin/perl
#
# Listing 2. By Ian Wrigley
#
#
# First, write out the standard HTML stuff
print '<HTML><HEAD><TITLE>Hello</TITLE></HEAD>';
print '<BODY> Welcome to my page.<P>';

# Now find the date and time

$thetime = localtime;

# This puts a string into the variable $thetime, in the form
# Mon Feb 1 12:12:12 1997

print "\<B\>The time is $thetime\</B\>. \<P\>";

# Notice we use double quotes above, because we want to print out
# the value of the variable $thetime. But because of that, we
# must put backslashes before each less than or greater than symbol.
# See the text for more information.

print '</BODY></HTML>';
```

p226 ➢

Perl you are using, so try installing it on your server to make sure that everything is installed correctly.

Spicing things up

Now it's time to make your page a little more interesting. Fig 2 *(p225)* uses a few more Perl commands to customise the page by adding a date and time.

The date and time section of the code uses a standard Perl function call and simply puts the date and time into a variable (all Perl variables are given a name which starts with a dollar sign) then, using the print command, outputs the value of that variable. Note that this time we've used a slightly different version of the print command: we delimit the printed string with double rather than single quotes. The difference is that if you use single quotes, the content is merely output as it is. Double quotes tells the Perl interpreter to try and evaluate anything between the quotes before it outputs. Since the less than (<) and greater than (>) signs, which are such a major part of HTML, are also significant in the Perl language, we need to use "\<" and "\>" which tells the interpreter just to display < and > rather than do any file redirection, which is what it normally uses the symbols for.

Fig 3 HTML source listing

```
<HTML>
<HEAD>
      <TITLE>Server-side include example</TITLE>
</HEAD>
<BODY>
<H1>Hello! Welcome to my page!</H1>
<P>The current time is:


<!– #exec cmd="/export/home/ian/public_html/timer.pl" –>

<P>Have a nice day!
</BODY>
</HTML>
```

When you access a web page, your browser sends quite a lot of information to the server, much of which is stored in environment variables. For example, the browser type is one of the environment variables produced by the web server, although you need to check just what your particular web server called that variable.

There are several other environment variables that are normally passed to a CGI by the server: they can be used to completely customise a site and we'll be looking at this in a future article. As a taster, though, it's worth knowing that you can find out where a visitor is coming from (the IP address of their machine), what type of browser they are using, and even, on some servers, the name of the page from which they have just come. Some of this information is not particularly useful but you ought to be able to see that you can, for instance, create a site with both framed and non-framed areas, then automatically direct the visitor to the relevant place depending on the browser they are using.

Accepting input

It's all very well writing CGIs that produce live content, but normally, the point of server-side software is that it accepts input from a form and does something with that input. This is perfectly easy to achieve in Perl, and indeed in some ways it's easier than in C. This is especially the case using the CGI.pm add-in module available at www.genome.wi.mit.edu/ftp/pub/software/WWW/. This is an excellent library (written by the rather exotically named Lincoln D Stein) which makes things like reading input from forms a breeze.

The best way to examine it is to look at the program in Fig 5 *(p228)*. This makes use of a tiny subset of the library; it simply reads in a parameter from an HTML form. Assuming you had written the HTML code for the form and specified this CGI as the target, using the POST method to pass the data, this program would write it out in a new page. Not the most exciting thing in the world, true, but once you know how to accept input from forms you can do whatever you like with that data. In fact, CGI.pm supports both the POST and GET methods transparently: you can use

p228 ➢

The "server-side include" technique

Server-side include is a technique for adding dynamic content into predominantly static web pages, by calling a program from within the HTML.

The easiest way to understand this is to take a look at the HTML source in Fig 3 *(above)* and the accompanying Perl in Fig 4 *(p228)*. Together, they do much the same job as the program in Fig 2 *(p225)*: they greet the user by telling them the current date and time, and the type of browser they are using.

The Perl code is called by the #exec command part way through the HTML. This is a command specific to Apache, although most web servers have something similar. Essentially, the line reads "go and run the program named here, include any output it produces in the web page, and then write out the rest of the page". The user will never see the #exec line. The HTML they receive will have had the line replaced with the Perl program's output instead.

This technique is a powerful one and you must be careful that it doesn't get misused. Indeed, such is the potential for misuse that by default your server probably doesn't allow server-side includes like this. To turn on the feature in Apache, you need to edit the server's httpd.conf file and include the line

```
XBitHack On
```

You must also ensure that the HTML page has its execute bit set, using the line

```
chmod +x yourfile.html
```

If the two instructions above don't make much sense to you, talk to your server administrator to see whether you can use server-side includes. However, many administrators are unhappy with this feature because it's very easy to write a malicious piece of HTML that can wreak havoc with the server. Imagine including a line (just one little command which does exist) that deletes everything in the filesystem!

If you are allowed server-side includes, though, it can make your life much easier. Rather than writing the entire HTML code within the CGI, you can now create most of it using whatever HTML editor you're happiest with: just put the commented #exec line where you want "live" content, and then write the CGI (in Perl, C or whatever).

whichever you want, although POST is normally preferred since GET limits the maximum amount of data that can be passed.

Another smart feature of CGI.pm is that it allows you to debug your Perl CGIs offline; that is, without uploading them to the server. If you run a Perl program that uses the library and expects input from a form, it will print out the message "enter name=value pairs on standard input". You simply type in the name of your parameters and test data, then hit Control-D (or Control-Z on Windows/DOS systems) to end the data entry, and the program will continue to run using the data you've entered. This can dramatically reduce the time it takes to develop a new CGI since you don't need to upload your code to the server each time you make a modification.

A (very) simple database

Finally this month, we'll use Perl to implement a very simple searchable database. Although it's nowhere near fully featured, you should be able to see how to use the basic commands to enhance the program to your needs. Remember: Perl isn't incredibly fast, especially on a heavily loaded server, so for popular sites another solution would probably have to be found. But for most people, a program like the one

Fig 4 Perl code to accompany Fig 3

```
#!/usr/local/bin/perl
#
# Listing 4. By Ian Wrigley.
#
# This program just prints out the time. It is used
# as a server-side include.
# To be used with the HTML in Listing 3, it must be
# called 'timer.pl'.

$thetime = localtime;

print "$thetime";

# That's it!
```

Fig 5 Reading in a parameter from an HTML form

```
#!/usr/local/bin/perl
#
# Listing 5. By Ian Wrigley
#
#

# Following line is to use the CGI.pm library

user CGI qw(:standard) ;

# Now we can access parameters like this:

$name = param('myname');

# the line above reads the value from the parameter 'myname', and
# puts it in the variable '$name'.

print '<HTML<HEAD><TITLE>Hello</TITLE></HEAD>';
print "\<BODY\>Hello there, $name. \<P\>";
print '</BODY></HTML>';
```

p230 ➢

Fig 6 Implementing a simple database

```
#!/usr/local/bin/perl
#
# Listing 6. By Ian Wrigley
#
# Very simple database application. Reads in a parameter,
# opens a file and looks for a match.
#
# First, the CGI.pm library...

use CGI qw(:standard) ;

# Get the value to be searched for

$prodname = param('productname') ;

# Now open the tab-delimited file. Replace name with your
# datafile name...

open DATAFILE, "/export/home/ian/catalogue" ;

# write the HTML stuff

print'<HTML><HEAD><TITLE>Search results</TITLE></HEAD>' ;
print'<BODY>' ;

$matched = 0 ; # flag to see if we've matched

LOOP: while (<DATAFILE>) {  # Loops around, reading a line at a time

                @values = split("\t") ;
                # splits the line into its component parts, and
                # puts them in the array 'values'. We assume that
                # each field is separated by a tab (\t)

                if ($prodname eq $values[0]) { # They match
                        $matched=1 ;
                        last LOOP ;

                }
}

if ($matched == 1) {
        print "\<P\>Product name: $values[0]" ;
        print "\<P\>Product code: $values[1]" ;
        print "\<P\>Product description: $values[2]" ;
        print "\<P\>Product price: $values[3]" ;
} else {
        print '<P>Sorry – nothing matched.' ;
}

print '</BODY></HTML>';
```

Fig 7 Sample of data as a tab-delimited text file

Widget	A001	Spring-loaded widget	£12.02
Thing	A010	Triple-loaded sprong-holder	£33.07

in Fig 6 will probably do just fine.

The idea is that we have a database of information on products we sell. The database has four fields: product name, product code, product description and product price. We want to create a searchable database that will take the product name from the user and output the entire record in an HTML page. However, the database runs on a Mac (or a Windows machine) and the web server is on a different platform. So how are we going to implement the database?

First, we export the data as a tab-delimited text file, in the order: name, code, description, price. Each of these fields is separated by a tab character and there is one record per line in the file (Fig 7). From a search form, the user needs to type in a product name, or part of the name. This name is put in the parameter "productname" and sent to the CGI when the Submit button is pressed. (We haven't included the HTML code for the form but you should be able to create that yourself.)

When the CGI is called, we read in the product name that has been requested and open the data file. The program then loops around, reading in one line at a time and splitting the input into four elements of an array, using the split() function. When we find a match, the loop exits and we print out the full database record.

We don't claim that this program is bullet-proof, nor that it is the most elegant way to solve the problem, but it works and demonstrates a few useful techniques. Problems would begin with large databases (more than a few hundred records) where the time taken to read in each line and check for matches would become prohibitive, especially on a less powerful server. As a rule, you should not keep the user waiting for more than about five seconds before you start sending data down the line; any more, and people begin to think that there has been a problem with the software.

■ *Next month we'll take a look at "cookies", a method of retaining information about a user so that you know something of them the next time they log on.*

PCW Contact

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net.news

Around the web world with PJ Fisher.

Marimba pushes ahead

■ Marimba, the company behind the CastaNet "content push" technology, outlined last month in Net.news, is reportedly involved in deals with Intel, Macromedia and the US Public Broadcasting Service (PBS).

At the moment, Marimba technology makes subscription web "channels", consisting mainly of traditional web content, available to users' desktops. The involvement of Intel and PBS could turn the web into the Holy Grail of an interactive entertainment delivery channel capable of competing with TV, according to the partners.

The CastaNet tuner is now available for Mac, and Lotus has announced it will support CastaNet in forthcoming releases of its Domino web server technology.

www.marimba.com

Spyglass for IBM NCs ?

IBM is expected to include browser technology from Spyglass in its first line of NCs (network computers), due to ship in March.

Although it announced last autumn that Netscape's Navio technology would run native on the boxes, IBM needs to come up with an alternative solution to meet its shipping date. "Netscape's Navio browser for NCs won't be available until summer," said Dick Allen, European brand manager for network stations.

He confirmed that the company would, meanwhile, choose a browser to put into the code of its network station manager software. Sources suggest the chosen browser technology is likely to be Spyglass, although there is the possibility of using software developed in-house.

According to Allen, network station users will be able to use any browser running on their server. But if they want one that works across internet and intranet functions simultaneously, it will have to be one that's built into the network management software. "Although it will look and feel like an internet browser, behind the scenes there is a lot of work going on," he said. "Whether we reveal whose browser technology is used, is unclear at this stage. It will depend on how many development dollars each company puts in."

The deal would be a much-needed victory for Spyglass, which last year decided to change gear, leaving the browser market to pin its hopes on the emerging sector of internet devices.

Lucy Ness, VNU Newswire

www.ibm.com

Moldavian net porn scam shut-down

■ The US Federal Trade Commission has put an end to an internet scam that advertised free pornographic software but ran up huge international phone bills for those unwary enough to take up the offer.

A federal judge in New York took action to close down what the Commission called an "insidious" scam to hijack modems, allegedly run by three people in Long Island. The scheme encouraged users to access three adult sites by downloading a free viewer program called david.exe. This file then disconnected users from their local access provider and connected their modem to the former Soviet republic of Moldavia at a cost of more than $2 a minute.

Jodie Bernstein, FTC consumer protection director, said: "Telephone bills were often the first indication to consumers that they had been defrauded."

The Moldavian Ministry of Telecommunications has begun its own enquiry to discover whether any of its citizens had been involved in the scam. It seems likely that the Moldavian phone company shared profits with the US operators of the scheme.

Three defendants in the case (all officials or employees of New York-based Audiotex Connection) had their assets frozen pending the outcome of a full hearing of the case.

Stuart Lauchlan, VNU Newswire

Net decency case begins

The US Supreme Court has heard the first evidence in a landmark case that will determine the legality of the country's controversial Communications Decency Act (CDA) and which could set the standard for global internet censorship laws.

The Act was introduced last year as part of a range of sweeping telecommunications reforms introduced by President Bill Clinton. Among other things, it makes illegal the online transmission of material it describes as "indecent and patently offensive" to children. But opponents of the Act, including civil rights groups, healthcare organisations and internet service providers, claim its wording is too vague and open to abuse. Led by the American Civil Liberties Union (ACLU) they successfully challenged the legality of the CDA in a Philadelphia court last year.

The case has now gone to appeal in the Supreme Court, scheduled to have begun its formal deliberations on 19th March. In preparation for that hearing, both sides in the case presented summaries of their arguments. ACLU's argument, successfully tried out in the lower courts, is that the First Amendment of the US Constitution guarantees freedom of speech and expression, and thus, attempts to censor material on the internet represents a fundamental infringement of that protection.

The ACLU brief warns: "Because there is no way for the vast majority of internet speakers to distinguish between adults and minors in their audience, the CDA is the most restrictive censorship scheme imposed on any medium."

But, for the US Justice Department, which passed the CDA into law, acting solicitor general Walter Dellinger argues that the First Amendment does not protect the right to distribute porn to minors, and as such the Act is in line with the Constitution.

Justice Department officials also argue that internet service providers and web developers are not liable for prosecution as long as they insist that people accessing their sites pass through age verification systems.

When it is delivered, the Supreme Court decision will be the final word in a long-running dispute over US internet censorship laws. It is also likely to set a precedent for other countries in their own attempts to set up similar laws.

Stuart Lauchlan, VNU Newswire

Netscape beats MS betas

■ Following the release of Netscape Communicator, the new intranet suite for Windows 95 and NT, Netscape has announced that it is now available online for UNIX, Win 3.1 and Mac users.

Meanwhile, at Microsoft HQ, the expected release of Internet Explorer 4.0 for Windows 95/NT is now delayed and there are rumours of serious development problems at Redmond. The company says that public betas are not expected until the middle of this year.

www.netscape.com
www.microsoft.com

Stac reaches out to the internet

■ Software company, Stac, has revised its Reach-Out product to make it TCP/IP-based and available on the net, according to Anita Habeich, Stac's senior product manager.

It now supports Windows NT 4.0 security and other Microsoft platforms including DOS, Win95 and Windows 3.x. Reach-Out is available as an ActiveX control and for Netscape as a plug-in, said Habeich, and that the product has been re-engineered to provide access to local internet service providers following encryption rules for Microsoft and Netscape products.

Reach-Out costs £149. An upgrade is available for existing users. A shareware version is downloadable from its web site at www.stac.com/.

Mike Magee

Lotus gets down to business with Java

■ Following Corel's lead, Lotus is developing its own Java-based suite of business applications ready to run from browsers or NCs. But unlike Corel's, the applications will be new versions, rather than exisiting ones rewritten to look familair. Codenamed Kona, the new suite is described as compact, modular and programmable for on-site customisation and the applications have a "web-like" interface.

For its part, Corel has said that its server component for Office Suite for Java is nearly ready for release.

www2.lotus.com/home.nsf
www.corel.com

Vote for me…please!

With a general election imminent, Charter88 (campaigning for a modern, fair, democracy) has set up a web site for voters to discover which constituency candidates are hoping for their support. Typing in a postcode reveals a list of all candidates and their contact details.

Who Wants MY VOTE?

The technology is based on QAS Systems' address management software.

www.gn.apc.org/myvote

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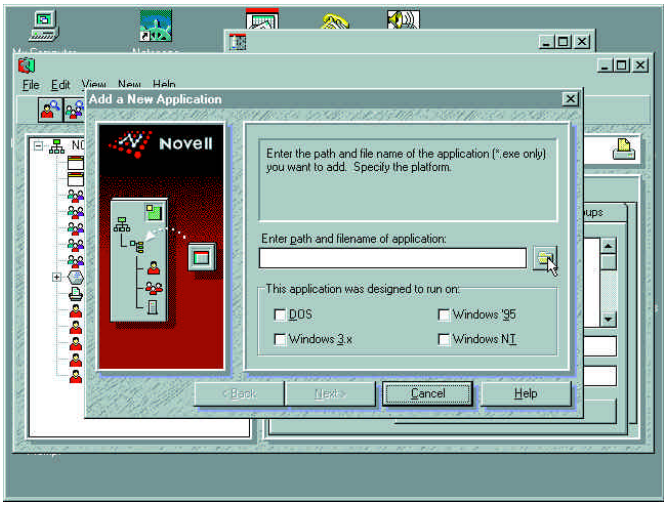
Novell turns on the lite for small firms

Novell has launched a cut-down version of its IntranetWare, designed for businesses with 25 employees or less: a market as big as 9.3 million worldwide, it believes. Novell plans to take a 35 percent share of the 400,000 European businesses which are believed to be installing LANs in the next year.

IntranetWare for Small Business (ISB) uses NetWare 4.11 and will support multi-platform environments. The package also includes Netscape Navigator 3.0 (and can be used with Internet Explorer), and the Kayak installation engine.

The software provides multi-user access to a modem, or asynchronous ISDN modem, sited on an office server for access to the net. This also allows resellers to dial-in and manage the network, if sold as part of the contract.



Novell expects ISB to be sold and installed by resellers because the level of technical expertise in this market sector is perceived as low. According to Jim Greene, senior marketing manager for Novell's Small Networks Business Unit, resellers make little money out of selling to small businesses so instead seek lucrative service contracts; something for which ISB has been designed.

It is a growing and specialised market. "Small businesses don't want to buy something they don't actually need today," said Greene.

IntranetWare for Small Business will retail at around £200 for a 25-user licence which, Novell claims, is enough for most of the companies it has targeted. Additional user licences will be available for £30 each and an upgrade to the full IntranetWare product will also be available.

www.novell.com

UNIX remains choice for net apps

■ Despite Microsoft's best efforts, a report from Forrester Research shows that corporates are still wary about trusting NT for high-level internet server applications.

Although NT is making inroads into file and print sharing, and LAN email, the UNIX boxes are still perceived as being more reliable.

However, the wider picture is brighter for Microsoft. Forrester predicts major migrations from legacy operating systems like NetWare and OS/2, to NT. The intranet will also boost NT's adoption among corporations.

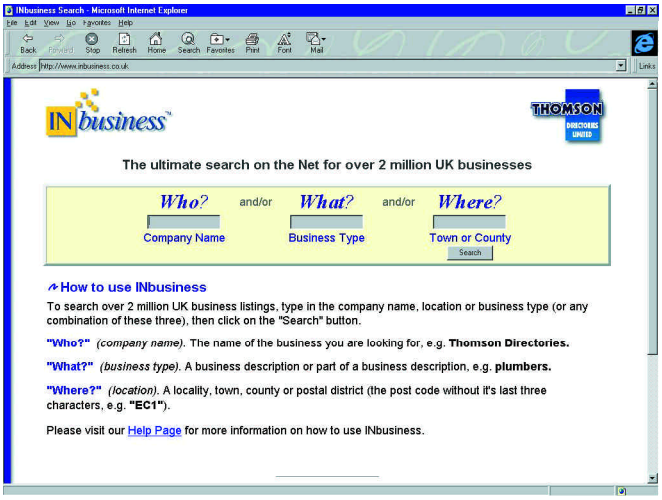
By the year 2000, NT will have become robust enough to challenge UNIX and cause a fall-out among UNIX vendors. Sun should survive the shakeout because of its leadership in Java and other internet technologies.

There is no doubt that NT is making its presence felt. In a separate study, IDC found that 23 percent of UNIX users had lowered their commitment to UNIX, compared with 33 percent of NetWare users who had reduced their commitment to NetWare.

www.forrester.com

p236 ➢

InBusiness tacked onto Thomson site



■ Thomson Directories has put its business database onto the web. The InBusiness site is designed to complement the existing Thomson web site and directories. The database has a claimed 2.1 million UK classified business listings.

According to Thomson, around five percent of UK businesses are now online. "We have concentrated on making the Thomson database as fast, as comprehensive and as accurate as possible," said Jon Pope, Thomson's business ventures manager.

www.inbusiness.co.uk

Cheaper names from Nominet

■ Nominet, the UK authority for issuing internet domain names, has announced reductions in registration fees. Ivan Pope, a member of Nominet, said: "The issue of management and charges for domain names is central to the development of the internet."

www.netnames.com

Top Ten Books / CD-ROMs

1	The Internet & World Wide Web: Rough Guide 2.0	Penguin	£5.00
2	Client/Server Programming with Java & CORBA *	Wiley	£29.95
3	Programming Perl (second edition)	O'Reilly	£29.50
4	Creating Killer Web Sites	Hayden	£41.50
5	Instant Visual Basic 5 ActiveX Control Creation	Wrox	£27.49
6	Inside COM: Microsoft's Component Object Model *	Microsoft Press	£32.99
7	Rapid Development: Taming Wild Software Schedules	Microsoft Press	£32.49
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New Sun JDK doesn't look back

■ Sun has released version 1.1 of its Java Development Kit (JDK) offering significant enhancements over the previous version but, it warns, not backwards compatibility.

The problem arises with the new version of the Java Virtual Machine (JVM) which is needed to run applets built with JDK 1.1 on users' PCs. Class files written with the new 1.1 compiler will have to rely on existing JVMs to run: something that Sun says cannot be guaranteed and which has not been tested. JVM's are found in browsers like Netscape Navigator and Internet Explorer, and make them Java compatible.

Developers downloading JDK 1.1 will find a number of new features, one of which is Abstract Window Toolkit enhancements.

Both versions of the JDK are available for download from the Sun Microsystems web site.

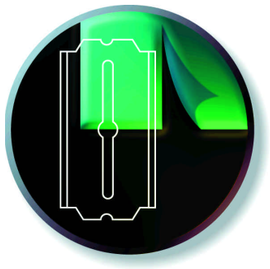
java.sun.com/nav/read/products.html

UK top ten websites

Howay the lads! The Spice Girls lose the coveted top spot to the (real) lads at FHM. Which proves that even the Spice Girls aren't immune to the first rule of web sites: keep it fresh!

1. FHM www.erack.com/FHM/
2. Spice Girls http://channel3.vmg.co.uk/spicegirls/
3. No Sex, No Money, Just Football FC www.tis.co.uk/football/
4. Cheap Flights www.cheapflights.co.uk/
5. Stringfellows www.stringfellows.co.uk/
6. AA Guide: Where to stay and eat www.theaa.co.uk/hotels/index.html
7. UK Laughter Links www.netlink.co.uk/users/tucker/comedy/link.html
8. British Airways Global Check-In www.british-airways.com/
9. Damon Hill's Formula 1 Home Page http://trek.microprose.com/damonhill/
10. B.B.C. www.bbc.co.uk/

The chart is based on the most popular web sites to which Yell's visitors jump. (This chart as at 24/02/97.) For the latest, go to www.yell.co.uk.



Let's shake on it

Troubles with hardware handshaking and FIFO buffers? Then bounce the problem off Nigel Whitfield. He takes on network links, junk mail filters and creating a personal web page, too.

Q *"I use a PCMCIA modem (Apex v34) and by default Windows 95 employs hardware handshaking. Can a PCMCIA modem use hardware handshaking? I've switched over to software in the meantime. Can my modem use FIFO buffers? Diagnostics show an 'NS 16550AN' UART in the modem. By default, FIFO buffers are used in Windows 95, but I've switched them off and seem to get more reliable (if seemingly slower) connections. I also suffer a lot of dropped connections. None of the other computers dialling in to our NT Server get this problem, and I rarely get it when connected to my ISP (even when connected for half an hour or so).*

"Where do you suggest I should begin to investigate the problem? I wonder if the NT Server might be dropping my connection when it is busy with other server duties at the other end?"

A. Taking your questions in order: yes, a PCMCIA modem can use hardware handshaking. As a general rule of thumb, that's always the best sort to use and you should have no problems with using it in your system provided you have told both the software and the modem to use the appropriate settings.

You should also be able to use the FIFO buffers with the modem. The fact that you're experiencing more reliable connections without them suggests that you're having problems with the handshaking, too: your computer isn't reacting fast enough to the software handshake signals and so data is lost; you don't notice this, as it will be automatically re-sent. Using hardware handshaking in conjunction with FIFO buffers should produce the best results, but make sure that you use the correct modem initialisation string.

There are several pre-set configurations in your Apex modem so choose the "auto reliable" setting "&F0". You might also consider telling the modem to wait longer before reporting a loss of carrier, which is controlled by setting register 10 to a higher value. For instance, try S10=40: putting these together will give an initialisation string of AT&F0S10=40 which may fix some line drop problems, especially if they are caused by noisy phone lines.

Your problems with the NT Server could be the result of not having the correct modem settings. If data is being received too fast for your system to cope with, the end result may be dropped connections. You are correct in thinking that it's possible that the NT Server could be too busy to handle connections, but it's unlikely, unless it's a heavily loaded machine. The serial ports fitted in most PCs aren't really up to the demands of a multitasking operating system, especially if there's more than one modem being used, as much of the work still has to be done by the main processor, notwithstanding the use of buffers in chips like the 16550. For the best performance in a server, you should really use intelligent serial cards such as those from Specialix and Digi. The first thing to look at, though, is your modem and its link to your computer.

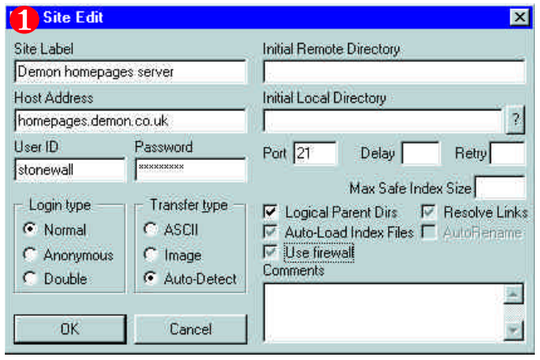
Your own home page on the web

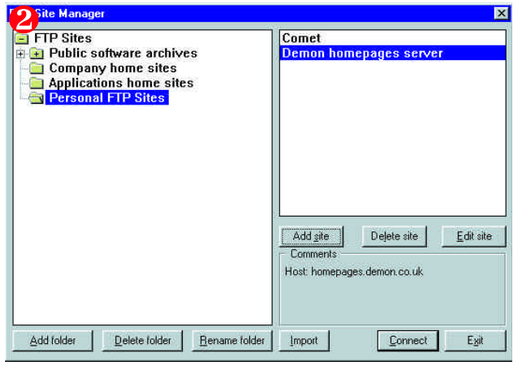
Q. *"I am a subscriber to Demon, trying to set up my free space on the World Wide Web, but as yet I am not technically savvy regarding the internet or PCs as I have only had my computer for three months. I would like to make use of my free space and hope you can tell me how to set this up."*

A. Creating your free space with Demon is easy (and the procedure is similar for most other internet providers). You need to use an FTP program, like WS_FTP or CuteFTP, to transfer web pages to the homepages server which is called homepages.demon.

Uploading web pages with CuteFTP

Although this walkthrough illustration shows how to upload pages to Demon's web server, you'll need to use exactly the same process for other companies. Ask your Internet Service Provider for details of their homepages server.

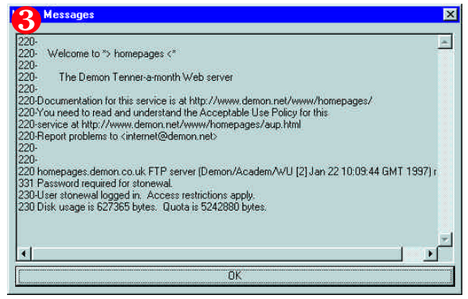


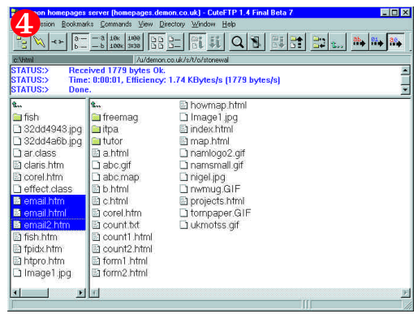


1. When you start CuteFTP, click on the "Add site" button to add a new site to the directory. This is the screen that appears. Fill in the details: for Demon, you will have to put homepages.demon.co.uk as the name of the site to connect to and give your node name and password; set the login type to "normal", rather than "anonymous".

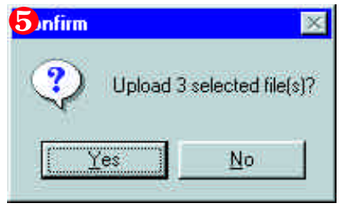
2. When you have created a site, you will see this screen again. All you have to do to connect to the homepages server is click on the Connect button: if you're using Windows 95 your system should dial automatically, otherwise you'll need to connect to the internet first.

3. When you connect to the server, you'll see a message like this, which will be slightly different depending on which provider you use. Many will provide similar information, including the amount of space you have remaining.





4. When you click "OK" to remove the message, the main CuteFTP display is a little like the Windows 3 File Manager. The right-hand part shows the files on the remote system and the left-hand part shows the files on your own computer. All you have to do to upload your web pages is find the correct directory on the left and then drag the files to the right.



5. Finally, you will be asked to confirm that you want to copy the files and then they'll be transferred to the server. That's all there is to it — you've just created your web site.

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co.uk. The series of illustrations on pages 238 and 239 show exactly how you upload pages with CuteFTP, which can be downloaded using your web browser by typing in the URL ftp://ftp.demon.co.uk/pub/ibmpc/win3/winsock/apps/ftp/ and then clicking on the appropriate version of the file, depending on whether you want the 16- or 32-bit version.

When you upload your pages, you will only be able to see them immediately if you configure your web browser to use Demon's Proxy server (you need to tell your browser to use www-cache.demon.co.uk, port 8080 for the "http proxy"); then, if you wait until the end of the next working day, they'll be available to everyone.

To actually create your pages, you can either build them by hand, which means learning HTML, or use one of the many page creation programs such as Claris HomePage. The online version of *PCW*'s 1995 HTML tutorial can be found at public.diversity.org.uk/webtutorial/ and will be a good starting point if you want to build pages by hand.

Small network link to resources

Q. "*I have two PCs and want to set up a small network between the two to share resources (printer, modem, etc). I have read somewhere that using a crossover cable is cheaper to use than a thin Ethernet cable. Is this true?*"

A. Yes, it is true. If you have twisted pair Ethernet cards, all you'll need is a crossover cable which you should be able to buy from the network suppliers. You can buy low-cost Ethernet adaptors for around £20 via mail order. If you're planning to add extra machines, though, you may like to consider using thin Ethernet cable: you'll need two T-pieces and terminators, but you can add another system very easily. With twisted pair cabling, you'll have to buy a hub if you want to link more than two computers.

Phone line file transfer, on the cheap

Q. "*I have rather large files that I would like to transfer across the phone lines to a friend who lives locally. I would like the maximum data transfer rate to keep the phone bill low, and I am wondering whether there is a way of directly connecting my computer to my friend's using inexpensive software? I know of HyperTerminal, which comes with Windows 95, but the problem is getting the other computer to answer the call.*"

A. There are a number of solutions to your problem. One of them would be to use bulletin board software, much of which can be downloaded for a try-out. Or, you could invest in a remote control program like ReachOut, which can be configured to allow unattended access to another computer; it also optimises file transfers by only sending those parts of the files which have changed. *(See Net.news, p233.)*

However, all is not lost. If you're not too worried about security, you can still use HyperTerminal. By setting your friend's computer to talk directly to the modem and enabling auto-answer using the ATS0=2 command (to answer on the second ring), you can connect to his modem. You won't receive any helpful prompts from his system, but if you choose to use the Zmodem transfer protocol, you can take advantage of HyperTerminal's ability to begin receiving automatically. Just start to send the file when you're connected to your friend's computer and it will be downloaded to the default directory on his system. It may not be the most secure solution, but it's certainly the cheapest.

Cutting out the rubbish

Q. "*I am a student at Cardiff University and have been given the task of finding software that can filter email to get rid of junk mail. The person for whom I am doing this uses Eudora for Windows 3.11 and, ideally, wants to be able to grade all his email in terms of how useful it is likely to be. If any systems exist which allow this, irrespective of how primitive, could you please advise me or at least give me some pointers in the right direction? Also of interest would be ways of tracing junk email and the protocols involved when complaining about it.*"

A. Depending on how you receive your email, it can be quite tricky to filter it effectively. If you're using Eudora you will be picking up email via POP, which means you won't have the "envelope" information so you'll have to rely on the message headers to filter things out.

It is also very likely that you'll be using Eudora 1.4 or 1.5, and the lite versions don't support filtering. However, the Windows version of Eudora Lite 3 is now in beta and you can download it from www.eudora.com (Mac users don't have to wait, as the Mac version came out first).

You can create filters in Eudora Lite 3, by choosing Filters from the Special menu. The

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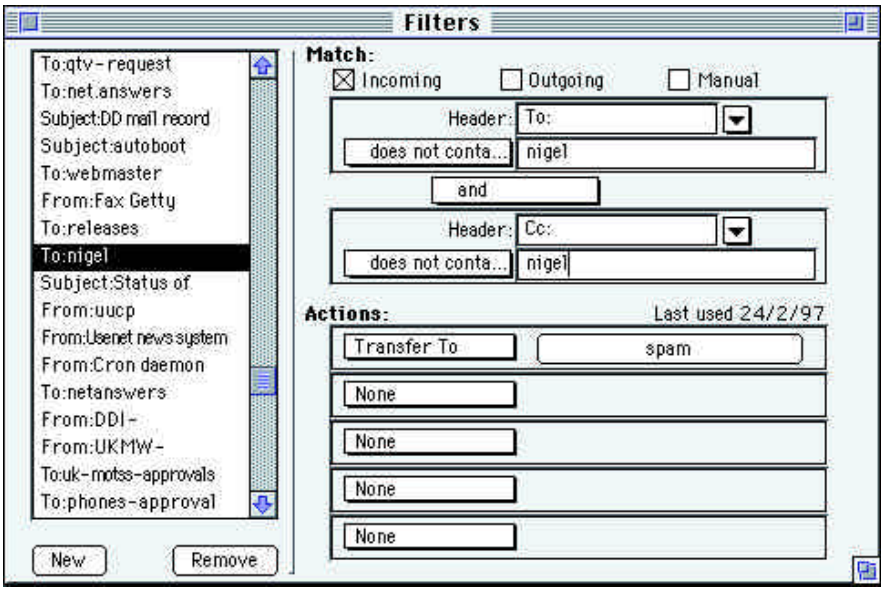


Mail programs like Eudora can be used to filter your messages so that you can avoid having to see all the junk mail that is infesting the internet

screenshot in above shows a filter being set up. By using the rule "To: does not contain nigel AND Cc: does not contain nigel" I could remove a large chunk of the junk mail I receive, since my name doesn't appear.

However, remember that mailing lists are unlikely to have your name in either of these headers, so you'll need a rule to filter out messages from mailing lists first. And, instead of deleting messages, you should tell Eudora to set a priority on them and then sort your mailbox by priority. That way you can also include rules that look for keywords matching current projects, or particular people, and prioritise them.

As for tracing junk email, you need to look at all the headers of the message, which will usually tell you where the message came from — the From address is often forged. You'll need to look at the "Received" headers, which list the machines through which the message passed. The oldest ones are at the bottom of the list and one of these will tell you the system from which the spam originated. The reason it's not necessarily the oldest is that some experienced junk mailers forge "Received" headers, too.

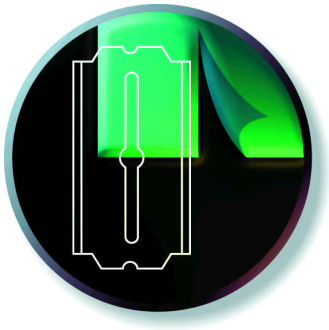
To cope with this, you should always include all the headers when you write to complain about junk mail. That way, if you contact someone whose site has been named in a forged header, they will be able to contact the appropriate people.

To whom do you write? Every site on the internet is supposed to have an address called "postmaster" which is the contact for email queries, so in the first instance you should write to them, although large internet companies may have special addresses at which you can report abuse. If you have no luck contacting the computer that appears to be home to the junk mailer (after all, the postmaster may well be the person sending the junk!), then you should find out who their internet provider is and contact them.

You can usually find out who someone's provider is by using tools such as traceroute (tracerte under Windows) which will show how internet traffic from your computer reaches theirs. For instance, in Windows or Win95, typing **tracerte www.vnu.co.uk** in a DOS box will show the route to our VNU web server. The last few hops will give you the name of their internet provider, just before traffic passes into the VNU network. You can then contact the provider, who will usually be happy to take action against customers sending junk mail.

PCW Contacts

Nigel Whitfield is a freelance journalist and maintainer of several internet mailing lists. You can send questions to netanswers@pcw.vnu.co.uk, but a personal reply to every query cannot be guaranteed.



Books

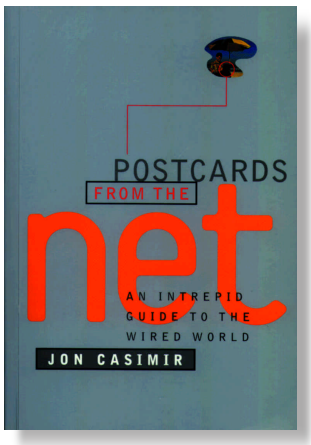
Not sure what's out there on the net, and why? Don't panic, there's a guide book to help net novices on their way through cyberspace. Plus, a new book for Netscape navigators.

Postcards from the Net: An Intrepid Guide to the Wired World

This guide is ideal for those who don't know a lot about the internet. It provides a good insight into what is available on the web, telling you where and why to go, and what to do when you arrive.

The author keeps the jargon to a minimum and explains things in a humorous way. To him, the beauties of the net are social rather than commercial. He covers a broad range of topics: from how to behave online, to cyber soap operas, to cyber-rights and censorship. He reviews the sites, too, and tells you what is good and bad about them and what to look out for.

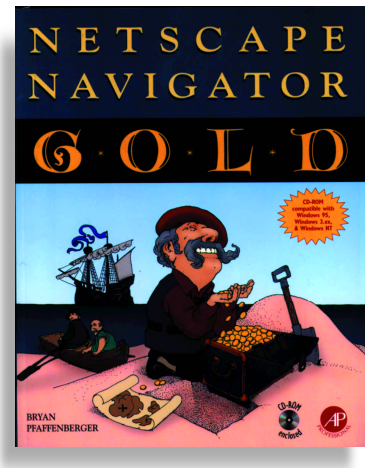
I couldn't resist searching for sites such as those containing the transcripts of Nicole Brown-Simpson's emergency calls, and the cabin conversation in the space shuttle just seconds before the Challenger exploded — an interesting, though macabre, read. I watched pictures of turtles being filmed live from net cameras, and Steve's ant farm, which was, er, fascinating.



This book will take you to places where others don't go and introduce you to the minds that feed the net culture. You'll meet cyber-soap stars and cyber-feminists. In the Net Courtroom you'll be asked whether Kurt Cobain did kill himself and whether Elvis Presley really is alive and well and living in cyberspace.

This is a travel book like no other: cyberspace is a parallel universe and this book is like a Lost in Space journey to a few of its planets. The net *is* fun and there *is* more to net life than downloading pictures of the Spice Girls.

Etelka Clark



Netscape Navigator Gold

This weighty tome is neither bedtime reading for newbies, nor something new for the experienced user, and the early chapters are couched in an awful "Hello, campers!" style. The author, Dr Bryan Pfaffenberger, claims that even experienced surfers will find nuggets of interest in his "How to" guide, yet the only new thing I learnt from the first 150 pages was the meaning of the Yahoo acronym: "Yet Another Hierarchically Officious Oracle". At 600 pages, there's just too much padding with repetition and obvious information.

Although interesting tips are sometimes provided, it seems unlikely that even the most luddite newbie would need, say, more than a couple of pages of information on navigating by using "forward", "back" and bookmarks; Pfaffenberger devotes far more space to this than is necessary. The book has some good points, though. The sections on plug-ins is handy: search engines and information resources are always good to know. And the smart-bookmarks chapter introduces an interesting addition to the Netscape family. But still, Pfaffenberger insists on explaining everything, even when previous chapters have already covered it.

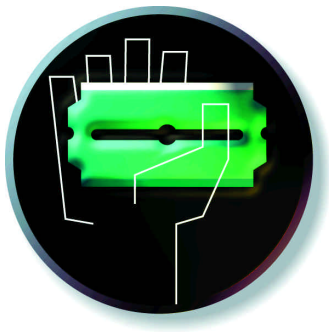
If this book were about 400 pages shorter (and the price reflected that) I would heartily recommend it as a useful reference tool. As it is, you'd be better off firing up Gold and playing around with it yourself.

Rob Venes

PCW Details

Postcards from the Net: An Intrepid Guide to the Wired World
Author Jon Casimir
Publisher Allen & Unwin
ISBN 1-864-48280-X
Price £9.99
★★★★

Netscape Navigator Gold
Author Dr Bryan Pfaffenberger
Publisher AP Professional
ISBN 0-12-5553151-6
Price £24.95
★★



The crest of a wavelet

What's in a wavelet? Well, there's wobbles, for a start. Toby Howard takes a look at the ideas behind this new mathematical technique, which has great advantages for storage saving.

Every so often, an idea comes along which gets people hopping. One of the newest is a mathematical technique called "wavelets" and it is having a massive impact on the computing world. The mathematics of wavelets can give you a headache at the best of times, but the underlying ideas are simple.

To illustrate how wavelets work, I'll take an example from image processing, a field in which wavelets are playing an important role. Consider one row of pixels taken from an eight by eight grey-level image. The numbers represent the values of the pixels from left to right, in the range 0 (black) to 255 (white):

```
Pixels 13 5 12 2 6 0 2 0
```

To create a wavelet representation of this image, start at the left and average out the values of pairs of pixels, keeping a note of the difference between the average obtained and the value of the first pixel; call this difference the "wobble". Averaging the first two pixel values (13 and 5) results in 9, with a wobble of 4. If this is done for each pixel pair, the end result is a lower resolution image (four pixels instead of the original eight) and a list of their respective wobbles:

```
Pixels  9 7 3 1
Wobbles 4 5 3 1
```

No information has been lost. By taking each new pixel value and adding and subtracting its associated wobble, the original two pixels can always be retrieved. If you average and wobblify again, the result is:

```
Pixels  8 2
Wobbles 1 1
```

Repeating the averaging a final time gives

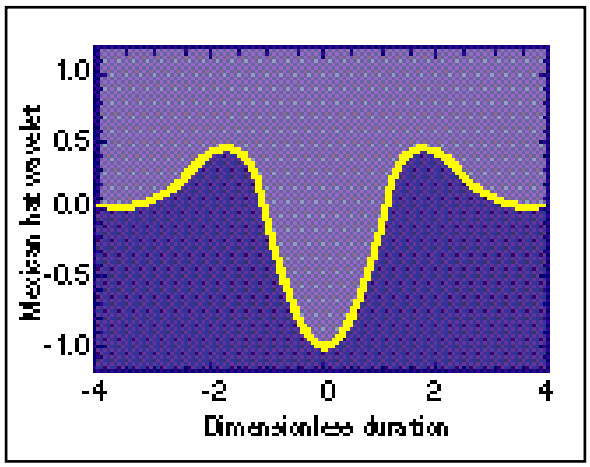
```
Pixel  5
Wobble 3
```

The end result is a single pixel, which is an average of all the original pixel values. If you list this final pixel's value, followed by each of the wobbles recorded along the way, you've generated the wavelet representation for the image:

```
Wavelet representation
5 3 1 1 4 5 3 1
```

At first sight, nothing appears to have been gained by this strange procedure. You haven't saved any data storage (there are still eight numbers) and worse, it appears that all the pixels have averaged out into one mysterious shade of grey. In fact, you have gained something. The wavelet representation can be used to generate versions of the original image at different resolutions. This wavelet representation gives you your lowest resolution image right away. You can take the single average pixel value 5, and give all eight pixels this value.

Fig 1 Example of a wavelet function



It's not interesting, and there's no chance of anyone guessing what the original image looked like. But it's a low-resolution version of the image.

To display the image at the next highest resolution, you take the single pixel value 5 and apply its wobble to it, to recover the two pixels from which it is was averaged. This gives

```
8 (5 + 3) and 2 (5 - 3)
```

The first four pixels can be set to 8, and the second four to 2, to give a better-resolution image. Repeating the process, you take each of these two pixel values and apply their wobbles (one and one respectively) to recover the pixels from which they were averaged: these values are

```
9 (8 + 1), 7 (8 - 1), 3 (2 + 1) and
1 (2 - 1)
```

Now there are four pixel values which can be assigned to each pair of the eight image pixels. Repeating the process once more brings back the original image.

This isn't useful with an image of eight pixels. But for a complete image, if you have its wavelet representation, you can easily display the image at several resolutions, ranging from best (no averaging) to worst (the average shade of the whole image). For an image of 512 x 512 pixels there would be nine choices of resolution, and for 1,024 x 1,024 there would be ten choices. Having choices of resolution is useful in image editing and incremental display of web graphics. The advantage of the wavelet representation is that from it, you can generate an image at many resolutions, without needing to store each in a separate file. The idea is easily extended to colour images.

Wavelets perform image compression.

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Look at the wavelet-encoded image:

```
5 3 1 1 4 5 3 1
```

Some wobbles are small and will have little effect on image reconstruction. If it is decided to not bother with wobbles less than two, and replace them with zeros,

```
5 3 0 0 4 5 3 0
```

what effect will this have on the reconstructed image? Repeatedly applying the wobbles to the averages leads to the following image which can be compared with the original:

```
Reconstructed image
        12 4 13 3 5 -1 2 2
Original image
        13 5 12 26 0 2 0
```

While not identical, they are close (don't worry about the pixel value -1; it can just be displayed as a zero). Having removed three wobbles from the wavelet representation, an image is still able to be created which is almost the same as the original. The image has effectively been compressed, and a storage saving of 37.5 percent has been made. The zeros don't need to be stored, so the wavelet representation now has five numbers instead of the original eight. This is an example of "lossy" compression, where we save storage space at the expense of degrading the image quality. This may sound bad, but with full-colour images you can distort the pixel values a lot before any differences become visible to the eye. This happens in every JPEG file you see on the web (although wavelets are not involved).

In practice, the details of wavelets are more complex than this simple example illustrates, but the underlying principle is the same. As in classical Fourier analysis, where a complex signal can be dissected into a collection of pure sine waves, wavelets provide a means of taking complex data and representing the same data as simple scales and shifts of standard wavelet functions (see Fig 1, page 249, as an example of a wavelet function). The wobbles express the scales and shifts required. So, the data can be processed by operating on the wobbles and reconstructing the original data.

In computer graphics, a curve can be analysed into a set of wavelets and wobbles, and by removing wobbles below a certain threshold value, the curve will be automatically smoothed when it is reconstructed. This technique can also be used for level-of-detail control in virtual reality where objects are only drawn in high detail, with lots of polygons, when you are close enough to them. The further away from them you get, the more they are drawn using fewer, but bigger, polygons, in an effort to keep the animation rate constant.

Wavelets have cropped up in many unexpected places, from cleaning up a noisy old recording of Brahms playing his First Hungarian Dance on the piano, to reducing the storage by a factor of 20 in the FBI's archives of 30 million fingerprints. Wavelets are being used to extract hidden patterns from satellite and radio telescope data, for speech recognition, radar and optics. Research is in full swing into applications like sound synthesis, with the promise of creating realistic natural sounds at little cost, analysing financial markets and modelling the human visual system.

The web is awash with information about wavelets, and there is free software for you to download. A good place to start is www.amara.com/current/wavelet.html. But a word of caution: if you feel tempted to dip into the mathematics behind it all, have a stiff drink first. ■

Things that go ping on the web

Is yet another file format really necessary? Proponents of PNG believe it is, and that it will pave the way for high-quality graphics on the web. It's also free. Toby Howard reports.

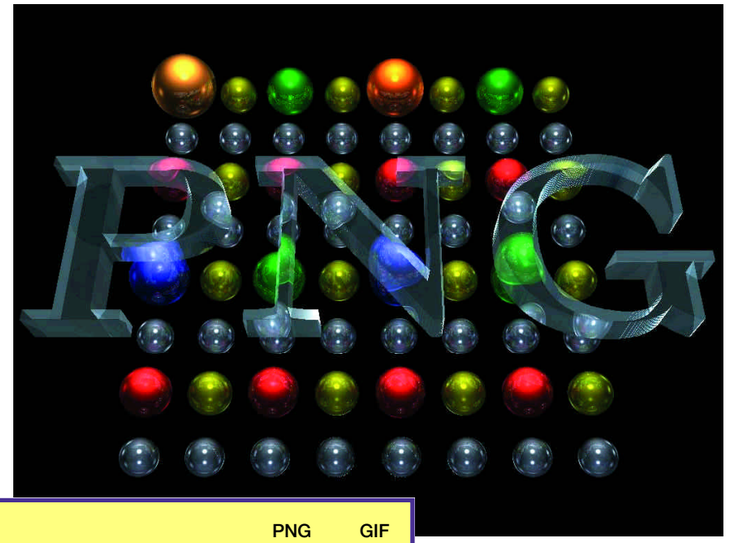
The world is bursting with file formats for storing pictures: GIF, JPEG, BMP, PICT and TIFF should be familiar, but there are many more. Do we really need another one? According to the World Wide Web Consortium and a growing number of companies, we do. Proponents of the new image format PNG (pronounced "ping") claim it will revolutionise the web by providing high-quality graphics for the first time. PNG stands for "Portable Network Graphics" or, depending on your sense of humour, for the recursive phrase "PNG's Not GIF".

PNG is elegant, powerful, extensible and, as its authors modestly claim, "cool". It provides lossless compression, handles indexed and truecolour images, supports image gamma data, file streamability and very fast progressive display, sophisticated file integrity checks and full transparency. There is also a publicly available implementor's library, but best of all, it's free.

Currently, almost all images on the web are stored as JPEGs or GIFs. The two formats work quite differently, and are intended for two different kinds of image. JPEG (Joint Photographic Experts Group) is specifically designed for images which contain a large number of colours, such as scanned photographs. JPEG stores the colour of every pixel using a "lossy" compression method, which means that whenever you save an image, you lose information. The size of the resultant JPEG file is small but the data it contains is only ever an approximation (albeit a very good one) to the original image. JPEG is an official international standard. It is free, it works well, and appears to have a rosy future.

GIF (Graphics Interchange Format) stores images using an "indexed" encoding whereby each pixel is represented by an integer index into a palette of colours. The size of the palette is limited to 256 colours, which makes GIFs suitable for images which do not contain many fine gradations of colour, such as logos, icons and simple graphics. GIF uses a lossless compression technique that can result in very small files. CompuServe invented GIF in 1987, specifically for online storage and delivery of images. It uses a compression technique known as LZW, after its inventors Abraham Limpel, Jakob Ziv and Terry Welch. LZW is an excellent lossless compression method, and with suitable images (those which contain blocks of continuous colour) can result in savings of up to 40 percent in file size. But there is a catch. It turns out that LZW was patented by Unisys in 1985, which gives them the right to charge a royalty for anyone writing or reading files that involve LZW compression and decompression. Since 1990, Unisys has reached licensing agreements with hundreds of companies, including CompuServe, whose software creates and reads GIF files. This means that GIF is not a freely usable format, and to many web developers, this goes against the grain.

Together with some known technical shortcomings of GIF, the legal problems prompted 20 graphics experts from ten countries to get together (virtually, of course) to form the PNG Development Group in 1995. Headed by US researcher Thomas Boutell, and with the support of CompuServe and other companies, their mission was to rethink the implementation of graphics for the web, and design a new format which would be free and future-proof. In late 1996, PNG was endorsed as a standard by W3C, the official web standards organisation headed by Tim Berners-Lee. It is now starting to catch on.



Feature	PNG	GIF
Indexed colour images of up to 256 colours	●	●
Transparency	●	●
Streamability	●	●
Progressive display	●	●
Lossless compression	●	●
Multiple images in one file (for animation)	❍	●
Truecolour images, up to 48 bits per pixel	●	❍
Grayscale images up to 16 bits per pixel	●	❍
Full alpha channel for general transparency	●	❍
Image gamma information	●	❍
Automatic file integrity checking	●	❍
Legally unencumbered	●	❍
Completely free	●	❍
Standard implementor's toolkit available	●	❍
Standard benchmarks available	●	❍

PNG is designed to replace GIF directly, and supports an equivalent 256-colour indexed image storage scheme. In addition, it supports 8-bit greyscale images and "truecolour" images of up to 48 bits per pixel. With truecolour images, pixel values are not stored as indexes into a small palette. Rather, like in JPEG, the red, green and blue components of each pixel are stored directly, allowing images with many millions of colours.

PNG was designed with high-quality graphics in mind. Today, web images generally look different when viewed on different computers. A GIF which looks good when created on a Mac, for instance, will often look too dark when displayed on a PC. This is due to the non-linear display characteristics of monitors, known as their "gamma". PNG partially solves the problem by storing the gamma value of the monitor on which the image was originally created. PNG viewing software, knowing the gamma of the display on which it is running, can compensate for any differences by adjusting the brightness of the pixels in the image. The results are very good, but for applications where truly exact platform-independent colour-matching is important, such as online catalogues, product logos, fine art and medical imaging, PNG can also support images stored as device-independent colours and includes the calibration data required by sophisticated colour management systems.

Another requirement for high-quality graphics is transparency. GIF provides this by allowing the image creator to define one colour (usually the background colour) to be transparent. But this is a crude method, and often leads to ugly halo effects, especially with anti-aliased images. PNG supports full "alpha channel" transparency, where each pixel can be assigned a transparency in the range 0-255, from "fully transparent" to "fully opaque". This enables partially transparent images to be seamlessly overlaid onto any browser background.

Due to a superior compression technique, a PNG file is on average about 20-30 percent smaller than the corresponding GIF. Not surprisingly, the PNG Development Group has put a lot of effort into ensuring that their compression method is legally unencumbered.

Like GIF, PNG also supports progressive display, giving a low-resolution preview image after only 1/64th of the image data has downloaded (as opposed to 1/8th with GIF). PNG's preview, known as "Adam7" after its author, Adam Costello, is unusual: the image fades into view in seven stages, as a rectangle whose definition gradually improves. The initial image is rather like the enlarged pixels that sometimes cover alleged criminals' faces in TV news reports. One reason for the choice of this method is to accommodate imagemaps, where it is often obvious where to click even when presented with a low-resolution image.

PNG also has a few other interesting features, including a clever scheme for checking common types of file corruption, the facility to apply built-in filters to the image to improve compression, and the storage of text with images to make them more readily indexable by web search tools.

So, now that you are hopefully convinced that PNG is "cool", if not "gnarly", where can you get PNG images, and how

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can you view and edit them on your machine? The best starting place is www.wco.com/~png/, which has lots of links to online documentation, to software which supports PNG (such as Photoshop, Paint Shop Pro and CorelDraw) and to the free C source code for the PNG "reference implementation".

What about web browsers? As I write, neither Netscape nor Internet Explorer supports in-line PNG images, but plug-ins are available. But both companies have stated their intention to fully implement PNG, so we should expect the two biggies to play ball soon. Microsoft liked PNG so much, the company chose it for encoding all the graphics in its Office 97 suite.

You might be relieved to know that there is one thing our old friend GIF can do which the young upstart PNG cannot: storing multiple images in the same file, the animated GIFs we all know and love. But the PNG people are working on this, developing a new multi-image standard called MNG (ming?). As for JPEG, they want to improve on that, too, and WNG (Wavelet-based Network Graphics… wing?) is already on the drawing board.

The work of the PNG Development Group is leading the way for high-quality graphics for the web, and it looks like everyone will soon be following. ■

Word rap

It's not what you say... Tim Frost looks at how text-to-speech software is rising to meet the challenge of an infinite vocabulary.

A couple of *PCW*'s ago, Futures looked at how technologies are developing to get the PC to recognise speech. Any system to make use of software to take speech and turn it into text, is likely to take advantage of reversing the process: taking computer text and turning it back into the spoken word. Well, it's only polite that your machine responds when you talk to it.

The technology of text-to-speech (T-T-S) conversion has been around for years. As soon as the PC gained a sound card, it gained simple T-T-S software like Monologue. But these systems have given T-T-S a poor reputation, sounding like a dalek soft-talking you while propelling itself down a cobbled street. The problem is that speech contains a vast amount of human characteristics, and unless every aspect of human speech is replicated accurately, it sounds like… well, computer speech.

Complications are numerous. Apart from speech patterns and pronunciations, there are side issues like how to handle written text's shorthand references like "Mr" and "Dr" and how to deliver dates and numbers.

Text-to-speech converters split the process into several specific sections, first analysing the text for these sorts of shorthand references. It is not just a matter of converting the letters "Dr" into the word "doctor"; this text normalisation process has to look at how references are used in the context of a sentence. 1996 is spoken quite differently if it is a number of items (one thousand and ninety-six), than if it is a house number or a date (nineteen ninety-six).

Having used text analysis with a set of pre-programmed rules to normalise the text, the software can get on to trying to convert the words themselves into sound. For the high-level T-T-S system, simply looking at the text and turning it into phonemes, the separate noises that make up each word, is not enough. There has to be fine-tuning of letters and letter combinations. An obvious example is the difference between long and short vowels; "hot" and "go" use the same vowel, pronounced in different ways. This simple stuff is handled adequately by most software, even Monologue. But since English consists of more exceptions than rules, there are other traps for the unwary T-T-S software. The software is programmed with "exception dictionaries" to tell it how to pronounce bits of words like "lost" and "host" that look virtually the same on the page but are pronounced using different rules.

As the software becomes more subtle in its speech patterns, its exceptions have to be more complex and subtle. The sound of a "T" is different depending on whether it appears at the start or end of a word, and the computer must deliver these differences if the speech is to be convincing.

What has aided the realism of computer-speak is the recent change from simple sound synthesis to building-in wavetable-type sound creation. Early speech systems used synthesis to produce the phonemes, using the same technology and chips as the PC does to make MIDI music and effects.

The T-T-S industry has learnt well from the music world and has developed the use of sound sampling. The purely synthesised sounds have been replaced with phonemes extracted from real speech — the text-to-speech equivalent of wavetable synthesis. And, like wavetable synthesis, phoneme-sampling significantly increases the realism of the artificial voice. These voice segments can be pitched up or down to change the overall speaking pitch, but only to a certain extent. The days of taking male speech and trying to make it sound like a woman by speeding it up are long gone in the higher echelons of T-T-S systems. It is more satisfactory to load a female set of speech segments from the outset.

The similarity with synthesised music doesn't stop at the generation of the voice itself. The last key element to making the voice sound convincing is adding its cadences and speech patterns, known as the prosodic characteristics of speech. For the PC to do this, it must analyse the structure of each sentence, and string of sentences, to work out the natural cadence pattern that matches the sense of the words. The sentence's structural information is used to control the pitch and length of each of the phoneme segments as they are played out.

These techniques are bringing T-T-S closer to the quality of pre-recorded messages with the infinite vocabulary offered by text control. T-T-S can store a large number of messages in the sort of mini-memory chips that are used to add voice messaging to a car or a fridge. Its ability to speak convincingly is making telephone and kiosk information services sound more human, and the more realistic they become, the more acceptable they are. ■

The last word…

In the February edition of Futures, referring to standard prefixes for powers of ten, I mentioned that the highest yet agreed was "exa", for 10^18. I'm grateful to David Pickup of Gateshead for pointing out that in 1990, at the 19th Conference Generale des Poids et Mesures, further units were agreed: zetta (10^21) and yotta (10^24) at the top end of the scale, and zepto (10^-21) and yocto (10^-24) at the lower end. Wags on the web have suggested Groucho (10^-30) and Harpo (10^-27), but these are yet to be formally adopted, and Zeppo, Gummo and Chico remain available for future use.

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 would prefer) and we will 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 are 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

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Getting automated

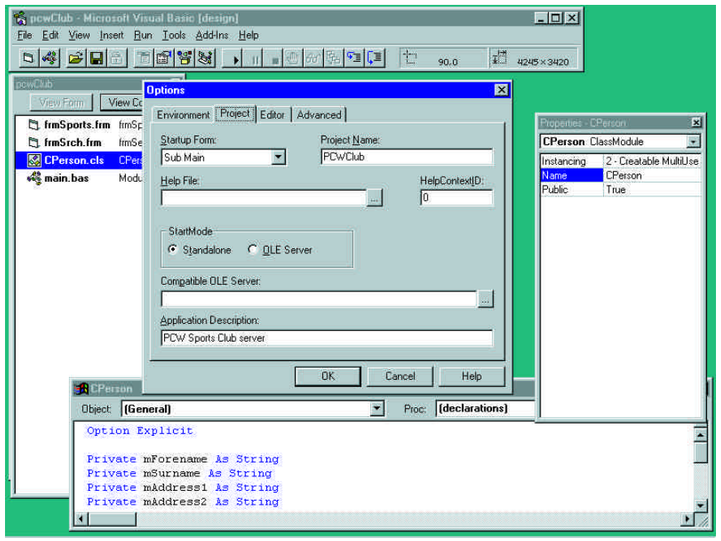
Tim Anderson does clever stuff with automation servers in the final part of the workshop. Plus, polishing the Sports Club database and adding some essential new functions.

Last month's workshop demonstrated how a Visual Basic class can be plucked out of the standalone version of VB and, with care, planted into Microsoft Office as a Visual Basic for Applications class. That is one way of re-using code, but an even better approach is to create objects that can communicate with any number of different applications without the need to recompile. With the rise of PC networks, and now the internet, this kind of software is the way of the future.

Under Windows, the way to achieve this is by using Microsoft's Component Object Model, or COM. This is the technology beneath OLE and ActiveX, and Visual Basic programmers can use it without knowing the detail of how it all works. For example, what if the PCW Sports Club wants to get at membership details not only via Word, but also from other programs like accounts and desktop publishing packages?

A key part of the Sports Club application is the CPerson class module which describes a club member. By making a few changes, that class module can become an automation object which exposes its properties and methods to other applications. The steps are as follows:

1. Open the CPerson module and press F4 to reveal the class properties. Set the Instancing property to CreateTable MultiUse, and the Public property to True.
2. Add a module to the project using Insert - Module. In the module, create a Sub Main.
3. On the Tools menu, in Options - Project, change the project name to PCWClub, and put a few words of description in the Application Description field. Finally, change the Startup Form to Sub Main.



Two key steps in creating an automation server are: first, the properties for the class to be exposed; and second, the project options

The project name must be unique to your automation server. The full class name of objects in your server will be of the form PCWClub.MyClass.

By taking these simple steps, you have created an automation server that lets other applications create and control objects of the CPerson class. All that remains is to register the class in the system registry. If you run the application in VB's development environment, it will be registered temporarily. If you build an .EXE or OLE DLL, it will be registered permanently. Then you can write code like this in Excel:

```
Dim myobj As Object
Set myobj = CreateObject
("PCWClub.CPerson")

  If myobj.FindPerson("Bloggs",
"Fred") Then
MsgBox "Fred lives at: " &
myobj.Address1
End If
```

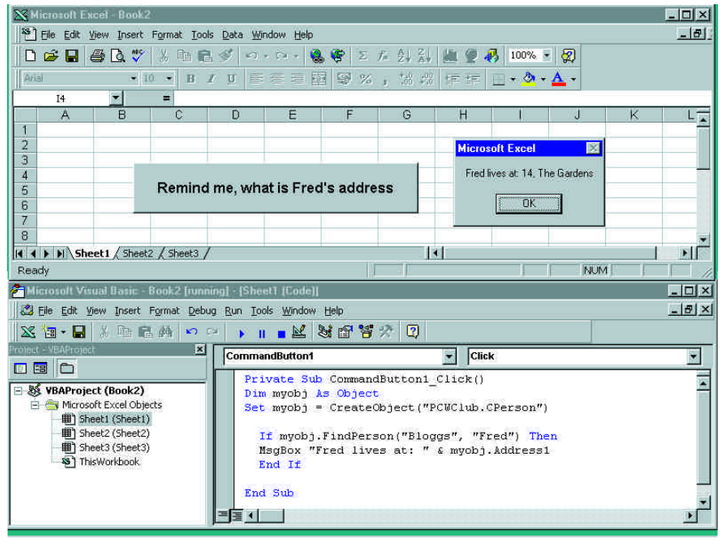
Although applications such as Excel function both as automation servers and standalone, most VB applications will be one or the other. Often, VB automation servers have no user interface, since this is provided by the client application. The workshop example, though, is designed to work in both guises. The trick is to use Sub Main to detect whether the application is running standalone or as an automation server. Here is the code:

```
Sub Main()

If App.StartMode <>
vbSModeAutomation Then
frmSearch.Show
End If

End Sub
```

You may wonder what Sub Main does when running as a server? The answer is, nothing at all. The only thing the server application does is to expose its classes so other applications can create and control objects. For testing, you can simulate this mode by setting the startmode in Project Options to OLE Server. Run the application and then minimise VB. Next, run another instance of VB, open the References dialog and check the PCW Sports Club server. Now you can test the server by creating objects of the CPerson class.

If you have run a compiled VB automation server such as PCWCLUB.EXE, it will be entered permanently in the system registry. Once you have finished testing, it is good practice to remove it. You can do so by running it from a command line with the /UNREGSERVER parameter. DLLs are unregistered using REGSVR32.EXE which is found in the System directory. Run it without parameters to see the switches.

Automation servers are powerful but do present some new programming challenges. The section of the Visual Basic manual called "Creating OLE Servers" is essential reading.



Excel is able to get at Sports Club details by using a VB automation server

Adding the essentials

The Sports Club database is also used as a standalone application, and the version in last month's workshop is lacking some essential features. First, there is no way to add or delete members; and second, you cannot add or remove sports from the list which applies to each member.

The thinking behind the design of this simple application is that interface code belongs in the main form, while database code belongs in the CPerson class so that it can be used in other applications or as an automation server. The natural approach is to create new public methods for CPerson that give this new functionality. For example, here is code to add a new member:

```
Function CreateNew(sSurname As
String) As Long
' creates a new person in the
database
Dim lId As Long
myRecordSet.AddNew
myRecordSet!surname = sSurname
lId = myRecordSet!ID
myRecordSet.Update
Me.load (lId)
End Function
```

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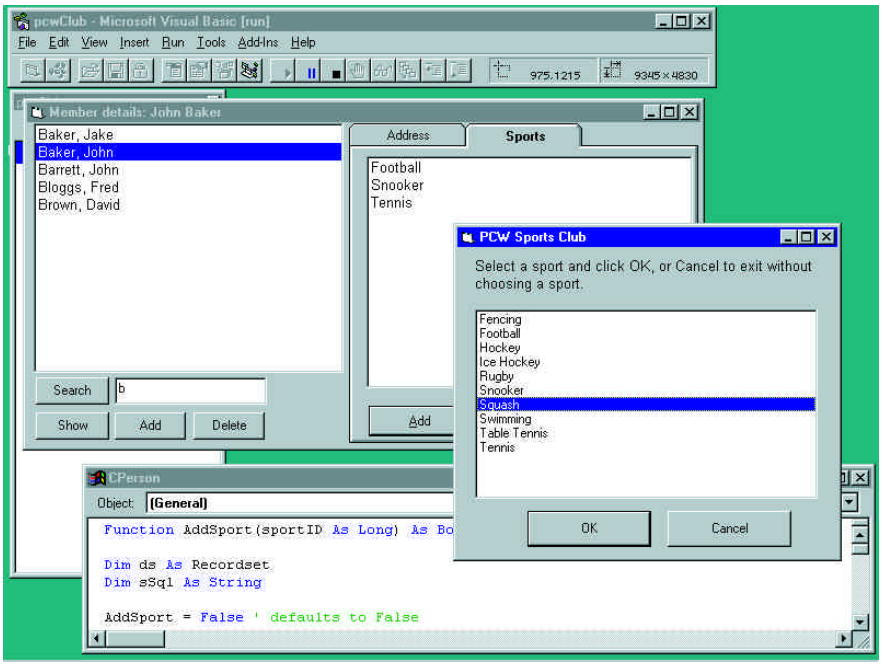


Adding a sport to a member's list of interests is achieved via a simple dialog

The ID field is a counter, which means that the JET database handles the business of ensuring that the new member has a unique number. There is an issue, though, about how to cope with users who change their mind.

What if someone starts to create a new member, and then wants to back out and leave things as they were? One possibility is to call the AddNew method, but not to call Update until the user confirms the action. Unfortunately, bullet-proofing the application so that Update is only called after AddNew or Edit is prone to error. The easier approach is to minimise the time when JET has unsaved changes in its copy buffer. In this application, clicking the Add button creates a new member with the surname "Unnamed". If the user wants to cancel the addition, it is just a matter of clicking Delete.

The DeletePerson method is a little more involved. The problem is that there may be other records, in the SPORTLINK table, which refer to the member being deleted. To maintain data integrity, these records also need to be removed. Database objects have an Execute method which is an ideal solution. Execute takes an SQL command and applies it to the database. For example:

```
sSql = "DELETE * from SPORTLINK
where SPORTLINK.MEMBERID = " &
Str$(lId)
myDB.Execute sSql, dbFailOnError
```

The code at form level also has some work to do. When a member is deleted, the name must be removed from the list currently displayed, and the other fields on the form updated as necessary.

To make sense of adding sports to a member's list of interests, you need to throw a dialog listing the available sports. The dialog has a SportID property. To add a sport, the application takes these steps:

1. Show the Sports dialog modally, which means the user must either choose a sport, or cancel, before continuing.
2. When the OK button is clicked, the Sports dialog sets the SportID property to the currently selected sport.
3. Next, the program calls CPerson's AddSport method, passing the SportID as a parameter. AddSport creates a dynaset-type recordset which looks for records in the SPORTLINK table that match this member with the chosen sport. If the dynaset is empty, AddSport adds the required record. If it is not empty, AddSport reports that the member is already linked to that sport.
4. Finally, the program updates the form with the new list of sports.

Finishing touches

There is plenty more work to do in improving the Sports Club application. One professional touch is to enable and disable buttons according to whether or not they are applicable. For example, when no sports are listed, the Remove sport button should be disabled. Next, you can add keyboard shortcuts for mouse-free typing.

Another important area is error-handling, to prevent the program from crashing and to show the user informative messages when things go wrong. For instance, the database could become corrupted.

Finally, there is the issue of multiple users and what happens when two people try to update a record at the same time.

■ *All the code for this month's workshop is on the cover CD. And see Hands On Visual Programming (p301) for answers to queries concerning this workshop and other Visual Basic problems.*

Beating the OLE jargon

OLE has lots of strange jargon. and here are two examples that can cause confusion. Mastering these issues is important to make good use of the technology.

First, you will see references to in-process and out-of-process servers. In-process servers are DLLs which run in the same address space as the calling application, whereas out-of-process servers run in their own address space. This is a decision you take when building a VB executable. In-process servers have substantially better performance but introduce more programming restrictions.

Second, there is the matter of early or late binding. Binding is the process of locating the properties and methods which the client application calls. If you use variables declared as Object in the client application, then these identifiers are not resolved until runtime. This is called late binding. On the other hand, if you use an OLE-type library to resolve these identifiers at compile time, the code will execute faster. This is early binding. To use early binding in Visual Basic, open the Tools - References dialog and check the type library required. Then, declare variables of the specific class required, rather than the generic Object. This is much faster and also enables you to detect errors in parameters, properties or method names when the application is compiled. Another bonus is that you can use an object browser to inspect the interface of available classes.

Naturally, the best performance combines both techniques — that is, in-process servers called with early binding.

PCW Contacts

Tim Anderson welcomes your comments and queries. Write to the usual *PCW* address, or email freer@cix.co.uk.

Name that PC

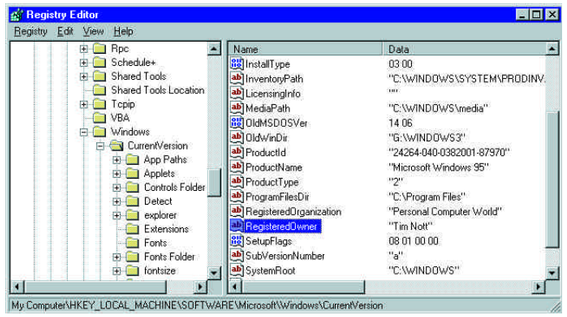
Fed up with being called “A. User”? Been working for “My Company” too long? You need REGEDIT. Tim Nott shows you how to change the user name and company on your computer.

This month, a friend asked me how she could change her name. Not the one her parents had given her, but the one her computer dealer had branded, seemingly permanently, into her new PC. It’s what you see in the “Help/About…” boxes, and forms the basis for all sorts of things such as installing new software or creating templates, so it’s a comfort to get it the way you want it. By a happy coincidence, in an attempt at self-improvement, I’d been reading the column of the illustrious sci-fi author and PC guru, Jerry Pournelle, who had been tackling this very thing. You may think *I’m* mad, but this guy is barking. He has a fine, robust style: phrases such as “…the new Orchid Fahrenheit Video 3D board. That sucker screams” are bounced around the column. He also doesn’t shirk danger or excitement. “Cyrus, still running, fell about three feet to the floor. The bezels popped off the front, and the CPU-Cool chip fan I’d attached to the Barracuda hard drive hung out the front looking for all the world like an eyeball popped out of its socket.” (Cyrus is a computer, I think.) What really amazed me was his scornful attitude to some of our best-loved Windows utilities. Okay, I admit to defaming the Great British Car Industry by comparing one of its most successful products with Poledit, but you should hear what Mr P says about Poledit’s dear brother, Reg.

So, he wanted to change the user name and company on his PC, as the person who configured his new hard disk had misspelled both. “The books say that a program called REGEDIT.EXE comes with Win 95… all the books warn you to be extremely careful. I tried it a couple of times, but I wasn’t sure what I was doing so I never saved any changes I made. However, it became clear that what I wanted was in a hexadecimal file called SYSTEM.DAT.” Uh-oh, Jerry. You don’t save changes: they change dynamically. It gets better. Having made two backups of SYSTEM.DAT, he “attacked that file with the Norton Disk Editor. It turned out to be easy enough to find the hexadecimal equivalent of the word ‘Mazgne’. A bit of study showed how the user and company names are stored, including what is used to terminate the string: it’s an 01 followed by blanks. I looked up the hexadecimal equivalents of the English letters I wanted, used Disk Editor to fix my name and spell Magazine properly, terminated the strings with 01, and all’s well.” I won’t bore you with the rest, but if you want chapter and verse, then I suggest you point your webby thing at byte.com/art/9701/sec14/art1.htm.

What’s in a name: the problem…

…and how to fix it



Anyway, I’m inspired by this no-nonsense macho stance and in future I’m going to write this column using EDLIN. For all those of you who’ve bought machines from box-shifters and are forever known as “A. User” of “My Company” but are too wimpish to deploy a disk sector editor, fire up that Regedit sucker and mosey on down to HKEY_LOCAL_MACHINE\ SOFTWARE\ Microsoft\ Windows\ CurrentVersion. Look for the two keys Registered Owner and Registered Organization: double-click on each to change.

Waltzing ma tilde

Every file on your disk has two names. One is the name that you see in folders, and the other is the one you’ll see in DOS or File Manager. If you want to see both at once, open a DOS box and type “DIR /P” (the /P switch stops the listing scrolling off the screen). You’ll see the Windows 95 long file name on the right and the DOS-compatible one on the left. If the Windows 95 extension is more than three letters — e.g. .HTML, the DOS extension — it will be truncated to three, .HTM. If the name itself is more than eight letters, it will be truncated to six, followed by a tilde (~) and a number; the number increments for each file with the same six first letters.

You can change this behaviour so that the full eight first letters are shown, so Tyrannosaurus.txt appears as Tyrannos.txt, not Tyrann~1.txt. Start Regedit and go to

```
HKEY_LOCAL_MACHINE\ System\
CurrentControlSet\ control\
FileSystem
```

You should see an entry entitled “Win31FileSystem” in the right-hand pane. If you don’t, search the Registry for that text. Right-click anywhere in the right pane, and select “New/Binary value”. Type NameNumericTail over the “New Value #1” default and hit enter. Double-click on the new value and type 00 in the box. Close Regedit and reboot.

Note that this only applies to new files; it won’t update existing ones as their short names are already created. Also, if you create more than one file with the same first eight letters, subsequent ones will revert to the six + tilde + number format.

Sound advice

When God didn’t make little green applets, he didn’t make them much greener than the Sound Recorder. Its most annoying feature is that you can only record very short clips: depending on the quality (which you can select from File/Properties) this varies between six and 60 seconds on my machine. Although you may well have better recording software bundled with the sound card, there is a way around this limitation. Hit the record button and wait until it reaches the end. Don’t bother actually recording anything at this stage, this is just preparation. Hit the record button again: it will have a little shuffle around, then record another slice. Repeat until the number of seconds shown in the “Length” panel is enough for your needs. Then rewind to the beginning and do the real recording. Warning: you can produce some very big files this way, and they might break up on playback if you don’t make as much memory free as possible. The Media Player seems to cope better with playback than the Sound Recorder. Thank you, Peter Darton, for that tip.

Breaking the sound barrier

Recent files and recalcitrant colours

Two queries this month on the “Documents Menu”. Dave Smith was having problems getting the Windows 3.1 versions of Lotus 1-2-3 (.wk4) and WordPro (.lwp) files to appear on this, the list of the last fifteen files worked on. The problem is that 16-bit programs can’t add their files to the MRU (most recently used) list. This, at least, is the word according to Microsoft. But Dave goes on to say that this does work with old Ami Pro (.sam) files, and also with any 1-2-3 files that are opened from a shortcut on the desktop. I can’t reproduce this strange situation, so I throw it open to the floor.

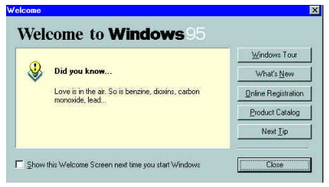
Tim Parkinson has the opposite problem: “How can I exclude filetypes from the Documents Menu? I don’t really want

Tip of the day

Welcome back to the section where we endeavour to improve upon the wit and wisdom of the Windows “Tip of the Day”. Remember, you can view these at any time by running Welcome.exe, and you can edit the existing tips by diving into the Registry at HKEY_LOCAL_MACHINE\ SOFTWARE\ Microsoft\ Windows\ CurrentVersion\ explorer\ Tips – BUTR first. A couple of good one liners from Andrew Stratford. “I refuse to have a battle of wits with an unarmed person” and “I never make predictions — and I never will”. Mike Kirk achieves screenshot stardom (below), but the Mrs Smegma prize for utter weirdness goes to Dave Ives of Hebden Bridge.

“Mary had a little cow
It could not walk properly
Bovine spongiform
Encephalopathy”

Thank you, Mike Kirk, for this inspirational thought…



p264 ➢

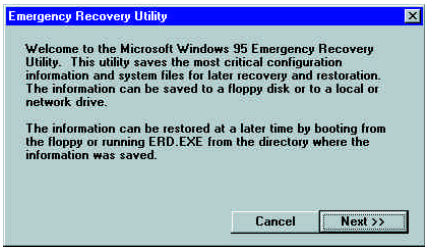
gifs and jpegs excluding the latest Word documents or text files I've opened." Sorry, Tim, and others who have mentioned this, you can't. Not unless you use a 16-bit program for editing bitmaps, anyway.

Noel Gallagher (no, not that one) had a little problem with his desktop settings. No matter what he changed the fonts and colours to, in Control Panel Display, every time he started, they reverted to Windows Standard. Noel did once have multiple users enabled, but not any more. This sounds very much as if someone has been playing with the System Policy Editor, and the cure is to load the latter again (Poledit), go to :File/Open Registry… double-click on the Local User Icon, and expand the branch named "Desktop". Clear any check marks by "Wallpaper" or "Colour scheme", and close the property sheet. Unlike Regedit, Poledit doesn't save changes automatically, so "File/Save" before you close Poledit.

David Nichol wanted to know how to convert a fax to a normal bitmap format. Faxes are stored in one big mailbox file, and although you can export them as individual .AWD files, I don't know of any software (apart from the Exchange Fax Viewer) that will read this. The trick is, while viewing the fax, to click on the "Select" button, drag out the area of the fax you want, then "Edit/Copy" or just "Edit/Copy Page". You can then paste this into any bitmap editor, though Windows Paint tends to choke on hi-res full pages.

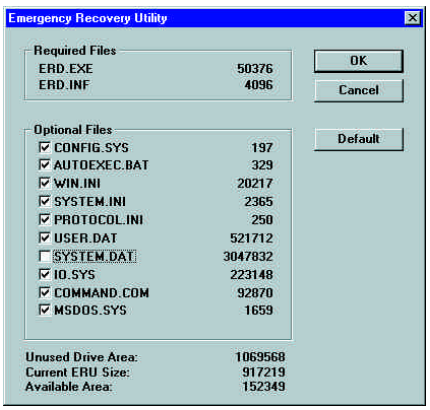
Quick Explorer tips

1. If you want to select nearly all the files in a folder, highlight the ones you don't want, and Edit/Invert selection.
2. If you hold down the Shift key when double-clicking a folder in folder view, that folder will open in Explorer (i.e. two-paned) view.
3. Often, you want to make a safe copy of a file in the same folder, prior to messing around with the original. In Windows 3.1 File Manager this was simple — and still is if you run Winfile.exe in Windows 95. You highlight the file, hit F8, and then type in the new name. There's no direct equivalent in Windows 95, but if you right drag and drop a file in the same folder, then choose "Copy here", you'll get a copy of the file, named, appropriately enough, "Copy of xxx".
4. To open Explorer with all drives showing but not expanded, create a shortcut with the command line Explorer.exe /e, /select, C:\.
5. Clicking on a heading in "Details" view orders the files by that category. Clicking again reverses the order.



The ultimate Windows 95 survival disk?

Not quite. There isn't room…



PaintShop power users only

Here's a clever tip for PaintShop Pro 4 users, sent in by Tim Bailey. It let users browse pictures by right-clicking on a folder.

1. In Regedit, go to

```
HKEY_CLASSES_ROOT\ Directory\
Shell
```

2. Right-click on this and add a new key, called "Browse Pictures".
3. Right-click on this new key and add another new key called "Command".
4. In the right pane, double-click the "Default" entry and edit it to read

```
drive:\path\psp.exe /BROWSE %1
```

replacing "drive" and "path" to suit. (PaintShop 3 users should use drive:\path\pspbrowse.exe %1.)

Safe keeping

I've lost count of the times I've written "but first, back up the Registry". What's worse is that I've just noticed that this month's column has already offered three Registry tweaks and none of them contained the magic words. So, before you try them, BUTR. But how? The simple way is to make copies of SYSTEM.DAT and USER.DAT, which live in your Windows folder, to a safe place — for argument's sake, C:\Safe. Note that these files have the System, Read-only and Hidden attributes set, so to restore them you'll need to boot to DOS (press F8 at boot and choose Safe Mode Command Prompt) and do the following.

```
CD C:\Windows
attrib -h -r -s system.dat
attrib -h -r -s user.dat
copy c:\safe\system.dat
c:\windows\system.dat
copy c:\safe\user.dat
 c:\windows\user.dat
attrib +h +r +s system.dat
attrib +h +r +s user.dat
```

There's also the Configuration Backup utility. It's located on the CD-ROM at Other\Misc\Cfgback, and lets you keep up to nine Registry backups in compressed form. However, you have to be running Windows to restore the Registry from these, which is a bit of a challenge if it won't load due to a corrupt Registry.

Digging further into the Windows CD-ROM (Other\Misc\Eru) reveals the rather more useful Emergency Recovery Utility. If you copy this folder to your hard disk and run ERU.EXE, you get the chance to back up not just the Registry files themselves (SYSTEM and USER.DAT) but various other essentials, such as CONFIG.SYS, AUTOEXEC.BAT and various .INI files — you can choose which. By default, these get backed up to a bootable floppy disk — i.e. one that has had the system files copied on to it. In the event of catastrophe, restarting the PC with the disk in the drive will magically restore everything. There's a snag to this, however. After creating a boot disk, there is only about 1Mb left on a standard floppy. So when I tried this, it couldn't copy my SYSTEM.DAT file which somehow, behind my back, had grown to over three megabytes.

Fortunately, you can save the back-ups to a folder anywhere on your hard disk: ERU will copy the files, plus the program that restores them, ERD.EXE, to this folder. Let's say you choose C:\ERD as the folder. Restoring is then a little more complicated than from floppy. First, *don't* try to restore from within Windows. Either boot from a start-up floppy, or hit F8 during normal boot and choose "Safe Mode Command Prompt Only". Then change to the directory (CD C:\ERD) where you saved the files, and run ERD.EXE. Once the restoration is finished, you'll see a triumphant message. Reboot in the normal way; if you just booted from a floppy, make sure you remove it first.

PCW Contact

Email **Tim Nott** at Win95@pcw.vnu.co.uk

Starters orders

How to get applications to open on startup, getting stuck in to Paste, and gaining the upper hand when your computer hangs. With Panicos Georghiades and Gabriel Jacobs.

The usual way of automatically starting programs when Windows is loaded is by moving (dragging) or copying (dragging while pressing down the Ctrl key) all the application icons you require into the Startup group window. To automatically start all the applications found within a particular group, you can change the name of the Startup group entry in the progman.ini file. Using Notepad, edit this file to contain the line

```
Startup="group name"
```

where "group name" (quotation marks are needed) is any acceptable group in Windows. For example, to start the applications in the group Project A (a group you created, and added in all the programs you require for a particular project you are working on), you would add the following line to the progman.ini file:

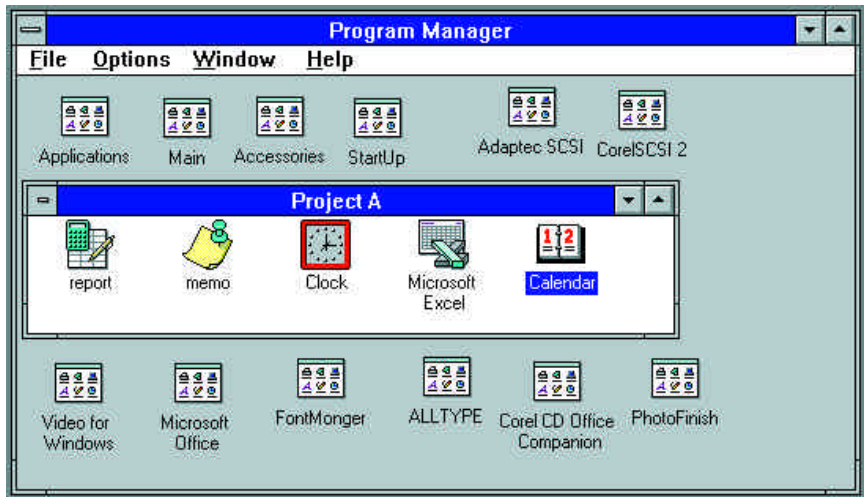
```
Startup="Project A"
```

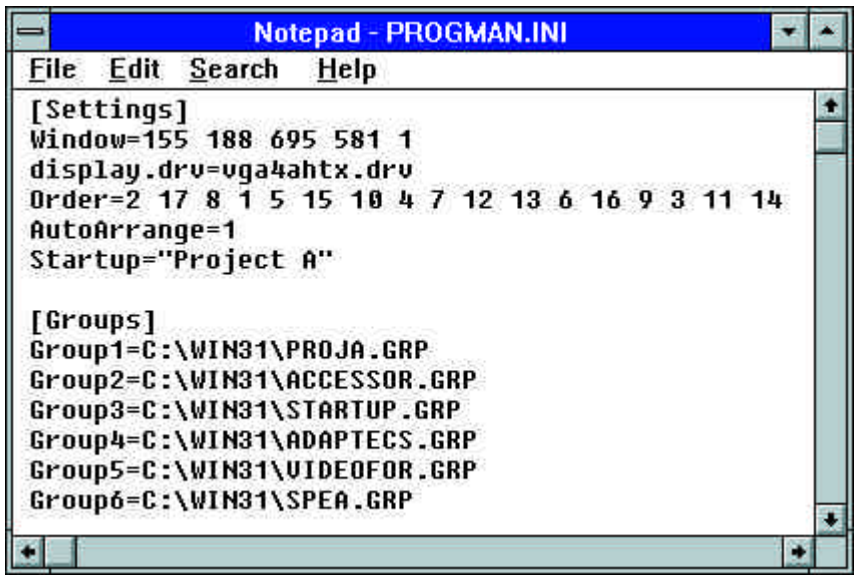
Acceptable group names are what's listed in the Window menu in Program Manager or at the title bar of the group you want to start automatically. Adding the above line in the Progman.ini disables the Windows Startup group until the line is removed or commented out with a semi-colon (;) at the beginning of the line.

What's a bitmap and what's a picture?

One of the great things in Windows is the ability to copy and paste from one application to another, especially graphics. But this isn't so great when you're slowed down by all sorts of obscure options. For instance, do you use Paste or Paste Special, and what about all the options in the Paste Special dialogue box?

Well, Paste is paste — simple as that. But the choices you see in the Paste

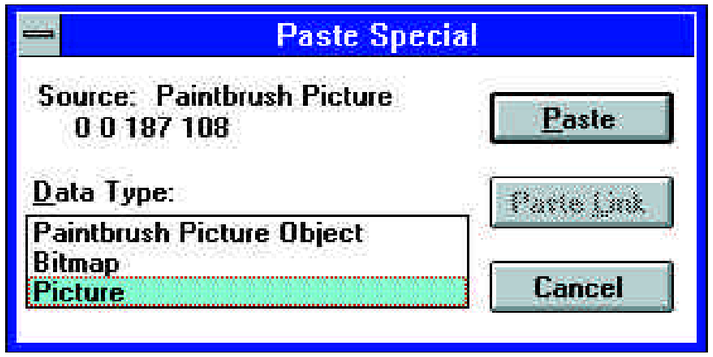




To automatically start all the applications in the group Project A (a group you created, and added in all the programs you require for a particular project you are working on), you would add the following line to the progman.ini file:

```
Startup="Project A"
```

p266 ➢



Special dialogue box will depend on the format of the object in the Clipboard. This can be a bitmap or a Windows metafile (Microsoft calls this a Picture), and selecting either of these means that the object is not part of an OLE (Object Linking and Embedding) library: it's a so-called static object with no links to anything else.

If you select Bitmap from the Paste Special dialogue box, the object will be painted more quickly but will take up more disk space when the file is saved. The reverse is true of a Picture.

A bitmap file (extension may be BMP, PCX, TIF, GIF etc.) is a grid filled in with coloured dots. Its file size depends on its width and height in pixels and its colour depth: black and white (1-bit), 256 (8-bit) or 16 million (24-bit) colours. Scaling (resizing) of bitmaps creates distortions, jaggedness, and other unwanted effects.

A metafile or picture (the extension is usually WMF) often consists of a variety of different data structures (usually scalable vector graphics, but it can include bitmaps) and takes up little space. Metafiles can be scaled, and printed using the highest resolution of the printer. However, if one of the data structures includes a bitmap, then scaling will produce the same kinds of distortion of the bitmap element as you would get with an ordinary bitmap.

Try copying a graphic from a paint program to the Clipboard and pasting it into another application. You won't see much difference whether you choose Bitmap or Picture in the Paste Special dialogue box. Now copy a graphic from an application which normally uses the metafile format (Excel, say). Do this first by choosing Bitmap, then Picture, and see the difference.

When in trouble ...

When your computer hangs, or when you get a message about something being unrecoverable, giving the machine the three fingers treatment (Ctrl + Alt + Del) isn't always the best choice. Various problems can cause software to behave badly or crash, and even make your machine go into a deep sleep. Some of these problems may be caused by incompatibilities between programs, or between programs and hardware, or between different pieces of hardware.

Sometimes (although not often) you may find an answer in the documentation. If not, you may have to contact a support service. But when you do, you'll have to tell them exactly what has happened, and for them to be able to diagnose the problem, it has to be one that can be repeated. If it can't be, you may have to do a lot of detective work to find out the cause. Most problems in computing are solved by a process of elimination, which means you often have to make a fresh start. And if your system has crashed, you will have to do this anyway.

There are three ways to restart a machine: (a) pressing Ctrl + Alt + Del (the three-finger method); (b) pressing the Reset button; and (c) turning the machine off, waiting for a while, then turning it back on. Never turn the machine off, then immediately on, as you risk wrecking your hard disk.

Which method?

The three-finger method is known as a warm reboot and in most cases skips the power-on self test. What's more, it generally doesn't reset all the adaptor cards in the adaptor slots. Using the Reset button (a cold reboot) usually makes the machine go through its self test, but doesn't necessarily cut power to the motherboard or (once again) to the adaptor slots. Therefore, to be sure that everything has been reset from scratch, you should turn off the power completely. After about 15 seconds, the capacitors in the motherboard will have discharged and the hard disk will have stopped spinning.

If you use the three-finger method or the Reset button and the problem isn't cured, but it is cured if you turn the machine off and on, this implies a hardware problem, usually with a graphics card, internal modem, sound card or other controller.

One final, important point: If you're using a write-behind cache, make sure that the contents of the cache have been saved to disk before turning off the machine. You can do this with smartdrv.exe 4.0 or later by entering SMARTDRV /C at the DOS prompt.

Disk dilemma

Christian J. van den Bosch writes: *"I had an empty 0.5Gb partition on my hard disk, and I decided to turn it into a compressed volume so I could copy a CD-ROM into it. I went into DOS, typed DRVSPACE, chose the partition, and chose to have 2Mb of uncompressed space on the drive (this being the minimum offered), but there were a number of anomalies. The process took about half an hour and included at least three defragment operations using Scandisk. The result was a 0.5Gb compressed drive occupying 340Mb of real space and a claimed compression ratio of 2:1, leaving 160Mb free (not 2Mb as requested).*

"All attempts to enlarge the compressed drive (reduce the uncompressed space) were rebutted: apparently, the remaining 160Mb of uncompressed space contained files that could not be compressed. In the end I just created a larger partition.

"Can you explain?"

<cjb@homenet.ie>

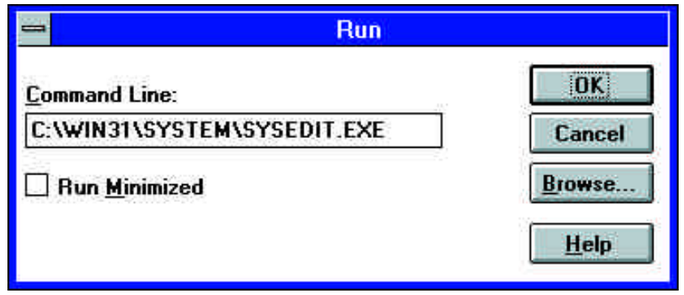
It's normal for the process to take a long time, even half an hour, and normal for the Scandisk operations to check the disk. DOS DrvSpace (originally known as DoubleSpace) does not precisely double the space on your hard disk. Doubling is an estimation derived from an average compression ratio. Different files compress at different ratios depending on what they contain. We carried out some experiments on this, with the results shown *(see the next column)*.

We can't explain why you got an estimate of 2Gb with a compression ratio of 2:1, except that sometimes the possible compression is overestimated. In any case, changing a drive's estimated compression ratio doesn't affect how much DrvSpace actually compresses the files; it changes only the way DrvSpace estimates the free space on the compressed drive. However, having the wrong estimated compression ratio for your files can cause DrvSpace to provide inaccurate space estimates to DOS, which can, in turn, result in problems when storing files.

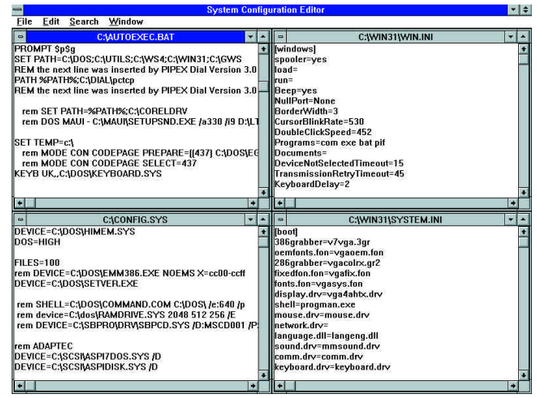
Anyway, we don't recommend the use of DrvSpace any longer because hard disk prices have dropped so low. You can buy a 2Gb IDE drive for just over £160, so why bother with compression? DrvSpace takes memory from your 640K, it's slower to defragment or to check with Scandisk, and can affect performance in other ways. And there may be conflicts with other programs. Our advice is: hard disk compression out, larger hard disk in.

Utility of the month: SYSEDIT.EXE

If you like playing about with system files — editing your autoexec.bat, config.sys, win.ini, or the system.ini files — there's a Windows utility called SysEdit which has been designed especially for this purpose. SysEdit.exe can be found in the Windows\System directory (it can't be run from DOS) and it opens all four files at the same time. It also creates a backup of the original file with an SYD extension. When booting a system from a floppy drive, note that SysEdit brings up the autoexec.bat and config.sys files found in the root directory of your boot hard drive, not the ones on your floppy.



You can run SysEdit by selecting File and Run from Program Manager



FILE TYPE	COMPRESSION RATIO (X:1)
Zip/GIF	1.0
BMP	1 - 10
ASCII	2*
Excel/Word Programs (EXE, COM)	2.4
	1.7

**Depends on content and whether it's 16,256 or 24-bit colour*

PCW Contacts

If you have any queries or Win3.1-related topics to discuss, contact **Panicos Georghiades** and **Gabriel Jacobs** at Win3@pcw.vnu.co.uk

Mind your own business

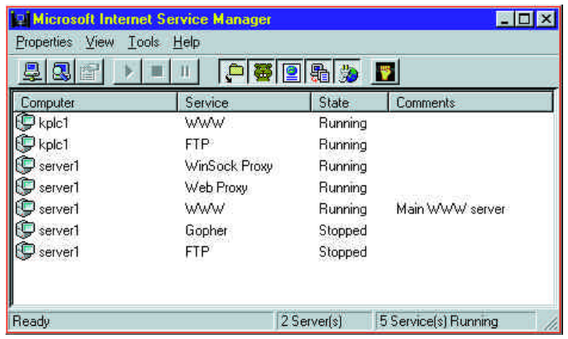
Are you a small business and keen to take advantage of the internet? Then why not set it up yourself. Dale Strickland-Clark helps you keep control of your system — and your money.

The world is changing the way it conducts its business. Companies are getting on the net, and now even the smaller companies are finding the advantages too compelling to ignore. Email is generally the first consideration, but a corporate presence on the web and equipping users with browsers may also be important. Whatever the objective, if you have an NT server, it needn't be a complicated job to set it all up.

There's more than one way to achieve this, and many people might turn to a router to provide the bridge between the LAN and the internet. However, I've chosen a different approach which gives you better control and accountability (at least, in this price range). For browser access, you need just two things: a copy of Microsoft's Proxy Server, and a modem or ISDN terminal adapter. If you want to provide internet email you'll also need a mail system, such as Exchange. Hosting a web site requires a bit more thought, if only to make sure you're handling the security properly. Indeed, Microsoft recommends that you don't host a web site on the same machine as Proxy Server and I won't be covering that this month. Setting up email using Exchange will be the subject of next month's column.

A proxy server allows any number of machines to access internet resources external to the LAN using only a single public IP address. All client requests destined for the internet are transparently diverted to the proxy server which then re-issues (as opposed to simply routing) the request to the internet. Responses from the target sites are sent back to the originating system.

You will, of course, need an account with an internet service provider (ISP). If you're planning to run a mail service and want your own domain name, make sure the ISP handles SMTP (Simple Mail Transfer Protocol) and can register the name for you. They will also need to offer mail forwarding. This means that the ISP will store your inbound email while you're not connected instead of returning a "host unreachable" indication to the sending system. Demon is one of several who offer these services, and I use them.



You manage the Proxy Server's two components (Web Proxy and Winsock Proxy) from the same application you use for the rest of IIS, but it's not clear that the WWW service must be running before the Web Proxy can start

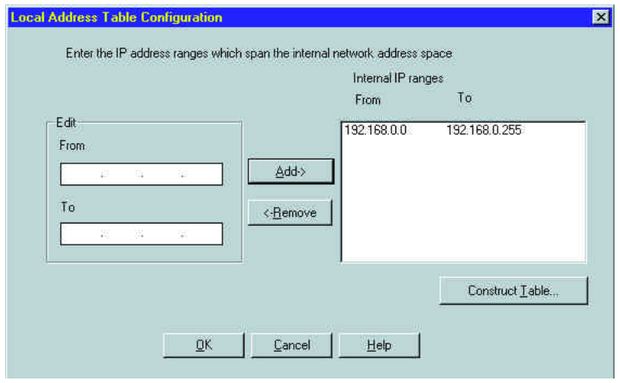
First, a modem...

The first task is to connect a modem. Even if you're planning to use an ISDN terminal adapter, you might find it helpful to debug the Dial Up Networking (DUN) connection using a modem. Then create the entry in the DUN phone book on the server that will connect to your ISP. I covered this a few months ago so I won't go into it again here. If you can establish a connection with this new entry and browse a web site from your server, the first phase is complete.

You can download the Proxy Server from Microsoft's FTP site. Unfortunately it's only an evaluation copy but it will last you a couple of months while you assess its suitability. A licensed copy should cost you around £600 — rather more if you buy it from Microsoft. If you want the evaluation, your journey starts at http://www.microsoft.com/proxy with a registration form and a 6Mb download.

The Proxy Server comes in two parts: the server software itself and client software for each workstation. The server software is, in fact, an extension to IIS (the internet server component of NT) and you manage it from the Internet Service Manager applet along with the rest of IIS. The client software is responsible for identifying internet-bound traffic and diverting it to the proxy.

To install the Proxy Server, you will need an NT Server 4.0 system with Service Pack 2 already loaded. The installation is free of surprises as long as you've noted the CD key which you'll need to enter early in the process. (It was "375-1749043" when I last looked.) The only remotely taxing aspect is setting up the local address table. The LAT contains all the IP address ranges used in your local network and is automatically copied regularly to the client PCs. The client software uses this table to determine where it should direct network requests.



The local address table must reflect all the addresses used on your private network. In many cases, this may be a single entry

I always use one of the IANA (Internet Assigned Numbers Authority) suggested address ranges for private networks of 192.168.0.0 to 192.168.255.255 for all the networks I set up. This means my LAT only needs a single entry. You can build the table yourself or use the Construct Table button to have it attempt to build the LAT for you from information it can glean from your network. The server installation needs to know the name of the DUN entry it should use to start the link and the times during the day that you want to allow auto-dial on demand.

A matter of protocol

I haven't yet found the need to differentiate between internet protocols: a user is simply given access to the internet. However, you can restrict access by protocol, allowing FTP access but not World Wide Web, for example. You will find it easier to manage and see who can do what if you create a security group for each type of access you want to control, then admit users to the appropriate groups.

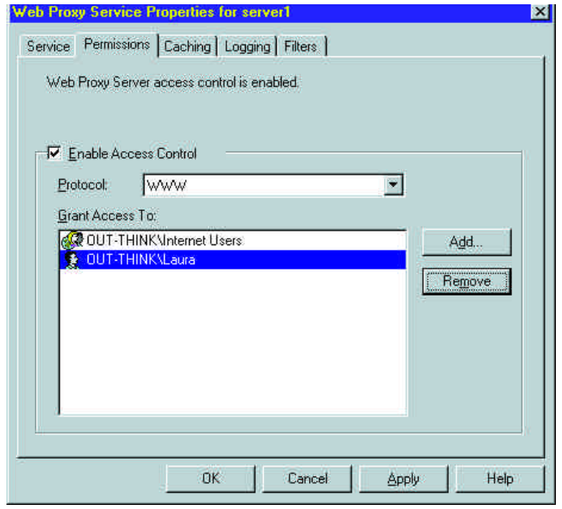
The fun bit is determining who will be allowed to access the internet through the proxy. Your company may have certain business rules on this, but I have found that granting entrance to the necessary security group in exchange for bribes works well.

During the server installation, a network share is created on the server called, rather anonymously, mspclnt. Open this share from each workstation and run the Setup program found within. This installs the client software and takes a few seconds. It also updates Internet Explorer (if it's installed) to direct its requests to the proxy.

That's it. The first authorised user to fire off an internet request will trigger the proxy to autodial and establish a connection. There's an appreciable delay here when using a modem and some clients may time-out, but if the user retries the request it should succeed on the second attempt.

The line will now stay up until the inactivity timer closes it down. This time limit is set in the DUN phonebook and you might want to try different values to keep connection charges down without the line dropping in the middle of an online session. To adjust it, open Dial-Up Networking from My Computer, click on the More button and select Logon Preferences.

A Control Panel applet allows the user to use an alternative server or switch the proxy off altogether, so they're not cut off from internet access through their own modem if they need it occasionally.



Assigning internet access permissions is best kept to specific security groups because it's easier to see what privileges a user has been granted by inspecting their group memberships. However, if group membership has wider implications, you can list users individually, too

Ah yes, ISDN...

Using the Proxy Server for internet access almost feels like having a permanent connection, inasmuch as you don't have to take any special action to get the line going when you need it. Unfortunately, the time taken to establish a connection and get any data across it reminds you that your knees are firmly planted in modem land.

I needed something faster that wasn't going to provoke shrieks of horror from the Finance Director. I decided to go for an ISDN2 line and a terminal adapter (TA). BT has a number of price options for ISDN lines at the time of writing so you can get one installed for a modest outlay. ISDN TAs have been dropping in price too and I picked the Pace Ultralink which is keenly priced and comes from a reliable stable. This neat little box sits external to the server and connects via a suitable COM port. To be suitable, the port must definitely be buffered and preferably be on a Digi board serial port adapter to relieve the main processor of much interrupt handling. The Pace Ultralink comes with the installation material you need to set it up on NT in a few moments and then you just treat it like a modem.

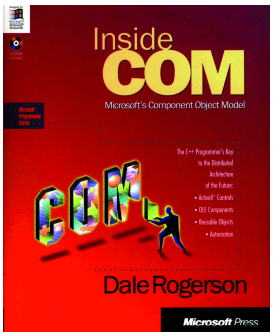
The Pace Ultralink is a tidy little ISDN terminal adapter but don't let the picture fool you. This device can stand on its side, too

Connection times with ISDN are very

p271 ➢

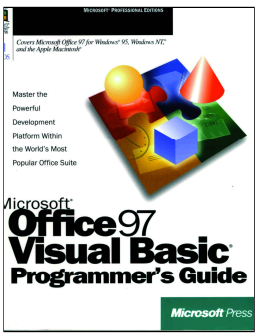
Windows NT Books

I am indebted, as ever, to Computer Manuals (0121 706 6000) who keep me supplied with books to review.



Inside COM
Author Dale Rogerson
Publisher Microsoft Press
Price £28 (£32.99 inc VAT)
Pages 376
Includes CD-ROM

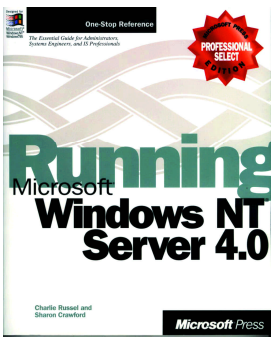
COM is Microsoft's Component Object Model. It defines the way programs (or, more correctly, components) talk to each other and is the basis of OLE and ActiveX. This book assumes a solid grounding in C++ and develops the principles of the interface from the basics through to automation and beyond. It's a thorough book and the author explains the concepts clearly, although he has a tendency to lapse into patronising fables at the start of chapters. There are plenty of diagrams and code samples which you will also find on the CD. This is an ideal book for newcomers to the subject because of the careful explanations, but more experienced programmers will find it a bit slow.



Microsoft Office 97 Visual Basic Programmer's Guide
Publisher Microsoft Press
Price £32.49 (no VAT)
Pages 528

Visual Basic now sits behind all the main components of Microsoft Office. It doesn't really matter whether you like it or not; if you are involved in administering Office or writing the odd macro, you are probably going to need to get to grips with it. Fortunately, the flexibility of the language has improved in recent revisions and the development environment in Office 97 helps a lot, but you are still going to need help with the object models of the applications. That's where this book comes in. Once it has explained the basic language principles, it goes on to describe the object model and then the object structure of each application. These are taken in turn and then the book goes on to explain programming the Office Assistants, manipulating the drawing layers and programming databases using Data Access Objects. Finally, it covers ActiveX and programming the internet applications. The appendices help with converting old Excel and WordBasic macros. You could probably get by without this book and just the online help files, but life has more worthwhile challenges.

Running Microsoft Windows NT Server 4.0
Authors Charlie Russel and Sharon Crawford
Publisher Microsoft Press
Price £36.99 (no VAT)
Pages 615



I was pleasantly surprised when I started dipping into this book. I was expecting the usual maintenance tasks explained and a list of steps you need to perform to complete them. Well, it's got all that, but it also offers more background and insight than I recall from similar books. The fact that it's an inside job might have something to do with this. It is also a very compact book and covers its subject without spreading itself across yards of shelf space, although it does stick to server issues. You won't find too many topics covered which might also fit in a book on NT Workstation.

much shorter than an analogue line and you don't get that confrontation between Hissing Sid and Zebedee as the modems suss out each other's capability and the quality of the line.

The question now, of course, is do I go for ISDN at home. It's awfully tempting.

PCW Contacts

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Computer Manuals 0121 706 6000

Top hat time

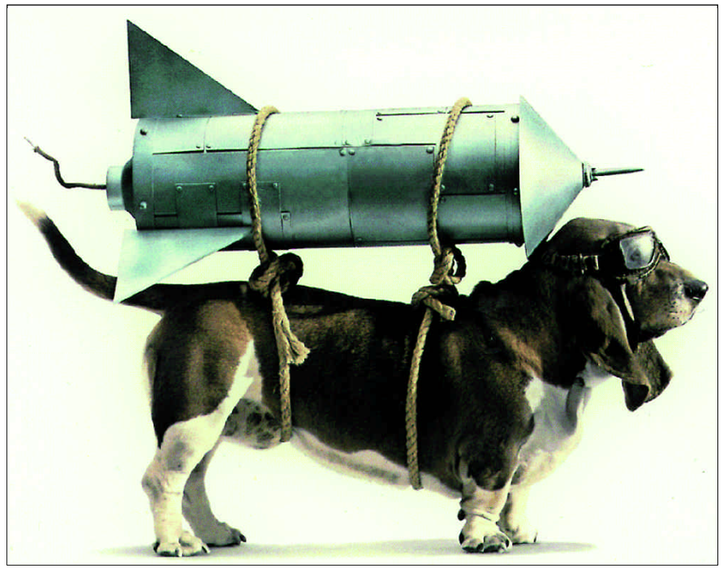
Chris Bidmead looks at RedHat and OpenLinux Base, and installation on a notebook computer using XFree86 3.2. There's the latest RedHat Linux for you on our CD-ROM, too.

One of the frequent themes of your emails to me is the request for Linux on the "front cover". This month you're in luck, because the very latest version of RedHat Linux is there, on our cover-mounted CD-ROM, ready for you to install.

Meanwhile, devotees of other UNIX-like operating systems want to know why I am forever harping on about Linux, at the expense of, say, FreeBSD? No doubt some of you will regard the inclusion of RedHat on our CD-ROM as not so much a positive blow for Free Software or the UNIX life-style, as a kick in the teeth for FreeBSD or NetBSD.

Operating-system wars are not very interesting. My network sports a number of different operating systems: Linux, NeXTStep, AIX, SCO and (as a link into the Microsoft world) Windows NT. And that happens to be just about as far as I can stretch it for the moment. I've nothing against the BSDs, or other UNIXes, and it's always good to hear from readers who have positive and interesting things to say about them. This column is certainly not written on the assumption that you're all running Linux, or that Linux is all you want to read about. Linux, for me, is just one instantiation of a UNIX-like operating system, chosen because it does make a pretty good reference point: it's probably the easiest for anyone to get hold of and it runs on the widest range of software.

To get a broad picture of the free UNIX products available, you might visit www.public.iastate.edu/~free-unix/homepage.htmld or www.ici.net/faq/unix-for-pc.html. And the free version of SCO on www.sco.com is proving popular, too.

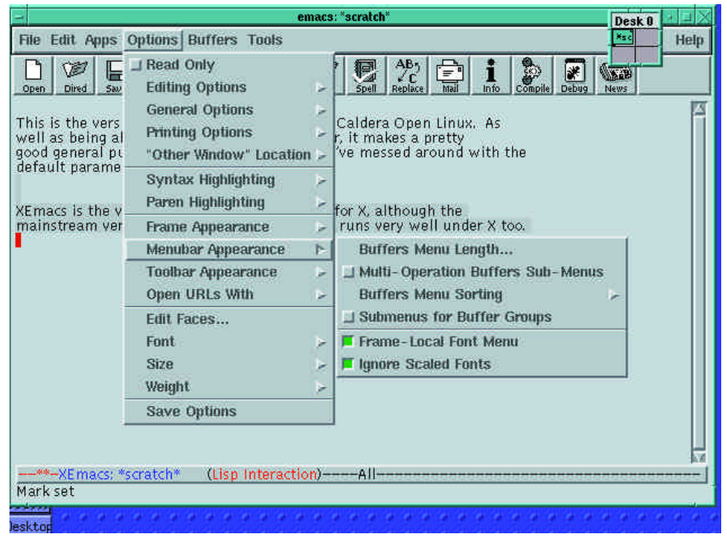


Perhaps not a wildly informative screenshot, but I fell for this picture when UNIX workstation vendor, Silicon Graphics, used it to explain why its own new Octane graphics workstations (starting price $25,000) are in a different league from anything else you could put together around a PC. This is supposed to represent a PC with a whizzy graphics card installed

There are also many readers who turn to this column to expand their horizons without necessarily wanting to get involved in installing any of this stuff. That, too, is fine by me. If you're among this group, please don't junk the CD-ROM: there is a lot of really useful documentation on it and Martin Houston, the Linux guru who helped put it all together, has fixed it so that you can read most of it from the comfort of your Windows installation, using a web browser.

Probably the best thing on the CD is Matt Welsh's *Linux Installation and Getting Started* book which you'll find on the disc, complete and in HTML format under the /instguid/ directory. Load the file called gs.htm into your browser and you're on your way. This is the way to read it from DOS or Windows, because this copy has been doctored to work with DOS-foreshortened filenames. If you're already running Linux or another UNIX, use the copy at /doc/HTML/ldp/install-guide-2.2.2.html/gs.html.

Be aware that Matt's book is a general guide to Linux. For specific details of how to install the Linux from the CD, turn to the instructions that Martin Houston has provided in the folder called "linuxtxt". The instructions assume that you'll probably want to preserve your existing DOS or Windows installation and will show you how to create an additional partition using only existing DOS software and the fips DOS utility provided on the CD-ROM. As Martin says, please do read the documentation thoroughly before you proceed, and back up your data first.



The new Caldera OpenLinux Base comes with the latest update of Xemacs, the version of the Emacs text editor specially developed for X. I use variants of Emacs for all my writing, and as a totally cross-platform writing tool it cannot be beaten at any price (even though it's free!)

RedHat and Caldera

Until recently, RedHat provided the core operating system on which Caldera built the Caldera Network Desktop release. That has now changed, and the new Caldera product is called Caldera OpenLinux Base and it's built around the company's own implementation of Linux. Essentially, it's the same kernel as the one on our CD-ROM but with some additional Caldera features, including a proprietary implementation of PPP (the code used to dial up an internet connection), a commercial X-server and a fancy desktop called Visix LookingGlass. Also included is a licensed copy of Netscape Navigator.

Caldera plans a range of products under the name Caldera OpenLinux (COL) with Base as the entry level. In a month or so it will add OpenLinux Workstation which will include NetWare client software and a secure web server. Later in the year, the range will be expanded to include the Caldera OpenLinux Server; a multiprocessor version with a built-in SQL database intended as a high-powered web site, or as an enterprise intranet server.

I don't suppose many of you "home-brew" readers will be rushing out at the end of the year to spend over $1,000 on this last item, but equally, I don't doubt that a lot of serious business customers will be flocking to Caldera to snap this up. As a full-blown commercial server it's not at all expensive for what it offers, and it will come with full technical support.

The interesting thing from the point of view of anyone using Caldera products is that they'll all be based on the same industrial-strength version of Linux. And if you're thinking "hang on a minute, you just said the high-end server version will be multiprocessor…" Yes, right. The truth of the matter is that the core of all the Caldera products will be multiprocessor. Bryan Sparks, CEO of Caldera, tells me that if you load any of Caldera's products onto a Quad Pentium box, it will find all four processors and know what to do with them.

You may also be thinking "Yes, but whatever happened to the spirit of free software among all this commercialism? Isn't Caldera just exploiting the labours of some dedicated, unpaid software engineers for its own commercial ends?" Well, frankly, I'm still in two minds about this. Caldera is certainly treading a delicate path in this case and we'll have to see where the company goes with it. In the firm's favour, though, this is probably the place to mention that it will be making available a freely downloadable version of OpenLinux from its web site at www.caldera.com. I understand that this will be stripped of any proprietary hinderences (so you will not get the LookingGlass desktop accompanying it, for instance) and will mostly be covered by the GNU licence, so the source code should be available.

The only exception, I am told, is that the installation routine will be copyright Caldera. This is not to deter you from passing a copy on to your friends once you've downloaded it, or making multiple copies across your own network: the intention is to prevent the code being exploited by certain CD manufacturers who have been bundling multiple Linux distributions into cheap CD sets and cornering the market. There's nothing in the GNU licence to prevent this. Indeed, the GNU licence is expressly designed to encourage distribution of all kinds, but the creators of easy-to-install Linux distributions have worked hard at writing installation routines and testing them, and they feel they should be in charge of dishing them out.

Caldera OpenLinux Base is sold and supported in this country through a company called Avalan. It costs around £55 and the company's Ben Partridge can tell you where to get hold of it *(see "PCW Contacts", p274)*.

Installing Caldera OpenLinux Base

Several readers have been asking me about installation on notebook computers. In the early days, the problem was getting the X-server to understand the LCD screen, but this has become much easier with last October's release of XFree86 3.2, which contains drivers for the main notebook video chips and includes an easy-to-use graphical setup. To help me gauge just how much easier, Seimens-Nixdorf kindly delivered one of its top-of-the-line notebooks, the Scenic Mobile 700, with a built in CD-ROM and stereo sound system.

It came with Windows 95 installed and my natural instinct was just to format the hard disk. However, I do know that many of you like to run machines that dual boot between the two operating systems and I get a lot of letters asking how to do this. Windows 95 was occupying the whole 1Gb of the Scenic's hard disk, so I needed to shrink this down to about half that size and create a second partition for Linux. Well, two new partitions, actually: one for the Linux root file system, and a second

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partition dedicated to swapping. (If you are puzzled by this, look up "Linux partition requirements" in the Matt Welsh book, mentioned earlier.)

Firstly, I used Windows 95's own disk defragger to squeeze out the spare space and pack everything down into the lower 500Mb of the drive. To create the new partitions I could have used the fips utility, but this seemed a perfect opportunity to put Partition Manager 3.0 to the test. It runs from Windows 95 as an old DOS application, closing down the whole of Windows before loads and bringing Windows back again when it has finished. It shows a diagrammatic representation of the partitions on your drives and allows you to resize them visually by mouse dragging, and this gives you a much better picture of what's happening than having to calculate in megabytes or, as in the early days of fdisk, in cylinders.

In fact, I ended up with four partitions in all: one for Win95, a pair for Linux and Linux swap, and a fourth to house OS/2's Boot Manager… "Eh? How did OS/2 get in here?" you may wonder. It so happens that version 3.0 of Partition Magic comes with OS/2's Boot Manager as an optional way of handling multiple boots once you've got your partitions set up.

It's rather unfortunate that Boot Manager needs a whole partition to itself even though this is only as small as 1Mb, because the PC architecture only allows you a total of four primary partitions. But in this case it fitted in nicely. Installing the Boot Manager is a simple matter of clicking a pull-down menu from inside Partition Magic.

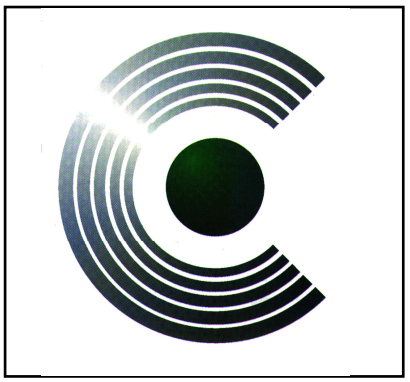
When I eventually quit Partition Magic I had just three partitions: in between Windows 95 and the Boot Manager was an unformatted wasteland onto which I was about to drop Caldera OpenLinux (establishing and formatting the Linux partitions is usually something you do during Linux installation).

Before you can do that, you first need to create one or more boot diskettes from the CD-ROM: at least, that is what I have always had to do so far; but not this time. Between them, Caldera and the Scenic Mobile had a neat trick up their sleeves — something I'd never seen or done before on an ordinary PC. The Caldera CD is set up to act as a boot disk on hardware that knows how to boot off a CD, and the Scenics BIOS setup has an option to do just that.

I felt I was cheating somewhat. This was just too simple: insert the CD, boot the machine, and up comes the skeleton version of Linux that Caldera uses to run its installation routine.

Anyway, I'll have more to tell you about Caldera on the Scenic Mobile, next month.

A chat with Caldera's Bryan Sparks



Bryan Sparks, CEO of Caldera, was in the UK earlier in the year setting up distribution and support, so I thought I'd corner him and get the Caldera story direct from the horse's mouth, so to speak. He has a nice, soft-spoken manner and what he says sounds OK; not at all like marketing-speak.

Caldera started inside Novell as something called "The Corsair Project". Bryan Sparks was one of 15 researchers whose brief it was to look for new ways to develop quick time-to-market system software products. I wondered why he settled on Linux, rather than any of the other free UNIX offerings?

"We looked at NetBSD, FreeBSD and all the others," Sparks told me. "The truth is, FreeBSD is a good product and its networking has always been very, very strong. Linux's networking wasn't, at the time, but that was fixed when Linux 2.0 came out." (By the way, the Linux 2.0 kernel is the one used in our cover CD-ROM RedHat version.) Sparks calls picking Linux "a kind of gut move on our part". It was the originator of the kernel himself, Linus Torvalds, who finally decided the Novell team. "We flew him in to Utah to get to know him better because this was going to be a big risk for Novell. In fact, we got to know several of the key Linux people and we thought their personalities were perfect."

The idea for a commercial platform based on Linux was originally Sparks' own. He'd worked on several projects inside Novell, including the NetWare for UNIX that was called "Portable NetWare", and he was in on the early days of Novell's relationship with USL, the company that owned UNIX and which Novell eventually, and disastrously, bought. "It was a total mess," says Sparks. "I was working with USL for six months, and there were such irreconcilable philosophical differences that I just couldn't stand it any more." Tragically, Sparks could see the opportunities that UNIX represented, if only the politics hadn't been getting in the way. "I went back to Novell and said, 'Boy, you have the opportunity of a thousand lifetimes here'. Windows NT was totally unproven. UNIX System V Release 4 was decades ahead — well, I'm exaggerating, but it was a very good technology. But the personalities at USL just killed it."

However, the experience prepared Sparks for Linux. In fact, he liked Linux so much that he wanted to quit Novell and set up his own company around it with two other Novell employees. "But I owed a lot to Ray [Noorda], so before we quit we took the business plan to him." Sparks had put together a working prototype. "I had good friends at Visix giving me their user interface, and a bunch of other things I'd done myself. I showed it to Ray and he said 'Boy, we need to be doing that…'"

Ray Noorda OK'd the Corsair Project in early 1993, but in the following year, at the age of 70, he announced his retirement. "We ended up with Bob Frankenberg coming in," said Sparks. "I don't have any qualms about him: he listened to what we were doing (we were kind of a skunk-works, off-site). He was a very bright man and he said 'This is really good… but we're not doing it.' But Ray Noorda still believed in it and financed what became Caldera with his own money."

PCW Contacts

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Caldera OpenLinux Base is available through Ben Partridge at Avalan on 01923 208449; email Ben.Partridge@PSC.co.uk

The waiting game

Okay, it's not the networking article Terence Green promised last month, but he does have a good excuse. And if you're waiting for a full native SmartSuite for OS/2, take a deep breath...

Last month I promised a networking article, but all I can say is, never trust a journalist. As I was starting to put this column together, IBM released the first of a series of enablers for Warp, Windows 95 and Windows NT network connections. I haven't had time to try them out and only one of the three components is available at the time of writing: that's a new Windows 95 client which allows you to have a single log-in from a PC running Windows 95. It replaces the Microsoft or NetWare client you're currently using and enables you to store user profile data on a Warp Server.

Currently (the beginning of February) there are some bugs being reported by early users but nothing too serious. The other two new network components are a Windows NT client and a Network Neighbourhood enabler for Warp Server. These were in beta at the time of writing. Check out the Warp Server home page at http://www.software.ibm.com/warp-server/ for more details.

I'll do the networking thing in the next issue and put the new clients on the Cover CD for the June issue, if that's permitted in the licence.

I had hoped to be able to plonk the first FixPack for Warp 4 onto the current issue but it hasn't surfaced yet. It's slipped out once but that was unofficial. Why would you want a FixPack for Warp 4? Well, it's a case of "Lotus SmartSuite — the Nightmare continues!"

The essential update site for IBM's Java developments is down south at http://ncc.hursley.ibm.com/javainfo/hurindex/html

Nightmare on SmartSuite

I recently attended the annual Lotusphere conference and spoke to the new OS/2 product manager, the previous incumbent having managed to escape back to sanity after what must have been some very trying times. Basically, the Open32 saga has yet to run its course, and in order to install and run the Generally Available (GA) versions of Lotus WordPro 96 for OS/2 and Freelance 96 for OS/2 on Warp 4, you must have the Warp 4 FixPack which may or may not be FixPack 1 when it is released.

In the UK, Lotus has decided not to ship the full SmartSuite 96 for OS/2 which includes only WordPro and Freelance in native OS/2 versions and the rest as Win-OS/2 applications. It will only ship the native OS/2 WordPro 96 and Freelance 96.

Now that the Windows version of SmartSuite 97 is shipping we can expect later this summer to see the full native OS/2 suite, I'm told, and this should include the final working version of Open32 which is supposedly what the first Warp 4 FixPack will also include and which the '96' GA versions require. The Open32 scheme, which seemed like such a good idea when it was mooted, has taken nearly two years since first being publicly announced to get to the point where IBM has nearly managed to get it working.

Hopefully IBM will manage Java a lot better. For a start, the Java team is pumping out updates at http://ncc.hursley.ibm.com/java and the Java story for OS/2 is looking good. The possibility of OS/2 being refined to run as a Java machine to which I alluded in an earlier column now looks like becoming a reality in the not too distant future.

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Currently, Warp uniquely ships with a native Java Virtual Machine so does not need to run Java applications in a browser; which means that a Warp client can run Java, OS/2, DOS and Windows applications. Some people call this a "thick" client to distinguish it from a "thin" client which, for example, would be a network computer that only ran Java applications or perhaps used one of the ICA clients such as Citrix mentioned in the previous column.

Warp NC

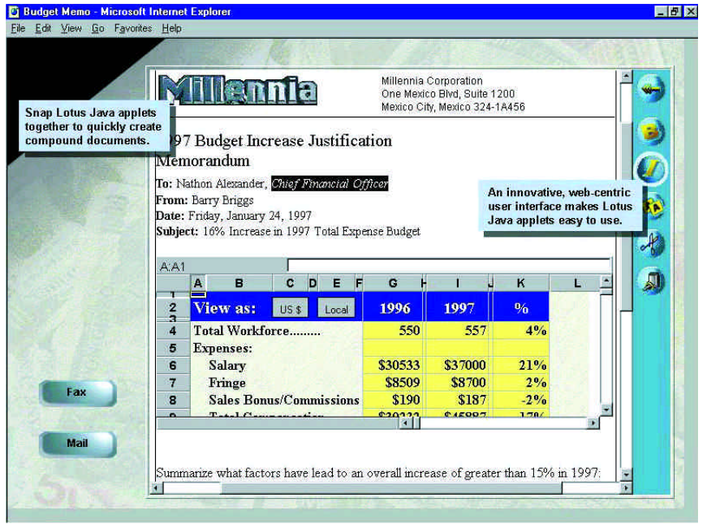
Clearly there's a huge interest in Java as a means of distributing applications to networked computers from central servers. Whether you're an end-user in a corporate running a small portfolio of applications, or a home user with a WebTV, thin clients are going to enable many more people to have access to computing services as the equipment will be cheaper than a PC and easier to manage. The way OS/2 fits into this scheme is that it can serve either or both purposes, thus providing a seamless transition from client/server computing to networked computing. With the full set of Warp services, a company could start to run Java applications while still maintaining traditional client-server applications. Later, Warp could be run without the WorkPlace Shell and with a Java interface instead, perhaps running the Kona Desktop, a collection of Java components, that Lotus demonstrated at Lotusphere.

The Lotus Kona desktop components are similar to Lotus ActiveX Components but contain more functionality, and they're tied together with the InfoBus, a dynamic component bus which allows them to interact. So in effect, it would be possible to have Warp running on a PC (and even perhaps on non-Intel architectures — remember the ill-fated microkernel Warp for PowerPC project?) without the WorkPlace Shell.

This sits neatly with the IBM NC (see http://www.internet.ibm.com/networkstation) which only runs Citrix at the moment but will run a Java front-end by mid-year. The problem some people have with this approach is that it is not flexible or powerful enough and therefore the Warp middle way is seen as a more viable integration path until Java comes of age. Once Java does begin to provide the services that take it out of hype space and into the real world, we can expect computing to become a lot more interesting. The problem with Windows on the PC is not that it's the wrong way, but that there are some things it simply can't do, and networked computing with Java can take both PCs and many other computing devices into areas where they can't go today.

IBM has spun off a Network Computing Project from the OS/2 developer team which will look at "mission-critical" Java applications, and at a recent seminar talked more about this. The developers have been through the OpenDoc component architecture mill and have taken that experience into the JavaBeans component architecture. At the same time, IBM, Sun, Novell and Netscape are embarking on a Java World Tour to promote the "100% Pure Java Initiative". See http://javaworldtour.sbexpos.com or any of the major Java sites for more details.

The aim of the Pure Java initiative is to ensure that Java retains the "write once, run everywhere" ethos and does not fall into the trap of "enhanced HTML" which "runs best on" this or that web browser. Such moves, whereby companies try to gain a competitive advantage with proprietary enhancements, have confused the browser world and Java would suffer if it went down that road.



The Kona Desktop from Lotus consists of a suite of Java applets which can be snapped together to create web applications

Reader response

We have some utilities coming up that have been written by readers, but the only material on the current cover CD is a set of backup and restore utilities for Warp LAN Server disk quota management (THCDASD.ZIP). They were written by Steve Sharrad of Henley College who is happy to take email at ssha@henleycol.ac.uk on the subject of LAN Server. Steve plans to upgrade to Warp Server this summer. He has "200 multimedia-hungry, yet totally diskless, stations running from two 486-DX33 servers". He has nearly 3,000 home directories to manage and reckons his OS/2 servers can give Windows NT a run for its money.

Several people responded to my query regarding Hauppage Win/TV drivers and I should have given more detail in the last column as there are several Win/TV boards. Faye Pearson has a Win/TV PCI board. She discovered that drivers were being written for the Win/TV PCI back in December. They may be ready now at http://www.wdi.co.uk/os2tv/os2tv.html which is the homepage for the Warp/TV application and where you will find drivers for the more expensive Celebrity and Prisma boards.

Paul Bristow wrote to me that Warp includes a driver for the standard Win/TV card. He's running a Win/TV Celebrity and says the drivers are kept well up to date.

John Hern says he has used the Windows NT 4.0 workaround on about 25 configurations and has seen no problems so far. This is the fix that puts HPFS support back into Windows NT 4.0. John is also looking for a way of dealing with Win95 and HPFS on the same system. The easy answer, John, is to dump that pesky FAT file system, but that's not always possible.

John also wants to hear if anyone supporting Windows 95, Windows NT and OS/2 Warp can recommend a solution for "backing up different OSs on the same network with one program" as he has problems with restores. He's testing backup hardware and currently has a Seagate EIDE 4000 tape streamer.

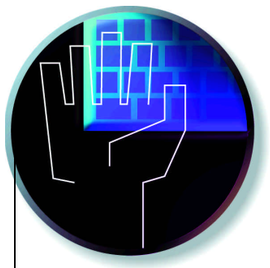
Miltiadis Mitrakis responds on the subject of Java with a suggestion that readers might wish to try out a couple of Java games he has ported from the OS/2 originals he wrote last year. He says the Chinese Checkers for Java game scored "Top 5%" in *JavaWorld* magazine in Japan. Yyou can find the games on Mil's site at http://www.strath.ac.uk/~cadp44 where there are applet and application versions.

More details of the totally cool Lotus Kona Desktop technology can be found at http://www.kona.lotus.com

Visit http://www.strath.ac.uk/~cadp44 to try out the games that Miltiadis Mitrakas has ported to Java

PCW Contacts

Terence Green can be contacted by post via the *PCW* office or at **os2@pcw.vnu.co.uk**



In from the cold

Users of lesser-known WP software make themselves known, and Tim Nott is here to greet them. He also grapples with Greek characters and turns his attention to Tables in Word.

John Coryn was one of the many readers who responded to my challenge to users of minority word processing software, to stand up and be counted *(PCW March)*. He uses Protext 6.5, and has produced "more letters than I can count, plus one reasonable-sized book. I want to buy a further copy for an old friend, but Arnor, who produced Protext, seems to have moved, been bought out or to have given up." The bad news is that Arnor closed in May 1995, but the good news is that Protext goes on. Version 6.7 is available from Protext Software (see *"PCW Contacts", p280)*.

And another one: this time it's a LocoScript problem from Sandra Tuppen. "I have a number of LocoScript files (created on an Amstrad 9512) which I would like to convert to Word for Windows. The files are saved on standard 3.5in floppy disks."

The problem here is twofold. First, the floppy disk format of the Amstrad 9512 isn't the same as a PC. Second is the problem of the file format: Word doesn't come with LocoScript converters. If you still have the 9512 machine to hand, then you can solve both problems by linking the two machines with a serial cable, converting the files to a Word-readable format (which may well have to be plain text) at the 9512 end, and using a comms program to transfer the files. If you don't, then you can get the disks converted. The LocoScript people themselves will do this, for £5 per disk; contact Softco *(see "PCW Contacts", p280)*. Other firms advertise similar services from time to time in *PCW*, so you may be able to hunt down a better price.

Finally, if you have both PC and 9512 to hand, each with its own version of LocoScript, Softco can provide the cable and software to transfer the files fully formatted. You can then export from LocoScript (PC) to a format, such as WordPerfect 5, that Word can read.

Pi in the sky

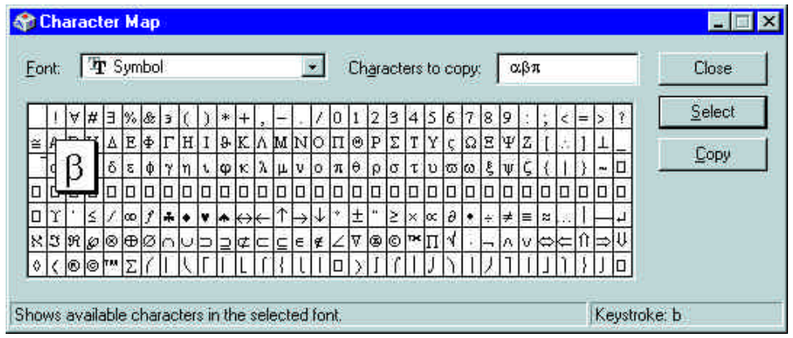
Frank Dowson has a rather symbolic problem. He constructs school timetables using a program called GP-Untis. He says: "I have come up against the problem of using the symbols for alpha, beta and pi. I cannot find a font which looks good in the normal sense and also allows me to type in these Greek characters directly or by using the Alt + numeric keypad codes."

Frank is working in Windows 3.1, but Win95 users face the same obstacle. The problem is that the character set of the standard typefaces such as Times or Arial do not contain these characters. The Symbol font, which does, doesn't contain the normal alphabet.

If you want to use one font for all, then you can buy a font (or hopefully get it bundled with a word processor) such as Monotype Greek, which replaces the usual accented characters with Greek characters. But then you're limited to a single typeface, and rather stuck if Française or Español figure in the curriculum. Otherwise, you have to change the font to Symbol, insert the character (α, β and π map to a, b and p, but there are "lonely heart" matches such as θ for q) then change back to the original font.

Most word processors can do this automatically. You can assign a keystroke to produce a "one-off" symbol from any font. Less endowed applications, such as Write or Wordpad (and presumably GP-Untis) don't have this capability so you'll have to do it manually.

The Windows Character Map lets you find characters. Choose the target font "Symbol", for instance, from the drop-down list and select the character. They are rather difficult to distinguish but clicking on one gives a magnified view. You will also see the keyboard assignment, if it exists. Clicking the "Select" button (or double-clicking the character) stores it for copying. You can store several characters if, for example, you want an entire Greek word. The "copy" button places the lot onto the clipboard, from where they can be pasted into applications in the usual way. Note that in Windows 3.1 you'll still have to change the font in the application to match. In Windows 95, it changes to the symbol font automatically (at least, with WordPad) but it doesn't change back, which is a παιν ιν τηε αρσε if you carry on blithely typing.

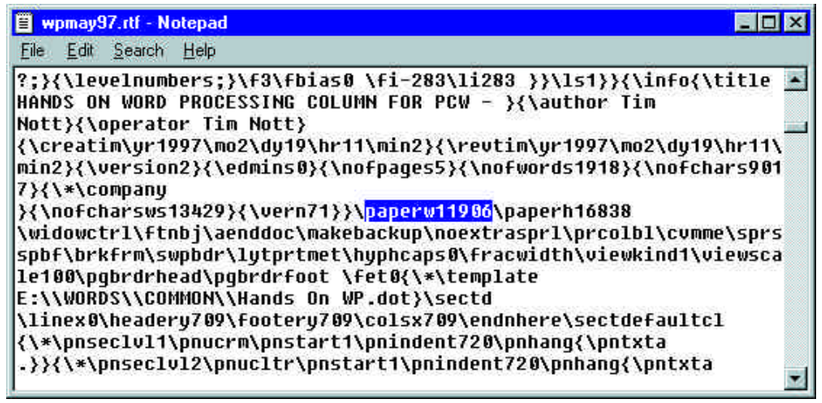


Find that symbol with the Windows Character Map

Finally, if you're using Windows 3.1 you might like to try getting the Windows Recorder to automate the process. We don't have space here to go into the nitty-gritty, but here are the basics:

- Just have the application and Recorder open, then in the latter, "Macro Record".
- Set mouse clicks to "Ignore", set "Playback" to "Same application" and "Fast"
- Set a shortcut key, then hit the start button: Recorder will minimise.
- Record the macro in by using the keyboard to change fonts, type the symbol and change back.
- Stop recording and save the macro.

It's a file, Jim, but not as we know it.



This column shows off its RTF codes

My brother's keeper

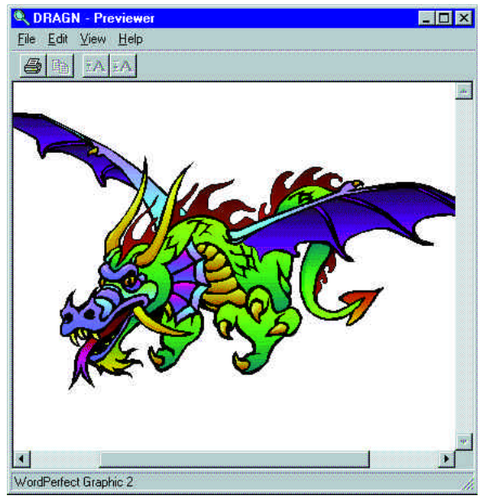
"I have an application, Brother's Keeper Genealogy, which creates text and RTF files for different purposes," writes Jim Mann-Taylor. "My MS Word Version 7, like most in the world outside the US, is set to default to an A4 page setup. Having created the file, Brother's Keeper then opens it in MS Word. For some inexplicable reason, the text files open correctly in A4, but the RTF files open Word in that insular 'Letter 8Ω x 11', and with odd margins. Somewhere there must be a deeper default which would enable these RTF files to open Word in A4 format, but where do I find it?"

This one's easy, but not very encouraging. Text files are just that; they contain no formatting apart from carriage returns and tabs. RTF (Rich Text Format) files, like text files, are 7-bit ASCII but they can contain formatting codes, which are delimited by backslashes and curly brackets. For example, \b turns on bold and \fs24 sets font size to 12 points (it counts in half-point steps). If you open an RTF file in Notepad you'll see the codes. If you open it in Word, it will interpret the codes. Somewhere amidst all the slashes and curls will be a code containing the page size: \paperw12242\paperh15842 is US Letter, while A4 is \paperw11906\paperh16838.

Just as with a .DOC file, Word will preserve the formatting (including the original paper size) when opening the file. You can get around this by creating a new, blank document in your default page size, then "Insert/File…" rather than opening it directly. And I'm sure you're all dying to know how RTF distinguishes a control code from a backslash or curly bracket that occurs in the text. Well, it puts another backslash in front of them to denote "literal backslash". Believe me, it works.

A better view

Here's something I've only just discovered. If you set the Word 7 "File/Open" dialogue to "Preview" mode and file type to "All files", it will additionally display any graphics for which Word has import filters installed. The Word 6 "Find File" feature has a similar capability, as does WordPerfect 7.



WordPerfect's free-range preview window handles graphics, too

Reader Paul le Gassick has an additional WordPerfect 7 previewing tip: "For a better (and in my experience, faster) preview while in the 'File, Open' dialogue, go to the 'View, Preview' menu item and tick 'Use separate window'. This gives a preview in a larger window, just like WordPerfect 6.0."

Droopy draw

Tim Parkinson wanted help in starting MS Draw in Word 7.0: "I want to create a .GIF to add to a web site and can do it easily in Draw, but I'm having real trouble getting my

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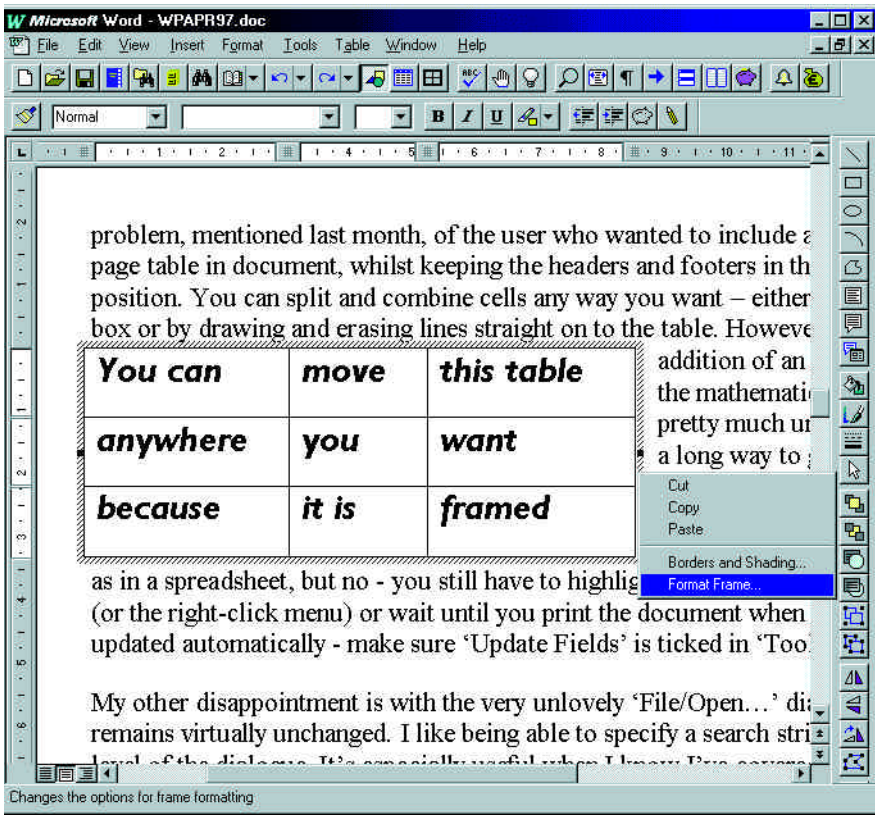

Framing Word tables makes life much easier

Incredibly useful little macro

I don't know how you organise your work, but I like to do it by project. A feature I'm writing will often involve one or more .DOCs, a text file or two, several graphic files and maybe one or more spreadsheets. Rather than keep each file type in a folder "belonging" to the parent application — documents with Word, screenshots with PaintShop, and so on — everything goes in a sub-folder of my "Words" folder; for instance, "Words\PCW\DTP97" for a DTP group test project. That way, not only is it all together for easy access, but I can back up the whole project with one drag. And as I keep such items as templates, and address books in sub-folders of "Words", it makes it extremely simple to back up nearly all that is precious.

Usually, when starting a project, I stick a shortcut to the folder on the desktop, but one day it struck me that it would be useful to put a shortcut to the folder in the document: then I could have instant, in-place access to all the graphic and other files. Well, you can't create a shortcut to a folder in a document, but what you can do is even better. Try this macro:

```
Sub MAIN
Shell "explorer " + FileNameInfo$(FileName$(), 5)
End Sub
```

Note that it won't work without the space before the closing quotes.

For those of you battling on the frontlines of Word 97 and Visual Basic for Applications, the VBA code is:

```
Public Sub MAIN()
Dim retval
retval = Shell("explorer.exe " & ActiveDocument.Path, vbNormalFocus)
End Sub
```

Again, the space is important. In either case, running the macro opens the folder containing the current document. Switch documents, re-run the macro, and if the new document is in a different folder, that one will open. Cool, or what? Stick it on your button bar — you know it makes sense.

Of course, none of this is much use to those working with Windows 3.1, but you can start File Manager from a macro with the line:

```
Shell "winfile.exe"
```

You cannot, however, specify a directory.

new computer to want to play. It will edit Draw documents which I import but won't start Draw itself."

I'm rather confused here. The way to start MS Draw is from the "Insert/Object…" command. Find "Microsoft Drawing" in the list and the Draw applet will start. It hasn't seen an update since pre-OLE2 days, so it will appear in a separate window. As an OLE server it can only be started from another Windows program and you can't save a Draw file as an independent entity, so I'm wondering where he's getting these "Draw documents" from. In any case, it's a truly awful piece of kit. The built-in drawing tools in Word 7 and 6 are far better, and those in Word 97 are drool-making. Also it won't create .GIFs; for that you'd be better off with a shareware image editor such as PaintShop Pro.

Table tennis

Matt Baker has been trying to centre a Word table on the page. "If I select the whole table then move the left-most vertical line, the table squashes up. I am at a loss," he writes. "When it comes to tables, bring back Ami Pro."

Quite. As I've remarked before, Word 6 and 7 are definitely the poor relations when it comes to tabling. You have to set the left and right margins independently, then jiggle around with the internal divisions. If you decide you want to move the whole table — well, then you're back where you started. There has to be a better way, and there is, although you'd go mad trying to find it.

But try this wonderfully intuitive procedure. Click in the table. From the "Table" menu, choose "Select table". Go to the "Insert" menu and choose "Frame". I, too, was under the misapprehension that "Insert x" means "put x inside" but Microsoft takes the Humpty Dumpty approach in that words mean what you want them to mean. In this case, it actually means "Insert the table into a frame". Once this has been done, you can drag it anywhere on the page, and even wrap other text around it.

PCW Contacts

You can contact **Tim Nott** by post c/o the *PCW* office or via email at wp@pcw.vnu.co.uk

Protext 6.7 costs £39.95 (£34 ex VAT) from Protext Software, 39 High Street, Sutton, Ely, CB6 2RA. Tel 01353 777006; fax 01353 777471
Softco, 10 Vincent Works, Vincent Lane, Dorking, RH4 3HJ. Tel 01306 740606

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A balanced approach

Stephen Wells explains how spreadsheets can be used to create a model for businesses to balance liquidity with profitability. Plus, how to stay sane when moving from 1-2-3 to Excel.

To an accountant, Working Capital is simply defined as a business's current assets minus its current liabilities (current, usually meaning consumed or payable within a year). To a businessman, it is the fuel of the enterprise. Sufficient working capital ensures that a company can pay its creditors, hold adequate stocks and allow debtors reasonable time for payment. The amount required will depend not only on the size of the business, but also the type of industry it is in. But all businesses need to manage their working capital and balance liquidity (the speed of converting into cash) with profitability (the return on idle funds).

Generally speaking, longer-term financial instruments will usually pay a higher rate of return than shorter-term ones. But the responsible manager can't tie up funds for six months when they are needed in 30 days. A spreadsheet can be of help here to create a useful model.

I emphasise that the example shown here is *only* a model and not intended to be incorporated into a company's financial statements. It is concerned only with the cash portion of working capital. This is money which a company might typically roll over in Treasury Reserve accounts, pooled with others to qualify for deposit minimums.

Fig 1 shows the layout. The total interest expected to be earned in the half-year is in cell F5. The current yields of the planned short-term financial instruments are in B3:B5. The starting cash is in B8. After the month-labelling row 7, the six columns B through G show the position at the start of each month; in this case, July through December. Column H shows the position at the end of the last month of the period.

The starting cash is entered in B8. The rest of row 8 shows the cash position at the end of the previous month and the start of the current one, so =B15 is entered in C8, =C15 in D8, and so on.

The initial anticipated investments in one-month, three-month and six-month instruments are entered in B11:B13. Row 14 shows the estimated cash needs of the business for each month. In many months (hopefully!) the business will generate more than its cash needs, and those amounts are entered as negative figures (as in Aug, Sep and Dec).

Row 15 shows the ending cash. C9 is entered in cell =B11 because the one-month deposit has now matured and is thus available if needed. However, it is turned over or immediately reinvested and entered in C11. At the beginning of October, as recorded in E9, both a one-month and a three-month deposit mature; and at the end of December, H9, all three types of deposit mature.

Row 10 shows the interest earned. So

```
=B11*$B$3
```

is entered in C10, and

```
=D11*$B$3+B12*$B$4
```

in E10, and

```
=G11*$B$3+E12*$B$4+B13*$B$5
```

in H10.

Cell F5 shows the total of this interest:

```
=SUM(B10:H10)
```

At this point, you could fiddle around with the investments to see if you could

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Fig 1 (Right) **A worksheet for modelling potential short-term investments to maximise returns on the cash portion of Working Capital**

Microsoft Excel - WC Mngmnt.xls

File Edit View Insert Format Tools Data Window Help

	A	B	C	D	E	F	G	H
2		Yield	Annual % Rate					
3	1-month Inst.	0.6%	7			Interest earned		
4	3-month Inst.	2.0%	8					
5	6-month Inst.	4.5%	9			£1,525		
6								
7	Month:	July	August	September	October	November	December	Ending
8	Starting Cash:	£ 150,000	£ 90,000	£ 100,146	£ 120,292	£ 40,538	£ 25,683	£ 40,829
9	Matured Inst.		25,000	25,000	30,000	25,000	25,000	40,000
10	Interest:		146	146	246	146	146	696
11	1-month Inst.	25,000	25,000	25,000	25,000	25,000	25,000	
12	3-month Inst.	5,000			5,000			
13	6-month Inst.	10,000						
14	Cash needs:	20,000	-10,000	-20,000	80,000	15,000	-15,000	30,000
15	End Cash:	£ 90,000	£100,146	£ 120,292	£ 40,538	£ 25,683	£ 40,829	£ 51,525

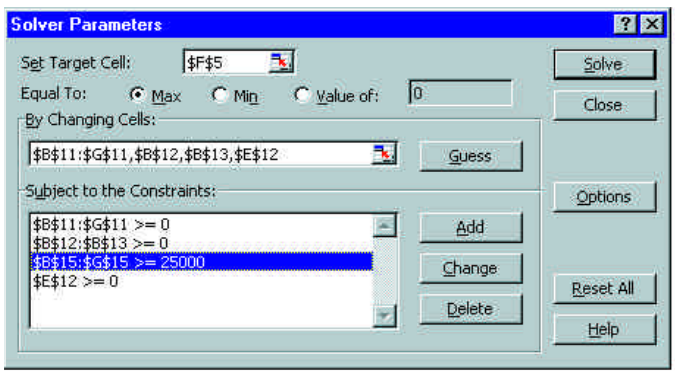

Fig 2 (Left) **Establishing the parameters for Solver to follow: the target cell, the cells which can be changed, and the constraints**

improve on the return. But both Excel and Lotus 1-2-3 offer a Solver tool which rapidly tries out hundreds of options for you.

In a dialog box (Fig 2) you set the Target Cell, in this case F5, and enter the cells which can be changed, here B11:G11,B13,B13,E12.

You can also establish some rules, which both Excel and 1-2-3 call Constraints. Here we've stated that all investments must be greater than, or equal to, zero. Also, it is management policy that the month-end cash balance after all transactions must always be at least £25,000.

If we now run this example using those constraints (Fig 4), Solver says we can earn £3,548 (more than a 130 percent increase) and still satisfy the same cash needs by increasing the six-month investment, not reinvesting the three-month investment in October and not making a one-month deposit in July and November. Who says computers aren't intelligent?

Staying sane

Even though statistically, Excel is currently the leading seller among spreadsheets, it can occasionally confuse people who have been used to Lotus 1-2-3. Take the simple matter of calculating compound growth. Let us say you bought a product for £416.90 in 1989 but the identical product is sold today for £583.66. You want to calculate the average percentage increase of the price each year. We'll enter the £416.90 in C1, £583.66 in C2 and 1997-1989 (or 8) in C3.

Lotus 1-2-3 offers the @RATE function with the arguments: Future Value, Present Value, Term. As far as an investment is concerned, logically £416.90 is the Present Value and £583.66 is the Future Value. So we enter @RATE(C2,C1,C3) in cell B1. The correct answer is displayed: an annual growth rate of 4.3 percent.

Excel also has a RATE function but its arguments are different. They are: NPER, representing the total number of payment periods for a loan or annuity; PMT is the payment made each period ; PV for Present Value; FV for the Future Value; and Type, with a logical value depending on whether the payment is made at the beginning or end of each period.

If you enter the three elements which are known, Excel just returns a #NUM! error. You can enter the 1-2-3 formula, @RATE, and Excel will recognise it, but you'll still get a #NUM! error.

EXCELlent little formulas

■ **Counting occurrences** If the range A1:A100 contains surnames, you can count the number of times that the surname in cell A10 appears in the total range A1:A100 with this formula:

```
=COUNTIF(A1:A100,A10)
```

■ **Counting coincidences** Using the same worksheet, now add the names of sports in the range B1:B100. You can count the number of rows in which the same particular surname occurs with the same sport by using

```
SUM(IF(A1:A$100="Smithson",IF(B1:B100="Cricket",1,0)))
```

Enter as an array, using Ctrl+Shift+Enter.

■ **Conditional additions** As above, but add figures for costs in the range C1:C100. You can total the costs for the rows in which the same particular surname occurs with the same sport. Also enter as an array.

```
=SUM(IF(A1:A100="Smithson",IF(B100:B100="Cricket",C100:C100)))
```

■ **Joining text** If the surname in A1 is Jones and the sport in B1 is hockey, in another cell you can display Jones plays hockey with this formula:

```
=A1&" plays "&B1
```

■ **Joining dates** You can convert a date to text and join it with other text. If the date in cell D17 is 31/8/97 (that is, in the format dd/m/yy) you can display it in another cell as Fixture date: 31/8/97 using this formula:

```
="Fixture date: "&TEXT(D17,"dd/m/yy")
```

■ **Taking a discount** If there is an amount in cell C30 and you want to show this amount less 15 percent in another cell, you can use this formula:

```
=C30*(1-15%)
```

Make sure that this cell is formatted as a decimal or currency, though, not as a percentage.

Fortunately, Excel will calculate it the 1-2-3 way if you choose Tools, Options, Transition and, under Sheet Options, select the Transition formula entry check box. Click OK. Now it's just as though you were using 1-2-3 and you can enter the @RATE function with its three Lotus arguments.

Excel will change it to =RATE(C3,,-C1,C2). You'll note that Excel is inserting a minus sign before the Present Value, which is enough to confuse anyone.

If your organisation has moved from 1-2-3 to Excel and you can't find a particular Lotus function that you are used to, it's worth trying this feature. But don't forget to clear the Transition formula entry check box when you're done.

Happy events

In days of yore, you would run a macro manually by pressing a hotkey, like Ctrl+Z, or selecting it from a menu list of macros, or by clicking a custom-made button. But VBA in Microsoft Excel 5.0 offered the opportunity to have events trigger a macro.

There were (and still are) properties like OnEntry. As soon as a user enters data on a worksheet, then a macro can run. Another property is OnUndo which triggers a macro if the Undo command is selected. I particularly like OnTime which can automatically run a message that it's time to go to lunch at 12.50.

In all there were 14 of these events in Excel 5. Another was added in Excel 95, the OnSave event. It doesn't work if a workbook is saved by a program but is triggered when the user selects the Save or SaveAs commands from the File menu. OnSave might run a macro which simply states that the file has been saved.

Now Excel 97 has added 62 new events, many of which are very sophisticated. Among those available for use with charts, for instance, is MouseDown which occurs when the user presses the mouse button, and MouseUp when he or she releases it. The syntax includes a number of parts so that you can specify whether we're talking about the left button, right button, or middle button if you've got one. You can also specify if the macro runs with a simple press or when SHIFT, CTRL, SHIFT + CTRL, ALT, ALT + SHIFT, ALT + CTRL, or ALT + SHIFT + CTRL are pressed. Whether anyone would remember which of those variations is needed to run the macro is another matter. Maybe it will remain your little secret that you have to press the right button with ALT+CTRL?

Some of the new events are more refined versions of earlier ones. For example, there was a DoubleClick property which runs macro when the user points to an object and then clicks a mouse button twice. Now there is also the BeforeDoubleClick event which occurs when an embedded chart or worksheet is double-clicked, before the default double-click action. It could be used for overriding the default double-click behaviour in a specific instance, like someone wanting to change an element of a chart.

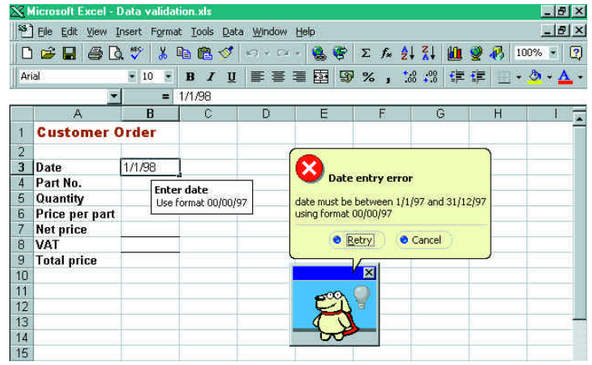

Fig 3 Excel 97 offers automatic data validation. It's easy to create parameters which must be followed and error messages if they aren't Optional, if you have space...

Data entry control

Excel 97 also offers an easy way to ensure that anyone entering data onto a worksheet follows your rules. Perhaps it would be more diplomatic to say you can be helpful in communicating what is expected. They still have the option of clicking in a list and choosing Data, Form, and an entry form will automatically be created.

Alternatively, you can set up the sheet as in Fig 3 so that a message such as Enter date Use format 00/00/97 automatically appears when a data entry cell is selected. If the user enters something which is not within the defined parameters, they are prevented from going further and an error message appears either as a regular error message box, or within the Office Assistant if it is active (again, as in Fig 3).

This is arranged using a new option, Validation, on the Data menu. You have many options from which to choose. The error message can be Stop, Warning, or Information. You write your own message box title and error message. It is also an option whether a title and input message is displayed when a cell is selected.

If you ever have to design a template for any kind of data entry, whether for expenses, invoices, patient reports, ticket sales, you name it, you will find this built-in, easy-to-use feature can save hours of programming time.

Care to share?

With every new version of Excel, it becomes easier to share workbooks with other people on a network. The only limitation is that if a shared workbook were created in Excel 97, you can only make changes to it with Excel 97. But that's not unreasonable. Beyond that, the whole business of sharing is remarkably easy and there is little to be learnt. The intention is that the features be used without instruction from a systems administrator. The typical uses are for budgeting, forecasting, record keeping and project tracking.

Changes can be made in three ways. The first is that a workbook is made available on a network and different people can open it, make changes, and close it. The second is that the file can stay open on a network and several people can make changes simultaneously. The third is that a copy of the workbook can be sent to someone outside the internal network, modified, and the changes merged with the original workbook, together with a revision history.

To get started, all you do is open a workbook, then on the Tools menu choose Share Workbook and click the Edit tab. This is where you choose whether to allow more than one user at a time. Then, you save the workbook on a network location where the users can gain access to it.

Also on the Tools menu, you can select Track Changes, then Accept or Reject changes, and then the When, Who, and Where changes can be made. The When might be "since a certain date". The Who might be "Everyone" or certain specified personnel. The Where indicates the ranges of the workbook which allow changes.

Under Tools, Track Changes, Highlight Changes, you can specify whether changes are visible on the screen, as a cell tip (when you hover the mouse over a cell), or listed on a separate worksheet, or both.

You can see who made a change, the date and time they made it and what they did (for instance, changed a numerical or text entry, or a formula). Cell borders can even be colour-coded corresponding to the person who made the changes.

Operating order

To help myself remember the order in which operators take precedence in Excel, I have devised the mnemonic, EMDAS, standing for Exponentiation, Multiplication and Division, Addition and Subtraction.

Lotus 1-2-3 can work differently in some respects but not for the following cases, which give the same results in both spreadsheets:

```
2^2*2+2/2-2  =   7.0
2^2/2+2*2-2  =   4.0
2/2^2-2+2*2  =   2.5
2+2/2^2*2-2  =   1.0
2+2/2-2^2*2  =  -5.0
```

On the PCW CD-ROM

■ In the Software Library, Hands On, Spreadsheets section there are two worksheets which are templates for financial analysis. Example.xls is for retail, wholesale or manufacturing companies (which carry stock) and Service .xls is for service companies (which don't). They can be used with Excel 4 and above, and Lotus1-2-3 versions for Windows 3.1 and above.

■ Requests are again coming in for the templates which accompanied my series on financial analysis (Sept '94-Jan '96). I assume that people have been reading these articles on the various compilation CD-ROMs which have been issued. To satisfy demand I've included the templates on the CD-ROM, but you will have to assemble the back issues containing the explanatory articles if you need them (see "PCW Contacts", below).

PCW Contacts

Stephen Wells welcomes input on all spreadsheet matters. Write to him at *PCW*, or email spreadsheets@pcw.vnu.co.uk

Back issues of *PCW*: phone 01483 733870

In the round

The subject of rounding in Access gets a discreet revival, and your contributions are sought for the most unusual RDBMS application. Mark Whitehorn briefs you on what's required.

This column has harboured several discussions about rounding functions in Access. I thought all had gone quiet until two intriguing emails arrived, one from Roger Moran and the other from Ray Hall. While some of us (myself included) find this topic fascinating, I am loath to devote much more space to it since it may be of limited interest to some people. So, I have included their emails in full as memo fields in the DBCMAY97.MDB file on the CD-ROM. This ensures that the information is available to those people who wish to look at it, but doesn't soak up bandwidth for those who aren't. See the form called "Rounding" if you are interested, and thanks to Roger and Ray for their contributions.

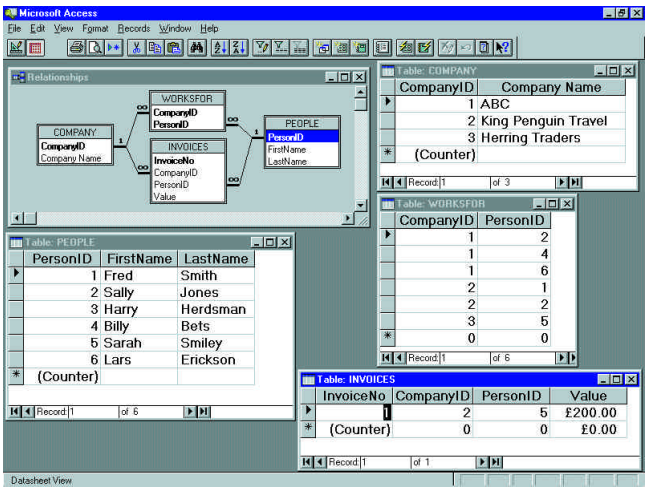

Fig 1 Taken from DBCMAY97.MDB and showing the tables from Greg Barstow's question

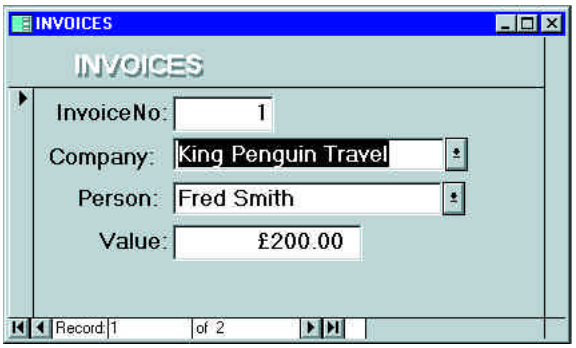

Fig 2 The two combo boxes on the form from DBCMAY97.MDB

Competition time!

From Andrew Leaman: *"I am interested in databases but find it difficult to think of useful applications. Could you possibly supply a list of typical applications, starting at the simplest and working up to the more complex?"*

Starting with the most basic database is easy: an address list, maybe a list for sending Christmas cards. As to the more complex uses, these are almost without number and range. Banking systems, air traffic control systems, process control systems in factories — all have at their heart some form of database. In fact, it is possible to argue that almost all computer applications are essentially databases; some of them just have rather odd front-ends.

Take a word processor, for example. It stores and manipulates data. You can query the database (with the search facility), generate different forms (normal view, outline view, etc.) and generate reports (print-out). You see? A document is really a database and a word processor is really a DataBase Management System.

I wouldn't want to take this argument too far, but what about a competition? We'll offer one of our much sought after book/record tokens for the most unusual example of an application developed with a recognised RDBMS. It doesn't have to be developed by you or your company, but if it happens to be so, that's fine. Just to start the ball rolling, I've heard of a really odd application, developed in Australia, which made the international news recently... But I'll leave it open for a reader to suggest that one since I'm sadly excluded from the list of potential prize-winners.

Sets and subsets

Greg Barstow writes: *"I do freelance for a range of companies. Each company has a number of people who can commission work from me for the company concerned. I need to generate invoices for each piece of work, and I want a form in Access which lets me pick the company from a combo*

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box (which I can do easily). Then I want the next combo box (which allows me to pick the person to whom the invoice should be sent) to show me only the people who work in that company."

This is a good generic question. Essentially it asks: "Given a long list of options which can be unequivocally sub-setted by a choice in another list, how do I show this elegantly on a form?" There are many applications. If you have different sales people who work on different product lines, or different aircraft which are serviced by different engineers, this is an area which may be of interest to you.

For one possible solution, see DBCMAY97.MDB. Fig 1 *(p285)* shows the tables involved and a small quantity of sample data. It also shows a tempting but incorrect set of relationships between the tables. Those who enjoy conundrums can work out why this particular set of relationships works but is non-optimal. The answer is on page 288 (the relationships in the MDB file on the CD-ROM are correct).

The form (Fig 2) has two combo boxes. The upper one is straightforward. It looks up values in the table COMPANY:

```
Select [CompanyID],[Company Name]
From [COMPANY];
```

and writes the value from COMPANY.CompanyID into INVOICES.CompanyID.

The lower combo box is more devious. It pulls data from a query called TheRightPeople rather than directly from PEOPLE. The purpose of this query is to find the people who work for the company which has been selected in the upper combo box.

The SQL for this query (Listing 1) is, like a great deal of SQL, impenetrable at first glance. Translated into English (more or less) it says:

- Find the value which is in the combo box above.
- Use that value to find the correct record in the COMPANY table.
- Then use that to find the people who work for the company. This has to be done via the table called WORKSFOR, since that is the table which stores the information about who works for which company.
- Finally, collect the relevant person's ID number and assemble their name neatly, attaching the first and last name together so that it looks tidy in the combo box.

If we run through that again, we can add in the relevant bits of the SQL statement:

Find the value which is in the combo box above.

```
[forms]![invoices]![companyID]
```

Use that value to find the correct record in the COMPANY table.

```
WHERE ((COMPANY.CompanyID=
[forms]![invoices]![companyID]))
```

Then use that to find the people who work for the company; this has to be done via the table called WORKSFOR, since that is the table which stores the information about who works for which company.

```
FROM PEOPLE
INNER JOIN (COMPANY INNER JOIN
WORKSFOR
ON COMPANY.CompanyID =
WORKSFOR.CompanyID)
ON PEOPLE.PersonID =
WORKSFOR.PersonID
```

Finally, collect the relevant person's ID number and assemble their name neatly, attaching the first and last name together so that it looks tidy in the combo box.

```
SELECT DISTINCTROW
COMPANY.CompanyID,
[FirstName]+" "+[Lastname] AS Name,
PEOPLE.PersonID
FROM PEOPLE
```

The nett result is that, when the second combo box is opened, the only names that appear belong to people who work for the company you have just chosen in the upper combo box. At least it *would*, except that it doesn't work automatically all the time because Access often buffers information so it doesn't automatically re-query the source for a control. The lower combo box has the query called TheRightPeople as its source. If this query has already returned an answer table, then simply selecting a different company in the upper combo box doesn't cause TheRightPeople to be re-run; hence the list of people may not be up to date when it appears in the lower combo box.

The answer is to force a re-query every time you use the lower combo box. This can be done in code or with a macro, and since I usually demonstrate everything in code, I thought for the sake of variety I'd use a macro (Fig 3).

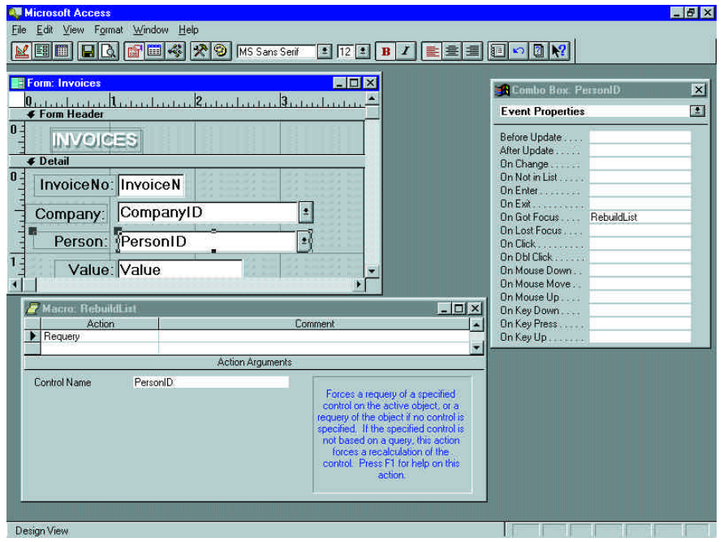

Fig 3 The extensive, and highly complex, macro used to force a re-query of the lower combo box on the form

David Ruffel emailed in a question which seems to have general application. He maintains a list of consultants who are experts in various areas — mathematics, computing, etc. There is a many to many relationship between the consultants and their subject areas, hence three tables are needed to model this relationship, while a fourth table contains information about times when the consultants are absent (Fig 4). Finding those consultants who can provide information about a given subject, say, Chemistry, presents no problem (Listing 2, p288).

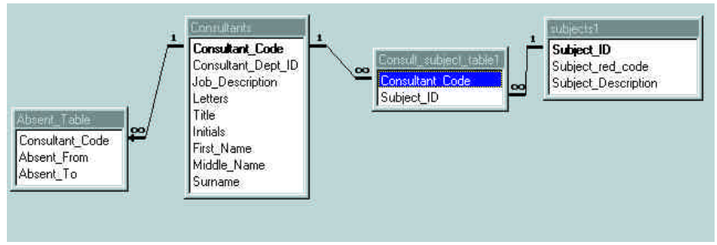

Fig 4 The tables used in David Ruffel's database

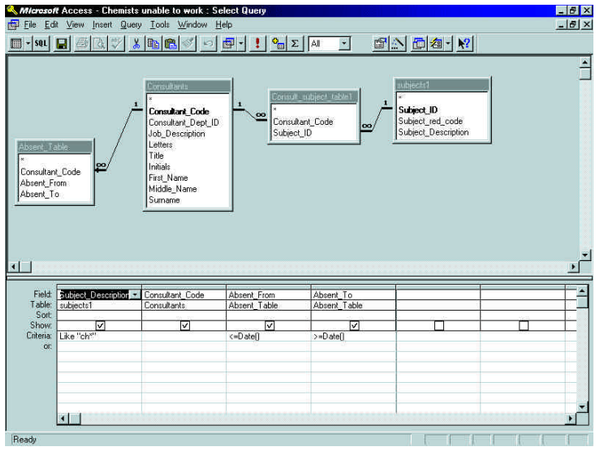

Fig 4a The GUI version of a rather impenetrable SQL statement

However, David also maintains a table of the dates during which particular consultants are unavailable. What he needed was a query which found not only the consultants who were experts in a particular area, but also those who were available on a particular date.

To my twisted mind, the easiest way to solve this one is to use one query to find all of the Chemists who are unable to work. This can be accomplished with Listing 3 which looks pretty horrible if you aren't used to SQL, but is much more understandable in Access' GUI (Fig 4a). This produces an answer table which looks like Fig 5.

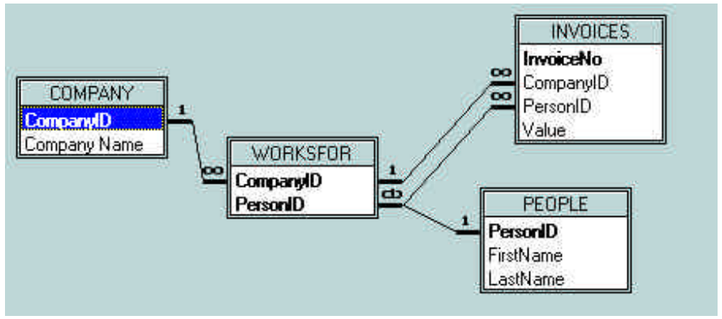

Fig 7 Showing a better set of relationships to use in DBCMAY97.MDB

The ConsultantCode identifies the Chemist who can't work on the given date (in this case I am using the Date() function to return today's date). Then, a simpler query can use the information in this answer table to identify all of those who can work (Listing 4).

This solution may not be optimal and I haven't tested it extensively, but you might want to use something akin to it if you have a similar problem.

The sample file is on the CD-ROM as an Access 7 file called QP4.MDB.

The format of this file (Access 7) brings me to another email, from Dave Milor.

Versioning

"Is there any specific reason why you write your articles with reference to Access version 2 but are using the Windows 95 interface? I have heard that there are problems with version 7 regarding speed and possible bugs."

I use Access 2.0 whenever possible simply because Access maintains compatibility in only one direction. If I provide a solution in Access 2.0, anyone using that version or later can read it. However, if I supply an MDB file in the most recent version, Access 97, only those people with that version can use it. All of the machines that I now use are running either Windows 95 or NT 4, which is why the screenshots of Access 2 appear as they do. When run under 95 or NT, Access 2 "acquires" the look and feel of these particular systems.

With regard to bugs, Access 7 certainly has them; but then, so does every bit of software I have ever seen (including my own). I haven't come across any which would make the product unusable.

The speed issue is more complex. Given any RDBMS, speed considerations can be split into two areas. First, there is how fast the interface runs. This is non-trivial, since a slow interface makes development work painful and will upset end-users. Second, there is data-processing speed: essentially the speed with which queries run. This is very different, and also clearly non-trivial. This second measure of speed is the one which people like myself love to benchmark, but we shouldn't ignore the interface speed, even if it is more difficult to quantify.

So, what about speed in Access 7? The interface speed is worse than Access 2.0, but the data processing speed is a bit better with certain queries. Access 97 (the

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Listing 1 SQL for TheRightPeople query

```
SELECT DISTINCTROW COMPANY.CompanyID,
[FirstName]+" "+[Lastname] AS Name, PEOPLE.PersonID
FROM PEOPLE
INNER JOIN (COMPANY INNER JOIN WORKSFOR
ON COMPANY.CompanyID = WORKSFOR.CompanyID)
ON PEOPLE.PersonID = WORKSFOR.PersonID
WHERE ((COMPANY.CompanyID=[forms]![invoices]![companyID]));
```

Listing 2 Finding Chemistry consultants

```
SELECT DISTINCTROW subjects1.Subject_Description, Consultants.Title, Consultants.Surname
FROM subjects1
INNER JOIN (Consultants INNER JOIN Consult_subject_table1
ON Consultants.Consultant_Code = Consult_subject_table1.Consultant_Code)
ON subjects1.Subject_ID = Consult_subject_table1.Subject_ID
WHERE (((subjects1.Subject_Description)="Chemistry"));
```

Listing 3 Finding the Chemists who are unable to work

```
SELECT subjects1.Subject_Description, Consultants.Consultant_Code, Absent_Table.Absent_From,
Absent_Table.Absent_To
FROM subjects1
INNER JOIN ((Consultants LEFT JOIN Absent_Table
ON Consultants.Consultant_Code = Absent_Table.Consultant_Code)
INNER JOIN Consult_subject_table1 ON Consultants.Consultant_Code = Consult_subject_table1.Consultant_Code)
ON subjects1.Subject_ID = Consult_subject_table1.Subject_ID
WHERE (((subjects1.Subject_Description) Like "ch*")
AND ((Absent_Table.Absent_From)<=Date())
AND ((Absent_Table.Absent_To)>=Date()));
```

Listing 4 Identifying the Chemists who can work

```
SELECT DISTINCTROW [Able Chemists].Consultant_Code, Consultants.First_Name, Consultants.Surname
FROM Consultants
INNER JOIN [Able Chemists]
ON Consultants.Consultant_Code = [Able Chemists].Consultant_Code
WHERE ((([Able Chemists].Consultant_Code) Not In (Select Consultant_Code from [Chemists unable to work])));
```

Fig 5 Answer table from Listing 3

Subject Area Description	ConsultantCode	Away From	Until
chemistry	5	Thursday, January 02, 1997	Thursday, June 19, 1997

next version on) definitely requires a better machine to run the interface (in other words, it is even slower). However, the data-processing is markedly faster, even given machines of the same spec.

Fig 6 Entry into the INVOICES table

InvoiceNo	CompanyID	PersonID	Value
1	1	3	£200.00
2	1	4	£0.00

A client-server future

In the February issue I asked if the column was too biased towards Access and, more generally, what did people want me to cover in future issues. The area which was overwhelmingly popular as a new topic was practical information regarding client-server databases.

This email from Tom Cliff was typical:

"I've been building databases for a couple of years and all of them have been on standalone PCs. Some of these have grown and now need to be migrated to a client-server system, because the volume of data has increased or they need to become multi-user. What I need is a good overview/ description of what is involved. How much work is it? How do I actually do it?"

So, we'll start next month having a look at the hardware you need, then move on to actually installing a back-end RDBMS, setting up a database on it, connecting to that database from clients, and so on.

Answer to conundrum

The relationships shown in Fig 1 ensure that the values inserted in INVOICES.PersonID are drawn from the available list of people (which is kept in table PEOPLE). They also ensure that the values inserted into INVOICES.CompanyID are drawn from the list of available companies. What these relationships *don't* forbid is an entry into the INVOICES table like Fig 6. This is bad, because person 3 doesn't work for company 1.

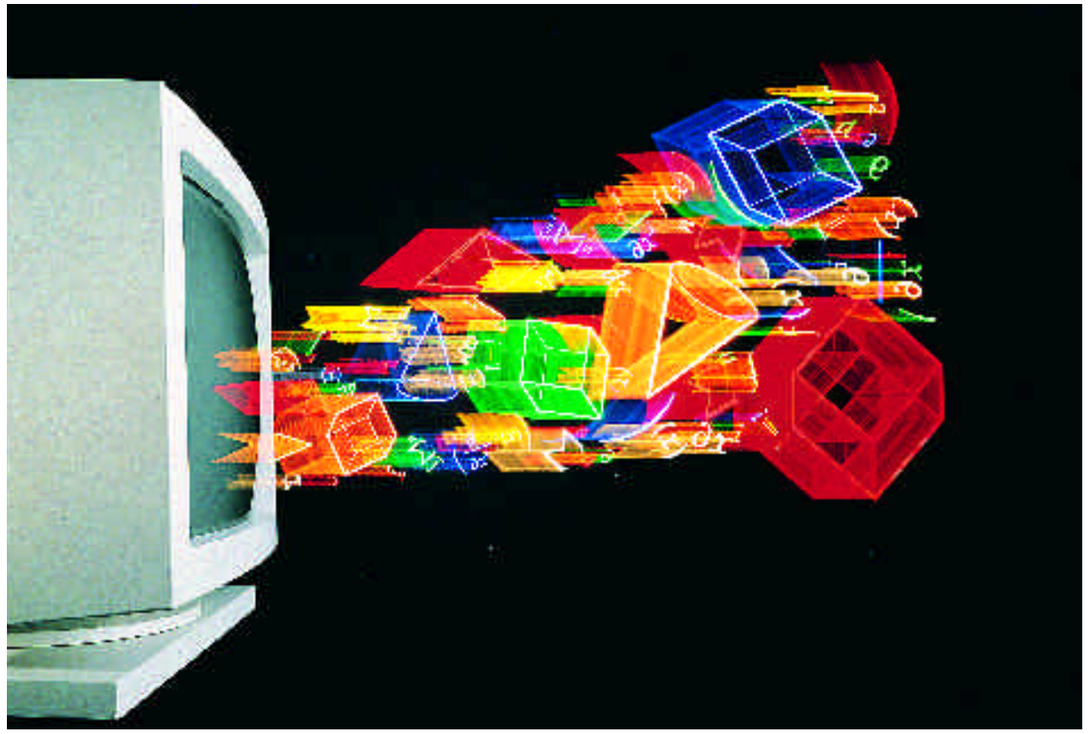
A much better set of relationships to use are those shown in Fig 7 *(p287)*. These ensure that the INVOICE table can only ever contain "meaningful" combinations of CompanyID and PersonID.

PCW Contact

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column, at database@pcw.vnu.co.uk

Morph code

Instead of dots and dashes, Mike Mudge checks his figures to find out whether numbers are nonamorphic or nonagonal. He also wonders why readers have been slow to respond.



Once upon a time... In the *Journal of Recreational Mathematics* Vol. 20(2), 1988, Charles W Trigg, of San Diego, addressed the problem of which primes had the sums of the squares of their digits also prime, e.g. if Prime (P) = 9431, then $9^2 + 4^2 + 3^2 + 1^2 = 107$ (Q) which is also prime. Among the 1229 prime numbers less than 10^4, Charles found 237 primes with this property… five two-digit, 47 three-digit and 185 four-digit primes. He observed that among the generating primes were the nine palindromes:

```
11, 101, 131, 191, 313, 353, 373, 797 & 919
```

The smallest of these is the sole prime repunit P = 11. For further study of repunits see *Repunits and Repetends* by Samuel Yates, Library of Congress Catalog Card Number 82-502451 (Star Publishing Co, Boiynton Beach, Florida 33435, in 1982).

There are also two near repunits, 223 and 8887. Among other structures present are members of the 25 reversal prime pairs such as 3169 and 9613. The smallest numbers of the pairs include

```
113, 179, 199… 3389, 3583, 7187, 7457, 7949 and 9479.
```

There are also some cases where the sums of the digits and the generating prime are equal, e.g. any prime permutation of 1136 giving 47 and 11, a prime permutation of 337, 1741 or 3037 giving 67 and 13, a prime permutation of 119 or 1019 giving 83 and 11. The most complex structure observed by Charles showed ten chains of primes wherein each Q is a P for the next link in the chain, e.g;

```
191, 83, 73, :443, 41, 17, :463, 61, 37, :1699, 199, 163 :6599, 223, 17, : 6883, 173, 59, : 467, 101, 2, :883, 137, 59 : 449, 113, 11, 2,: 797, 179, 131, 11, 2,:
```


Problem CWT

Extend this analysis to both squares of digits of integers greater than 10^4, the cubes and higher powers of the digits of such prime numbers… and also address the problem to other "well-known" classes of integers like Fibonacci Numbers, Triangular Numbers, Tetrahedral Numbers etc. There may be underlying structures that deserve attention? Finally on this particular topic, the MM special: how do these results extend to other number bases? (Is there anything particular about base ten, from a number theoretic viewpoint? And if so, why?).

Nonamorphic numbers

Charles Trigg, the author cited above, introduced this terminology in the *Journal of Recreational Mathematics*, 13:1, pp 48-49 (1980-81). Definition: Nonagonal Numbers have the form N(n) = n(7n - 5)/2. A number is said to be nonamorphic if it teminates its nonagonal number.

Clearly, 1 is trivially nonamorphic in any number base. With this exception there are no nonamorphic numbers in bases two, three, four, five, eight and nine. In base ten there are five nonamorphic numbers less than 10^4, namely

```
N(1)=1, N(5)=75, N(25)=2125, N(625)=1365625 and N(9376)=307659376.
```

In base six there are five nonamorphic numbers less than 10^4, namely

```
N(1)=1, N(4)=114, N(13)=1113, N(213)=253213 and N(5344)=302505344.
```

Now, in base seven there are 42 such numbers!

Problem CWT nonamorph

Extend the above statistics to number bases greater than seven, and investigate any structure within these nonamorphs.

Finally, generate further "agonals" with associated "amorphs" and attempt to find an underlying general theory relating to their distributions within a given number base, and in particular the number bases in which non-trivial "amorphs" do not occur.

Can we consider "almost amorphs", where the termination differs from the input number in only one digit (by only one digit in that place)? Are we losing sight of number theory here and just playing with patterns? An underlying theory would say no.

Send any investigations of the above problems to Mike Mudge (see "PCW Contact", below) to arrive by 1st August, 1997. All material received will be judged using suitable subjective criteria and a prize will be awarded by *PCW* to the best entry arriving by the closing date (SAE for the return of entries, please). Each contribution should contain brief descriptions of the hardware and coding used, together with run times and a summary of the results obtained, and general comments on the topics. References to published or unpublished work in these areas would be appreciated.

Stop Press

In the March issue of *PCW* I requested a proof that $1^2 + 2^2 \ldots + n^2 = N^2$ had no solutions other than n = 1 and n = 24. The reference has been supplied by Robin John Chapman of the University of Exeter to WS Anglin, The Square Pyramid Puzzle, *American Mathematical Monthly* Vol. 97, pp 120-124 (February 1990). Thanks, Robin.

George Sassoon has investigated $x^2 = ny^2 = p$ and has so far (10/2/97) found that the value p = 316234801 leads to integer solutions for n = 1(1)30. He wonders what percentage of possible n values give solutions and suggests that there is no upper bound on values for p yielding such solution sets? Your comments, please.

Review of "Prime candidate", (Numbers Count 162, Oct '96)

For reasons totally beyond my comprehension, this did not prove to be a popular hunting ground for *PCW* readers. The worthy prizewinner is therefore the originator of the problem: Jonathon Ayres, 59 Watson Road, Leeds LS14 6AE.

Are there any readers with at least partial results to Jonathon's questions? If so, please contact him directly. There is also a fourth question to consider: What happens if you use different functions such as the highest Alliott Hailstone function, so that HAHF = highest alliott function (a*x + b)?

PCW Contact

Mike Mudge welcomes correspondence from readers on any subject within the areas of number theory and computational maths, together with suggested subject areas or specific problems for future articles. Email numbers@pcw.vnu.co.uk or write to 22 Gors Fach, Pwll-Trap, St Clears, SA33 4AQ (tel 01994 231121).

Still waters…

… run deep: Intel has been quietly working away on processor developments, some with curiously watery codenames. Roger Gann anticipates a deluge of new products to come.

A river runs through it — Intel's future processor strategy, that is. For some time now, Intel has codenamed its future processor development projects after local rivers. The watery names have replaced the traditional Pnn scheme that Intel used for a decade.

Last year wasn't particularly busy for Intel. Even though it sold Pentiums by the shipload and hoovered up the cash, its new product release schedule was quite relaxed. After the introduction of the 150 and 166MHz Pentiums in January '96, the only new products were the 200MHz Pentium (July) and the 150MHz Mobile Pentium.

This year promises to be hectic. The launch of the Pentium with MMX Technology will be swiftly followed by OverDrive versions and a special version for notebooks, and we'll see the launch of an MMX-enabled version of the Pentium Pro. So this month I'll take a break from the toil of upgrading and instead gaze into my crystal ball at Intel's road map of future processor products.

The new MMX Pentiums are pin-compatible with their predecessors, but to gain maximum benefit you will need MMX-enabled software

Klamath

The Pentium now has the benefit of MMX technology, but what about the Pentium Pro? You won't have long to wait: Klamath is a cost-reduced version of the Pentium Pro intended to bring Pro performance to mainstream PCs this year. Although still based on the P6 core used in the Pentium Pro, Klamath will add the MMX multimedia extensions already seen in the new Pentiums. Klamath will initially run at 233MHz and later at 266MHz. These new, faster clock speeds are made possible by Intel's new 0.28-micron CMOS process. This will be slightly faster than the 0.35-micron BiCMOS version of the Pentium Pro, allowing Klamath to outperform it but at a lower cost. The new processor will come with a large, 512Kb, L2 cache.

Klamath's most visible difference will be its packaging: it won't resemble existing Pentium and Pentium Pro chips. The new processor will be housed in a new package, the Single Edge Connector (SEC) cartridge, a plug-in design that will require a complete motherboard redesign and which will function in much the same way as a CPU daughtercard. The SEC cartridge will probably ship in a metal case that provides for thermal transfer as well as electro-magnetic shielding.

Although the Pentium Pro was the most powerful processor Intel makes, it added little to its profits: Intel shipped fewer than three million Pentium Pros during 1996, compared with more than 60 million Pentiums. For Klamath to sell in the vast quantities that Intel would like, it must be cheaper to fabricate than the existing Pentium Pro.

The Pro broke new ground by coupling the microprocessor chip with a secondary or Level 2-cache chip in a single package. This solution, although providing good performance, was expensive and consumed too much of Intel's manufacturing capacity. The SEC design allows Intel to employ cheap, off-the-shelf, conventional SRAM chips (normally used for external caches) for its "internal" L2 cache; a move that offers considerable cost savings. The downside of the SEC is that its new packaging means there'll be no Pentium Pro MMX OverDrive upgrade. If you want Klamath, you'll need a new motherboard, too.

Initially, the SEC daughtercard will be designed to direct I/O traffic. Later on, Intel is expected to incorporate microcontrollers, DSP technologies and even some analogue devices into the card, making the prospect of full-screen, full-motion MPEG-2 or DVD-playback a distinct possibility.

It's now looking like Klamath will ship towards the end of Q2 this year, later than originally expected. So, it's more than likely that AMD will beat Intel to the draw by launching its rival K6 processor early in April. A minor fly in the ointment in the impending launch of Klamath is that its new motherboards will use the old 440FX PCI chipset which lacks support for advanced features such as SDRAM, Intel's Advanced Graphics Port (AGP) and 33Mb/sec EIDE transfer rates. An enhanced chipset, likely to be called the 440LX, won't be available until the second half of this year.

Two types of user will derive the most benefit from Klamath. First in line are the users of 32-bit operating systems such as Windows NT 4.0. These business users will see a big performance boost from the chip. Secondly, home users will just love Klamath as it will be great for 3D gaming. The Pentium Pro's floating-point unit is much faster than the Pentium's and thus most 3D programs will be dramatically faster.

Klamath will be a desktop-only processor: there will be no notebook version of the MMX-enhanced P6 processor, simply because it runs too hot. It's likely that Intel will skip a beat and jump to a notebook version of its next-generation processor, code-named Deschutes. So, although Pentium MMX notebook processors will be introduced and enhanced this year, there will be no Intel Pentium Pro-class notebook processor until 1998.

Deschutes

The Klamath architecture will support up to two processors and will be aimed at the workstation and entry-level server markets. The existing Pentium Pro supports Symmetric Multi-Processing (SMP) to the tune of four processors, maximum. This limitation will be overcome by Deschutes, a version of Klamath specifically designed for network servers. Intel is rumoured to be developing an eight-processor motherboard using the Deschutes architecture. And, some reports claim that the new architecture will feature a new bus interface that will allow manufacturers to build systems with up to 32 processors.

The processor itself will be a refinement on Klamath and will probably be a shrink of the Klamath design using the forthcoming 0.25-micron process. The die size of Deschutes will shrink markedly as a result: from 690 mils (0.69ins) for Klamath, which will use 0.35-micron technology, to 400 mils (0.4ins) for Deschutes; enough to allow high-volume, low-cost production.

Similar to the Klamath design, Deschutes will offer a CPU based on the Pentium Pro core but with separate components, such as a larger Level 2 cache and a modular CPU-to-cache bus on an SEC daughterboard. CPU speeds will range from 266MHz, 300MHz and 333MHz for Deschutes.

Some sources have predicted that Intel may also be moving to develop a 75MHz bus to run the Deschutes. Although that would require a new motherboard and related components, they noted that the faster bus might also be necessary. In common with Klamath, Deschutes will be configurable, capable of handling multiple cache memory types such as static RAM or multibank DRAM, the Advanced Graphics Port controller or a communications director for managing high-speed communications. Deschutes might appear towards the end of the year but 1998 is a far more likely timeframe.

In order to realise the full impact of Deschutes, you'll need a network operating system that can handle lots of processors. The current release of Windows NT Server will scale to eight processors but will need to support even more than this in future to take full advantage of Deschutes.

Katmai

Okay, so Katmai isn't a river, it's a volcano. But allow me a little artistic licence here!

Katmai will most likely surface late in 1998 or early '99, about six months after Deschutes. It will essentially be a Klamath MkII, with revamped and enhanced MMX technology, dubbed MMX 2 in the US. This version of MMX technology will significantly improve 3D graphics performance, making it an absolute must-have for serious gamesters. It concentrates on boosting 3D graphics performance — something not specifically addressed by the first version of MMX.

To recap, MMX cleverly re-uses the CPU's floating-point registers for its own highly optimised multimedia tasks. Obviously, programs can't use both FP and MMX instructions within the same routines as both share the same register set. This is rarely a problem, since most programs don't use FP at all. Those that do, typically use these calculations to generate data, while MMX is typically used in separate routines that display data.

For 3D graphics, Intel recommends that geometry calculations remain in floating point while MMX is used to accelerate 3D rendering routines. Each time the processor swaps the FP registers between FP and MMX, a time-consuming "context-switch" is required. Hence Intel's admission that 3D rendering doesn't benefit dramatically from MMX, although applications that take advantage of Microsoft's Direct3D programming interface will see some improvements. MMX2 will have additional instructions and a larger cache compared with the first release of MMX.

Merced

Also referred to as P7, Merced will be the first CPU to be released which supports IA-64, the new 64-bit architecture jointly developed by Intel and Hewlett-Packard under the codename Tahoe. Merced, which appears to have slipped into 1999, is likely to serve primarily the workstation and server markets, while Willamette, a cut-down version of Merced, will drive high-end personal computers.

It is early days, however, and very few hard facts are known about this processor. Intel has been tight-lipped about this particular project. It seems that the processor will comprehensively address many of the limitations of its 32-bit forebears. The chip is a joint Intel/HP venture and will not only support x86 binaries but also HP's PA-RISC binaries for its UNIX workstations.

Presumably, x86 support will be provided by way of emulation, in much the same way that PowerPC Macs can run 68K code. The key in both cases is sheer speed; the PowerPC was so fast anyway that the speed penalty imposed by emulation was unnoticeable. The same will probably be true of Merced.

Tillamook

Conspicuous by its absence from the MMX launch was the 200MHz version of the Pentium MMX for notebooks. Don't worry, though: Intel is planning something special for later in the year.

Codenamed Tillamook, this CPU will be among the first to be built on an Intel-developed pop-out module for notebooks, called MMO. It will include a processor, Level 2 cache, a voltage regulator, a clock and a PCI chipset called the 430TX. Instead of plugging a new processor onto the motherboard, users will plug the MMO processor module into the MMO socket.

So, for the first time, notebook users will have a CPU upgrade path. Fabricated using the new 0.25 micron process, the new CPU will not only be smaller than the Pentium MMX on which it is based but it will draw significantly less juice; down from 2.45v to 1.8v. A 233MHz version will follow.

And just for the record, Tillamook is a town, not a river. So there.

PCW Contact

Roger Gann can be contacted by post c/o *PCW* at the usual address, or via email at hardware@pcw.vnu.co.uk

Colour coded

Don't feel blue when your on-screen colours aren't printing out right. To put you in the pink again, Gordon Laing explains why and tells you how to cope with it using colour coding.

Good news for graphics fans: our annual DTP and monitor group tests appear in this issue. The former covers low-cost products as well as the heavyweights. In our monitor test this year we have concentrated on 17in monitors only, since these make up the bulk of current standalone display purchases. Our group test is broadly split down the middle into those models featuring maximum horizontal scanning frequencies of around 65kHz or 85kHz. This specification defines the highest signal the monitor can lock on to and display. As the group test explains in more detail, there's more than just the scanning frequency involved to display a certain image.

In real terms, a 65kHz monitor will be able to display a resolution of up to 1,024 x 768, non-interlaced at a refresh rate of 75-80Hz. An 85kHz monitor will be able to display a resolution of up to 1,280 x 1,024, non-interlaced, also at a refresh rate of 75-80Hz. Again, as the group test explains, interlacing produces an undesirable image for computer applications, while refresh rates above 70Hz are considered flicker-free. In my opinion, a good monitor is essential; far more important than blowing all your budget on speed and storage. Whatever your software application, you'll be staring at your monitor all the time, so it's worth getting a good one. If you're using graphics applications, the need for a quality display is immediately apparent.

It's also worth bearing in mind that your monitor is displaying only what the graphics card is feeding it. The best monitor in the world will flicker if your graphics circuitry is telling it to, so before blaming the tube in front of you, check out those display settings from Windows (the Mac OS tends to enforce a 75Hz refresh rate on resolutions above 640 x 480). You may have to use the utility which came with your graphics card, but a little nosing around here and there will, hopefully, reveal a control panel with refresh-rate settings.

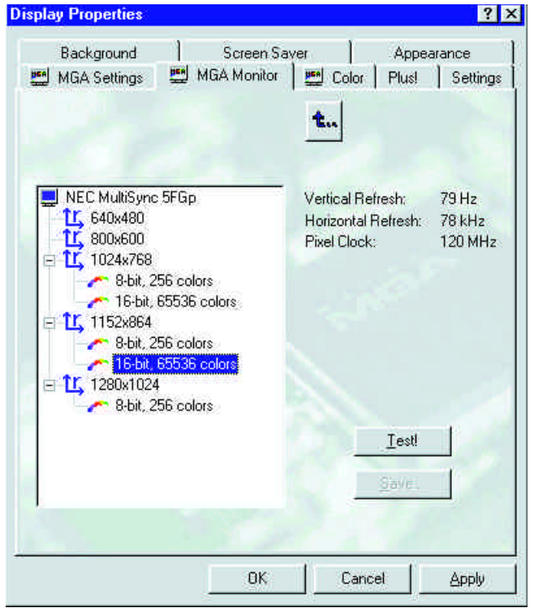


Fig 1 The popular Matrox Millenium graphics card adds its own extras to Win95's display properties. Select a suitable monitor and the card will feed it as high a refresh rate as it can handle

I know we're supposed to support new formats and standards but the plug-and-play monitor specification is a bit odd. It's supposed to allow the monitor to feed back its capabilities to the graphics card to stop you selecting too high a display mode, and to allow your system to arrive at the perfect setting for your equipment. But you often end up with a non-interlaced refresh rate of 60Hz at your selected resolution, which flickers.

Often the best solution is not to select a plug-and-play monitor from the list at all, instead going for a model you know matches your monitor's specs. If you can't find your model on the list, I'd recommend selecting either an NEC 4FG or NEC 5FG, which support modes up to 65 and 85kHz respectively; go for the one which matches your model's maximum horizontal scanning frequency. Now you should be able to go back into your graphics card utility and select a higher refresh rate. If you accidentally opt for something beyond your monitor's specs, the display will go blank, but fortunately Windows 95 and NT will return to your previous settings after ten seconds or so, asking which you'd prefer.

Colour coding

Colour has been the subject of numerous Graphics & DTP columns in the past, but popular demand has brought it back into the picture. It is a fascinating topic, ranging from perceptions of colour to the physics of light. This time it is the turn of the over-used acronym WYSIWYG (you know the one; What You See Is What You Get) and the miracle that is modern graphical computing.

WYSIWYG works to a certain extent. We all take for granted the idea of designing a page layout or even just a carefully-formatted document, and seeing it print out with the same size and styled fonts in the right places. It's fairly cunning if you examine what it entails but the whole thing falls apart when colour is involved. All you really want is for the colours you scan to be the same on-screen as when you print.

But there are two problems. Firstly, different devices (such as monitors and printers) create colours using different means and, believe it or not, many simply cannot produce the same range as others.

The second problem is down to your device's settings. You could have a dull red on-screen, thanks to having your brightness dial too low, and wonder why the printer is outputting a bright red. You should additionally consider that the kind of lighting surrounding you will greatly affect your colour perception. The solutions are to understand the colour capabilities of your devices, followed by calibration and compensation.

So, back to the bad news that not all devices can produce the same range of colours. Monitors produce colours by combining the light emitted by the red, green and blue phosphors on the inside of the glass tube. This is known as an additive process. Printers produce colours by using inks which absorb certain colours of light, leaving the eye to see which colours remain after reflection. This is known as a subtractive process.

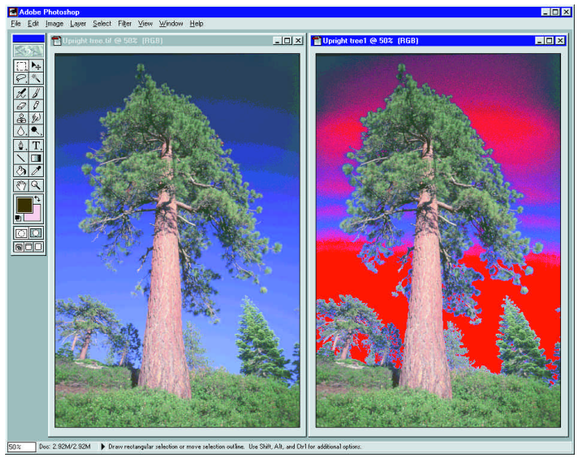


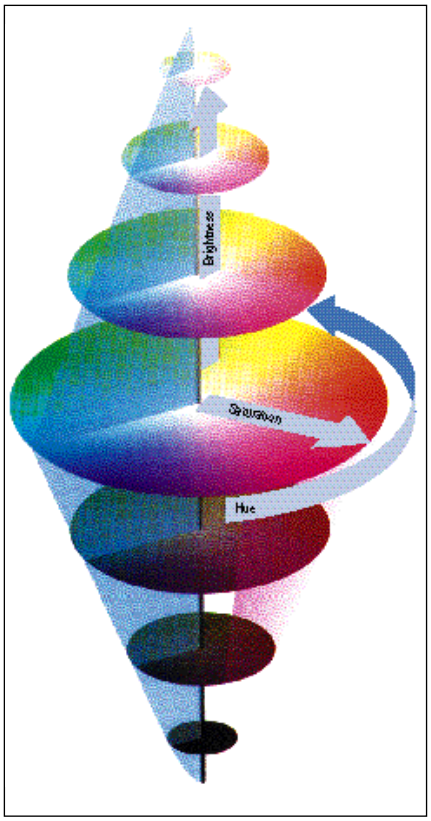
Fig 2 The tree on the left is an original RGB scan containing colours the CMYK process cannot print. A "gamut preview" in Photoshop highlights the problem areas (indicated in red on the tree on the right). The original RGB colours have been lost, as this screenshot had to be converted to CMYK for printing

It would be impractical to print different inks for each shade of every colour in your document, so a technique was developed whereby most colours could be simulated by printing various-sized dots with three colours of ink: cyan, magenta and yellow. In theory, placing equal amounts of these inks should absorb all light to give the impression of shades of grey or black, but in practice you get a muddy brown. Since black is so important (consider the abundance of black type), this three-colour printing process is usually accompanied by a separate black ink. This is a four-colour process, known by the initial letters of the inks involved, apart from black which is referred to as K to avoid confusion with B for Blue. Hence the four-colour printing process used to make virtually every colour magazine and poster is known as CMYK.

Unfortunately, the CMYK colour model is only capable of reproducing a limited range of colours. The RGB (red, blue, green) colour model is capable of a wider range but still nowhere near the complete range of the human eye. The range that a device can display is known as its "gamut", and if you try to get it to reproduce a colour that falls outside its gamut, you'll be disappointed.

It is possible to create a profile of a device's capabilities: say a scanner with reflective or transparent media, or an inkjet with shiny or plain paper. Such profiles could be used to calibrate and compensate for any imperfections (remember, the limited CMYK model is further limited by impurities in the ink and of course the paper on which it's being printed). Profiles could also be used to warn an application that you're working outside its gamut. Photoshop, for instance, can let you know if you're working

p296



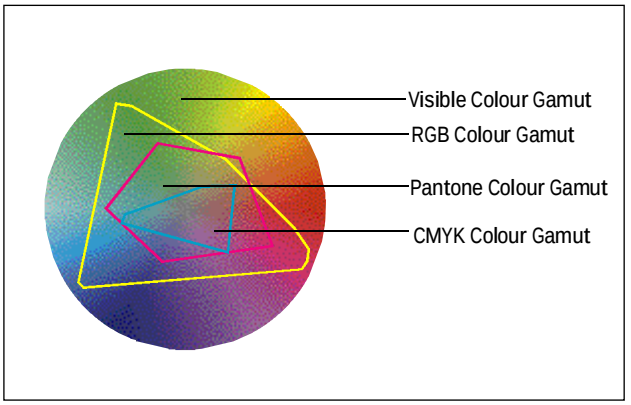


Fig 3 (far left) The CIE colour model of hue, saturation and brightness from which most colour pickers are derived
Fig 4 (left) A section of the CIE model overlaid with the ranges (gamuts) supported by various processes. Notice how some gamuts are wider than others

with a colour that your chosen printer has no intention of reproducing.

For this reason, many illustrators whose work is only going to appear in print don't bother using the RGB or indexed colour modes of applications like Photoshop, but instead start working in CMYK. That way, they know they're not using colours which won't reproduce when their precious work makes the inevitable conversion to CMYK.

Don't get me wrong, though. There's no need to avoid RGB modes from now on. You could be working on an image which is only ever going to appear on-screen, like a web page or CD-ROM title. Also bear in mind that CMYK files are one-third larger than RGB, so if you have your warnings activated you could work cautiously but more quickly in RGB and convert later.

Colour scanners are RGB devices with specific gamuts, too, which begins to make you wonder how any of the colours on your prints even remotely resemble those with which you started. There is a light at the end of the tunnel, however, with colour management systems (CMS).

A CMS system lets you measure the gamut of your devices compared to a standard colour space, such as the CIE model (Figs 3 & 4). To measure a device's gamut, you must scan, display or print a standard reference target, typically consisting of many natural colours, and compare it to a reference "perfect" version, usually supplied on disk with the target. The differences between the original and what your device produces can be used to make a unique profile, or tag, which can then be used to correct for that device's characteristics.

What happens is that an original bright red may be reproduced by a device as dull orange. This is incorporated into the profile for that device, which tells the CMS to take dull oranges from that device and turn them into bright reds. The CMS can, in some instances, modify your graphics card's output to make your monitor reproduce colours as accurately as possible.

If you're serious about colour matching, it's worth employing the aid of a CMS and regularly calibrating your system. Many decent graphics applications come with a CMS; either one of their own or, quite commonly, one devised by Kodak called KPCMS. My particular favourite is Agfa's FotoTune, which allows you to create profiles for each device and use them as exports or filters in Photoshop to convert RGB files into CMYK.

Alternatively you could use spot colours, like those offered in the standard Pantone library. Pantone offers a catalogue full of colour swatches from which you choose the ones you want: pure ink which produces a pure, solid, known colour without all that faffing around mixing cyan, magenta and yellow and wondering whether it's going to turn out right. There are many spot colours which exist outside of the CMYK gamut, allowing you to print, say, bright green, metallic silver or gold.

As explained earlier, using one ink per colour is only practical if your document consists of less than, say, four colours. However, many magazine covers and posters add one or two spot colours to their existing four-colour CMYK printing process for impact, to provide vibrant colours which liven up the image.

If your budget can stretch to six inks but you're not bothered about spot colours, you could consider using colour systems like Pantone Hexachrome, a six-colour process with a wider gamut than CMYK. Pantone also offers a CMS called ColourDrive for Windows 95 which I'll cover in detail, along with Agfa FotoTune and Kodak Precision CMS, in a forthcoming column.

Digital update

Last month I tried out Sony's consumer DSC-F1 digital camera and reckoned it was the best in its league. Bear in mind "its league" involves a working resolution of 640 x 480 pixels, which may not be sufficient for some needs. The optional DPP-M55 colour printer didn't arrive in time for my review, but I've since had a chance to play with it.

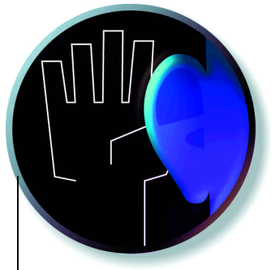
Printing from the camera is easy: select the images you want from the DSC-F1, select Print from the menu, and point the camera at the printer. A little infra-red beaming later, and the printer does its thing. It takes just over a minute for the print to arrive, which isn't bad for dye-sublimation technology. As you'd expect from continuous tone dye-sub technology, the colours look excellent; just like real glossy photos. However, even at the small printing size of 113 x 84mm, the low 640 x 480 pixel resolution is quite apparent, particularly so with regards to fine detail.

Digital photography is not yet quite there for many users, but the novelty of making your own colour prints minutes after taking the original photos is certainly pretty cool.

PCW Contacts

Any questions or problems? Contact **Gordon Laing** at the usual *PCW* address or email graphics@pcw.vnu.co.uk

Agfa 0181 231 4141
Pantone 01303 259959
FontWorks 0171 490 5390

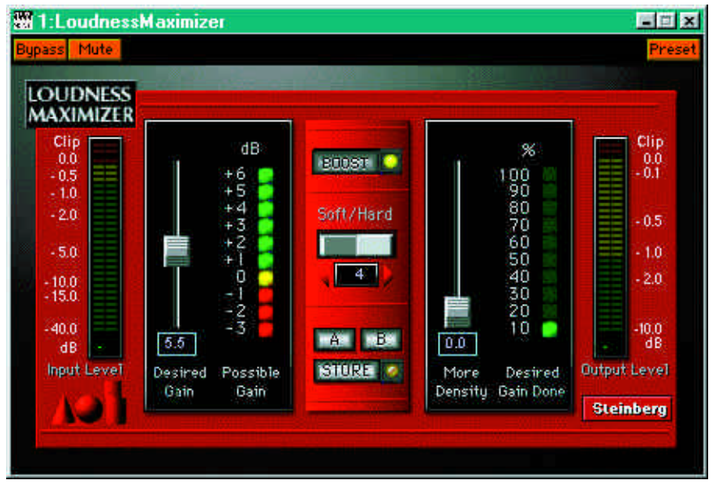


Bass-ic instinct

Remember Roland's classic TB-303 Bassline? Dance music would be devoid of "that" sound without it. It's revived today in software form, to the unabashed delight of Steven Helstrip.

The past month has been quite exciting. Not only have I finally persuaded Internet Explorer 3.0 to recognise my modem, but I've also been inundated by new software releases including updates for WaveLab, Cubase and Recycle. From the products I have received, however, the one to grab my attention and, indeed, much of my free time was the return of Roland's classic TB-303 Bassline. This time around, it's in the form of a software package.

It's hard to believe until you hear it, but the RB-338 Techno Micro Composer from Propellerhead gives you two fully-tweakable and programmable TB-303s on-screen. And that's not all. You also get an equally desirable TR-808 Rhythm Composer, a digital delay unit and a distortion pedal, all in one package.



Main story **The TB-303 is reborn, thanks to those clever people at Propellerhead. Have a go at tweaking those knobs for yourself: the demo can be downloaded from www.propellerheads.se. There are some free samples up for grabs, too**

Fig 1 **Loudness Maximiser can pump up your mixes with no noticeable loss in audio quality**

The unique sound of the 303 has been synonymous with dance music since the day it was born. The only mistake Roland made was ending the production line in the mid-eighties. Up until now, to get "that" sound, you would either have to have been one of those lucky people who bought one new, or wealthy enough to have bought one from the second-hand classified ad pages.

The RB-338 engine models the tonal characteristics of the 303 and 808 in software: it is not sample-based. This represents a major breakthrough in sound technology and will hopefully pave the way for more classic synths to be reproduced in software. It works with any 16-bit sound card, including the digital variety, so it's possible to get a decent output signal for studio use.

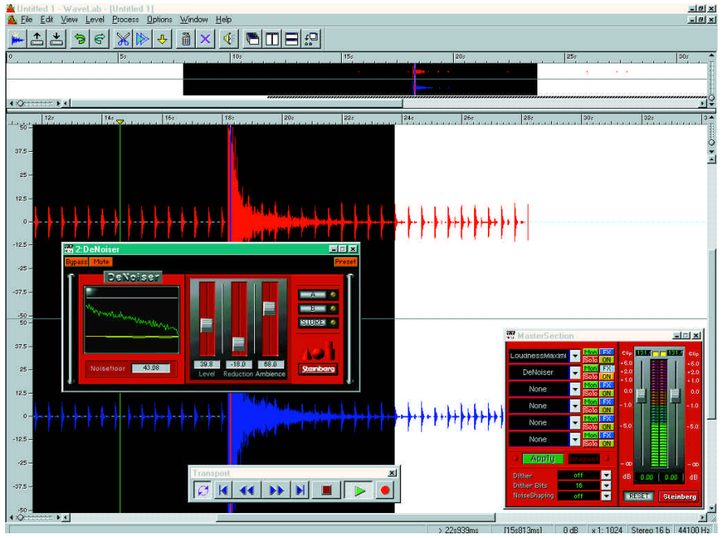


Fig 2 **DeNoiser working miracles within a quiet musical phrase**

Although analogue purists will disagree, the RB-338 does sound like the real thing, especially when routed through a valve compressor which can help soften the harsh nature of digital audio. The filter section, which is largely responsible for making the 303 what it is, has been faithfully reproduced and is more convincing than any previous offering. The pattern-based sequencer works in exactly the same way as its predecessor, and has slide and accent parameters to enable you to get authentic acid riffs.

Once you have programmed your bassline, the RB-338 will sync to an incoming MIDI clock. Alternatively, you can output the sequence to a wave file and import it into any audio-equipped sequencer.

Why the TR-808 was chosen to be implemented rather than the TR-909 I'll never know, since the 909 has far more clout on the dance floor. It's handy to have

The FAT FB383, a serious clone

Throughout the nineties, nearly everyone in possession of a soldering iron has attempted to clone the TB-303. The first successful attempt to go on sale was the Novation Bass Station, followed by the Deep Bass Nine and a string of others including the RB-338. The FAT FB383 (confused with the names yet?) from Freeform Analogue Technologies, is the latest. I chose to review it here because of its staggeringly low price and versatility.

It comes in a 1U rackmount and is quite possibly the most distasteful design I have ever seen. Looks aside, though, it's a gorgeous synth to have in any MIDI setup. From left to right the front panel gives you tweak tuning, wave shape, filter cutoff, resonance, envelope modulation, accent, decay and volume. The knobs are of a much higher quality to those found on the Bass Station and the Deep Bass 9, enabling accurate and comfortable tweaking. This is important, since they cannot be operated via MIDI. Being an analogue instrument, the inclusion of an auto-tune button is welcome.

So how close is it to the 303? Very close. It is able to create everything from fat, round, basses through to thin, resonant, blips. The filter, although very lush, doesn't quite crank up to the intensity that the 303 can, though. Since wave shape is variable between square wave and saw-tooth, it is capable of producing a wider range of sounds than the 303. And programming is a joy. Overlapping notes glide, similar to portamento, and velocities over 100 are accented.

I would be happy to pay double the asking price for the FB383. It's a serious instrument at a silly price.

Price £199 (£169.32 ex VAT)
Contact Turnkey 0171 379 5148

p300 ➢

Creative Essentials — Dance Drums

I like the idea of Dance Drums. One CD, squillions of carefully selected drum samples. This, for once, enables you to find the sounds you're looking for in next to no time, assuming you know what you're after. There are no loops on this CD, though. Oh no. It's better than that. What you get are the sounds used by the professionals to make drum loops; the source code, for want of a better analogy.

As part of the Creative Essentials collection, each sample is provided in .aif, .wav and audio format so there's no audio degradation to endure if you use a soundcard-based sampler. Tracks two to six consist of a complete set of sounds from the coveted 909, 808, CR78, R8 and SP-12 drum machines. Where possible, samples have been recorded with numerous decay settings: for example, there are four 909 kicks.

Although based on just one sound, each has different characteristics — track seven has 30 kick drums to annoy the neighbours with. As ever, there are a handful of fillers, but this is a handsome collection nonetheless. The remaining tracks contain a mixed bag of snares, crashes, rides and percussion.

On our cover-mounted CD-ROM this month, in the hands\sound folder, there are ten samples to try out. If they work for you, check out the rest. At less than twenty quid, you can't go far wrong.

Price £19.95
Contact Time + Space 01442 870681

the full 808 kit, though, with tweakable decay for each instrument.

As I write, the RB-338 is still in alpha testing, but it looks set to be released this month. So far it looks and sounds great, and I expect the final will be rock solid. You can't beat being able to tweak the knobs with your own hands, however, so this month's product review is of a true analogue 303 clone *(see page 299)*.

Harman Audio will be distributing the RB-338 in the UK but hasn't yet decided on the price. If you happen to be in the United States, you should be able to pick one up for less than $200.

WaveLab update

By the time you read this, WaveLab 1.6 should be available as a free update for existing users of 1.5. Released last December, 1.5 introduced professional real-time plug-in modules for mastering and re-mastering audio tracks. With the 1.6, you can now master and burn a CD all from the same package. Whole tracks, or selected parts of an audio recording, can be dragged directly into the CD-Track list.

The CD writing capabilities support full PQ coding and editing of PQ markers. Drivers are supplied for most CD writers, allowing up to four-speed CD-writing.

On the subject of WaveLab, I recently checked out two new plug-ins and was seriously impressed with the results. Loudness Maximiser *(see page 298)* is designed to increase the perceived volume of an audio track, to give it more clout. Even tracks that have been normalised to digital 0dB can be raised up to a further 6dB, depending on the type of material. The Soft/Hard parameter enables further modifications. By applying a positive value, the bottom end of the material is tightened up, enabling a higher gain setting. This works well with dance-orientated music and can really toughen up your mix.

DeNoiser *(see page 299)* is based on the non-trivial task of spectral subtraction. You don't need to understand this technology to get great results since the plug-in is intuitive. The display shows an estimation of the noise floor, along with an FFT snapshot of the current signal. This enables you to set up the three parameters ensuring that only noise is taken out, with no loss of signal. I successfully cleaned up some of my own old tracks and was amazed by the results.

Because the modules work in real time, you can listen to the effect they're having while the music is playing. What's really neat is that you can feed a signal into your PC, process the audio and output the results straight to DAT.

Both modules cost £299 (£254.47 ex VAT) and are available from Harman Audio.

PCW Contacts

If you have any hints or tips, MIDI-related items or general comments, contact **Steven Helstrip** at the usual *PCW* address or email him at sound@pcw.vnu.co.uk

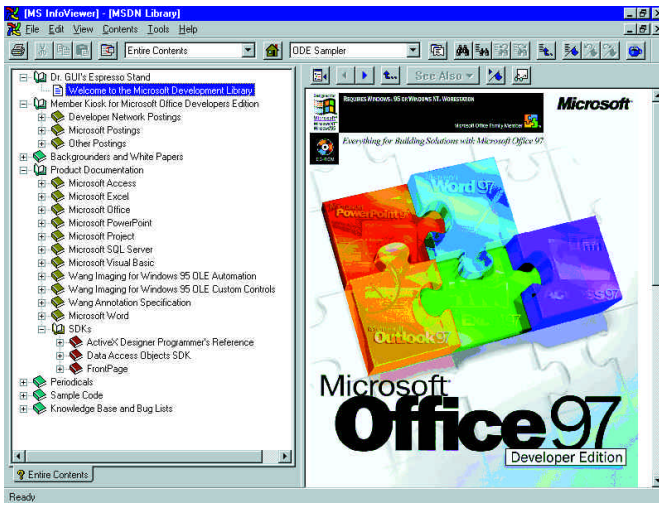
Harman Audio (for the RB-338, and the Loudness Maximiser and DeNoiser modules)
0181 207 5050
Time + Space (for Dance Drums CD)
01442 870681

Open and shut case

Office 97… just more of the same and not worth the upgrade? To casual users, maybe; but for developers, it offers a more open programming environment. Tim Anderson explains.

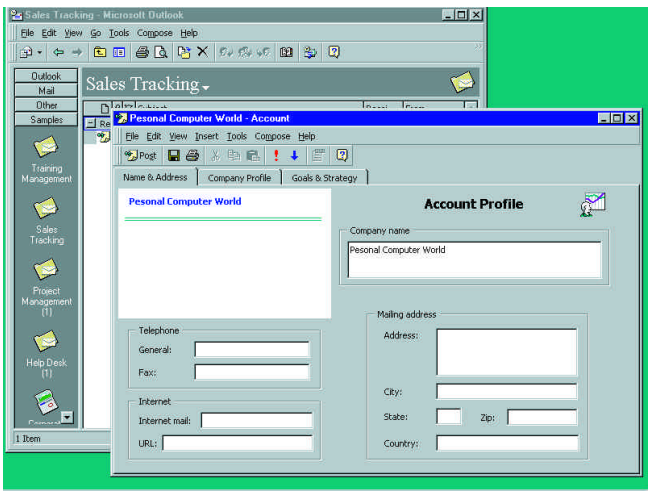
I have heard muttering to the effect that Office 97 is not much different from Office 95, or even Office 4.x. From some perspectives, that is correct. Word looks similar, Excel looks similar and all the casual user will notice at first is the Office Assistant (fantastic or horrific, according to taste) and a new, flatter, look to the toolbars.

But developers should welcome Office 97 with open arms. It is even worth explaining to the users why they really should upgrade, even if the animated Clippit is not their cup of paperclips. The reason is Visual Basic for Applications combined with the updated Office object model, all of which is exposed for programming. In most cases, equipping an Office user with suitable templates and macros soon pays for itself in increased productivity.



Left The Office 97 Developer edition is great if you need Access runtime, but otherwise it is not essential

Below, left You can develop applications in Microsoft Outlook by creating custom forms driven by VB Script. Nearly wonderful, but not quite there yet



To do these wonderful things, you need appropriate resources. This might or might not include the Office 97 Developer Edition, Microsoft's one-stop solution. What you get is the Office Professional CD, plus a further CD of developer tools. There are also two books: the *Office 97 Visual Basic Programmer's Guide* and *Building Applications with Access 97*, along with a booklet of Object Model charts.

Before getting too excited, though, it is worth recalling that the original Office Development Kit CD used to be more or less given away by Microsoft, presumably on the grounds that it pays to have people develop Office solutions, since in order to deploy them a copy of Office must be purchased for each installation.

Another noteworthy detail is that the books in the Developer Edition are available separately from Microsoft Press. A third observation is that not all the documentation you might need is actually included, neither on paper nor online. A notable example is *Building Microsoft Outlook 97 Applications*, which would be particularly valuable as Outlook is brand new. Another noteworthy example is the Office 97 Resource Kit: the version on the CD is for Office 95, or at least it is in my US shrinkwrap copy. The resource kit is aimed at network administrators but contains useful information for developers as well.

The most essential developer reference, the VBA reference for each application, is actually on the Office 97 Professional CD so it is questionable whether the Developer Edition is worth having. Most of the material can also be found on the Microsoft web site, often in updated form. There is only one convincing reason for buying this product: to obtain the runtime version of Access 97. This gives you a licence to deploy Access applications royalty-free, and could soon pay for itself. If you don't need it, just subscribe to MSDN (or buy a library

p302 ➢

Fig 1 Using the clipboard

```
Dim cr As String
cr = Chr$(13) & Chr$(10)
RichTextBox1.Text = "This is a picture" + cr
RichTextBox1.SelStart = Len(RichTextBox1.Text)
RichTextBox1.SetFocus
Clipboard.Clear
Clipboard.SetData Image1.Picture, vbCFBitmap
SendKeys "^v"
```

CD from time to time) and buy the books you really need from a bookshop.

Outlook: nearly great

Is it a Personal Information Manager, or an email client, or maybe groupware? Outlook is ambitious, and nearly the foundation of a complete Office solution. For example, it should be possible, with a bit of customisation, to right-click a contact name and open up a customer's order history or an index of previous correspondence.

There are two snags, though. One is that Outlook has VB Script but not yet Visual Basic for Applications. The second is that you need Exchange Server to do anything serious with Outlook over a network, like sharing an address book or viewing other people's calendars. In fact, Outlook without Exchange Server is less capable than the old Schedule, a fact which has not gone down well with small businesses running peer-to-peer networks. Exchange Server needs Windows NT, is priced for the Enterprise market and needs client licences, too, which makes Outlook far less attractive. Incidentally, if you decide to get going with Outlook development, a trip to Microsoft's web site is essential. Documentation and numerous sample applications are available for free download.

Sheridan's Active Threed

Sheridan products now come on a Toolkit CD containing all the company's developer tools. You can install demonstration versions of any tool, or full versions where you have the right key code. For instance, if you purchase Active Threed you get the code for this product along with the CD. There is no manual, the lame excuse being that Sheridan wanted to check the printed manual against the release code. A voucher lets you obtain it at nominal cost. But the manual aside, the all-in-one CD is a great idea. Another plus is that the ActiveX controls come digitally signed with CAB versions included for web distribution.

Active Threed offers seven controls which are intended as plug-in replacements for the standard Windows items like command buttons and check boxes, but with extra features. These include marquee captions which blink, scroll, slide and bounce, plus animated pictures created with a sequence of bitmaps. There is also a splitter control which lets you create windows with resizable panes. The controls are 32-bit only; not even Visual Basic 4.0 16-bit is supported. Packages like this cause me to hesitate since many VB applications are slow enough without the additional weight of controls which aren't strictly necessary.

Two things make ActiveThreed worth a second look, though. Firstly, the SSplitter control is well implemented and provides a feature which has become something of a Windows standard. Secondly, the SSRibbon control allows you to create toolbar icons with an active border, as seen in Office 97 and Internet Explorer 3.0. I was also glad to find that Delphi samples had been included.

Rich Text in Delphi and VB

Dr Francis Burton asks: "*I want to be able to alternate graphics and text in a scrollable window, with the ability to cut and paste text (and possibly bitmaps/metafiles, too). New text and graphics are appended to the end of the window. Do you know of any controls, either Visual Basic or Borland Delphi, which implement scrollable graphics/text windows?*"

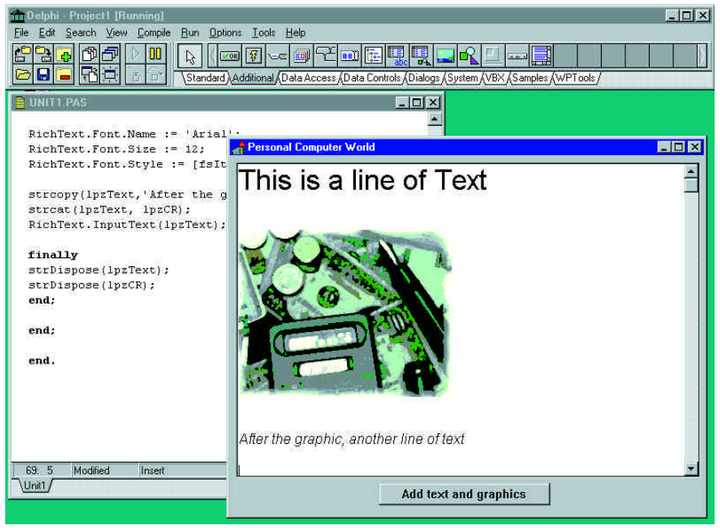
If you are working in Windows 95 or NT, the standard rich text control can display formatted text and graphics. It is easy to miss this functionality in Visual Basic, since there is no InsertPicture method. You can insert OLE objects, though, using the OLEObjects collection. For example, this code inserts a line of text and a picture:

```
RichTextBox1.Text = "This is a
picture"
RichTextBox1.OLEObjects.Add , ,
"c:\test.bmp"
```

Unfortunately, this can have unpredictable results depending on how OLE file associations are set up in the registry. There is also an overhead involved with OLE which makes the rich text box update rather slowly when an object is inserted. A safer approach would be to use the clipboard. The example in Fig 1 and the Delphi one (Fig 2) assume you have placed the picture you want to insert into an invisible image control on a form. The final

Fig 2 Using WPTools

```
var
lpzCR: pchar;
lpzText: pchar;

begin
lpzText := stralloc(256);
lpzCR := stralloc(3);

try
strcopy(lpzCR,chr(13));
strcat(lpzCR, chr(10));

RichText.clear;
RichText.Font.Name := 'Arial';
RichText.Font.Size := 24;

strcopy(lpzText,'This is a line of Text');
strcat(lpzText, lpzCR);

RichText.InputText(lpzText);

RichText.PicInsert( image1.picture, 0,0 );
RichText.InputText(lpzCR);
RichText.Font.Name := 'Arial';
RichText.Font.Size := 12;
RichText.Font.Style := [fsItalic];

strcopy(lpzText,'After the graphic,
another line of text');
strcat(lpzText, lpzCR);
RichText.InputText(lpzText);

finally
strDispose(lpzText);
strDispose(lpzCR);
end;
```

Even Delphi 1.0 is able to display text and graphics within a scrolling document using WPTools (illustrated here), or a component such as Visual Writer

SendKeys statement simulates the CTRL-V keypress which pastes from the clipboard at the insertion point.

For some reason, Delphi's equivalent rich text control does not support graphics. It is odd, since both use the same underlying common control, and it is likely that careful investigation of the Visual Component Library would reveal a way to overcome the problem by creating a new component which exposes more of the features in the rich text control. Or, you could use VisualWriter, an OCX and VBX control which does support graphics. Better still, use a native Delphi component like WPTools (it's shareware but works well). The WPRichText control, part of WPTools, has a PicInsert method which lets you insert a picture. It also support fonts and styles so you could implement scrollable text and graphics as required. The main snags with WPTools are its uneven documentation, and extensive use of pointers which can be error-prone. Fig 2 shows example code using WPTools.

String along with SQL

Michael O'Reilly writes: "*I have been following your excellent VB tutorial, and while using some of the code given in the February issue article I encountered a problem I can't solve. In the example given, you take a string from a text box and use it in an SQL query. How do you do the same with a number from a text box?*"

A printed picture does no justice to this Active Threed form, which is crawling with animation. Note the split window at bottom left — a genuinely useful feature

When you create an SQL string for querying a database, you use a different technique according to whether the field is character or numeric. If it is the former, the value must be in single quotation marks, as in:

```
sSql = "select * from
members where
members.surname = '" &
mySurname & "'"
```

Admittedly this looks ugly, but it works well. If the field is numeric, then the single quotation marks must not be used. All you need to do is convert the numeric value to a string like this:

```
sSql = "select * from members where
members.surname = " &
str$(myID)
```

The following question comes from Andrew Shaw: "*I need a lot more input boxes than the PCW Sports Club uses and want to implement some kind of counter/loop to run through the DisplayPerson code. I want to avoid:*

```
txtForename = CurrPerson.Forename
txtSurname = CurrPerson.Surname
```

"*I tried an array of text boxes and a laborious trawl through the manual, with no success. I want to try something like:*

```
txtInput(Counter) =
CurrPerson.Counter
```

"*What should the CurrPerson.Counter part look like?*"

Andrew's idea is to write a loop that iterates through all the fields of a particular record, filling text boxes with the values along the way. This can be done as follows:

```
Dim iCountvar As Integer
For iCountvar = 0 To
 (ds.Fields.Count - 1)
Label1(iCountvar).Caption =
 ds.Fields(iCountvar).Name
Text1(iCountvar).Text = "" &
 ds.Fields(iCountvar).Value
Next
```

The trick is to get at the Fields collection of a Recordset object. You could make the routine even more flexible by creating the necessary labels and text boxes at runtime.

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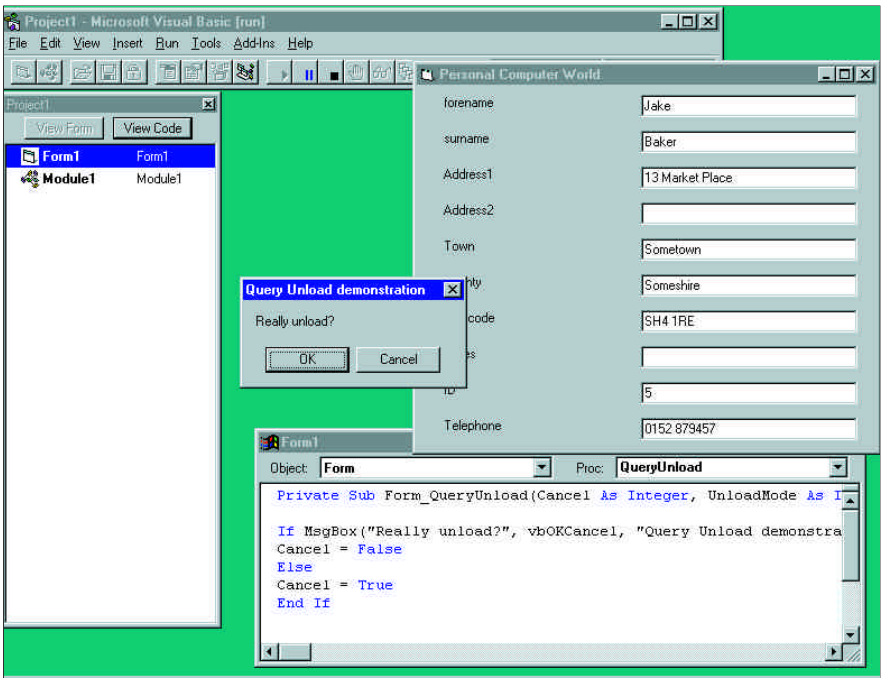


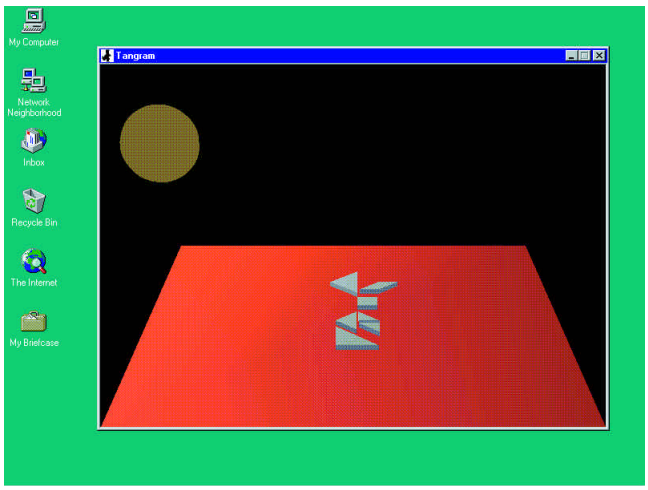


Fig 3 (above) Using the QueryUnload event to confirm a close decision
Left (see "Inside Com") This application from Inside COM demonstrates agregation, containment, and interchangeable components. The Tangram pieces look like a rabbit… allegedly

The main value of a routine like this is in applications where the number and type of fields in the recordset may vary at runtime. For example, you could let the user choose which fields they wanted to view, build an SQL string to return just those fields, and display them using the procedure described.

Where's the tab strip?

Phil Richard asks: "*In a recent column, you mentioned a tab strip option in VB4 which I would like to use; either TabStrip or SSTab. Neither seem to be included in my installation of Standard Edition VB4, which I purchased as an upgrade. I have, however, found TABCTL32.OCX from the Sheridan web site. Is there a way of registering it, as it appears as not found when trying to load the PCWClub project.*"

Unfortunately Phil is correct, and the Tab custom controls are only present in the Professional edition of Visual Basic. While a lot can be done with the Standard version, it is severely restricted both in its use of the JET database and in the number of custom controls supplied. It is also cheap, and my guess is that Microsoft views it as an introductory, learning product rather than a real development tool.

With TABCTL32.OCX, most third-party OCX vendors allow free distribution of its controls. So in order to make some sales, use of an OCX in developing an application is allowed only if you have purchased the control. When you do buy it, you get either a .LIC file or special registry entries that allow you to use it for development.

How do I cancel?

Ammar EL-Hassan has this query: "*I am trying to add a facility to enable the user of my VB application to CANCEL the operation which Closes his form. The user clicks the control box in the top left corner of the form. They then click the Close option, which unloads the form (application dead!). How can I interrupt this to enable the user to cancel after selecting Close?*"

VB forms have a QueryUnload event for this purpose (Fig 3). Use code like this:

```
Private Sub Form_QueryUnload(Cancel
 As Integer, UnloadMode As Integer)
If MsgBox("Really unload",
vbOKCancel) = vbOK Then
Cancel = False
Else
Cancel = True
End If          End Sub
```

You can even discover why the form is trying to close, by inspecting the UnloadMode parameter. If it is vbAppWindows, then the user is trying to close down Windows.

Inside COM by Dale Rogerson

Inside COM is a book that takes you step by step through the mysteries of COM interfaces, reference counting, globally unique identifiers, containment, aggregation and automation. All the examples are in C++ but the author has avoided Windows-specific code where possible. The strength of the book is that it is about COM rather than OLE or ActiveX technologies which are based on COM, so it does a good job of explaining what COM is and how it works. Of course, the impressive thing about tools like Visual Basic and Delphi is that you can use COM without needing to understand much about it. When it comes to advanced development or troubleshooting, though, a book like this provides an invaluable background.

PCW Contacts

Tim Anderson welcomes your Visual Programming comments, queries and tips. Contact him at the usual *PCW* address or email visual@pcw.vnu.co.uk.

Office Developer Edition is £639 (ex VAT). Upgrades from Office 97 Professional are £215 (ex VAT). Contact **Microsoft** 0345 002000
Office 97 Visual Basic Programmer's Guide available separately at £32.49 from **Computer Manuals** 0121 706 6000
Sheridan Active Threed £99 (ex VAT) from **Contemporary Software** 01344 873434
Inside COM (Microsoft Press) is £32.99 from **Computer Manuals** 0121 706 6000.
Visual Writer is £195 (ex VAT) from **Visual Components** 01892 834343
WP Tools is shareware. Contact Julian Ziersch 100744.2101@compuserve.com

SAPS up!

It's Spring again, the sap be risin' and it's a good time for Mark Baynes to review the SAPS modem sharing software kit for Windows, in addition to zapping your networking problems.

At long last I have managed to get the SAPS modem sharing software reviewed, as promised. This is for those among you who were wondering how to share a modem using Windows NT.

Last month, I was having *big* problems with my server, "Pig", and as I write it is languishing in the corner, not sulking but dead. This has meant quite a few problems, as we have been getting up to speed with our web work and so the use of a server was an imperative.

To get around the problem, I have simply used the most powerful workstation which is running NT Workstation 4.0 as a server, although as it is not a dedicated server, it is really peer-to-peer. However, this has proved not to be too much of a hassle as we are simply sharing files and do not use the "server" for anything else. Anyway, this is unlikely to be the case for much longer as we get more work in and we just *have* to be able to work more efficiently.

This month, I have had some letters from people who want to get to grips with the very basics of networking, and I have received several others from people asking me to stick with the problems of smaller networks. But don't worry, I will.

For those of you who are concerned about getting started with networking, I would say (a) ignore my cynicism, and (b) just get on with it. If you are running Windows 95 all you need is the networking hardware (all the essential software is included in the basic product) and this means a couple of good SMC or 3Com cards and a length of thin Ethernet cable to connect the two together.

If you take things slowly and try not to run before you can walk, then it's not too much of a problem. The main thing to consider when setting up a network card is to make sure that it works properly before you try to do anything with it. There is no point in attempting to use a network card when you know you have an interrupt problem with it. Networks are layers built upon layers and if the foundations aren't right then everything else is going to fall down: I may get a couple of cards and go through the basics of setting them up.

One of the letters I have received this month comes from Barry Phillips who has a small network running but wants to send email to his colleagues. While I was considering his question, it occurred to me that this might be a better way for me and my team to share each others' files at times, rather than simply saying "It's called snigger1.gif in AntWeb\Blue\Test\Final on Big Boy". So I may also go through the basics of setting up a Microsoft Mail PostOffice on our system in the near future and tell you how we get on.

I have most probably apologised before about spending a lot of time talking about Microsoft products like NT and so on, but the simple fact is that

SAPS — SpartaCom Asynchronous Port Sharing kit

■ *The package reviewed here is the SAPS kit containing one server and five client licences.*

The way this product works is that it establishes a modem as a shared resource on the server and is accessed via the addition of a com port re-director on the clients. This version of SAPS supports either a single Windows NT or Windows 95/3.x server and five clients which can be either NT, Windows 95, Windows or DOS. SAPS supports all NetBIOS protocols such as TCP/IP, NetBEUI and IPX. I chose to install the server on a 133MHz Pentium running Windows NT Workstation 4.0 with 64Mb RAM and the client on a 100MHz Pentium running Windows 95 in 32Mb RAM, connected via thin Ethernet.

The first task was to remove the 28.8Kbps US Robotics Sportster which usually runs on the client and install this onto the NT box. Setup is simple apart from having to enter a serial number and software protection key, the only real choice being whether to install the SAPS Server and the SAPS Manager, or just the SAPS Server (I installed both).

Once this has been completed you will be presented with the main SAPS Server screen. Click on the familiar Microsoft share icon at the top of the screen and the Shares window will be displayed. Click New, then enter the new share name and an optional password. I entered Sportster and ignored the password option. I added the available Com port shown and clicked On. And that's it (see Figs 1 & 2, opposite).

The next task was to install the client. You should check to make sure that the client can see the server over the network before installing SAPS. During installation you will again have to enter a separate serial number and software protection key. You will then be asked for the redirection path that will be connected to your new SAPS port. You can set up pools of modems on an NT server to operate with SAPS (it works with NT's Remote Access Services) but as I was only sharing the one modem, I didn't bother.

Next, you must undertake a standard Windows 95 modem install, making sure that you choose auto-detect. This checked Com 1 and Com 2 and then found the modem on the newly installed Com 4. You are then ready to go, simply specifying the modem on Com 4 for any of your dial-up needs (Figs 4 & 5).

The only problems I experienced were initially naming the shared modem in the NT server setup "USR Robotics Sportster", which SAPS did not seem to like, so I changed this to "Sportster" and all was well. The other glitch was that following the autodetect on the client, which found (as it always does with my Sportster) a "standard modem", I changed this to "USR Robotics Sportster" and, despite being able to undertake a complete diagnostics test of the modem over the network from the client, I could not connect to the SAPS Server. I re-installed and this time did not change the modem detected from "Standard Modem": SAPS worked fine, and allowed me to connect to the net from my PC in the same way as if it were attached locally rather than via the network.

SAPS is a simple product, with no frills, which does exactly what it is supposed to. More software should be made this way. The documentation is simple and straightforward: it could do with a troubleshooting section, but that is my only minor criticism. I highly recommended it.

PCW Details

Price SAPS One: NT server plus five clients, as reviewed, £195. SAPS Small Office (not NT): one line plus five clients £115; two lines plus five clients £165; two lines plus ten clients £210. SAPS Server for Windows NT: £535 for 256 lines/users. (All prices ex VAT)

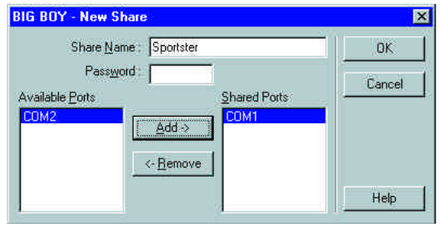
Contact Icon Technology 0181 357 3600. Email icon@icon-plc.co.uk. Web www.icon-plc.co.uk

Good Points Simple to install and use.

Bad Points None.

Conclusion The ideal product if you want to share a single modem in a small office with a minimum of fuss. Buy it now and save yourself a lot of hassle.

★★★★★



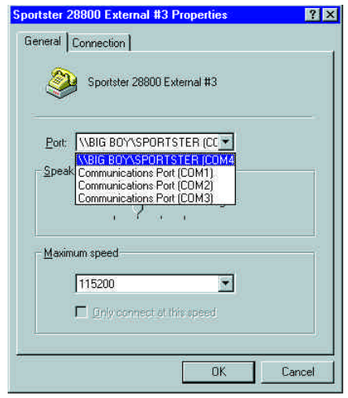
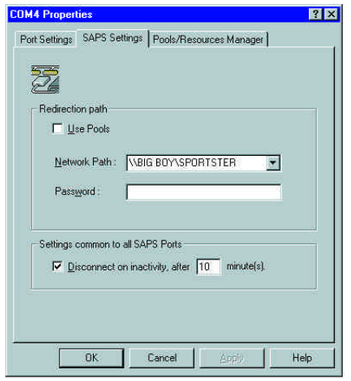


Fig 1 (top) Using SAPS Server Manager to establish a new shared Com port on NT Workstation 4.0

Fig 2 (above) Connecting to the shared modem on the SAPS server from the client workstation



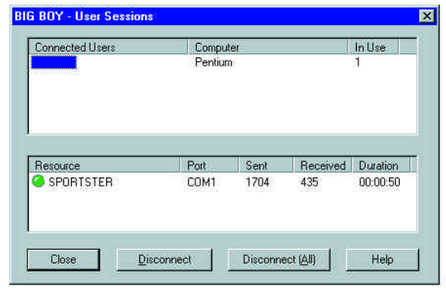


Fig 3 (below, top) The modem seen as a shared network resource from the client

Fig 4 (below, bottom) The SAPS Server Manager shows the activity of any open sessions

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there's a lot of Bill's software out there and it seems sensible for me to write about what you are likely to be using. And, although I occasionally use NetWare for testing, I never, ever touch OS/2 in any shape or form. Sorry.

So last month, having shared the printer using the Intel Netport Express PRO/100 Print Server and then having shared a single modem using SAPS this month, the next may well involve my setting up an internal email system using MS PostOffice and Exchange.

Or, I might just take my dead fileserver, "Pig", down to the beach and set fire to it. We like burning things in Sussex. (Ever been to the Lewes Bonfire Festival? You should go, it's great.) Or there again, I may just change my mind. On the other hand...

Booking in

Q. *"Could point me in the right direction regarding the connection of two PCs I have at home? I know I can use a Null Modem cable (and have successfully done so) but I want to try using network cards and cables. Can you suggest any FAQs or good books on the subject?*

"By the way, is it possible to connect WFWG to a machine with Win95?"

Sanjay Patel

A. A reasonable book is *Nets and Intranets with Win95* by HD Radke (ISBN 1-55755-311-4), published by Abacus. Don't worry about "Intranets" being part of the title; it is much more about basic Win95 networking fundamentals, although you might find something just as good, or better, in your local book store.

I am not too hot on FAQs and newsgroups but a bit of net surfing might reap rewards. But be warned: I have found some stuff on the net which is just plain wrong. And yes, it is possible to connect a WFWG (Windows for Workgroups) machine to a Win95 machine. I do it all the time.

Exchange and start

Q. *"I have a LAN consisting of four computers running Windows 95. We can access one another's hard drive but that's all we can do between us. Is it possible to send memos, etc, to each other? Do we need particular software to do this?"*

Barry Phillips

A. As you will already have gathered, my approach to networking is KISS (which stands for "Keep It Simple, Stupid") even though the rest of my life seems amazingly complicated, so I would suggest that if you are running Windows 95 you use the basic tools that come with it and see how they work for you. If you really find that you need something more, then start looking around.

Every copy of Windows 95 comes with Microsoft Exchange which you can use for sending email to your colleagues or for sending faxes. However, I must confess that I only use it for the latter because I find it easier and far more satisfying to shout at my colleagues and/or write things down on bits of paper (…and then promptly forget about them!). But seriously, I reckon that you will find Exchange is reasonably easy to install and use.

A simple way to check whether or not Exchange is installed on your machine(s) is to see whether the Inbox icon is on your desktop; if it isn't, then it isn't, if you see what I mean.

It may well be that when you go into Exchange, you can only see Fax services. If this is the case, you will have to go into Control Panel, Add Remove Programs, Windows Setup, Microsoft Exchange and check Microsoft Mail Services.

However, before you do all the Exchange setup, you will have to set up a Microsoft Mail PostOffice. But this is fairly simple to do: go into Control Panel again, choose Microsoft Mail PostOffice and set up a new post office. Of course, the machine with the post office on it will need to be on all the time and will have a slightly heavier load than the other PCs in your organisation, but this shouldn't cause too much of a problem.

Once you have Mail and Exchange up and working, you can set up a Memo template in Microsoft Word (I am assuming that you are using Office like 95 percent of the rest of the world) then simply send these Memos to whoever you like, using the Send or Routing Slip option that you will find on Word's File menu.

As I say, there are other mail programs on the market, but as the Microsoft one is there, why not use it?

PCW Contact

Mark Baynes is a web developer and IT journalist based in Brighton. He can be contacted by post at the usual *PCW* address, or via email at networks@pcw.vnu.co.uk

Speed reading

Put aside that “mine’s faster than yours” attitude when comparing the PowerPC and the Pentium and put some zip into your Mac’s performance. Howard Oakley shows you how.

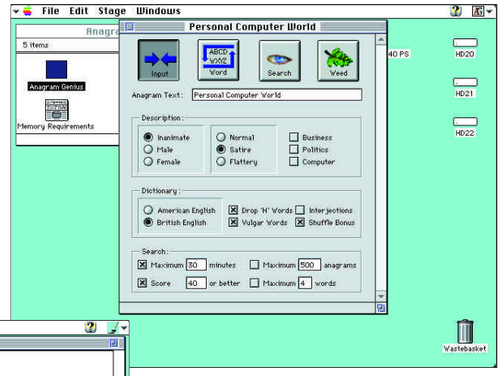
PowerPC processors can be amazingly quick. A friend, whose computer research programs take days to run even on high-end workstations, recently chose to buy a box containing 64 PowerPC processors instead of a supercomputer. Clock for clock, 604 models are quicker than the 601, which are in turn quicker than 603 chips. Those with larger on-chip cache memory and distinguished by an “e” suffix are quicker than those without.

Unless you have a high-end workstation, the internal bus and memory will not be running at anything like the speed of the processor. This is because components which work reliably at high clock-speeds are prohibitively expensive and results in Apple using tricks to match different speeds. This limits the maximum speed to which you can upgrade, but at least you know you will be able to afford the upgrades. This is where Level 2 cache comes in, to provide a faster-than-memory store to allow a very fast processor to access data from slower main memory. Level 2 cache becomes increasingly important as performance rises. A 60MHz PPC601 (the original Power Mac 6100) may get a 10-15 percent speed improvement with as little as 256Kb of Level 2 cache, and little more with larger sizes. Faster PPC604 machines should have at least 512Kb if not 1Mb of Level 2 cache.

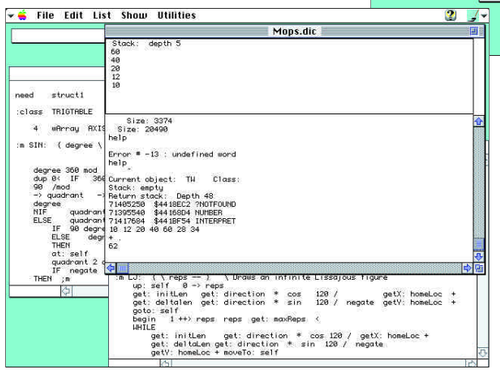
While my friend is getting value for money from his multi-processor system, most Mac users will be unable to discern any difference between single and multiple PowerPC hardware. Until we hear the strains of Rhapsody (this month’s variation on the Mac OS 8 theme) a lot louder and closer, a limited range of applications will be able to do much with a second processor.

All these years after the first Power Macs, it may seem extraordinary that parts of the Mac OS System sofware have still not been ported to run native on PowerPC Macs. Thankfully, the remaining unconverted sections are among the less frequently used parts of Mac OS so you will be unlucky to find applications which are much affected. This is a good reason for using the latest version of the System, as the proportion of unported code has been steadily falling with each new release.

Third-party products should be treated with care. You may need to gain experience of an application and its configuration from the documentation before you can tune it for optimal performance. Although you also need to minimise the number of System extensions and control panels in use, you must do so with care so that you do not inadvertently clobber other extensions.



Above **Turning your favourite footballer’s or politician’s name into an anagrammatic travesty is made easy with Anagram Genius. Type in the words to be anagrammed, and the rest is done by your Mac. If you want to find out what “Personal Computer World” creates, you’ll have to buy your own copy**



Left **MOPS is a free but polished Forth development system, capable of generating shrink-wrapped applications. It is just a shame that it does not yet run native on Power Macs**

Tests and measures

Just as you wouldn’t dream of buying a car without a test drive, you should not buy a “serious” computer system before you have had a good session using it. During that time you should try to estimate the system’s performance: don’t just run benchmarking programs like Speedometer, but try out standard tasks using your own application benchmarks. These should not include starting the application up, unless this is something you are likely to do more than, say, once every half hour. Instead, select standard time-consuming tasks such as sorting, searching and printing to disk.

Speedometer can give you insight into specifics of a particular computer’s performance when running highly abstract jobs. Thus it might help you spot deficiencies or problems, such as a slow hard disk. But it cannot tell you whether you will need to make a cup of coffee or a three-course meal while waiting for a job to complete.

Seconds out

Another major issue to bear in mind is that perceived time is very different from actual time. It is easy to demonstrate this if you have an application which provides good feedback during “busy” periods, and one which does not. Hide all clocks and then set each application turn into such a busy period, recording your estimate as to the time you had to wait. Unless your biological clock tunes in to Rugby every couple of hours, you will overestimate the wait incurred by the application with poor feedback, and underestimate that with good feedback. Add that to the fact that your computer spends almost all its time waiting for your input and actions, and the case for the fastest at any cost looks weaker.

Back and Forth

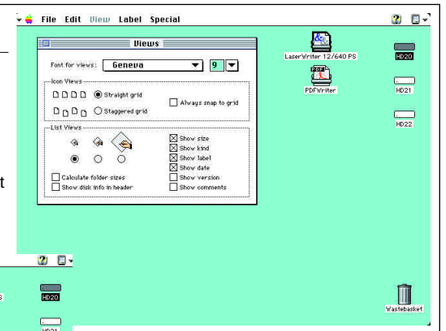
Finally, I want to take you back more than ten years and remind you of a high-performance programming language, Forth. When memory meant 64Kb and hard disks cost a king’s ransom, Forth was commonly used for high-performance real-time systems which had tiny memory footprints. Along came Kriya, who developed an object-orientated implementation for the Mac, sold as Neon. With its demise, they placed the source in the public domain, and it has now blossomed into MOPS, thanks to the loving care of Mike Hore. Although he has not yet completed a Power Mac port, MOPS runs happily in emulation and creates double-clickable applications with real Mac interfaces — free of any cost. Next month I hope to be able to compare it with Power MacForth, a heavyweight commercial implementation.

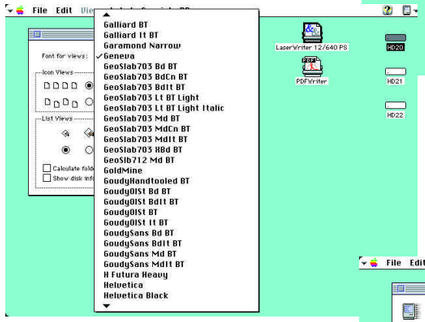
And in case you think this is all anachronism, Apple has just been advertising for Forth programmers, as it is used to program the boot ROM code for the latest Macs, Suns and other modern computers.

How to slow your Mac down

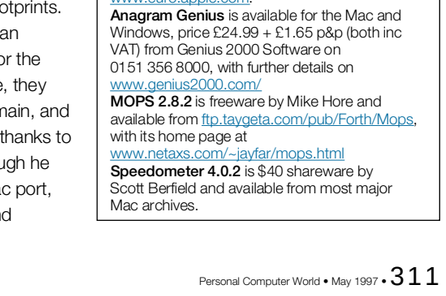
If you’re sure that you want to slow your shiny new Power Mac 9600 down to remind you of halcyon days with a Mac Plus or SE, here are some good ways to do it:

- In the Views control panel, check the box to “Calculate folder sizes”. This makes the Finder painfully slow, as each time it displays a folder in a “list” view, it has to add up the file sizes of every file within the folder. And all its sub-folder...
- Reduce the disk cache (the top item in the Memory control panel) to the smallest possible value. Although you cannot turn it off any more, making it tiny will slow down all disk reading and writing.
- Turn virtual memory (in the Memory control panel again) on and run an application like Adobe Photoshop, which operates its own virtual memory scheme. In fact, if you are running System 7.5.3 or earlier, you won’t even have to use Photoshop, as everything drowns in the treacle of Apple’s old virtual memory. So retrograding to System 7.5.3 could be worth thinking about too.
- Run all your applications with the bare minimum of memory allocated to them.
- Fill your System folder with extensions and control panels, especially if they do not run native on the Power Mac — old 68K extensions can be ideal for soaking up those spare processor cycles. Don’t allow Extensions Manager to turn any off, either.
- Add more fonts than you could ever recognise, let alone use. Then every application and utility which contains a Font menu will have to spend ages putting the list together.
- Use LocalTalk rather than Ethernet networking. Because of physical limitations, the cheaper and simpler LocalTalk networking system is about ten times slower than Ethernet, so moving a few big images around will freeze two Macs at a time.
- Use the 68K Mac version of all applications rather than the latest PowerPC native version. Although the 68K emulator is wickedly quick, it is slow by comparison with a good native port to the PowerPC.





Above **Check to “Calculate folder sizes” to spell doom for the Finder’s speed**
Left **Adding lots of unused fonts to the System folder** Below **The Memory control panel has enormous influence on speed through each of its setting**



PCW Contacts

Howard Oakley is keen to hear from Mac users and can be contacted via the usual *PCW* address or at mac@pcw.vnu.co.uk
Apple Computer is on 0181 569 1199 and has web home pages at www.apple.com and www.euro.apple.com.
Anagram Genius is available for the Mac and Windows, price £24.99 + £1.65 p&p (both inc VAT) from Genius 2000 Software on 0151 356 8000, with further details on www.genius2000.com/
MOPS 2.8.2 is freeware by Mike Hore and available from ftp.taygeta.com/pub/Forth/Mops, with its home page at www.netaxs.com/~jayfar/mops.html
Speedometer 4.0.2 is $40 shareware by Scott Berfield and available from most major Mac archives.

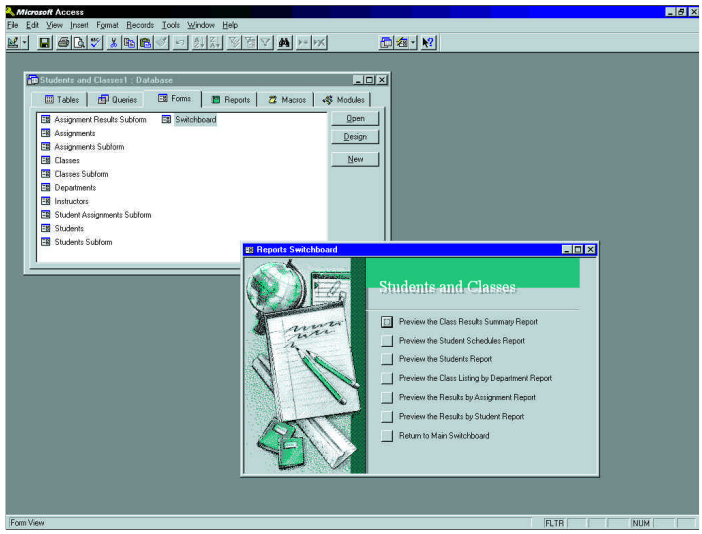
Database basics

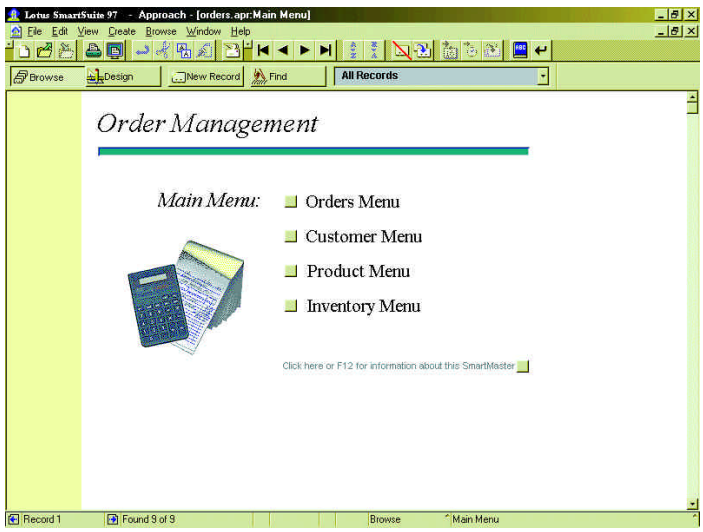
If you understand a manual filing system, you're half way to understanding databases. Eleanor Turton-Hill explains, and shows that they are not as daunting as you might expect.

If you're new to computers, databases can seem complex and daunting, but they're easier to learn now than ever been before and once you've got to grips with a few basics, you'll realise how simple it is to put your own personal database together. So here are a few general guidelines to get you started.

A database is essentially nothing more than a computerised record-keeping system. If you've worked with a manual filing system, you'll already understand most of the basic concepts. That is, you know how to add a new file, how to throw away an old one and how to update an existing one. You'll also have some kind of indexing system which allows you to retrieve files and some key information, letting you cross-reference from one filing cabinet to another. If you understand all of this, you're half way towards understanding how to create your own database.

Over the years, there have been many different ideas about how data should be organised so that it can be accessed most efficiently. At present, the relational model is the most popular and the vast majority of database management packages currently on the market are based on this model.





Microsoft Access (left) and Lotus Approach (below, left) both contain pre-prepared database solutions complete with their own forms, hierarchical menu systems and reports

Records and fields

When it comes to setting up a database on your computer, there are a few essential terms you need to know. Firstly, each unit of information you create is called a "record" and each record is made up of a collection of "fields". Typically, a single record consists of a set of field names like: Title, FirstName, Surname, JobTitle, TelNo and ID.

When you've filled in all the relevant information for each field and saved it, a new record is added to the file. Some database management systems, such as Lotus Approach, come with a selection of fields already set up, but most systems require you to define your own fields.

Firstly, a field can be of any specified length, which makes sense as some fields will contain far more data than others. Secondly, you must decide on the type of field you want to create. There are many different data types, but the basic two are "text" and "numeric". Text fields can hold letters and numbers whereas numeric fields can only hold numbers.

If you're not used to database concepts, this seems slightly strange. After all, if you can store numbers in a text field, what's the use of a numeric data type? The answer is simple. Many numbers stored in a database are not actually used as numbers at all — that is, they are not used to perform any numeric calculations. Telephone numbers are the obvious example. They sit on your database next to a particular name or company, and are referred to in the same way as any textual information. Lists of accounts figures are different in nature and may well be used in calculations and reports. Numbers which are used in this way must be stored in numeric fields.

Other types of fields to look out for include memo, graphic, data, and binary. A memo field is a long text field which allows you to attach additional notes to a record. Date fields can be used to pick up the current date from your system at the time the record is created. The most interesting field types however, are graphic and binary for storing pictures and sound. These field types have been around since the first Windows database came onto the market but have not been widely used until now because of the heavy demands they make on your system resources.

The need for more powerful and flexible data models to support unconventional

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non-business applications has led to extended relational data models in which different types of data can be stored; programs, text, or any kind of unstructured data in the form of binary large objects.

Indexes

Once you've defined fields in each table, indexes must be created to help the database find specific records and sort records faster. An index in a database performs the same function as in the back of a book or in a library. The fields you choose to index should be those which you use repeatedly to search for data. For example, if you regularly search your database by surname, the index should be defined on this field to speed up the searching process.

In addition to commonly searched fields, there should also be at least one index in each database file which has been set up on a unique field, that is a field in which the data stored in each record is different to all other records. With a unique index set up, you will always have a way of identifying a record uniquely.

Linking tables

Identifying records uniquely is essential when it comes to linking files together. Two database files can be related or joined as long as they they hold a piece of data in common. A file of employee names, for example, could include a field called "DEPARTMENT NUMBER" and another file, which contains details of the department itself, could include the same field. This common field can then be used to link the two files together.

Most database packages will allow you to link two files, provided the chosen fields are of the same length and the same type — but not necessarily of the same name.

Queries

Extracting information from a database is known as performing a query and most database management systems feature a separate query program which allows the user to design intricate queries and produce on-screen or paper print-outs of the results.

On an employee database, a query program would provide a filtering facility which allows the extraction of any selection of records, for example all employees in a certain department, or all employees with salaries over a certain amount. Most database packages also allow you to perform queries which link data from different files and perform calculations.

Access97 has enhanced its help system with the Office Assistant which pops up when you need some guidance. You can ask the Assistant questions, using natural English sentences

Relational integrity

The word "integrity" can apply to many different aspects of an RDBMS (relational database management system) but the two most important are referential integrity and domain integrity. The idea of integrity in a database refers to the consistency of all aspects of stored data. For a database to be truly relational, certain principles should be maintained. The definitive set of rules for a truly relational database were laid down in IBM's research laboratories by Dr Tedd Codd in the seventies.

Altogether there are 12 of these rules and in theory, each of these must be fulfiled in order for an RDBMS to qualify as a fully relational system. In practice, none of the databases included in this round-up would qualify as "relational" in Codd's rigorous sense but there are certain basic integrity functions which should be provided in a database management system.

Domain integrity refers to the accuracy of data in individual fields. Most RDBMS systems should allow you to place conditions on the specific format of data entered in individual fields. Phone numbers, postcodes, and N.I. numbers, for instance, each have their own formats and a database system which has domain integrity will allow you to enforce that the values entered in these fields comply with the pre-defined format. Referential integrity is to do with the co-ordination of data between two or more tables. The tables in a database are linked by way of a key field which is specified in the file definition. When a large number of tables have been created and linked together, the relationships between them can become complex. But generally, there are two types of link which can be made: a one-to-one link, or a one-to-many link. Referential integrity refers to the way that data is synchronised in a one-to-many relationship.

In a typical company database, information on departments will be put into one table and information on employees put in another. There are many employees in one department. But suppose that a department becomes defunct. To delete that department from the database would leave "orphaned" employees in the employee file. But a database which supports referential integrity will ensure that links between groups of records in different files maintain consistency.

Learning more...

Most database packages have become more sensitive to the needs of the user by including learning tools and "wizards". Microsoft's wizards have been designed to take you through common database tasks, step-by-step on your own live data. There are comprehensive help facilities available, too, which explain all aspects of database design and implementation.

PCW Contact

Eleanor Turton-Hill welcomes feedback and suggestions from readers.
Email beginners@pcw.vnu.co.uk

No-nonsense **Buyer's Guide**

Buying a **PC**

The one universal rule is that PCs get cheaper, better and faster all the time. The result is that your state-of-the-art PC can become outdated and old-fashioned in a couple of years. It may still work perfectly well, but it probably won't run very fast and won't run the latest software. If you're just planning to do simple word processing, this may not matter. But we're assuming here that you want to buy a general-purpose multimedia PC that can play games, use CD-ROMs and run a range of modem software.

Buying Don'ts

- Don't buy a machine with less than 16Mb of memory if you plan to run Windows 95.
- Avoid cheap 14in monitors.
- Bundled 14.4Kb/sec modems are not the bargain they seem. Opt for 28.8Kb/sec or one of the new 33.6Kb/sec modems when they become available.

Buying Do's

- You can never have too much disk space. Spend extra cash on buying the next largest hard-disk size.
- Make sure Pentium motherboards have an Intel Triton chipset; either 430HX or 430VX.
- Check the warranty. Is it for on-site or back-to-base repairs? If it's on-site, does the manufacturer offer guaranteed response times?
- Check the technical support. Is it free? Is it easy to contact?
- For home use, you'll probably want full multimedia capabilities to enable you to use CD-ROM games and edutainment products and play video clips. This should include at least a 16-bit SoundBlaster-compatible sound card and speakers.
- Think about ordering more memory. RAM prices are low at the moment but creeping up — you can pick up 16Mb of EDO RAM for around £100 or less

Upgrading memory to 32Mb is also the quickest way to improve the performance of your machine — often more so than upgrading your processor.

- Look at the software bundle. If you want an office suite, it is far cheaper to buy it as part of the bundle. Larger manufacturers can offer MS Office, for example, at about one third of the recommended retail price. Multimedia CD-ROM bundles will not include the UK version of Encarta 96: Microsoft only allows the US version to be bundled.

Other things to consider

PCs have become similar in the last few years. The days when smallish computer companies designed their own chipsets (the chips that assist the computer's main processor) are long gone. Most small box-shifters buy their motherboards from Taiwanese manufacturers. Larger companies either design motherboards themselves (Apricot, Compaq, IBM) or get motherboards built by other companies to their specifications (Gateway).

Cyrix chips are worth considering. Their 6x86 chips, such as the P133+, are often cheaper and give better performance than their Intel counterparts.

If you are serious about multimedia, it may be worth upgrading your sound card to a 16-bit wavetable card. A six-speed CD-ROM drive will give you a noticeable performance gain over a quad-speed, but the speed increase of an eight-speed over a six-speed is less tangible. Remember that, unlike your hi-fi setup, good speakers are powered from the mains, not from your PC.

**** We assume that any new PC has PCI local bus and a 3.5in floppy disk drive.***

You can read our up-to-date PC reviews in every issue of *PCW*.

PCW Second-hand spec

Buying second-hand or discontinued kit is the cheapest way to get started. This is the minimum spec we think you should choose for general business use, playing games and accessing the internet.

- Windows 3.1 or 3.11
- DX2 66MHz 486 processor
- 8Mb RAM
- Graphics card with 512Kb of memory
- 200Mb hard disk
- 3.5in floppy disk
- CD-ROM drive
- 14in colour monitor

PCW Minimum specification

This is the absolute minimum spec we think you should consider if you're buying a new PC. Suitable for general business use: word processing, databases and spreadsheets, and, with a modem, accessing the internet.

- Windows 95
- 100MHz Pentium processor
- 16Mb RAM
- Graphics card with 1Mb of memory
- 1.2Gb hard disk
- Quad-speed CD-ROM drive
- 15in colour monitor
- PCI local bus

PCW Recommended spec

If you're not strapped for cash, this is the specification we recommend. No-one at *PCW* would settle for less.

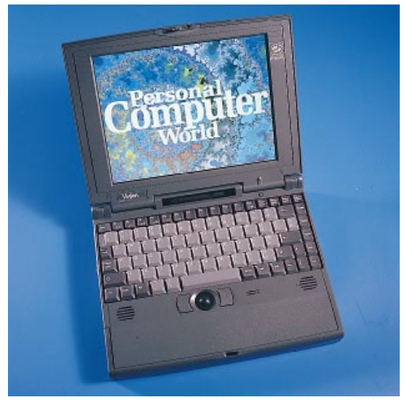
- Windows 95 or Windows NT 4.0
- Pentium or equivalent 166MHz processor (a fast processor will make your computer run quicker and more smoothly)
- 256Kb secondary cache
- 32Mb EDO RAM
- Graphics card with 2Mb of memory
- 2Gb hard disk — modern computer software takes up a lot of space
- Six-speed CD-ROM drive (video clips will play more smoothly and you will be able to access files on CD-ROMs more quickly)
- 17in colour monitor
- 16-bit SoundBlaster-compatible sound card

PCW Best specification

This is as good a PC as you are likely to need for most software. For some specialist applications, like professional DTP or CAD, you may need even more memory, a bigger hard disk, a more powerful graphics card or a larger monitor.

- Windows 95 or Windows NT4.0
- Pentium 200MHz MMX or Pentium Pro
- 512Kb secondary cache
- 32Mb EDO memory
- 4Gb hard disk
- Eight-speed CD-ROM drive
- 17in colour monitor
- 4Mb VRAM or WRAM graphics card (this means your graphics card can display more colours and at a higher resolution on your monitor: 16 million colours at a resolution of up to 1,280 x 1,024
- 16-bit wavetable sound card

Buying a **Notebook**



Notebooks are one area in which it's often safer to stick to brand names. Not that some of the Far Eastern kit doesn't work perfectly well, but reliability seems to be a problem and it can be fiendishly difficult to obtain spares. A useful guideline when choosing a notebook is: try before you buy.

Remember that standard notebook specifications are generally a step or two behind the desktop equivalents.

What to look for in a notebook

- **Pointing device** There's been a wholesale move from trackballs to trackpads. Some notebooks, notably IBM Thinkpads, use stick technology (a device which looks like the rubber on top of a pencil and is controlled using one finger).
- **CD-ROM drives** These are rapidly becoming standard in notebooks. If your notebook is going to be your only machine, it's worth getting one.
- **Floppy disk drive** Often there's a choice between a CD-ROM drive and a floppy disk drive. If the notebook is to be your only machine, make sure the CD-ROM drive and the floppy can be used simultaneously.
- **PC Cards** Modern notebooks all have at least one PC Card slot. They take credit card-sized expansion cards which add a fax-modem, a network interface card or even an extra hard disk to your computer.
- **Battery life** Battery life varies from as little as 30 minutes to over six hours. Lithium Ion and Nickel Metal Hydride batteries have now replaced the older NiCad (Nickel Cadmium) batteries.
- **TFT screens** TFT or active matrix screens are replacing the slower dual-scan or passive matrix screens. It means the screen image is refreshed far more quickly.
- **Warranty** Drop a notebook and it may break, so it is vital to check the terms of your warranty. How long is it? What level of service is provided?

PCW Minmum specification

Notebooks change quickly. It's possible to pick up end-of-line machines with Pentium processors from brand-name manufacturers like Toshiba and Compaq at discounted prices of £1,000 or less. These can be a very good buy. Just make sure they can run the software you need to use.

PCW Recommended spec

- Windows 95
- Pentium
- Quad- or six-speed CD-ROM drive
- 256Kb secondary cache
- 16Mb RAM
- On-board graphics with 1Mb of memory, PCI local bus
- 850Mb hard disk, 3.5in floppy disk drive and/or dual-speed CD-ROM drive
- TFT 800 x 600 screen

PCW Best specification

The state-of-the-art notebook: either you're loaded, or your company's picking up the tab.

- Windows 95 or Windows NT
- Pentium
- 256Kb secondary cache
- 32Mb RAM
- On-board graphics with 2Mb of VRAM memory, PCI local bus
- 1.2Gb hard disk
- 3.5in floppy disk drive
- Eight-speed CD-ROM drive
- Active matrix 1,024 x 768 TFT screen
- Long battery life

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No-nonsense Buyer's Guide

Glossary of computing terms

A

Access time
The time it takes for a device to access data. The access time, quoted in milliseconds (ms) for hard disks and nanoseconds (ns) for memory, is usually an average as it can vary greatly. Together with the transfer rate, it is used to gauge the performance of hard disks and other devices. The lower the number, the better the performance.

Applications
An application, or package, is one or more programs used for a particular task. For example, word processing, invoicing or spreadsheeting. Applications are bought shrink-wrapped (wrapped in cellophane for general use) or custom-built for specific uses.

ASCII (American Standard Code for Information Interchange)
Usually a synonym for plain text without any formatting (like italics, bold or hidden text). Since computers naturally use binary rather than Roman characters, text has to be converted into binary in order for the processor to understand it. ASCII assigns binary values to Roman characters. RTF, a Microsoft standard, adds extra formatting features to plain ASCII.

B

Backwards compatible
Compatibility of hardware or software to older versions of the product or standard.

Baud rate
The amount of data that can be sent along a communications channel every second. In common usage, it is often confused with bits per second. These days modem speeds are normally measured in bits per second. (See V and Bit).

BIOS
Basic Input/Output System. Software routines that let your computer address other devices like the keyboard, monitor and disk drives.

Bit
Binary digit, the basic binary unit for storing data. It can either be O or 1. A Kilobit (Kbit) is 2^{10} (1,024 bits); and a Megabit is 2^{20}, which is just over a million bits. These units are often used for data transmission. For data storage, Megabytes are more generally used. A Megabyte (Mb) is 1,024 kilobytes (Kb) and a Kb is 1,024 bytes. A Gigabyte (Gb) is 1,024Mb. A byte (binary digit eight) is composed of eight bits.

Bug (See Crash)

Boot
Short for bootstrap. Refers to the process when a computer loads its operating system into memory. Reboot means to restart your computer after a crash, either with a warm reboot (where you press CtrlAltDel) or a cold reboot, where you switch the computer off and back on again.

Bus
A "data highway", which transports data from the processor to whatever component it wants to talk to. There are many different kinds of bus, including ISA, EISA, MCA, and local bus (PCI and VL-bus).

C

Cache (See Memory)

COAST
Cache On A Stick.

CD-ROM
A CD-ROM is the same as a normal audio CD, except it can store data as well as sounds. A CD-ROM player can be attached to your computer to read information from the CD-ROM into the computer's memory in the same way that a domestic CD player reads information from the CD into your hi-fi. The advantage of distributing information on CD-ROM rather than other media is that each one can hold up to 680Mb of data — equivalent to some 485 high-density 3.5in floppy disks. The disadvantage, however, is that you can only write once on CD-ROMs, yet this makes them ideal for archiving.

CISC (See **RISC**)

CPU
Central Processing Unit. Normally refers to the main processor or chip inside a PC. (See Processor.)

Crash
Common term for when your computer freezes. Can be caused by a power surge, a bug (which is a fault in software) or a GPF.

D

DRAM (See Memory)

DOS (Disk Operating System)
Once the standard operating system for PCs, it is now being replaced by Windows 95 and Windows NT.

DPI (Dots Per Inch)
Common measure of the resolution on a printer, a scanner or a display.

Drive controller card
An expansion card that interprets commands between the processor and the disk drives.

Drivers
Pieces of software that "drive" a peripheral. They interpret between the computer and a device such as a CD-ROM. If you have a SCSI CD-ROM drive connected, you will be able to use it on a PC or a Mac just by loading up the relevant driver on each machine.

E

EIDE (See IDE)

EISA (Extended Industry Standard Architecture)
A bus standard designed to compete with MCA. Now being replaced by PCI.

Electronic mail (E-mail, email)
Still the biggest single use of the internet. When you sign up with an ISP you are given an email address. Usually you can incorporate your name, or part of it, into your email address to make it easy to remember.

Expansion card
Circuit boards that fit inside PCs to provide extra functionality. For example, one might be an internal modem, providing the same functions as an external version (which is more common) but sitting inside the PC. Expansion cards are designed to be fitted and removed by people with little knowledge of PCs.

F

Floppy disk drive
Practically all PCs come with a floppy disk drive. 3.5in HD (high density) 1.44Mb floppy disks are now the standard. They come in hard plastic cases and have replaced the older, literally floppy, 5.25in disks.

Fonts
A font is an alphabet designed in a particular style. Fonts apply to both screen and printed letters. TrueType and Type 1 fonts are stored as shape descriptions, scalable to any size.

Format
To wipe a floppy or hard disk in order to prepare it to accept data.

G

GPF
General protection fault.

Graphics card
An expansion card that interprets commands from the processor to the monitor. If you want a better, higher-resolution picture or more than your existing setup, you'll need to change your graphics card and/or your monitor.

GUI (Graphical User Interface)
(See Windows)

H

Hard disk
Sometimes called a fixed disk, hard disks are hermetically sealed rigid disks able to store data and programs. Disk capacities increase all the time. The standard is now 1Gb but disks of up to 9Gb are available.

Hardware
All electronic components of a computer system, including peripherals, circuit boards and input/output devices.

HTML (Hypertext mark-up language)
The standard language used in the creation of web pages, which can be read by web browsers.

I

IBM-compatible
Originally meant any PC compatible with DOS. Now tends to mean any PC with an Intel or compatible processor capable of running DOS or Windows.

IDE
Integrated drive electronics. A

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control system designed to allow computer and device to communicate. Once the standard for PC hard disks, now being replaced by EIDE (enhanced IDE) which offers improved performance and extra features.

Internet
Millions of computers interconnected in a global network.

Internet Service Provider
ISPs provide access to the internet. You use your modem to dial the ISP's modem. The ISP has a high-bandwidth permanent connection to the internet.

IRDA
Infra-Red Data Association. The standard for exchanging data using infra-red, typically from PDAs or notebooks to a PC or printer.

ISA (Industry Standard Architecture)
This was the original bus architecture on 286 PCs. Also known as the AT bus (the 286 was known as the AT), it is still in use today. Slow by modern standards, but so widely accepted that expansion cards are still made for it. (See EISA, PCI.)

ISDN (Integrated Services Digital Network)
Offers significant advantages over analogue telephone lines. It can handle multiple transfers on a single connection and is faster. In the UK, however, costs of installation and rental are still high.

J

JPEG (See MPEG)

K

Kbit (kilobit), Kb (kilobyte)
(See Bit)

L

LAN (Local Area Network)
(See Network)

Local Bus
PCI (Peripheral Component Interconnect), developed by Intel, is now the standard for local bus architecture. It is faster than the older VL-Bus (Video Electronic Standards Association local bus) it replaces.

M

Macintosh (Mac)
A personal computer made by Apple and which is incompatible with PCs. Developed as a rival standard, its operating system looks like Windows but pre-dates it and (in some people's view) looks and works much better.

Maths co-processor
A specialised chip that handles mathematical calculations (floating point operations) for the processor. Modern processors such as the Pentium have a co-processor built into them.

Mbit (megabit) (See Bit)

Mb (megabyte) (See Bit)

MCA
A type of bus designed by IBM to beat EISA. Although faster, it never became popular because every machine that used it had to pay a royalty to IBM, and because it was not backwards-compatible with ISA.

MPEG (Moving Picture Expert Group)
A standard for compressing video available in several flavours: MPEG 1, MPEG 2, MPEG 4. JPEG (Joint Photographic Expert Group) is a standard for still image compression.

Memory
The term normally refers to RAM (Random Access Memory). This is the kind that disappears when you turn off your computer and is much faster to access than a hard disk. It acts as a staging post between your computer's hard disk and its main processor.

- **DRAM (Dynamic Random Access Memory)** This requires its contents to be replaced every 1/1000th of a second and is the most common form of memory in PCs.
- **SRAM (StaticRAM)** Retains memory until the power is switched off.
- **VRAM (VideoRAM)** Faster than DRAM, this is used by graphics cards.
- **EDO (Extended Data Out RAM)** The latest type of memory. Offers improved performance.
- **Cache memory** Temporary memory set aside to store the information that is accessed most frequently. The Pentium processor has 8Kb of in-built cache. This can be further speeded up by a secondary cache, typically 256Kb. Part of your DRAM is often used to cache your hard disk.
- **ROM (Read-Only Memory)** A type of memory which can only be read: you can't make changes to it as you can to RAM. It is commonly used for things that will never need to be changed, such as the information the computer requires when you start it up.

MMX (Multimedia extensions)
(See Pentium)

Modem
The word is a contracted version of "modulator/demodulator", which means that a modem is a box (or, less commonly, an expansion card) that lets your computer talk over phone lines to other computers.

Monitor
Your computer's screen. Signals are sent to it from the video card.

Motherboard
The main printed circuit board which houses processor, memory and other components.

N

Network
A network is a group of computers linked together with cable. The most common form is a LAN (Local Area Network), where electronic mail and other files can be exchanged between users without swapping floppy disks. Printers and other resources can be shared. All the PCs on a LAN are connected to one server, which is a powerful PC with a large hard disk that can be shared by everyone.

O

OS (Operating System)
The operating system communicates with the hardware and provides services and utilities to applications while they run, such as saving and retrieving files.

P

PC Card
Formerly PCMCIA. A standard to allow PCs, particularly notebooks, to be expanded using credit-card sized cards.

PDA (Personal Digital Assistant)
Small electronic organisers. The Psion 3a is a typical example.

PCI (See Local bus)

PCMCIA (See PC Cards)

Package (See Application)

Parallel ports
Used by your PC to communicate with the outside world, usually via a printer. Information can travel in parallel along a series of lines, making it faster than serial ports which can only handle one piece of information at a time.

Pentium
Fast 32-bit processor with a built-in 16Kb cache. Now the standard on PCs. It is about to be replaced by the Pentium MMX chip which has extra instructions and a 32Kb cache. The Pentium Pro is a higher-end workstation CPU with 256Kb cache meant for full 32-bit operating systems such as Windows NT.

Pixel
Picture element. The smallest addressable dot displayed on a monitor.

PowerPC
This family of RISC chips is the result of a collaboration between IBM, Apple and Motorola. It is now used in all Apple Macintosh computers and many IBM workstations.

Processor
The chip that does most of a computer's work.

Programs (See Applications)

Public domain
Software that is absolutely free. The author usually retains the copyright but you can make as many copies as you want and pass them to other people. "Public domain" software is often confused with "shareware".

Q

QWERTY
The name of a standard English-language keyboard, derived from the first six letters in the top row. The French equivalent is AZERTY.

R

RAM (Random Access Memory)
(See Memory)

Reboot
(See Boot)

RISC (Reduced Instruction Set Computing)
These are starting to replace CISC (Complex Instruction Set Computing) as they're usually faster. The PowerPC chip is a typical example.

ROM (Read Only Memory)
(See Memory)

RTF (Rich Text Format)
(See ASCII)

S

SCSI
Small Computer System Interface is a bus that comes as standard in a Macintosh and is starting to rival EIDE on PCs.

Serial port
Serial ports (com1 and com2) are used by your PC to communicate with the outside world. Serial ports are mostly used by modems and similar devices which communicate quite slowly. Faster communications are achieved via the parallel port.

Shareware
A method of distributing software. It is freely available, but not free of charge. You are honour-bound to pay a small fee to the software's developer if you continue to use the program after a set period.

SIMM (Single Inline Memory Module)
The standard modules for memory expansion on PCs. Older 30-pin SIMMs have now been replaced by the 72-pin variety available in capacities up to 16Mb.

T

Tape streamer
Magnetic tape recorder for backing up data from a hard disk.

U/V

UART (Universal Asynchronous Receiver Transmitter)
Pronounced "you-art". A chip that allows your PC to cope with high-speed communications.

(…Glossary continued on p334)

How to choose an ISP

There are now over 100 Internet Service Providers, which makes selecting the right one a difficult task. Competition between them is so fierce that many are happy to offer prospective users a month's free trial.

All ISPs (Information Service Providers) allow you to send and receive internet email, browse the web and download files from internet servers. But there are differences between the extra services that each provides.

Large, centralised, online services like AOL and CompuServe offer discussion areas and specialised content like online magazines and searchable file libraries, and are easy to use. However, they are not the fastest way of accessing the web.

Some ISPs charge a flat-rate for internet access while others charge extra if you exceed a specified number of hours online.

The quality of the software and technical support provided also varies. In general, the big "consumer" ISPs offer better support and more commercial software. The smaller, more basic operations often offer cheaper deals.

Some ISPs are more geared up to business users who may need a fast ISDN connection and/or require the service provider to host or even design web pages for them.

Your chosen ISP can have a big effect on the performance of your internet connection, particularly access speed to US sites. Relatively few ISPs provide local call access to anywhere in the UK. In London you'll have plenty of choice, but in the west of Scotland, say, the choice will be limited.

PCW Recommended products

Big, commercial ISPs which are not cheap but are easy to use, with plenty of extra services thrown in: **CompuServe 0800 289378; AOL 0171 385 9404**

Barebones service which is not for beginners but it does make your PC a full internet node in its own right: **Demon 0181 371 1000**

Another established service provider worth considering: **Easynet 0171 209 0990**

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Buying a **Printer**

There are two main types of printer: laser and inkjet.

Lasers

Most office printers are lasers. They work much like photocopiers, and are cheap to run and print quickly. The disadvantage is the higher initial cost and mono output. Laser printers are available in all sizes and at all prices. Small desktop printers cost as little as £300. You can buy colour laser printers but they are still expensive, typically £5,000 or more.

Types of laser

PCs print by sending a description of the page to be printed down a printer cable. There are three commonly-used page description languages (PDLs):

● PostScript
This sends an outline in vector form (see Drawing Software) to the printer where it is rasterised (converted into dots) and printed to the device's best ability. PostScript is device-independent so the image looks the same on a monitor (75dpi), a laser printer (300dpi) and a professional image-setter (2,400dpi).

● PCL (Printer Control Language)
Hewlett-Packard's alternative to PostScript, licensed to many clone-printer manufacturers. Printers using PCL tend to be cheaper than PostScript ones, but output will vary from one machine to another, making it less well suited to professional use.

● GDI (Graphical Device Interface)
These printers download the description of your page already used by Windows straight to your printer. They only work with Windows but are cheap and fast. They are only suitable for a personal printer and will not work across a network.

PCW Recommended products

- **Cheap lasers** Brother HL 730: **Brother 0161 330 6531**. £270
  Sharp JX9210: **Sharp 01753 819819**. £209 (see *PCW* January 1997)
- **Sub-£750 lasers** Hewlett-Packard 5P: **Hewlett-Packard 01344 369222**. (*PCW* November 1995)
- **Network lasers** Hewlett-Packard 5M: **Hewlett-Packard 01344 369222** (RRP: £1,659 ex VAT)

Inkjets

Inkjets work by spraying ink onto paper. There are still some mono inkjet printers available, but it is best to stick with a colour inkjet as the price difference is negligible. They are cheap to buy but more expensive to run, and slower. Even cheap inkjets can print in good-quality colour, especially on high-resolution paper.

PCW Recommended products

Hewlett-Packard DeskJet 870CXi: **H-P 0990 474747**; street price £311.
Lexmark 2070: **Lexmark 01628 481500;** street price £280. (*PCW* November 1996.)

Multi-function devices

For home use and small offices, a hybrid could be the answer. It combines a printer, a fax machine and copying capability in one unit.

PCW Recommended products

Hewlett-Packard OfficeJet: **HP: 0990 474747**. £650. (*PCW* January 97).

Buying a **Scanner**

Scanners are used to import text, graphics or pictures into a PC. They vary from low-cost hand scanners not much bigger than a mouse, to drum scanners costing thousands of pounds. The latter are designed to scan photographic transparencies to professional standards.

Flatbed scanners

The most common type, costing from £300 to over £3,000. They are capable of scanning colour pictures to a high standard. Most have transparency adapters as optional extras.

Document scanners

A new category which aims to combine the reliability of flatbeds with speed and portability. They're intended for OCR and document management. Most will cope with photographs and some with colour, but it's not their forté.

PCW Recommended products

Flatbed scanners

- Intermediate — Epson GTX 9000: **Epson UK 01442 61144;** street price £750.
- Budget — Umax Vista S6E: **IMC 01344 872800;** street price £199 (*PCW* Sept 1996).

Agfa Snapscan: **Agfa 0181 231 4000;** street price £249

PCW Recommended products

Document scanners

Visioneer PaperPort VX: **Computers Unlimited 0181 200 8282;** street price £299.
Logitech PageScan Colour: **Logitech 01344 894300**; street price £299.
Plustek PageReader 800: **Scan Direct 01292 671676;** street price £149 (*PCW* March 1996).

Buying a **Fax Modem**

You'll need a modem to connect to the internet or an online service, such as CompuServe or AOL, and also to send and receive email.

Modems are available in three formats: as PC Cards to plug into notebooks, as external boxes, and as expansion cards. PC Card modems cost the most, and external modems cost slightly more than expansion cards.

Apart from the case and the external power supply, there's often little difference between the internal and external versions of a modem. Most modems now have built-in fax capability, which means you can receive faxes on your PC to view or print out. If you're strapped for cash, a V32bis 14.4Kb/sec modem is just about adequate, although

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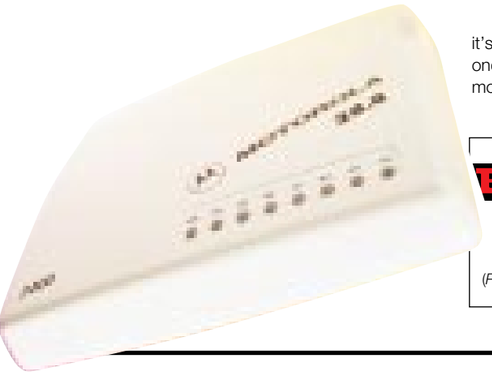


it's better to buy a V.34 28.8Kb/sec modem or one of the new V.34 Plus 33.6Kb/sec modems.

PCW Recommended products

Fax modems

• External — US Robotics Sportster Vi; **US Robotics 0800 225252**; £199. (*PCW* November 1996.)

Buying a CD-ROM Drive

Just about the only things which vary on today's CD-ROM drives are their speed, and means of connection. The most common connection is IDE or Enhanced IDE (EIDE). It is possible to connect an IDE CD-ROM drive to most existing IDE hard disk controllers. Older PCs may need a newer EIDE controller. IDE controllers are also found on some sound cards.

The first CD-ROM drives spun the disc at the same speed as an audio CD and were called single-speed, delivering a sustained data transfer rate of 150Kb/sec. Double-speed drives spun twice as fast, doubling the data transfer to 300Kb/sec, and quad-speeds were twice as fast again, raising the transfer rate to 600Kb/sec. Eight-speeds are the standard (1200Kb/sec), with 12-speeds (and faster) becoming increasingly common. All figures are theoretical maximums. Buyers should go for six-speed or higher. There is little to choose between models, but off-the-shelf supplies are frequently short. Internal IDE sixes start at under £100 and 12-speeds around £130.

PCW Recommended products

CD-ROM drives

Teac CD56-E six-speed: fitted to many new PCs and costing around £85. **Teac 01923 225235** (*PCW* January 1996).
The Goldstar 8X is a good eight-speed choice for around £99. **LG Electronics 01753 691 888** (*PCW* August 1996).

Glossary

(contd. from p331)

V.34 Plus, V.34, V.32bis
A series of CCITT standards that defines modem operations and error correction. There are more than 20, but the key ones are:
• **V.32bis**, the standard for 14.4Kb/sec modems.
• **V.34**, the standard for 28.8Kb/sec modems (see Baud).
• **V.34 Plus**, the new standard for speeds up to 33.6Kb/sec.

VESA (See Local Bus)

VGA
Video Graphics Array is the name given to a popular display. VGA graphics have 640 pixels horizontally and 480 vertically, and can display 16 colours. SuperVGA (SVGA) graphics can display 800 x 600 or 1,024 x 768 in as many colours as the memory in your graphics card will allow: up to 16.4 million, or true colour.

VL-Bus (See Local Bus)

VRAM (See Memory)

W

Windows
A GUI (Graphical User Interface) developed by Microsoft. Windows is intended to make programs easier to use by giving them a standard, mouse-driven interface.
• **Windows 3.11** 16-bit operating system.
• **Windows NT** Robust, fully 32-bit operating system from Microsoft. The latest, version 4.0, features a Windows 95 interface.
• **Windows 95** Major improvement to Windows 3.11, with a redesigned interface. Less prone to crashes and easier to use, but requires more memory.

Winsock
Short for "sockets for Windows". The Winsock.dll is an extension for Windows which is necessary for connecting to TCP/IP networks.

World Wide Web
A service on the internet which uses special software called web browsers (Netscape and Internet Explorer are the two best-known ones) to give you access to pages of information with text, pictures and multimedia.

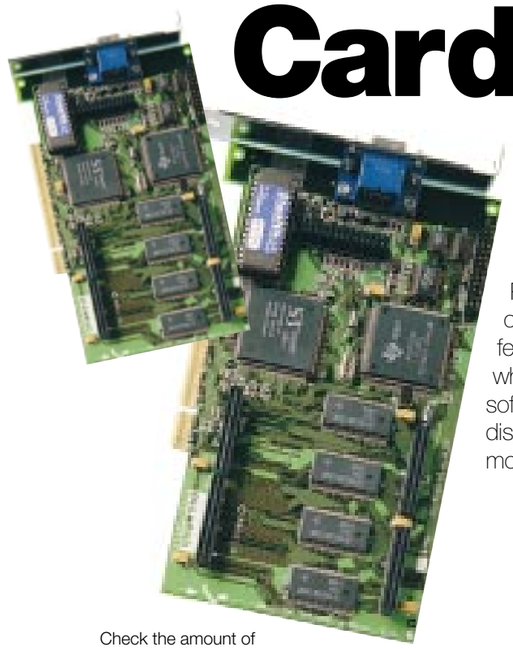
WYSIWYG
An acronym for "What You See Is What You Get". What you see on the screen is exactly what you get when you print out your work.

Z

ZIF (Zero Insertion Force)
Sockets which are used for large CPUs. Lifting a handle enables you to remove the processor.

ZIP
The common standard for compressing files so that they take up less space. Zipped files have the extension .zip and are compressed and decompressed using shareware utilities such as Winzip and PKZip.

Buying a Graphics Card



The graphics card sits inside the PC and controls the features which the software displays on the monitor.

Check the amount of memory on the card. 2Mb is standard these days, 1Mb is skimpy and 512Kb is barely usable. Better-quality cards are likely to be fitted with VRAM (Video RAM). Also, check out the performance capability of the card. Video cards come as 16-bit, 32-bit, 64-bit and even 128-bit: all you need to know is that a large number of bits means faster performance.

The most important aspect of your video card, and the most frequently quoted feature, relates to the resolution which the card supports in Windows. This is measured in terms of the number of pixels that the card displays on screen. The absolute minimum these days is 1,024 x 768 with a refresh rate of 70Hz.

A 2Mb card can display 16-bit colour (65,000 colours) at 1,024 x 768 pixels. A 1Mb card can only manage 8-bit colour (256 colours) at 1,024 x 768 pixels. To display 24-bit colour (16 million colours) at 1,024 x 768 you'll need 4Mb of memory. The refresh rate (measured in hertz) is important, too. It represents the number of frames displayed on-screen per second. A flickering display is very tiring to use.

Finally, find out whether your video card is "local bus" or not. Local bus (PCI or VL) is a type of interface which connects your video card to the motherboard. It allows the memory in the card to be addressed directly by the CPU, which makes it a lot faster than the standard ISA interface.

PCW Recommended products

Orchid Righteous 3D: **Orchid 01256 479898**; £199 (*PCW* January 1997)
Matrox Millennium: **Matrox 01793 441144**; £150
VideoLogic GrafixStar 600: **VideoLogic 01923 260511** from about £150

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Buying a **Monitor**

Regardless of your computer application, you'll be looking at your monitor all day, so make sure you get a good one.

Some people claim not to see monitor flicker, but your brain does, resulting in fatigue and headaches. A refresh rate of 70Hz or higher will produce a flicker-free image on most monitors.

Interlacing also results in flicker. Always run in non-interlaced modes and ignore interlaced quotes. The resolution refers to the number of dots (pixels) horizontally and vertically on-screen. Standard VGA mode runs at 640 x 480 pixels, while other typical modes include 800 x 600 and 1,024 x 768. The more pixels, the more you'll be able to fit on screen, but everything will be smaller and may only be suitable on a larger screen. Go for a 15in or 17in monitor capable of running a resolution of 1,024 x 768 non-interlaced at 70Hz or higher. The visible area of most monitors (and TVs for that matter) is smaller than the model implies: a 15in screen may only have a 14.5in visible area, and a 17in may have only 16in visible. Aperture grill tubes such as Sony's Trinitron or Mitsubishi's Diamondtron are very bright, but need two fine but visible wires running across the screen for stability.

PCW Recommended products

- For a 15in screen: try the CTX 1569MS (around £300) or the NEC M500 multimedia. **CTX 01923 818461**. **NEC 0181 993 8111** (around £410 on the street).
- See this month's group test, p152.

Buying a **Sound Card**

You need one of these to add sound capability to your PC.

Check compatibility with your CD-ROM drive, and remember that 16-bit cards capable of 44kHz provide higher-quality sound than slower 8-bit cards. Better sound cards now include wavetable synthesis which means they have samples of real instruments held in ROM.

The quality of wavetable synthesis still varies widely. Even cheap cards which have the inferior Frequency Modulation synthesis should have a daughterboard connector allowing them to be upgraded to wavetable. The newer cards are also plug and play which means, in theory, that you should be able to plug them straight into a PC without any extra configuration. Most cards are bundled with extra software, normally sequencers, wave editors and audio players.

PCW Recommended products

AWE-32: **Creative Labs 01245 265265;** £199 (*PCW* April 1996).

Aztech SoundGalaxy Waverider Pro: **Aztech 01734 814121;** £79 (*PCW* April 1996).

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No-nonsense Buyer's Guide

Buying Software

Only a few years ago there were dozens of different software applications in each category. During the last two years or so, however, there has been rapid product consolidation. Other magazines list large numbers of packages, most of which are out of date and not worth considering. We've distilled each category down to just one or two recommended products.

Software A-Z

A

■ ACCOUNTS SOFTWARE One of the few categories in which there are still masses of packages on the market at a huge range of different prices. Accounts is also one of the last bastions of DOS.
Recommended products: MYOB, and QuickBooks from Intuit

B

■ BROWSER Programs used to navigate the internet. A modern browser lets you navigate web pages, download files and send and receive email.
Recommended products: There are only two worth talking about: Netscape Navigator and Microsoft Internet Explorer.

C

■ CAD SOFTWARE Computer Aided Design covers everything from architectural drawings through office planning to complex engineering drawings.
Recommended products: AutoCAD is the industry standard but we think MicroStation 95 is a more capable product at the high end. At the cheap end, DesignCAD 3D offers astonishing value for money.

■ CONTACT MANAGERS
(See PIMs)

D

■ DATABASE At its simplest, an electronic card index. For just a few hundred names and addresses, an electronic-type Filofax such as Lotus Organizer may be more appropriate. But for more sophisticated applications like tracking products and customers, the power of a relational database is required. Databases are generally the least user-friendly of the main suite applications. In most offices you are likely to use a database application that somebody else has written for you.
Recommended products: Lotus Approach, Microsoft Access.

■ DESKTOP PUBLISHING SOFTWARE (DTP) This is software used to create newsletters, magazines, books, brochures or adverts.

Typically, it allows you to incorporate graphics, lay out text in multiple columns and run text around graphics. You also have control over how text appears, including the leading (pronounced "ledding") which is the space between lines of text, and kerning, which is the space between individual letters.
Recommended products: The high-end market leader is Quark XPress on the Mac. On the PC, PageMaker is strong. For serious work on a budget we recommend Serif Publishing Suite, and for sheer ease of use, Microsoft Publisher.

■ DRAWING SOFTWARE Programs for drawing, that work using vectors. This means each shape drawn is described using mathematical equations.
Recommended products: At the budget end, GSP DesignWorks 3 stands out. At the professional end, FreeHand 5 gets our plaudits.

I

■ IMAGE EDITING SOFTWARE A program for editing bitmap files (files made up of pixels). Typically used for converting graphics files, retouching photographs and preparing pictures for printing.
Recommended products: For simple image editing the popular shareware program, Paintshop Pro, is fine. For professionals, Adobe's Photoshop is the industry standard.

■ INTEGRATED PACKAGES Typically these combine the functionality of a database, word processor and spreadsheet in one application. This makes it easy to move data from one component to another, but integrated packages tend to lack some of the advanced features of individual applications.
Recommended product: Microsoft Works.

M

■ MULTIMEDIA AUTHORING TOOLS Programs designed for producing interactive multimedia applications, typically for training applications or for CD-ROMs. The software lets you control and manipulate different types of media like sound files, audio files, video clips and graphic files.
Recommended product: Macromedia Director, the product used to produce *PCW*'s cover-mounted CD-ROM, gets our vote.

O

■ OCR SOFTWARE Optical Character Recognition software converts printed text into computer text you can edit. You will need a scanner or fax card to get the printed text onto your PC. OCR saves re-keying documents and can cut down drastically on paper filing systems.
Recommended products: OmniPage is the best product we have found, but TextBridge offers most of the same capabilities for less cash.

P

■ PERSONAL INFORMATION MANAGERS (PIMs) PIMs are an electronic way of storing names, addresses, phone numbers and appointments. Contact managers take the idea one step further to include business information about dealings with clients.
Recommended products: SideKick 95 and Organizer are excellent PIMs. For contact managers we recommend Goldmine for Windows.

■ PRESENTATION GRAPHICS Increasingly the trend is towards doing presentations on a PC and the latest packages tackle this by including sound, sophisticated transitions between slides, and support for video clips.
Recommended products: Powerpoint and FreeHand are both capable products sold with Microsoft Office and SmartSuite respectively.

■ PROGRAMMING TOOLS Applications designed for writing software. These range from "low-level" languages which are powerful but difficult to learn and use, to "high-level" languages which, although much easier to use, generally sacrifice performance and flexibility in the process. Commercial programs like Word for Windows are written using low-level languages. Bespoke applications and prototypes are often written using Delphi or Visual Basic.
Recommended products: Delphi 3.0 is a great example of scalability, catering for beginners and serious developers working on major projects. Optima++ 1.5 is the pick of the high-end Windows development tools.

■ PERSONAL FINANCE PACKAGES These help manage home finances. They're also well suited to some small businesses and tend to be easier to use than full-blown accounts packages.
Recommended product: Quicken is the outstanding product in this category and has no serious rivals.

■ PROJECT MANAGEMENT Programs for managing large projects — anything from building a power station to planning a marketing campaign.
Recommended products: SuperProject 4.0 for Windows.

R

■ REMOTE CONTROL SOFTWARE Software which lets you access and control a PC remotely, usually via a modem.
Recommended products: ReachOut, for its simple interface and support for different networks, particularly TCP/IP.

S

■ SPREADSHEET An electronic version of an old-fashioned ledger. Excellent graphing and charting facilities are included.
Recommended products: Lotus 1-2-3, Microsoft Excel.

■ SUITES Most general business software (word processors, spreadsheets, presentation graphics packages) is now sold in suites.

Two suites are widely available: Lotus SmartSuite and Microsoft Office. Lotus SmartSuite also contains a database.

For Microsoft Office, you pay extra for Office Professional which contains Microsoft's Access database.
Recommended product: Microsoft Office is close to the industry standard. Its high level of integration gives it the edge over the opposition.

V

■ VISUAL PROGRAMMING
(see Programming Tools)

W

■ WEB EDITORS Programs designed to do for web page design what DTP did for magazines and newsletters. They let you create web pages without writing HTML. You can incorporate graphics, backgrounds, tables, images and sounds into web pages.
Recommended products: HotMetal Pro 3.0 is our first choice. Adobe Pagemill is a capable alternative.

■ WORD PROCESSOR An application in which you can write letters and prepare reports, or even produce a simple newsletter.

The latest word processors have advanced features such as outliners, table editors and facilities for adding columns of figures.
Recommended products: Microsoft Word is the clear market leader. WordPro (formerly AmiPro) is a capable alternative.

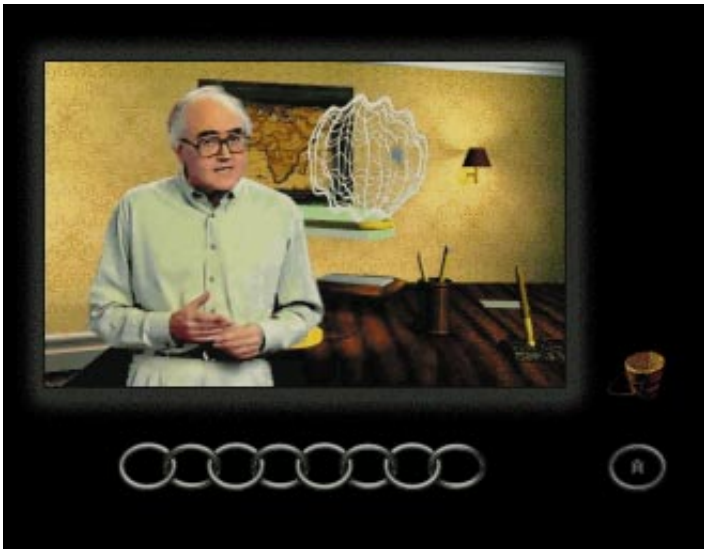
■ *If you want to read any of the reviews listed on these pages and do not have the original issues, order PCW on CD-ROM. It costs just £9.95 (including postage and packing). See pages 22/23 for full details.*

A-Z of Recommended **Software Products**

	Category	Product	Supplier	Contact	Price (ex VAT)	Date of *PCW* review
A	Accounts	MYOB	Bestware	01752 201901	£195	April 1997
	Accounts	QuickBooks	Intuit	01932 578501	£125	April 1997
B	Browsers	Netscape Navigator	Netscape	0181 564 5100	£49	Mar 1997
	Browsers	Internet Explorer	Microsoft	0345 002000	Free	Jun 1996
C	CAD	Microstation	Bentley	001344 412 233	£3,495	Jan 1997
	CAD	DesignCAD 3D	BVG	01874 611 633	£149.95	Jan 1997
D	Database	Approach	Lotus	01784 455445	£99	Nov 1996
	Database	Access	Microsoft	0345 002000	£220	Nov 1996
	Desktop publishing	XPress 3.3	Quark	01483 454397	£795	May 1997
	Desktop publishing	Publisher	Microsoft	01734 270 000	£70	May 1997
	Desktop publishing	Publishing Suite 3.07	Serif	0115 942 1502	£99	May 1997
	Drawing	Freehand 5	MacroMedia	01344 761111	£450	Apr 1996
	Drawing	Designworks 3	GSP	01480 496789	£39.95	Apr 1996
I	Image editing	Photoshop	Adobe	0181 606 4000	£382	Dec 1996
	Image editing	Paintshop Pro	Digital Workshop	01295 258335	£49.95	Jun 1995
	Integrated package	Works	Microsoft	0345 002000	£79.99	Oct 1995
M	Multimedia authoring	Director 5.0	Macromedia	0181 200 8282	£99	Oct 1996
O	OCR	Omnipage	Caere	0171 630 5586	£595	Nov 1995
	OCR	Textbridge	Xerox Imaging Systems	01734 668421	£349	Nov 1995
P	Personal finance	Quicken	Intuit	0800 585058	£34	May 1996
	PIM/contact manager	Organizer 2.1	Lotus	01784 455445	£99	Mar 1996
	PIM/contact manager	Goldmine for Windows	Elan Software	0171 454 1790	£395	Mar 1996
	PIM/contact manager	Sidekick 95	Starfish UK	0181 875 4400	£39	Mar 1996
	Presentation graphics	Freelance	Lotus	01784 455445	£415	Nov 1996
	Presentation graphics	Powerpoint	Microsoft	0345 002000	£220	Nov 1996
	Programming tools	Optima ++1.5	PowerSoft	01494 555555	£139	Mar 1997
	Programming tools	Delphi 3.0	Borland	01734 320022	£89	Apr 1997
	Project management	SuperProject 4.0	Computer Associates	01753 679679	£495	May 1996
R	Remote control	Reachout	Stac Electronics	01483 740763	£110	Nov 1995
S	Spreadsheet	Excel	Microsoft	0345 002000	£220	May 1995
	Spreadsheet	1-2-3	Lotus	01784 455445	£365	May 1995
	Suite	Office (Standard)	Microsoft	0345 002000	£360	Mar/Dec 1996
	Suite	Office (Professional)	Microsoft	0345 002000	£460	Mar/Dec 1996
W	Web authoring	HoTMetal Pro	SoftQuad	0181 236 1001	£99	Oct 1996
	Web authoring	Fusion (dist. Micrology)	NetObjects	01784 485500	£399	Jan 1997
	Word processing	Word	Microsoft	0345 002000	£220	Oct 1996
	Word processing	WordPro (AmiPro)	Lotus	01784 455445	£99	Oct 1996

News

Great escape



Thinkers unite! BMG Interactive has just released its newest game, Connections, based on the popular TV series. With a mix of adventure, trivia, and strategic thinking, Connections is a game that puts you firmly in the place of history.

The game consists of five levels of gameplay where the time/space continuum has been disrupted. Your goal is to figure out how you have ended up in the virtual world and how to get out, all by reconnecting the chain of discoveries.

Throughout the game you are guided by James Burke, the well-known host of Connections, and 50 other characters in full motion interactive video sequences and 3D gameplay.

It is also available as a PC or Mac CD-ROM.

Price: £29.99
Contact: SKS 01373 455999

Wet and wild

Power Boat, from Interplay, set to be released this coming Christmas, looks like it will make a few waves when it arrives. According to Interplay, serious gamers should brace themselves for the ultimate powerboat race experience.

Being set in a true 3D world, this game should provide quite a challenge for the damply-inclined gamer.

The action will include obstacles and hazards like thick fog, as well as the intense pull of G-forces as you pilot your boat around bends and marker buoys at break-neck speed.

Power Boat will offer three modes of gameplay. Championship mode is where you race in sequence, while in Arcade mode you can choose your course and race against the clock. Slalom mode should truly test your powerboating prowess, too. Add to this the various watery locations which are on offer, ranging from New York to Monaco, and then throw in some network gaming features, and Power Boat could break over the market like a tidal wave.

Expected release: Christmas 1997
Expected price: Around £40
Contact: Interplay 01628 423666

Charts

Interactive Leisure Software Level One

1	Mario 64	Nintendo 64	Nintendo
2	Star Wars: Shadows of the Empire	Nintendo 64	Nintendo
3	Pilotwings 64	Nintendo 64	Nintendo
4	Cool Boarders	PlayStation	Sony
5	Die Hard: Arcade	Saturn	Sega
6	Destruction Derby 2	PlayStation	Psygnosis
7	Tomb Raider	PlayStation	Eidos
8	Command & Conquer: Red Alert	PC/CD-ROM	Virgin
9	Die Hard Trilogy	PlayStation	EA
10	Tomb Raider	PC/CD-ROM	Eidos
11	Championship Manager 2: Double Pack	PC/CD-ROM	Eidos
12	Flying Corps	PC/CD-ROM	Empire
13	Scourge of Armaggon	PC/CD-ROM	Activision
14	Soviet Strike	PlayStation	EA
15	Diablo	PC/CD-ROM	Ablac
16	Broken Sword	PlayStation	Sony
17	Dark Forces: White Label	PC/CD-ROM	Virgin
18	Twisted Metal World Tour	PlayStation	Sony
19	Victory Boxing	PlayStation	Virgin
20	FIFA '97	PlayStation	EA

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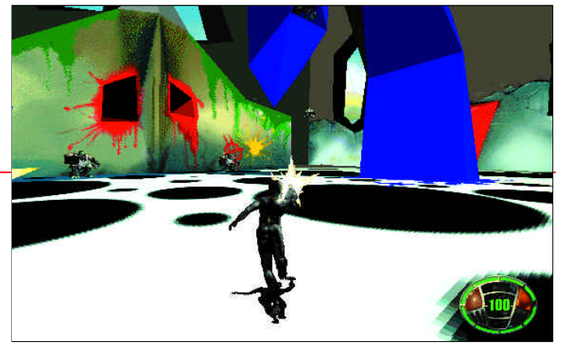
MDK

Kurt! My man! Total me some monster-dudes.



Aliens have taken over the Earth and are joyriding in huge mining machines which devour everything in their path: cities, mountains, Pot Noodles… you name it, they eat it. You play Kurt, orbiting the Earth with a mad professor and your six-armed canine chum, Max. Your mission? To save the Earth.

Initially, the game plays much like Doom, with the perspective altered so you can see Kurt just in front of you. There's plenty of rough-and-ready carnage (MDK stands for Murder Death Kill), yet there is more to it. The game is visually glorious with some superbly designed elements, including monsters, power-ups, Kurt's suit and the coolest parachute ever.

The initial levels are dark and moody but once you've advanced some way into the game, you should be prepared for some wild, "drug-induced" scenarios.

Would *you* let an alien redecorate your house?

One of the biggest innovations is the sensationally cool Sniper mode. Kurt's helmet allows you to zoom in on monsters from an incredible distance, providing images that are as clear and well defined as nearby objects. You can plug an alien right between the eyes from over a mile away — *seriously* top banana!

MDK includes a welcome dose of black humour: from the Thumper (a giant spring-loaded hammer) to the monsters' artificial intelligence. They are alternatively cheeky, taunting you to come and get 'em, and psychopathic, charging at you in a crazed rage. There's plenty of variety in the game, too, including the groovy West Coast level where you surf on an antigravity board and fight huge lumbering monsters who are doing likewise. This game is the bee's knees and the eel's heels rolled into one.

Adam Evans

PCW Details

Price £44.99

Contact Interplay Productions 01628 423666

System Requirements Pentium, 8Mb RAM, fast SVGA Vesa-compatible graphics card, CD-ROM drive, 30Mb hard disk space. DOS 5.0 (or higher), Windows 3.1 or 95.

★★★★★

Diablo

Catacomb capers — one hell of a role-play.

The town of Tristram has been ravaged by hordes of evil demons. The frightened townsfolk are crying out for a hero.

Take your pick from the classic role-playing game (RPG) line-up of warrior, rogue or wizard and put your best boot forward on this mission to save these embattled people. It's not easy. The shadowy catacombs beneath the ancient cathedral are riddled with horrible demon spawn and naughty imps, all of whom are more than willing to kill you — instantly.

The mastermind behind these evil machinations is Diablo, Lord of Terror, third of the Prime Evils of Hell — a *very* nasty piece of work. But don't be too scared: the terrified townspeople are always keen to give you advice and will help you as much as they can in this cracker of a game.

The controls and gameplay are excellent and the god's-eye-view is well handled,

Oi, Skeleton King… NO!!!

lending genuine atmosphere to the catacombs. To ensure variety, the layout of the underground levels is randomly generated at the beginning of each new game, and many of the gaming elements are different depending on which character you choose to adopt.

You can also play multi-player games using an IPX network (requiring only the one CD) or the net. This is great fun but can cause friction, even when co-operating with other players: a wizard stealing a spell by telekinesis from the outstretched hand of a fellow warrior being a case in point.

Diablo is certainly the most addictive RPG to hit the PC for a long time, and unless you actually hate the genre, buy it and be prepared to play it solidly until the next millennium.

Adam Evans

PCW Details

Price £44.99

Contact Zablac Entertainment 01626 332233

System Requirements Windows 95 or NT 4.0, Pentium 60MHz or higher, dual-speed CD-ROM drive, SVGA graphics card that supports Direct Draw, 8Mb RAM (16Mb for multi-player games).

★★★★★

MAX Commander

To conquer worlds, keep a cool brain in your head… You must, because *you* ain't got no body!

Mankind has been tricked into colonising planets for alien overlords. As a MAX (Mechanised Assault and Exploration) Commander, your brain has been detached from your body and now exists in cold storage.

Your mission is to take over and colonise other worlds. But you're not the only frozen brain attempting to dominate the universe. There are eight clans out there, all competing for 24 worlds.

The storyline has appeal and it's similar to Command and Conquer: Red Alert. MAX may not rank as highly but it's nevertheless an addictive and enjoyable game. The graphics are crisp and the explosions are satisfyingly realistic. The game is aimed at the more experienced player and may not suit newcomers to the strategy/action genre. However, if you get a kick out of jumping in at the deep end and are willing to tackle a game that makes no allowance for lack of knowledge, this is worth a try. In many ways it's refreshing not to be pandered to — you're expected to work everything out yourself and much lateral

You'll need to keep a cool head to conquer your part of the universe

thinking is needed to solve various problems. There are a number of gameplay modes: LAN, Hot-Seat, network and modem. If you want to go it alone, there's another menu of game types from which to choose. All in all, this is a perfect game to suck up your spare time.

Lynley Oram

PCW Details

Price £39.99

Contact Interplay 01628 423 666

System Requirements 486-66 CPU or faster, 8Mb RAM (Pentium 90 recommended), 2x CD-ROM, 16-bit SoundBlaster-compatible soundcard, SVGA video card, mouse.

★★★★

Goosebumps

Welcome to Horrorland, the evil theme park where even your goosebumps get goosebumps.

How do fancy wandering alone in a creepy theme park full of werewolves, vampires and other ghoulish beings? If you think you have the guts, I seriously advise you to check this game out.

Goosebumps — Escape from Horrorland, is gripping gameplay guaranteed to glue you to your screen for hours. Your goal is to help 12-year-old Lizzy search for her brother and his friend who have been snatched and taken to an evil theme park.

Based on the same theory as The Neverhood, from DreamWorks, you have to crack twisted puzzles and solve cryptic clues to find the whereabouts of the young victims. The graphics are on the edge of virtual reality, with certain scenes being so terrifying they will knock your socks off. I found myself walking through a dark forest when suddenly a very convincing werewolf jumped out of nowhere and started lashing at me. Believe me, I nearly fell off my chair!

There are 16 excitingly scary levels to complete, featuring the best film production techniques from Hollywood. And there's the added bonus of Jeff Goldblum playing Count Dracula. This game is designed to be the interactive sequel to *One Day at Horrorland*, the hit children's novel by R.L.

Horrorland holds some horrible surprises

Stine (now a popular US TV show). The game also provides one of the first characters to really engage young female game players (an audience often ignored by PC games manufacturers).

Goosebumps is targeted at eight-year-olds and upwards, but those under 12 might need some guidance and a hand to hold during the scary bits.

Etelka Clark

PCW Details

Price £39.99

Contact Microsoft 0345 002000

System Requirements Pentium 75MHz or better, quad-speed CD-ROM drive, 8Mb RAM, Win95, SVGA monitor,1Mb video card with 256 colours, Windows-compatible soundcard,10Mb hard disk.

★★★★

The stuff of dreams

What was turqoise, mechanically streets ahead of today's hardware, and boasted a 100MHz processor? The Silicon Graphics Indigo 2.

It's interesting to look back and see when machines as powerful as today's new PCs first appeared. It was May 1993, when we looked at the Silicon Graphics Indigo 2. It's funny how excited we got about the machine, describing it as the "...stuff of dreams. Its turquoise case is jammed with leading-edge technology and will set you back a mere £34,000". Silicon Graphics was excited, too, having flown the machine to the UK to give *PCW* an exclusive review in Europe. Two days later it was back on another plane and flying home to SGI's Mountain View, California, headquarters.

We thought the R4000 processor was fast because it ran at 100MHz, and we believed that the MIPS processor would amount to something. Silicon Graphics had just bought MIPS. And NT for the Indy was just pending.

The last time you would have seen an Indigo would have been if you had watched Jurassic Park on video and the too-cute girl said: "I recognise this, this is Unix." What she was actually looking at was Indigo Magic, the front-end on the Indigo 2 which was enjoying its 15 minutes of fame.

The 100MHz processor ran on a 50MHz daughterboard in an impressive 447 PGA (Pin Grid Array). Like a Pentium, the chip had 16Kb of on-chip cache and was designed to cope with up to 4Mb of external secondary cache. It looked good. A strange turquoise colour, with "cooling fins" running all the way around the 19in x 5in high case. This is still smaller than many PCs on sale today. A section of the front panel hinged down to reveal the power switch and an empty 5.25in half-height drive bay for use typically with a CD-ROM. Back then, CD-ROM drives were expensive and certainly would not have been supplied as standard, although the review machine did have a DAT drive.

Because the boot configuration would not fit on a 3.5in floppy and the data you were likely to move around was measured in megabytes, a floppy drive was not an option that Silicon Graphics expected many people to take up. It will be interesting to see how long this remains the case with ordinary PCs.

A SCSI-2 interface was standard, but a hard disk wasn't (SGI claimed that some network users wouldn't need one) yet in practice it was an essential addition that was available in 236Mb, 432Mb or 1Gb sizes. Disks were fast, operating at 10Mb/sec in Fast SCSI-2 burst mode. Predictably, this became hot, so the back of the unit contained a fan exhaust from the power supply. Built into the Graphics subsystem was an interesting three-pin connector looking something like a mouse port. This was for the "shutter" glasses which allowed "stereo viewing" through special goggles. A tiny co-ax connector (a gen-lock used for synchronising other screens and cameras) betrayed its use in television.

Modern machines have yet to catch up with the Indy's mechanical aspects. The cover easily unclipped to reveal a mass of chips dominated by the biggest heatsink we had ever seen. Next to the heatsink, eleven 15-nanosecond chips made up the giant 1Mb of secondary cache. The connection between the processor and the secondary cache was 128 bits wide, and between processor and system bus, 64 bits wide. Silicon Graphics quoted 384Mb as the maximum RAM capacity, which required rare, high-density, 32Mb SIMMs.

Sound quality from the built-in 2.5in speaker was superb. The audio board was built around a controller chip and there was an ASIC, called the HAL2, which contained two CODEC chips. The machine pre-dated the PCI bus, so bisecting it was an upright connector plane that plugged directly into the motherboard. This connector plane carried four EISA sockets and three of Silicon Graphics' own 4.5in long GIO64 connectors. This gave a throughput 16 times that of contemporary PCs and still twice what you get with a PCI machine today. But the most impressive element was the Extreme graphics subsystem itself, costing around £8,000 with vast quantities of huge 2in x 2in chips. The end result of all this hardware was little more powerful than today's new generation of 3D cards. Back then it cost £34,000 and really was the bee's knees. Today, you'd get something approximately as good for less than £4,000 and no-one would bat an eyelid.

Simon Rockman

Brainteasers

Quickie

Can you think of three different numbers which, when added together, give the same result as when they are multiplied together?

This Month's Prize Puzzle

Ossarium is the national sport of the natives of the island of Phalanges in the South Pacific, or so my son-in-law was telling me the other day. He is a marine engineer, and gets around the world quite a bit.

I was particularly interested in the method of scoring. There are only two scoring plays — the Fiber and the Fibril, the latter having six times the points value of the former. As a result, the game is quite a high-scoring event, which adds to the excitement and the game's popularity. In 1992, the winning side scored more than 900 points, but that was exceptional and has never happened since.

In the recent island final, the Hyoids played the Maxillas, with the Hyoids winning comfortably. Strangely enough, the Hyoids scored as many Fibers as the Maxillas scored Fibrils, and as many Fibrils as the Maxillas scored Fibers. Moreover, the final Hyoids score was the exact digital reverse of that of the Maxillas.

Given that each team scored more than one with each type of play, what were the final scores? Send the solution to: PCW Prize Puzzle - May 1997, P.O. Box 99, Harrogate, N. Yorks HG2 0XJ, to arrive no later than 20th May 1997. Good luck!

Winner of February 1997 Prize Puzzle

A very big response to our logic puzzle. There were 260 entries in all, mostly with the correct solution which was that CELIA is the mother and DAPHNE is the daughter.

The winning card, chosen at random, came from Mr AA Robertson of Chinnor in Oxfordshire. Congratulations, Mr Robertson, your prize will be with you shortly.

Meanwhile, to all the others — keep trying, it could be your turn next.

J J Clessa

Computations

Electronic money explosion

Computers have helped make people twice as dependent on a money economy as they were a generation ago. Taking the index of disposable money income in 1966 as 100, by 1994 it had reached 196.7.

The adding of value in transactions is so universal that its taxation (VAT) is the mainstay of the government budget. 21 million collectors yield £43 billion a year, or one fifth of UK revenues. Income tax has propagated so fast, the Queen has nearly eight times more income tax payers than when she was a girl of eleven. Income tax began in 1907 at one-twentieth of income: a world war drove it soaring up to one-quarter, and including health and pension tax it is now about one-third for workers.

One fifth of the nation's business is the market in "financial products", a complete abstraction. None of the products is about cutting reliance on money, or enabling barter, except as a means of tax evasion, like company cars and travel packages.

In this monetarist existence, luck has more power and influence than ever. "It could be you" shout the adverts for the National Lottery, although a glance at the tables of probability show what a false claim it is. Punters buying one ticket are twice as likely to die when parachuting than they are to win a smaller prize of £10,000.

Luck is a mass-production line for losers. For every National Lottery winner great or small, there are seven losers. When insurance (the industry founded on hedging bets against luck) was hit by disasters in the eighties, Lloyds insiders arranged for a large number of "names" to be losers. When the Wall Street stock market crashed on 24th October 1929, it crushed an army of small investors, while insiders' stocks rose in value. The National Lottery admits that its takings exceed payouts by 400 percent. Those of bookmakers on a good day exceed only 56 percent. Every time the Lottery delivers a fantastic sum of money to some poor chump, about 50 million people experience envy and disappointment.

■ Sources: The Bank of England, Camelot, HM Treasury, Chronicle of the 20th Century

Promises, promises

"I promise to pay the bearer on demand", the chief cashier of the Bank of England writes on his notes. The promise once meant the gold that was paid in return for his promissory notes. After that, bank notes were "fiduciary", which meant based on trust. So the chief cashier's promise, spanning 200 years of Britain's domination of world trade, meant: "I promise to pay you back your weight of precious gold deposited with me". What it means today is, "If this fiver gets damaged, I'll take it back and give you another one". We can gauge the merit of trusting the chief cashier by the fact that since 1931, the pound has declined to $^{1}/_{29}$ of its value.

If some paper with an indiscriminately made promise written on it seems a crummy "keystone of modern economic life", consider computerised finance. Computer money is more symbolic, as all it amounts to is a series of figures recorded in software code. Its speed and secrecy are unprecedented and have outstripped officialdom's regulatory capability.

Thousands of international transactions can be conducted in a minute. A bank will charge about £20 for a money order made out in a foreign currency. But in the time it takes a clerk to write out the order, many discounting deals, in many different currencies, will have been done at the bank's trading room. So many that the value of the currency may well have changed before the order is completed. Strings of digits can be whisked around the planet in milliseconds. Foreign exchange dealings are estimated at £812 billion per day, two-thirds of them nominally based in London.

Rowland Morgan

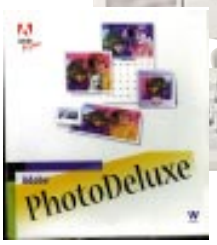
Win an Apple Creative Studio worth **£2,600**

In this month's competition we're giving away, courtesy of Apple Computers, the absolutely stupendous all-in-one, state-of-the-art, Apple Creative Studio. There are prizes from Adobe, too, for the runners-up. That's over £3,000-worth of prizes at retail value.

The Apple Creative Studio is the perfect system for the budding film director or music composer. Based around a Macintosh Performa and worth over £2,600 (RRP) this machine is loaded with high-quality goodies.

There's a 200MHz PowerPC processor, 24Mb of RAM, 2.4Gb hard drive, L2 cache, SBS 3D Surround with subwoofer, 8x CD-ROM, Apple Multiple Scan 15av monitor and built-in 28.8 fax/voice/data modem. A TV tuner with teletext is also included.

The Creative Studio comes pre-loaded with Avid Cinema, Cubasis AV from Steinberg, Dabbler from Fractal Design and Adobe PhotoDeluxe. With these packages you'll be able to turn the Performa into a video-editing suite to make your own films, and be able to convert it back to VHS video tape, make a slide show, or create a QuickTime movie for a CD-ROM or web site.

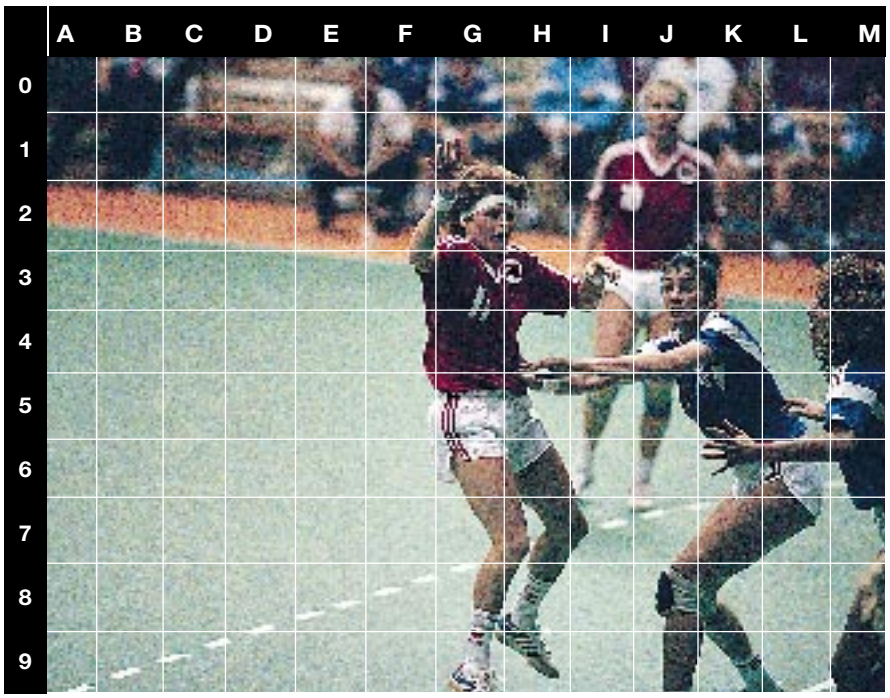


You'll even be able to add your own music score and retouch images along the way.

Additionally, Adobe is offering each of five runners-up a copy of Adobe PhotoDeluxe, valued at £75. PhotoDeluxe is perfect for the home or small business and you'll be able create amazing photo effects with just a click of the mouse.

So whether you have dreams of being the next Steven Spielberg or just want a great computer, send us your entry, by post or via our web site, and the Apple Creative Studio or a copy of Adobe PhotoDeluxe could be yours.

Simply spot the ball in the photograph below. Please do not mark a cross — just tell us what the grid co-ordinates are.



How to enter

Send your grid co-ordinates, with your name, address, and daytime telephone number, to: *PCW* April Competition, P.O. Box 11312, London WC2H 0DJ. Alternatively, enter the competition via our web site at www.pcw.vnu.co.uk. ***Please do not send direct email***. Entries must arrive by 15th May 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 *Personal Computer World*, except for employees and their families of VNU Business Publications, Apple and Adobe. The Editor of *Personal Computer World* 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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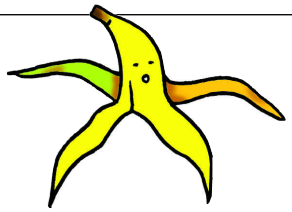
ChipChat



Oops!

■ In the printer section of the Buyers Guide (April issue, p332) the telephone number for Sharp was wrong. The correct contact number is 0800 262958.

Techie tales

■ A technician received a call from a man complaining that his system wouldn't read word-processing files from his old 5.25in diskettes. After troubleshooting for magnets and heat failed to diagnose the problem, it was found that the customer labelled the diskettes first and rolled them into his typewriter to type the lables.

■ A customer was asked to send a copy of her defective diskettes. A few days later, a letter arrived from the customer along with photocopies of the floppies.

■ A technician advised his customer to put his troubled floppy back in the drive and close the door. The customer asked the tech to hold on and was heard putting the phone down, getting up and crossing the room to close the door to his room.

■ Another customer called to say he couldn't get his computer to fax anything. After forty minutes of troubleshooting, the technician discovered the man was trying to fax a piece of paper by holding it in front of the monitor screen and hitting the send key.

■ A technician received a call from a customer who was enraged because his computer had told him that he was "bad and invalid". The tech explained that the computer's "bad command" and "invalid" responses shouldn't be taken personally.

■ Another customer called tech support to say that her brand-new computer wouldn't work. She said she unpacked the unit, plugged it in, and sat there for twenty minutes waiting for something to happen. When asked what happened when she pressed the power switch, she asked, "What power switch?"

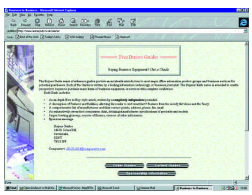
Caption competition

"Hmmm. I'm not so sure I like this new Virtual Reality headset technology."

Think you can do better? Email captions@vnu.co.uk, enter via or web site, or write to the usual *PCW* address with your own captions on a postcard marked "May Caption Compo" before 15th May. We'll print the funniest entry and the winner will receive a £20 book token.

Congratulations to Huw Pritchard, who won March's caption competition with this: "Andy seemed to be having problems getting to grips with the "Suspend" option on his new notebook."

Excitement



Arena Publishing appears to have hit a new high in promotion with its web site called The Buyers Guide. Touted by Vox Communications, Arena's PR company, as a site that "hits new lows in boredom" and "plumbs the depth of dullness and tedium", we think it's bound to be a winner.

So if you need to get a bit of boredom into your life, check out this site at www.arena-pub.co.uk/arena/.

PHREAKS