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MORTAL KOMBAT MANIA PAGE 98

Personal Computer World

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Mortal Kombat mania ● Group Tests : Anti-virus packages, Storage and backup media ● HP Omnibook 600CT

PC/TVs

At home with your computer

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First glimpse of Viglen's P6

Office hybrids

Printer/ fax/ scanner

RAM Doublers

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All sorts of storage stuff

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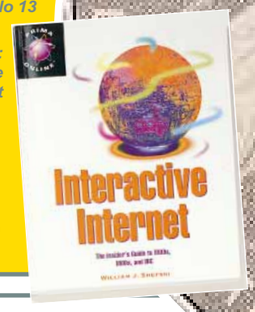


PCW Cover Disk

EXCLUSIVE! This month we're proud to bring you PhotoPlus Intro, the latest in a line of top-selling software from Serif. Robin Nixon explains what it does and how to use it.

Installing and running the PCW Cover Disk

To install the programs, insert the disk in drive A: or B:, and from Windows run the file INSTALL.EXE in the root directory of that drive. All the files will then be installed onto your PC.

PhotoPlus Intro
[Minimum Requirements: Windows 3.1+, 256 colour graphics, mouse, 4Mb RAM (swapfile can be used)]
PhotoPlus Intro provides all the features you need to get the best out of your bitmap pictures. It has all the basic tools for gamma correction, adjusting colour balance, brightness and contrast, rotating, flipping and cropping. It also has a range of special effects and patterns, including emboss, posterise, pixellise your pictures, solarise, enhance shadows and highlights, and make pictures look hand drawn. It also has a selection of digital processing filters.
PhotoPlus supports TWAIN scanners and Kodak PhotoCD directly. It can load and save pictures in a wide variety of formats, and convert between them. It also works as an OLE applet.

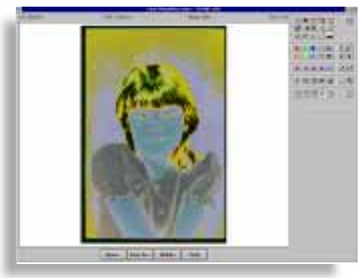
MAIN FEATURES

Preview Window
Most of the PhotoPlus window is taken up by the Preview window. This is the workspace where you see the results of your manipulation. If the picture is too big to fit all at once, you can use th scroll bars to see different parts. You can zoom into the picture by dragging the mouse cursor over the area you want to look at, or by clicking on the Zoom buttons.

HintLine
If you can't remember what a particular part of the screen does, check out the HintLine which tells you the purpose of the screen item under the mouse cursor. If it contains ">>" when over a button, this means that double-clicking on that button will bring up a dialogue.

Front Panel
All the other controls are placed on the Front Panel. The controls in the top group produce special effects. The second group manipulate colour, the controls in the third group perform geometric operations, and the next line of controls support the clipboard. The bottom group of controls manage the Preview Window's Zoom percentage. The final button displays information about the picture, including its colour histogram which shows you how its colours are distributed.

Undo
PhotoPlus supports multi-level undo. This is useful when you are not sure how to get the effect you want. You can try a button, and if you don't like the result, click on the Undo button and try again. Undo needs lots of memory to store old copies of a picture. To get more levels (or to turn it off altogether), double-click on the Undo button. There is also a button to reload the original picture from disk. This is like a "Super Undo" which undoes everything you did since the last load or save.


PhotoPlus brings your bitmaps to life

Status bar...
The Status Bar shows information about the current picture which includes: The width and height of the picture in pixels; the picture's colour depth, which is the number of bits used to store the colour of each pixel; the amount of memory the

CONTINUES ON PAGE 131

IMPORTANT
PhotoPlus Intro is a fully working application. However, when you install it you will be asked to call a freephone (0800) number in order to be given an access code to use the program. This can be done any time during office hours, it only takes a few seconds and costs you nothing at all.

PLEASE READ THIS!
If you have problems with the Cover Disk such as receiving a "Cannot read from drive A:" error, please return the disk to the duplicator: TIB PLC (PCW), TIB House, 11 Edward Street, Bradford BD4 7BH (who may be contacted on 01274 736990) together with a stamped addressed envelope and two 25p stamps. Where it is a duplication fault, the postage will be returned along with the replacement disk.
However, you should note that if your problem is not due to a faulty disk, and a phone number is shown for the publisher of the program in question, then it will probably be quicker for you to call them first as they will be able to provide direct assistance on their own programs faster than might otherwise be possible. Alternatively, ring our hotline on weekdays between 10:30am and 4.30pm on 0891 715929. Calls are charged at 39p per minute cheap rate and 49p at all other times.
The PCW cover disk is virus checked at every stage of production. However, neither VNU nor PCW will accept liability for any problems arising from the use of the disk. Installing or running any of the programs on the disk indicates your agreement to this condition.
You are advised not to install any software on a networked PC before checking the disk. While PCW maintains a high standard of quality control, disks may be damaged in transportation. Check the disk's shutter before inserting it in the drive by sliding it to the left and allowing it to spring back.

PCW Interactive CD-ROM

David Price introduces this month's CD-ROM which includes a fabulous 400Mb+ program from Granada TV, called The Program, packed with videos, music and much more. There's also the best of the latest DOS and Windows demos, shareware, utilities, games, applications and drivers. And that's just the tip of the iceberg...

[Minimum requirements: 8Mb RAM (4Mb of this can be in a permanent swapfile), 386SX/33 processor, Windows 3.1. Users with less than this should still be able to run all the DOS programs on the CD-ROM directly from DOS or Windows (rather than using the front-end). For best performance we recommend: 8Mb installed RAM, 486DX/50 processor, Windows 3.11 or Windows 95]

PCW INTERACTIVE: Entire Contents List

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Sound — Superb sound files.
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UK Online — A bright new electronic info system.
Biblos — Another selection of plays from Shakespeare.
Cerberus — Ground-breaking CD quality chart music by modem.
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EXTRAS
Super VGA Graphics Drivers — Microsoft (Not for Win95).
Video For Windows Version 1.1e — the latest (Not for Win95).
MSCDEX — Microsoft's latest CD-ROM extensions (Not for Win95).
Quicktime For Windows — The latest version.
CD Test — Test your CDs for duplication errors, scratches or other damage.

CUT OUT THIS LABEL AND KEEP WITH YOUR CD-ROM

Because Granada TV's demo is so comprehensive we have set the CD-ROM up so that it boots directly into it under Windows 95. You can then choose to enter PCW Interactive from inside The Program.

To run the program using Windows 3.x, from File Manager double click on the program THEPROG.EXE in the root directory of the CD-ROM. If you have Windows 95, just insert the CD-ROM and the program will automatically load.

To run PCW Interactive immediately use either Program Manager or File Manager to select your CD-ROM drive and run the file PCWI.EXE in the root directory of the CD-ROM. Or, if you are using Windows 95, just insert the CD into your CD-ROM drive and wait for it to load.

Using PCW Interactive

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

MAIN FEATURES

Granada TV
The producers of GranadaTV's The Program have got together with Personal Computer World Interactive to amaze, absorb and entertain you with a multimedia roller coaster. It contains a mixture of video clips, celebrity interviews, reviews and more. To find out how The Program CD-ROM was made, turn to page 199.

UK Online
UK Online offers a comprehensive online service. From Windows run the file \UKONLINE.EXE to view a chance to try out the system for yourself, the username is pcw and the password is freetrial. You can also call up the UK Online demo from within PCW Interactive.

Cerberus
Pioneering work from the company that aims to pipe the entire contents of a high

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picture takes up; and the current zoom percentage for the Preview Window.

MENU OPTIONS

Open...
Clicking on the Open... button brings up a dialogue which lets you load pictures into PhotoPlus, ready for manipulation. PhotoPlus understands a variety of file formats.

Save As...
Clicking on the Save As... button brings up a dialogue which lets you save your work to disk.

Update
The Update button puts a copy of your picture onto the Windows clipboard, as a Windows Metafile, a Windows bitmap and as an OLE object. Most DTP programs will allow you to insert the object using a menu entry typically labelled Edit/Paste Special... If PhotoPlus was invoked from an OLE container, then the Update button behaves slightly differently: it updates the container program as well as the clipboard. The formats take up a lot of memory, so PhotoPlus clears the clipboard when you exit it.

Help
The Help button calls up the Help file. You can also get help by pressing F1.

HintLine
The HintLine tells you the purpose of the screen item under the mouse cursor.

Special Effects
These buttons perform a range of special effects and distortions: Charcoal, Mosaic, Emboss, Posterise, Randomise colours, Negative, Grey scale, Sepia, Highlight/shadow, Solarise, Pixellise, Sharpen, Smooth, Remove noise, and Monochrome.

Brightness and Contrast
These buttons adjust the brightness and contrast of the picture. The top row increases them and the bottom row decreases them. Their effect is similar to that of the brightness and contrast controls on a television.

Gamma Correction
Click on this button to apply Gamma Correction to the picture. Gamma Correction helps to compensate for differences in brightness between various input and display devices. For example, Photo CD pictures are designed to be viewed on a television, and come out looking too dark on a computer monitor Gamma Correction makes the dark parts brighter without losing much definition in parts which are already bright enough. This gives a better result than adjusting the brightness and contrast.

Convert Colour Depth
This button brings up a dialogue which converts the image between various colour depths. The colour depth determines how many bits are used to store each pixel in the picture, and so the maximum number of colours possible in the image and the total amount of memory it needs. Reducing the colour depth reduces the picture's memory requirements but loses quality.

Histogram Equalisation/ Brightening
These two buttons maximise contrast by expanding the range of colours used. As a result, they make dark pictures look brighter, bright pictures look darker and tend to make obscure detail more apparent. Histogram Equalise treats all colours the same, giving a roughly linear distribution of pixel intensity. Histogram Brighten increases contrast in the dark areas at the expense of contrast in the bright areas.

Flip Picture
These buttons flip the picture horizontally or vertically. The result is similar to holding the picture up against a mirror. Most images look fine when flipped. Remember, any text in a picture may no longer be readable. Horizontal flipping reverses left and right, and vertical flipping reverses up and down.

Rotate Picture
The first two of these buttons rotate the picture by 90 degrees clockwise and counter-clockwise. You can use them to convert a landscape picture into portrait. They are especially useful when you want to scan a picture which is too wide for your scanner as you can turn the picture on its side, scan it that way and then rotate it back in PhotoPlus. The third button provides free rotation where you can rotate the picture to any angle. When a picture is rotated to an irregular angle, the resulting picture is larger than the original as the corners of the picture have "pushed" the sides out. The extra areas will be filled in with white pixels.

Resize Picture
This button brings up a dialogue which lets you scale the picture to an exact size in pixels. If you select Custom, you can enter any size you want into the edit boxes. If the Maintain Aspect Ratio button is checked, the width and height of the picture will remain in proportion so that, for example, a square object within the picture will remain square and not become rectangular.

Crop Tool
This button selects the Crop Tool which you can use to cut unwanted information from a picture. If you have a picture and you only want a portion of it, use the crop tool to discard the unwanted areas. The new picture is smaller and hence faster to manipulate and save. You crop an image by selecting the Crop Tool then dragging out a rectangle over the Preview Window. The picture will be cropped to the rectangle with everything outside the area thrown away.

Cut, Copy and Paste
These buttons manage the Windows Clipboard, an area shared between all Windows applications, which provides a way to move pictures between applications which is sometimes more convenient than saving them to disk. Cut puts the picture onto the clipboard and clears it. Copy copies the picture to the clipboard, without clearing it, while Paste replaces the picture with whatever is on the clipboard. Cut and Copy put the picture onto the Clipboard as a Windows Metafile, a Windows bitmap and as an OLE object. These formats take up a lot of memory, so PhotoPlus clears the clipboard when you exit it.

Undo
This button reverses the previous operation. Use it when you've made a mistake, or when a transformation didn't work out the way you hoped it would. Undo works by keeping a copy of the picture as it was before the last change. This takes up memory. If you have a low powered PC, or are using large pictures, you can reduce the memory requirements by disabling Undo. Alternatively, if memory is not a problem, you can increase the number of undo levels. To edit the undo settings, double-click on the Undo button and set the undo value as required.

Reload Picture
This button throws away the copy of the picture you've been working on and reloads the original from disk. It's like a "Super Undo". It undoes everything you did since the picture was last saved or loaded.

PhotoCD Gallery
This button provides a quick and easy way to load Kodak PhotoCD pictures from a CD-ROM drive. Each PhotoCD file stores a single picture at a variety of resolutions and colour depths.

Gallery
The Next and Previous buttons step forwards and backwards through the gallery, six pictures at a time. You can double-click on one of the pictures to load it, or you can use the Tab key to switch between them and then press Return. PhotoPlus will then close the dialogue and load the picture.

Scan in an Image
This button supports the TWAIN image acquisition system which allows you to scan pictures directly from your scanner, provided it comes with a TWAIN driver. When you click on the Scan Image button, PhotoPlus finds and loads the scanner's TWAIN software. This will originally have been supplied with the scanner. The scanner's dialogue will appear, when you finish scanning, so close the scanner's dialogue and the picture will appear in PhotoPlus.

Zoom
This row of buttons controls the zoom of the Preview Window. The current zoom percentage is displayed in the Status bar.

Information
This button brings up a dialogue which provides more information about your picture. The colour histogram displays information about colours and how they are distributed within the picture. A picture is made up of pixels, each pixel can have a different colour and the colour of a pixel is determined by mixing red, green and blue components.

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street record store direct to you, in CD quality. Please note that the demo is set up to work best with Pentium PCs. If you have a 486DX/266 or a slower PC you should install Cerberus and then, using File Manager or Win 95 Explorer, double click on the program \CERBERUS\CERBPLAY.EXE on your hard disk. Then click on the top right-hand button and click on "Half" in the frequency Box, followed by the "Downmix" button. This will reduce the quality of the music output slightly, but will allow the program to perform well on virtually any PC. You can then use the new Program Manager icon to call up the complete Cerberus player. Note that when it comes to loading in tracks to play, the music can be found in the \CERBERUS directory of the CD-ROM.

PhotoPlus

Top-notch photo editing from the market leader. For full details, see the program's comprehensive built-in help, and/or the cover disk notes (pages 8 and 131).

Mac Software

We're sorry, but we had so much material this month we would have needed one and a half CD-ROMs to hold it all. After selecting only the very best programs, there was no room left for Mac software, but we will bring you another superb selection very soon.

Video for Windows Enhanced Setup

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

Some extra buttons on the Video for Windows page, which allow you to fine-tune your PC's performance without having to leave PCWI or restart Windows.

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

Testing your CD-ROM

If you suspect your CD-ROM may actually be faulty or damaged you can run the file CDTEST.EXE in the SYSTEM directory of the CD-ROM. The program will then examine every byte of data on the disc to see if it can be correctly read. The process takes up to 35 minutes and generates a verification code if the disc passes the test. If the CD-ROM fails this test, try cleaning it with a light solution of washing-up liquid and dry it with a lint-free cloth and run the test again. If it still fails, return your CD-ROM to the magazine for a free replacement.

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

```
CDTEST D:
```

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

IMPORTANT - READ THIS!

• General Protection Faults

If you receive General Protection Faults when running PCWI or playing any digital videos, it is probably because your graphic display driver may not be entirely Microsoft compatible. The answer is therefore to install one of Microsoft's own drivers, as follows (but *not* if you are using Windows 95 as the drivers supplied with it are even newer than the ones on this disc):

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

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

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

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

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

• VIDEO FOR WINDOWS INSTALL FAILS

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

• PCWI IS SLOW TO LOAD OR RUNS SLOWLY

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

• WINDOWS NT AND OS/2

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

CD-ROM Advice & Contacts

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

For technical support on the CD-ROM and the programs on it call the VNU 24-hour Hotline on 01233 665800. This is a computerised touch tone advice system providing hints and tips on a wide range of topics. It also offers you the opportunity to speak to a member of our technical support staff during office hours. Using the computerised system you should be able to access the information you need very quickly. If you prefer you can email rnixon@cix.compulink.co.uk, or on Compuserve 70007,5547, or write to us at the magazine.

Personal Computer World

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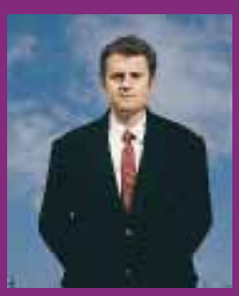
Editorial

The consumer PC/TVs reviewed in this issue (page 110) are the manufacturers' first serious stab at the format. They know that some people are buying PCs for the home, but they're not really sure what they want or where they're going to use them

The result is a hotchpotch of machines. Some have TV tuners or fax/modems, some don't. Olivetti's Envision even lacks a monitor, an echo of the first home computer revolution in the late seventies when home computers routinely plugged into televisions. None of them really exploit the format.

The consumer PC/TVs of the future will have a high-resolution 17in, or larger, monitor, a TV tuner and a fax/modem as a matter of course. They'll be on the Internet and designed to send and receive email as easily as an office mail system. You won't need to dial up manually; your PC will log on and collect your email for you. You'll still need a keyboard though, perhaps an infra-red one like the one with Olivetti's Envision. But your PC will also come with an all-singing all dancing TV remote control, with a built-in trackball (or similar) and designed to make surfing the Web as easy as, but faster than, using Teletext now.

The challenge for the manufacturers is to deliver all this at prices consumers can stomach. Getting home PC/TVs to sell in large numbers will be all about hitting price points. I was recently shown a prototype of the machine described in the last paragraph. It's expected to ship in late '96 for around £2,000 and will sell in small numbers to people with money to burn. The big retailers will sell a few, but won't get too excited: what they want is the same product at £499. For that we'll have to wait.



Ben Tisdall
Editor

Next Month

Personal Computer World

Superfast PCs

Pentium 120MHz processors, 1Gb hard disks, 16Mb of RAM, quad-speed CD-ROM drives. The ultimate machines for running Windows 95 at speed. And with prices starting from under £1,500

Accountancy software

David Carter reviews 10 accounting packages, from the latest Windows ones to tried and tested DOS stalwarts.

Booze round-up

Paul Begg samples some of the beer and wine guides now available on CD-ROM

January '96 issue
— On sale Thursday 7th December

February '96 issue
— On sale Thursday 4th January
• Visual programming tools
• Fax/modems

FREE SUPPLEMENT

GUIDE TO GETTING ONLINE

The essential guide to comms. All you ever wanted to know about getting online — choosing a service provider, buying a modem, and using the Internet. Plus free trial with CompuServe.

Newsprint

NEWS Contents

Threat to mail as macro viruses sweep the world

Many users have yet to wake up to the danger of the new macro viruses and other email boobytraps, security experts say. The Concept virus, also known as Prank, is close to being the most widespread in the world only weeks after Microsoft circulated it in a Word document on a CD for Win95 technicians, said Graham Cluney, senior consultant at S&S, publishers of Dr Solomon's Anti-Virus Toolkit.

"Concept has got to the stage now where it will never go away. It will always be with us," he said. "It is spreading like a petrol fire. People don't realise documents can be dangerous. They are not used to checking their email."

One effect of the virus may be to delay a long-expected move from fax towards a more general use of email

Lotus and Novell/WordPerfect documents also look vulnerable to Concept-type macros which use Basic-like languages that can perform virtually any task on a PC, like formatting a disk or emailing files (nice for industrial spies). Most dangerous are macros that start automatically when you open a file — whether or not they reproduce to become viruses.

There were no reports of problems with Lotus or Novell products but neither company seemed eager to comment on the threat.

The original Concept is harmless in itself though it can prove costly for companies who may have to disinfect thousands of files. But it is in effect a virus template: a novice programmer could add a damaging payload.

"It has lowered the threshhold of who can be a virus writer," said Andy Campbell, sales director of virus specialist Reflex Magnetics. Raw text, as sent in ordinary email, is safe, but any formatted document received or downloaded — even on Macs, and other platforms — should be checked. Microsoft and S&S have posted Concept detectors and Reflex has a fix.

The absence of major disasters (as we went to press) may explain user complacency. But Cluney warned: "The sort of people who write viruses looked down on Concept because it does not require machine code. But that could change very quickly."

Fixes can be found at www.microsoft.com and www.drsolomon.com; Microsoft 01734 270000; S&S 01296 318700; Reflex 0171 371 6666 ; Lotus 01734 455445; WordPerfect 01344 724000

120MHz Toshiba notebook

Toshiba announced a portable using a battery-friendly 2.9-volt 120MHz Pentium on the day Intel launched the chip. The Tecra 700CT also boasts a quad speed CD drive and an 11.3in 800 x 600 TFT screen.

● New notebooks — page 23; news analysis — page 34

Toshiba 01932 841600

Grove makes some smart connections

After the multimedia PC... the communicating PC. This is the latest wheeze of Intel chief Andy Grove, described in his keynote address (left) at Telecom 95 in Geneva and during a London stopover.

He also spoke again of his vision of a computer where the central processor (made by Intel, naturally) does the signal-processing tasks usually offloaded to subsystems such as video boards and modems. The next-generation communicating PC, which Grove called the Smart Connection, will emerge late next year. It will bundle videoconferencing, fax, voice and data comms, and support virtual reality and Web Page templates.

It will get a extra help from Intel in the form of "multimedia extensions"; Grove declined to elaborate on these. He used Nokia's mobile video system (see page 29) to illustrate his vision of the future.

Meanwhile, a UK company has proposed a neat reversal of Grove's architecture, with a standard based on a general-purpose signal-processing subsystem — see page 22.

Enter the P6... er, the Pentium Pro, with 32 bits flying under NT

Intel has given the name Pentium Pro to its next-generation 5.5 million-transistor processor, codenamed the P6. The first machines to ship are likely to run Windows NT and Unix.

On Windows 95, which still contains some 16-bit code, the Pentium Pro is not appreciably faster than the equivalent Pentium. Running 32-bit software under Windows NT, the performance is said by Intel to "have exceeded expectations."

First applications will be in full motion video, 3D graphics and Web authoring. One main feature of the Pentium Pro is 256Kb of built-in cache. This improves the scalability so that performance rises steadily as clock-speed is increased.

First versions will run at 150MHz with a bus speed of 60MHz. The first server implementations, which require high bus bandwidth, will run at 166MHz with a 66MHz system bus.

Two new PCI chipsets, the 82450GX for servers and the 82450KX for workstations, have also been introduced. Both have been optimised for Windows NT and support multiple PCI slots, "glueless" multiprocessing and up to 4Gb of RAM.

The 0.6 micron 150MHz Pentium Pro will cost just under $1,000 in volume — comparable, Intel says, to the pricing of early Pentiums. The 166MHz 0.35 micron version, slated to ship in the first quarter of 96, will cost $1,066 in volume.

Website: http://www.intel.com/

See review, page 104

StrongARM challenge from Digital

Two moves by Digital last month pushed home the message that chipmaker Intel will never regain the domination it had in DOS days.

One opening for Intel rivals lies in the market for handheld organisers which are are not so tied to Windows and DOS. A strong contender is the StrongARM chip stemming from a collaboration between Digital and Cambridge-based Advanced Risc Machines.

Digital demonstrated the first StrongARM (SA-1) core, running internally at 160MHz and with a claimed Pentium-class performance, or better. More significant is the fact that it draws only 120 milliwatts — a fraction of the battery power drawn by the Pentium.

ARM spokesman Trent Poltonetti said it would also be much cheaper. ARM chips were used in the Apple Newton, and StrongARMs will power the next generation of organisers and portable video communicators.

The second opportunity for Intel rivals stems from the fact that Microsoft appears to be moving Win95 closer to Windows NT, which has been ported to several platforms including the PowerPC and Digital's fast Alpha chips.

About 100,000 Alpha systems are running in high-end systems worldwide. Now Digital is offering an Alpha workstation (above) priced for the desktop. The XL systems, which offer a choice of 233MHz or 266MHz Alpha 21064 chips, and are also available with Pentiums, cost between £2,000 and £4,244. They are aimed mostly at CAD users.

Intel chief Andy Grove, asked in London (see opposite) if he feared a migration to rival chips as operating systems become platform independent, said: "If we don't keep ahead of the competition, we don't deserve to survive."

Digital 01734 868711; ARM 01223 400400

Short Stories

Eight-speed CD drives on the way

● Several developers are said to have eight-speed CD-ROM drives in the pipeline. Diamond Multimedia is offering one as part of a £425 multimedia kit including a 16-bit audio card and speakers, but it was not available at the time we went to press.

Diamond 01753 501400

Site takes flight

● Isle of Man airport has announced that it has put up a Web site at www.enterprise.net/airport/airport.htm "to provide information and support for both passengers and pilots". We hope the pilots have a fast line ...

Lips Aid

● From the lovely kitsch lips of Joanna Lumley, a plea for Net users to festoon their Web sites and email with red ribbons on 1 December, which is World Aids Day. Ribbons like this, designed by celebrities such as Ms Lumley and Chris Evans, can be downloaded from the Health Education Authority's site at www.wad.hea.org.uk.

HP claims to beat Intel P6 board

Hewlett-Packard has made its own Pentium Pro motherboard which it claims is faster than Intel's.

It has also made its own support chips because Intel's do not support Extended Data Out (EDO) RAM, said European PC product manager Alison McCallum-Varey.

EDO RAM is up to 60 percent faster than normal DRAM because it allows its output to be read while it is being primed for a new data fetch (i.e. the data-out time is extended, hence the name).

Third-party chipmakers, and indeed Intel, were expected to produce EDO-friendly support chips but not until at least next year.

One criticism levelled at the Pentium Pro, with its integrated cache RAM and Orion support chipset, is that it limits the scope of manufacturers to differentiate their machines by offering fast memory to boost data flow.

Hewlett-Packard 01344 360000

New print system ushers in cheaper smaller lasers

A new generation of laser printers has hit the market which take advantage of Windows software allowing them to be cheaper, smaller and smarter.

They are bundled with the Microsoft Windows Printing System which, like the so-called GDI printers that became popular under Windows 3.1, cut down on hardware prices by allowing the image processing to be done by the host PC rather than the printer. They have to be used by a Windows machine, but can be used from applications running within a DOS box under Windows 3.x or 95.

The system also means that printing can be controlled by friendly PC dialogue boxes rather than by the ludicrously complicated system of buttons and tiny LCD screens that printers have sprouted in recent years. If your PC has a sound card, it will even tell you when there is a printing problem.

The first of the WPS range to be launched was the JX-9200 series from Sharp, which claims they are the smallest laser printers on the market. They measure just 299 x29 x185mm and print at four pages a minute. The 300dpi JX-200 costs £329 and the 600dpi JX-210 costs £429.

Canon is offering the slightly larger (336x319x249mm) 600dpi LBP-460 for £349. The Windows Printing System addresses only 300dpi, and both 600dpi printers use enhancement technology.

Canon 0181 773 6000
Sharp 0800 262958

Home PCs converge in style

More manufacturers have followed the lead of the likes of ICL and Packard-Bell in bringing out novel home and small-office PCs, which are leading the field in using converging TV and phone technologies (Newsprint, November).

Olivetti, which is proud of its Italian styling, has launched the Envision (reviewed on page 117), which looks more like a video-recorder than a PC. Brother has announced a TV-style PC with the monitor incorporated into the system box.

Hewlett-Packard's Vectra 5000 series are phones as well as PCs, with sophisticated voicemail, fax, and remote access facilities.

MJN announced a range of what it called "futuristic style" models with PC card options.

HP 01344 360000; Olivetti 0181 705 6666; MJN 01262 777555

Compromise on new CD standard

The row over which standard to use for the next-generation compact disks has ended in compromise.

One contender was the multimedia compact disc (MMCD) backed by Philips and Sony. The rival SD (super density) alliance of Toshiba, Panasonic, Thomson and Time Warner proposeda sandwich of two half-thickness disks.

The compromise is closer to the SD proposal, allowing a slightly reduced 4.7Gb on a single side of the sandwiched disk. The reduction is because the MMCD method of error checking was adopted, and this uses 16-bit rather than 15-bit packets per 8 bits of raw data. This was at the insistence of companies like Microsoft and IBM, who had favoured the MMCD format.

The SD camp was dominated by entertainment companies who were more concerned with packing an extra eight minutes of video on a disk. Much of the impetus for the change has stemmed from the fact that a full-length film cannot be packed into the standard CD's 650Mb.

Short Stories

64-bit Win95 accelerator

● Trident has launched what it claims is the first 64-bit Win95 accelerator chip, supporting direct draw and direct video acceleration.

The TGU19682 accelerator also implements Unified Memory Architecture (UMA), using PC system memory rather than extra graphics memory to process images.

This saves up to £70 in video RAM costs and the chip itself will cost about £20 in quantity, which should lead to cheap high-quality graphics acceleration.

Kudos Thame (distributor) 01734 351000

Free service boosts sales

● A free after-sales warranty scheme has left a direct reseller claiming sales of more than £1.1 million after just one month of launch. ICL subsidiary Alternatives, which launched the CareFREE warranty in September, is said to be overwhelmed by the response.

CareFREE is on offer to buyers of Compaq, Toshiba, IBM and Fujitsu PCs and provides a full on-site parts and labour warranty for three years at no cost. The success of the scheme may lead rival direct sellers to follow Alternatives which is now expected to extend the scheme into specialised areas.

Alternatives 01925 700007

Online share service reopens

● The Stock Exchange has backed down in the row over its blocking of Britain's first stock-dealing service for Web users. The stated reason for the block was a claimed breach of confidentiality by Electronic Share Information in its dealings with the media.

The ESI service is now back online at www.esi.co.uk

Idealist 4.0

● Idealist 4.0, a Win95 version of the freeform database, will be available this month for £149.50 or £69 for upgraders.

Blackwells 01865 206206

Tim Bajarin in the US

Go man goes with Net auction

● Lotus co-founder Jerry Kaplan started Go Corporation on the premise that pen computing would be hot and appeal to untapped markets .

Pen computing went bust, and so did Go. But Kaplan learned some lessons and started an interesting Internet venture called OnSale. It is a new type of interactive retailing program that is much more than an online store. It recreates in electronic form the fun and thrill of bidding at an auction.

OnSale (http://www.onsale.com) exploits the unique advantages of the online medium to create a new retailing format. It focuses on limited quantity goods, such as collectibles and close-outs, and offers them in a series of fast action formats where prices and availability change in response to demand.

OnSale creates an entertaining and exciting experience. Check it out.

New Sony link is Magic

● The PIC 1000 Magic Link personal communicator has won only a moderate following since Sony and General Magic launched it a year ago..

But Sony is willing to give it time to evolve and has come up with the PIC 2000, a significant upgrade.

It still uses GM's Magic Cap environment, but boasts a backlight that you can turn off and on. It also includes a built-in speaker phone, as well as two Type II PC card slots.

With a cellular modem it becomes a solid wireless communicator. RAM is boosted from 1Mb to 2Mb — 1.4Mb of it free. The built-in modem now offers speeds up to 14,400kbps.

Software is included for accessing various email programs and the street price is expected to be about $895 (the P100 price drops to $499). It will be available worldwide in late November.

Could LSI's ViPA be Intel's snake in the grass?

A new British-designed architecture which could lead to cheap do-it-all multimedia comms cards is being backed by major IT companies, the developers claim.

At the heart of the system, from Loughborough Sound Images, is a general-purpose digital signalling processor card which can act as a fax/modem, ISDN interface, SoundBlaster-compatible audio card, MPEG player, and video-conferencing card.

Managing director Simon Yates claims the videoconferencing quality is four times as good as rival systems at a quarter of the cost.

An upper software layer communicates with Windows using standard hooks via a media manager. A second layer consists of server applications for functions such as fax or H3120 videoconferencing.

Extra functions can be created simply by adding software to this layer — limited only by the types of input and output sockets installed.

"The great thing is that if standards change, you can update through software. You don't have to change the hardware," said LSI business manager Ralph Weir.

LSI has been looking closely at the Firewire and USB communications ports, which may be used to link next-generation peripherals.

LSI calls the architecture ViPA (Video Processing Architecture) and said it would probably eventually be made open standard. ViPA cards will be made under licence by other manufacturers rather than by LSI.

The first ViPA cards are expected to come out early next year for about $1,000 (ISA) and $750 (PCI). Yates said prices could be expected to fall dramatically.

The architecture flies in the face of Intel's strategy, which is to concentrate all processing in the main processor.

Asked if LSI was not being optimistic taking on the might of Intel, Yates said: "Wait until you see the companies we have backing us."

Loughborough Sound Images (LSI) 01509 634300

Meet Adam and Eve, a virtual reality man and woman who live in the extensive clipart library of the lastest release of the V-R authoring package, Superscape.

Like their Biblical counterparts, the virtual Adam and Eve can reproduce to populate an entire world. They have collision detection to prevent them crashing into walls. They can walk, run and climb stairs.

Superscape 4.0 supports VRML, the virtual-reality version of the Internet's HTML markup language. Also launched is a software developer's kit, including a new module for designing device drivers, and an authoring tool for applications that can run across networks of up to 25 PCs.

The price of the Visualiser, Superscape's V-R viewer, has been reduced to £99.

Superscape 01256 745745

First ISDN cards at modem prices

British Telecom was said last month to be reconsidering its much-criticised charge for setting up ISDN lines, as news broke of the cheapest-yet PC interface for the fast digital link.

AVM Telecom is offering an ISDN card, supporting data transfer rates before compression of up to 128 kilobits per second, for just £198. It is the first to approach the price of modems, for which the fastest VFast-plus mode offers just 33.6kbps.

Ken Brown, AVM product development engineer, said the new offering was "bringing ISDN cards down to a realistic price." British Telecom still charges £400 for an ISDN connection — more than ten times the equivalent charge in Germany. Brown agreed this was expensive but said the comparison with France and Germany was unfair because the line charges were higher there. "When you compare the charges, you break even after about two years with British Telecom."

● Dataflex is offering a Plug and Play 14.4kbps fax/modem that also provides hands-free speaker phone and voicemail facilities for £129.

AVM 01504 370370; Dataflex 0181 543 6417

The Demon millions

Net pioneer Demon Internet has raised £8 million with a private stock issue which values the company at £26.7 million. Chairman Cliff Stanford said £5.5 million of the money would be ploughed back into the company, which he claimed has 45 percent of the UK dial-up market. He admitted that there had been complaints from users about overloaded lines, but he pledged: "We have more than enough modems installed now and we will keep ahead of the game in future."

Demon 0181 371 1234

Palmtops set the pace for portable innovation

The focus for change in mobile computing has shifted emphatically from laptops to palmtops, judging from the latest round of launches.

The most innovative portable was the new OmniGo 100 organiser from Hewlett-Packard. With the lid open it looks a conventional palmtop with a square LCD screen and a keyboard looking like that on the Psion 3a, arch rival to HP's LX palmtop range.

It uses the GEOS graphical interface and includes all the usual organiser features on 3Mb of ROM. With the lid flipped on its back, it can be pen driven, using a redesigned handwriting (see below) to get around the recognition hassles of previous pen-driven machines.

It will be priced below the market-leading Psion 3a.

At the other end of the scale, multimedia notebooks have bigger screens and there is a drift from nipples to finger pads as pointing devides. Olivetti's new models (of which more next month), which boast 11.8in TFT colour screens, use pads, and so do the new high-end NECs.

NEC's flagship Versa 4000 uses Intel's frugal 2.9 -volt Pentiums running at 7MHz or 90MHz.

NEC launched a complete range, starting with the Versa 500 aimed at private and small-business users and having a 9.5in dual scan colour screen. Prices start at £1295.

The mid-range Versa 2000C use a 75MHz DX4 chip with 8Mb of RAM, upgradable to 40Mb, with prices starting at £1,995.

Hewlett-Packard has launched another Omnibook, the 5000, running a 90MHz Pentium with a choice of 10.4in VGA or SVGA screens.

Compaq showed its new LTE 5000 modular notebooks with a choice of 75MHz and 90MHz Pentium processors. It boasts an IRDA-compatible infra-red port and an MPEG and TV adaptor.

A CD drive, a second hard drive, an extra battery, or a 3.5in floppy drive can be added to a spare bay. Screens can be either an 11.43in STN colour or 10.4in TFT.

IBM has announced a new Thinkpad with a 75MHz DX4 processor and a choice of 10.4in dual-scan or TFT screens.

Clive Akass

NEC 0181 993 8111; HP 01344 360000; IBM 01256 343000; Compaq 0181 332 3000

● News analysis — page 34

New script could be easier than abc

As the fabled Irishman said when asked the way to Dublin: "If I wanted to go there, I would not start from here." Handwriting designed for our brains is not necessarily the best starting point for a script designed to be read by computers.

The problems stemming from similarities like that of the figure 1 and letter l are obvious. Less so is the fact that a computer could distinguish between the two if the meaning depended on the way each was written: up for the number, down for the letter. Computer-readable script thus needs fewer shapes than the alphabet.

The Graffiti script used by the OmniGo 100, and available for Apple's Newton, uses the computer's sense of direction, but otherwise deviates little from alphabetic shapes. Each letter has to start at a particular point, and capitals are marked by a separate symbol. Palm Computing, which licensed the technology to HP, says it can be learned in 20 minutes.

HP seemed rather coy about using Graffiti, as if it expected to be accused of defeatism over handwriting recognition. Yet a new script is not such an outrageous idea: we take for granted the effort required to master a cumbersome keyboard.

The big question is whether Graffiti goes far enough. If we do turn out to need a new script for computers (by no means certain, with speech recognition looking promising) it should be given very serious thought because we could be stuck with it for a long time, just as we are stuck with the inefficient qwerty keyboard.

And why stop at the alphabet? As the computer can make a few symbols go a long way, it should be possible to invent a very efficient PC-readable shorthand.

Clive Akass

Palm Computing 425 949 9560 (US)

Short Stories

Infra-red is in for a boom

● The number of portables sold with infra-red ports will quadruple over the next couple of years, according to IDC figures cited by I-R specialist Extended Systems.

The increase in sales could bring down the price of standalone ports — Extended's JetEye module currently costs £95.

"The price is a function of the volume of sales," said managing director Julie Jones. Sales of JetEyes are split roughly equally between printer and PC connections. But this, too, could change as transfer rates rise from the 115kbps of the older IRDA1 standard, to up to 4Mbps under emerging IRDA2.

David Dack, director of the communications lab at HP's Bristol reseach centre, where much of the groundwork for IRDA was done, said he believed Windows 95 will drive down prices because it includes an IRDA driver.

"Before Windows 95, each manufacturer had to write a driver as well as build the hardware," he said.

Extended Systems 01705 875075

Psion palmtops beat the world

● The British company Psion has thrashed the Americans and Japanese to gain the major share of the world market in personal organisers, according to a new Forrester report.

It reckons that world sales of all makes will top 500,000 this year representing an annual growth of 40 percent. Psion tops the league with 32.7 percent of the market, with Hewlett-Packard second at 28 percent. Apple is well behind with 14 percent for its Newton range

But Psion cannot afford to be complacent. It uses proprietary software and Forrester predicts that the market with shift en masse to standard graphical interfaces such as Geoworks' Geos and Microsoft's Pegasus.

Psion 0171 262 5580

Short Stories

Smart switch sorts out the fax

● A new smart box will switch phone calls automatically between a fax/modem, fa machine, answering machine or voice phone as appropriate.

The £119 Frontier TrioLine can drive up to five extension telephones, and if a fax or modem is in operation when someone tries to dial out, it will give two warning beeps when the line goes free.

Electronic Frontier 01734 810600

Remote support in your lap

● Traveling Software is selling a cut-down version of its Laplink software to allow helpdesks running Laplink for Windows to configure PCs remotely. Machines running Laplink Host can be taken over completely by the remote caller.

Compaq already uses Laplink software to provide technical support for Presario users. Hewlett-Packard uses the rival software Carbon Copy. Laplink Host costs £59.95, or ££349.95 for ten users.

Traveling Software 01753 818282

Scanner puts finger on intruders

● Fujitsu has developed a system for identifying people from 3D scans of their fingerprints. A single Fingerscan box with 512Kb of memory can store reference images for up to 300 people locally. But boxes can be networked together or controlled from a PC network. False acceptances are fewer than one in a million, Fujitsu claims.

Bannerbridge (distributors) 01268 419101

Sales blip

● Applications software sales in Europe faltered in the run-up to the Win95 launch, according to Software Publishers Association figures. Sales for the three months up to July were $423 million, an increase of just one percent over the previous year. Sales for the half-year were $9,390 million, up three percent.

Novell dumps Unix as system giants redraw battlelines

Shocks waves from the Windows bandwagon caused a major realignment last month in the networking world. Novell announced that it was selling its interests in the Unix operating system to concentrate on developing its Netware software.

The move was widely seen as a bid to stave off the threat of Microsoft Windows NT, which has been gaining support among corporate and academic users and is to get the same look and feel as Win95, allowing organisations to standardise on a single interface.

In a complex deal, Novell passes its interest in Unix to Hewlett-Packard and the Santa Cruz Operation in return for a 17 percent share of SCO and seven years of royalties. SCO will develop a 32-bit version of Unix for Intel machines, and HP will develop a 64-bit version primarily for the RISC chip it is developing in conjunction with Intel.

SCO and HP have also agreed to incorporate Netware file, print and directory services into their versions of Unix; Novell in turn will merge HP's Distributed Computing Environment into Netware. The deal means Novell will drop its so-called SuperNOS project, by which its UnixWare and Netware software would be merged into a single net operating system by 1997.

The scheme could remove some of the confusion over different flavours of Unix, though it leaves IBM a little isolated with its AIX dialect.

Novell chief Bob Frankenberg announced a Gates-style grand strategy to provide a billion-node Smart Global Network by 2000AD. A set of programming interfaces called Net2000 will make the network accessible from any major platform including NT, Windows, OS/2 and Unix. Frankenberg said: "We're talking about supporting all clients and all networks. This is anathema to Microsoft."

Novell will launch a Web server suite early next year to provide Netware users with easy access to the Internet.

Novell 01344 724000

Re-volt over poor power supplies

The developers of software and add-on cards are being unfairly blamed for problems stemming from poor-quality PC power supplies, according to the makers of a new diagnostics board.

The problems occur when the line voltage fluctuates beyond the tolerances of the components on the motherboard or add-on cards, said Adrian White, research and development director with WCD Research. "The first thing an engineer will do when testing a piece of equipment is to measure the voltages. But your average user never thinks of it, " he said.

WCD's diagnostics board, called Conflix, was designed primarily to solve memory and IRQ conflicts which still bedevil users despite the advent of the Plug and Play specification, which many devices do not adhere to.

White said: "We built the card for our own use at first because there is no absolute foolproof way of sorting out memory conflicts through software. Then we thought we might as well sell the card."

The voltmeter was added to check for power problems.

The Conflix board costs £99.

WCD 01734 391225

Ear it is... the smallest PC

This tiny hearing aid contains what makers Oticon claim is the world's smallest computer. The DigiFocus weighs just 4gms and includes two custom chips capable of 14 million instructions per second — which Oticom claims (somewhat misleadingly) to be equivalent to a 486 computer. The advantage is that the devices can be fine tuned to the needs of the individual user.

Oticon +45 39 17 71 00 (Denmark)

Short Stories

Fighting spirit

● The storage war (see story right) extends to traditional hard-disk makers, who have been going through a shake-up. Market leader Seagate had hardly finished the launch of a new software division when it announced the takeover of rival Conner.

And Western Digital announced the sale to Philips of its multimedia division, which produces the Paradise video-card range.

President Chuck Haggerty (above), passing through London, said WD was going to focus on storage management.

He claimed the Seagate merger could actually work out well for Western Digital because it could curb an "irrational" price war. He added: "A lot of manufacturers buy from Seagate and Conner because they do not want to be tied to one source. Now they may want an alternative."

Haggerty said hard-disk data densities would grow by more than 50 percent a year "for the foreseeable future" — enough to fight off drives like the Jaz, which takes removable 1Gb disks.

600dpi colour

● Lexmark, which broke new ground with a relatively low-price 1200dpi mono laser, is to introduce a 600dpi colour model for about £6,000.

Lexmark 01628 481500

Drawing lessons

● Fractal Design has launched version 2.0 of its Dabble art package. It includes flip-book animation tutorials based on Walter Foster's Learn-How-To-Draw books.

Fractal Design 0171 454 9360

Sony MD Data drive arrives late as storage war hots up

Sony is at last shipping its MD Data drives, which it announced more than a year ago as the death of the floppy disk and the greatest thing to hit computing since the integrated circuit.

But the delay could cost Sony dearly, with a host of rival and cheaper technologies already competing in the market (see feature, page 134).

None is quite as elegant as the MD drive, which can also be used to play audio discs. Each 2.5in MD disk can store 140Mb and will cost £15. But at £499, the drive is more than three times the price of Iomega's Zip. It comes with headphones, a lithium-ion battery, Mac and Windows software, and a SCSI or PCMCIA interface.

Meanwhile Iomega continues to make the running in the market, with a £149 Zip-like drive offering which takes the new Travan tapes with a compressed capacity of up to 800Mb. It will also use QIC 80 tapes (see page 150).

Iomega also says that it will ship its new Jazz drive in Europe in January. This will cost about £400 and take 1Gb removable disks.

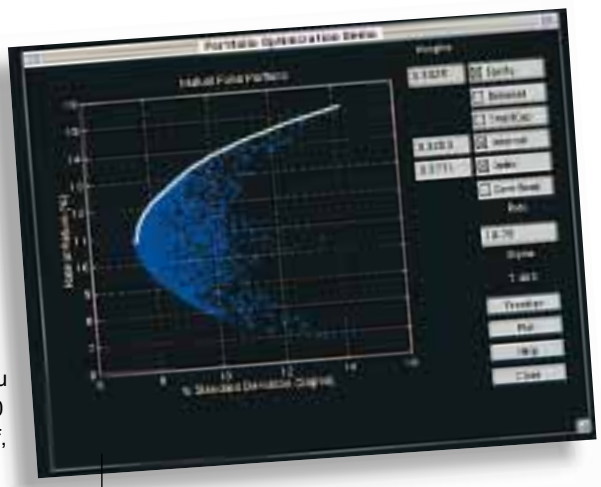
And there are more details of Hewlett-Packard's relatively cheap CD-Recorder (see Newsprint, November). It costs £850 list price, though will probably sell for rather less, and the price includes a dedicated SCSI adapter card — you are recommended not to daisy-chain this, and not to use an existing SCSI port.

You also get software which HP says simplifies CD recording, which can be a tricky business. The drive records at two-speed and reads at four-speed.

Sony 0181 760 0500; Iomega 0800 898563; Hewlett-Packard 01344 369222

Clive Akass

Cold War cybernauts battle on Wall Street



Optimisation curve for an investment portfolio, showing the greatest returns for given risk levels

The thawing of the Cold War has led to a new type of warfare — between financial analysts using sophisticated software. Arms development has slumped, throwing highly-trained engineers and mathematicians out of work in both the US and Russia. Many have switched to finance, applying to financial structures mathematical techniques that were once used to design and control missiles. The result is a kind of cybernetics of money.

"We are talking about areas in which you stand to make a lot of money if you get a 10 percent edge, or even less," said Mike Wolf, head of finance-products group at maths software specialist The MathWorks.

The company became aware of what was happening when it realised that its Matlab package, traditionally used by academics and engineers, was being taken up by finance houses and large corporates.

Wolf said one big difference between the engineering and finance worlds is that new ideas get taken up more quickly. Engineers get sued if anything goes wrong but "if you do something in finance and it works, you get a quick result and you use it again."

Now The MathWorks is targeting a £745 finance toolkit at the market. Techniques used include fuzzy logic, neural networks, signal processing (to detect trends through "noise"), and dynamic system simulation, as well as more conventional tools like data visualisation and matrix manipulation.

The Mathworks 01223 462244

Video phones go mobile

Nokia has shown a system which will allow mobile phone users to use cellular links for video conferencing.

Normally up to seven callers share a single frequency, with each digitised conversation being allotted one of eight time slices — the eighth being a control channel.

The links are limited to a speed of 9600bps which is too slow for moving pictures. The Nokia system, shown at Telecom 95 in Geneva, uses three of the time slots to achieve a data rate of 28,800bps, which is good enough for limited moving pictures.

The system uses a modified phone, data card and cell site. It can manage up to 7.5 frames per second, or a minimum of two per second. It conforms to the H.261 video specification rather than the more common H.320. Sound is limited to 5300kbps.

A European Telecoms Standards Institute (ETSI) specification exists for the use of all eight timeslots and has the potential for full-screen video conferencing.

The Nokia technology is still experimental and uses a desk-top computer. But it paves the way for video phones built into laptops and maybe even Dick Tracy-style video watches.

Nokia 01793 512809

Simon Rockman

New Netscape browser posts secure sender/receiver envelopes

Netscape has announced that Navigator Version 2.0 will be available in early December for Windows, Mac and Unix platforms. It uses nested frames, described as metadocuments, turning single Web pages into complete one-stop publications.

Designers can now create multi-layered Web pages containing, for example, a list of hyperlinked contents in one frame with a separate frame to display linked documents. Readers no longer need to return to a home page to access the contents list.

Multimedia developers will be able to display video or other moving images within frames using MacroMind Director and Hot Java Netscape extensions.

Version 2.0 supports an Adobe PDF extension which allows Acrobat documents to be displayed within the browser — enabling Acrobat's own links within the PDF document itself and back out to the Internet.

A Gold version of the Navigator will allow readers to design Web pages on the fly using cut-and-paste techniques. Users can add pictures or video to documents which can be posted to Web servers or sent as an email message.

A new transaction system, Secure Courier, has been announced. This is described as an "electronic envelope" whereby only the sender and receiver are able to view the contents.

Netscape believes it is right to release its extensions to HTML ahead of the international committee approval but will continue to release them into the public domain.

Three beta releases of Navigator 2.0 will precede the final release and all will be available to download from Netscape's home page. This free download policy has virtually made Netscape Navigator a de facto standard on the Internet and will continue. Netscape's home page is on http://home.netscape.com.

Paul Fisher

UK breakthrough claimed in speech translation

A UK-developed system for translating near-natural speech into computer-readable text will be launched by the end of the year, according to its promoters. The Abbot Recognition System, based on research at Sheffield and Cambridge universities, was due to be launched at the Live 95 show last month by Responsive Systems. But marketing manager Melanie Knowles said at the show: "It was not quite ready."

Most recognition systems require you to pronounce each word separately, Philips sells a network-based continuous-speech recognition system designed for dictation tasks normally undertaken by audio-typists. The Abbot system is targeted more at the individual user. Knowles said the first versions would have only a limited vocabulary — but enough for standard letters.

Responsive Systems 0171 603 9406

Short Stories

Dual card

● Epson has produced what it claims is the first PC card to support both 10BaseT and 10Base2 Ethernet connections.

Epson 01442 227291

CD goodies

● Sprint Software's £14.99 "Super Oz" CD includes more than 3Gb of compressed games and educational shareware.

Sprint 0161 477 4235

Versatile Brother

● Brother's new multi-function machine, the £1,299 MFC 6000, can act as a printer, fax, copier, scanner and modem, and can share a single line with a phone.

Brother 0161 330 6531

● This shows Cirrus Logic's latest 64-bit graphics chip, the CL GD5436, which talks directly to the PCI bus and supports a resolution of up to 1024x768 in true colour.

Cirrus Logic 01727 872424

cc:Web

● The new cc:Mail Web lets you access your mail via any Web browser. The software sits on a Web server and talks to any browser or cc:Mail post office. It costs £149.

Hot Orchid

● Orchid's Kelvin Video64 64-bit graphics card offers full-screen video playback and resolutions up to 1280x1024. It costs £99 and £147 for 1Mb and 2Mb of RAM. Orchid 01256 479898

Short Stories

Apple woes start with a bang

● Apple recalled more than 1000 of its new PowerBook 5300 portables after lithium-ion batteries on some models exploded into flames. None had been sold in Britain and sales were quickly resumed with cheaper NiMH batteries.

But the affair was one of a series of setbacks for Apple, in the wake of the Win95 launch, sparking off rumours of an imminent merger with IBM or Oracle.

Apple warned that its profits for the past three months would be down due to a shortage of chips and other components for its PowerMacs. Ironically, this was because demand was greater than expected — the company is said to have back orders worth $1 billion.

Dataquest said Apple's world market share was down 1.6 percent to 7.4 percent.

See analysis, opposite

Power accounts

● British software house Global Business Systems, a division of TIS, has ported its flagship business packages to the AIX 4.1 operating system, enabling them to run on the Motorola PowerPC. The range covers accounts, distribution, and manufacturing software as well as more than 200 specialist applications.

TIS 01628 532565

Freehand 5.0 out

● Macromedia has launched Freehand 5.5 for PowerMacs and Macs, which it describes as a "significant upgrade".

Macromedia 01344 761111

BeBox-a-lu-lah - it's a totally new PowerPC

Former Apple executive Jean-Louis Gassé has emerged from four years of silence with a new PowerPC-based computer — and, more surprisingly, a new graphical operating system (pictured).

The BeBox uses two Motorola PowerPC 603e chips, running at 60MHz, that allow you to run multiple Windows and applications with no apparent degradation in performance.

Gassé, who founded the Be company in 1991, claims it is the first PC operating system designed specifically for multi-processing.

He showed me seven applications working all at the same time; they included three Web pages all getting data on the fly, and four other programs processing in real time. It was actually the most amazing demonstration I have seen on a low-cost PC platform — the base system will sell for around $2,400 when it ships later this year.

The machine will support the PowerPC alliance's CHRP architecture in the future, which means the BeBox will run the Mac, NT, Solaris and AIX operating systems as well as its own.

Gassé is positioning the BeBox for techies and the audio-visual market but it could also be a powerful Web server. He has shown a lot of guts and he could end up with a winning strategy, albeit one with limited potential.

More details can be found at Internet address http://www.be.com.

Be 415 462 4141 (US). Fax 415 4624129

Tim Bajarin

Dream package

Ray Dream Studio is a suite of 3D imaging software for the PowerMac and Windows 95. The £375 package includes four modules: Designer, Animator, Models and Extensions – the last including a panoramic camera.

Principal (Mac version) 01706 832000; Softline (Windows version) 0181 401 1234

Top 10 Windows and DOS

	Product	Manufacturer	Last month
1	Windows 95 U/G	Microsoft	1
2	SoftRAM Memory Doubler	RMG	-
3	Plus	Microsoft	2
4	Office 4.2 U/G	Microsoft	4
5	Works	Microsoft	-
6	Uninstaller v3.0	Microhelp	11
7	Office Pro 4.3	Microsoft	13
8	Sidekick 95 for Win95	Starfish	-
9	Office 95 v7 U/G	Microsoft	10
10	PCDOS v7 U/G	IBM	-

Top 10 DOS

1	PCDOS Version 7	IBM	1
2	QEMM v7.5	Quarterdeck	2
3	Flight Simulator v5.1	Microsoft	3
4	WordPerfect 6.0 C/U	WordPerfect/Novell	-
5	Turbo C++ v3.0	Borland	4
6	PC Anywhere v5 Host	Symantec	-
7	Easy to Learn Computing	VCI	-
8	Pegasus Solo Payroll	Pegasus	7
9	Solo Accounts	Pegasus	-
10	Gardeners World	Europress	8

Top 20 Windows

	Product	Manufacturer	Last month
1	Windows 95 U/G CD	Microsoft	1
2	SoftRAM Memory Doubler	-	
3	Plus CD	Microsoft	2
4	Office 4.2 U/G	Microsoft	4
5	Works	Microsoft	-
6	Uninstaller v3.0	Microhelp	11
7	Office Pro 4.3	Microsoft	13
8	Sidekick for Win95	Starfish	-
9	Office 95 v7 U/G	Microsoft	10
10	PCDOS v7 U/G	IBM	-
11	RAM Doubler	Com. Unlimited	5
12	Business Plan Builder	RMG	8
13	First Aid Windows	RMG	3
14	CorelDraw 5.6 U/G CD	Corel	-
15	Sidekick for Windows v2	Starfish	7
16	WordStar V2	Softkey	18
17	Lotus Smartsuite	Lotus	12
18	Office Pro 95 (U/G)	Microsoft	-
19	Applications trade-in Pack	Microsoft	-
20	Dr Sol Anti Virus Quarterly	S&S	15

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

Spindler's **list**

Apple is having a rough ride at the moment — president Michael Spindler is under pressure to fix the mistakes of the past year. Tim Bajarin's meeting with Spindler revealed his strategic goal to focus on a list of market segments where he hopes that Apple can accelerate its share.

Two years ago, when John Sculley was forced out of his position as president of Apple, German-born Michael Spindler took over, and now all eyes turn to him when something goes wrong.

And there have been a lot of eyes on him over the past few weeks, with a succession of bad news (see page 30): the problems with the PowerBook's lithium-ion battery, a warning of poor earnings because the supply of parts could not meet demand, and the latest Dataquest figures estimating Apple's worldwide market share as having fallen from 9 percent to 7.4 per cent in a year — perhaps due to its lack of a portable product with strong appeal.

Amid rumours that he was about to be fired, Spindler invited seven analysts to Apple, for a talk. As the only analyst who has covered Apple from day one, I had a particular perspective.

Apple is clearly going through a difficult time, but nothing like as bad as when co-founder Steve Jobs was fired amid accusations of poor management, or when Sculley had to lay off 2,000 people due to lack of demand. Even though Apple has made mistakes over the past year, all can be fixed.

This was the main topic of the meeting with Spindler. All of us wanted to know how Apple was going to deal with these challenges. Spindler was confident that Apple has enough entry-level and mid-range products for this Christmas, but said it would not be able to keep pace with the demand for its high-end boxes until early next year.

When asked about rumours that he is quitting, Spindler just laughs. In fact, he was the most relaxed I have seen him in the past four years: one reason is that Apple chairman Mike Markula has publicly supported him. Markula helped Sculley oust Steve Jobs, and then helped Spindler with the ousting of Sculley — no-one, not even the board, can oust Spindler without the nod from Markula.

Markula supports Spindler because despite the recent problems, the fact remains that demand for the Mac is still 35 percent up on last year. The key reason for this strong demand is that Spindler did an amazing job of smoothing the transition from Motorola 68000 chips to the Power PC. Apple misjudged demand this year because it had not reckoned on the thousands of 68000 Mac users who were waiting for more Power PC software to come out before upgrading — and a lot of Power PC software emerged last year.

Spindler pointed out that Apple cannot be all things to all people. His strategic goal is to focus on market segments where Apple can accelerate its market share. These segments include publishing, media and entertainment creation, small business and home office, home PCs, graphics and engineering and government sectors.

Several analysts wanted to know when Mac prices would be on a par with those of the PC — Apple has been defensive on this issue in the past, claiming that its easy-to-use operating system could command between a 12 to 20 per-cent premium. Now, though, Spindler has changed his tune slightly: he said Apple knows that Mac prices should match those of the PC and claims that there is near parity at the high end of the market; a PowerMac 9500 costs the same as a Pentium 120 of comparable configuration. Meanwhile, there are glaring differences at the low end. Spindler vows to change that in some models this year, and in all by early 1996.

Spindler wants eventually to take the Mac operating system to other platforms and extend its reach in the digital world. But unless Apple gets its shortages and pricing problems dealt with quickly, the company will continue to suffer tough times.

ANALYSIS

Seeking excitement

A new Internet search and navigation site, called Excite, is receiving rave reviews. California-based Architext Software's site at www.excite.com is regarded as a next-generation Web navigation service.

Excite uses powerful concept searching, so that even though a search on "bond" may turn up articles on municipal bonds, chemical bonds and even James Bond, they will be sorted into subject area. Excite also has more than 30,000 lively reviews of Web sites. A virtual Web newsroom provides hourly news updates.

The **final** frontier?

Subscribers to the Internet service of a company called Frontier Communications voiced severe criticisms: a disappearing news server, unanswered telephones, lack of technical support. Then the company went offline. What has been happening? Wendy M Grossman reports.

ANALYSIS

When we reviewed Internet service providers (*PCW* October), we gave the nod to a service called Frontier Communications International (which we will call FC for short). As we went to press in early August, users were reporting that they were happy with FC's service and its technical support. But the honeymoon didn't last.

Shortly after our review appeared, several users mailed me with criticisms: engaged tones had become the norm at FC and its news server had gone down for nearly four days, during which time the technical support people were unavailable.

Since then people have been asking questions, especially on the CIX conferencing system, about claims FC made about its service and the company behind it.

Claims

FC, based in Hove, Sussex, launched its service in June claiming a huge bandwidth, its own international links, seven-day 24-hour technical support, and as many as 32,000 points of presence (since modified to 120), and 100 staff (they now say 29). It also claimed to be part of a large, multinational American telecommunications company. Users who asked on CIX for the name, address, and phone number of this company and details of its Public Telecomms Operator licence, were told to write to the company for information.

These same questions were among 12 queries we faxed in September, to FC managing director, Eden Akhavi, asking for clarification. He referred us to the company's lawyer, who declined to comment.

Public records show that FC began as Philgan Ltd, with Akhavi as a company director and Wenda Shehata, thought to be Akhavi's mother, as company secretary. On CIX, the resumé for Akhavi's "eden_akhavi" ID links him to a company called Expotech: FC's tireless promoter, Justin Rogers, who logs onto CIX as "expotech", has repeatedly said that FC is "part of the Expotech Group" which he stated had taken over Frontier Communications.

A faxed brochure for FC, dated 12th September 1995, was sent on Expotech letterhead, and FC users' credit card debits are headed "Expotech Direct". Akhavi and Shehata, according to Companies House records, did have a company called Expotech Corporation, at the same Hove address as FC: 24 Western Road.

But the Expotech Corporation was wound up in October 1994, by petition from IMSI UK, which claims that it is still owed £18,000.

Legal action

Expotech seems to have specialised in Visual Basic add-ons and tools for Borland Delphi. A trail of old CIX conferences (expotech, delphi_direct, farpoint, thenet, and many others) shows the same pattern of promotion, followed by patchy service and customer complaints, followed by silence.

Akhavi says that its corporate customers (one of our unanswered faxed questions requested a corporate reference) were not interested in CIX but in Compuserve. But Akhavi's Compuserve ID was cancelled last August.

Akhavi says the company is taking up to 15 legal actions against some of the users who complained publicly, as well as several Internet service providers, which "could be" including Pipex.

Pipex says it terminated FC's leased line feed on 25th September for non-payment. Akhavi claims it was his company who pulled the link.

By the end of September, a few FC users had received refunds but one potential customer, calling at around the same time, was told he could be connected in a couple of days.

Unanswered questions

Another of our unanswered questions was: "When is the service expected to be up and running again?" As of 9th October, FC's "thenet" domain remained offline to the rest of the Internet

All who came into contact with FC believed its claims; even the unrelated, Hatton Garden-based Frontier Internet Services, which has come in for a great deal of trouble over the similarity in names.

Internet service provision is an area where flaky service and growing pains abound. Everyone longs for a low-cost, all-purpose solution and wants to believe in a company that seems able to offer one.

It's a shame: a service that could build a PoP network as quickly as FC, and offer 24-hour technical support, even if it were a small service, would be welcomed with open arms in this market.

It's a **heavy** scene

Today's notebook PCs are akin to desktops on wheels, and seem to weigh almost as much, Clive Akass observes. The latest crop of launches shows how manufacturers have moved away from portability — why can't we have a notebook fit for a briefcase, he asks?

ANALYSIS

Some months ago I took to carrying around an Amstrad Notepad costing about £100. The two-inch deep screen is unreadable except in perfect light and the technology is a decade old, but it has a full-size keyboard. It stays live for weeks on four AA cells, and allows me to write on the move.

It is not PC compatible but it is lighter and more genuinely portable than any state-of-the-art notebook currently on the market. A similar, perhaps better, machine is the Cambridge Z88 — also using old technology and retaining a host of users, too.

The trend today is to turn out notebooks that are desktops on wheels, with all the facilities of a sit-up-and-beg PC packed into an A4 case. That means having disk drives, backlit colour screens and even CD drives, which add weight and need big batteries to run them. You may also have to carry a mains charger/mains adaptor (one day, perhaps, the industry will standardise to the extent that you'll find notebook power sockets wherever you go).

Pattern

Last month's crop of new notebooks from NEC, Compaq and Hewlett-Packard all fell into this pattern. They are fine if you don't plan to carry them about much, or can sling them into a car; otherwise, as the hippies used to say, "it's a heavy scene".

Inteco analyst Rana Mainee, speaking at the NEC launch, put current machines into three categories: high-end notebooks with TFT colour screens and the latest multimedia gizmos; low-end notebooks using cheap off-the-shelf components and lower-quality dual-scan screens; and executive mobiles — high-quality machines with pretensions (my word, not Mainee's) to portability.

In addition, there are palmtop organisers which are nothing if not portable. I've been using a Psion 3a this month, and have been pleasantly surprised by how easy it is to type on (though I would not use it to embark on writing a book). I'm told the two AA batteries can last months.

By contrast, I also looked at an Omnibook 600CT (see First Impressions, page 60), a prime example of an executive mobile. The Lithium Ion battery lasts two and a half hours between charges. It is a lovely machine: better to use than most desktops and more portable than any standard notebook, but for hard travelling I'd rather take the Psion.

User demand

The 600CT, which boasts just about every desktop feature short of a CD drive, is a curious case: it shows how manufacturers have actually moved away from portability. The original Omnibook 300 had its main software on ROM and no hard disk, and could run off pen batteries. Hewlett-Packard says power-hungry disk drives and colour screens were added in later models because of "user demand".

This echoes what I have been told by just about every manufacturer to whom I have spoken on the subject: that users are not willing to sacrifice features for portability. This may well be true for people whose notebook is their only machine, but I simply don't believe it of those who use a portable as an adjunct to a desktop.

Manufacturers say, too, that a low-featured lightweight model cannot be made at a price that people are willing to pay, particularly when it is for a second machine. This argument would have some force if it were not for the success of the Psion. If we can get a machine that good and that cheap into the palm of our hands, why can't we have one fit for a briefcase?

Change of attitude

Happily, the growing importance of comms and networking is already forcing a change of attitude. With a high-speed Net connection, the world is your hard disk and you can contact your base machine from anywhere — no need for power-hungry disk drives.

PCMCIA cards are already available to link portables and mobile phones, to offer true go-anywhere wireless networking for Europe. Hewlett-Packard last month demonstrated a hybrid organiser called the OmniGo 700, looking like one of its LX palmtops which had been speared by a Nokia mobile handset (Nokia and HP have just signed a co-operation deal). The next step must surely be to merge the palmtop completely into the phone.

And if redesigned handwriting, like the Graffiti script used by HP's new OmniGo 100 palmtop (see page 23) takes off, or predictions of a breakthrough in speech recognition prove correct, the keyboard and the notebook format may go the way of the dinosaurs.

Sounding Off

Michael Hewitt

I recently had to have my business stationery reprinted. The main reason, apart from availing myself of Phoneday's additional digit, was that the UK press have taken it upon themselves to rechristen me. In PCW I am Michael Hewitt, as it says up top. However, for reasons best known to themselves, newspapers and glossies call me "Mike" Hewitt. Maybe "Ozzie" Wilde and "Ginnie" Woolf got this in their day, but had the wit to do something about it. Not me. I just said What the hell? and had the letterhead amended, instead.

Anyway, as part of the amendment, I asked that my email address be included, too. It took the droid at Kall Kwik four attempts to get it right. Okay, typing in hewitt@cix.compulink.co.uk might be the keyboard equivalent of saying "The Leith police dismisseth us", after downing a couple of large ones, but surely it isn't that complicated to master? The printer apologised. There isn't much call for email addresses on business stationery, he explained, so he wasn't used to setting one.

That just about sums up the state of our nation, doesn't it? Email ought to be universally regarded as the major evolutionary leap in business communications: the homo erectus to the Australopithecus which is the fax and telex. But the great British boardroom just does not want to know. It makes you think: If the Institute of Directors had been asked to evaluate sexual intercourse, by now we'd be having to rely on virgin birth to propagate the species. Why this peculiarly British reluctance to move into the nineties? I used to think it was simple technophobia. But if that were truly the case, you'd expect executive clonazepam usage to have rocketed back in the mid-eighties when the first fax machines appeared. No; I think the real reason why more British businessmen won't go online has a far more simple explanation: bone idleness coupled with — dare I say it — vestigial sexism.

Apologies if I'm starting to sound like a member of the Neasden Socialist Vegetarian Alliance and Gender Awareness Fellowship. Actually, I'm about as politically correct as a 12-month subscription to Loaded. However, a study of UK business practice over recent years has convinced me that I'm right.

If I get in touch with a fair-sized US company, the likelihood is that all the senior personnel will have an email address. Furthermore, they'll display it proudly on their business cards and letterheads, too. And I'm not just talking about hi-tech US companies here. In recent months I've had to contact low-tech organisations as diverse as used-car dealerships and undertakers. Whatever, even the head honcho is accessible via email, and usually reads and writes his own. That goes for simple two-line memos right through to elaborate letters and proposals. In other words, there appears to be no "Take a letter, Miss Jones" culture.

Over here, the situation is quite different. Just a couple of months ago, for instance, I had a department store manager phone up and apologise for not having faxed an urgent and short letter through to me. There were two reasons for this, he explained. The first was that his secretary (female, naturally) was away and therefore couldn't type it up. The second was that "the girl who operates the fax machine" was out for lunch. Hit by this double whammy, he was effectively rendered incommunicado. Indeed, credit is due to him for managing to dial my number without the assistance of a Kelly Girl temp. But even on those rare occasions where the businessman can do his own typing, I've often observed a marked inability for him to progress much beyond that. In other words, he'll save the document to disk, extract said disk, and pass it over to a secretary for printing and posting, or subsequent faxing. It's a bit like parking his car in the middle of the road and then taking a taxi to the kerb.

Interestingly, the majority of British businesswomen seem able to bypass this intermediate stage. Not only can they type, they're physically capable of printing out and faxing their own documents, too. And when, once in a blue moon, I actually receive email from a British (non-technical) company, it's usually been sent by a woman.

All of which suggests that the main reason why British businessmen don't use email is that it represents a challenge to their masculinity. To click on that mail icon — to have to take responsibility to send and receive their own messages, which is what email forces you to do — could provoke instant and irreversible detumescence. It might even drop off.

Fortunately, there are signs of change. I was recently told the tale of a senior executive who has gone over to email in a big way. He insists that all his colleagues now send their messages to him electronically, eschewing the fax and the Royal Mail. He spends hours both reading and replying to their missives. On the face of it, the guy sounds like the corporate equivalent of a "New Man".

There is a downside, however: he has to get his secretary to log on and download the mail on his behalf. She edits it all into a single document which she then prints out or faxes to him. Once he's read it, he dictates his replies to her, and the cycle begins again.

Still, it's progress — of a sort.

Homefront

Tim Nott

Is it now safe to turn on your television? I refer, of course, to the Microsoft advertising campaign, which has been blasting us with the Rolling Stones' Start Me Up, to foster the impression that computer operating systems are cool, sexy and fun. Yes, we've had it here in France, too. Night after night.

There's nothing new, of course, in using well-loved music in an advertisement, in order to enhance the attractions of what might be an otherwise dull product, but some might argue that it's far better to stick with the classics. Firstly, the music is out of copyright. Secondly, people are familiar with the tunes — even though they may not be able to quote composer and work, they know that "tum-tum-tum-tum-ti-ti-TUM", technically known as Spring, from Vivaldi's Four Seasons, is posh and adds a touch of class to any product it accompanies. Thirdly, long-gone composers are unlikely to embarrass their corporate clients by dropping dead of a drug overdose, embracing a bizarre religious cult, or making a record with Tom Jones.

The real damage is to the composers themselves. Take Dvorak, and his New World symphony. Well, why not? Many others have helped themselves. And since he himself lifted the "dah-dee-dah, dah-dee-dah…" bit from what I am probably in flagrant breach of political correctness in calling a negro spiritual, there's an ironic nemesis in its being used to laud the natural, old-fashioned goodness of factory-produced bread.

Compared to Beethoven, however, Dvorak gets off lightly. Back in the eighties, when the corporate view of the Rolling Stones was that they were a bunch of dangerous drug-crazed anarchists, there was a TV commercial for a perfume spray, called, if I remember rightly, Tweed. A difficult one to market, I would think, as it sounds more like an aftershave, or at best, something Bertie Wooster's Aunt Agatha would have dabbed behind her ears. Nevertheless, the marketing people gave it their best shot. A smartly-dressed woman is seen driving what is obviously Her Own Car through an expensive-looking suburb, stopping to pick up her immaculately-uniformed children from what is, equally obviously, a fee-paying school. Quite what this has to do with Shepherds Giving Thanks After the Storm is not made clear, but the final movement of Beethoven's Sixth rolls majestically out as we are left in no doubt that "Mrs Upward-Mobile wears Tweed Parfum de Toilette spray". And you can bet your bottom dollar she doesn't own a Rolling Stones record. From then, it was downhill for Ludwig Van's TV career, as the next time the tune surfaced it was advertising a well-known brand of lavatory roll. And having been downgraded, so to speak, from toilet water to toilet paper, poor Beethoven was given the push in favour of a small yellow puppy. This sad tale reveals the fatal flaw in using out-of-copyright music for advertising — anyone can do it. Just when you've carefully woven your advert for a 32Mb Pentium portable around the delicate strains of Mozart's Clarinet Concerto, along comes some clown using the same tune to flog washing powder.

Nowadays, Mrs Upward-Mobile would have not just Her Own Car, but her Own Job, Own Laptop, a nanny to fetch the children from school, and more sophisticated tastes in both fragrance and music. So maybe Microsoft is right after all. I'm sure that the reputed eight million pound deal included exclusive rights, so we're unlikely to hear Start Me Up being used to promote laxatives. And the Stones can now be considered a fairly stable product — raunchy, but mature, and unlikely to embarrass their host.

As computers and software become increasingly consumer-desirable, I think we can look forward to much more of this. REM, apparently, have already turned down an offer from Microsoft, but in any case can't be seen as serious message-pushers as everyone knows that, in computers, you ignore everything after a REM statement. For reasons of geographical and spiritual affinity, WordPerfect obviously has first claim to the Osmonds, but hopefully, it will have the good sense not to use them. Could U2 be persuaded to change their name to OS/2? Or given IBM's penchant for employing high-flying grocery executives, perhaps it has designs on the Jam.

Perhaps it would be more useful to consider function. Obviously Blur are non-starters in anything to do with displays. Similarly, no peripheral manufacturer is going to touch the Clash. But the Spin Doctors are heaven-sent for a purveyor of disk utilities, the Cure have got to be snapped up by an anti-virus company, and Eric Clapton's Unplugged could bring a cachet of virtuosity to any member of the Infra-red Data Association. Finally, let's not forget the users. As it's becoming increasingly common to involve the general public in beta-testing with "Preview" software, then obviously the Crash Test Dummies are on to an earner.

Straight Talking

Barry Fox

What a rare treat to find a computer company that knows and cares about its products. When I tried a copy of Flagtower's Space Race CD-ROM it threw up the error message "Application error — call to undefined dynalink". Flagtower's parent, First Information, then sent me a write-once disk containing a new version — which gave the same error message

At this stage, most ROM publishers run for cover and concentrate on selling as many discs as possible before the bad news gets around. Instead, First Information insisted on sending a software engineer round to my office to find the cause of the problem.

The high quality images on the Flagtower disks are encrypted. They display on a PC screen, but cannot be copied. The encryption system is C-Dilla, which a lot of ROMs use to control access. Flagtower's installation program had found some previous C-Dilla files with the same name. It should have over-written old with new, but had not. So Space Race was looking in vain for its own code. We solved the problem by renaming the old files and then reinstalling Space Race. It ran like a dream. Flagtower say they will now alter the installation program.

Compare this to what happened earlier this year, when science magazine N*ature* gave away CD-ROMs containing full copies of all issues between 1992 and 1994. The purchase price of the disk is around £155. The free trial version stops working twelve days after its first use. But the dead files remain on the hard disk. These files soak up nearly 4Mb of valuable space. And N*ature* neglected to provide an uninstall option.

N*ature*'s office admitted that it had been getting "quite a few calls" about this. But their technical helpline had been closed down. Someone in the editorial office tried to be helpful and suggested that people with dead files should "find the directory on the hard disk that is labelled Nature, and delete it."

You cannot delete a disk directory until you have first deleted all its files. Bulk deletion of files is always risky. In any case, it leaves the icons in Windows and stray files in other directories. This is just one of many recent incidents which, until the Flagtower reassurance, had left me wondering whether there is anyone in the computer business who really understands or cares about what they are selling.

I recently bought a Canon BJC-4000 colour printer. For weeks it drove me mad, spewing out a three-line "info status" printout before each page of real printing. Canon's press office referred me to several in-house techies, none of whom knew the answer. I then spent ten minutes, at 49p a minute, on Canon's helpline, much of it spent listening to horrid Muzak on hold. For my £5 I got useless advice that failed to solve the problem.

Purely through trial and error, I found the simple trick myself. Go to Windows Print Manager, Options, Set-up, Connect and then uncheck the box: "Fast printing direct to port". Hey presto. No more wasted paper. At 49p a minute shouldn't Canon's helpline have been able to tell me this?

A year ago I raised an issue with Hewlett-Packard about the then-new 4L printer. It was the first HP laser without NVRAM. On all previous lasers it was possible to store favourite settings in non-volatile memory. With the 4L, settings evaporate if the user powers down to save wasting 10 Watts, 24 hours a day, 365 days a year. They also disappear if the printer has to be reset or altered by other software. In each case, the 4L resets to its factory defaults, which include the Roman 8 character set which wants to print hashes instead of pounds. It also defaults to 64 line page length.

HP says, rather unsympathetically, that this only affects people who are using a DOS program without the correct driver. A lot of business offices still use DOS (if only through a Windows window) and cannot get new drivers for the older programs their staff are trained to use. I regularly get business letters with hashes instead of pounds. If you are going to sell a printer in the UK which cannot be prevented from defaulting to North American settings, at least explain it in the instruction book, I begged.

Now HP has launched the 5L. Like blood from a stone, I have established that it too has no NVRAM and resets if the owner is energy-conscious. But the 5L has a new feature. It comes with a DOS utility which resets the printer to the user's chosen defaults every time the PC is powered up.

This is a clear admission from HP that the 4L caused problems for some users. The 5L utility won't work with the 4L. I have suggested to HP that the company should now provide a 5L-style utility upgrade for suckers who bought the 4L. I doubt it will happen. Dealing with HP is like dealing with IBM five years ago — no sense of urgency or concern. And we all know what happened to IBM in the end. ■

Business Matters

Nick Beard

After last month's brief foray into the realm of the anorak, my personal computer world has been smooth and easy, with most things running as happily under Windows 95 as they did before. Some DOS games no longer work properly, much to my son Alex's irritation, since Fatty Bear's Birthday Surprise was a big favourite.

The "free" game, Hover, which comes with Windows 95 is a tolerable substitute, though (Hover involves driving a hovercraft around a disused Doom set after the bodies have been cleared up). ccMail works fine, which means I can still access remote mail, but the remote log-in via our Shiva modem pool no longer functions, so my ECCO file synchronisation mechanism is no longer working and I cannot pick up files from my office drive. I have to remember not to make changes to my home ECCO database, but sporadically to bring changes back on disk. It's a hard life…

I wrote, some columns back, that we have been restarting our document imaging system. There had been problems with the system since we upgraded the software to which it is interfaced. These have been solved, and we are merrily rolling it out. Merrily, but with caution, since there are things which document imaging simply should not be used for. Our system is from Atlanta-based company IMNET. Their Image Engine product is pushed as an "under the covers" solution — it is a fine technology which system users hardly ever get to see. As regular readers know, at HCI we have implemented a highly integrated hospital information system, which enables doctors and nurses to access patient records from any PC in the building. The primary clinical system software is from Cerner Corporation, whose UK office is in Luton. This provides a full suite of hospital applications, including lab, radiology, pharmacy and "enterprise wide" systems such as patient registration, scheduling, and an ordering system to set up tests and investigations on patients. All clinical notes go straight into the system, so staff at HCI turn to the PC, not a filing cabinet, to find out about patients.

We use a clinical workstation, which is an X Windows application running through an X-emulation routine on the Microsoft Windows desktop. (The business of migration to a Microsoft Windows desktop client is a near-future plan, and topic for this column.) A doctor may be reviewing a patient's casenotes on the system, through a database browsing tool which displays all the available data in a spreadsheet-type view. Much data can be displayed directly in this fashion — blood chemistry results, temperature etc. To access information which cannot be displayed in a single cell, such as a long clinical report, a doctor simply clicks on the cell which shows that the report is there, and the report pops up in a window. Thus far, the work is all being done by the Cerner systems.

If the document is an image, then the Cerner application — an Oracle database — sends a message over an OS/2 gateway to the IMNET image engine. The message states "send document number PQR to workstation XYZ" and the image is sent. The desktop viewing client pops up, and there's the document. This means that when a user requests an electronic document, be it a summary of lab results or a surgical operative note, they do not know when they summon it whether it is coming from the scanned document source, as a bitmap of a sheet of paper, or whether it is a native Cerner file in digital text format.

It all seems very simple, yet we avoid using it wherever possible. Document imaging is fine and clever technology, and has a place. The concern is that it becomes a sop to people who are too idle or set in their ways to learn to use a computer "properly". Instead of going through the discipline of devising an electronic form and thinking about the data needed at a particular stage in a workflow process, an institution allows people to just carry on with their traditional paper scribbles, and scans them all in. Of course, there are good reasons to use this technology: it is hard to capture a quick surgical plumbing diagram any other way and surgical consent forms, signed by a patient, need to be kept. (One could build a big online text database which builds a consent form according to the scheduled surgical procedure, and uses pen-based computing to capture the signature, but life is too short.) Document imaging is powerful and effective technology — if it is applied properly.

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Letters

Gateway to hell

I am writing to you about the extremely poor level of service that I have experienced from Gateway 2000. I bought a P5 executive system from Gateway at the end of last year. After I had two faulty monitors replaced, the system settled down apart from one annoying feature: it would not reboot when hot. I lived with this for a while but as it was taking longer and longer to reboot I decided to get it fixed.

That's when my problems began. Gateway decided that a new motherboard needed to be fitted. Apart from the reboot problem, the system had been working well. The engineer arrived (a day late) to fit a new motherboard. He couldn't get the system to work and diagnosed the replacement board as faulty. He fitted another board the following day and was still unable to get the system working properly.

After speaking to the Gateway technical support team, he reloaded Windows, thus wiping out the PC tools desktop shell that I had a spent a considerable amount of time setting up and customising to my requirements. He was still unable to get the system working and left. And so it went on.

I went from having a system that was working extremely well to one that was not working properly for over two weeks. During those two weeks, I spoke to at least six different support staff; I was asked to do the same things over and over again; I lost the customised working environment that I had set up on my PC, and a considerable amount of time — I would estimate that I spent over ten hours on the phone and some 20 hours re-installing and downloading software. On several occasions people promised to call me back and failed to do so.

The support I received was badly informed, badly co-ordinated (there has been hardly any continuity when I have spoken to different technical support people) and cost me an awful lot of time and money.

This is not what I had been led to expect from Gateway and the impression I am left with is that they are keen to win your business, but if anything goes wrong you will be met with incompetence and indifference. I hope this will serve as a warning for anyone for whom service and support are critical issues.

RV Geal

Gateway 2000's managing director, Ian Pluthero, replies:

Having recently taken on the role of Managing Director, Europe, at Gateway 2000 I am extremely keen to maintain our company at the forefront of customer services and so value all customer comments, good or bad. Mr Geal has made some observations regarding on-site service which I am happy to say have been addressed. In fact, customers are now able to arrange a four hour slot with service engineers, during which time the engineer will visit the customer's home. Additionally, we have extended our on-site service hours, from 8.00am-10.00pm Monday to Friday and 8.00am-8.00pm Saturday.

In this particular instance I would like to point out that Mr Geal has since been given a replacement PC and that overall, Gateway 2000 has a very high rate of customer satisfaction; having recently won PCW's award for best after sales service.

Demon overload

I don't think Cliff Stanford of Demon (*PCW* November) should be so dismissive about BT and the cable companies. They are quite capable of picking off the 90 percent or so of Net subscribers who know their way around the system and who just want a high quality dialup service without bottlenecks.

What Demon offers over what BT is likely to offer is a news server, but the Demon server is so overloaded that while one can just about retrieve message headers, it hangs after a few minutes without returning a single message contents. I have tried it many times. In comparison, the Compuserve server is vastly more accessible.

The only other offering from present Net service providers is web page storage. Despite media hype, this is of little relevance to the average private individual, and technically this service can be provided by any net-connected third party organisation which could easily charge far less than the £25/month per 5Mb Demon charges.

Peter Holy
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Virtual reality

When you "test" internet service providers, do you connect through virtual points of presence (where the provider uses them) rather than physical PoPs?

Perhaps you should. My present provider uses Pipex virtual PoPs, giving a very wide coverage at local call rates. Or that's the theory. What Pipex and the other VPoP providers don't tell you is that the reliability of these VPoPs is so poor that over the last four days, only half my attempts to connect were successful. Each one of these failed connections cost me five pence and considerable time and frustration. From the correspondence with the provider (who is as frustrated as its customers) I know this is a common problem. To protect my provider (who has used Pipex in good faith) I would be grateful if you would omit my email address.

John Gruffydd
Wales

Rodent rage

I feel I must register my dismay at Nick Beard's comments in Business Matters, *PCW* September, denigrating what I consider to be a very worthwhile pastime; namely his view of wasting hours "spent downloading useless wretchedness from various hamster-discussion groups". Many people might consider expense forms, freeform text databases, forms routing *et al* considerably more "useless" and "wretched" than dissemination of information on such a noble beast as the hamster. Having participated in both sets of activities (corporate software development and hamster showing) I can personally vouch for the greater fascination of the latter.

May I respectfully suggest that Mr Beard sticks to his

area of expertise and we, the South Of England Hamster Club (email soehc@ri.ac.uk) will desist from derogatory comments about the merits of in-house ledger software. If Mr Beard would like to experience the joys of hamster showing first hand, he would be most welcome at one of our shows.

Adrian Dornford-Smith (Secretary, South Of England Hamster Club)
adrian@ri.ac.uk

Correct diagnosis

Sometimes it's clear that what columnists write has little resemblance to what they know. Nick Beard's opening paragraphs in October's Business Matters typifies this: his knowledge of formal methods appears to fall far short of the two paragraphs you wrote.

It is *impossible* to mathematically prove all programs correct. I refer you to the classic "Halting Problem" for more details. Formal methods, however, are not designed to prove existing programs correct; they are designed to *create* proven correct programs. By starting with a mathematical specification of the problem, one can iterate through a series of proven logical steps to another specification, and finally to code — again via proven translations from your specification language to your coding language. Thus one can develop proven correct programs.

Of course, there are still problems with this process: the "fuzzy" stage of actually determining the original specs mathematically (the users rarely know what they want, to start with, as your recent columns show) and assumptions on the correctness of the compiler and OS and hardware and so on. But the actual "spec to code" stage of the process *can* be performed in a rigorously correct manner. It's hard work though, and unlikely to be of interest to the brilliant programmers currently used by Microsoft *et al*; the flash of insight used to solve programs has to be rigorously proved rather than assumed correct.

Incidentally, a few years back (1989 I think) Intel (yes, that company with the dodgy Pentiums) funded a research project at Oxford University's Programming Research Group (PRG) to prove one of their Transputer chips correct. Using the Z language, a specification of the chip was drawn up and then mathematically modified until the spec matched the final chip layout. And (surprisingly, perhaps) the chip was correct. More surprisingly, the chip emulator used to test the layout was proven to have bugs in it (Oxford PRG received the Queens Award for Technology for this bit of work).

Stephen Harris
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Image problem

In Computer Answers (*PCW* October) the picture on page 312 states "Data transfer problems caused by a video card like this one could be down to driver software". I suspect the fact that the "video card" is a disk drive doesn't help.

David Pryor
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Wake up to MDL

Tim Nott's evaluation of several CAD products squeezed more than a quart of information into a pint of review (*PCW*, October).

However, he omitted to mention that both MicroStation and PowerDraft from Bentley Systems are open to third party developers through the use of the MicroStation Development Language (MDL). This is an extended version of C — the extensions covering areas such as command parsing, the user interface and data resource management. Developers familiar with Windows or

Macintosh programming will feel at home with these MDL concepts.

The astonishing thing about MDL is that it is source-code compatible across all the platforms that Bentley support — every Unix workstation you can think of, plus the Mac, and the PC in all its forms: MSDOS, Windows 3.x, Windows NT and OS/2.

Jon Summers
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Winword weightwatchers

The time is now right for Microsoft to prepare a version of Word for Windows which could be called Winword Lite.

The latest version, Word 6, is a huge heavyweight that is simply over the top for most users. The hardware cost and performance penalties are a drawback. Part of my job involves training novice computer users in the gentle art of word processing, and those that have seen current versions of Word tell me that they were overwhelmed by the complexity of the screen and the huge array of meaningless buttons.

I am still running Word for Windows version 1.1 and I find it more than adequate. A colleague used it for a 240-page document on a 286 machine with just a 20Mb hard disk and 2Mb of RAM. Word 6 would barely fit on the disk, let alone run.

In your October issue, Eleanor Turton-Hill's Beginners column lists some interesting features of Word. Well, every one of them except Word Art is available in Winword 1.1, although some of the keystrokes are different.

Adrian D Bailey
Loughborough University of Technology

Three legged horse won't win the race

If Barry Fox could get PC suppliers to give us products that work, can be used by the average purchaser and have all necessary bits with them, he would deserve a medal (Straight Talking, *PCW* October).

As a result of a recent *PCW* review I opted for the Umax Vista S8 scanner. A fine machine by all accounts — but only if you can get it to work. After several evenings of poring over the manuals, wondering what to do with a device driver update disk not mentioned in the documentation, wondering how to configure the SCSI card model also not referred to, wondering where my bundled OCR software was, trying every combination of options in the software and still not getting the PC to recognise the scanner at all, and memory problems which Photoshop LE reports as peculiar to Umax scanner drivers, I was driven to call the dealer for support.

"Sorry, we're not really experts on this. You'd better phone Umax's distributors." Technical support was out to lunch (how prophetic) so an hour and a half and five calls later I am told that the wrong version of the driver and software has been included for that card. Oops. And sorry about the OCR software. Yes, we'll send it by courier. And yes, there is a memory utility to deal with the "Not enough RAM to run Photoshop LE" problem. And in the meantime we'll email you the necessary files and instructions. Needless to say, the email doesn't arrive. So now (with the document feeder) I have £1,000 worth of junk doing nothing while I wait for the bits that should have been there in the first place.

To avoid future grief and anguish couldn't we have a little item in product reviews like "Umax Vista S8 — excellent scanner once it was working but arrived as complete and usable as a three-legged horse".

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Maudlin mugshot
Avid reader of *PCW*. Think it's an excellent publication. There's a lot to praise and very little to criticise. In fact, the only thing that lets it down is the appalling photo of the editor (page 13). What a dreadful cardboard, characterless exposition. The current photo has about the same effect as a pair of furry dice dangling in the windscreen of an Aston Martin.
Graham S Mills
Southwell, Notts

Satisfaction guaranteed?
I always enjoy Barry Fox's Straight Talking column and particularly his comments in the October issue on the subject of guarantees. How about a page each month on the variations of guarantees offered? On page 101 (October issue) Gateway offer an extended warranty of three years for £210 but "at Gateway's discretion". I am sure your staff could come up with many more examples of guarantee quirks which would make interesting reading,
R Swarbrick, Troon
Ayrshire

Don't cry, buy!
Peter Brown (Letters, October) stop whining. You've been buying *PCW* for years, so you know the magazine has been practically yelling "GET 8MB RAM" for nigh on two years and as recently as April 1995 an extra 4Mb RAM was listed as the most important upgrade with your spec, followed by the processor.
You just can't cry naïvely about trying to run today's software on yesterday's minimum specs.
Kenneth Henry
Enfield
Middlesex

Big heap no fun

I am doing a project on Computer Desk Tidies for my GCSE technology course and I am going to design and make a computer desk tidy. I find that I have a permanent heap of useless items surrounding my computer. It's extremely annoying and no matter how many times I clear it away, it always returns.

So that is the background to my project. Please could you tell me if you, your company, or anyone else in the whole wide world suffers from this problem, and if so, what would you most like to see a desk tidy featuring?

Oh, by the way, your magazine is dead cool.
Victoria Folgate (14)
Kettering
Northants

***PCW replies:** We could certainly do with some desk tidies in this office. If readers have any suggestions, please write in and we'll pass them on to Victoria.*

Hindsight

Five years ago: December 1990
Michael Dell interview
"He managed to make one faintly incautious prediction. By the middle of the decade, he thinks the PC will have dispensed with the need for mainframe makers. 'We'll be selling mainframes in 1995.'"

Update: He was wrong. The death of the mainframe was widely predicted at the time but has failed to materialise. They're still doing surprisingly well, particularly with the move towards (the hot buzzword) data warehousing. At times this year, IBM has been unable to meet demand for its ES9000 enterprise mainframes or its mid-range AS400s.

Ten years ago: December 1985
WordPerfect review
"A useful question when approaching a new word processor is: How easy is it to write a short letter or document without using control codes? In this case, the answer must be 'very easy indeed'. WordPerfect comes close to the ideal of 'What you see is what you get' (WYSIWYG) and although it doesn't show right-hand justification on-screen, you work at all times on a screen uncluttered with control codes...WordPerfect costs £425."

Update: As far as a DOS program working in text mode can be WYSIWYG! And that's when £425 was a lot of money.

First Impressions

Contents

First Impressions includes the irresistible "Gadgets" spread on page 56. Highlights include the tempting Intel Pentium Overdrive, a side by side comparison of the latest new-look notebooks: the Solo and the Hi-Grade Notino. And, Teleshares 2.0 might help you make your fortune on the stockmarket.

VNU European Labs

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

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

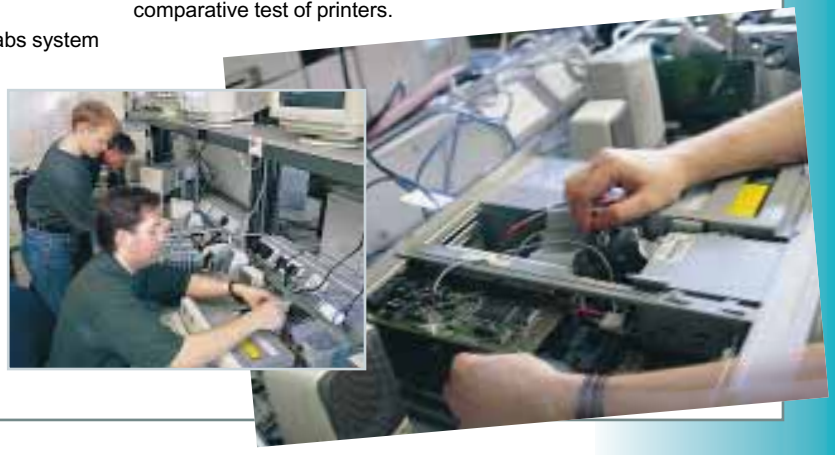
Application tests are the backbone of all the VNU Labs system evaluations but it's nearly impossible to pin an application result to a specific machine component. Only system-level tests (also known as low-level tests) can reliably tell the difference. VNU Labs' system-level test suite is called Euromark.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

Starting this month are our Doom 2 tests, which offer a good indication of processor, graphics and games performance. You can do these at home: quit Windows 3.1 or shut down Windows 95, restarting in DOS mode. Start Doom 2 and set the screen size to maximum, then quit. At the DOS prompt type

```
doom2 -timedemo demo1
```

then wait for the demo to finish, automatically quit and drop back to DOS with two results. Divide the first by the second and times the result by 35 to get a frames per second total — bigger is better.

● To make them easy to read at a glance, all the graphs in *PCW* are now drawn so that the bigger the bar, the better the result. Normally we'll also include the original data we worked from: for example, the time in minutes and seconds to print a page in a comparative test of printers.



HARDWARE

Hewlett-Packard Omnibook 600CT

A classy little number that you'd be proud to take anywhere in your briefcase, says Clive Akass.

The lighter models of Hewlett-Packard's Omnibook range fall into the class known as executive mobiles, which are the nearest manufacturers currently get to making a truly portable, desktop-standard PC. They are not so portable as non-PC old bangers like the Cambridge Z88 or Amstrad Notepad (see our *News Analysis* pages), but unlike most notebooks they can be carried in a briefcase without putting your back out.

They are also high-quality machines. Too expensive for your average punter and too useful to be dismissed as an executive toy; they sell on power, mobility and status.

Omnibooks have undergone various weight reducing measures. Earlier models dispensed altogether with heavy disk-drives. Sensibly, they relied on easy communications with a base desktop PC, pioneering the use of an infra-red port but also offering a conventional serial link.

The Omnibook 600, introduced last year, had a 170Mb PC card disk, a plug-in floppy drive as standard, and an 8.5in dual-scan colour screen. The latest 600CT packs a larger 9.5in TFT colour screen, 8Mb of RAM as standard and new features such as 16-bit audio with a built-in microphone and tiny internal speakers providing surprisingly good sound quality.

Nevertheless, it weighs much the same as the 600 at 1.72kg (3.8lb), or just over 2.1kg including the mains adaptor and cable. The floppy drive would add still more weight but of course may be dispensed with on many journeys. The 18.5cm x11.1cm x 4cm (7.25in x 11in x 1.6in) case is slightly smaller than a standard A4 notebook.

The screen supports only VGA to 256 colours but an exterior monitor can be driven at 1024 x 768 in 256 colours. Subjectively it gives a strong, easy-on-the-eye display which can be read from quite a wide angle (not necessarily an advantage if you want to keep your work to yourself) and is desktop-fast thanks to 1Mb of video RAM and local-bus acceleration.

H-P has had to embed the numeric keypad among the QWERTY keys but claims that otherwise the keyboard is full-size. Certainly, it is fine for typing on. Like its predecessor, the 600CT has an extra Fn key which can be used in conjunction with the function keys to launch chosen applications; you can write names or icons on a membrane above the keys to remind yourself what launches what.

The CT also retains the traditional Omnibook mouse, which pops out on a short plastic arm from the right edge of the machine. This works well (at least for right-handers) on a good surface in short doses, but is difficult to use on your lap and becomes very hard work during a long session — though perhaps not so much as a trackball or nipple pointer. The review version was a little tricky to get back into its slot, though we have not had this problem with earlier models.

Superficially, the CT looks much the same as the 600, except for three audio sockets (stereo out, line in, mic in) on the left edge; next to these is a slot for one Type 3 or two Type 2 device PC cards; a similar slot on the opposite edge, in front of the mouse, carries a 260Mb disk (there's a 340Mb option).

Beneath the machine is a memory-expansion hatch (up to 32Mb), a reset button, and a compartment for the Lithium Ion battery with a claimed life between charges of up to three and a half hours.

At the rear edge are a power-supply socket and the IRDA-compatible infra-red port, capable of transferring data at 115Kb/sec — as fast as a standard serial link. A flap lifts to reveal the serial, parallel, floppy-drive, and exterior monitor connectors, plus one for an optional enhanced port replicator with SCSI-2, PS/2 mouse and keyboard ports.

Software includes HP's suite of organiser applications, including a phone book and financial calculator. You also get good online manuals and Laplink Remote for phone links to your office machine. The review machine was supplied with Windows 3.11 but Win95 should be available by the time you read this.

The Instant On feature works particularly well, without the disconcerting delays of some rival implementations. It lets you switch the machine on and off like a light, with as-you-were boot-up and no tiresome exit procedures.

The review model had a pronounced whine, apparently coming from the screen; H-P said this was a problem on some early products but had been sorted out. Certainly, the second machine we looked at was silent.

The 600 proved robust on the road and there seems no reason why the 600CT should be any different. It scored a nifty 5.47 in our Euromark tests — a performance aided by its fast hard disk. The only factor that may hold it back is the processor: at this price level, customers may look for Pentium power.

PCW Verdict

Fast, elegant and roadworthy.

Price 600CT £2,460; port replicator £259
Contact Hewlett-Packard Customer Information Centre 01344 369222

HARDWARE

Intel Pentium Overdrive

Don't be tempted into a P24T upgrade just because it's there. If your BIOS and cache can cope it represents a reasonable upgrade, but you might be better off with a DX4, says Simon Head.

With the release of the 83MHz version of the Pentium Overdrive chip, many people using 486 DX33 or DX2/66 machines may be tempted into an upgrade. But this is not necessarily as simple as it sounds, and with some PCs, upgrading to a P24T will not provide a performance increase over a DX4/100, which is considerably cheaper.

The main issue is that of the Level 2 cache in your PC. The Pentium chip uses a bus operating at 60 or 66MHz, whereas a 486 chip operates at 33MHz; so to get Pentium performance from a 486 chip immediately presents a problem in delivering data to the chip fast enough. To try to alleviate this, the Intel designers have placed a large 32Kb cache on the overdrive chip; twice as much as is available on the Pentium itself. This cache has to operate in conjunction with the cache on your motherboard to provide data to the P24T overdrive.

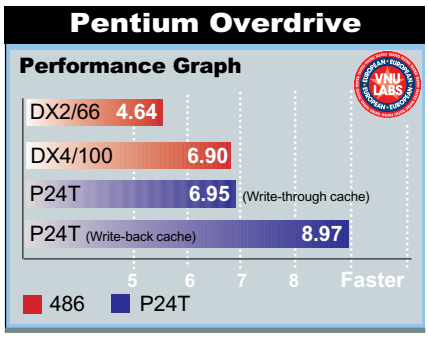
Cache memory can operate in two modes: write-back and write-through. In write-back mode, writes to cache memory are allowed and the changes to the cache are subsequently written back to the main memory. This is the most effective mode but is more expensive to implement as you require logic to keep track of cache modifications. Write-through cache is simpler: when a memory write occurs it is immediately written to main memory.

One of the other major features of the P24T is the fan and heatsink design.

Power for existing fans is drawn from the power supply, either from pins on the motherboard or from a floppy disk power cable. The P24T draws power for the fan directly from the ZIF socket. The fan can be detached from the processor and Intel offers a lifetime guarantee on the fan. Removing the fan reveals three contacts on top of the chip: two of these power the fan and the third provides monitoring of the fan's performance.

The P24T can monitor the fan speed and, in the event of failure, will switch down from its 83MHz clock speed to the bus speed of the processor. Although this will provide a performance loss it stops the chip overheating. Intel provides a small Windows utility that can monitor the fan and notify you if it breaks, though the resulting loss of performance as the processor slows down to bus speed does make this superfluous. One thing the processor will not do is switch back up to 83MHz when the fan is replaced, so if you stop the fan with your finger, or if a cable in your PC fouls it momentarily, the processor will drop down to bus speed and you will have to reboot your machine to convince it that the fan is now working.

Should you upgrade your PC? In our VNU Labs we have experienced some problems with PCs and P24T overdrive chips, particularly with older PCs, so unless you are sure that your PC's BIOS can support a P24T you would probably be better off buying a DX4 and using the price difference to upgrade your memory.



PCW Verdict

If you have a BIOS and cache that can take advantage of a P24T, then it represents a reasonable upgrade. Many people will be better off with a DX4.

Price £219
Contact Intel 01793 403000

SOFTWARE

OfficeBlox

This OLE-compatible component software can make all the difference to the way you work. Users of small hard disks or slow processors should take special note, says Adele Dyer.

AlphaBlox is the first global components company to ship Windows 95 and Office 95 compliant component software. OfficeBlox is its first product and is built as OLE-compatible component software. Put in non-technical terms, the product is a series of building blocks which can be added to any files of any OLE 2 applications or which can receive files from the same applications.

The five components themselves are a means of storing words (NoteBlox), lists (ListBlox) and doing calculations (CalcBlox). ToolBlox, a toolbar, controls their operation and WorkBlox creates an area in which to store your work. The functionality of each can be added to simply by downloading code from AlphaBlox's Web site. Thereafter, you can add only the components you need: as a result, each component is initially low on functionality but high on adaptability.

This has advantages and disadvantages when compared with larger applications. Firstly, OfficeBlox needs very little resources: only 2Mb of hard disk space. On the down side, compared with an application such as Microsoft Office, OfficeBlox at first seems a little crude in its implementation.

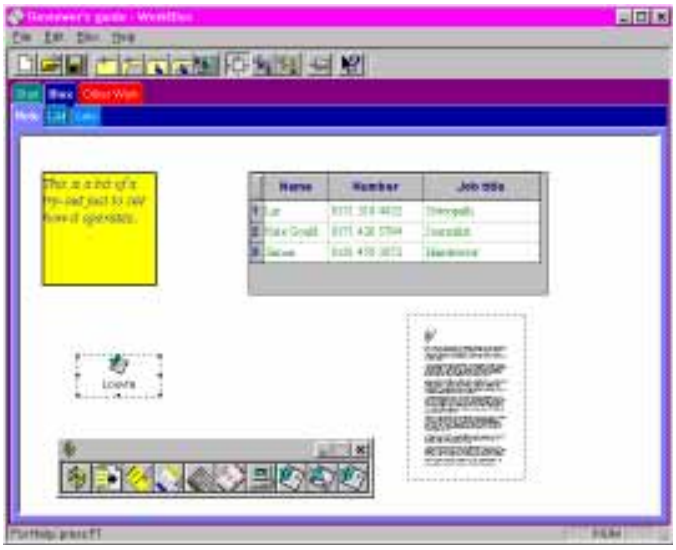
It is suspiciously easy to use and the size of the manuals does nothing to allay your fears: you expect a textbook to arrive with a new application, not 15cm^2 little booklets containing only eight pages of explanation. You can learn to use most of the functions of OfficeBlox in about half an hour, but this does not mean they are just toys.

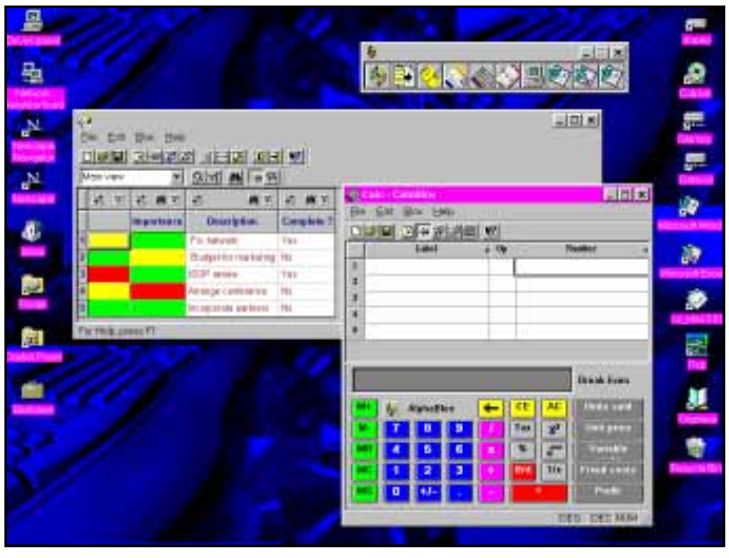
Toolblox is the first element which can be used to improve your working methods. The first improvement is provided by the ToolBlox. From here you can launch any of the Blox as well as any MS Office application or documents you choose to include on the toolbar. (Eventually, OfficeBlox will support any OLE 2 application but there is no fixed date for that at present.) It also works as a source for dragging and dropping any application you wish to embed. You can open a frequently used Word document from the ToolBlox, add a CalcBlox to do a specific calculation and then stick in a NoteBlox to make additional notes to yourself.

Another improvement to your working environment is supplied by WorkBlox. It looks like a filing cabinet, into which you can drop your documents. You can add as many tabs and subtabs as you need to organise your work and mix different types of documents within those tabs. Documents can be copied to make multiple entries under different tabs.

The structure of OfficeBlox takes a little getting used to after a continuous diet of applications, and the differences require a change in your working practices. For example, with NoteBlox you can create little notes to yourself and others which can be posted anywhere. The functionality is nothing like Word's or even Write's, but it does allow you to easily drop text into whatever setting you choose. You achieve more satisfactory results, for example, by dropping a note into an Excel spreadsheet than by embedding it in a Word document. The simplicity of the design makes advanced functionality look like child's play.

You are advised not to throw away MS Office just yet: AlphaBlox removes the need to open these vast applications so often, but it does not replace them. OfficeBlox rather supplements the most commonly used functions of Office, but saves you processor time. For instance, instead of launching a large Excel spreadsheet each time you want to perform a quick calculation on some recent





Above
Workblox lets you store and view many different file formats together

Left
Each component has a specific purpose. Information can be dragged and dropped between them

figures you could keep the figures in a ListBlox, export them to a CalcBlox and embed the results in a NoteBlox, then use Microsoft Mail to send them to a colleague. Any figures stored in the ListBlox can then be exported to Excel by dragging and dropping. As a result you work in real time and are not held up by having to load cumbersome files several times a day or by having them running in the background. They are ideal for low-end business users, allowing significant freedom of working methods but more importantly, for those with low clock-speed processors, the ability to work in real time.

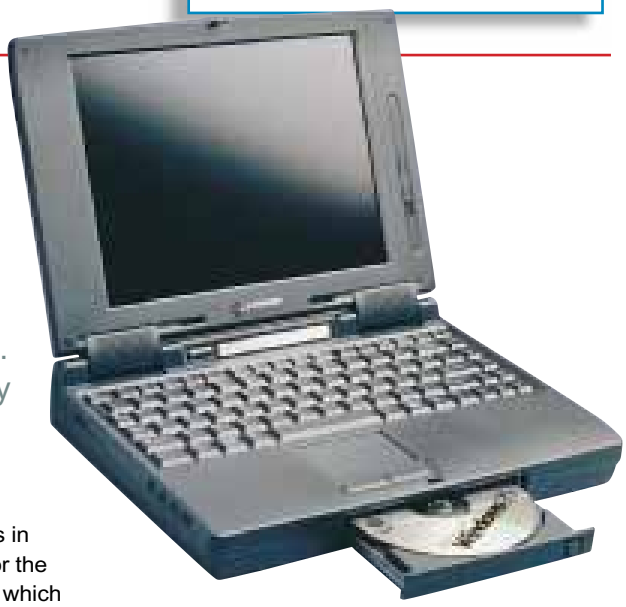
PCW Verdict

An excellent working package specially for use with small hard disks and low clock-speed processors.

Price £69.96 until 17th November; £99.95 thereafter
Contact AlphaBlox 01628 777475; http://www.blox.com, uksales@Blox.com

HARDWARE

Gateway Solo and Hi-Grade Notino



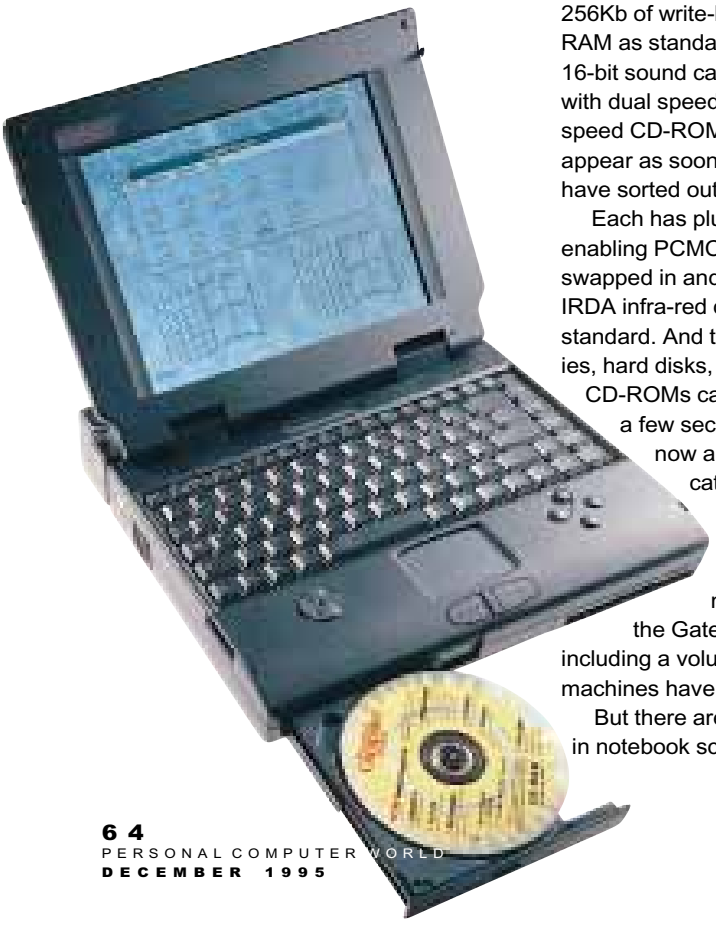
The latest notebooks come equipped with Pentium processors, CD-ROM drives and sound capabilities. Ben Tisdall agonises over two able contenders, only to be seduced by Japanese elegance.

Notebooks are going multimedia in a big way. Everywhere, manufacturers are using fast Pentium processors, whipping out floppy disk drives in favour of CD-drives, building sound onto motherboards and concealing stereo speakers. The Gateway 2000 Solo and Hi-Grade's Notino are two of the latest and the cheapest with starting prices of less than £2,500.

The machines have a number of features in common. They've gone for the trackpad pointing devices which first appeared on Apple Powerbooks. These are easy to get the hang of, don't suffer from "sticky ball" syndrome which often affects trackballs, and there's plenty of space to rest your wrists in front of the keyboard.

They have 75MHz Pentium processors (with faster versions promised), 256Kb of write-back cache and 8Mb of RAM as standard. Both have on-board 16-bit sound capability and are fitted with dual speed CD-ROM drives (quad speed CD-ROMs for notebooks will appear as soon as the manufacturers have sorted out power requirements).

Each has plug and play BIOS, enabling PCMCIA cards to be hot-swapped in and out, and support the IRDA infra-red communications standard. And they're modular so batteries, hard disks, floppy drives and CD-ROMs can be slotted in and out in a few seconds. Both go for the now almost standard LCD indicator screen at the back of the keyboard and both have jacks for a microphone, headphones and midi on the side, although the Gateway gilds the lily by including a volume control, too. Both machines have port replicator bars.



But there are differences. The trend in notebook screen technology is towards active matrix screens at the SVGA resolution of 800 x 600. These refresh faster and prevent the mouse pointer submarining (disappearing) as you move it around. Gateway has gone fully active matrix. The dazzling 10.4in SVGA screen on our review machine would cost you extra. Hi-Grade still offers a slower dual-scan screen on its entry-level machine.

The Hi-Grade has nickel metal hydride batteries while the Solo goes for the more leading edge lithium ion battery technology. The entry level Solo has a 720Mb hard disk, while on the Hi-Grade it's 500Mb.

Take a closer look at the styling and detail of the two machines and it's the Gateway which has the edge. Partly because it has a CD or floppy drive, rather than both, the case is more compact. There are neat touches like the contoured plastic moulding, the way the speakers are built into the hinges and the special Windows 95 key. The Gateway weighs less than the Hi-Grade, too, and its power supply is lighter and smaller. It has a ghetto blaster-type connector rather than the bulkier kettle lead variety.

The Hi-Grade does, however, offer the option of an internal adaptor which fits into the battery compartment.

Whether you prefer the black Hi-Grade or the dark grey Solo is a matter of taste. The overall look of the Taiwanese-made Notino is a year or two behind the Japanese-designed Solo. Yet the Notino has a couple of tricks of its own. For example, it's the only notebook I've seen with a built-in games joystick, and promised soon is an MPEG/TV Tuner module to fit into the floppy disk drive bay.

There's little to choose between the two keyboards. Gateway's goes to the trouble of lining up the touchpad with the space bar so it's easily to hand for touch typists, but it's a trivial difference. And it sports a couple of fairly pointless, but harmless Windows 95 keys for the Start button and right-clicking. On the performance front there's barely a fag paper between the two machines' performance levels. In our Doom frame-rate test both scored just under 22.5fps: disappointing results for Pentium-based PCs.

The Notino arrived a couple of weeks before the Gateway and I became quite attached to it. Yet just a short time with the Solo was enough to cause a complete switch of loyalties. The Gateway is a better thought out and more complete machine that illustrates the gap between Taiwanese and Japanese design.

PCW *Verdict*

Both notebooks are capable, well specified and competitively priced. But it's the more compact, stylish Gateway Solo which gets my vote.

Gateway Solo
Price £2,499 (75MHz Pentium, 8Mb RAM, 720Mb hard disk, active matrix screen)
Contact Gateway 0800 172000.
Fax 00353 1 848 2022

Hi-Grade Notino
Price £2,125 (75MHz Pentium, 8Mb RAM, 500Mb hard disk, dual-scan screen)
Contact Hi-Grade 0181 591 9040.
Fax 0181 591 1586

HARDWARE

Evesham Platinum 133MHz

This big, chunky, high-performance machine leaves little space on your desk for a telephone and a cup of coffee but is nevertheless well designed. Ben Tisdall gives it the thumbs up.

Although Evesham Micros doesn't quite get mentioned in the same breath as Dell or Compaq, it's firmly up there with the likes of Viglen, Elonex and Dan Technology and now turns over £45 million, annually. The name betrays its age. When the company started, 12 years ago, PCs were still called micros.

The Vale Platinum PCI is Evesham's top of the range desktop. Despite the state of the art 133MHz Pentium processor, it's a traditional machine which arrives in a desk-gobbling steel case. Arrange the seriously large Zydec Pro speakers on either side and you're hard pushed to squeeze a coffee cup and a phone alongside.

As befits such a generously proportioned case, there's a nice chunky on/off switch at the front. To the left is a Toshiba XM-5302B quad-speed CD-ROM drive above a free drive bay for another device. Further along there's a completely unnecessary clock-speed indicator and turbo and reset buttons. They're not recessed and far too easy to press accidentally. Press the reset button and you lose your work. As for the turbo button — I once spent a couple of days wondering what was wrong with my PC before someone suggested I might have inadvertently turned down the speed.

Three cross-head screws get you into the all-steel case to reveal an airy interior. There are spaces for two extra hard disks if you need more space than the Seagate 1Gb EIDE drive, fitted to our review machine, provides.

Other components are tidily arranged. The Intel Advance/EV Baby AT sized motherboard has the latest Triton PCI chipset, three ISA slots and four PCI slots. There's a special Card Edge Low Profile (Celp) for the 256Kb of second level write-back cache, and support for EDO (Extended Data Out) RAM or the cheaper standard DRAM. Our review machine had 16Mb of EDO, which is basically RAM with a small cache of its own. It's faster and reduces the need for second-level processor cacheing.

Diamond graphics cards are fast becoming an industry standard. So it's reassuring to discover that one of the PCI slots is filled with a Diamond Stealth 64 VRAM video card. It makes the machine a pleasure on which to run Doom, and the 2Mb of on-board memory will cope with 16.7m colours at 800 x 600 or 65,000 at 1024 x 768. The card has its own slim manual and comes with Diamond's easy-to-use InControl utilities.

One of the ISA slots contains a Diamond Telecommander 2500XL. This is a

Psion Link for Nokia

The short messaging service, SMS, allows short text messages of up to 160 characters to be sent from one suitably equipped digital mobile phone to another. But entering the words from a mobile's keypad is a real pain. Psion's Link allows messages to be composed on the Series 3a and transmitted from a Nokia 2110 GSM phone. Nokia Oranges will work too if upgraded to firmware release 4.77. The cable will cost around **£80**. Call **TBC** on 0171 258 7368

Canon SV-15A speakers

If your PC multimedia experience is lacking the sonic punch it deserves, then you should be looking for a new pair of speakers. How about these from Canon? They're not lava-lamps, oh no. With built-in mains powered amplifiers, these magnetically shielded wonders wack out 40 Watts, with a wide sound dispersion offering a wider listening area than normal speakers.
Price **£179** from **Canon UK** on **0181 773 6000**

Microsoft Sidewinder Pro

To make Windows games more enjoyable Microsoft has released a joystick, which comes bundled with Fury^3 reviewed in this month's Screenplay. The Sidewinder Pro has multiple fire buttons, a special twisty grip, and is ideal for both fast action and simulation titles.
Price **£69.99**.
Microsoft is on **01734 270001**.

Gadgets

POW **Gadget** Photography by David Whyte

Panasonic Panafax UF-S1

It's a phone, a fax, a digital answering machine, and a copier! Yes, it's Panasonic's remarkable Panafax UF-S1, a feature-packed gadget which could singlehandedly look after most of your home or small office communication requirements. It looks rather nice, too. Well worth the £299 asking price (VAT already added).
Panasonic is on **0500 404041**, price **£299.95** inc VAT

Fujifilm FV-10

This impressive-looking gadget is Fuji's answer to many imaging requirements. Using a 470,000 pixel CCD similar to those found in video camcorders, the fully automatic FV-10 can focus its zoom lens and image anything. Use it for archiving, databasing, multimedia, the internet, or even film scanning with its 35mm film carrier. The PAL output can be viewed on-screen, recorded on tape or captured by a PC with a suitable card.
Price **£695** from **Digital Imaging Group** on **0171 586 5900**

Philips Routefinder

If you're fed up with getting lost, tangled up in maps or hitting inpenetrable traffic, the Philips Routefinder could be the gadget for you. This handheld device calculates routes, estimating time and cost of journey, taking into account preferences for scenic or speedy routes. Don't leave home without it.
Price **£199.99**. Dial 100 and ask for **freefone routefinder**

multi-function fax/modem, sound and messaging card. It turns your PC, armed with a suitable printer, into a plain paper fax machine/answering machine. It also enables speed dialing and allows you to receive files from any ITU/TSS T.434 Binary File Transfer (BFT) compatible program. At the time of writing, the card wasn't quite BABT approved, although it should be by the time you read this. Call Evesham to check.

I liked the Keytronics Windows 95 keyboard. It's somewhere between spongy and clicky in feel. The Windows 95 keys either side of the space bar bring up the Start button, and there's a key to the right of the space bar which has the effect of a right click.

And there's nothing wrong with the rather unusual-looking 17in Ecoscan monitor. The controls were easy to use and the image was distortion free. There's a decent software bundle included: Encarta, MS Works for Windows, MS Golf, Scenes, Money, Dangerous Creatures and Photo CD software. There's a choice of Windows 3.11 or Windows 95 at the same price.

As this was the first 133MHz Pentium we've tested with Windows 95 benchmarks, comparison is difficult, but the preliminary figures looked about right for this level of specification. Its Doom benchmark result (57.56 frames per second) was excellent.

PCW *Verdict*

A good-looking, well-designed, high-performance machine with just a couple of niggles: the oversized case, and that reset button.

Price As tested £2,528 plus £150 approx for the Telecommander
Contact Evesham 01386 765500.
Fax 01386 765 354

SOFTWARE

Cubasis Audio

Steinberg's Cubasis has been given a tune-up and now includes a new stereo sampling facility. It heralds the end of traditional four-track recording, says Steven Helstrip.

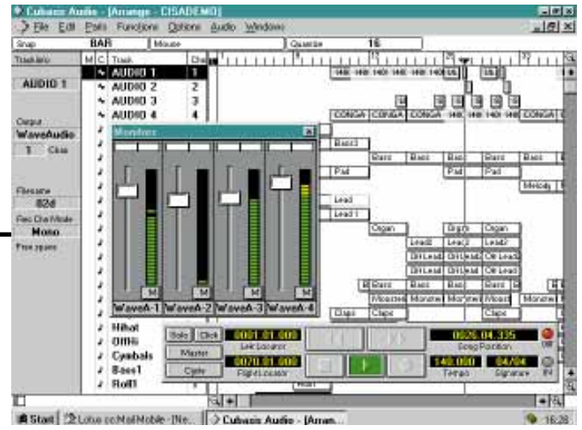
Steinberg has added audio capability to Cubasis, its entry-level version of Cubase. In addition to its 60 tracks for recording MIDI, Cubasis Audio enables you to record and play back up to four stereo tracks of sampled audio — that could be a live guitar, sax, vocals or a combination of these.

Over the years, Cubase has established itself as the industry-standard music sequencing package and is distinguished by its ease of use and intuitive interface. Cubasis Audio is no different and maintains many of the features found in the full version. These include a similar arrange window; score, piano role and lists editors; a toolbox allowing you to quickly edit parts; and drop-down menus containing many of the same functions as before.

To get Cubasis Audio up and running, you need a Windows-compatible 16-bit sound card; see January's sound card group test. Once you're wired for sound, it's easier to install than it is to carry this magazine from your doorstep to the living room.

Given the size of sound files (around 10Mb per minute for a stereo track recorded at 44.1kHz), audio is recorded direct to disk unless you have a few gigabytes of RAM to spare. Therefore, a fast enhanced IDE (EIDE) or SCSI drive is essential. Utilities are supplied with Cubasis Audio to test the performance of your hard drive and at the same time tell you how many audio tracks you can play simultaneously.

The mixer provides overall track level and a pan pot when using mono samples

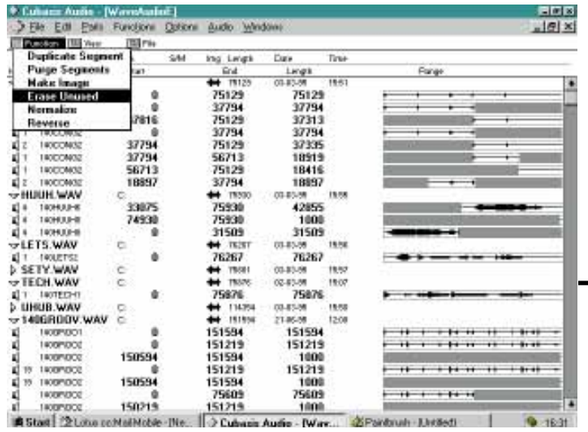


Our test machine, an Elonex P90 fitted with 20Mb RAM and 540Mb SCSI hard disk, had no problems playing four stereo tracks sampled at 44.1kHz. Systems with slower hard disks may only be able to play two or three mono tracks and at lower sampling rates.

In the arrange window, audio tracks can be identified by a wave symbol in the track info column. Other than the way audio tracks are recorded (which first requires you to give it a filename) audio parts can be treated in pretty much the same way as MIDI parts: you can move them around; copy and drag audio parts to other sections in a song; parts can be glued together; and sections can be cut out and/or deleted. What you can't do is quantise or fine-tune any performances. More of which later.

Audio is recorded as standard Windows wave, or .wav, files in either 11, 22 or 44.1kHz. You can record in mono or stereo, but you cannot combine the two within the same song. When you hit the record button you are given the usual two bars count-in. As with MIDI information, Cubasis records between the left and right locators and allows you to punch in and out as normal.

Unless you have a duplex sound card such as the Turtle Beach Tropez, you will not be able to record and play audio at the same time. None of Creative Labs'



Samples are managed from the audio pool. From here you can audition, copy and create new audio sections

cards offer duplex audio as I write. In theory it is possible to use two cards, one for recording, the other for playback. That said, we tried this with a Roland RAP-10 and Creative's AWE-32, only to find it crashed the system. Steinberg assures us they have had this working on their test machine, however.

All editing in Cubasis Audio is non-destructive, which means any edits you perform won't change the original sound file. Instead, a new image is created, based on the original take. For example, say you have recorded a 16-bar vocal and you only want to keep the first two. Cubasis does not delete the last 14 bars, but makes a virtual copy of the first two. This, you may think, is a waste of hard disk space, but worry not. After you have completed the song you are working on, there is a "delete unused" command which does just that.

After an audio part has been recorded, you can "chop up" the sections you want to keep and position them as you would with MIDI parts. If there are timing problems, each track can be offset and made to synchronise with any MIDI tracks.

All sound files are displayed in the Audio Pool dialogue. From here you can audition parts, copy sections and create new images. Images can also be dragged into the arrange window for use in the song. Drop-down menus in the Audio Pool allow you to optimise the gain of audio parts (the same as normalise), import sound files and reverse samples.

Once you have your audio tracks laid down and positioned correctly, you can then use the audio mixer to get the best mix. This is a basic four-channel mixer with sliders for output level and pan position. One disappointment in this area is that you cannot record fades, or recall mixes at a later stage. And unless you have a 500MHz Pentium system, changes in volume don't happen in real time.

Another drawback with Cubasis Audio is that there is no sample editor. If you need to create a crossfade or fade out, you'll need to export the sound files to a dedicated sample editor, such as Fast-Eddie, then import it back. Well, you just can't have your cake and eat it, can you?

Overall, though, what you get for your money is a solid system that looks set to make the traditional four-track recorder redundant. Those already familiar with Cubase will only need a few hours to become proficient with this package and some excellent results can be achieved with a highly-specced system and the right sound card: we recommend at least a DX2/66 with 8Mb RAM and a Turtle Beach Tropez, or equivalent.

PCW *Verdict*

When used with a highly-specified PC and the right sound card ,you can obtain some excellent results. However, even with our test machine some glitches did occur.

Price £211; upgrade from Cubasis, £102
Contact Harman Audio 0181 207 5050

SOFTWARE

ImageAXS

Adele Dyer goes through the looking-glass to assess New Media's ImageAXS image database and finds it easy to use, with impressive results, if a bit pricey against the competition.

Image databases have been around for a while and this one follows very much in the footsteps of Kodak Shoebox and Power Album from Softkey. They are a means of collecting together all your images without actually having to store all your image files in a single place, so cluttering up disk space unnecessarily.

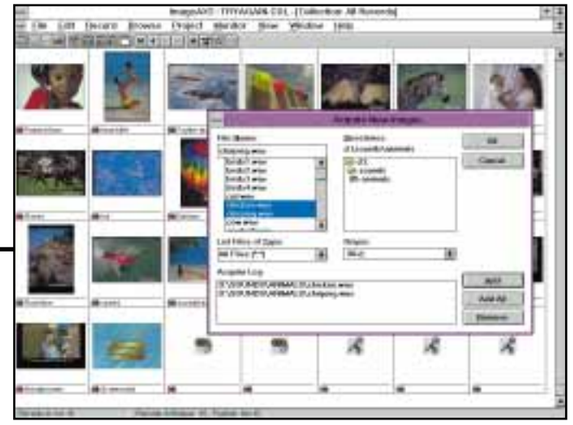
New Media Solutions (NMS), an off-shoot of Virgin, has distribution rights and has anglicised what was originally a US product. Asked to produce an image database for Storm model agency, NMS discovered this software and approached its authors with a view to making it more widely available — a case of: "We liked the product so much we bought the right to sell it." NMS has already created products for various corporate clients, including a major car company, and is now launching ImageAXS onto the general market.

Multiple file formats can be saved in each collection, including AVI movie files and WAV sound files

ImageAXS lets you catalogue your pictures, wherever they may be held. Instead of storing your images in one database, it creates a database of images with pointers to their locations, while at the same time creating thumbnail representations. Three-megabyte GIFs can therefore be replaced with thumbnails of only 128 x 128 pixels, allowing you access without crippling your hard disk.

NMS is keen to stress that the users of this product do not need to be either graphics gurus or database nerds. Its interface is very simple to use and with a little application you can go from taking off the shrink-wrapping, to producing some fairly impressive results in an afternoon.

We began by creating a database which included PCD files taken from a Kodak PhotoCD collection, AVI movie files and WAV sound files from the Softkey Multimedia Library CD-ROM. The package supports a reasonable selection of other file formats including BMP, TIF, TGA, PCX, GIF, EPS, JPG, WMF and JIF. As a cross-platform package you can happily point to either Macintosh or PC files on a CD-ROM, your hard disk or a remote site.



Acquiring new images is simple and quick: thumbnails act as pointers to the actual files

To create a collection, all you need to do is tell ImageAXS where to find the relevant files. It then takes over to create thumbnails, with blank records attached for you to fill in. Each record contains seven database fields which can be tailored to each collection you create, allowing a description of up to 32,000 characters and keywords. There is no compulsion to fill in all of these, although as they can be used to facilitate searches it's an idea to cram in as much information as possible. In the case of the model agency, there was so much disagreement as to what should and should not go into the descriptions they decided to catalogue their models according to physical restrictions, set out

in the database fields alone.

Collections can be subdivided into projects, allowing you to copy records from one collection into a smaller one. You can open as many projects as you want, so large databases can be broken down into more manageable and potentially more useful pieces. The real advantage is not the simple databasing of images, video and sound, but the ends to which you can use them. So long as you have access to the original files, you can view them, including AVI and WAV files, through the database without opening other applications.

Taken to its logical conclusion, the package lets you run slide-shows either of an entire collection or on a more selective basis. These pull up the source files with alarming speed to roll through a show of images. Unfortunately, you cannot add videos to the slide-show as these need to be launched through a particular command.

If you want to see what is outside the database you have the option to monitor accessible material, even if it has not yet been collected, without leaving ImageAXS. This is of limited use. You can collect images into the monitor window, but you cannot view them unless they are JPGs with a thumbnail already attached.

But this is really a minor gripe. The package is easy to use and can produce good results with little effort. However, since it does very much the same thing as Kodak Shoebox, it is a little overpriced.

PCW Verdict

Very easy to use and you can create good results, although it is a little overpriced.

Price £149
Contact New Media Solutions
0171 229 1708. Fax 0171 727 8200

HARDWARE

Xerox 4920

For small office workgroups looking for colour and black & white printing across mixed platforms, the 4920 offers a nice size at the right price. Eleanor Turton-Hill reports.

Up until recently, colour printing was considered by most computer users to be an expensive and unobtainable luxury. But massive changes in the printer market over the past couple of years have got people used to the idea of producing colour documents. Many different technologies can be used to achieve this, but the most effective (and affordable) one to date is the inkjet.

Laser technology, of course, gives much better-quality results than the inkjet but the printing process is far more complex, and consequently, colour lasers have not hit the mass-market in anything like the same way. Most colour lasers are massive pieces of equipment (about the size of a deep freeze) and cost several thousands of pounds, and this restricts their market to large corporate organisations and medium-sized businesses.

This latest printer from Xerox has a list price of £5,999, one of the cheapest colour lasers we've seen so far. It's also a lot smaller than previous offerings – not exactly a neat desktop device, but it can be lifted by two people and will fit on a largish desk. It measures 533 x 610 x 380mm and weighs 49kg. The 4920 is targeted at small office workgroups and attempts to cater for all printing needs, producing black and white documents at a speed of 12ppm and full colour at 3ppm.

The 4920 has Adobe PostScript Level 2 as standard, with optional PCL 5e. 24Mb memory is fitted out of the box, expandable to 48Mb. Ethernet and Token Ring network cards are optional. The engine will handle paper from 60 to 160gsm.

The design of this printer shows Xerox's experience in the printer market. It comes with all the necessary cartridges pre-installed and a "Getting Started" card showing how to set the whole thing up. As the cartridges are already in the printer, there's no risk of spraying yourself with toner. All you have to do is remove a series of protective tags, fill it with paper and plug it in. There's nothing fiddly about this either; the top cover opens to reveal the entire innards of the printer and from here everything is clearly accessible — four toner cartridges containing yellow, magenta, cyan and black, two rollers at the back which guide the paper out of the machine, and a selection of colour balance controls on the left-hand side.

The paper tray opens towards the front of the machine at the bottom. It has a capacity of 250 sheets of ordinary paper, or 75 transparancies. This can be extended with an optional paper tray with the same capacity, which slots in below. We did have the odd paper-feeding problem, but this is easily resolved by opening the rear door of the machine and removing any stray sheets.

When it comes to quality of output, Xerox has developed several imaging enhancement techniques including Quad Dot technology, Smooth Screen technology and microfine toner which enhance various aspects of the printing process. On the Xerox 4920, these techniques are referred to collectively as "Intelligent Colour" because the best image quality is applied automatically.

If you're experienced in tweaking your printer driver to provide the best possible effect, there are advanced options for customised adjustments. It is possible to adjust colour correction separately for text, graphics and halftone photographic elements. If you're not into fiddling around, the Intelligent Colour provides an "idiot button" pretty much like an automatic flash on a camera. This will apply the most suitable imaging methods to individual elements within a page, such as halftones, graphics or text.

In practice, the "intelligence" factor works better on some images than it does on others. We found that Xerox's smoothing technology worked exceptionally well on large blocks of dark colour. Lighter colours, on the other hand, tended to suffer from a very slight banding and shadowing effect. Compared to similar products however, the overall quality was excellent. Performance increase was marked on plain black and white text documents, and the quality of output on these appeared crisp, showing the clear superiority of 600dpi resolution.

As well as its relatively low price and manageable size, this printer is also one of the easiest colour lasers we've come across to set up. The automatic driver features allow non-specialists to produce good-quality, well-balanced colour documents. It's also flexible across operating systems working with Macs, PCs, and workstations, and has built-in automatic sensing which allows you to talk to it in any language without having to reconfigure the control panel for each print job. This printer is a sensible choice for small- to medium-sized workgroups who need good-quality colour as well as a reliable office workhorse.

PCW Verdict

Great buy for any office workgroup which needs black & white and colour capability, especially across mixed platforms. There are minor glitches in the "Intelligent Colour" technology, but otherwise, the 4920 is user-friendly, reasonably priced, and versatile.

Price £5999
Contact Xerox 01895 251133

SOFTWARE

Teleshares 2.0

Stock market thrills and spills come direct to your PC with Updata's Teleshares 2.0. Andy Webb reckons aspiring City types will find this system pays for itself in no time.

Updata Software not only offers a range of investment packages aimed at the private investor, but has also become a market leader at using free Teletext data to feed those packages. Teleshares 2.0 can be combined with three different cards — Hauppage WinTV, Opt III Teletext, or Microtext. System requirements are not too demanding, so a 386 (DX for choice) with 4Mb RAM and 10Mb of free disk space will be able to cope.

The Microtext card used for this review takes up a standard ISA slot and uses the same circuitry as the text card in a TV. It's quite tall, so you have to be sure that you have clearance between it and any adjacent card, otherwise life could get expensive when you next power up. Tuning the card to the Teletext signal is handled by the software and takes less than two minutes. You aren't restricted to UK text services with this setup, so if reception is strong enough you can access European data as well.

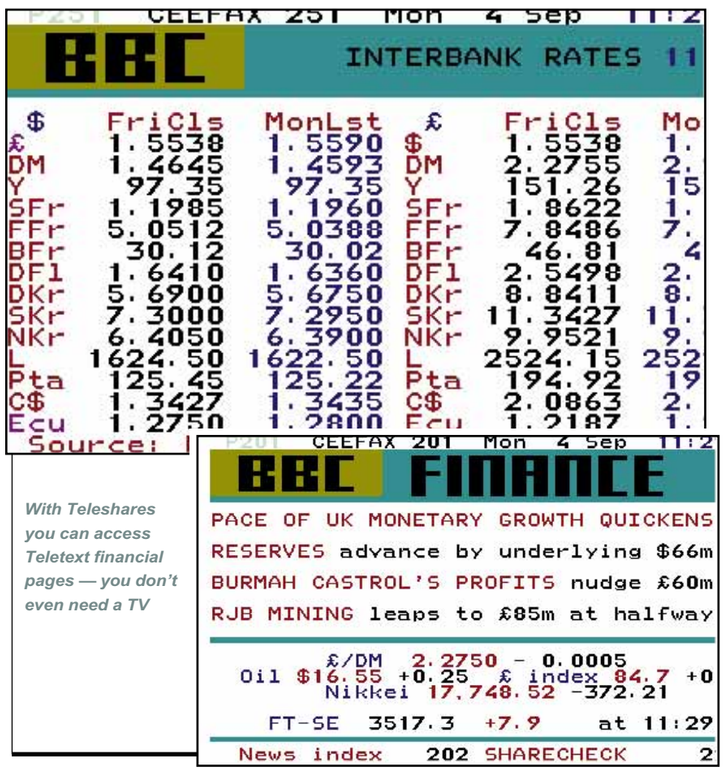
The system is built around a series of lists and folders. The lists specify which text pages the software will strip from the text card. The program comes with eight lists already set up, but as the last four are duplicates you can alter these to suit yourself. The software only scans one list at a time, though you can switch lists manually and automatically. The fewer the pages in the list, the faster the refresh cycle; so it's worth deleting any irrelevant pages. Each item on a list has a template (Updata calls it a "mask") that ensures only relevant data is stripped from the page.

The folders allow the data collected from the lists to be grouped in a meaningful manner. The software arrives with ten system folders already set up for markets ranging from commodities to investment trusts. You can create your own customised folders by selecting individual items from the system folders, so if you lust for a page full of obscure Middle Eastern currencies, you simply select the ones you want from the relevant folder and add them to a page. The folders continually accumulate the data from the card into a database for each security. The data can be manually edited in case of errors, or exported to other applications in a variety of popular formats. You can even import data and graft it to an existing Updata file.

Teleshares offers DDE links to other Windows applications. If you set up your share portfolio in an Excel spreadsheet and use the "Paste link" command, you can have its value updated throughout the day. At present, the only Teletext prices that are realtime (instantaneously updated) are the currencies and the FTSE index, while most other markets are refreshed on roughly a three-hour cycle. Any software that supports DDE can take the free feed from Teleshares and, considering that the cheapest real-time data feeds start at about £1,200 a year (not including hardware), this looks a bit of a bargain.

The information in a custom window can be manipulated in several ways. You can choose to see the current or previous day's price, the highest/lowest price for the day, or the change on the day. A "Leaders and laggards" facility will sort the page in ascending/descending performance order. If you don't know the origin of a particular piece of data, a "Source" command will put the Teletext page number next to the name of the security. At present, the source of the data cannot be changed, so if Updata has decided that ICI's share price will come from Channel 4 not BBC2, tough. This can be bad news if there is a transmission problem on one channel and you are left with no alternative data source. Updata sasy this will be revised in the next release.

News stories are split into various categories — City, general, company — and can be displayed as they break or saved



With Teleshares you can access Teletext financial pages — you don't even need a TV

for later viewing. If you want to view complete Teletext pages as you would see them on a TV screen, you can do that too. The program also screens incoming data for errors so you shouldn't wind up with a database full of garbage. You can even go on holiday and leave your PC to gather data in your absence by setting a software data capture timer. The only additional costs involved before you are up and running with Teleshares, are an aerial and a colour TV licence.

There isn't much to pick fault with. It's not a clever move to have loads of windows open simultaneously or the program starts hogging system resources to run the refresh cycle. I ran the package on a DX2/66 with 8Mb of RAM and by the time I had eight text pages open, Word 6.0 (where I was trying to write this review) was going like a snail on sedatives. That aside, Teleshares looks like a winner.

PCW *Verdict*

A neat idea that will save the keen investor serious money.

Price £249 for Microtext card and Teleshares bundle
Contact Updata 0181 874 4747 or Optimum Technology 0181 203 0220

SOFTWARE

Autoroute Express for Psion Series 3a

Clive Akass was in no hurry to chuck away his well-thumbed road atlas for any new-fangled nonsense. But Autoroute Express might just have changed his mind.

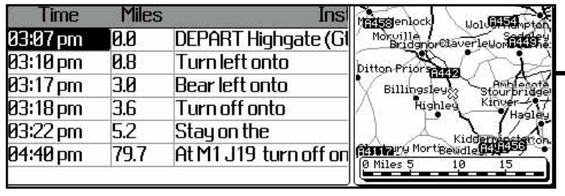
The marriage of Autoroute journey-planning software to the Psion 3a organiser brings together two of the more successful British computer products of recent years. It allows you to plan the best route between any two of 7,200 locations and estimate the journey time, all in a pocket device. And it will even replan a route to take account of traffic jams. The question is whether, given the inevitably limited display capabilities of a palmtop, it can do better than the eminently portable and supremely readable pages of a tupenny-hapenny road atlas.

The designers have gone all out to prove that it can. Hotkeys allow you to zoom easily in and out of both text and map screens, and you can select the level of detail to avoid cluttered screens. Scrolling map views is awkward: you have to press a hotkey, then hold down the cursor-key for the required direction; the edge of the map shifts, leaving a blank space, and you press Enter when you guess the view has shifted as required. Only then is the map redrawn.

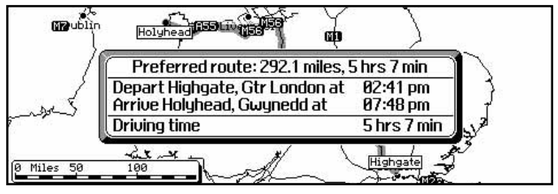
The Psion's diamond key cycles you through three main views: map, table of written directions, and split map/table. There are hotkeys for most important control functions, but you can navigate the program just as easily via the menu key. One aspect jars until you get used to it: the dialogue box in which you enter your start point and destination is summoned by an obscure option labelled Route/Calculate — which surely implies the calculation of data already entered. However, you can opt for this dialogue to come up automatically on start-up.

You can also specify roads and locations to avoid, and set defaults such as your home location and average speeds for different road conditions.

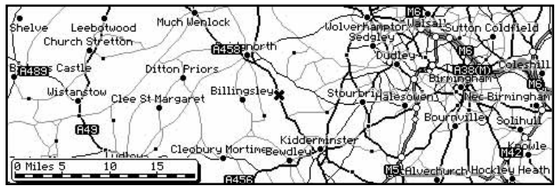
Autoroute Express for the Psion comes on a 1Mb ROM card and is sold under the Microsoft Home brand — Bill Gates bought the company last year. It will work on any 3a with 512Kb of RAM or above.



Top *Autoroute allows you to tab between a route table, a map, or a view of both*



Middle *You get an estimate of journey time*



Below *You can zoom easily in and out of maps*

PCW *Verdict*

Quart-sized application crammed onto a pint-sized platform, but works well enough to compensate for occasional clumsiness.

Price £69.95.
Contacts Microsoft 01734 270000, fax 01734 270002; Psion Dacom 0171 262 5580, fax 0171 258 7340

Long term tests

PCW How You Can Contribute To The Long Term Tests Section

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

HARDWARE

Epson GTi-8000 24-bit colour scanner

1 YEAR TEST

Marc Hindley has pushed his GTi-8000 to the limits. Speedy and reliable, it has proved up to the task every time.

I find it unusual that mechanical, electronic and household items are given vehicular names. I'm just waiting for turbo vacuum cleaners with intercoolers. But perhaps the 'i' suffix here is an apt analogy. While Epson GTx scanners come with a cut-down version of Adobe Photoshop, GTi scanners are bundled with the full version — fuel injection as standard, you might say.

My specification for this, my third scanner, was that it had to be 24-bit and bundled with the full version of Photoshop, so it was a case not of what software do I get with an Epson, but more what kind of scanner do I get with Photoshop. Sorry, Epson, but there's more difference between software than hardware here.

After installation, Adaptec SCSI in this case, calibration is the first thing you need to conquer, and I do mean conquer, because Epson seems to make a habit of bad documentation; and while printer installations are more or less self-navigable, scanners are not. In this case it's best to read right through the calibration procedure, then bear it all in mind as you go through the stages for real.

Having said that, once set up, the scanner is reliable, sturdy and accurate, and has given uninterrupted performance over the past 12 months. If I were to reveal that I do up to 90 scans a week in mono and two in colour which are colour corrected, adjusted or edited, and separated within Photoshop, printed on a paper page printer with remarkable end results, most people in the media would find it hard to swallow; but it's absolutely true. This is why I must have Photoshop, and also why accurate calibration is essential.

Colour depth is a problem for all 24-bit scanners with dark images. The way to get round this is to alter the curve before you scan rather than after. It's easy to go too far, but you'll soon notice after scanning — nothing but experience will help. Rather than manually alter the curve, I find that between one and four clicks on the scroll bar (note, not the button) will give amazing results to dark pictures. Relying on software curves will not give the same results.

A tiny amount of space is claimed around the top and left edges of each scan — worthwhile bearing in mind but hardly ever a problem. The TWAIN front-end is comprehensive and allows individual setups to be named and stored, ideal if you have a large workload with differing requirements.

I may not have chosen the GTi-8000 for its own merits, but I cannot fault its speed and reliability. I push it to the limit, and it never fails.

The GTi-8000 has been superseded by the GTi-9000, pictured here, which has won our Editor's Choice accolade

PCW Verdict

The Epson GTi-8000 scanner has been discontinued and is very difficult to find. Interested users should look for the more recent and much improved GTi 8500 and GTi 9000 models, the latter winning Editor's Choice in our last scanner group test.

Price Epson GTi 8500 £769, Epson GTi 9000 £869
Contact Epson UK 01442 61144

HARDWARE

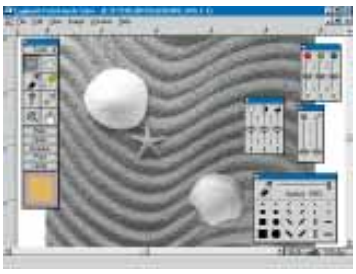
Logitech Scanman 32

2 YEAR TEST

A bit long in the tooth it may be, but the venerable Scanman 32 can hold its own in low-cost, low-resolution scanning. Jonathan Thaw praises its usefulness.

Don't underestimate handscanners. They may not be so great for OCR, but small line art and photographs are fine. Here's a scan made with the Logitech Scanman 32, loaded into the supplied FotoTouch software. It may only support 32 grey levels, but remains a bargain buy while stocks last

The Logitech Scanman 32: outdated, outperformed and outclassed, maybe, but still on the market at a rock-bottom price. Computer operators may want scanners for one of three reasons: for scanning-in photographs, diagrams, or for OCR work. The Logitech Scanman can satisfy anyone's needs in terms of diagrams, some people's needs for photographs and a few people's OCR work. Thus is the dilemma of a scanner: what is it going to be used for? One thing the Scanman is not suitable for is scanning large, high-quality photographs, but with a little improvisation and a bit of effort it can fulfill most of your needs.



The Scanman 32 was one of the first hand scanners on the market. It has a 10.5cm (4.25in) scanning area and can scan in black and white at up to 400dpi resolution. This means that it cannot, of course, scan full A4 pages of text in one go. These must be done in two strips, which is a good idea, but in practice, scanning a page in two strips is a little fiddly. However, surprisingly good results are obtained if you put a little effort into it.

The scanner achieves 32 levels of grey, unlike its big brother, the Scanman 256, which can handle 256 shades of grey. It is TWAIN compliant, meaning that it will work with almost all applications requiring a scanner. It is available for DOS and Windows. The Windows version was always a better buy due to the superior standard of the software included, and with the advent of Windows 95, the Windows version is essential. It comes complete with a dedicated controller card which fits into a spare 16-bit expansion slot.

Getting the thing to work is as easy as Microsoft intended plug-and-play hardware to be, as long as you don't have any conflicts with other cards. It comes with three main programs: the actual scanning utility, which is run from inside other applications; Fototouch Colour, a photograph-editing program; and OmniPage Direct, a not half-bad attempt at an OCR application.

If, for example, you want to put a photograph into a piece of work, the process is quite straightforward. You tell your word processor to insert a Fototouch Colour object. Once Fototouch Colour is loaded, you click on Acquire, the Scanman window opens, and you're ready to start your first scan. This is nearly always the first of several, as it can be quite difficult scanning straight, at the right speed and at the right brightness.

Although a little primitive, the Scanman software allows you to select the paper orientation, calibrate the scanner and set whether it is Line Art (for diagrams) or Greyscale (for photos). The scanned image then appears magically in Fototouch for editing. Although a bit clumsy, this utility is quite useful and I usually use it to get rid of the stuff around the picture that I don't need; but if photo editing is your game, you would be better off using something like Photoshop.

When Fototouch is closed, the image is pasted into the word processor (usually in the form of a black & white blob, the quality of the printout being far superior). For diagrams, the Scanman could fulfil your every need (except colour) and with a little perseverance, the quality of scanned photographs is surprisingly good.

OCR work is a different matter. Omnipage Direct is a little application which sits quietly in your memory and "registers" itself with your applications, with the words "Acquire Text" appearing on your file menu. This is all very well if you are using Windows Write or Notepad, but when it comes to registering applications like Word, your whole computer is liable to give up.

The simple solution is to scan your work into Notepad and copy it to the other applications. On selecting "Acquire Text", you are asked what type of text it is: it may be either continuous or in columns. Then you are confronted with the familiar Scanman window, which has the same settings as before. The groups of little black blobs scanned are then recognised by Direct (the speed depending on the resolution) and appear as text in Notepad. The quality of recognition varies from awful to quite good, but never stunning. The Scanman is only useful for occasional OCR work but can be handy and convenient when scanning smallish chunks of text.

If your use for a scanner is on an occasional basis, and you require diagrams, black & white photos and a bit of OCR, the Scanman is a must. It is simple to install, easy to use and, on the whole, produces good results. And at a knockdown price of about £60 you really can't go wrong.

PCW *Verdict*

Multi-talented no, multi-useful yes; the Scanman 32 offers extraordinary low-cost, low-resolution scanning and at times can be incredibly useful.

Price £69
Contact Logitech 01344 894300

Take 5

Print it, fax it, and copy it — three different machines; three times the outlay and three times the problems. The new, hybrid fax-cum-printer-cum-scanner machines for small or home office use combine all three functions in one and make a lot of sense, says Simon Rockman. Here, he tests a selection, from the easy-to-use to the high tech, and there's something to suit all pockets.

It makes a lot of sense: why buy three printers when you can have one? Whether you are setting up a small office as a sole trader, a regional branch or just working from home you'll need a computer, printer, fax machine and a photocopier. The likelihood is that you could end up with a tatty thermal printer spewing out rapidly browning paper from your cheap fax machine, a workaday printer (probably inkjet) attached to your computer and the expensive bits of a laser printer in your photocopier.

The systems reviewed here offer all the functionality of the basic office hardware. The devices from Hewlett-Packard, Xerox, Lumina, Canon and Ricoh each take a slightly different approach.

If you have a computer and a printer you might argue that all you need is a scanner and a fax modem, and from a technology point of view you'd be right. But leaving the computer on all the time in anticipation of an incoming fax is a far from satisfactory solution. And, while most systems will send and receive faxes while you work they slow down the rest of the functions so much that the system becomes pretty well unusable. Fax modems are fine for sending computer originated messages but once you want to include a hand-drawn diagram or annotation, the hassle of scanning, saving to the hard disk and then using the fax software is so great you usually don't bother. A British Telecom executive once said "Fax machines are not high-tech because they are easy to use." It's much easier to feed a page into a slot rather than mess about with scanners. The machines reviewed here bridge the gap between easy to use and high technology.

Lumina 2000

The Lumina 2000 is a very sensible device. It attacks what is currently the sweetest spot of the computer market and gets it just right.

The SoHo (small office/home office) market is more than just a fad. Many people will have a computer and a printer. They will want a fax machine and think it a crazy idea to buy a thermal fax when they already have a printer. The Lumina provides the missing bits: a scanner and modem which can observe the fax protocols.

Without a computer attached it's a send-only fax. Attach a printer and it becomes a fully-fledged fax machine — if you want a laser fax, this is the cheapest way to do it. Buy a Lumina and a very cheap laser printer: you will also reap the benefits of the low-priced consumables of a cheap laser. With an H-P Laserjet 4L at under £400 in the shops, it's a bit of a bargain. The printer varieties supported are LaserJet 2, 3 and 4, PostScript, Epson, ProPrinter and BubbleJet.

Hook up a PC (IBM compatible only, as unfortunately there is no Mac or odd-ball option) and you have a far more powerful machine. You can use it as a fax modem and access all its functions from Windows. The Lumina control panel runs under Windows and offers basic function control, and you can edit and manipulate the phone book in the printer which saves a lot of hassle in bulk faxing. Especially so, as the alphabetic keyboard on the device is in alphabetical order (rather than QWERTY) which makes it very annoying to use.

With a Lumina 2000 at either end of the phone line you can send files using a binary transfer mode. This conforms to the T.434 standard so, in theory, you could also send data to a suitably equipped PC. A variation on this is a remote print option. Instead of sending a bitmap down the phone lines, two Lumina 2000s can communicate at a data level so that the phone line becomes a long printer cable. The result is that the print quality at the far end is as good as it would be locally.

You can scan images into memory and into the PC. TextBridge OCR software is included and works quite well. The communication between the computer and the Lumina is through a parallel cable, with a second parallel cable connecting the Lumina to the printer. Only one cable is supplied as Lumina assumes that if you already have a printer, you also have a cable.

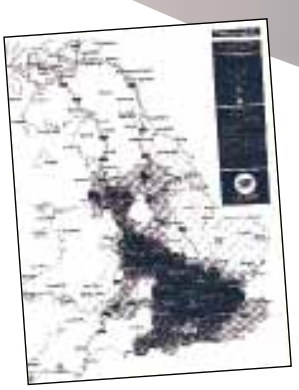
There is sensible software scaling to allow for a non-printing area all around the image and this can be set to auto-detect the image before printing. In our tests the scan quality proved to be comparable with that of the H-P OfficeJet but not as good as the Xerox 3006.

As part of its home office repertoire, the Lumina has a phone connector for a

telephone answering machine, but as BT only charges £99 for a second line it is a sensible option for anyone who wants a fax at home — at least that way the ring can be silent so you won't get woken by faxes from overseas during the wee small hours of the night.

The documentation is excellent: it covers the hardware and software in one easy-to-follow guide. Its only downfall is the lack of an index.

The Lumina 2000 is an excellent product, but it does have one serious problem; the price. Small distributors are selling it for £550, which is £50 more than the OfficeJet with all its major features and a printer built in. You could argue that some people would rather have the option to add their own printer, but to expect customers to pay more for less is a trick only the marketing departments of flash German sports cars can pull off.



PCW Details

Lumina 2000
Price £550
Contact Westwood Distribution
01753 887161

Verdict A clever and well-engineered device. With a lower price it could be the market leader.

This should be £150 cheaper if it is to take on the might of Hewlett-Packard rather than compete at the edges.

Hewlett-Packard OfficeJet LX

Whenever a Hewlett-Packard printer is included in a group test we secretly hope that there will be another printer able to give it a run for its money. It can be slightly dispiriting to begin a test in the frame of mind that the most obvious choice will in fact turn out to be the winner. But with this multifunction round-up there was some hope.

The Lumina and Ricoh machines each offer different approaches but ultimately it's the H-P which will suit most of the people most of the time. This is partly attributable to high standards of quality control but mainly due to the huge volumes in which H-P kit is manufactured. This makes it very difficult for rival manufacturers to compete on price. The big mail-order discount companies work to very tight margins on Hewlett-Packard equipment which further reduces the price to the customer.

The OfficeJet LX uses the same 300dpi print engine as the DeskJet 520. This can be improved to 600 x 300 using H-P's resolution enhancement software but the final results are still not as good as the substantially more expensive Xerox. With the H-P, the areas of black fill in badly, making reversed out text difficult to read.

The device was supplied with comprehensive software support in the form of fax manager software and Eclipse which allows the OfficeJet to work as a faxmodem. This saves on paper (although the running costs for this machine are already reasonable) and provides OCR. It allows the OfficeJet to work as a scanner, too.

You cannot use it as a modem — although much of the hardware is there you'll need a separate modem if you want to log in for a data call. This should not be much of a problem as even fast modems are now sensibly priced and, unlike the Xerox, the OfficeJet does not use a serial port, hence the connection is unencumbered. General faxmodem software can be used as the fax manager captures a virtual com3: and assigns it to the serial

N Details

ckard OfficeJet LX

Price RRP; £499 street

Contact Hewlett-Packard 01344 369222

Verdict Excellent value for money. It's the perfect solution for a growing number of people. A laser-based version would be even better.

port. The modem can, however, be used by H-P technical staff to exercise remote diagnostics, trouble-shooting down the line.

The documentation is excellent. Installation of the software and hardware is easy: the printer cable attaches deep underneath the OfficeJet which means turning the machine onto its side. Thus, if you want to swap leads to use another printer, it's easier to have several leads and disconnect at the computer end.

As a printer it works well, but as with all inkjets it is sensitive to the quality of paper. You might be best off keeping cheap photocopy paper in the tray for fax usage and replacing it with "best" chalk coated paper when you have an important document to print.

Most people will want a printer and fax and this machine performs those functions admirably. It's competitively priced against standalone plain paper faxes. You have the additional advantage of computer control over the phone book and the fax sending, which is all very much easier than fiddling about with a keypad on the front of the unit. This alone would make it a good buy for many people.

The advantages of OCR and scanning are not quite so marked, but anyone who handles a lot of contracts by fax (or deals with a lot of drawings, for instance) will find it useful. It is not very good as a copier: the inkjet may be impressive for text and show no signs of banding, but it fills in shapes and therefore isn't a patch on a proper photocopier.

In the SoHo market, the size of the hardware is very important: people working in a box room or a cupboard under the stairs don't want to give up their limited space to hardware. The OfficeJet may be substantially bigger than a simple inkjet printer but it nevertheless provides a good space saving over a printer and a separate fax.

Canon B360

Canon is the company which seriously rivals H-P in the printer market, so the B360 with a similar specification to the OfficeJet was of particular interest.

A small, solid device; it is easy to set up with a photocopier-style paper tray, which affords it the greatest paper capacity (around 150 pages) of any inkjet reviewed here. With a cut-sheet feeder you cannot receive pages longer

PCW Details

n B360

e £1,295 RRP; under £1,000 street;
oftware £100 (free until Christmas)
Contact Canon UK 0500 246246

Verdict A good buy, but just pipped at the post by the better value HP machine.

than A4 onto a single sheet: the B360 will either split the fax across several pages or reduce it to fit, scaling either in proportion or vertically. This can be set from the front panel.

Both scanning and print quality are good: print quality proved to be better than that of the OfficeJet with less filling-in on reversed out text. (All tests were conducted using the same grade of paper.)

All communication between the B360 and the PC is down the parallel cable using proprietary MultiPASS software. This consists of two executables: the MultiPASS server and the MultiPASS Desktop Manager. You don't need to run the Desktop Manager the whole time but you do need to have the server running if you want to receive faxes to the PC (use the B360 printer drivers, or use the fax driver). In order for this to happen automatically, the server software is put into the Windows 3.11 startup group. If you disconnect the B360, a warning pops up. Repeatedly. The only way to stop this is to take the icon out of the program group. Canon is clearly used to people deleting the icon and then needing it again because a spare is provided in the Canon utilities group.

The MultiPASS software allows you to set up the fax with its number and your company name (much easier than using the keypad), but unfortunately these details are used only on the cover sheet. The page header information is still controlled by (and has to be set up on) the B360. The receiving fax option in the Desktop Manager allows the incoming fax to be received in either PC memory, B360 memory, or printed. Pages can be scanned and saved as .BMP, .PCX or .TIF files. A meaningful file name of up to 24 characters can be used, even under Windows 3.11, although this needs the Desktop Manager to extract the name. The scanning ability is particularly useful for logos and signatures, which can then be sent in paperless form, from the PC. The Desktop Manager saves the huge waste of paper usually encountered with fax machines which insist on printing reports. The PC can read a log of messages.

Overall, the B360 falls somewhere between the H-P and the Xerox. It's better than the former but not as good as the latter, and the price reflects this. It looks good and occupies less desk space than the others. It did have a small problem with feeding a heavyweight original (all the others, bar the Ricoh, did too) but ultimately it's neither fish nor fowl.

Consider whether you are prepared to pay the extra for better print quality. Alternatively, if you want the best option but don't want to give up a serial port, the B360 is a good alternative to the Xerox. For some users, the higher paper capacity and a longer-lasting ink cartridge might appeal but it's bad enough being met by a small pile of papers on a Monday morning, let alone a large one.

In the home office, its small size, together with its ability to add a telephone answering machine are a bonus, and generally the excellent manual is worthy of praise even though computer operation is split between manuals for hardware and software.

Xerox 3006

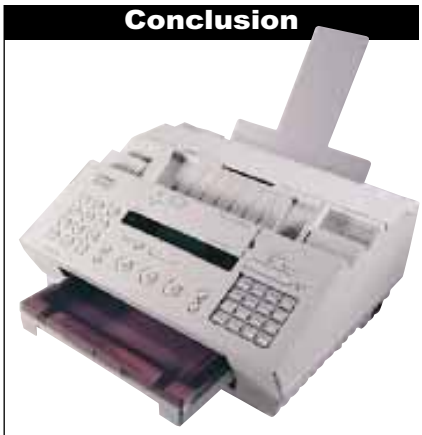
This is the slickest of the devices reviewed here and, in our tests, proved to have the best print and scanning quality. The 3006 is closest in mien to the H-P. It has a centronics parallel port at the back and can be set up as a fax or printer astonishingly easily. The point at which it differs is its ability to act as a scanner, or to fax from the PC. This is an optional extra, as with the Ricoh (and was supplied with the review machine). Setting up was simple and the documentation easy to follow. The printer drivers for the H-P 500 compatible printer option proved to be reliable under Windows 95 but had to be installed using a custom print program rather than the Windows '95 Add Printer option.

Upgrading to PC connectivity requires a separate board and a serial lead. This means that anyone who has a modem and a mouse connected to their serial ports will need a third port to add the connectivity. The H-P solution of using the parallel port and trapping a virtual COM3 is cheaper and neater.

The 3006 is designed to be left on; it will receive faxes to memory while you are printing. The memory can hold 35 pages and can be expanded, with a 1.5Mb upgrade, to hold 115. This is battery backed up and will hold information for 24 hours.

The two-line LCD gives sensible reporting of the problems the device may be incurring and there is a menu system which is easy to follow. Although there are lots of buttons on the machine they make things less confusing since

Conclusion



If all you want is a fax machine, go and buy one. A cheap fax machine costs less than £300 and will happily sit on a phone line and churn out thermal paper. If you need a photocopier you'd better buy one of those, too — none of the systems reviewed here really rival a proper office copier. There are much more expensive systems from Rank Xerox but they don't really compete in the small and home office sector. This is a shame, because of all your equipment needs, it is the one piece of machinery which will cost the most to run and need the most attention.

But if you sit somewhere in the middle ground, if you want something better than the crudest of fax machines and can live with the inadequacies of the copier functions of these machines, or if you're prepared to nip out to a local copy shop to get the more arduous work done, then these systems represent excellent value for money.

No-one should consider buying a fax machine and an inkjet printer when the OfficeJet and Canon will do the same job, better and cheaper. It's a plain paper fax machine at a competitive price and you get computer control, scanning, OCR and a decent inkjet printer thrown in.

If you already have a printer, the Lumina is an excellent system. You should make sure that it's a printer which will work well with the device but you'll have to pay for the privilege. The Xerox is the best money-no-object option but is it really worth paying more than double the HP price for a slightly better machine?

In judging the best compromise it is the HP OfficeJet which comes out top — it's a great machine to use and the cheapest both to buy and run.

most have only one function each (a welcome departure from the Sinclair Spectrum approach of having buttons with multiple functions).

The machine is very versatile: it can scan to its own memory while printing from the PC, copy a document while sending a fax from memory, and scan a document to memory while sending a fax from the PC. There is a comprehensive selection of polling and documentation features — the kind of thing no-one uses — and some useful features like the copy function which asks how many copies of a document you want.

The 3006 is supplied with three programs for use with the Connectivity option. The Fax/Printer setup lets you program the telephone directory, mailbox, fax and printer options. These can be uploaded into the fax's memory. So if you are a major corporation with regional offices, this feature alone may save a huge amount of time: it's the kind of feature you'll love if, in another fit of lunacy, Oftel decides to mess with the phone number of every fax machine in the country.

The PC fax software acts as an interface between the Xerox and the supplied copy of Delrina's Winfax Lite. This saves the cost of a fax modem but since that hardware is triflingly cheap compared with the Xerox it's no reason to buy the interface card.

The PC Scanning software uses the industry standard TWAIN driver — you should mention this at every opportunity because it sounds so silly, but it works well and allows you to save bitmaps by using a TWAIN compatible program. Xerox supplies the Textbridge OCR software, which works well.

The Xerox 3006 is the best device here. It has the best print quality, the biggest document memory and is very solidly built. But being the best is not the only criterion for buying something: it costs twice as much as the H-P and that seems too great a premium to justify the advantages. It is complicated to set up, too. The H-P puts the onus on the software which runs all the control through the parallel port. The Xerox requires a separate cable.

If you are in the market for a more sophisticated machine you should look at the laser-based Xeroxes. Again, they are expensive but offer even better print quality.

PCW Details

Xerox 3006
Price £1,139 RRP (PC interface £149)
Contact Xerox 0800 787787

Verdict Solid, well built and a good performer with easy-to-use controls. A bit pricey, though.

Ricoh 2700L

The Ricoh 2700L is a fax machine — a big, industrial fax machine designed for high-volume work with a £2,000 price tag to match.

Ricoh has taken the approach that once you have the laser printer engine *in situ* it makes sense to add the electronics necessary to turn the device into a printer. This takes the form of a box hanging on the back of the machine, to provide a standard centronics port. The addition is very new and was supplied in pre-release form. A more comprehensive add-on — which adds control of the fax machine, faxing from and to the computer and scanning to the agenda — will be available soon. At present, the only way to send a fax from the computer is to use the printer, print it out, and then fax it.

Even on its own terms, the 2700L proved to be a disappointment. As a printer it's a very ordinary 10ppm laser at an extraordinary price. But as a fax machine it's an abomination. The user interface is impossibly crude. There is a menuing system but none of the options are presented in any kind of logical sense. The result is that you have to resort to the manual — a book which elevates patronisation to an art form — and type in long and meaningless strings of numbers. Ricoh technical support intimated that this was a security feature, "a password" which meant that unauthorised users (i.e. anyone with the manual) couldn't use the machine. In practice it was such a pain to use that it seems unlikely anyone but the most obsessed fax user would bother to set up the advanced features.

Unless the software with the forthcoming multifunction device offers a huge improvement — and Ricoh is about as well known for its software as Microsoft is for its pasta — the machine remains an expensive techies' toy.

This is a shame, because as a fax machine it works well. You can only feed in single sheets so it's not much cop as a copier, but if you want to send and receive a lot of sheets it's great once it's set up; but the setup takes a lot more effort than just wrestling with the user interface.

The transit packaging has what appears to be an entire roll of Sellotape holding bits in place. Removing the tape, and making sure that you haven't missed a length, which will gum up the whole thing, is an operation akin to taking the pins out of a freshly unwrapped shirt: you know that if you miss just one, it'll get you later. (The toner and drum are separate units.)

It's difficult to know at which market this is aimed. A cheap laser printer and a cheap thermal fax machine are substantially cheaper to buy and run. They are also easier to use. Only if you are about to buy a laser printer and a high-capacity fax machine does the 2700L make sense.

TABLE OF FEATURES OFFICE HYBRIDS

Product	Canon B360	HP OfficeJet XL	Xerox 3006	Lumina 2000	Ricoh 2700L
Manufacturer	Canon	Hewlett-Packard	Xerox	Westwood Distribution	Ricoh
Fax	Yes	Yes	Yes	Yes	Yes
Copies	Yes	Yes	Yes	Yes	Yes
Scan	Yes	Yes	Yes	Yes	No
Printer	Yes	Yes	Yes	No	Yes
Price	£1,295 (RRP) under £1,000 (street price)	£650 (RRP) £499 (street price)	£1,139 (£149 PC interface)	£550	£2,000
Contact	0500 246246	01344 369222	0800 787787	01753 887161	0181 261 4000

Kombat rules

Games used to be… well, games, before they became "cross-cultural phenomena" attracting multi-million dollar licensing deals and spin-offs. Tim Green talks to Ed Boon, creator of Mortal Kombat, and looks at the cunning marketing strategy surrounding the launch of MK3 on the PC.

Every morning, Ed Boon sorts through his post-bag and waits for the full horror to emerge. There, among the bills and the junk mail, are letters from youngsters describing sickeningly explicit death scenes. Nothing makes Boon happier. The letters are proof that kids really love his special creation: Mortal Kombat.

Boon is the programming genius who gave gamers "THE FATALITY": that moment in Mortal Kombat where a fighter is impaled, garotted or decapitated as the soundtrack shrieks "finish him!!!" Parents and churchmen might like not it, but the kids do — hence the postbag full of helpful advice. Fatalities, along with other original touches, helped make Boon's game so successful that it went from being a decent piece of software to a licensing phenomenon along the lines of Power Rangers and The Simpsons. Official figures say the MK (Mortal Kombat) series and all its merchandised spin-offs have earned a staggering $2bn so far.

How things change. Four years ago MK was an idea inside Boon's head; an attempt to cash in on the mammoth success of the first international beat-em-up blockbuster, Streetfighter. The concept gathered momentum when the programmer and his game designer partner, John Tobias, decided that the combat element would be enhanced by an atmosphere of mystery and legend. They set the game in a mythical domain called Outworld and gave each of the fighters a history and a purpose. Visually, the tone was dark and foreboding. The concept was coming together — all that was needed was a name. After Kumitay, Dragon Attack and Combat were adopted and dropped, Mortal Combat was finally agreed. At the last minute, Boon changed the C to a K for absolutely no reason at all and a cross-cultural phenomenon was born.

In October, the "licence" reached its zenith. MK3 was released on the PC as the focal point of a marketing bonanza which also features the Hollywood movie, the animated video, the roadshow, the toy range, the comic book and (inevitably) the Web site.

Marketing genius

Classic mass-market promotions have been put in place already. In the US, fans who buy the video receive a free watch offer and $70 worth of vouchers towards Mortal Kombat merchandise. But the *coup de grace* takes the so-called "synergy" between licences to new levels.

It works like this: six original Kombat Kodes have been devised to unlock secret moves that can empower the player against enemy warriors. The Kodes are cracked by arranging six out of a series of ten weird symbols. The clever bit is that clues have been hidden throughout the game's TV and print advertising campaign and within the video, live tour and movie.

Boon explains the concept: "When we created Mortal Kombat we filled it with mystery and intrigue. Since the beginning, fans have been obsessed with discovering its secrets and finding its hidden characters. So with MK3 we went further and put in an encryption code which can be unlocked by putting the symbols in the right order to reveal secrets. Then we thought; why stop at the game? We decided to put the Kodes into the movie, the video and the roadshow."

Kunning or what? These hieroglyphics appear in a panel at the bottom of the screen while the game is taking place. In the film and video, they are harder to spot. The idea of course is that their whereabouts will be discussed voraciously in the playgrounds of the world. Cinemas will fill up with children carrying notebooks. The hype has already helped the Mortal Kombat movie gross over $50m and top the US box office chart.

The stroke of marketing genius which threw up the idea of the Kodes has made Boon central to the licensing activity surrounding his game. Suddenly, the man with the programming nous has been required not just to finish the game on time, but also to make sure all the other spin-offs feature the correct Kodes. Fortunately, Boon still programmes every algorithm of the MK series single-handedly.

Boon's solitary position at the forefront of the MK story has made him something of an expert (to say the least) on the changing technologies of the games business. The factor that staggers him above everything else is the evolution of the PC as a games format. He marvels at the version of MK3 playing on his 486 laptop: "The PC version is the best: it's closest to the arcade game, which is amazing really. It's all to do with the access times — running off a hard disk is quicker than running off a CD on a console.

"I still think back to the roomful of equipment we used to program the game and I'm always amazed to look at the one square foot of machine we have here, running it perfectly," he says. The PC version benefits from a networking facility which allows users to "daisychain" machines to play their own tournaments.

Getting in on the act

Developing technology has led programmers in all sorts of directions. Now that motion pictures can be captured and video can be compressed, Boon and Tobias find that they spend more and more of their time in the film studio coaching actors.

Boon would rather be programming. To him, filming is boring. But it's not just the tedium that puts him off; he's wary of

Above *Outworld. A nice place to visit, but you wouldn't want to live there. Ed Boon and John Tobias felt the combat would be intensified by a mythical backdrop. Our heroes come here to face the sinister forces of Shang Tsung.* **Right** *A genetically-enhanced Jax thinks Sheeva is a real knockout. It could turn out to be a fatal attraction*

And you thought it was just a game...

Mortal Kombat's publicity material reveals its subject to be "a multi-media licensing bonanza" and "a cross-cultural phenomenon that has generated excitement and interest worldwide". Too bloody right: in all, 60 licensees have produced more than 100 products. Here are some of the spin-offs:

The movie

In the late summer, New Line's Mortal Kombat topped the US box office chart against all odds. New Line appeared to be the perfect studio to make it, with a track record that boasted Teenage Mutant Ninja Turtles and The Mask. But stacked against it were two mighty negatives. First, none of the films-based-on-games that came before it had distinguished themselves. Second, neither the stars (a fading Christopher Lambert and a rarely seen "Bond girl", Talisa Soto) nor the director (Paul Anderson, a Brit whose only other feature was the flop Shopping), had any kind of crowd-pulling appeal.

Unlike its game-based predecessors, Mortal Kombat emerged as a pretty good action movie. But the sheer power of the name cannot be underestimated. Producer Larry Kasanoff says: "Our film is a high-density companion to all the media formats. It offers the back story that helps define the characters and explains why they have been singled out for this incredible mission."

The animated video

Riding on the back of the live-action film comes the $15 video, featuring a 15-minute "making of the movie" short followed by an hour of animated "latest 3D techniques". The full weight of the merchandising machine has already kicked in Stateside where $3m has been spent on advertising the video. Each purchase additionally contained a voucher book entitling the owner to discounts on all the other spin-offs.

The live tour

Not content with stealing Rock'n'Roll's fans, video games are now stealing its venues too. "Mortal Kombat — The Live Tour" started at New York's historic Radio City Music Hall in September and will go on to more than 200 cities worldwide.

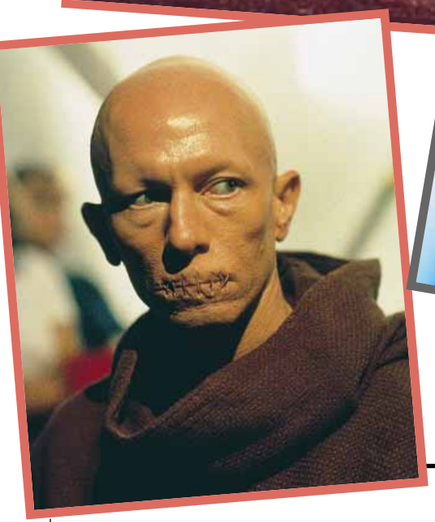
The show features actors who appeared as digitised warriors in the game itself. They take part in what the organisers describe as an "extravaganza that features martial arts, gymnastics and stunts plus hi-tech audience interaction, state-of-the-art special effects and illusion." Parents are advised that it's safe to go with their kids. They won't have a clue what's going on, but they can be sure that the bad guys will end up getting a good hiding.

The figurines

No licensing bonanza can qualify for the name without its figurines – foot soldiers in the battle to win the hearts and minds of the younger consumers. The Mortal Kombat range includes a poseable Sonya Blade complete with her own missile launcher.

The web site

"More like a game" is how New Line's marketing president, Chris Pula, described the Mortal Kombat web site. From May until August, New Line challenged browsers to find the extra information it had been feeding into the site. The central conceit was that MK baddie Shang Tsung wanted to shut it down and prevent the film opening. Only browsers could stop him by solving the riddles that lined up alongside real-time video and audio clips, photos, interviews and competitions.



Top *Sonya Blade is back — and how!*
Above and left *The MK characters come to life in the latest US box office smash*

Games into movies — success at last

When video games began stealing children, Hollywood reacted in time-honoured fashion: it bought the rights to the biggest, and made films of them. Unfortunately, the film makers botched it big time and, until Mortal Kombat, they all flopped.

In 1992, Disney unveiled the Super Mario Bros movie, confident of blockbuster success. It had every reason to think Super Mario would be as much of a crowd-puller on the big screen as it had been on the small one. Here was a major motion picture event: a $50m film based on a series of video games which had so captured the imagination of American children that Super Mario Bros 3 alone had earned Nintendo $500m — more than any film except ET, The Extra-terrestrial.

But the blockbuster never came. Instead, Super Mario Bros grossed just $20.9m while its close rival, Jurassic Park, romped to $340m.

Chastened by the Mario episode, Hollywood didn't put any more video games on screen for 16 months. And when a second attempt was made, it provided more evidence of how *not* to do it. Double Dragon, a futuristic romp based on a 10-year-old arcade classic, skulked into video stores after earning less than $3m at the US box office.

Earlier this year Streetfighter, featuring Jean-Claude Van Damme and Kylie Minogue, showed box office promise. It grossed over $30m but then quickly disappeared as audiences cottoned on to the stars' inability to act.

Despite this abysmal track record, Hollywood will not be deterred. Myst is being talked about as a possible movie, and Ivan Reitman (of Ghostbusters fame) is developing a script based on Doom. Let's pray he doesn't call Rick Moranis.

The PC comes out on top

By the programmer's own admission, the PC version of MK3 is the best. Here's why.

- The PC version contains all the features found in the arcade version. This includes all the characters, play modes, finishing moves and hidden codes. A hidden game appears after 50 plays.
- New features include modem and network play, which allows up to eight players to take part. Participants can play round-robin tournaments and join in games-in-progress.
- Up to seven levels of multi-tiered background scrolling, and all background animations from the arcade version, are exactly as they were in the original.
- The program code runs at the same speed as the coin-op so there is no slow-down in gameplay, no matter how fast the PC.
- The game's graphics are VGA. Two modes are used, 320 x 200 and 320 x 240 — so, no problems with video-card compatibility.
- The average amount of compressed memory for each character is just under one meg. This fits the game completely in RAM.
- Background music is streamed off the CD during play.

anything that could make a games designer become slave to a schedule: "I think the danger with high-cost projects is that spontaneity is lost. For example, we didn't come up with the idea of the Mortal Kombat fatality until we were halfway through the first game. But it was such a good idea that we reworked the game to accommodate it. You couldn't do that with, say, an interactive movie."

As for the future, Boon acknowledges the impact that rendered 3D beat-'em-ups like Sony's Playstation hit Tekken and Sega's Saturn flag-bearer Virtua Fighter have had. But he's wary of following the 3D route blindly: "I've watched kids playing these games and they seem to get bored after a while. You can't argue with the visual effects, but in my opinion the gameplay doesn't match the 2D of Mortal Kombat."

Animal magic

So we can expect MK4 — and there *will* be an MK4 — to continue in the same vein as its predecessors. The worldwide marketing machine demands it. As Boon says: "Mortal Kombat has become an animal that must be fed."

PCW Details

Mortal Kombat is distributed by **GT Interactive** on 0171 258 3791.

Going Pro

POV Photography by David Whyte

Intel's Pentium Pro chip has been designed to provide the rest of us with the kind of power previously enjoyed by high-end workstations and servers — and Viglen has already produced a system firing on this force. Nick Lawrence reports.

The Pentium Pro has a staggering 5.5 million transistors compared with its predecessor's 3.1 million. The first version will run at 150MHz and faster speeds will follow. In development since 1990 (and known until recently as the P6), the Pentium Pro is Intel's successor to the Pentium processor.

Opting for Pentium Pro is not a straightforward case of "it's new so it must be bigger, faster and more powerful". For some older applications, P6 will be slower than a Pentium. The Pro comes into its own when running 32-bit applications. The first machines are likely to be used as graphics workstations or network servers, and it will be a year or two before they migrate down to home or office use.

Far left *The Pentium Pro*
Left *Viglen's pre-production Pro-driven system*
Right *Once again, UK-based Viglen is one of the first to support new PC technology. The Pentium Pro contains a staggering 5.5 million transistors*

When Intel began designing the chip, it assumed that everyone would be running 32-bit software by 1995 and so designed it to perform particularly well when faced with a 32-bit environment. The rate of change in the industry hasn't been as fast as Intel envisaged, and most users are stuck with Windows 3.x and the partially 32-bit Windows 95. The Pro will be no faster than a Pentium when running these programs and 16-bit applications: in some cases, it will be significantly slower.

Computing power

The Pentium Pro is best suited to true 32-bit software such as Windows NT which is particularly popular among two groups of users: system administrators, who enjoy its robustness and security as a server platform; and 3D graphics designers, who use its OpenGL architecture to speed up 3D graphics calculations.

Intel is aiming the Pentium Pro squarely at these two markets, which have traditionally been dominated by workstations such as Sun SPARC-stations and servers such as Digital's AlphaServers. The Pentium Pro should deliver this level of computational power to the rest of us.

Inside the Viglen PC

Viglen has built up a reputation as one of the best of the UK's home-grown PC manufacturers. Its ability to get systems out early is now well established; initially with the Pentium 133 and now the Pentium Pro. The company's close relationship with Intel has enabled it to obtain engineering samples of the new chip, and its accompanying Intel motherboard and chipset, before most other UK companies.

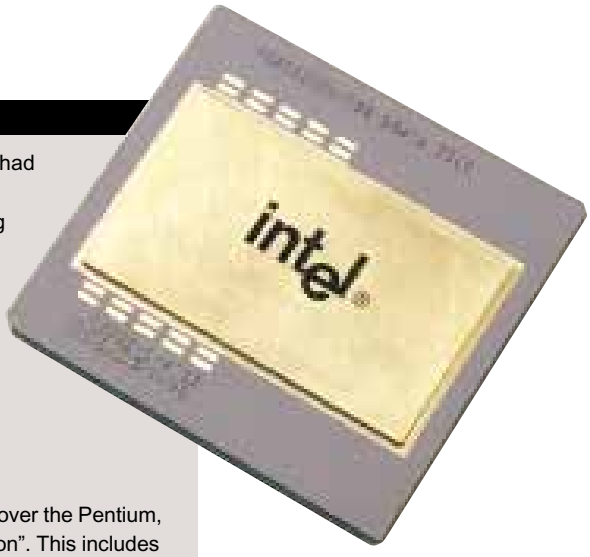
This pre-production model of the Pentium Pro was housed in a desktop case (a mini-tower will also be available) which has been altered from Viglen's usual design to meet the new ATX design specifications. There are two 5.25in and two 3.5in device bays positioned at the front. Beneath the 3.5in bays is a blind bay for a hard disk. At the top right of the case is the power supply with a modified design to fit the requirements of ATX.

The motherboard (made by Intel) is officially entitled the "Performance/AU" although it has been known for some time as the Aurora. The chipset is the 82450GX (previously known as the Orion), which supports multiple PCI buses and up to four processors. The use of the GX variant of the 82450 is somewhat surprising: Intel has clearly positioned the GX as a server chipset, and the KX as the workstation chipset for this type of system. That is, until the Mars chipset appears for the lower end of the market.

You should be looking at P6 systems if you satisfy these criteria:

- ☑ You are running mainly, or exclusively, 32-bit code — for example, Windows NT running Windows 95 applications. If you are running Win95 you can expect some performance benefits but not enough to justify the price premium. Microsoft has left a lot of legacy code in the crucial USER and GDI segments. Legacy code slows down the Pentium Pro: in some cases to the point where it is slower than a Pentium.
- ☑ You need SMP (Symmetric Multi-Processing) or may do at some point in the future. The Pentium Pro and its accompanying Intel chipsets support glue-less SMP of up to four processors.
- ☑ You are looking for better data integrity than the Pentium/Triton combination can offer. Both versions of the Orion chipset support ECC on the memory bus, and the server version (82450GX) supports parity checking on the system bus as well.
- ☑ You are willing to take a small, but real, risk: just as early Pentiums turned out to have an FPU bug, the Pentium Pro could have any number of nasties that escaped beta testing.
- ☑ You have enough money to be an early adopter — the latest and greatest always comes with an inflated price tag.

Let's get technical



The first Pentium Pro will run at 150MHz (rather than 133MHz as Intel had originally promised) and will feature 256Kb on-board L2 cache, and is just one of the improvements Intel has made to its new baby. The siting of the L2 cache on the chip, rather than on the motherboard (as was popular with Pentiums and 486s), enables signals to get between the two on a 64-bit data path, rather than the 32-bit path of Pentium system buses. Their physical proximity also adds to the performance gain. The combination is so powerful that Intel claims 256Kb of cache on the chip is equivalent to over 2Mb of motherboard cache.

Dynamic execution

An even bigger factor in the Pentium Pro's performance improvement, over the Pentium, is down to the combination of technologies known as "dynamic execution". This includes branch prediction, data flow analysis and speculative execution. These combine to allow the processor to utilise otherwise wasted clock cycles, by making predictions about the program flow to execute instructions in advance. RISC-like features such as pipelining are being used to their full potential in the Pentium Pro, for the first time in the x86 family.

Yet the Pentium Pro's performance gain over the Pentium when running 32-bit software represents only half the story for its high-end users. One of the worst frustrations suffered by many designers of Pentium-based servers was the difficulty of putting more than one processor in the same system and making them work together. The Pentium Pro makes it much easier to design SMP (Symmetric Multi-Processing) systems, as they are known, and both variants of Intel's first chipset support more than one processor.

The workstation version of the chipset (whose proper name is the 82450, commonly known as Orion) supports one or two Pentium Pros, whereas the server version supports up to four, as well as multiple PCI buses.

Raw speed

The Triton chipset, popular among Pentium systems, is not particularly suitable for server applications because it does not have ECC or parity (both methods for detecting memory errors). Both variants of Orion support ECC on the data bus, and the server version additionally supports parity on the system bus for enhanced error detection. The Pentium Pro and Orion chipset pairing therefore offers advantages for system designers as well as those users who require raw speed for their applications.

There is more good news for speed demons, with the announcement of two more Pentium Pro chips. There will soon be two 166MHz versions: one with 256Kb on-board L2 cache, available before the end of the year, and another with 512Kb. The latter will be manufactured using a 0.35 micron process instead of the 0.6 micron process used for the first two chips.

Availability and pricing

At the time of writing, the release date for the 150MHz Pentium Pro was 1st November, priced at $974 in quantities of 1,000 (a UK price had not been announced). The first 166MHz chip will cost $1,066 in 1,000-unit quantities — no price indication was available for the second variety of 166MHz processor. The workstation (82450KX) and server types (82450GX) of Orion will cost $209 and $291.60 respectively in Quad Flat Packaging. A low-cost chipset aimed at desktops and codenamed "Mars" is expected to hit the market early next year, although details are not yet available.

The Performance/AU, Intel's first ATX board design, has some surprises for those used to the Baby AT style. The slots — four PCI and three ISA, with one shared — are still positioned at the back left of the case facing towards you as you lift the lid, but their path is no longer blocked by the processor so all the slots will take full-length cards. The processor, in a ZIF socket 8, has moved to the top right of the case, where it can be cooled directly by the power supply unit fan sitting above it.

There are four SIMM slots, but instead of being hidden away underneath a drive device at the front right of the board, they are positioned next to the PCI slots for easy access. The two EIDE connectors and single FDD connector are positioned directly underneath the drives to which they connect, enabling shorter cable lengths and a less cable-strewn case interior. Another feature of the ATX design is the ability to stack the I/O connectors at the back of the case so that they rise directly off the motherboard instead of being connected via cables. This looks neater and frees up space at the back of the casing for the possible addition of serial-bus connectors like the USB (Universal Serial Bus).

Processor and graphics card

Although the specification of the final machine will vary, this is the sort of thing you can expect. The processor will be a Pentium Pro 150 with 16Mb RAM, 1Gb hard disk, and 4X CD-ROM drive on Enhanced IDE. The graphics card will probably be a Diamond Stealth 64 Video VRAM with 2Mb, driving a Viglen 15in monitor.

This bundle will cost around £2,700 and will have been available from the launch date of the Pentium Pro — almost certainly 1st November, at the time of writing.

Fitting in

This machine fits into Viglen's entry-level Pentium Pro range. The company is also working on an enterprise-level server with a minimum of four Pentium Pros to be available in 1996, and will offer Pentium Pro daughterboards for its Intel-designed EX EISA Xpress in the near future.

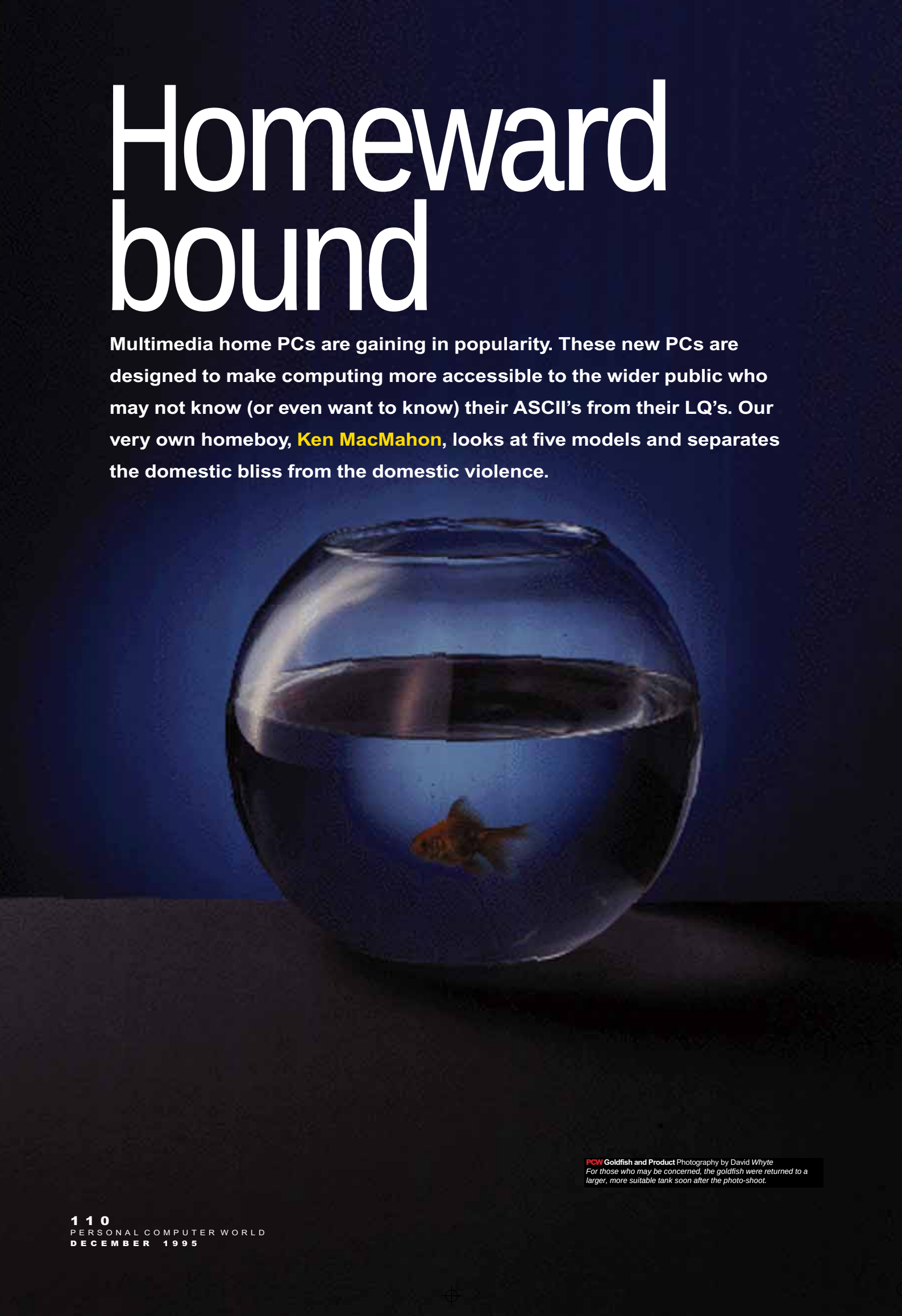
It was not possible to benchtest this machine as it was still pre-production when we looked at it and some of the silicon wasn't final. Nevertheless, with the right software, it is sure to fly.

PCW Contacts

Intel 01793 40300.
Viglen 0181 758 7000.

Homeward bound

Multimedia home PCs are gaining in popularity. These new PCs are designed to make computing more accessible to the wider public who may not know (or even want to know) their ASCII's from their LQ's. Our very own homeboy, Ken MacMahon, looks at five models and separates the domestic bliss from the domestic violence.



PCW **Goldfish and Product** Photography by David *Whyte*
For those who may be concerned, the goldfish were returned to a larger, more suitable tank soon after the photo-shoot.

Faced with relatively flat sales of office machines, manufacturers are putting big efforts into infiltrating living rooms throughout the world. Their efforts have been fuelled by a spate of reports, as well as the results of their own market research, which anticipates phenomenal growth in the sales of home PCs. It's fair to say that there has never been a better time to buy a computer for your home.

PC manufacturers have very different ideas on what consumers want from their multimedia home PCs. But one thing on which they all agree is the need for a fast CD-ROM drive and a bunch of multimedia CD titles, although quad speed drives are not yet a standard feature.

Another thing that all vendors are at last coming to recognise is that many people are intimidated by a PC. They need plenty of help; not just to get up and running, but with everyday tasks like sending email. Attempts to provide a more accessible interface and improved help, range from the purely cosmetic to GUIs (graphical user interfaces) that are fun to use and easy to operate, even for the novice. So choosing the right machine is as much a question of software as hardware specification.

Some models include extras like fax/modems and TV tuner cards — and there are even those that have been designed to look like existing domestic appliances. Here, we review five of the latest models from IBM, Packard Bell, Olivetti, Apple and ICL.

Apple Macintosh Performa 5200CDTV

Launched in April, this model is a return to the original Mac design philosophy of a "one box" computer. Aesthetically speaking it's gorgeous, but it's also a supremely functional design which keeps everything neat and tidy.

This small box is home to a 15in colour display which offers a palette of 32,000 colours at 640 x 480 resolution and 256 colours — good enough for most games — at the maximum available resolution of 832 x 624. Stereo speakers sit either side of the screen and a tiny slot at the top betrays the presence of a mono microphone. Slightly larger slots, bottom left and right, provide access to the quad speed CD-ROM and a 1.4Mb "Superdrive" which will read DOS format as well as Mac OS disks.

Beneath the floppy drive, brightness and volume controls and an infra-red sensor label this as being a machine destined for the dining room, rather than the boardroom table. This is a "box" in the original sense of the word: a TV tuner and video card allow you to watch broadcast TV and videos.

Among the bits you can't see are a 500Mb internal hard disk and 12Mb of RAM. The fixed disk is an IDE drive, which is cheaper than the SCSI drives which have been favoured by Apple in the past. The RAM sits in two 72-pin SIMM slots which can be used independently (so you don't have to fit matching-sized SIMMs) and can be expanded to 64Mb.

Around the back you'll find holes for the only two cables you need: the power lead and an ADB (Apple Desktop Bus) port for the keyboard. There are, however, plenty of options for "spaghetti-lovers": two serial ports marked for printer and modem, external SCSI, sound input and output and TV aerial socket, just for starters. The video input card provides three RCA phono sockets and an s-video socket. The remaining two ports are covered with removable plastic covers. One is an LC040 compatible processor-direct slot which should work with most PDS cards available from third party vendors. The other is a communications slot which can be used for an Ethernet card or a modem. (Apple has just released a 14.4Kb/sec modem with answering machine and fax capabilities.)

Impressive though it is, the Performa

PCW Details

Apple Mac Performa 5200CDTV
Price £1,642
Contact Apple 0800 127753

Verdict Without doubt, the best of the PC/TV home machines.

Bundled Software MacOS 7.5.1 with At Ease, ClarisWorks, Claris Organiser, Amazing Animation, Spectre Supreme, Mavis Beacon's Typing Tutor, Thinkin' Things, Click Art Performa collection, Mac Gallery Clip Art Treasure pack, Grolier Multimedia Encyclopedia, Leonardo the Inventor, MS Dinosaurs, Rosetta Stone, Benjamin Bunny, San Diego Zoo, Guinness Multimedia Records.

5200's hardware specification tells you very little about it. It's not until you switch it on that you get any real idea of what this machine is all about. With system software (MacOS 7.5.1) and several applications already installed, you can get to work or play immediately. Pre-installed software is a canny mix of business, education and play stuff including ClarisWorks, Claris Organiser, Mavis Beacon's Typing Tutor, Spectre Supreme and a couple of pre-school play-and-learn packages. When you get bored with those, you can turn to the CDs.

Sooner or later of course, you're going to end up watching TV. But the 5200 is more than just a computer with a TV bolted on: you can use Apple's TV/Video System software to capture still images or video sequences from either a broadcast TV channel or any video source (most likely a VCR) attached to the video-in port. Although much is made of this, most people will probably ignore it. Spicing up your business presentation with snaps of Captain Jean-Luc Picard confronting the Ferengi will soon lose its appeal — at least for your audience, if not for you. And even RISC processing power can seem gutless when faced with the task of digitising and compressing 25fps full-screen video. Determined Quicktime movie makers will nonetheless be pleased with the inclusion of Avid Videoshop among the lengthy list of bundled software.

Of great interest to parents will be the security features offered by the Video Player, which provides password protection for those channels you might prefer your children *not* to watch. Of course, there's nothing to prevent them watching it on your regular TV but that's hardly Apple's fault. The TV tuner also includes a teletext decoder with a Fastext facility which stores up to 500 recent pages for quick retrieval — about 490-odd more than the average TV or video.

Lastly, and probably most importantly, there's the ease-of-use factor. The word "intuitive" could almost have been coined specifically to describe Macs. Apple provides lots of help for the uninitiated including an online tutorial in two parts and the Apple Guide interactive context-sensitive help, which takes you through common procedures step-by-step, getting you to press the buttons to make sure you've understood and going over it again each time you screw up. There's At Ease, a much-simplified graphical interface which sits on top of the Finder and allows an administrator, such as a parent or teacher, to limit access to applications and files for a child user for instance (or even yourself when you've had a little too much to drink!). On one hand, At Ease can provide the non Mac-literate with a simple method of accessing the resources they need from the Performa. On the other hand, it's the best way to stop the kids trashing a week's work in less time than it takes to say "Apple Backup".

In a bid to stay one step ahead of its PC rivals, Apple is launching a new beefed-up Performa, the 5300 CDTV, based on the PowerPC 603e chip. In addition to the TV tuner, the new Performa will be Internet-ready with a built-in 14.4Kb/sec modem and include 16Mb RAM, an MPEG video player and 16-bit stereo sound. Given the current dearth of MPEG video titles and a price tag of £2,375, budget-conscious households might consider a 5200 with the modem card to be a more realistic option.

IBM Aptiva 941

The IBM machine is the most highly specified of the bunch with the exception of the Performa, but also the ugliest apart from the Spectria. Earlier in the year, IBM split its product range into four categories and aimed the Aptiva at the home consumer. There are nine machines ranging from a DX2/66 to a P120 mini-tower. None of them include a TV tuner — IBM discontinued that model last year because it wasn't selling well. Our review model had Windows 3.11 pre-installed but by the time you read this, machines will have Windows95 and Lotus SmartSuite 4.0 in the software bundle.

The Aptiva 941 is a 100MHz Pentium with 8Mb of RAM and an 850Mb hard drive. An unexceptional-looking 15in tilt/swivel monitor sits atop the processor box which, in design terms, looks more in tune with the office of the seventies than the home of the nineties. A slightly curved front panel drops down to reveal the CD-ROM and floppy drives, but other than that there's not much to see.

The Aptiva is supplied with 30W external speakers, which means you get much better sound quality and volume than with the built-in type, except the spaghetti

PCW Details

IBM Aptiva 941
Price £2,199 (inc VAT)
Contact IBM UK 0345 727272

Verdict Not one for the uninitiated. Good for business use at home, though.

Bundled Software Windows 3.11, Aptiva Guide, Music Centre, Jack Nicklaus Golf, Aptivaware: Rapid Resume Manager, Custom Tools, Aptiva Index. MS Works, Launchpad, Personal Desktop, Wall Street Money, Undersea Adventure, Magic Theatre, Jumpstart Kindergarten, Cyberia, Hyperman, Sports Illustrated for Kids, Photodisplay. Compton's Encyclopedia.

factor takes on significance when speaker cables and an external power supply are considered. You need three power outlets In all: one for the processor box, another for the monitor (there's no through connector), and a third for the speakers. A 16-bit SoundBlaster card is fitted and there are two spare PCI-bus slots.

When you switch on you're whisked, via Windows, straight into the Aptiva guide/demo. This multimedia affair gives a reasonable introduction to all the software installed on the machine. The software is divided into four categories: games, multimedia, home productivity and Aptivaware.

The Aptivaware suite is, with one exception, a fairly mediocre collection of utilities that allow you to undertake such exciting and groundbreaking activities as saving your Program Manager setup, setting the resolution and colour depth of the display, and changing power management parameters.

The exception is Launchpad, the interface your children get to play with. The Launchpad screen features a cartoon graphic of a dog sitting in a car that is straight out of the Jetsons. And if the dog looks familiar, it's because you've seen him on a screensaver somewhere. Lauchpad is written by After Dark authors Berkeley Systems. Unfortunately, we couldn't gain access to the parent section where you set kiddies' access privileges and so on, because the password had been previously set and we didn't know what it was.

A trio of educational applets accompanies Launchpad. Kids Clock is a talking analogue clock which tells you the time when you move the hands, but unfortunately there's a second hand so the time is always something like "half past three *and twenty three seconds*". There's a talking calculator as well, and a tape player which records your voice and replays it with wacky distortions applied.

IBM has made little effort to disguise what is, in its basic format, an unreconstructed office PC bundled with some children's software and a few CD-ROMs. It is an unquestionably powerful machine but although the build quality is superior, it suffers from the same problems as the Spectria; namely that it's not a home consumer electronics product. This is really more a machine on which to work at home than a genuine "home PC".

ICL Fujitsu PCTV

Three things set the PCTV apart from other models: its sleek, curvaceous charcoal grey casing, the trackball on the keyboard, and the fact that the TV functions are completely divorced from the PC. This means you can't watch TV in a window while you do other work and you can't grab digitised frames or video clips. In every other respect the TV works as well as, if not better than, the other models reviewed here.

It will receive teletext and you can create "magazines" containing your favourite teletext pages (although if you *are* the sort of person who has favourite teletext pages, you should perhaps consider seeking professional help!). You can also program reminder alarms so you don't miss your favourite programmes.

The interface which sits on top of Windows follows the popular room metaphor; in this case the starting point is the disconcertingly-named "Den". That's the only transatlantic twaddle you'll have to put up with, though: the voiceover on the tutorial is reassuringly BBC English.

"The Den" looks rather like one of those room settings you get at MFI or Ikea stores where everything from the books, to the TV and the hi-fi, are really just cardboard boxes with pictures on the front. A click on the PC takes you into Windows, the hi-fi pulls up a CD audio player and sampling application, the bookshelf provides access to reference manuals and CD-ROM material. The light switch shuts down and you can probably guess what the TV, games cupboard, filing cabinet and diskette box are for, but then, that's the whole idea.

A rather revolting-looking picture hanging on the wall provides access to your personal file details. Parents and guardians can make use of the channel barring feature which prevents minors watching what's not good for them.

The PCTV isn't short of connections to the outside world, there are two serial

PCW Details

ICL Fujitsu PCTV
Price £1,299
Contact ICL 0800 317711

Verdict Quite a nice PC with a TV stuck on top.

Bundled Software PGA Tour Golf 486, Putt Putt joins the Parade, Wing Commander, Privateer, MS Works, Encarta 95.

ports and a parallel printer port. Of the three spare expansion slots two are EISA and the third is PCI bus. Installation of cards or additional RAM doesn't require so much as a screwdriver: you simply turn a key at the back and the entire chassis slides out. Video in and out facilities are provided in the form of RCA phono sockets on a panel at the back next to the aerial socket, and there's a SCART (Syndicat des Constucteurs des Appareils Radio Récepteurs et Télèviseurs) connector too, for video equipment. But don't forget, all this is for your viewing pleasure only — you won't be able to do any digital recording from external video devices. I very nearly missed the joystick/midi port and the mic and headphone sockets, which are mounted conveniently close to the front on the left-hand side.

It's clear that Fujitsu ICL has taken a much more consumer-orientated approach to the home PC than most other manufacturers. The PCTV is very accessible: it has good tutorials and documentation written by people who understand that readers may never before have set eyes on a PC. The whole concept has been well thought out and implemented, from the dialogue boxes that warn unsuspecting users they are about to leave the cosy security of "The Den" and enter Windows, to the thoughtful placing of the joystick port. It won't suit everyone though. The lack of digitised TV in a window will rule it out if you want to grab stills off the TV or play with digital video, and the lack of a modem renders it an Internet-free zone.

Olivetti Envision 400

The Envision 400 marks Olivetti's entry into the domestic market. The Italian company is probably better known for its office products and its PC range includes the Pentium-based M6 Suprema range. The Envision has only just gone into production at the company's Scarmagno plant, so our *PCW* review model was a pre-production prototype.

It may not be the epitome of Italian style but the Envision 400 certainly looks the part. The matt black box bears more resemblance to a VCR than anything else and would certainly not look out of place underneath the TV or the hi-fi stack. The first surprise, which is evident from the size of the box, is that there is no monitor. In a rather neat inversion of the prevailing philosophy, instead of providing a PC with a built-in TV Olivetti has decided that as most people already have a TV, they might as well make use of it.

PCW Details

Olivetti Envision 400
Price £1,399
Contact Olivetti 0181 780 8032

Verdict Innovative, fun, a real home PC… can I keep it?

Bundled Software Windows95, Olipilot 2.0, MS Works 3.0, Cheyenne Bitware, Midisoft Recording Session, Incat Magic Lantern 2.0 (Photo CD), Willow Pond MediaRack, Kid Desk, Millie's Math, Thinkin' Things. King's Quest VII, Uncle Archibald, Incredible Machines 2.

It doesn't stop at the TV though. The Envision has sockets to accommodate virtually all your home's electrical appliances with the possible exception of the Hoover. There are two SCART sockets: one for the TV connection and another for your VCR. Additionally there are audio in and out minijacks and RCA connectors for your hi-fi , midi in and out sockets, and a VGA connector for an optional monitor.

Surprisingly, the keyboard is a cordless IR (infra-red) model about half the size of a conventional keyboard and incorporating a thumb-operated trackball. It has sculpted handles at either end and two buttons at the front just where your index fingers rest when you're holding it. This makes it ideal for couch-potato-mode operation but if you want to look more businesslike you can rest it on the table in front of the Envision. The IR receiver has a range of over six metres and a wide angle of view which, in practice, means you can move so far away you can barely see the screen without the aid of binoculars. The keyboard powers down after a couple of minutes' inactivity to save battery power and this can be a bit irritating, but a single key press revives it once you realise what's happened. For some reason the trackball takes about five seconds to kick in.

Another surprise comes when you switch on. The Envision was the only one of the home PCs we reviewed to be shipped with Windows 95, though you don't see a lot of it because the first thing it does is to launch Olivetti's own GUI — the lamentably-named "Olipilot". The first thing to say about Olipilot is that it looks and works a lot better than its name suggests. It follows the room metaphor in a similar fashion to the Packard Bell Spectria, only better. You start out in the hall, where three doors lead to the study, the kids' room and the living room.

The kids' room contains objects such as the TV bookshelf, camera and hi-fi, which appear in the other two rooms as well. These objects launch commonly-used applications like online manuals, a Photo CD viewer and the hi-fi stack. Clicking on the desk takes you into Kid Desk, a separate interface for small people with a propensity for deleting all your files. Here kids can customise the desktop, launch their own applications, and even send each other email and leave voicemail messages for other Kid Desk users. Two excellent applications are

pre-installed, Thinkin' Things and Millie's Math House, and there's a further selection of Sierra CD-ROM titles.

There's not much in the living room that you can't access from elsewhere, though you obviously have the option of associating your chosen applications with various objects. The software cupboard is disappointingly bare but Willow Pond's Media Rack is a functional Wav/midi/CD audio player and there's a Midisoft Recording Session, too.

Moving through to the Office, things start to look more interesting. The office suite is MS Works, accessed from the notepad on the desk. But it's the presence of the telephone and fax which hint at the Envision's superior communications capabilities, supported by the LC144 14.4Kb data/fax/voice modem card. Software support is provided by Cheyenne's Bitware suite of comms utilities which include fairly comprehensive facilities for managing fax and voicemail.

There's very little to criticise about the Envision. You can't really get on with Works using a TV (at least not the 12in portable we tried), so if you intend to spend a lot of time looking at text you'll need a decent monitor. And the documentation could be better. Other than that, I can't find a bad word to say about it. It has a good specification: the 400 is a 486DX4 100 with 8Mb of RAM and a 630Mb IDE hard drive and quad speed CD. It's expandable to 24Mb and has one VL and three spare ISA slots. If you want more power, there's a Pentium 75 model with MPEG card for an additional £500. The software is genuinely home-orientated and it offers communications facilities that you can actually make productive use of.

Olivetti has tried very hard to get every detail right — even down to the inclusion of batteries for the keyboard and remote. But if you're looking for something on which you can watch Neighbours while finishing off your accounts, this isn't it.

Packard Bell Spectria Executive

Like the Performa, Packard Bell's Spectria range of home PCs was launched in April too. The Spectria Executive is an all-in-one design with a 15in monitor moulded onto a base, housing the motherboard and drives. The monitor doesn't tilt or swivel so you need to be positioned right in front of the screen, at the right height to get a good view. It's nowhere near as stylish as the Apple or ICL machines and has a shoddy, cobbled-together look and feel. The screen is bulbous by today's flatish, squarish standards, with elongated speakers emerging from either side and extending almost to the depth of the screen.

A quick look around the back does little to boost your confidence. A rather feeble attempt has been made to colour code the cables and ports, so you know that you must plug the purple keyboard cable into the purple socket, and likewise for the green mouse cable. The serial and parallel ports are also colour coded, but as this model is supplied with neither a printer or a modem it's largely irrelevant.

The processor behind all this is a 486 DX2 66MHz, with 8Mb of RAM and a 500Mb IDE hard drive. The CD-ROM drive is a dual speed Matsushita unit. So, nothing spectacular on the inside either then.

Three expansion slots are occupied by a sound card, TV tuner/video grabber and the FM radio tuner. Here, non colour-coded black cables run everywhere. There's an anonymous-looking black lead from the sound out of the TV card, to the sound card's line in, and an identical lead from the FM tuner's speaker port to the sound card's mic socket. A VGA connector runs from the VGA port on the motherboard to the TV card and three leads run off this, terminating in RCA phono sockets — presumably for video capture.

This might be less intimidating were some kind of hardware documentation provided, but you are expected to get by with a generic "486 personal computer User's Guide". Here, no attempt has been made to disguise the material as fit for home consumption: this is a typical user manual of old, full of incomprehensible jargon and pages of help for those interested in advanced configuration of serial ports, configuration of motherboard jumpers and so on — completely useless.

It gets a little better when you start up the Spectria. A button on the front boots up, launches Windows 3.11 and starts PB Navigator — Packard Bell's attempt

PCW Details

Packard Bell Spectria Executive 9505
Price £1,799 (inc VAT)
Contact Packard Bell 01753 831914

Verdict Kidspace is good, but poor overall design and non-existent documentation means this machine is best avoided.

Bundled Software WFWG 3.11, MS Works, Lotus Organiser, Sage Moneywise, PB Navigator, PBTV, PB Radio, Voyetra Audio Station, Cyberia (limited edition), Four Seasons of French Cuisine, 3D Body Adventure, MS Fine Artist, Knowledge Adventure: Speed, Space and Undersea, Encarta 95, Language Learning with Asterix.

to protect the innocent from Microsoft Windows. Navigator's entry point is a hallway with four doorways leading off, each providing access to a different work area: Software, Workspace, Kidspace and Learning Centre. Each of these provides an appropriately configured front-end to application and data files, with big buttons for individual applications or application groups.

Perhaps the best of these is Kidspace, which provides a secure but fun environment for small computer users. Applications are stored as objects on shelves and files are tidied away in big drawers labelled "homework", "letters", and "personal". It's all wrapped up with wacky animation and sound effects and, speaking as an overgrown child, I thought it was pretty good.

Workspace provides the same thing for grown-ups, and the Learning Centre gives a guided tour complete with a female American talking head. Information, however, is not Packard Bell's forté and a lot of this is general to the point of uselessness. Generally, Upgrade Information tells you that you can upgrade your machine by changing the processor, adding more RAM or cache — call your dealer for more information.

It proved impossible to get any kind of picture on the TV tuner using a portable aerial, and reception on the FM radio was poor using the antenna supplied. While reception in our VNU Labs is not wonderful, we were able to obtain a viewable picture on the other machines with a TV tuner. There was no information on how to use the TV tuner, and limited help as far as the radio was concerned.

If Packard Bell is as serious about cornering the home market as it claims, it needs at the very least to provide comprehensive, clear documentation that tells you exactly what the machine can do and how you do it. The Spectria range is due for an update soon: if Packard Bell is to maintain its reputation as a market leader, it will need to provide home consumers with better than this.

Editor's Choice

Prior to having seen the Envision, there was no question that the Apple Mac Performa 5200CDTV was the pick of the bunch. Firstly, it is beautifully designed: the all-in-one unit needs only one power supply and the built-in speakers means there are no cables to worry about. Plug and play was a reality on Macs a decade before Windows 95, so you'll have no problem installing a modem card or any other third party upgrade. On the software side, MacOS 7.5.1 is such an easy-to-use interface it requires very little in the way of additional material to make it suitable for home consumption.

But then the Olivetti Envision arrived and we had to change our minds and make this the Editor's Choice. This machine has a very high "wow" factor indeed. The cordless keyboard is a real delight to use. It has some exceptional children's software and the communications software makes the most of the built-in fax/modem. What sets the Envision apart is that it has been designed as a home consumer product from the ground up, unlike the Aptiva and the Spectria for instance, which are simply office products with a new coat of paint.

TABLE OF FEATURES CONSUMER PC'S

Product name	Apple Macintosh Performa 5200CDTV	Packard Bell Spectria Executive 9505	ICL Fujitsu PC/TV	Olivetti Envision 400	IBM Aptiva 941
Price	£1642 ex VAT	£1799 inc VAT	£1299	£1399 (P75 with MPEG £1899)	£2199 inc VAT
Contact	Apple 0800 127753	Packard Bell 01753 831914	ICL 10800 317 71	Olivetti 0181 780 8032	IBM UK PC response centre 0345 727272
Screen size	15in	15in	14in	n/a	15in
Built-in speakers	Yes	Yes	Yes	Yes	No (external)
Processor	PowerPC603 75MHz	486 DX2 66	486 DX2 66	486 DX4 100	Pentium 100
RAM (fitted/max) Mb	12/64	8	8/64	8/24	8/128
Hard disk (Mb)	500	500	350	630	850
Modem built in	No	No	No	Yes	No
Internet ready	No	No	No	Yes	No
Free expansion slots	Yes	No	Yes	Yes	Yes
CD-ROM	Quad speed	Double speed	Double speed	Quad speed	Quad speed
TV tuner/video card	Yes	Yes	Yes	No	No
Infra-red remote control	Yes	No	Yes	Yes	No
Windows95?	N/A	No	No	Yes	No

The Fastest Draw in the West

CorelDraw 6 is bigger, bolder and more bundled than ever. Dual editing views, new tools, beefed-up photo editing, animation and 3D mini-applications, Windows 95 compatibility... you name it. Alex Gray takes you on a guided tour of this new supersuite.

PCW Photography by David Whyte

The CorelDraw 6 suite is the latest in a venerable product line, in which each new version has topped its list of new features only by the number of bugs from which it suffers.

This latest version is a 32-bit suite that relies upon the Windows 95 operating system. Draw 6 seems significantly less bug-ridden at first release (6.00.118) than was version 5. The extensive range of Windows graphics calls made by Draw seems to expose weaknesses in a number of otherwise satisfactory video drivers, especially for the more advanced cards. It's a moot point whether this should be laid at Corel's door or blamed on the video driver suppliers; but the net effect for Joe User is the same — crash.

Since version 5, a major change to this package is that as fast as it joined the bundle, Corel Ventura has now left the standard product again and will appear later in a separate deal with PhotoPaint. This will raise some complicated pricing and upgrade issues.

Suite dreams

The CorelDraw bundle is bigger than ever, with some parts old, some new, and others renamed. First, there are

the two major applications of long standing, Draw and Photo-Paint, plus three new secondary applications for version 6: CorelDream 3D, Motion 3D and Presents. Then there are nine utilities, mostly integrated by way of OLE, covering OCR and tracing, font and clipart management, application automation, and a few other items along for the ride.

As if all that weren't enough, there are Corel's legendary (and now bigger than ever) sets of fonts, photos and multimedia bits and pieces. These include 100 quaintly named "floating objects" (their logo is a hot air balloon, after all). The whole kit comes in a large box along with manual, clipart/fonts reference book, colour calibration photo and other useful bits and pieces.

Some recent 32-bit packages have been compiled to run under 32-bit native systems such as Windows 95, and under the old 16-bit Windows with the support of the Win32s library. CorelDraw 6, however, is full 32-bit only — the whole bundle has been compiled for Windows 95 and cannot be run at all under Windows 3.1 or 3.11. (Ironically, one good example of Win32s programming, Xara Studio, will shortly be reappearing under the Corel brand.)

Windows 95 offers standard benefits not easily available under 16-bit Windows, and the Corel suite provides extensive support for its new features and working methods. These include support for long filenames, extensive right mouse button context-sensitive menus, use of tabbed dialogues and property sheets, and the new help system.

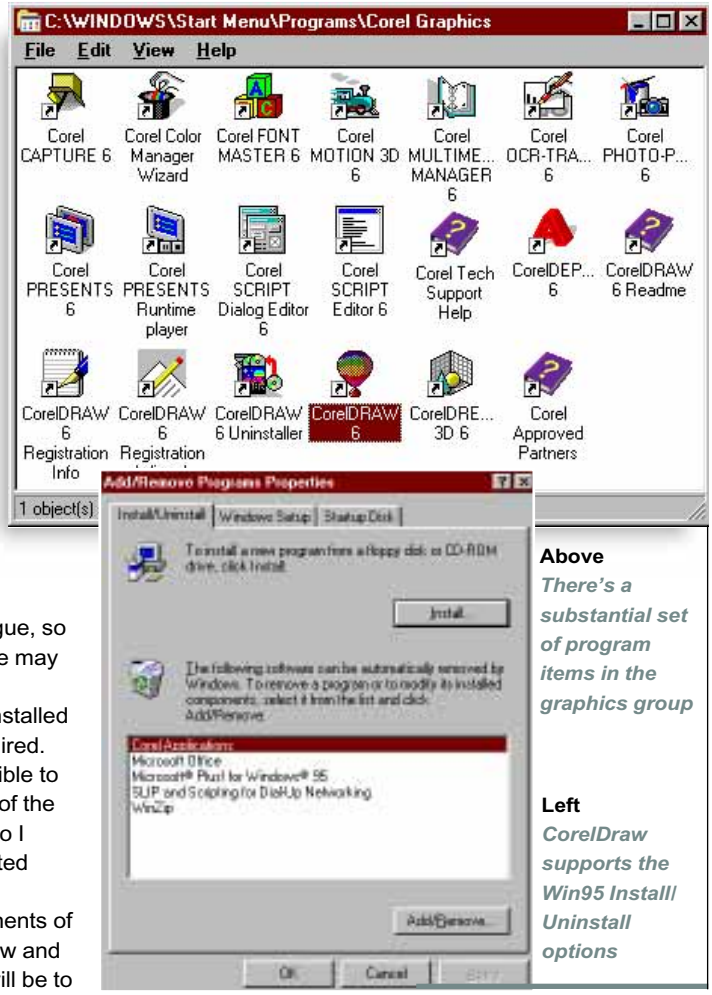
The CorelDraw suite majors on complete OLE support, in-place editing (so, for example, a Corel graphic can be edited in place in a Word document), and automation with a Basic-like language and full script recording. It provides full drag-and-drop support for moving objects between documents as well.

Installation

No serious user of the CorelDraw suite should be without a CD-ROM drive, and to emphasise that point there is no longer a floppy disk option. The 80 or more floppies that would be required are impractical for installation and too costly to produce by comparison with the four CD-ROMs supplied as standard.

A minimal installation of Draw and PhotoPaint will set you back around 90Mb of hard disk space, while a complete installation of all the components and a representative selection of fonts tops 170Mb. It is possible to install the package to run from CD-ROM, but performance suffers terribly and Corel doesn't recommend it. CorelDraw is one of the few programs I have found which supports the new Windows 95 add/remove programs dialogue, so that the package may be modified or uninstalled smoothly if required.

It is not possible to review all parts of the suite in depth, so I have concentrated here on the two primary components of the system: Draw and Paint. My aim will be to look at where it differs from version 5.



Above
There's a substantial set of program items in the graphics group

Left
CorelDraw supports the Win95 Install/Uninstall options

CorelDraw 6

Draw is a classical vector-based drawing package, providing comprehensive shape, pattern and text creation and manipulation. It has an extensive range of tools and features which make it the definitive PC package for display graphics, leaflets, typographic effects and logo creation, and even some technical drawing.

A new initial dialogue provides a guided start to a new or existing document, or to take you on a tour of the system. The most obvious improvements to Draw 6 are support of the Windows multiple document interface (MDI), and a huge dual improvement in the maximum drawing size, with greatly enhanced precision. Redraw speeds are greater than the previous version and the package has a smoother feel to it all round. On the downside, large bitmap-and-blend object redraws are still noticeably slow compared with those achieved in Xara Studio, for instance.

As well as providing for more than one drawing to be opened at a time, MDI support within Draw allows several independent views of the same drawing to be open at once. This is very useful, for example, in allowing precise magnified editing in one window, with a wider view in another which remains synchronised with changes in the drawing. A new View Manager allows alternative magnifications and page locations to be stored, with meaningful names for quick recall. Objects may be dragged and dropped directly from one open document to another; this is much faster than import/export or cut and paste.

Documents can now extend to an almighty 45sq metres, with precision to 0.1 micron. Previous versions had a problem with inaccurate placing of fine detail, owing to rounding errors in the arithmetic, but this version seems to have put the problem behind it (unless you're in the business of drawing life-size bacteria). The zoom range is vast, and even when working on the largest "page" size you still get a decent pasteboard area around the edges.

The user interface is similar to the

Right *MDI allows several views of the same document, with a View Manager to assist with rapid navigation of pages and magnifications*

Below
Every aspect of Draw's menus, toolbars and roll-ups can be reconfigured to your preference

previous version, and to other high-end graphics programs, but with the Win95 look and feel. There are standard menus, toolbars, floating palettes, and a Corel speciality: roll-ups. These are mini dialogues for controlling a related group of functions, that you can "roll up" (reduce to just a small title bar) with one click when you don't need them. Draw 6 provides more options for grouping the roll-ups in such a way that they automatically arrange themselves, avoiding the previous difficulty of making sure they don't obscure each other when rolled down.

The entire user interface (drop-down menus, toolbars, roll-ups) can be customised to the last degree, using a consistent set of hierarchical command trees to select and arrange the controls. Thankfully, there is also a command to restore default layouts. Comprehensive edge rulers and layout guidelines are provided and include, for the first time, slanted layout lines for unusual alignment.

Drawing tools

As well as the usual tools for creating lines, rectangles and ellipses there are now new ones for creating polygons, stars, spirals and grids. Once created, these can be converted to curves and edited in the usual way with the node editing tool. The polygon tool is particularly powerful as it maintains the regularity of the whole shape as you edit one point, or side. The spiral tool is a real time-saver if you should happen to need spirals as they are tedious to construct any other way. The grid tool provides a shortcut to graph paper and other cellular layouts.

Once the shapes are in place, there are new ways to destroy them. Knife and eraser tools provide methods for separating or erasing parts of objects almost as if they were simple bitmap objects, yet maintaining the integrity of their outline and fill properties.

Draw 5 introduced lenses. These are processing functions that can be applied within shapes overlying other objects, to give effects such as a magnifying glass or regions of transparency. Version 6 has extended them to offer fish-eye effects, wireframe rendering, and custom remapping of colours. You can now freeze the lens image or apply it to a fixed viewpoint, allowing you to move it so that it no longer lies over the subject, but maintains the lens image.

Bitmaps

Bitmap processing has been considerably enhanced, particularly with irregular cropping and colour masking. Irregular cropping is simple; the bounding box of the bitmap can be node edited just as if it were any shape drawn on the page. Colour masking allows the selection of one or more colours from the bitmap to be the only ones shown, or to be rendered transparent. A tolerance control lets you remove a band of shades: a typical use of this would be quick cropping of a character from a uniform background such as sky, without laborious hand masking or imperfect auto-tracing. A wide range of bitmap file formats is supported for import and export.

Text handling

Draw continues to handle text in two modes: "artistic" for small blocks of text requiring a high degree of manipulation, and "paragraph" for long runs of body copy. Artistic text objects may now contain up to 32k characters. Paragraph text may comprise a maximum of 32k frames of up to 32k paragraphs, each with up to 32k characters. The previous unseemly collection of dialogues and roll-ups necessary to set all text attributes has been replaced by a toolbar integrating all text-related matters. Draw can also gen-

System requirements

For efficient use of CorelDraw 6, a sensible starting point would be a system with:

- DX2/66 processor running Windows 95
- 16Mb of RAM
- 420Mb hard disk
- Mouse, tablet or pen
- SVGA display (256 colours)
- CD-ROM drive

These requirements are in line with a sensible minimum for any Windows 95 system. Although Draw 6 could be run on a somewhat lower specification, anyone with less would probably get better performance from Win 3.11 and Corel 5.

For complex graphics work, a display resolution of at least 800 x 600 would be advisable, and for multimedia work the CD-ROM should be at least double-speed. Photo-Paint, in particular, needs all the memory it can get so don't skimp on this if you plan to do a lot of bitmap paint work, otherwise you could be in for a lot of tedious swapping to disk.

erate and insert bar code label areas in the seven most widely used codes.

Draw already had powerful multi-page facilities, with paragraph text flow from one page to another. It now handles these more smoothly than before, has improved word-wrap, tabs, justification and irregular text wrap around other objects. Full proof-reading facilities are provided, which work in a similar way to those in Microsoft Word, and include substantial foreign language support and statistical functions.

Object placement

Before being moved around, objects must be selected. Draw 6 allows you to select objects according to their properties (for instance, all the yellow rectangles on the page, or all the pieces of paragraph text). This can be a real time-saver when, say, you want to recolour all the text on a page, or copy all the rectangles from one page to the next.

Routine interactive object movement and overall scaling, such as shearing and rotation, are unchanged from the earliest versions of Draw with grab handles appearing around the selected object(s) to drag as you want. For more accurate actions, the Effects roll-up offers numerical dialogues for moving, rotating or scaling, envelope editing, applying lenses, skewing, resizing, intersections, trimming and welding. The last three provide for one shape or group to be used to add to, or subtract from, another shape or group.

The standard alignment functions (left, right, top, bottom, centre) are provided for lining up multiple objects in respect to one another. Draw 6 now adds distribution functions to align multiple objects, or copies of an object, at equal intervals across the selected objects or across the whole page, vertically or horizontally.

Printing

Draw and Photo-Paint print options are superb and apply across the suite. Open Pre-press Interface (OPI) is now supported, allowing you to work at speed with a low-resolution copy of bitmap images (such as photos), with a matching high-resolution copy inserted automatically at printing/image-setting time.

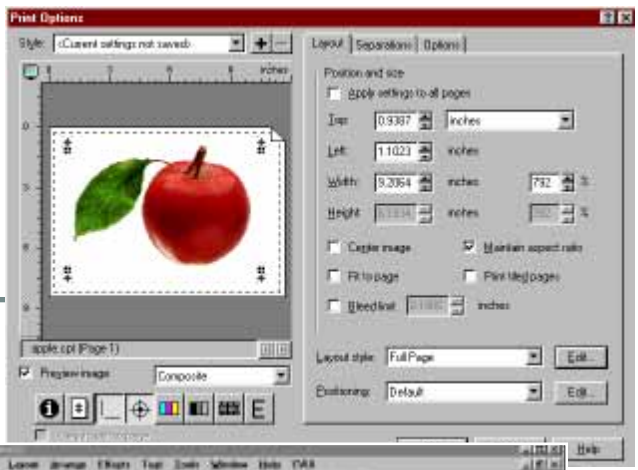
Comprehensive options are available for the control of colour separation plates, non-printing colours, job information, crop marks and registration targets. Different print setups can be stored on disk for repeated use as standard “recipes”. Almost 850 standard label printing formats are built-in, and limited “mail-merge” is available for printing things such as labels or certificates.

The layout options reflect Corel’s support of independent document page size and printing paper size. The dialogue includes interactive cloning, scaling and placement of the print area on the page with a visual preview. Multi-page documents may be printed as basic impositions, ready placed and organised for example as A5 booklets on A4.

Corel Photo-Paint

Photo-Paint was considerably beefed-up in version 5 to provide more credible competition for Adobe Photoshop and other standalone bitmap editing packages. That approach has been continued and refined with version 6. It sports the multiple document interface and now offers unlimited file size editing, although the practicality of this is constrained by system memory. Many of the enhancements to this version of Photo-Paint are package-wide improvements that I have previously described under CorelDraw; particularly the interface and printing details. Photo-Paint images can be dragged and dropped into other documents, including Draw and Ventura.

It still offers many of the advantages of a drawing program with the artistic



Top
One screen out of the three main tabbed elements of Corel’s very comprehensive printing options dialogue

Right
Fractal texture fills provide an almost infinite range of naturalistic fill patterns for abstract backgrounds and simulations

Left
Photo-Paint offers multiple-level selective Undo, providing flexibility for retracing your steps, and changing an earlier decision or accident

Other parts of the CorelDraw 6 bundle

Corel Motion 3D provides facilities for producing the full metallic flying letters animation so beloved of TV news programmes the world over

As well as Draw and Photo-Paint, the CorelDraw 6 bundle provides three other applications and nine utilities:

CorelDream 3D

An adaptation of the successful Ray Dream Designer 3D modelling and rendering application. It is supplied with a wide range of pre-built models, and others can be built from the tools provided. 3D scenes can be quickly created by merging the 3D-rendered scenes with bitmap images and Photo-CD pictures in Photo-Paint.

Corel Presents

This incorporates the earlier Chart and Move elements of version 5 into a new, comprehensive, animated presentation package covering similar ground as MS PowerPoint 7, with more bells and whistles (but perhaps less stability and speed). Built-in wizards and a wide range of clipart, photos and animation elements are available.

Corel Motion 3D

This niche package provides rendering and animation of 3D objects to produce the sort of dazzling flying logos and image manipulations favoured by film company animated logos. Final anti-aliased rendering of a ten-second sequence could take several hours on the average PC, but with Win95 multithreading and helpful progress facilities, this can be run in the background, or overnight at the end of a design session. During design, rapid wireframe renderings are used for visualisation.

Utilities

Two of the utilities are small resource manager applications:

- Font Master provides on-the-fly installation and removal of TrueType and Type 1 (PostScript) fonts, and has facilities for font preview and creation of custom font groups.
- Multimedia Manager is a comprehensive browsing utility for identification and selection of the items from the clipart, symbol and photo libraries of CorelDraw 6. Objects can be simply dragged from the Multimedia Manager into the workspace of one of the main applications for use.

Other minor utilities include:

- Corel OCR Trace. For bitmap tracing and optical character recognition.
- CorelDepth. For easy 3D text and logo effects.
- Corel Capture. For screen area capturing, including irregular masked areas.
- Corel Script Editor. An automation system that allows macro routines and customisation of other OLE-enabled apps.
- Corel Presents Runtime. A portable viewer utility for distributing presentations to those without the full Presents software.
- Other utilities for bar code creation, charting and mapping of data, sticky notes and equation editing that can be applied to other apps via OLE.

flexibility of a paint program, and achieves this by maintaining the concepts of objects and layers for all components of a painting, even for processed bitmaps. Objects can be freely converted to masks and back again as required. Unusually for a painting program, it offers rulers and snap to grid facilities. It can open a wide range of file types, including AVI video and FLC animation files. However, if these are opened for editing, they comprise a separate bitmap document for every frame of the movie so this work is a little slow and memory intensive, to say the least.

A lot of work has been carried out on rationalising the mask and object handling in Photo-Paint, and these are now integrated into one toolbar. The Colour Mask roll-up has been simplified too, but still manages to offer fading of a mask with control over the feathering options. The Object Manager roll-up provides largely the same functions as the Layers roll-up in Draw: independently controllable layers on which different painting elements can be placed for ease of manipulation. It's possible, for example, to hide or lock some layers, to prevent further modification. And it allows individual objects to be named, and can form the basis of a simple object library.

A new Texture Brush tool greatly improves the range of natural effects achievable when painting with textures: with control over virtual grain, texture, bleed and wetness. And it comes with a range of natural effect brushes such as pencils, pen, crayon and chalk.

There are 77 standard image manipulation filters in the system: new ones include terrazzo, tone map, embossed, 3D stereoscopic, canvas and desaturate. Should you be unable to find what you are looking for among those, then you can fall back on the fact that Photo-Paint supports the use of the same range of "plug-in" accessory filters as Adobe Photoshop (Kai's PowerTools for example). User-defined filters are also possible provided you know what you are doing.

Photo-Paint now has full support for duotone images (and monotones, tritones, and quadtones), beloved of many graphic designers seeking additional impact with only one extra ink colour. Text handling allows interactive editing of text even after it has been scaled and placed in the painting — an improvement on previous versions where the text was frozen after initial placement.

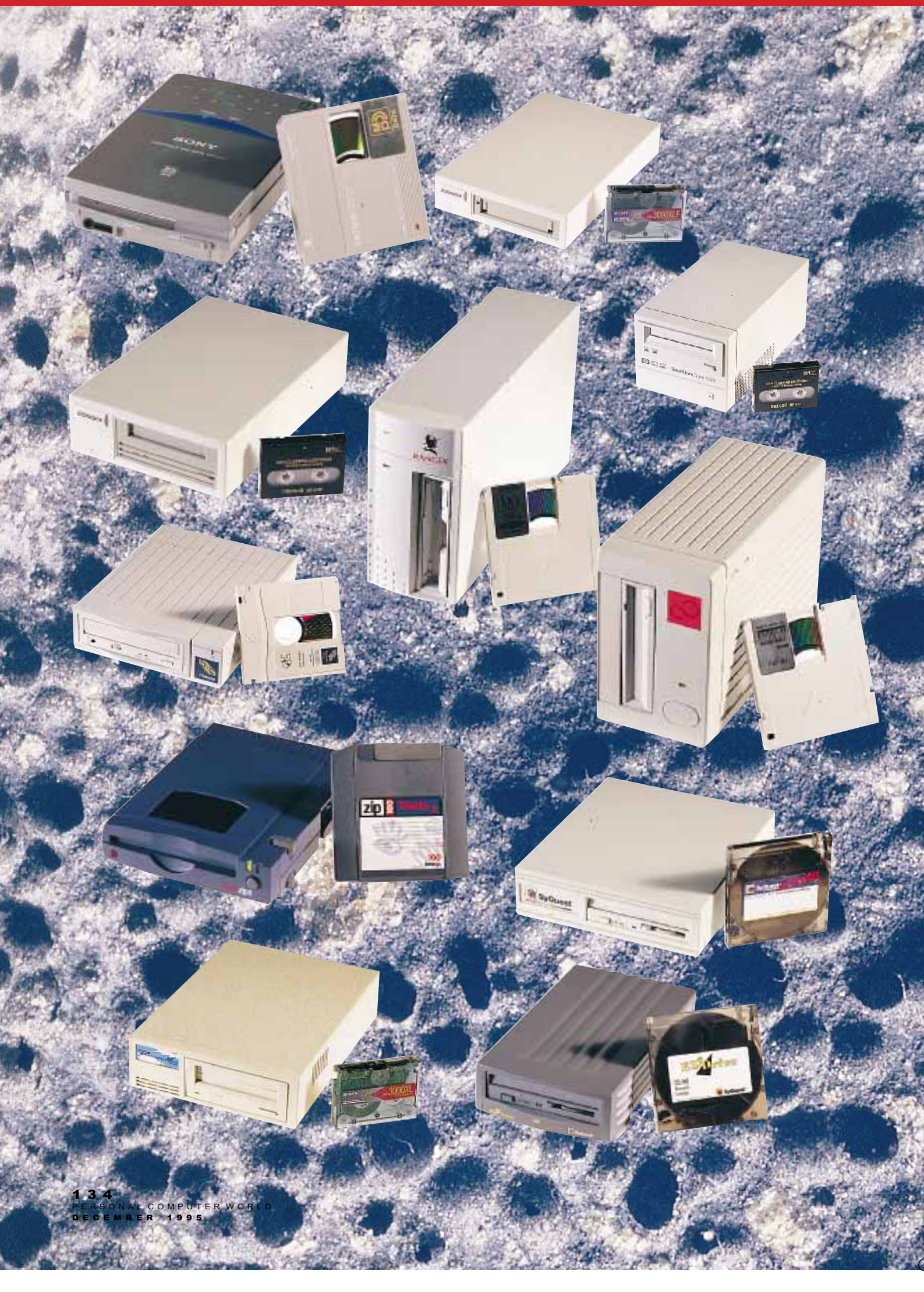
Conclusion

More reliable 32-bit operation, an easier interface, and the multiple document facilities alone have made a step-change in the usability of the CorelDraw suite. Photo-Paint 6 represents a good evolutionary move forward and a consolidation of Photo-Paint 5, which was itself a major step forward. It is now a highly useful and usable package to rival Photoshop. As separate applications or OLE utilities, the range of minor applications doesn't burden the main program with unnecessary functions. Even built-in functions can be removed from the interface if you don't like them. Some of the extras will prove invaluable for some people — there's no reason why 100 percent of a package like this should be of use to all the people all of the time, provided it's good value for the part that is of use to each buyer.

One could spend a lot of money assembling and learning to use alternative "best of breed" packages across the different elements covered by the CorelDraw bundle, but it would be a tall order for most people. As a one-stop solution with integrated menus and support tools, there is no other suite on the market to touch CorelDraw 6 for providing a comprehensive desktop graphics solution at a good price.

PCW Details

CorelDraw 6
Price £495 RRP
Contact Channel MarketMakers
01703 814142


SONY
zip
SyQuest

Storage & backup

No matter what your backup and storage needs, there's something to suit everyone. On these pages we look at the whole issue of storage media, and Gordon Laing puts eleven devices to the test.

We've said it before and we'll say it again: storage really is becoming very interesting. Not necessarily dinner party conversation, but certainly fascinating for anyone who needs more space to store their information. And that's everyone, since who can honestly say that they have enough storage?

The interesting part is the wealth of technologies that are out there. We've all recognised, perhaps on several occasions, the need for more storage; but what do you go for? A second hard disk? A single, bigger hard disk? Perhaps a removable storage medium, or something designed purely for overnight backup?

The variety is endless. There really is a storage solution for every occasion: either for those who need the greatest performance, or the best value for money. Perhaps huge capacity is an issue rather than speed of transfer. Maybe you need something as portable and reusable as a floppy disk, but with larger capacity. Sometimes compatibility with another system is paramount.

A feature covering all types of storage and backup devices would occupy an entire issue of *PCW*, and then some. Since we've recently covered CD-R and plan to round-up hard drives in the near future, we narrowed this group test to devices with removable and rewritable media (no removable hard drives however).

We've got 11 devices in all, covering all the tasks described above. None is the perfect storage device, although several appear to come very close. Along with reviews of the devices, we've given detailed explanations of all the different technologies and how they work. We've explained the pros and cons to help you choose which is best for you.

If you have only 2Mb remaining on your hard disk and have made the decision to buy, check out our findings to discover the perfect storage medium for your specific purposes. You may be surprised to see what's out there.

Storage and backup Contents

PCW Storage Photography by Bruce *Mackie*

Conner CTD-8000e

Conner's CTD-8000e, also known as a 4356XP, is a DDS-2 DAT drive. In native mode it can take 4Gb DDS-2 DAT tapes, and can just about double this using hardware compression.

If mass storage is what you're after, DAT is unparalleled. Tape sizes start at 2Gb and go right up to 8Gb on some drives using compression. If this kind of storage is essential, DAT is the only way to go. DAT media is quite cheap too, although the drives can be pricey.

The external CTD-8000, denoted with an "e" at the end, carries an RRP of £1,395 or £1,245 for the internal. This does not include software or a SCSI card as standard, but all suppliers will be able to sell you suitable accessories. Typical street prices are around £1,050 for the external and £900 for the internal.

In uncompressed native mode on a 4Gb tape, the CTD-8000 will do around 27Mb a minute — that's about 4Gb in three hours.

Conner is a very well known name in the storage business, particularly on the OEM side. If you want to go for a respectable name with excellent products, then Conner is a good choice. If you need backup capacities over 4Gb, DAT is the only reasonable route and the CTD-8000 won't let you down.

PCW Details

Conner CTD-8000e
Price External £1,395; Internal £1,245
Contact Conner Peripherals 01628 777277

Good Points Huge capacity and cheap media.
Bad Points Relatively expensive drive.
Conclusion The only choice if you need this capacity.

Conner TapeStor 4000

The Conner TapeStor 4000 uses QIC (pronounced *quick)*, tape cartridges. QIC carts are sturdier than DAT tapes, but cost around double for the same capacity. The TapeStor 4000 uses native 2Gb QIC-WIDE tapes costing around £15 each, and through software compression is capable of raising this to almost 4Gb.

QIC drives are cheaper than equivalent capacity DAT drives, and the TapeStor certainly represents good value; street prices have been seen at around £450 for the internal drive. Certainly when Tandberg Data releases its 2/4Gb internal QIC drive for £450, street prices on the Conner will match.

The Conner price includes Arcada Backup Exec software, but no interface. You'll need to provide your own SCSI card, although most dealers will recommend one. Conner interestingly offers an internal E-IDE version of the TapeStor 4000 which we will review in *First Impressions* next month.

Performance-wise, the SCSI TapeStor offers 27Mb per minute, or 2Gb in around an hour and a half in native uncompressed mode.

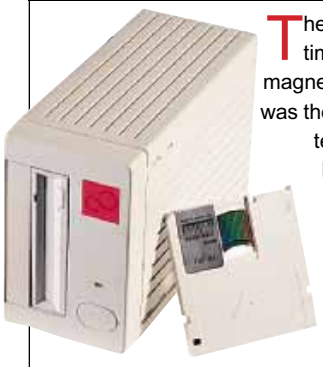
QIC is the format to go for if you want an entry-level priced, well-performing backup drive. If you only need 1Gb backup, and you can find the Tandberg Panther cheaper, then go for that. If you can get a good deal on the Conner, it's larger capacity would make it a better buy.

PCW Details

Conner TapeStor 4000
Price External £650, Internal £479
Contact Conner Peripherals 01628 777277

Good Points Large capacity QIC drive, E-IDE version.
Bad Points QIC tapes relatively expensive.
Conclusion Excellent, cheap backup drive.

Fujitsu M2512a



There was a time when magneto-optical was the storage technology to have. The 3.5in rewritable optical discs typically offered capacities of 230Mb and were a godsend to those wanting transportable storage or backup. Today, of course, there are lots of competing media technologies all trying to be the standard, and MO has a tough job ahead.

Fujitsu is the leading company in MO technology; indeed most MO drives use Fujitsu transports. The M2512a is its own badged 3.5in MO drive, using 230Mb cartridges, offering 217Mb post format. The external SCSI drive reviewed here costs £499 and comes with a Shuttle technology SCSI card, Claris Works, a SCSI cable and one cartridge. Internal SCSI and IDE versions are available for £390, and an external parallel model for £545. Fujitsu quotes around £17 for each additional cartridge.

Fujitsu's MO system has to reset the state of pre-written media before it can be written over again. This multipass system is consequently slow, especially compared to the SyQuests and ZIPs. The Panasonic PD system reviewed here under the Plasmon name can write directly over unwanted data in a single pass and is faster, too, than the MO.

MO's good point is the reasonably cheap and sturdy media, less affected by nasty magnetic fields than some other media. Fujitsu's bundle is good, but consider the SyQuest 270 and Plasmon PD before parting with money.

PCW Details

Fujitsu M2512a
Price External SCSI £499, Internal SCSI or IDE £390, External parallel £545
Contact Fujitsu 0181 573 4444

Good Points Fair capacity, resistant media.
Bad Points Expensive drive, slow performance.
Conclusion Solid, and a good bundle, but a little dated.

Graphtec Ranger MO

Graphtec has taken a Fujitsu 3.5in magneto-optical mechanism, fitted it into its own case, and rebadged it as Ranger. From the outside, Graphtec has opted for a slightly taller and thinner case than Fujitsu and supplies three different external configurations: plain SCSI with PC drivers for £555, plain SCSI with Macintosh drivers, and one which boasts SCSI and parallel ports, which we review here.

Graphtec throws in one MO cartridge with the Ranger (ours was from Maxell), but quotes a high £32 for additional carts. Fujitsu quoted around £17 for the same thing so it's certainly worth shopping around for media. As with the Fujitsu, the Ranger MO takes 3.5in 230Mb carts, which offer 217Mb after formatting.

Graphtec claimed the Ranger uses the same insides as the Fujitsu we reviewed, but our tests showed the Ranger to be quicker. Both MO drives are still slow though; better geared to backup than running apps. MO has the advantage of being fairly impervious to potentially damaging magnetic fields, and so long as you shop around, the media is fairly good value. Ranger's combined parallel and SCSI version offers flexibility that the Fujitsu doesn't, but Fujitsu's own drive is cheaper. Graphtec's Ranger MO has the edge on performance, but neither are ideal for running applications or operating systems.

PCW Details

Graphtec Ranger MO
Price External SCSI £555, External parallel/SCSI £595
Contact Graphtec 01270 611234

Good Points Model with parallel and SCSI ports.
Bad Points Fujitsu's MO is cheaper.
Conclusion Good, and quicker than Fujitsu's.

Hewlett-Packard SureStore Tape 2000e

Hewlett-Packard does a rather neat line in backup drives using a variety of technologies. We tested the 2000e model from the SureStore range of DAT drives; all are SCSI-2 devices.

All SureStore drives are available as internal or external configurations, the former being 3.5in wide but too tall to fit in a standard 3.5in bay, instead requiring a 5.25in bay and the supplied panel converter.

The external 2000 drive costs £799, and the internal £699. Both come with a suitable SCSI cable, diagnostics for DOS and NetWare Loadable Module (NLM), a 90m DDS DAT tape, cleaning tape, and Colorado Backup for Windows software.

The 2000 series do not use data compression of any kind, offering a maximum storage of 2Gb on 2Gb native DAT tapes. Backing up the entire 2Gb will take around three hours, about 11Mb per minute. You will need a SCSI card, and HP carries suitable Adaptec 1510A ISA SCSI cards.

The 5000 series use the same 2Gb native tapes but can double this with compression. The 6000 series can take 4Gb native tapes, again able to double this with compression to 8Gb.

Hewlett-Packard is a well-respected name in many fields, including tape backup, and the SureStore range will help it retain its good reputation. The 2000 series is an excellent entry-level DAT drive.

PCW Details

HP SureStore Tape 2000e
Price External £799, Internal £699
Contact Hewlett-Packard 01344 369222

Good Points Good value DAT drive.
Bad Points Maximum of 2Gb storage.
Conclusion Ideal entry-level DAT.

Iomega ZIP

Iomega describes its colourful ZIP drive as the new floppy drive, although it won't read conventional floppies. Instead, it uses 100Mb cartridges containing a flexible platter. When formatted, the ZIP carts offer 94Mb and cost around £15 each.

The ZIP drive mechanism is fitted inside an attractive-looking slim blue case, with a clear window through which the cartridge may be seen. There's no internal or IDE option, but both SCSI and parallel external versions are available for the same price of £149.

Each drive comes with ZIP Tools software which helps you organise and track data. While the cartridges are of course removable and pocketable, Iomega is partly selling the ZIP drive as an entirely portable device — just pick the whole thing up and go. You could of course buy two, but the ease of carting a single unit around is certainly a cost saving. At only 450g it is half the weight and a bit slimmer than the external SyQuest EZ135, the ZIP's main competitor; you will need to carry the heavy power supply though.

It isn't quite as quick as the EZ135, and the media is a bit smaller — when formatted it's 94Mb vs 126Mb — but both units are very cheap and incredibly useful. If carrying the whole unit is a primary concern, the ZIP wins. If you need the extra capacity and slight performance, the EZ135 has the edge.

PCW Details

Iomega ZIP
Price External SCSI drive £149, External parallel drive £149
Contact Iomega 0800 898563

Good Points Cheap and portable.
Bad Points Slower and smaller media than EZ135.
Conclusion None the less excellent.

Plasmon PD2000e

Plasmon's PD2000e is the only external configuration of the superb Panasonic PD system (reviewed in *First Impressions*, *PCW,* October 1995). Plasmon sells the internal version for £575, same as Panasonic, while the external box raises the price to £659. Both come with one 650Mb PD cartridge, resembling a CD-ROM caddy and offering a substantial 633Mb when formatted; additional carts cost £39 each. There are no IDE or parallel versions.

Panasonic's PD system boasts the company's own patented Phase Change technology; very similar to that used by phase change WORM (Write Once Read Many) such as CD-R. The difference with Panasonic's system is that the active layer is made of a material with reversible properties, so it's rewritable. Even cleverer is that it can rewrite in a single pass, making it faster than MO technologies, but still slower than the SyQuests and ZIPs. It's still fast enough to run applications but unfortunately cannot be booted from, so no chance of different OSs on a set of PD carts.

What makes the PD system really special is that it doubles up as a quad speed CD-ROM drive. You don't need a caddy either, since the cartridge tray has a circular dip to take bare CDs; you can't load a cartridge and CD simultaneously though.The PD system is extremely flexible and the ideal choice if you can stretch to the cost of the drive; remember you do get a CD-ROM drive too.

PCW Details

Plasmon PD2000e
Price External SCSI £659, Internal SCSI £575
Contact Plasmon 01763 262963

Good Points High capacity, cheap media and doubles as quad speed CD-ROM drive.
Bad Points Not quickest or cheapest.
Conclusion Extremely flexible if you can afford the drive.

Sony MD DATA Drive MDH-10

About three years ago Sony launched its MiniDisc (MD) format, capable of storing 74 minutes of digital audio on a 64mm diameter MO disc. The company managed to incorporate the same audio capacity as a CD, onto the MD using a compression ratio of around 5:1. Uncompressed, the MD media could store 140Mb information and the world wondered when Sony would get round to creating a computer data version.

After what seems like an eternity the MD DATA has arrived, and like all Sony products it looks and feels great. The MDH-10 is a tiny Walkman-sized device and the lightest in this round-up. It does need its supplied power adaptor to work off the mains, but unlike anything else reviewed here it can also run off batteries. A very light but powerful 1200mAh lithium ion rechargeable is included, as is a clip-on battery case for three AAs. There is a PCMCIA interface option for £149.

The MD DATA can play but not record audio MDs. It has a line-out socket and comes with a pair of headphones with a large bulge in the cord for transport controls, and even an LCD display. As promised in Sony literature, the MD system is fairly impervious to quick bumps and shocks, with its buffering system. Keep shaking it about for more than, say, six seconds though, and it will skip.

It connects to your computer with a SCSI-2 port on the rear, but MD media must be formatted using the supplied software. A somewhat tortuous DOS command formats the media not in FAT, but MDFS (MiniDisc File System) format. This allows the media to be used between PC and Macintosh platforms. You cannot use the standard DOS format, unlike every other device on test here.

We had difficulties operating the MDH-10 in Windows 95, but none in Windows 3.1 or DOS. Software for Macintosh is also supplied, and is a lot easier to use.

The MD DATA blanks cost £15 each and can store 135Mb after formatting. Performance is very slow even for a magneto optical drive.

The MDH-10 is an ideal device on the move: battery operated, PCMCIA option, and doubling up as an audio player. It is very slow for storage, and the drive is expensive compared to the ZIPs, EZs and in fact everything else here, but the MD DATA does offer a unique service and is the only truly portable device in this feature.

PCW Details

Sony MD DATA Drive
Price External drive £499
Contact Sony Peripherals 01932 816000

Good Points Truly portable plus audio MD playback.
Bad Points Very slow, and the drive is expensive.
Conclusion Perfect for the gadget freak on the move.

SyQuest EZ135 Drive

SyQuest introduced its 3.5in drives with two models: one with single-sided media 105Mb capacity (now discontinued), and the other, a double-sided 270Mb, reviewed in these pages. The EZ135 Drive is not much more than a remodelled, repackaged and remarketed cross between the two.

SyQuest's media is simply the rigid platter of a Winchester hard disk fitted in a removable plastic cartridge; it is effectively a hard drive with the performance to match. The mechanism is fitted into a neat grey box with two full-size SCSI ports and an ID selector at the rear.

Power comes from an external adaptor. An internal IDE version is available now and an external parallel port version due by Christmas. All are bundled with one cartridge.

Since the EZ135 needs only one head to read the single-sided media, it is considerably cheaper than the 270Mb drive. The media is almost one quarter of the price too. In fact, considering the similar performance, the 270Mb comes across as quite expensive. The formatted 135 carts offer 126Mb for around £13 each, and unless you absolutely need more, the 270 version is not worth considering.

The EZ135's main competitor is Iomega's ZIP drive. They're similar prices, but the EZ135 is quicker and has 32Mb greater formatted capacity. The ZIP is still pretty quick, but lighter, and consequently more portable as an entire unit.

PCW Details

SyQuest EZ135 Drive
Price External SCSI £179, Internal IDE £149
Contact SyQuest 0800 526559

Good Points Cheap and fast.
Bad Points The ZIP's a bit lighter.
Conclusion Excellent all-rounder.

SyQuest SQ 270

All SyQuest drives use the same kind of media: the rigid platter of a hard disk, fitted inside a plastic cartridge. When inserted into a suitable SyQuest drive, the combination effectively becomes a hard drive, with similar performance.

The SQ 270 is SyQuest's largest capacity drive, using 3.5in 270Mb cartridges, offering 254Mb when formatted. All configurations come with one cartridge; additional ones cost £42. We reviewed the SQ 270 external SCSI custom model ("custom" means just the drive and cartridge). Internal SCSI, IDE and external parallel versions are available, along with value packs which include SCSI drive, cartridge and Adaptec 1515 SCSI card.

The SQ 270 SCSI drive is very quick and the 270Mb cartridges offer a decent capacity. However, the drive requires two heads, raising the price well above that of, say, the SyQuest EZ135. If 135Mb is enough, the EZ135 is the better choice. If you need the greater capacity and excellent performance, the SQ 270 is ideal but expensive.

At a similar media capacity and drive price, there are the 230Mb MO drives — MO media is much cheaper than the SQ 270s, but far slower. MO media is less susceptible to damage than pure magnetic storage, but SyQuests are very reliable. MO 230Mb vs SyQuest 270Mb is media cost vs performance.

PCW Details

SyQuest SQ 270
Price External SCSI £450, Internal SCSI £300, Internal IDE £360
Contact SyQuest 0800 526559

Good Points Fast, and good capacity.
Bad Points Expensive media.
Conclusion Ideal if EZ135 is too small or MO too slow.

Tandberg Data Panther Mini 1000

Tandberg Data is well known for its backup devices, particularly its tape drives using the QIC minicartridges (pronounced *quick*). QIC minicartridges are physically slightly larger than DAT tapes, but much sturdier. DAT tapes start at 2Gb capacity, while QIC carts can be as small as a few hundred megabytes. Performance is fairly similar between DAT and QIC, but the QIC carts are around double the price.

On the plus side, QIC drives are much cheaper than DAT drives. Tandberg Data's Panther Mini 1000 drive costs £549 in an external box, or £449 as an internal; typically half that of a DAT drive. These prices include Sytos backup software for Windows and DOS. Another £48 gets you an Adaptec 1510 SCSI card; parallel Panthers are available.

The Panther Mini 1000 takes 1Gb native QIC-WIDE cartridges, and can squeeze up to 2Gb through software compression. In native mode the Panther backs up 1Gb in around one hour; about 18Mb per minute.

By the time you read this, Tandberg Data will have a new Panther Mini, costing only £5 more, and capable of taking the 2Gb native carts, approximately doubling to 4Gb through compression (like the Conner TapeStor 4000). Unusually, Tandberg intends to keep selling the 1Gb version at the old price to keep all users happy. We would recommend all new users to go directly to the 2Gb model.

PCW Details

Tandberg Data Panther Mini 1000
Price External £497, Internal £397
Contact Tandberg Data 01582 769071

Good Points Cheap drive, good package.
Bad Points New 2/4Gb model is a better buy.
Conclusion Go for the 2/4Gb version.

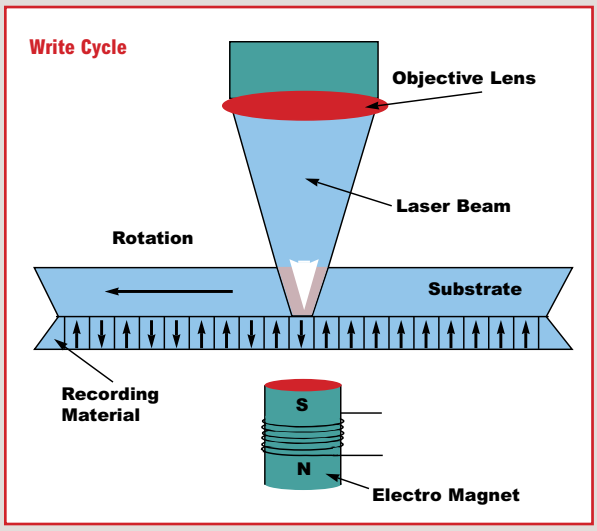
Optical drives

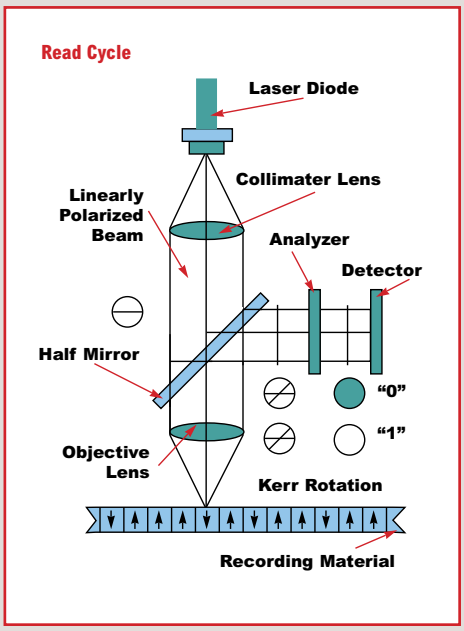
Optical drives include magneto-optical (MO), WORM (Write Once/Read Many), and rewritable optical. All these read data with lasers which are far more precise than the drive heads on a disk drive. They hold more data than traditional disk drives, too, allowing more data to be packed in per square inch; hence the name Compact Disc or CD-ROM (Compact Disc Read Only Memory).

WORM

Write Once/Read Many storage has been around for about eight years, and as the name suggests this type of optical drive can be written to and read from. When data is written to a WORM drive, physical marks are made on the media surface by a low-powered laser and since these marks are permanent, they cannot be erased, hence write once.

As far as the user is concerned, a WORM drive behaves in just the same way as any other storage media. When a file is saved to the drive and recalled for editing, the most recent version appears. Unknown to the user, however, every version of every file is permanently stored; even files that the user believes to be deleted. Financial institutions, government organisations and legal firms are particularly keen on the use of this type of media for storage as it provides a kind of transparent archiving facility which ensures sufficient security for the storage of sensitive data.





Rewritable optical disks

Rewritable, or erasable, optical disk drives provide the same high capacities as those provided by WORM or CD-ROM drives, but the data on them can be erased. Most people perceive a drive which is erasable to be a superior product, but this is not necessarily the case. The erase feature can be an asset or a liability, depending on the way you use it.

Research into how people use their storage media shows that most users who store hundreds of megabytes of data very seldom erase. The most effective application for erasable optical drives is for CAD/CAM files, or desktop publishing systems where large data files are continually altered.

Optical drive technology was often seen as the eventual replacement for the traditional magnetic hard drive, but this is not the way the market has worked out, and optical drives do not look likely to take over in the near future. Fixed magnetic drives have continued to improve in performance and capacity and offer superior performance to the optical drive. The average access time for a 5.25in erasable optical drive is around 40 to 60 milliseconds. The new 3.5in optical drives are much faster, producing scores of 30-40 milliseconds, but they're still about three times slower than the average magnetic hard drive.

So, why buy an optical drive? The main advantage with optical drives is their robustness compared to the normal magnetic type. Optical drives offer a storage medium which is easily transportable and rugged. Optical disks are immune from head crashes and the kind of data loss which is caused by adverse environmental factors. In fact, the relative advantages of the two types of system make them complementary rather than competitive. Optical drives offer security, while magnetic hard drives offer real-time performance.

Magneto-Optical Drives

The performance problem with optical drives has been addressed recently with a new generation of rewritable optical drives using magneto-optical technology and phase-change erasable technology. Magneto-optical drives are the most widely available optical storage product with drives being produced in two form factors: 3.5in and 5.25in.

MO technology, as you might guess from the name, uses a combination of laser and magnetic science. An electro-magnet and a laser beam are used together to change the state of the optical media. The active layer of the disk is magnetic, with each element having its own magnetic polarity. In order for an element to change from a binary "0" to "1", its polarity must be changed, and this is achieved using a combination of electro-magnetic and laser technology. Because of the way in which magneto-optical technology works, two or sometimes three rotations must be made each time data is written to the disk: once to erase old data, then to write new data, and thirdly to verify the data. This puts a considerable overhead on performance. Reading from the disk is much simpler and can be executed in a single rotation which takes half the time of writing.

Phase-Change technology

Phase-change technology does not suffer from the same performance overheads as magneto-optical technology. It is the only erasable optical solution which has direct overwrite capability. Using a purely optical technology relying only on the use of a laser, phase-change is able to write new data with just a single pass of the read/write head.

A laser light is used to convert spots on the disk's active layer from a dull amorphous material into a highly reflective crystalline state. The laser beam is then able to distinguish between the reflective and non-reflective light and can thus identify a binary "0" and "1". While phase-change media does not have the recycling properties of MO, tests show it can be written to at least a million times.

Eleanor Turton-Hill

Magnetic storage

The hard disk inside your PC is made of alluminium alloy covered with a magnetic coating. This makes the disk itself a pretty rigid plate, hence the name "hard" disk. Hard disks are completely sealed inside the disk drive and are not removable like many other media. They also spin very fast and have high recording densities, which means they must be kept free from dust and any other kind of environmental contamination if they are to be maintained properly.

Thankfully, for the user, most hard disks look pretty much the same and people rarely know much about their internal workings. Hard disks have changed radically over the years, especially in terms of capacity. The smallest hard disks of long ago held a tiny 5Mb while these days 8Gb is possible for a desktop PC. The average PC bought today has between 500Mb and 1GB in hard disk storage.

Data is recorded onto the magnetic surface of the hard disk in exactly the same way as it is on floppies or digital tapes. If you've ever defragmented your hard disk, then you probably have some mental image of how the surface of the disk looks. Essentially, the surface of your hard disk is treated as an array of dot positions each of which can be identified and set to a binary "1" or "0". The position of each array element is not identifiable in an "absolute" sense, so a scheme of guidance marks helps the recorder find positions on the disk. The need for these guidance markings explains why disks have to be formatted before they can be used.

When it comes to accessing data already stored, the disk spins round very fast so that any part of its circumference can be identified quickly. Floppy disks spin at 300rpm which means it takes about one fifth of a second for any given part to be identified. Hard disks, of course, spin much faster; typically about 5,400rpm or one ninetieth of a second per rotation, but these speeds are being superseded with new, faster products all the time.

Hard disk speed

The speed of a hard disk can be measured in lots of different ways, and it's important to know exactly what figures are being quoted when you're shopping for a new one. The performance of your hard disk is very important to the overall speed of the system. A slow hard disk will hinder a fast processor like nothing else in your system can.

As an initial gauge, look for the drive's "average access time". This is the time taken by the drive to locate the right track on which a piece of data is stored, and the specific place on the track where that data is sitting. This is usually quoted in milliseconds. As well as average access time look out for "transfer rates". The transfer rate is the speed at which the drive can deliver the data from the disk platters to the CPU, and is generally measured in megabytes per second.

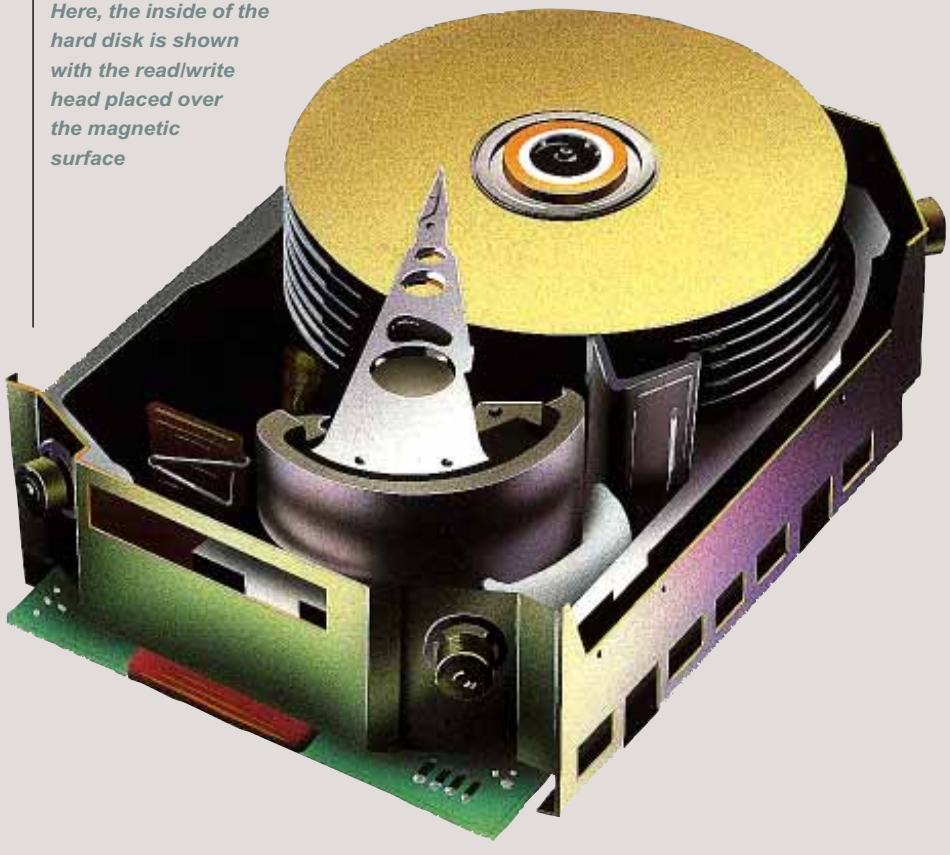
In order to get an accurate view of a hard drive's performance, the average access time and the transfer rate should be looked at together. Drive makers and dealers have a reputation for bending the truth on such issues and are often found to quote the fast access time of a drive, without any mention of the transfer rate: you'll also see this in advertisements. Unfortunately, a high access time coupled with a slow transfer rate produces a slow drive.

Because access time is measured in milliseconds and transfer rate is measured in megabytes per second, the overall drive performance can be difficult to get your head around: basically, you're looking for the lowest possible access time and the highest possible transfer rate.

Another measure of hard disk performance which you should be aware of is "seek time", which is conveniently confused (by some people) with the access time. Seek time is also measured in milliseconds and defines the amount of time it takes a hard drive's read/write head to find the physical location of a piece of data on the disk. The seek time says absolutely nothing about the speed of a hard drive. The importance of the access time and transfer rate is that they tell you how long a hard drive takes to locate and retrieve data.

PCW plans to benchmark a variety of budget and high-performance hard disks in the near future.

Eleanor Turton-Hill



Here, the inside of the hard disk is shown with the read/write head placed over the magnetic surface

Tape streamer technology

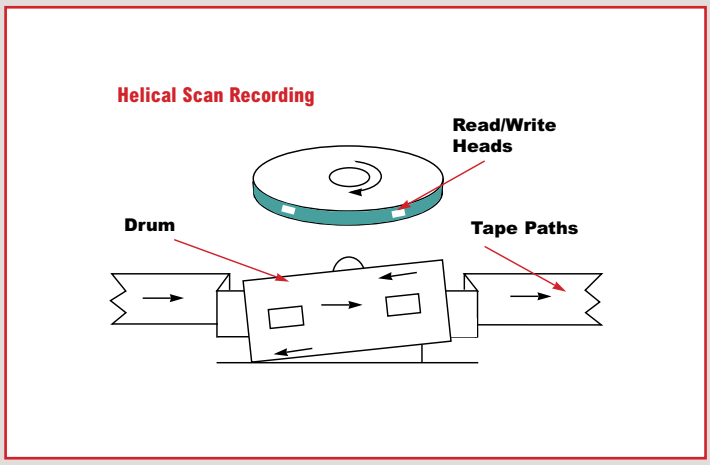
Helical Scan and Linear Recording

There are two types of technology used for tape streamers: helical scan recording and linear (or longitudinal) recording. The linear type offers better performance than the helical scan type, but typically lower capacities. Helical standards include 4mm DAT and 8mm tape, while linear includes QIC (pronounced *quick*).

QIC-WIDE tapes offering higher capacities are becoming increasingly common but cost around double that of equivalent DAT tapes. DAT drives are usually more expensive than QIC drives of similar capacities.

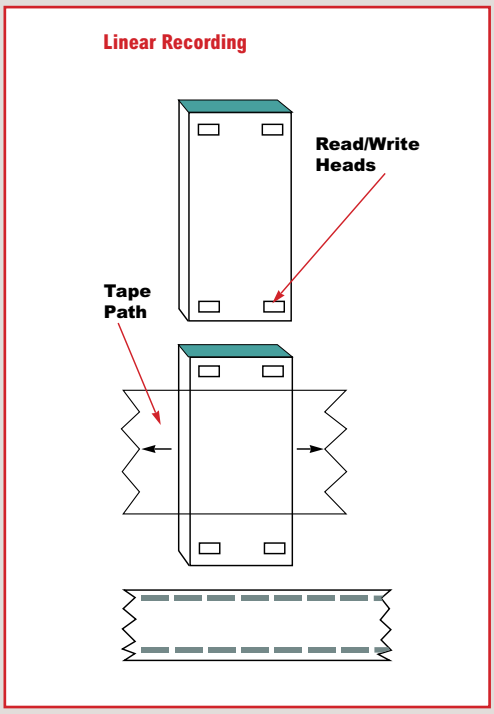
When data is recorded to linear tape, the read/write heads are stationary and the tape itself moves past the heads at 100-125ins per second. The data is recorded onto the tape in straight lines. Extra read/write heads can be added to improve performance. The 800Kb/sec achieved by two heads could be doubled to 1600Kb/sec by four heads. In some environments where high performance and capacity are required, as many as 36 read/write heads can be stacked up at one time.

Helical scan recording is the same type of recording as that used in video-tape recorders and is inherently slower than the linear type. For this reason, it is generally only used in environments where high capacity is the primary requirement. The read/ write heads on a helical scan device are attached to a rotating drum, and data is recorded onto a tape moving in the opposite direction in a stripped pattern. The tape moves at less than one inch per second but because it is recording more than one line at a time, it has an effective speed of 150ins per second.



Just like the linear variety, the performance would be greatly improved if additional read/write heads were added, but this is problematic with helical scan devices as the majority of heads require two parts (one to write and another to check for data integrity). The fact that the heads may only be added in pairs makes it difficult to fit the wiring inside a single drum and this limits the potential performance of helical scan devices. They are also rather prone to wear and tear because of the wide wrap angle of the tape.

Eleanor Turton-Hill



Travan

The Travan specification is an attempt by the tape industry, particularly the 3M conglomerate, to offer still greater capacities and a degree of backwards compatibility. It stems naturally from the evolution of the QIC cartridges, on which capacities were increased by lengthening and widening the tape (see table above).

Tape revolution

	Original	Longer tape	Wider tape	Travan
QIC 80	120Mb	170Mb	210Mb	400Mb
QIC 3010	340Mb	n/a	420Mb	800Mb
QIC 3020	670Mb	n/a	840Mb	1600Mb

Getting it taped: how data cartridges have evolved

The three travan sizes, known as TR1, TR2 and TR3, are wider and longer than the original QIC tapes and cannot be read on QIC drives; but old QIC tapes can be used on equivalent Travan drives. TR1, TR2 and TR3 cartridges will cost about £24, £28 and £30 respectively, so that the cost per megabyte falls as you go up the scale.

TR3 drives will read TR2 tapes so some manufacturers look like skipping TR2 drives. TR4 drives using 4Gb tapes are expected to appear before Christmas, and TR5 drives, storing 10-12Gb, will come in 1997. All of these capacities can, of course, be doubled with data compression.

Both Hewlett-Packard and Iomega have launched TR1 drives. Cheapest is Iomega's Ditto Easy 800, which has an estimated street price of about £125 and looks almost identical to the Zip. Iomega is also offering a TR3 drive, the Ditto 3200, which we will be reviewing next month.

3M is encouraging the development of software that makes tape drives easier to use, particularly to make them appear to the user as just another disk drive.

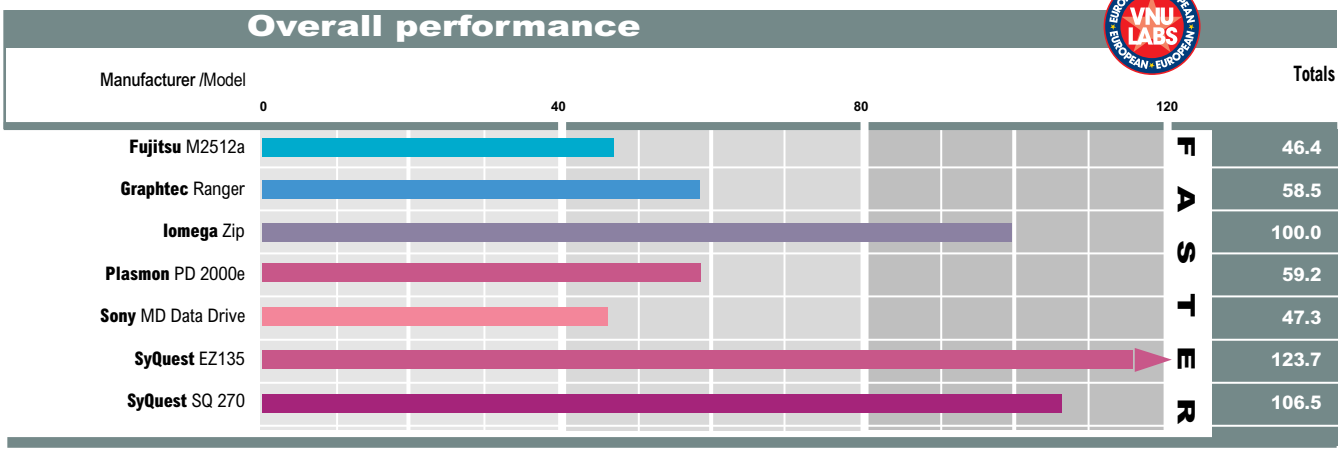
Travan's major advantage is perhaps that a single tape can be used to back up an entire hard disk. It can also carry huge video and graphics files. If tape remains much cheaper per megabyte than rival media, PC users may adopt the kind of storage management seen on large systems, where data is shuffled between slow data banks and fast local media.

Clive Akass

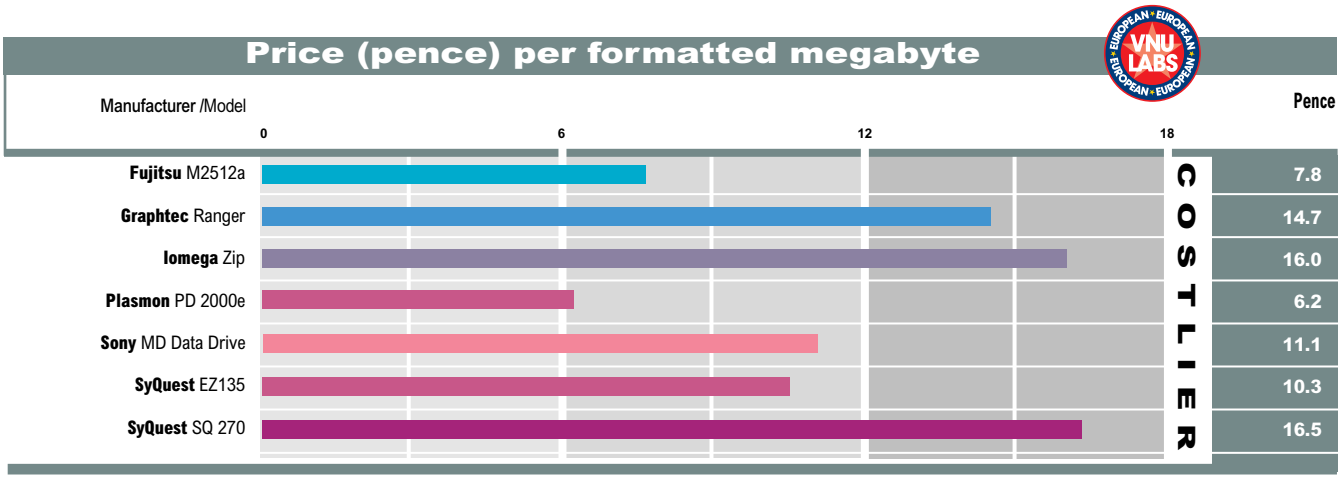
3M 01344 858000
Iomega 0800 898563
Hewlett-Packard 01344 369222

Performance results

Overall performance



Price (pence) per formatted megabyte



How we did the tests

This round-up is roughly divided into two halves: the four tape drives and the seven other devices. All 11 were connected individually to a high-performance Adaptec 2940 PCI SCSI card, fitted to a Pentium 90 PC with 16Mb RAM; at the time of testing, the only other SCSI device was the PC's own hard disk. The PC was running Windows 95 with Adaptec's EZ-SCSI 4 for Windows 95.

To put tape drive performance into perspective, you are always going to be looking at rates of typically 11 to 30Mb per minute.

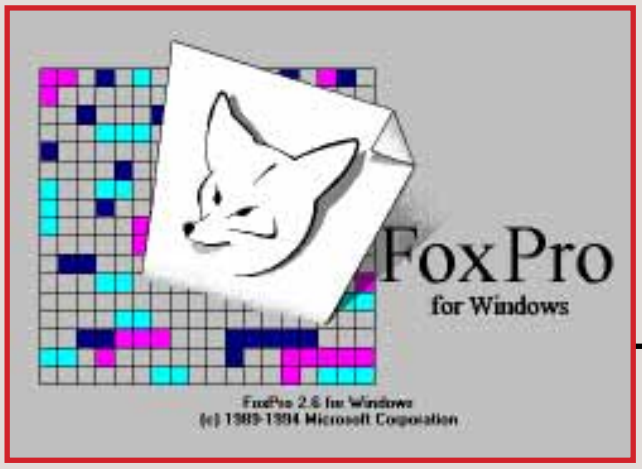
The point is that when backing up entire, or large proportions of a drive to tape, you'll be waiting long enough to make a hot drink or even pop out for a short wander round.

That's why so many backup software packages offer remote timers which back up, say, overnight. For this reason we have presented the typical backup rates of the tape drives in the table and the reviews, but not in the performance graphs on this page.

The remaining seven drives were tested with the database section of the standard VNU European Labs PC test suite. This repeatedly searches large databases, resulting in access times and transfer rates, both sequential and random, which are weighted and combined into a single score.

These final results for the seven drives are presented in graph form on this page; bigger is better.

Out of interest we have also calculated the cost per megabyte of the media. This does not take performance or the cost of the drive into consideration, but is here only to satisfy curiosity.



The FoxPro database portion of the VNU benchmarks, used here to test storage performance

TABLE OF FEATURES **STORAGE & BACKUP**

Manufacturer	Fujitsu	Graphtec	Iomega	Plasmon	Sony	SyQuest	SyQuest
Model	M2512a	Ranger	ZIP drive	PD2000e	Minidisc data	EZ135 Drive	SQ 270
Technology	Magneto optical	Magneto optical	Flexible platter	Phase change	Magneto optical	Rigid platter	Rigid platter
IDE option	yes	no	no	no	no	yes	yes
Parallel option	yes	yes	yes	no	no	yes	yes
Unformatted capacity	230Mb	230Mb	100Mb	650Mb	140Mb	135Mb	270Mb
Formatted capacity	217Mb	217Mb	94Mb	633Mb	135Mb	126Mb	254Mb
Cost of media	£17	£32	£15	£39	£15	£13	£42
Dimensions whd	89 x 140 x 206mm	77 x 152 x 253mm	136 x 184 x 38mm	210 x 62 x 270mm	86 x 30 x 131mm	122 x 53 x 215mm	181 x 54 x 205
Weight	1.75kg	2.7kg	0.45kg	2.52kg	0.34kg	1.05kg	1.73kg
RRP external	£499	£555	£149	£659	£499	£179	£450
RRP internal	£390	n/a	n/a	£575	n/a	£149 (IDE)	£300
Telephone	0181 5734444	01270 611234	0800 898563	01763 262963	0181 860 0500	0800 526559	0800 526559

Editor's Choice

Personal Computer World EDITOR'S CHOICE

There's a storage device for every situation. Whether you're after performance, capacity, portability, compatibility or maximum megabytes per pound, there's a medium for you.

Unfortunately, none do it all. This round-up confirmed what we knew: before being able to choose the right device, you must understand your desired application and expectations. What storage characteristics are most important to you? As almost every device we tested uses different media, it's hard to compare them and come up with any winners overall. Instead, here are our recommendations within each media category.

One of today's most heated battles is for the low-cost, 100Mb-or-so capacity yet relatively high-performance, storage market. The two contenders are Iomega with its ZIP drive, and the SyQuest EZ135. Both use media costing around £15 each, offering 96Mb and 126Mb respectively after formatting.

The drives themselves are similarly priced too: the external SCSI ZIP and internal IDE SyQuest cost £149, while the external SCSI SyQuest comes in at £179. Performance is good on both, although the EZ135 is faster.

Iomega suggests that its ZIP drive is so light, you can carry the entire unit around, saving you the cost of buying two. But the required mains power supply is fairly heavy, consequently invalidating any portability advantage the ZIP has over the EZ135.

Both systems are ideal for cheap and fast backup and storage, and come highly recommended. However, the EZ135 has the edge thanks to the better performance and slightly larger capacity at the same price.

• *SyQuest EZ135: Choice for general low-cost use*

If you want double the capacity of the EZ135 and ZIP drives, three fit the bill: the two 230Mb magneto-optical drives from Fujitsu and Graphtec, and the 270Mb SyQuest SQ270. All three drives are similarly priced between £450 and £550, but the media cost is very different. The MO cartridges are available for less than £20, while the SyQuest 270's come in at a somewhat hefty £42 each.

MO is very slow and only recommended for backup, particularly so since the media is relatively cheap per megabyte and quite resilient to ambient fields. The SyQuest SQ 270 was big and quick enough to run applications or boot operating systems from. If this high performance and extra capacity is desired, the SQ 270 is the drive to go for.

Plasmon PD2000E

Conner TapeStor 4000

SyQuest EZ135 Drive

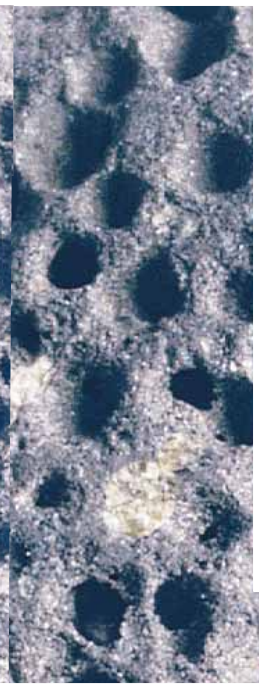


TABLE OF FEATURES **STORAGE & BACKUP**

Manufacturer	Conner	Conner	Hewlett-Packard	Tandberg Data
Model	CTD 8000e	TapeStor 4000	SureStore Tape 2000e	Panther Mini 1000
Technology	DDS-2 DAT	QIC-WIDE Minicartridge	DDS DAT	QIC-WIDE Minicartridge
Native backup rate	27Mb/min	27Mb/min	11Mb/min	18Mb/min
Native capacity	4Gb	2Gb	2Gb	1Gb
Capacity with compression	8Gb	4Gb	n/a	2Gb
Compression	hardware	software	none	software
Software included	none	Arcada Backup Exec	Colorado Backup	Sytos Plus
Dimensions whd	154 x 67 x 235mm	154 x 51 x 235mm	116 x 95 x 220mm	171 x 54 x 235mm
Weight	1.87kg	1.38kg	2.2kg	3.2kg
RRP external	£1395	£650	£799	£497
RRP internal	£1245	£479	£699	£397
Telephone	01628 777277	01628 777277	01344 369222	01582 769071

• *SyQuest SQ 270: Choice for high performance*

Also at the £500 mark is the long-awaited Sony MiniDisc DATA drive. Its tiny discs cost £15 each and offer 135Mb after formatting. Performance of this magneto-optical system is very slow, but flexibility, portability and sheer gadgetness are its strong points. The media is relatively cheap too, although the drive is quite expensive.

The Sony MD DATA can play audio MiniDiscs (though not record them) and even comes with a pair of headphones. It has an optional PCMCIA adaptor and is the only truly portable device here, capable of living off its lithium ion rechargeable battery or a set of three AAs. Even with the lithium ion battery, the whole unit weighs a mere 340g, making it the perfect choice for the notebook user on the move who wants to listen to music, and back up information.

• *Sony MD DATA: Choice for portability*

If you can stretch to £659, the Plasmon PD2000e becomes a possibility. Plasmon is the only company to offer an external version of Panasonic's PD System (reviewed in October 1995). It is probably one of the most flexible drives we have ever come across, being both 650Mb rewritable cartridge and quad speed CD-ROM system in a single unit.

At £39 per cartridge, the PD system has the lowest cost per megabyte of just over six pence. Performance isn't up to the SyQuests or ZIPs, but beats the conventional magneto-opticals. As a quad speed CD-ROM drive, it delivers 600Kb/sec and conveniently kills two storage birds with one device. Thanks to its large, cheap media with reasonable performance and the double life of the drive, Panasonic has a winner with its PD system, whether internal or external, from Plasmon.

• *Plasmon PD2000E: Choice for flexibility*

Those who want to back up over 1Gb of information can only look to tape. The two main format contenders use different recording technologies. The QIC tapes are a linear system, only recently offering high capacities. DAT is a helical system, capable of storing up to 8Gb with compression.

QIC-WIDE tapes capable of storing 2Gb uncompressed cost about £15 each; double that of an equivalent DAT. However, QIC drives tend to be cheaper. The two QIC drives we looked at, from Tandberg Data and Conner, both represent bargains. We'd choose the Conner TapeStor 4000 as it's only £100 more and can take the 2Gb QIC-WIDE tapes, whereas the Tandberg (at the time of writing) could only use 1Gb tapes. Tandberg intends soon to put out a 2Gb version at around the same price.

• *Conner TapeStor 4000: Choice for cheap take backup*

If 2Gb isn't enough, DAT is the only route left. All the established manufacturers have comparable drives and it's difficult to choose between them. Both the Conner and H-P DAT drives performed well, but the only conclusion is that DAT is the ultimate cheap media format: typically one quarter of a pence per megabyte.

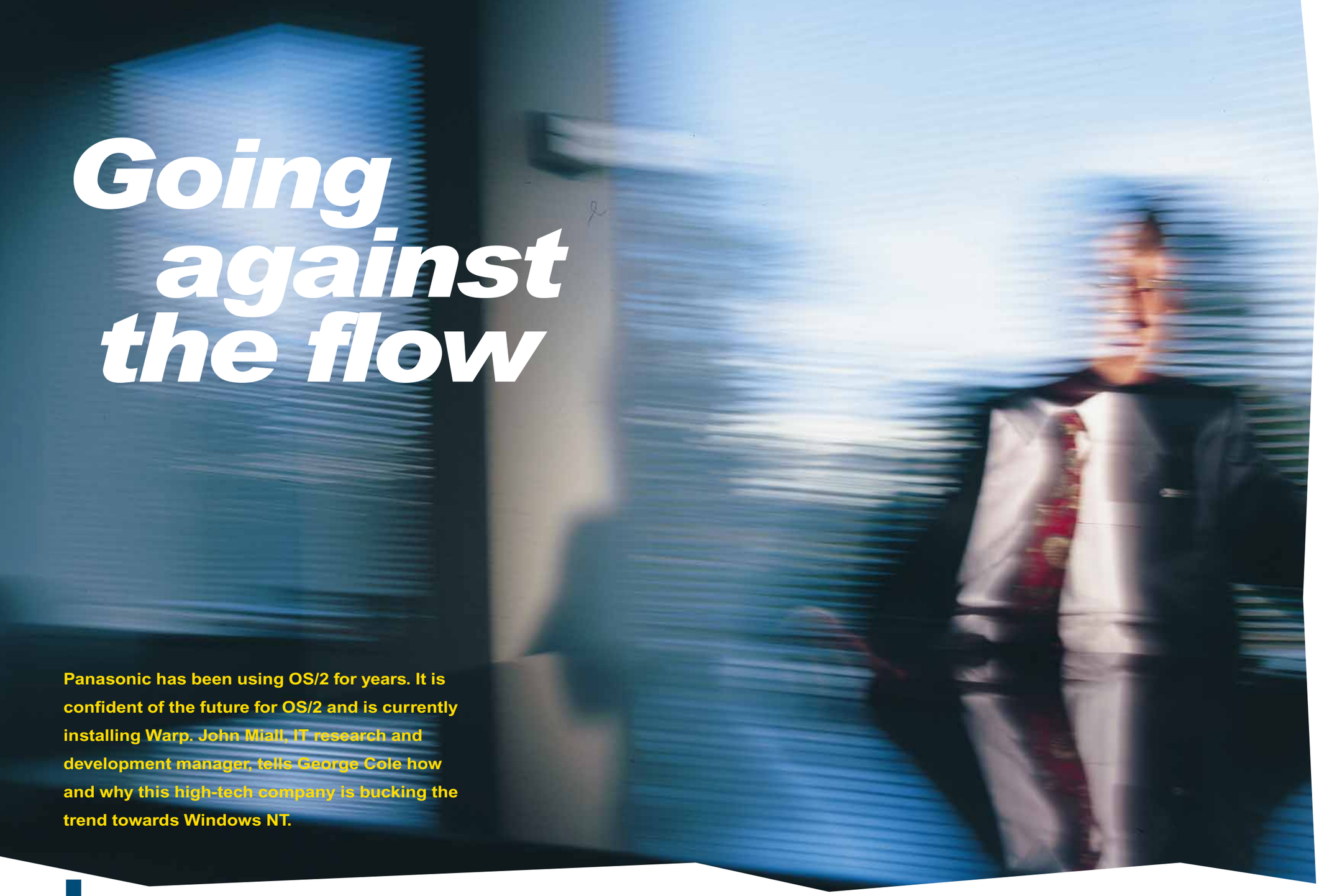
• *Any 8Gb DDS-2 DAT drive: Choice for ultimate capacity*

Gordon Laing

Sony MD Data

SyQuest SQ 270

Going against the flow



Panasonic has been using OS/2 for years. It is confident of the future for OS/2 and is currently installing Warp. John Miall, IT research and development manager, tells George Cole how and why this high-tech company is bucking the trend towards Windows NT.

PCW Photography by John *Millar*

In the PC world it's easy to believe that you can have any operating system you like as long as it's DOS and Windows. But not everyone has opted for Bill Gates' special brew. Panasonic UK, part of the giant Japanese electronics group Matsushita, has been using IBM's OS/2 operating system for more than three years, and is busily installing the latest version, OS/2 Warp, in some 500 workstations.

Panasonic is well known for its business and consumer electronics items such as TVs, VCRs, microwave ovens, telephones, faxes and answering machines. Less well known is the fact that the company has been making PCs and peripherals for years. Earlier this year Panasonic launched the CF-41, a 486/Pentium notebook PC with full multimedia features including sound card, speakers, CD-ROM drive and optional MPEG moving video.

So why has this high-tech company decided to swim against the tide of Windows systems flooding on to desktops? There are already around 80 million PCs with Windows 3.x. Research group Dataquest forecasts that around 30 million copies of Windows 95 will be sold this year. According to IBM, 10 million copies of OS/2 have been shipped — three million copies of Warp have been shipped since its launch in November 1994. It's not an insignificant number, but it does mean that OS/2 is overshadowed by Windows.

Right product, right time

According to John Miall, Panasonic's IT Research and Development manager, OS/2 was the right product at the right time: "PCs didn't get a firm grip in the company until 1989/90 but there was no network in place. This is because we work on the principle that you must have a sound business case before any project is put into place. So we started with a clean slate position as to which way the company should go and the operating environment we should use," he says.

At this stage, employees were using Panasonic FX600 PCs powered by an 8086 processor and running DOS programs such as WordStar. But it was becoming clear that the company would need to be networked in order to improve efficiency. Around 1992, Panasonic introduced its Panalink token ring network.

Then came the question of which operating system to use. Panasonic had worked closely with IBM for some time, and had even produced some products for "Big Blue" to badge as its own (such as monitors). Panasonic was also running an IBM ES-9121 mainframe: "We probably had access to more information than most people about what IBM was doing," says Miall, "and so we saw Beta copies of OS/2 and found that it had the ability to give every environment we were looking for and every connectivity method we wanted to use. It was clear we needed an advanced operating system, and as we knew one was coming along, why not go straight in?"

Growing pains

According to Miall, the decision was very easy because there was no other competition. Panasonic looked at Unix, but it lacked a graphical front-end and many of the applications that Panasonic needed, like spreadsheets and word processors. The DOS/Windows route was deemed to be fine for standalone PCs, but not for the networking facilities which Panasonic was planning.

OS/2 version 1.3 was installed in 1992 but it wasn't all plain sailing, says Miall: "I remember the outcry that was caused when it was discovered that we would need machines with 4Mb of RAM before you could load the operating system. And 1.3 was really for use on file servers: it had excellent multitasking facilities, but not the virtual DOS session [which lets users run DOS programs] which was as capable as the one you now have with Warp. You had a single DOS session which was very limiting on memory. You could run the very bare, basic, DOS

programs and only after it had switched the processor into DOS mode — so your OS/2 applications tended to come to a stop while you ran DOS. On a scale of technical achievement, I'd give OS/2 version 1.3 a score of minus one."

But Miall says Panasonic started off with version 1.3 because it knew what IBM was planning and had seen previews of later versions. Around 1991, OS/2 version 2.0 arrived: "This was a pleasant surprise. It was running DOS applications well and was a whole new ball game. It allowed you to use programs and applications which you couldn't before."

Network stability

Panasonic used successive versions of OS/2 and started to install OS/2 Warp in late 1994. Miall says one of the best things about Warp is the network stability it offers: "If an employee says he wants to use some unknown application on a networked workstation, you normally think, 'crikey, this could wreck the whole network.' With OS/2 Warp you're pretty confident that you can put the application in its own standalone virtual machine (which isolates it from other programs) and the thing flies. And if it does fall over, so what? The network server is still standing. A big point in favour of OS/2 Warp is that you get a crash-protected system, and from a corporate point of view this is very important."

But despite Miall's enthusiasm for OS/2 Warp, Panasonic has been cautious about its introduction: "Many of our workstations are still using version 2.11 and we're only just beginning to put Warp in place. We thoroughly test everything before we install it onto our live network. We've probably got a phobia about anything sneaking onto the network and causing damage." So Warp is being introduced on a department-by-department basis, with the R&D section using it first, followed by the customer information systems department.

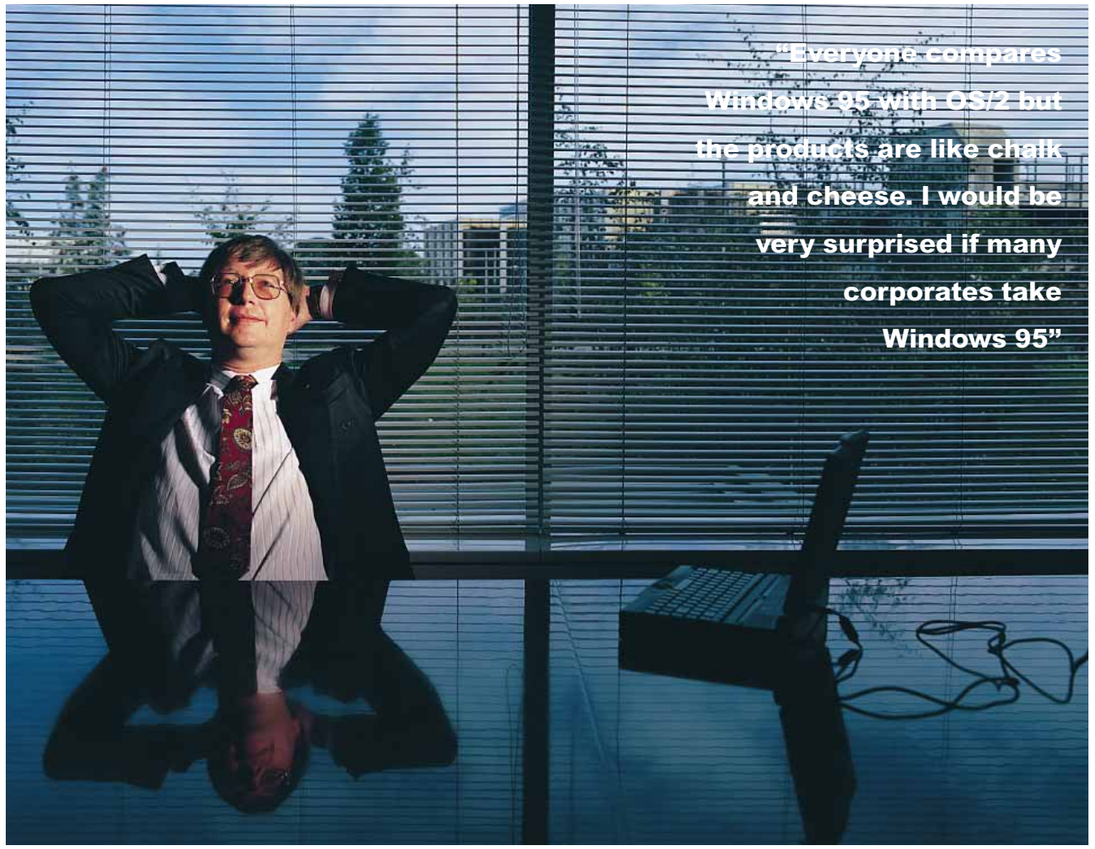
The standard configuration of Panasonic's current workstations is a Panasonic CFV-21P notebook with a 486 or Pentium processor, 12Mb of RAM (although high-power users, such as those in the R&D department, may have 20Mb on their machines) and 350Mb hard disk. "I would not recommend anyone trying to run Warp on a four-meg machine, despite what IBM claims," says Miall.

The major applications used are Microsoft Office and Lotus SmartSuite, although Corel Draw and AutoCad are used, too, in some departments. Panasonic additionally runs some custom-written applications. The network has 11 IBM PS/2 servers. Panasonic uses a clever method to install OS/2 on its workstations. It runs a central file server, allowing you to pull the operating system and network connection from it and place them onto an empty machine. Miall says OS/2 has been very easy to install.

Everyone using Warp has the same machine configuration and Panasonic uses a restricted workplace shell which stops users from messing up their desktop. Users are restricted to their own applications and Panasonic's internal email system (Panapios). But users cannot access OS/2 prompts to alter things: "OS/2 is pretty well protected but you can delete a couple of key files and suddenly the whole thing's screwed up — it's just a measure to save us the pain of putting them right again," says Miall. Panasonic's R&D section is currently testing Warp's internet connectivity and multimedia features.

Pros and cons

Miall sees many good things in OS/2: "It's quite capable of running any DOS or Windows application which has been written correctly and it doesn't use shortcuts to direct access parts of the operating system. Even some of these can be handled but you need to know how to fine tune



OS/2. I can’t stress enough the importance of having somebody who knows and understands Warp on site. If you haven’t got that, you’re going to suffer headaches from users — you’ve got to have someone there who knows what they’re doing. But having said that, OS/2 gives you worry-free computing.”

“Bad points,” he adds, “are the lack of native OS/2 applications — you’re not going to get as many as with Windows (for obvious reasons), although the majority of commercial applications are available on OS/2. But many applications appear on DOS and Windows before they arrive on OS/2. And if you’re hoping to use network services with OS/2, you’re going to need a machine with at least 8Mb of memory.”

Panasonic is looking to the future, and seriously considering using the PowerPC version of OS/2, when it finally comes out: “I think the Intel platform will reach its peak at the Pentium 7-series and so other chip technology will have to be used. PowerPC could be used for our high-end workstations,” says Miall.

And what about Windows 95? Does Miall wish he had waited for that? “Windows 95 is heading in the right direction, and it’s very different to how it was first announced. The reason for this is that Warp was there: it forced Microsoft to stretch further and further with their product, because OS/2 Warp was coming out with these features built-in. When I went to a Windows 95 presentation I sat there thinking: ‘Is this new? I’ve done all of these things for over two years’.”

Miall continues: “Windows 95 is a giant step forward for running DOS and Windows, but it wouldn’t be my personal choice, having used OS/2, mainly because OS/2 has been out there for a few years and had the bugs ironed out. Everyone compares Windows 95 with OS/2 but the products are like chalk and cheese. I would be very surprised if many corporates take Windows 95.”

But Miall adds that Microsoft may have a stronger card to play: “When the Windows NT workstation comes out with a graphic front-end, it will be the first serious contender to OS/2 Warp in the corporate market. NT is coming of age now and is a well-respected product that is starting to become stable — Windows NT is a future which I hope won’t go away.”

So would he consider moving over to NT? “If we found loads of Win-32 apps still appearing for that product, and it was stable, we might consider adding NT to our network. But whether we’d be in our right minds to change over to it, when we have a perfectly good product that’s been going well for the last two years, is unlikely. At the end of the day, if Windows NT was superior in its functionality we would consider switching but it would be silly if IBM didn’t keep up with it. *I’m* confident about the future of OS/2, even if at times IBM haven’t always sounded as if *they* were. OS/2 has certainly helped keep us ahead.”

PCW Contacts

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01329 242728

Cloud nine

A year ago, a laser printer designed for shared network use was a rare commodity. Now you can't move for them. Nick Lawrence asks what qualities a network machine needs, and chooses nine of the best.

PCW Photography by Bruce *Mackie*

Last month we tested 11 laser printers falling into two price ranges: under £321 and under £751 on the street. Here is the third and final category of our laser printer round-up: network machines.

Over the following pages we look at nine laser printers; ideal for shared workgroup use over a network. Rather than set a top price, we opted for a specific configuration to which all models should conform.

All had to have a resolution of 600dpi or higher: the Lexmark Optra was the only one to boast 1200dpi. All had to be fitted with a thin Ethernet BNC network connection, have 8Mb memory, and Adobe PostScript Level 2.

When choosing a network printer, all of these features have to be taken into consideration. Some models may boast all or better as standard, while others may offer a bare machine out of the box, requiring significant upgrades to fit the desired bill.

We chose the above configuration to represent a useful network machine, and asked all manufacturers to match it so as to provide a common ground for testing.

Unfortunately, not all the machines could be fitted with exactly 8Mb; some came with 2Mb as standard, with upgrades in multiples of 4Mb. Consequently, we received machines with anything from 6Mb to 12Mb; the HP LaserJet 4MV, for example, which comes with 12Mb as standard. Nevertheless, our tests did not especially favour machines with more than 6Mb (especially so, as we were using our network of a single workstation).

The reviews specify how much memory was fitted to the models supplied and tested: unless stated otherwise, it was 8Mb. The prices quoted in the table and reviews are for the configurations supplied and tested: notice that in all cases apart from the HP LaserJet, every printer had its memory upgraded from standard.

Along with our reviews, we've provided information on what setting up a network printer involves and what you should look out for. Descriptions of how laser printers work, both physically and electronically, can be found in last month's round-up.

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Network Laser Printers

Setting up a network printer

Network printers

Networking your printer can provide performance benefits over a simple serial or parallel printer, in addition to those gained by sharing a printer between many PCs. The actual performance gain will depend on the type of work you are doing and the content of your print jobs. This is not only the difference between text and graphics, but also whether information is being sent in PCL, PostScript or as a raster image.

If most of your printouts are text files and use fonts that are held in the printer (either in the form of soft fonts or cartridges) then, surprisingly, the performance gains over a simple parallel connection will be small. The information sent to the printer is basically a string of ASCII characters and some font instructions to the printer. A full page of A4 text is about 3,000 characters, and this can easily be transmitted in the bandwidth available from a parallel link.

You'll reap the benefits of a network printer connection when you print graphics or use documents with lots of fonts to be downloaded to the printer. A complete A4 page of graphics at 300dpi takes up just under 1Mb. At 600dpi that same document will take up about 3.75Mb. With a 10Mb/sec connection, and raster images being fed to the printer, it can print at full engine speed even when doing complex graphics.

If, however, the information is being fed to the printer using a higher-level PDL (Page Description Language), some of the speed advantage will be lost because the printer has to convert the PDL into a raster image. PostScript, in particular, can be notoriously slow with graphic images. The basic rule is that if your printer is I/O bound (i.e. waiting all the time for data to be transmitted), a network link can substantially improve performance.

How do you connect your printer to the LAN?

Connecting a printer to a LAN involves setting up three main structures: a print server, a print queue and a redirector. The way in which you set these up depends entirely on which network operating system you are using.

- The print server is that part of the system which receives the print job from a networked PC and directs it to the appropriate printer queue.
- The printer queue holds all the jobs for a particular printer until they can be serviced.
- The redirector runs on the workstation, takes output that would have gone to the parallel port on your PC and redirects it onto the LAN to be collected by the print server.

One print server can look after several printers. In the past, a dedicated PC would have been used with multiple printers connected to it in a conventional manner, by a serial or parallel links. Now, most of the network cards available for printers can set themselves up as print servers so that they can log into the network like a conventional user (with a password if necessary) and behave like a print server. Thus, a dedicated PC is no longer necessary.

To achieve this, you must set up the network card in the printer. Most manufacturers provide some management software to search for their printers on the network, allowing you to set them up by telling them how to log in, what password to use, and for which queue they have to print jobs. This software should be supplied with the network card.

The print queue is set up by the

management software for your network. Under Novell Netware this is an unnecessarily complex process, because queues and printers needn't be assigned on a one-to-one basis. This means you can have several printer queues all pointing to the same physical printer, or you can have one printer queue that points to several printers: whichever printer is free at the time, will be used. As the most common situation is a one-to-one assignment, most other network OS's queues are assigned on this basis.

Most manufacturers produce network cards for their printers,but as they are proprietary you should check that your printer manufacturer offers the options you need. The closest thing to a standard interface is that provided on Hewlett-Packard printers. Because HP printers are the *de facto* standard of the low- and middle-end printing world, there are many third party alternatives to HP's own JetDirect cards (e.g. those supplied by Pacific Data products).

Connecting your printer to the LAN will be a matter of ordering the correct add-on for your printer. The things you need to check are cabling type, protocol and manageability.

The cabling type defines the network connection to the printer, and needs to be the same as the other devices on your LAN. The two main cable types are UTP (Unshielded Twisted Pair) and Thin Ethernet. The former uses RJ45 connections which look very similar to standard telephone connections and are used for all sorts of networks (including Novell IPX/SPX, Unix TCP/IP and IBM Token Ring). Thin Ethernet uses a BNC-type connection and looks like coaxial cable. This is used mostly for standard Ethernet networks, using either Novell's IPX/SPX or Unix's TCP/IP.

Other cable types include Shielded Twisted Pair (STP) which is used by IBM for token ring networks, and Thick Ethernet that uses a 15-pin D-type connector that looks similar to a joystick port.

Although this may sound complicated, it is merely a matter of finding out what cabling your network is currently using: it's likely to be either UTP or Thin Ethernet. And whichever network protocol you are using, this is likely to be IPX/SPX, TCP/IP, Token Ring or AppleTalk. You need to specify your network operating system when you order the network card: Novell, Unix, Windows NT, LAN Manager or Apple's own (but it is possible to network Macs using other than Apple's own networking software).

If your printer doesn't have an add-in card (or perhaps one that isn't suitable for your network environment), all is not lost. There are a number of third-party devices available that connect to the network as a print server: black boxes that have a network connection and one or more serial and parallel connections. The printer is plugged in to the parallel port in a conventional manner and the box logs into the network as a print server.

The Future: 100Mb/sec Ethernet, Switching and ATM

The future of networking is moving towards new topologies that will allow you more bandwidth on your network. As these move into place, it is important that network printers don't get left behind. If you move to a 100Mb/sec Ethernet network, you don't want to have to install 100/10 Ethernet bridges just so that you can connect to your printer. There are currently very few manufacturers that offer 100Mb/sec options.

Although a 100Mb/sec card for a printer may not seem an important option as technology moves forward, you do want your printer to be able to connect to the LAN in the same way as any other device. The fact that the printer is not capable of handling 100Mb/sec of data is irrelevant: many of the workstations with 100Mb/sec cards will not be able to handle 100Mb/sec of data, either. You just don't want to have to use a different networking infrastructure for your printer than for your workstations.

Simon Head

How we did the tests

We asked for all the printers to be fitted with PostScript Level 2 and 8Mb memory. Many could not be fitted with exactly 8Mb and instead were delivered with anything from 6Mb to 12Mb. Under normal circumstances this would affect performance and make comparison difficult. However, our hardware configuration consisted of a single workstation and our tests included small enough documents not to make any discernible difference above 6Mb. The printers also had to have at least 600dpi true print resolution (without, or before, enhancement techniques). Finally (and crucially), they had to have Ethernet connectivity through 10Base2 (Thin Ethernet).

Previously, we have connected our testing PC to the printers through a parallel port, but these printers are first and foremost network machines. Consequently all were hooked up to a network running Novell NetWare 3.12 over Thin Ethernet 10Base2 cable. Since the only nodes were the testing PC (a 486 DX33), the NetWare server and the printer, possible network disruptions were kept to a minimum.

This additionally gave us an opportunity to test the quality of the installation software that came with the printers. Remote configurability is all the rage, and hopefully the implementations of SNMP (Simple Network Management Protocol) here will help to make it the tool which allows network administrators to configure many aspects of their users' computers, without leaving their desks. With any luck, tortuous front panel menus and the dreaded pconsole will soon fall from favour. We used Windows 3.1 as the workstation OS for these utilities (although many have utilities for other operating systems as well).

Speed test analysis

Overall scores for text and graphics printing speed are combined using standard weightings, giving an overall performance result. Windows 3.1 is used as a unifying platform which supports printer drivers: a VNU European Labs benchtest tool is used to provide accurate timing.

The speed tests were carried out using PostScript at 600dpi — this was the maximum resolution of all the printers except the Lexmark Optra which can achieve 1200dpi. Text and graphics performance are measured separately, as most printers should be able to rapidly print out many pages of text, whereas graphics pages generally require more processing by the printer's internal controllers.

The Text Speed score is derived from a geometric mean of the results of four different tests, two of which involve runs of ten identical pages. The other two text tests are based on a variety of fonts — thus exercising the controller's font-cacheing capabilities.

Graphics Speed performance figures are based on timings for printing three different graphics metafiles, one of which is actually a bitmapped font. The other two are simulated half-tone graphics generated by a graphics package.

Brother HL1260

The HL1260 is one of the smaller printers here, compacted into a cube which can take 500 sheets as standard. It is Brother's only workgroup laser.

Setting up the Brother network utility on a PC is something of a frustrating experience, as the Windows version needs to be installed from a batch file which won't run from within Windows.

The 1260 has some features that set it apart from the other printers: a PCMCIA card slot for a flash SRAM card or a hard disk (though the approved vendor list is small), an unobtrusive full duplexing unit which attaches to the back of the printer, and a simple macro language built into the PCL driver which allows the user to send a file to the printer with each print job. This combination of features could be useful in the financial services sector, when a standard set of terms and conditions could be stored on a PCMCIA card, called from the printer driver and printed onto the back of a sheet of paper.

Despite all these flashy features and 10Mb RAM as tested, the speed tests showed rather poor performance for the Brother, as it came in the middle of the pack in some tests and was the slowest on our difficult bitmap test.

PCW Details

Brother HL1260
Price RRP £2,036 with 10Mb; Street £1,630
Contact Brother 0161 330 6531

Good Points Lots of features for corporate bodies; holds 500 sheets as standard; cheap.
Bad Points Not the fastest.
Conclusion A printer for those with specific requirements.

Dataproducts T16

Being something of a huge beast, the T16 can hold loads of paper in the three trays in the model supplied, and is designed for higher-end networks than most of the other printers.

For a start there is no SNMP utility; which sets this Dataproducts printer apart. At first, this would seem to be an oversight, but Dataproducts claims that this is countered by the front panel setup which allows the printer to behave like 12 virtual printers, each with a different combination of network environment and emulation protocol, and each with a different printer name to feed the file server. This would apply where a Unix and Mac network would use TCP/IP, while a group of PCs would be using NetWare.

Unfortunately Dataproducts does not make it easy to plug the necessary names into the NOS. To configure it to work with NetWare, you have to fire up pconsole and feed it an arcane printer name which you have previously obtained by printing out a status sheet. The print server name is "T20" followed by the last six digits of the Ethernet address.

Once everything is up and running, you still need to fiddle with the front panel to change defaults such as the paper size. It needs an SNMP-type utility.

PCW Details

Dataproducts T16
Price RRP £3,495 with 12Mb standard; Street £2,800
Contact Dataproducts 01734 884777

Good Points Can be used with several networks simultaneously.
Bad Points No remote configuration utility.
Conclusion For big networks only.

Epson EPL9000 PS

The 8ppm Epson 9000 PS is the top model in its range of five lasers. New models will be released by the middle of November, but Epson hasn't divulged what form they will take, other than to say that they are better specified and lower priced, with smaller footprints than the current range.

A smaller footprint would be welcome on the lumbering EPL 9000 PS, but like the HP LaserJet 4MV its size can be forgiven on account of its A3 capability. The paper tray can take only 250 sheets, compared with the HP's 350 capacity.

The network setup was excellent, requiring the sysadmin only to click on an automatically detected queue and print server to attach the two.

Epson positions this printer as an "affordable A3 model", and the lightweight price reflects the 6Mb RAM supplied for testing with accompanying lacklustre performance under our speed tests (although good font cacheing did help its score in our font downloading test). Nevertheless, the ability to output A3 should by not be discounted.

This printer would probably serve best in a low-usage network needing simple remote configuration and A3 pages.

PCW Details

Epson EPL9000 PS
Price RRP £2,608 with 6Mb standard; Street price not available
Contact Epson 0800 289622

Good Points A3 capability. Good network setup.
Bad Points Not the fastest printer, although more RAM would help.
Conclusion Good for low-usage A3 printing.

Hewlett-Packard LaserJet 4MV

Hewlett-Packard has several technologies under its belt (including processor technology that has sparked the PA-RISC 7000 and a rumoured partnership with Intel on the P7) but it is perhaps best known for the printers with which it has dominated the market for so long.

The LaserJet 4 series is now stable and mature, with the 4MV placed in the middle of the three workgroup lasers. Unlike the other printers here (apart from the Epson) the 4MV is A3 capable, which accounts for its prodigious size and weight.

All HP printers come with JetDirect, a printing utility which communicates with the printer far better than Print Manager and returns more usable messages for the end-user. The systems administrator is catered for with JetAdmin, the HP remote configuration utility, which is also included as standard with Windows 95. JetAdmin was certainly one of the better examples of its breed. It was quick to find the printer across the network and performed all the necessary tasks with the minimum of user intervention.

The printer's standard 12Mb RAM made a difference when it came to the speed tests (many of the others had between 6Mb and 10Mb). The fast print engine must also have helped, as the 4MV came top in all our speed tests.

PCW Details

HP LaserJet 4MV
Price RRP £2,749 with 12Mb standard; Street £2,129.
Contact Hewlett-Packard 01344 369222

Good Points Very fast, A3.
Bad Points Large.
Conclusion An excellent printer from an excellent manufacturer.

Kyocera FS-1600

This is the most compact printer of the group, with a tiny footprint that could fit onto almost any desk, and the only printer here to use LEDs instead of a laser.

The FS-1600 keeps consumable costs low by separating the toner from the mechanical parts of the printer, so only the toner needs to be replaced (not the drum and other mechanics). Kyocera claims 10,000 pages from one toner cartridge; more than any other printer. The EcoLink remote configuration utility is one of the easier ones: it installs quickly and lets you get on with configuring the printer for your network.

The 8Mb RAM was used to good effect in our speed tests, achieving particularly good scores in the downloaded fonts test. It was faster coping with simpler, text-based work rather than more complex graphics. More memory, or space for downloading fonts, is available via the PCMCIA slot, which could also be used for "cable-free" printing whereby you take a card out of a notebook and plug it directly into the printer.

The printer's combination of good speed, small housing and an easy setup utility, sets it apart from the rest. Cheap consumables, which could make this printer one of the most economical during its lifetime, makes it exceptional.

PCW Details

Kyocera FS-1600
Price RRP £2,318 with 8Mb; Street £1,739.
Contact Kyocera 01734 311500

Good Points Cheap to run and easy to use.
Bad Points Not many.
Conclusion An excellent printer.

Lexmark Optra Lxi

The Optra Lxi is top of the range: 16ppm, 4Mb as standard (ours came with 12Mb) and a 500-sheet paper tray. The Lxi has easily the best front-panel setup of any printer here. 10baseT is fitted as standard, but 10base2 Thin Ethernet costs an extra £340. All models in the Optra range are capable of true 1200 x 1200dpi although this would usually be restricted to imaging or technical drawing rather than everyday use, so we tested it at 600dpi.

The remote configuration utility (MarkVision) is one of the best for a workgroup, as it uses fewer network packets than the SNMP printers here. It achieves this by using the Network Printing Alliance Protocol (NPAP), which has an alert-based system (the printer only makes contact with the controller when it needs to send an alert) rather than the polling-based system employed by SNMP. In fact, this is an option in the Unix version of MarkVision, soon to be implemented in the NetWare version to enable the sysadmin to keep control of SNMP printers as well as NPAP-based ones. MarkVision provides job statistics too, including which user printed which job and the tray from which the paper originated.

The configurability of this printer, combined with 1200dpi and Lexmark's reputation, is recommendation enough. The good speed-test results are a bonus.

PCW Details

Lexmark Optra Lxi
Price RRP £3,634 with 12Mb (£3,294 10BaseT); Street price not available.
Contact Lexmark 01628 481500

Good Points 1200dpi, MarkVision.
Bad Points Not cheap.
Conclusion Brilliantly designed for corporate bodies.

Mannesmann Tally T9008

This top-of-the-range Mannesmann Tally T9008 printer appears identical to the Olivetti PG508, and has a Japanese-made printer engine in common. But it differs in its electronics — it's more than just a re-badged Olivetti. This 8ppm machine is aimed at the small workgroup, with a 350-sheet paper tray and 2Mb RAM as standard (an upgrade to 10Mb, PostScript and an Ethernet were installed in our model) and Mannesmann Tally cited the example of a solicitor's small office, or similar environment with multiple light users.

We would recommend the presence of a Certified Novell Engineer (CNE) while installing this machine as it was virtually impossible to install it on NetWare via the supplied software. In the end, we left it to be arcane and wrestled pconsole into submission ourselves.

Perhaps the real problem was that the T9017, which has a 16ppm engine and is more robustly designed, would have been more suitable for this test than the souped-up T9008 Mannesmann Tally sent us. Perhaps this would have been easier to set up as well — certainly this was the aspect which most let down an otherwise reasonable printer.

PCW Details

MT T9008
Price RRP £2,256 with 10Mb; Street £1,750.
Contact Mannesmann Tally 01734 788711

Good Points Cheap.
Bad Points Network configuration.
Conclusion Wait until the software is more sophisticated.

QMS 1060e

QMS' 1060e comes with 8Mb RAM and a huge array of disks and setup utilities for almost every network environment found in everyday use.

CrownAdmin is the big selling point of these printers, and it began well by installing with no fuss. Once it has analysed the network and autodetected the printer, you can perform functions like changing the printer name. Doing anything beyond this involves communicating with the printer by typing commands to an interface, structured to mirror the front panel of the printer, and with the user-friendliness of edlin. The saving grace is that this utility locks out the printer's buttons so that it doesn't receive conflicting information locally, and remotely.

We were able to get the CrownAdmin utility to find the printer across the network and change the printer and print server names, but not talk to NetWare. We were forced to fire up pconsole and enter the names manually to get NetWare to recognise the device.

The 1060e's speed under PCL 5 emulation wasn't bad, though it was much faster when producing simpler, text-orientated pages than the more complicated bitmap and graph tests.

PCW Details

QMS 1060e
Price Street price £2,195 with 8Mb standard; RRP not applicable.
Contact QMS 01784 442255

Good Points Lots of disks and manuals; reassuring.
Bad Points CrownAdmin left something to be desired.
Conclusion Good potential, but needs more work.

Xerox 4510

From Xerox — the home of the GUI, photocopying, and countless other bases of our office life — comes one of the most compact printers tested.

Only a corporation such as Xerox could have a setup utility to install the printer setup utility (the catchy XDS/P). It warns you that XDS/P requires 8Mb disk space and (bizarrely) a free serial port to install. You should have the latest version of CLIB.NLM on your NetWare server: this could be difficult to get as it's only available from Novell.

XDS/P itself is distinctly nifty, however. It automatically installs the printer with NetWare with far less fuss than many of the other utilities, although its insistence on sticking a 21Kb TSR in your autoexec.bat file is something of a pain.

Xerox is one of the biggest names in laser technology: it supplies the huge 4700 II which created near-photographic quality output with a built-in PC for our August issue, as well as lasers which can throw out up to 60ppm. Yet it is reminiscent of IBM in that it has excellent hardware and software technology which could achieve so much, were it not for the poor finish of its products. In this case, it is the XDS/P utility's ridiculous insistence on TSRs and a certain NLM which let down what is otherwise a fine product.

PCW Details

Xerox 4510
Price RRP £2,087 with 10Mb; Street £1,774.
Contact Xerox 0800 454197

Good Points A small and well-built printer.
Bad Points The poor XDS/P setup utility, despite the fact that the XDS/P itself is good.
Conclusion The software could do with some polish.

Editor's Choice

If you've arrived at this point, there's a good chance you've got two or more PCs and want to be able to print from them all. The solution is not necessarily a network printer. As with any other purchase, sit down and have a good think about exactly what you're after. Consider how many and what type of machines you want to be able to print from, the volume of work and the typical size of the files.

Think about the quality of output, too: if you're just knocking out pages, then accuracy and consistency may not be paramount. But if you are proofing for pre-press work, then a good PostScript Level 2 printer is required.

The prices of the nine printers reviewed here are between £1,500 and £3,700 — that's a lot of money if you have less than five PCs. With good 300dpi personal GDI lasers available for about £300 each, you may be able to buy one for each user. Admittedly all the machines tested here are a lot quicker, higher quality 600dpi affairs, but even then, for the same price, you'd be able to buy two or three personal 600dpi machines instead.

Once again consider your environment: do you already have a suitable physical network onto which a network printer may be installed? Is it client server, or peer to peer? What network operating system is in use: Novell NetWare, Windows NT or Windows for Workgroups?

An ideal situation for a network printer is in our own office at *PCW*: we have ten PCs mostly running Windows 95, and 15 Apple Macs. A single Hewlett-Packard LaserJet 4SiMX was chosen as our office workhorse. It's a 16ppm A4 PostScript 600dpi printer with a huge paper capacity, and we hammer it on a daily basis. Along with an A3 DataProducts LZR-1580 printer, it is used not only for printing day-to-day documents, but for page proofing as well. The dual platform and proofing nature of our workgroup necessitates PostScript machines. Both are connected to our thin Ethernet 10base2 network, running Novell NetWare 3.11 on a single server.

If you're still reading, then you're definitely in the market for a network laser. So without further ado, here are our conclusions.

Unlike our August colour printers group test, there were no printers in this test that were identical but sporting different badges. But it was plain that the idea of remote configurability and SNMP (Simple Network Management Protocol) had caught on in a big way, and all the printers, except the Dataproducts T16, had implemented some form of remote configuration.

It was quite a surprise that no manufacturer had followed Kyocera's substantial lead and brought in lower costs for end-users by separating out the toner cartridge from the other internal mechanics;

Personal Computer World EDITOR'S CHOICE

perhaps HP's experiment in this area some years ago had scared others off, even though the company never followed it through.

Some of the most modern features appear to change the way in which printers are used. Accountability of usage can be a very big issue in a highly networked environment, and it looks as though printers will soon all be able to tell the system administrator which user printed which job, from which computer, at what time, and how many pages the job used.

In the meantime, there is still some sense of exploration among the more interesting possibilities thrown up by the ever-expanding workgroup printer market, with PCMCIA slots and other goodies thrown up by R&D departments all over the world. Surprisingly, no manufacturer of our nine printers had chosen to include an infra-red interface, but that too can surely be only a matter of time.

Brother's HL-1260 deserves a mention for being the cheapest printer reviewed here. Despite being the second slowest overall it's text score was good, and proves a network printer can be purchased for a little over £1,600.

Kyocera's FS-1600, although not as quick as our winner, was still above average in terms of speed, and wins brownie points for its environmentally friendly operation, longest toner life, and cost of operation. This latter is certainly an important issue in a network environment where the printer is sometimes being used almost non-stop. The FS-1600 was one of the cheapest printers on test.

Established network printer manufacturer DataProducts' T16 came in third place for performance, with good overall results.

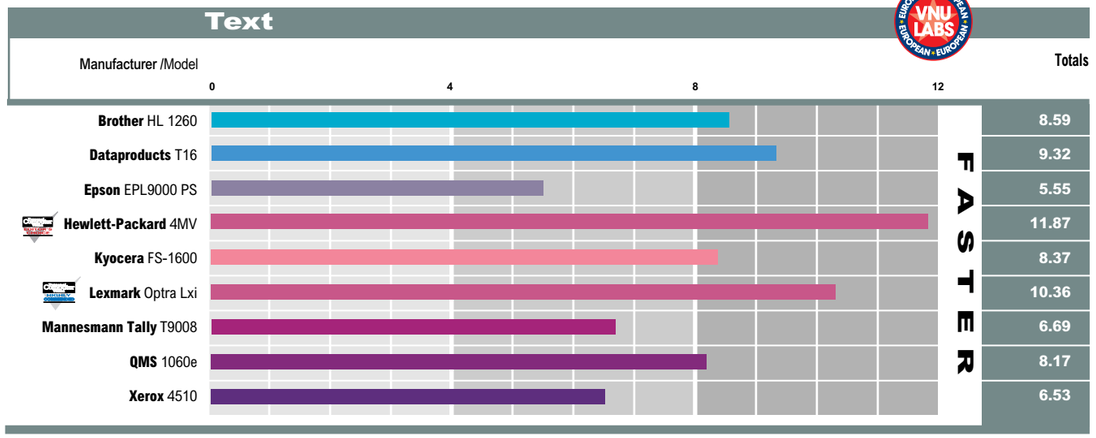
In terms of performance, there were two clear leaders: Hewlett-Packard's LaserJet 4MV, and Lexmark's Optra Lxi. HP beat Lexmark on text performance, but in the area of graphics the Optra was the leader and came out slightly ahead overall. Slight differences here are pretty much irrelevant however, since both machines were way ahead of anything else; DataProducts' T-16 came a close third.

Both printers have one big advantage over the other: with Lexmark, it's the Optra's excellent 1200dpi engine capable of producing camera-ready output, especially when good-quality paper is used; HP's 4MV can boast A3 output, as well as A4. The big difference, though, is price: Lexmark's Optra Lxi costs £3,634 (RRP) compared to HP's 4MV at £2,749 (RRP). Lexmark could not quote a street price — otherwise, this would surely have been much lower than the RRP. HP has a reputation for very low street prices, and at an expected cost of £2,129 is our winner.

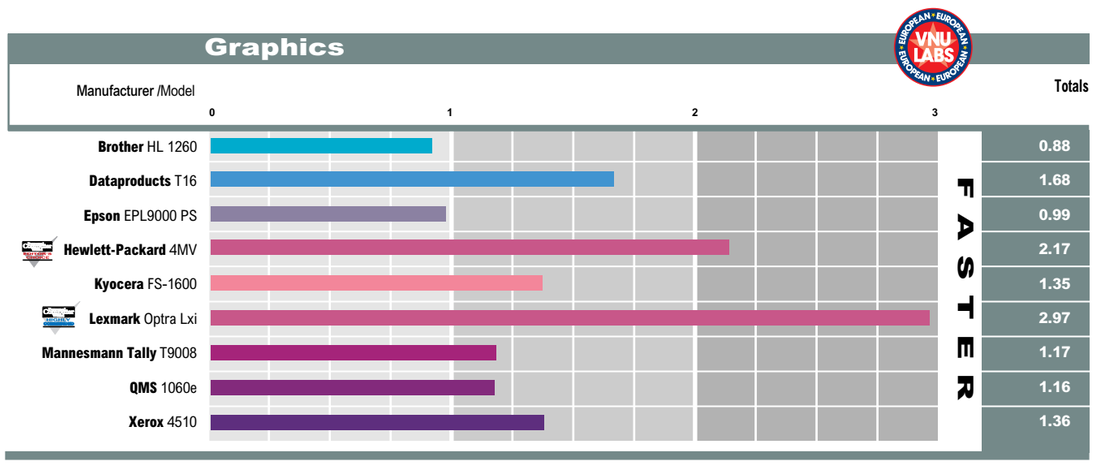
However, the forthcoming LaserJet 5 network printers are not too far away. For this reason, despite earning itself Editor's Choice in this group test, we would recommend waiting for the new models before plumping for the LaserJet 4MV. The 4MV is however the least long in the tooth: it is the ageing 4si which most deserves a successor. And a well-deserved Highly Commended for the excellent Lexmark Optra Lxi.

Performance Results

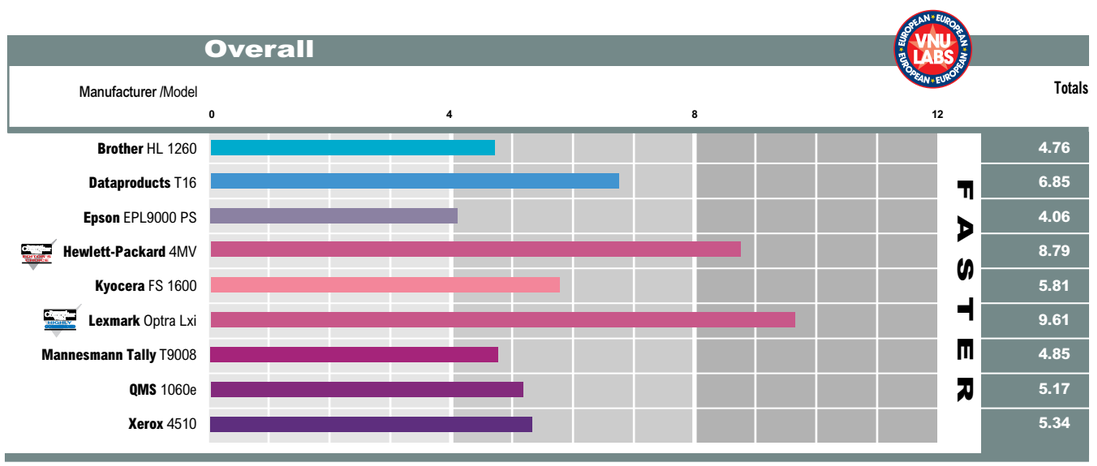
Text



Graphics



Overall



NETWORK LASER PRINTERS **POWER LEVEL**

Manufacturer	Brother	Dataproducts	Epson	Hewlett-Packard	Kyocera
Model	**HL1260**	**T16**	**EPL9000 PS**	**4MV**	**FS1600**
Laser or LED	Laser	Laser	Laser	Laser	LED
Max resolution	600	600	600	600	600
PostScript	●	●	●	●	optional
PCL level	5e	5	5e	5e	5
Engine speed, PPM	12	16	8	16	10
Standard memory	2Mb	12Mb	6Mb	12Mb	2Mb
Maximum memory	26Mb	68Mb	64Mb	44Mb	66Mb
Memory supplied	10Mb	12Mb	6Mb	12Mb	8Mb
Apple LocalTalk	●	●	●	●	optional
Ethernet	optional	optional	optional	●	optional
Maximum sheets in input tray	500	250	250	350	250
Toner life at 5% A4 page coverage	6,000 pages	6,500 pages	6,500 pages	8,100 pages	10,000 pages
Size inc. trays (WDH, mm)	371 x 326 x 343	439 x 476 x 290	437 x 473 x 270	459 x 522 x 317	345 x 350 x 245
Weight (kg)	15	21	17	23.2	10
Telephone number	0161 330 6531	01734 884777	0800 289622	01344 369222	01734 311500
Fax number	0161 971 2205	01734 883993	01442 227227	0171 735 5565	01734 311108
RRP as reviewed	£2,036	£3,495	£2,608	£2,749	£2,318
Street price as reviewed	£1,630	£2,800	n/a	£2,129	£1,739

NETWORK LASER PRINTERS **POWER LEVEL**

Manufacturer	Lexmark	Mannesmann Tally	QMS	Xerox
Model	**Optra Lxi**	**T9008**	**1060e**	**4510**
Laser or LED	Laser	Laser	Laser	Laser
Max resolution	1200	600	600	600
PostScript	●	optional	●	optional
PCL level	5e	5e	5	5e
Engine speed, PPM	16	8	10	10
Standard memory	4Mb	2Mb	8Mb	2Mb
Maximum memory	64Mb	32Mb	64Mb	16Mb
Memory supplied	12Mb	10Mb	8Mb	10Mb
Apple LocalTalk	yes	optional	optional	optional
Ethernet	yes: 10baseT	optional	optional	optional
Maximum sheets in input tray	500	350	650	250
Toner life at 5% A4 page coverage	7000 pages	5000 pages	6000 pages	5000 pages
Size inc trays (WDH, mm)	410 x 537 x 436	395 x 370 x 285	411 x 482 x 363	352 x 394 x 254
Weight (kg)	22.8	14	17	14
Telephone number	01628 481500	01734 788711	01784 442255	0800 454197
Fax number	01628 481893	01734 791491	01784 461641	0800 454198
RRP as reviewed	£3,634	£2,256	n/a	£2,087
Street price as reviewed	n/a	£1,750	£2,195	£1,774

* All information supplied by manufacturers, except prices which were obtained by *PCW*. E&OE.

Twice the RAM to ewes

RAM doublers — a extra shot of RAM can put the joys of Spring back into a tired old system. Tim Nott tests two software packages that claim to make things jump; or are they merely sheep in wolves' clothing?

Software and operating systems continue to make increasing demands on hardware: bigger disks, faster processors and more memory. During the past two years, hard disk prices have dropped dramatically — a one-gigabyte drive can now be bought for a quarter of its 1993 price. Processors and local-bus motherboards as well, have tumbled by well over 50 percent. One commodity that has held its price resolutely, however, is random access memory (RAM). And in general, it's a shot of RAM that will make the greatest performance difference to any Windows system. Increasingly, applications and suites are moving from "four megs good, eight megs better", to double those figures — an expensive upgrade. Hence, any software that makes better use of existing memory has got to be seen as a GOOD THING.

Having reviewed the brand leader, RAM Doubler for Windows (October issue), we now put two other similar applications through their paces: SoftRAM, and Hurricane. Each works in a different way and each claims to make a significant improvement.

Hurricane

The version of Hurricane reviewed was for Windows 3.1 but a free upgrade to the Windows 95 version will be made available shortly. A well-behaved installation routine copies the files from the single floppy to their own directory so you don't get any excess baggage in the Windows or System directories. It then updates the SYSTEM.INI file, copies the original to the Hurricane directory with a "B4" extension, and is also provided with an uninstaller. Five new icons are created in Program Manager. WinGauge monitors the amount of physical and virtual memory in use, the state of the GDI heap, CPU activity, swap-file requests and more. Eight warning lights indicate potential problems and conflicts as they arise, from the simple but harmless lack of physical memory — the system slows down as the swapfile comes into play — to the ominous "Unlocked Memory", which indicates that Windows is about to come to an abrupt halt and you should save everything and exit. As the help panel states: "Hopefully, you will never see this warning light".

PCW Illustration by Stephen *Caplin*

Hurricane's Control Centre — not for the technically faint-hearted

For those with an unquenchable thirst for Windows knowledge, there's a lot here: for instance, if you want to monitor the number of V86 mode

switches, or Page Faults, that are happening on your PC, you can.

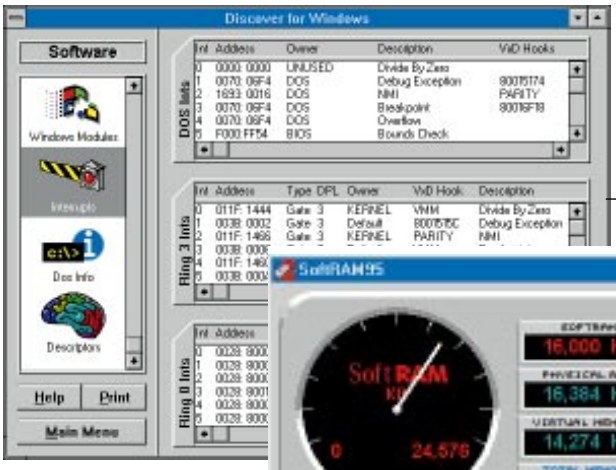
Next, the Discover icon goes much further than the Microsoft Diagnostics or System Information utilities in telling you everything you might want to know about your hardware and software: from the make and model of your hard disk to the details of Virtual Device Drivers loaded. The amount of detail available is almost overwhelming and a suite of benchmark tests are included. A Print Cache Manager takes over from the standard Windows Print Manager. The Uninstall icon is self-explanatory.

The heart of the matter is the Hurricane Control Centre. This is a dialogue box with ten tabs to control the settings of Hurricane's various enhancements which include: the Heap Expander, Virtual Cache, Screen, Mode-Switch and XMS acceleration, RAM drive, Print Cache and Global DOS Manager. Each page has a short explanation, but unlike the Discover Utility there is no help file. Many of the settings and options are fearsomely technical but the manual does provide further information: fortunately, it also states that the setup process will "turn on all appropriate utilities and set all settings to the best value for your system, so you generally need not use the Control Centre". If you want to use the RAM drive, you will have to read the manual and edit AUTOEXEC.BAT by hand.

Hurricane manages memory by swapping areas around and discarding regions that are not currently in use, which includes the 64Kb "resource heaps" — that notorious Windows 3.1 bottleneck. Unused resources are removed from memory and reloaded from the .EXE file on disk when needed. Similarly, memory is made available to the cacheing and spooling software when applications don't need it, and grabbed back when they do. Hurricane also compresses memory — not by compressing the data itself like a disk doubler, but by freeing unused ranges more like a disk defragmenter.

SoftRAM

SoftRAM is far less complex. Apart from a Readme file, which provides information on upgrading to Windows 95, there's just one icon for the main SoftRAM control panel, with far fewer buttons and gauges, plus an option to uninstall. There are three components here: the RAM compressor, resource extender, and the



All you ever wanted to know about your PC (and probably a lot you didn't) from Hurricane's Discover utility

SoftRAM's simple control panel

under-1Mb optimiser; each addressing the most common Windows 3.1 memory limitations.

The single floppy disk contains both Windows 3.1 and 95 versions. With the latter, you don't get the resource extender or under-1Mb optimiser because they're no longer needed. Under both versions, the default settings create as much SoftRAM as you have real RAM, although you can override these settings. Unlike Hurricane it actually compresses data held in memory, in a similar way to disk-doubling software.

Real-world tests

In an ideal world we would be testing these packages on a variety of machines and configurations, using a purpose-designed set of benchmarks. But as this technology is still fairly new, we don't have the benchmarks (unless you count those built into the software, which can't be assumed to be impartial). So instead we devised some "real world" tests, but bear in mind that these were conducted on one PC — other setups may show very different results.

Neither application alters the CONFIG.SYS or AUTOEXEC.BAT files: both are strictly for use with Windows, so we first made a back-up of the existing initialisation files WIN.INI and SYSTEM.INI. The system was an 8Mb 486DX/50, with an existing 17Mb "swapfile" of virtual memory. We then tested the PC with no RAM enhancement, with Hurricane, with SoftRAM, and finally with an extra 8Mb of real RAM, restoring the .INI files between each session to ensure a level playing field.

In each test we initially loaded two copies of Paintshop, each with a very large (2.2Mb) bitmap. We next loaded CorelDraw, Excel, and Word — all with substantial files. Finally, we loaded File Manager. On the unadorned machine this used all available physical memory, so we were now reliant on the virtual memory — paging data in and out of the hard-disk swapfile. We had also reached the Windows resource limit: it wasn't possible to load any more applications or documents, even though there was a considerable amount of virtual memory remaining free.

What happened

In terms of load times there wasn't a lot of difference between plain Windows, SoftRAM and Hurricane. SoftRAM didn't seem to make any difference to the remaining System Resources: at nine percent this was the same as undoubled Windows. Hurricane, however, reported an astonishing 46 percent free and we were able to load two more copies of Word. But this wasn't as useful as it seemed because the subsequent paging to disk reduced the system to a crawl.

With all the applications and data files loaded, results varied. SoftRAM was about 20 percent quicker than undoubled Windows when swapping between applications. Hurricane switched between the two bitmaps almost twice as fast, but switching from one of these back to Word was 25 percent slower. SoftRAM did better than plain Windows when closing applications, but Hurricane was extremely slow, with a lot of disk activity taking place before control returned to the user.

Best of all

The best performer of all was (as you might expect) another 8Mb of *real* memory: switching from a bitmap to Word took a fifth of the time of an undoubled 8Mb. Closing down applications was much faster, too; by between half to one eighth of the time. Leaving the extra memory installed, we also compared the performance under Windows 95, with and without SoftRAM, using a variety of graphics applications with a total of 17 images loaded. Despite this entailing considerable disk swapping without SoftRAM, no increase in performance was noted with it — loading and swapping applications was, on average, 12 percent slower.

Overall, neither SoftRAM nor Hurricane were impressive. It may well be, with fine-tuning (and SoftRAM claims to tune itself by "learning" how you work), that better results could be obtained, but the technicality of Hurricane's options would probably daunt the average user. In any case, even the company literature only claims an increase of between 10 and 30 percent. SoftRAM's literature claims that it "REALLY doubles RAM" but makes no further claims concerning performance. It must be pointed out that although Hurricane made a considerable improvement to Windows 3.1's resource limit, so would upgrading to Windows 95.

PCW Details

Hurricane
Price £69.95
Contact POW! Distribution 01202 716726

Good Points Makes a remarkable improvement to Windows 3.1 resource limits.
Bad Points Fearsomely complex. Only a slight performance increase noted on the test machine.
Conclusion You would probably be better off upgrading to Windows 95.

SoftRAM 95
Price £69
Contact Roderick Manhattan Group 0181 875 4444

Good Points Simple to use and configure.
Bad Points Doesn't significantly improve Windows 3.1 system resources. Little overall performance increase.
Conclusion No substitute for the real thing.

Speaking in tongues

Computer-based language learning programs have been around for some time, but there are more and more "all inclusive" packages appearing on the market — vocabulary, grammar and emphasis on the spoken language are benefiting from CD-ROM technology. Adele Dyer looks at the pick of the bunch.

Methods of language learning have gone through major changes in the past few years. Of all subjects, modern language learning has probably been prey to more fads and fashions than any other school subject. It was once taught in much the same way as dead languages like Greek and Latin, but now the idea of translation is anathema to language teachers, and thinking in the language from day one is in. This has been reinforced by a National Curriculum where the emphasis is on communication and everyday language use.

From a rational point of view, different people learn in different ways. You may feel you cannot fully get to grips with the language unless you can translate a passage, or you might not feel confident with a grammar point until you have correctly completed enough exercises to really hammer it home. When learning at home, it is important to find a method which suits your own individual style of learning, but also covers all the basic skills: listening, reading, speaking and writing.

All but one of the packages included in this round-up came on CD-ROM. This is tough on those without a CD-ROM drive, but the advantages of the medium are immediately apparent. Unlike disk-based versions, they offer vastly increased sound facilities. Not only can you record your own voice, you also get the opportunity to hear and, in the case of the Learn to Speak series, see a native narrator, learning to imitate their accent. Learning packages are not useless without this, but if you want to improve your accent this is just about the only way to do it using your PC.

PCW Illustration by Jake *Abrams*

Most of the packages we looked at were learning and revision aids rather than complete courses. Only the Berlitz Think and Talk and Learn to Speak series were self-contained packages. Each have been judged according to their function, not their overall teaching potential.

Berlitz Think and Talk German

The Berlitz philosophy is that language is learnt by absorption. It argues that you don't need translation or tedious learning by heart of grammar points to get to grips with a language. To achieve fluency you need to think in the language from the start, and you cannot do this if you are constantly translating your thoughts from English.

The Berlitz approach is to teach by absorption: the course aims to have you not only speaking, but thinking in German

This simple approach allows you to start learning from the CDs immediately. There is no need to go to textbooks, dictionaries or grammar books for reference. Everything you need is included on the nine CDs.

The course takes you from scratch and leaves you at about GCSE standard, giving you a good grounding and certainly enough for you to survive in the country concerned. However basic the method, none of the main skills are left out. The course covers listening, speaking, reading and writing.

The course is divided into scenes. Each one introduces one idea and drums it in by repeating it over and over again in various forms. You are left to work out for yourself exactly what the point is and how it works in the language. Each scene is subdivided into the separate skills to help you, and the further you get through the scene, the clearer the grammar becomes.

The first part of each scene is listening and piecing together the meaning. In the very first scene, you are aided by various sounds and "das ist ein..." to introduce the vocabulary. In this listening section there is great stress laid on pronunciation. Vowel sounds in particular are picked out, causing great hilarity as the narrator goes through apparent agony while demonstrating how to pronounce the German "a". There are sufficient breaks in the narrative to allow you to repeat the phrases to yourself after the narrator. The scene is then in written form and you can highlight any sections you wish to hear them again.

To practice the spoken and written language, you hear sentences and then have to write them. Finally, you have the chance to record your own voice and compare it to the voice of the narrator. The grammar points are explained at the end, and there are exercises to reinforce them if you are still having difficulties.

Learn to Speak Spanish: Like Think and Talk, Berlitz Learn to Speak is an all-inclusive learning package. It is not for absolute beginners, however

As a complete learning package, this was by far the best in the round-up as it was the only one to be fully self-contained, entertaining and capable of stretching without over-reaching you.

PCW Details

Conclusion An excellent product for beginners — Editor's Choice. Available in French, German, Spanish and Italian.

Price £139

Contact Guildsoft 01752 895100

Learn to Speak Spanish

The opening sequence to Learn to Speak Spanish features Latin American guitar music played alarmingly loud, and swirling picture postcards of Mexico. The South American connection had me foxed until I twigged it is being aimed at an North American audience.

Despite the catalogue's assurances to

the contrary, this is not a complete beginner's course. You will need to have done some Spanish before as this package throws you straight in at the deep end with complete sentences to understand. However, you are not required to have a huge knowledge. I did O Level over ten years ago and was quite able to follow the course.

Each lesson includes a plethora of exercises and games, in addition to a textbook which you are advised to work through. It is more like the language learning you experienced in school.

First up is a huge vocabulary list that you are supposed to learn. To help you there are little videos of the various narrators saying sentences using the word — it is actually easier to understand if you can see someone's lips moving. In addition, you can choose to see the sentence written in Spanish and/or the translation. The vocabulary lists are then used in the following exercises, including the next one, a drill to make sure you have done as you were told and learnt the vocabulary.

The exercises use the vocabulary learnt in context. For each lesson there is a story and a conversation, with accompanying video. The videos go slowly, speaking the sentences at a reasonable pace but pausing between each sentence while the narrator gives you an unnerving, cheesy grin.

The other exercises are less taxing. There is a listen-and-fill-in-the-blanks round and a few more game-like exercises before the game round proper. These games are something of an anomaly. Having been almost sadistic in approach up to now, the authors now offer you hard labour in the form of games. You are required to concentrate hard, and although they are effective and educational, they are far from light relief.

Learning Spanish is probably a more thorough way of learning the language than any of the others, but it's far from easy going. It is therefore recommended really only for those who are determined to get ahead in the language but who have to work on their own.

PCW Details

Conclusion Very thorough if hard work. Available in Spanish, French and Japanese.

Price £139
Contact Guildsoft 01752 895100

The Learning French package takes a conservative, thorough approach, with extensive vocabulary, verb and grammar testing. Unfortunately, this is reflected in the less than appealing interface

Learning French, Beginners to GCSE
Learning French, A Level course work
Learning German, Beginners to GCSE
Learning German, A Level course work

This was the only set of language learning packages in the round-up based around the National Curriculum. In their original form they were sold to schools and have now been adapted for home use by individual students. Interestingly, these were the only ones to come on disk and to run under DOS.

Divided into beginners to GCSE and A Level course work, both levels in the French and the German versions follow the same pattern. There are a number of different exercises, mostly based around multiple-choice answers, designed to test verbs, vocabulary and grammar points.

The vocabulary modules follow two patterns — find the right answer to a question, or fill in the appropriate missing word. In the GCSE packages this was simple, more of a familiarisation exercise; but in the A Level version it stretches your knowledge, including such things as workman's tools, or parts of a car.

You learn grammar through having to sort out jumbled words in sentences. In the beginners' section this is straightforward, but the A Level version points of idiom and structure are effectively taught by this method.

The verb section specifies number, tense and verb and asks you to find the correct answer. Unfortunately, all the answers remained the same all the way through the conjugation process and the number, for example "tu" or "du", was specified throughout, so possible sensible choices were limited. However, it is still a reasonable familiarisation exercise. The range of tenses covered is greater in the A Level version.

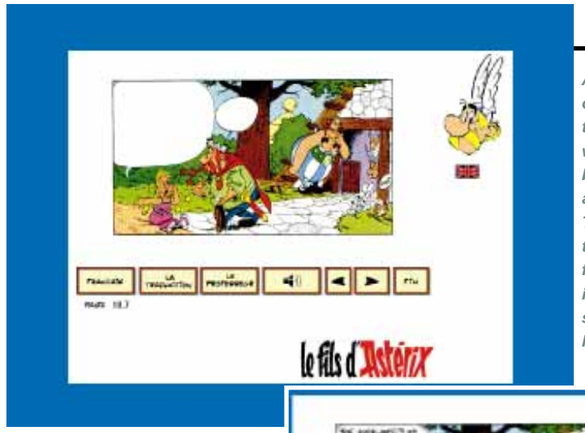
There are also several modules that you can put together yourself and this is where the original purpose as a teacher's aid becomes evident. There is a whole authoring section where you can add your own exercises, not necessarily a good idea if you do not know what you are doing.

The dictation package and playback facilities only work by recording someone's voice — the trade-off for not producing a CD where you can add a narrator's voice. This is a shame, as with a little more thought in converting for home use, this could have been an excellent package. But for two reasons this is still a useful aid. Firstly, the exercises are tailored to their purpose with reasonable learning potential. Secondly, it is the only one on disk and many people do not have a CD player. In spite of the limitations this imposes, it works in the program's favour.

PCW Details

Conclusion Instructive, but a naff interface.

Price £19.99
Contact VCI Software 01923 255558



Asterix works on the premise that the best way to learn is by having fun, and it works. The two-CD set tells a story, focusing on the idioms of the spoken language

Apprendre le français avec le fils d'Asterix

This is by far the most fun product in this round-up. It is aimed at children, but it should please anyone. However, this does not mean it is lacking in educational value. Working on the basis that you learn best when you are enjoying yourself, this CD takes a difficult text and teaches through context. Most language is absorbed rather than learnt as you soak it up through familiarity and repetition. It concentrates primarily on teaching listening skills and uses this to introduce reading skills, vocabulary building and grammar points.

Most of the two-CD set is taken up with a single story. The first approach is to listen to it all the way through simply using the cartoons and the voices to help you. You can then step through slowly, taking each frame at a time in a more interactive approach to learning. Here you can display the French in the speech balloons and you can choose to see the translations and/or the help boxes. You can replay the sound as many times as you want, slowly grasping the meaning and familiarising yourself with the words.

True to the idea of immersing the user in French, the quiz is entirely in French and the multiple choice questions are all read aloud by a character from the story. Other sections include a question and answer section between the user, Obelix and Asterix, and a page where the characters introduce themselves.

The standard of French is high, but the story is such fun it makes you want to fully understand it. It also, of course, prolongs the life of the CD if you keep going back to it. Not recommended for beginners, but if you have basic French, the grammar is not too difficult. The main learning areas are vocabulary and idiom. The presentation, learning potential and entertainment value make this disk highly recommendable.

PCW Details

Conclusion Brilliant idea, very nicely executed.
Available in French and Spanish.

Price Disk £242, double pack £65
Contact EuroTalk 0171 371 7711

Écoutez-bien

Coming from the same people that made Asterix, this is a simple practice CD intended to be used as a supplement to another course. There is no grammar section and I am not convinced it is meant to teach you any vocabulary. The CD hones your listening skills, increases your familiarity with the spoken word and allows you to record your own voice to compare it to the narrator's.

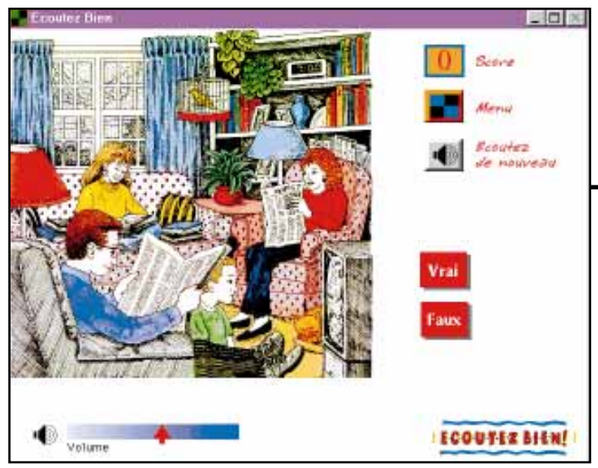
Both CDs in the series have the same approach. There are ten lessons on different subjects. You have to listen carefully to the narrator and then answer multiple choice questions based on what you have heard.

The lessons cover the basic subjects which most of the other packages in this round-up also seem to favour, which are listening, reading and speaking.

The level of French varies over the two disks, from beginners on the first through to intermediate on the second. Accordingly, the narrative on the "dix leçons" consists of single, straightforward sentences, while on "dix autres leçons" there are whole stories for you to listen to and understand, followed by several questions. You have to listen closely to the text to catch all the clues and the questions are very specific, so just half understanding the text is not enough.

Each of the lessons offers you a score at the end as you go through clocking up every right answer. At the end you are given a figure based on the percentage of questions you answered correctly. To the adult user this may seem a little childish, but it is a confidence builder if you can go back and improve your score the second time around. It also encourages you to repeat the lessons, so letting you learn more from the narrative.

At the end of each lesson there is a little quiz



Écoutez-bien hones and tests your listening skills, but it's a little weak on grammar and vocabulary

Editor's Choice

While many of the packages in this test concentrate on specific skills, or merely on brushing up your existing knowledge, we felt the Editor's Choice should go to a package that offered it all. That made it a toss-up between the worthy Learn to Speak Spanish and the Berlitz Think and Talk German. The Berlitz package won for two simple reasons: it is the only one to cover all the skills you need on one disk and without recourse to other sources, and it was fun. After all, speaking a language should not be an arduous task and the Berlitz managed to make the whole process just a little less painful.

which lets you answer questions with or without text to help you.

Although I was initially sceptical of the value of this package, it did prove a useful revision and reinforcement tool, as well as an excellent confidence booster.

PCW Details

Conclusion Fun quizzes and games, good for improving your listening skills. Available in French only.

Price Écoutez-bien Dix Leçons or Dix Autres Leçons £42 each, double pack £65

Contact EuroTalk 0171 371 7711

Best of the rest

There are numerous other language learning aids and here is a selection. First up is EZ Language from IMSI. This contains quick brush-up exercises for French, German, Spanish, Italian, Japanese and Russian. None are dealt with in detail; they are intended rather as quick reminders of the basics. There are quizzes and the chance to hear your voice spoken. *Price: £69.95 (each language also sold separately on floppy for £39.95 per language. Contact: IMSI 0181 581 2000.*

Triple Play Plus from Syracuse Language Systems includes a series of games for those with limited French to practice their skills. The usual subjects are covered, including food, travel, people, numbers, home and office, and activities. Some of the games can be infuriating and of limited educational value, but useful for children.
Price: £59.99 inc VAT.
Contact: J&S Software 01225 760743.

French Your Way and Spanish Your Way are new packages from Random House New Media. At the time of going to press we only had a Beta copy, but the premise was easy to see. It includes a series of conversations in various scenes with cartoon visual aids and a certain amount of interaction, as you can choose options to make the conversation take slightly different directions.
Price: £99.
Contact: Random House New Media 01621 816900.

Finally, Vocabulary Builder and Pronunciation Tutor, available in French, German and Spanish, are both by HyperGlot and are in the same series as Learn to Speak Spanish. Both deal specifically with particular areas of language learning which could hold up your progress, and both are very thorough. The vocabulary builder has a huge dictionary divided into easily digestible chunks through subject headings. The pronunciation tutor carefully teaches exactly where in the mouth to pronounce sounds and makes extensive use of recording the user's voice.
Vocabulary Builder — Price: £44.95. Contact: Guildsoft 01752 895100.
Pronunciation Builder — Price: £44.95. Contact: Guildsoft 01752 895100.

Translation

Why bother to learn a language at all these days? Why not just get a piece of software to run on your PC, producing a perfect translation of everything you type into it? At the moment, this idea is about as workable as the Babel fish in Douglas Adams' Hitchhiker's Guide to the Galaxy.

The idea of machine translation (MT) has been around almost as long as the idea of natural language processing. Many people automatically assume all translation is now done by software, and it is true that some professional translators do use certain pieces of software, especially for technical translation, and some of the larger organisations, such as the Commission of the European Community, use MT for their everyday internal mail. These professional applications do not run on PCs, however, but on Sun workstations or IBM mainframes.

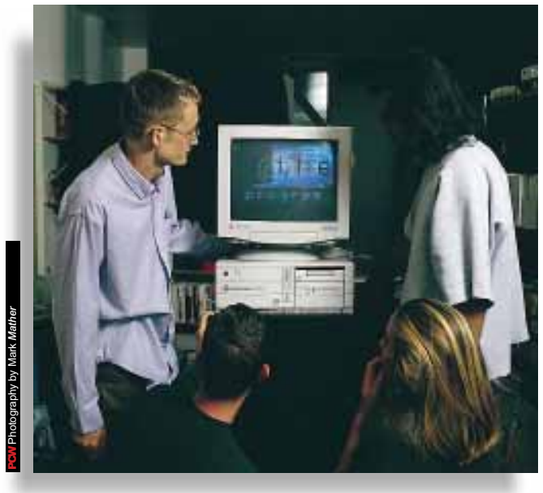
At present, all working MT systems work on language pairs: two languages are paired together and the code is written specifically for those two languages. This eases them together through a series of what often turns into make-do-and-mend solutions. The ultimate dream of MT researchers is to produce a translation system that can "translate" one language into an intermediary form and, from there, translate it into several other languages. This way, the necessary code is significantly reduced, but as yet this method is still in its early development stages.

The success of MT depends very much on the complexity of the language used and the amount of customisation one is prepared to carry out on the dictionaries and glossaries contained within the software. For these reasons, technical documents are ideal candidates for MT. They tend to be syntactically simple, repetitive and dependent on a specific, limited dictionary.

For other translation needs such as business letters, there is a crop of MT software which you can run on your PC at home and will cost anything from £399 for Power Translator Professional, to £49 for the Language Assistant series, both from Globalink. Both use language pairs and neither claims to be a translation panacea. They are intended to produce rough translations which act as a good grounding, but they will need to be post-edited. They are business aids, not mechanical translators.

How **The Program** was made

A television programme about computers couldn't look like The Antiques Roadshow. Malcolm Sutherland, director of Granada's The Program, takes you through the process of giving TV techs-appeal.



PCW Photography by Mark *Mather*

Computers are under-represented on our TV screens. After the car, the PC is the most valuable domestic purchase made by consumers, but this is a market that has sprung out of nowhere. As a result, Granada decided to create a computer consumer show. What to buy, how well it worked, what to watch out for.

One of the biggest issues surrounding a show like this is the visual expectations of a computer-literate audience. How to create a programme about computers that looked as interesting as a computers game show? The answer was to look closely at the possibility of going fully digital in the editing and graphics side of the show, using a mixture of dedicated systems and desktop PCs.

We looked carefully at two systems for editing, both Macintosh-based: Avid Media's Composer and Data Translations' Media 100. We settled for Avid, and used two quality levels for the programme: AVR 2 for rough-cutting tape, and AVR 27 for final laydown to tape. AVR 2 manages 30 minutes of footage per gigabyte and AVR 27 stores just over three minutes. The Avid machine came with 48Mb of RAM, dedicated sound and video boards and 27Gb of storage, which was just enough for one half-hour programme. Thank goodness storage costs have dropped so much in the last year!

We decided to create all the graphics using desktop packages. Photoshop was used for painting and storage, AfterEffects 2.0 for animations. We bought a Power Mac 8100/80 and added 72Mb RAM, and an extra 2Gb hard disk. It worked like a dream.

The final challenge was to use a virtual studio. We filmed the show in a small, blue box and used a Silicon Graphics machine to create and render a backdrop design. I then went into the blue box for a rehearsal with cameras and decided on a provisional set of shots for the show. Robotic camera heads were used to ensure that the positions could be precisely reproduced. We stuck a large, wooden box in the centre of the space to allow the Silicon Graphics experts to match the shots I had chosen to the 3D background.

We ended up with a choice of 16

pre-formatted shots, with 16 backgrounds stored on disk. When we cut from a wide shot of the studio ("shot 1") to a close-up of our presenter, Tony Wilson ("shot 2"), the background changed from "background 1" to "background 2" at the same time. By the end of the series we were experimenting with animations within the backdrop. At the moment it isn't possible to move the camera within the virtual studio, but that's just a question of time; and when it is possible you will see some amazing visual effects.

Some of the results of the show are included on this month's cover disk. What you will see is quite distinct from the TV show, but we think it provides a taster. And some of the properties of a CD-ROM — the ability to consult a text note for instance — help some of the more informative reports. Ironically, although most of the work was created using Macintosh computers, with Quicktime 2.0 the vehicle for video, this CD-ROM is purely for Windows. We hope to go dual-platform next time.

We would like feedback, both about the CD-ROM, and about what you would like to see in a computer show on television. You can reach us on our web site http:\\www.u-net.com\program\.

Producing high-quality digital video for CD-ROM

Cimex's Ian Hayes explains how the CD was put together:

The problems of sound and storage space have pretty much been solved on desktop computers, but when personal computers were conceived they were never intended to play digital video. To achieve full screen, full frame-rate video (as seen on our television sets), a data rate of 30Mb/sec is required. Most graphics cards are unable to cope with this throughput, and standard double-speed CD-ROMs can manage only 300Kb/sec. The solution is to compress.

Multimedia developers currently face two main solutions. The first is MPEG-1, which achieves near-VHS quality video but requires an additional board (MPEG Playback board, £300) to be slotted into your PC. MPEG worked well for applications Cimex has done for exhibitions and touch-screen kiosks, but the main drawback is that not many people have an MPEG card. The solution for the program CD-ROM was to use software-only playback of the digital video; this relies solely on the processing power and graphics hardware of the host machine. The two mainstream software video solutions are Microsoft's Video for Windows, and Apple's Quicktime which is cross-platform (Mac/PC).

Source material

There are several stages involved in producing the highest-quality material. The quality of the source is vital. It is easy to think you can make do with VHS video because your movies are only going to play in a small window, but this is not the case. Lack of image quality, and frame-to-frame differences caused by VHS, conspire to thwart the compression algorithms which are looking for identical areas in an image and small frame-to frame differences.

The next stage is digitisation of the source. We were lucky with some clips which were held in digital format from the Avid digital video editing system, but the rest had to be captured. We used a PowerMac and a hardware (JPEG) compression board to reduce the data sufficiently to ensure the hard disk could cope with the flow of information, allowing us to easily grab quarter-screen 25fps video with the minimum of compression.

Editing

Once grabbed, the video was ready to edit. Special effects were then added and graphic elements overlaid using alpha channels. (An alpha channel is an extra channel of information, over and above the Red/Green/Blue which contains information on how transparent a graphic element is.)

Before final compression, a smoothing filter was applied to each sequence to minimise artifacts caused by the original JPEG compression. These may not be visible, but reduce the effectiveness of the final compression algorithm. If the video had to be resized, we ensured that a high-quality bi-cubic spline interpolation method was used to maintain the linearity of the digital images, rather than nearest-neighbour methods as used by the majority of low-end digital video editing packages.

Final compression

The cross-platform Cinepak codec (compression/decompression algorithm) was chosen for final compression. At this stage, the data rate and the final 15-per-second frame rate used for most of the clips is set to ensure satisfactory playback from a double-speed CD-ROM. Digital video codecs are designed to allow fast decompression, but one minute of video can take around an hour to compress, even on a fast Power PC Macintosh.

How a TV programme is made

The traditional way to make a television programme is to shoot on broadcast-quality video (Betacam SP), create a rough edit (called an offline) and then conform that to broadcast quality (in an online suite). Traditionally, offline editing has been done using VHS-type quality tapes. In recent years, companies like Avid and Lightworks have brought out offline-computer based systems, turnkey systems that use basic PC platforms (Mac or DOS) allied to expensive customised hardware. Tapes are digitised onto hard disks and editing is carried out electronically. Their big advantage is that they allow an editor to work in a non-linear way. At the end of this electronic offline process, an EDI (edit decision list) is created. This is taken into the online suite where the various decisions are recreated at higher quality using dedicated equipment. Graphics and sound are also integrated. A typical online suite costs £1million.

Graphics platforms were digital ten years ago, and most broadcast work is centred around Quantel workstations. Photoshop work is done on a system called Paintbox; animations are created using HAL or Harriet. The cost of these systems means complicated graphics are expensive to create, which mitigates against low-cost shows. As the power of desktop systems increases, the software effects which used to be the preserve of high-end digital systems are being successfully reproduced on Macs and Intel platforms.

There is no doubt that TV is going to change its reproduction methods dramatically over the next two years. Digital video capabilities are trickling down to consumer machines very fast. The new Power Mac range is impressive, and it won't be more than two or three years before there are post-production suites that cost no more than £5,000.

PCW Contacts

Cimex 0171 609 3050
Compuserve 100640.261@compuserve.com
The Program http:\\www.u-net.com\program\

PROGRAMMING FOR WINDOWS

Get started with Delphi

It's hands on this month, as the free space application is developed into a truly useful utility. Subjects tackled include calling the Windows API, creating objects at runtime and using the timer control. By Tim Anderson.

Last month's introduction to Delphi showed how to create a program to inspect the free space remaining on your hard drive. Let's face it, it was a pretty hopeless utility. It did not monitor free space, but only reported when you clicked a button. And it only worked on one drive; the C drive. A useful space monitor would update regularly and would show space on all your drives, not just one.

This tutorial shows how to enhance the utility to do just that, also displaying a small gauge for each drive to show what percentage of the disk is full. Along the way many important features of Delphi are revealed. The enhanced version is substantially different, so it is best to start a new Delphi project rather than amend the old one.

The application will need to run through several stages. Here is the sequence:

1. Find out how many drives are on the system.
2. Create labels and gauge controls for each drive and then place them on a form.
3. Size the form appropriately.
4. Update the controls at regular intervals.

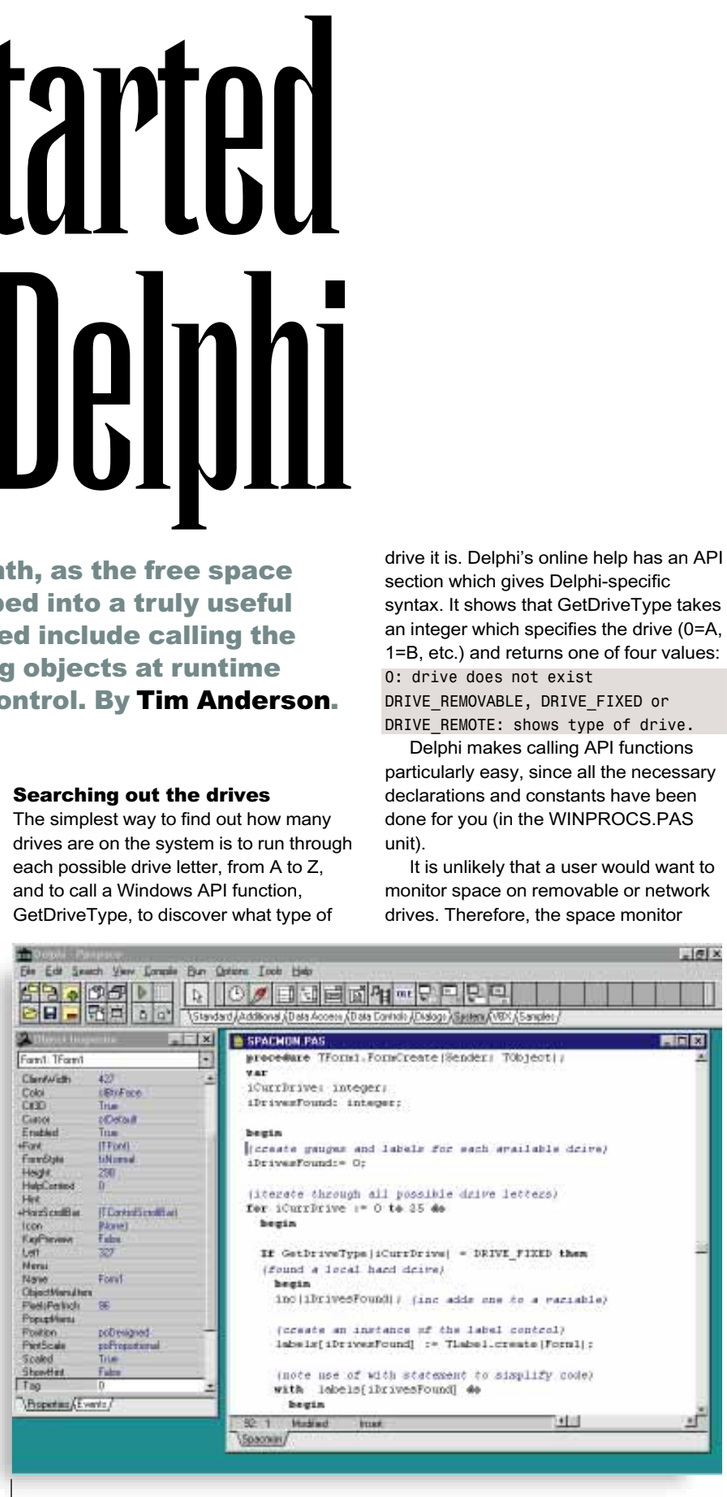
Searching out the drives

The simplest way to find out how many drives are on the system is to run through each possible drive letter, from A to Z, and to call a Windows API function, GetDriveType, to discover what type of drive it is. Delphi's online help has an API section which gives Delphi-specific syntax. It shows that GetDriveType takes an integer which specifies the drive (0=A, 1=B, etc.) and returns one of four values:

```
0: drive does not exist
DRIVE_REMOVABLE, DRIVE_FIXED or
DRIVE_REMOTE: shows type of drive.
```

Delphi makes calling API functions particularly easy, since all the necessary declarations and constants have been done for you (in the WINPROCS.PAS unit).

It is unlikely that a user would want to monitor space on removable or network drives. Therefore, the space monitor checks all the possible drives testing fo the DRIVE_FIXED result with an "if" statement. Other drive types are ignore



Double-clicking a Delphi form opens the FormCreate method; ideal for code which sets up controls on the form

Creating labels and gauges

When the application runs, it needs to create a label and a gauge for each relevant drive. There is a gauge contro supplied with Delphi, on the Samples t of the component paletter. But it is no u putting a gauge or two on the form at design time, since there is no way of knowing how many are needed. The answer is to create them at runtime. Th technique used is as follows:

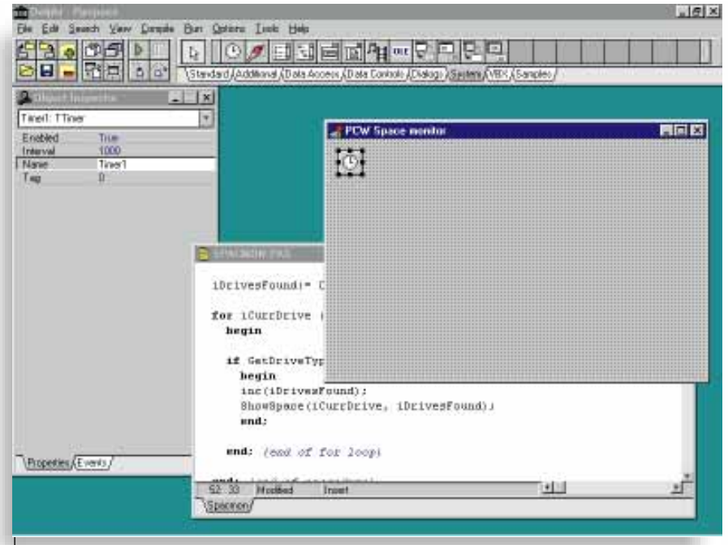
1. Start a new project.
2. Click on the unit tab and find the use clause near the top. Add Gauges and StdCtrls to the list of comma-separatec units. Delphi would add these automatically if we drew a gauge and label at design time, but in this case th controls are created at runtime so the reference has to be inserted by hand.
3. Just below the uses clause, find the section that declares the TForm1 class. There is space here to add private declarations, properties and methods that belong to TForm1. In this private section add:

```
Gauges: Array[1..26] of TGauge;
Labels: Array[1..26] of TLabel;
```

This declares two arrays of 26 elements, type TGauge and TLabel respectively. Because they are declared here, they will be visible to any of TForm1's functions or procedures.

4. Press F12 to redisplay the form, and double-click to open the FormCreate method. This code will execute when the form first opens, so is ideal for setting up the form as you want it. Enter code as shown in *Fig 1*.

This code creates a label and a gauge control for each local hard drive. Note the three essential stages in creating each control. First, a variable of that type is declared: this was done by declaring arrays. Second, a control object is instantiated (that is, an instance of that object is created) by calling the create method of the appropriate class. The create method takes one parameter, indicating the owner of the object, in this case Form1. That means the memory for the owned component will be freed when Form1's memory is freed. Finally, the control's parent property is set. A control's parent is the container in which the control resides, in this case also Form1. Other properties are set as required, but without a parent property the control could not be displayed.



The form at design-time looks alarmingly blank, since all the Space Monitor controls are created at runtime

Fig 1 Code for the FormCreate method (Cont'd over…)

```
procedure TForm1.FormCreate(Sender: TObject);
var
iCurrDrive: integer;
iDrivesFound: integer;

begin
{create gauges and labels for each available drive}
iDrivesFound:= 0;

{iterate through all possible drive letters}
for iCurrDrive := 0 to 25 do
  begin

  If GetDriveType(iCurrDrive) = DRIVE_FIXED then
  {found a local hard drive}
    begin
    inc(iDrivesFound); {inc adds one to a variable}

    {create an instance of the label control}
    labels[iDrivesFound] := TLabel.create(Form1);

    {note use of with statement to simplify code}
    with  labels[iDrivesFound] do
      begin
      height := 20;
      top := (25 * iDrivesFound) - 20;
      left := 5;
      parent := Form1;
      end;

    {now create an instance of the Gauge control}
```

Fig 1 (cont'd) Code for the FormCreate method

```
    gauges[iDrivesFound] := TGauge.create(Form1);

    {initialise the control's properties. Note use of
    With statement to simplify code}
    with gauges[iDrivesFound] do
      begin
      left := 100;
      Top := (25 * iDrivesFound) - 20;
      height := 20;
      Width := 100;
      MinValue := 0;
      MaxValue := 100;
      ForeColor := clAqua; {or a colour of your choice}
      parent := Form1;
      end;
  end; {end of DRIVE_FIXED if statement}

end; {end of for loop}

{Now size form to neatly enclose controls}
width := 215;
height := iDrivesFound * 25 +30;

{make always on top}
SetWindowPos(form1.handle,HWND_TOPMOST,0,0,0,0,SWP_NOSIZE or SWP_NOMOVE);

{call updateForm}
UpdateForm;

end;
```

Fig 2 Code for GetDrive Type and iDrivesFound procedures (Cont'd over…)

```
procedure TForm1.UpdateForm;

var
iCurrDrive: integer;
iDrivesFound: integer;

begin

iDrivesFound:= 0;

for iCurrDrive := 0 to 25 do
  begin

  if GetDriveType(iCurrDrive) = DRIVE_FIXED then
    begin
    inc(iDrivesFound);
    ShowSpace(iCurrDrive, iDrivesFound);
    end;

  end; {end of for loop}

end; {end of procedure}

procedure TForm1.ShowSpace(iCurrDrive, iDrivesFound: integer);
```

Once the form is set up, the API function SetWindowPos is called to make the form always on top. The idea is that the disk-space monitor should show when other applications have the focus, for example when the setup program is running. The always-on-top setting ensures it is always visible. Finally, the code calls UpdateForm to fill the controls with the correct details. You have to write that, so don't look for it in Delphi's online help.

Updating the form

With the form and controls created, it is easy to write the routine to fill in the details. There are two user-defined procedures involved. One iterates through the available drives, while the other actually calculates the free space. Both must be declared, in the Private section of the TForm1 class definition:

```
procedure UpdateForm;
procedure ShowSpace(iCurrDrive,
  iDrivesFound: integer);
```

The ShowSpace routine takes two parameters. The first is the number of the drive, as used when calling the GetDriveType function. The second, iDrivesFound, counts the number of drives for which we actually want to work out the free space. *Fig 2* is the code for the two procedures, which is entered in the Implementation section of the unit.

The UpdateForm routine detects the relevant drives in the same way as used in the FormCreate method. It is ShowSpace that does the real work, using a similar routine to that given last month. Note that the drive number, iCurrDrive, is incremented by one before calling the Delphi functions DiskFree and DiskSize. This is because the API function, GetDriveType, starts with 0 for drive A; while DiskFree starts with 1 for drive A, using 0 to mean the current drive. It's a typical inconvenience which would not happen in a perfect world, but at least it keeps programmers on their toes.

Delphi's string formatting functions are not as rich as some other languages, but one which is used here is particularly useful. The misleadingly-named Copy function is like Visual Basic's Mid$ and returns a string that is part of another string. Therefore,

```
copy(somestring,1,2)
```

returns two characters beginning at the first character in the string.

Adding a timer

The last enhancement makes the application monitor disk space at regular intervals. This job is ideally suited for a

The disk space monitor at work; revealing yet another hard disk under pressure

timer component, which you will find on the System tab of the component palette. The timer is a non-visible component, so although it is placed on a form you will not see it at runtime. It has just four properties and one event. Set the interval property to specify how often the timer fires, in milliseconds.

This is a compromise. The more often it fires, the more up-to-date the space monitor will be; but if it is too short an interval, the application will grab too much processor time and the system will feel slow. The default of one second is reasonable.

Finally, the OnTimer event specifies what happens when the timer fires, and in this example all you need do is call the UpdateForm function, like this:

```
procedure TForm1.Timer1Timer
  (Sender: TObject);
begin
UpdateForm;
end;
```

On my 486 DX2/66 the whole routine takes approximately 0.015 seconds to execute, so the interval would need to be extremely short before there were any noticeable slowdown. Delphi is very fast indeed.

If you have Windows 95, you will find it interesting to run SpaceMon and watch the space change on the drive where you have your temporary files, especially when running Office 95, Exchange or the Microsoft Network. Windows 95 is greedy for disk space, and will display a misleading “Out of memory” message when it runs out. With the space monitor, all is revealed.

Fig 2 (cont’d) Code for GetDrive Type and iDrivesFound procedures

```
var
sDrives: string[26];
lFreeSpace: Longint;
lDiskSize: Longint;
iMegFree: Integer;
sSpace: String;

begin

sDrives:= ‘ABCDEFGHIJKLMNOPQRSTUVWXYZ’;
{A convenient way to map drive letters to numbers.
The first char in the string has index of 0, second 1, etc}

{work out free space}
lFreeSpace := DiskFree(iCurrDrive+1);
lDiskSize := DiskSize(iCurrDrive+1);

{update gauge}
form1.gauges[iDrivesFound].progress := trunc(100*((lDiskSize -
lFreeSpace)/lDiskSize));

{format free space and update label}
iMegFree := Trunc(lFreeSpace/1000000);
lFreeSpace := lFreeSpace-(iMegFree*1000000);
sSpace := IntToStr(iMegFree) + ‘.’
  + copy(IntToStr(lFreeSpace),1,2) + ‘ MB’;
form1.labels[iDrivesFound].caption := sDrives[iCurrDrive +1] + ‘: ‘ +
sSpace;
end;
```

Recommended reading

Teach Yourself Delphi in 21 days
Authors: Andrew Wozniewwicz & Namir Shammas with Tom Campbell
Publisher: SAMS Publishing
Pages: 944
Price: £23
Contact: Computer Manuals 0121 706 6000

If *PCW*’s tutorial leaves you thirsting for more, you could do worse than this hefty tome from SAMS Publishing. It is divided into 21 day-at-a-time sections, although it is hard to believe that anyone would really use the book like this. That does not matter, since it is a well-indexed and thorough guide to Delphi which is rather more advanced than its title implies.

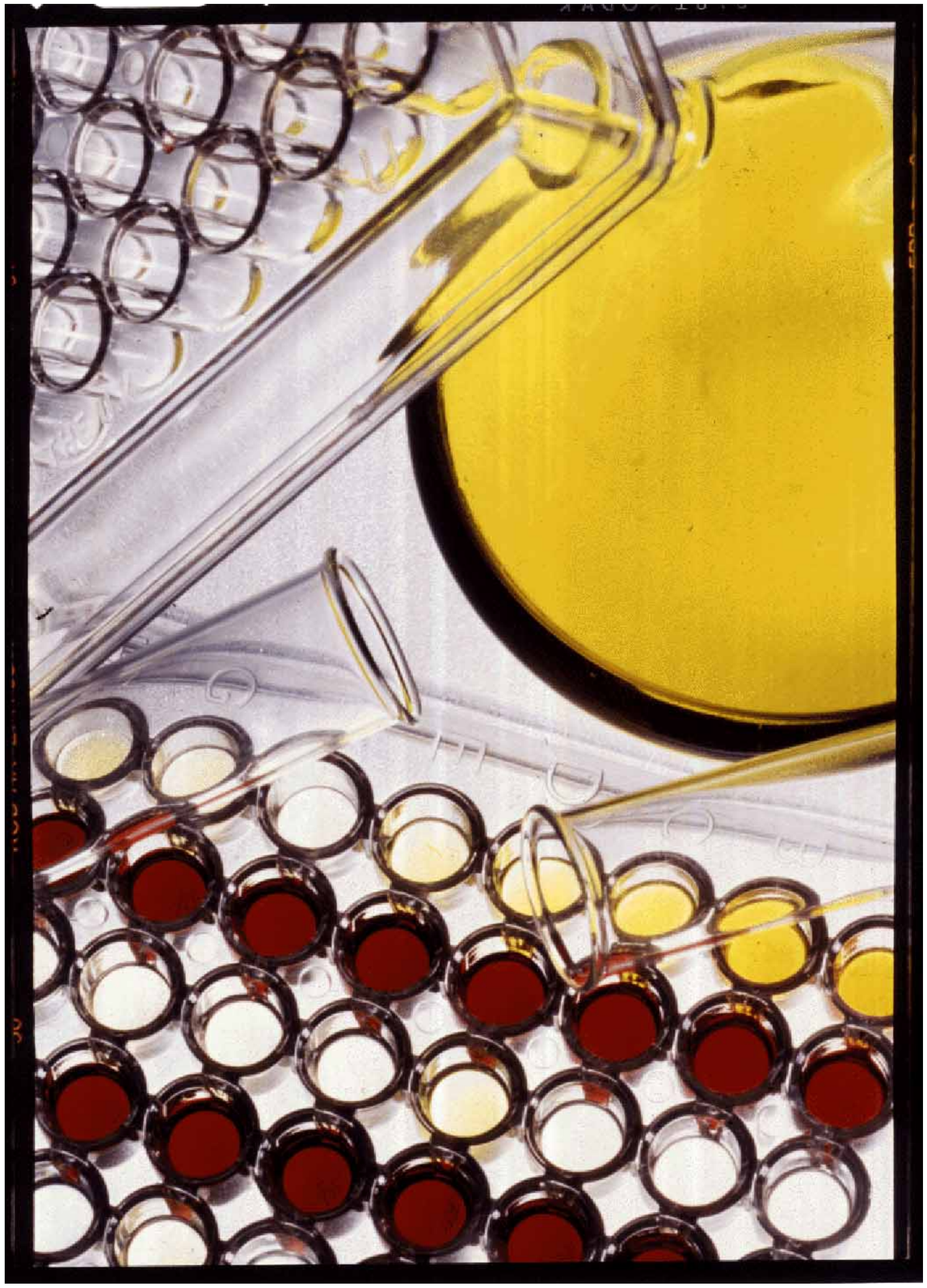
It tells you how to create your own Windows message handlers, and covers programming DLLs, DDE and OLE. Summaries, exercises, quizzes and do’s and don’ts are sprinkled liberally through the book. If you have the patience for these, you will find them good and thought-provoking learning tools.

I was glad to see over 100 pages given to explaining object orientation in Delphi, a subject all but ignored by most other Delphi titles I have seen. This will be particularly useful for programmers coming from Visual Basic or xBase, to whom most of this is new territory. It is well-presented, combining general object theory with strong Delphi-specific and practical content. Unfortunately there are weaknesses as well. There is nothing on how to use pointers, and the database content is thin. But overall I highly recommend this title, the best introduction to Delphi I have seen.

PCW Details

All the code for the Space Monitor project, together with an executable anyone can run, is included on the *PCW* cover disk/CD.

Contact **Tim Anderson** with your comments and queries, at the usual *PCW* address or email **freer@cix.compulink.co.uk**



Germ warfare

The result of a virus infecting your PC can be devastating. Both home and corporate PCs alike need adequate protection, so Adrian Mars tested eight anti-virus packages to help you fight the infection. And because forewarned is forearmed, he passes on a comprehensive battle plan of virus types, what to do if you think you have one, assesses the high risks, and more.

Anti-virus software Contents

If you get a virus you can count yourself fairly unlucky. The risk is on a par with losing a hard disk, but the chance of a virus damaging your data is considerably lower. Viruses do, though, pose a special threat. Hard-drive failures only affect one machine at a time, but having to phone everyone who has floppies that have been in your PC is embarrassing enough. When a business is involved it is worse: in the absence of up-to-date anti-virus software, a virus can spread throughout an organisation before it is detected.

Even though well over 96 percent of viruses are not designed to damage data, they are still a nuisance. Because nearly all common viruses install themselves in memory and stay active, they can interfere with other programs. For example, the "Jerusalem" virus uses DOS interrupt 21h which is also used by Novell's NetWare network operating system. It therefore disables NetWare and brings down network servers. Even worse, because of a bug, it can unintentionally overwrite parts of Windows executable program files. And some viruses compound the harm each has done. If a machine becomes infected by more than one virus, the potential for a bug in the virus-writer's code causing problems becomes greater. Another reason for removing viruses is that is difficult to be certain that the strain identified by an anti-virus package has not been modified.

The cost to a business of removing a virus in terms of lost time and money, can be considerable. It takes several minutes to check a PC and a minute or so to scan each floppy. And every disk needs to be checked. Since these can run into the hundreds or even thousands, a supposedly benign virus is much more than an annoyance.

Some of the most problematic viruses contain a destructive "payload" set for a specific date. The virus merrily spreads its way from PC to PC. Nobody suspects a thing, then, wham! — the damage can, on occasions, be appalling. The most notorious, Michelangelo, is a boot-sector virus. On 6th March — Michelangelo's birthday — it wipes both hard and floppy drives as soon as the PC is switched on.

PCW Photographic Illustration by David *Whyte*

Types of scanner

"Checksum" virus scanners look for unexpected changes to executable files. They generate a checksum (or Cyclic Redundancy Check) for every executable program each time the scanner is run. If a checksum changes between scans — because of the extra bytes a file virus adds — the file may be infected. Checksummers are unable to identify viruses by name and are prone to false alarms, particularly when software is upgraded.

Some software, such as LapLink 3, writes its settings to the end of its open executable file, also triggering a false alarm. Some viruses such as "Starship" cunningly infect files only when they are copied from hard disk to floppy. When the file is copied back to the hard disk, the user tells the scanner that this is an

expected new file, when in fact it is infected — thereby totally foiling CRC or checksumming. Starship is also capable of creating a new boot partition on the hard disk containing the virus code which then runs the real boot sector stored in the original partition. Scanners that check for changed files also miss this trick.

Although they have many flaws, checksum/CRC generators are most likely to detect new breeds of virus missed by the most useful form of scanner; those that search for the known characteristics of specific viruses. In the early days when there were few viruses around, scanners simply stepped through every byte in a file looking for a known signature. Now that there are around 7,000 viruses and variants at large including polymorphic (viruses capable of changing form) viruses, scanners have to be more sophisticated. In order to check files at reasonable speed, they look for the tell-tale signs of specific viruses only at an expected number of bytes offset from the end of the file under examination. To confirm infection by a polymorphic virus, most scanners execute the virus in a secure area of memory, thereby using the virus's own decryption routine. Once the virus has decrypted itself, it can be identified. Scanners that look for specific viruses are available both as TSRs (terminate and stay resident programs) that check files and disks as they are accessed, or as DOS or Windows applications that will step through each file and examine the boot sector.

"Heuristic" scanners look for unknown viruses by detecting suspicious-looking code or behaviour. They are not a solution in themselves. They will always trigger false alarms, but a heuristic scanner is a useful addition to anti-virus software. If a virus is suspected but can't be identified, they can provide further confirmation.

Other tools, such as Dissent by Reflex Technology, work in partnership with a third party's anti-virus software. It is designed to be used in standalone PCs which write a "stamp" to floppies to confirm that they have been checked. A TSR running on desktop PCs rejects all unchecked disks.

Useful protection against boot-sector viruses is supplied as Firmware on ROM. Many BIOSs (Basic Input Output Systems) can be set to flag writes to the boot sector. Because they are run before a floppy disk is booted, anti-virus TSRs loaded from the hard disk cannot be bypassed. Some BIOSs such as AMI's (American Megatrends Inc.) incorporate this method of protection. As a more draconian measure, many can also be set to boot from hard disk in preference to floppy, thereby preventing a boot sector virus being booted in the first place. AMI's BIOS has one fault; that the pop-up warning of a boot-sector write fails to mention it was generated by the BIOS. This can lead to potentially confusing virus alarms that apparently come from nowhere. A similar approach is taken by companies such as McAfee and Trend Micro Devices which produces ROMShield. It plugs into the empty Boot-ROM socket on Ethernet cards. Some security products supplied on AT expansion cards do the same job. Digipronix Control Systems' Vigilant Plus is just such a card.

BIOS's protection of the Boot sector can be overcome by relatively few viruses that communicate directly with the disk controller thereby bypassing the BIOS, though they will not work at all in some machines as PC hardware varies too much.

Other operating systems

Windows NT is relatively safe from boot sector viruses. Research by Ian Whalley, editor of the *Virus Bulletin*, tested NT with nine common master boot sector viruses. Seven of them prevented Windows NT from booting, while two others successfully infected the boot sector but were unable to infect other floppies. File viruses were not tested, but experience suggests they behave normally but need a DOS box in order to execute.

Windows 95 will, in most cases, handle DOS viruses the same way as would DOS. Most boot sector viruses can successfully infect the hard disk and then go on to infect floppies — though Win95 will generate a warning if it detects changes to the boot sector. Almost all file viruses are able to replicate in a DOS box, and most will do so without one. In some cases though, Windows 95 will block them and issue an alert if it detects a low level write. Old DOS and Windows scanners will pick up most viruses under 95, although using them to repair damage can cause considerably more.

A few viruses have been written specifically for OS/2 although most of the problem is, unsurprisingly, posed by DOS viruses. Even though many are rendered impotent, others can run successfully from a DOS box. Anti-virus software specifically for OS/2 is available, and is just as necessary as on a DOS machine.

Protecting servers

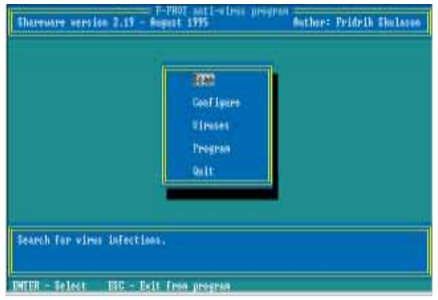
The only way a server can be infected by a boot sector virus is to boot it from an infected floppy. In any case, a DOS boot sector virus infecting a server cannot get access to users' files stored there. File viruses don't do anything special on a network. To spread from one machine to another, an executable file must be copied from workstation to workstation and then executed, just as if the infected executable had come from a floppy disk or via a modem. Corporate email systems that are able to transfer executables files with ease, increase the risks.

Many companies produce NLMs (network loadable modules), programs that work with Novell NetWare to either scan all files on the server as they are accessed or periodically scan files in the background. These are sold as separate packages by many anti-virus manufacturers. Since they use the same virus data file as their workstation-based products, the reliability of companies' standalone products is a good indicator of the effectiveness of their network versions. Since only one copy per server is needed, they offer good value for money when compared to workstation-based solutions.

Nevertheless, workstations should be periodically scanned for viruses. This can be triggered by network login scripts. Many workstation packages include facilities to schedule scans. Login scripts can also be used to download updated scanner data files to workstations.

Memory-resident scanners loaded by workstations at boot-up provide excellent protection, in particular against boot sector viruses stored on floppies that are unlikely to be specifically scanned. In network environments though, conventional memory is often in short supply. A few viruses have been written specifically to steal Novel passwords. They monitor login and write the password to a file in a known account.

F-PROT (shareware version)



F-PROT comes from Iceland and was created by the respected virus researcher, Fridrik Skulason. There's no charge for private use and organisations pay only US$1 to register a copy.

The online virus data is of excellent quality and detail — the Professional (commercial) version lists more viruses. Even if this is not your main anti-virus tool it's worth downloading for the list alone. Unfortunately, it can't be searched. Information is reached via an alphabetical list of viruses but this makes it impossible to find a virus if the software vendor refers to it by a different name.

There are two scan options. The heuristic scan checks for suspicious virus-like codes. "Secure" is a conventional scanner that looks for known viruses. This one has a couple of clever tricks up its sleeve: it looks for large blocks of data within executables, where viruses often hide, and it additionally uses two different search strings per virus. So it's more likely to spot unknown modifications to a known virus.

If it does find one, F-PROT offers configurable alternatives of reporting, deleting it or attempting to repair the file. Sensibly, it also offers the option of renaming infected files .VXE or .VOM so they can't be executed by mistake.

The list of DOS file extensions which F-PROT considers executable, can be edited. By default it searches the boot sector, executables and compressed files. And it warns you if it finds a compressed file form that it can't handle. The usual "scan all files" option is there, too.

F-PROT includes a DOS TSR (terminate and stay resident) called VirStop. This steps in and aborts an attempt to execute infected files or floppies. It doesn't include a companion pop-up message program within Windows, and in tests it missed several viruses. The documentation does warn, however, that the TSR will not detect as many viruses as the scanner.

A nice facility is the ability to add virus search strings by hand. You can check if F-PROT works by using a supplied file called the EICAR (European Institute of Computer Anti-virus Research) standard anti-virus test file. Many other anti-virus products will also spot it. It is, in fact, a standard text file with a .COM extension containing the following line:

```
X5O!P%@AP[4\PZX54(P^)7CC)7}$EICAR-STANDARD-ANTIVIRUS-TEST-FILE!$H+H*
```

The professional version is updated more frequently, and includes a full Windows scanner and Windows virtual device driver. There's also a DOS and Windows checksummer.

You get an effective DOS-based virus scanner and a less effective TSR for free. If you're on a tight budget, F-PROT is a good choice.

PCW Details

F-PROT

Price Shareware version is free to individuals. Organisations must buy the professional version.

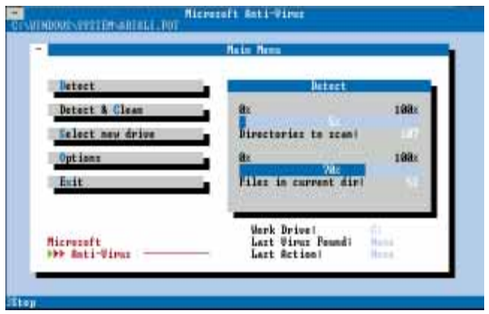
Contact Frisk Software 001 354 5617 273 (Iceland) Command Software 0171 259 5710 (professional version). FTP: complex.is

Good Points It's free and it works.

Bad Points DOS only and there's no checksummer. The TSR fails to spot many viruses.

Conclusion A bargain, worth downloading as a backup even if you have other A-V software.

Microsoft Anti-Virus (supplied with MSDOS 6)



MSDOS A-V is basically a version of Central Point's old anti-virus, minus its TSR memory-loading options and scan-scheduling ability.

It's a perfectly decent package that was more or less free until recently (it was installed on most new PCs). It has only one major drawback, but it's a big one: in its supplied state, its 1993 virus data file is hopelessly outdated. Microsoft provides a single phone number (in their DOS manual) for their US bulletin board but the telephone just rings and rings. Microsoft UK Customer Services can't help either: so after having made several phone calls, it transpires that Symantec is now supporting the product.

The checksum verifier (which Microsoft calls an "integrity checker") and the scanner's search for known viruses, are performed in the same scan. There is the option of switching off the checksummer but it cannot be set to either include or exclude specific files. Checksumming will, therefore, inevitably lead to false alarms on most machines, including each time a Windows DLL or driver is updated by an install. Checksumming, in most situations, will only be of real use if an unidentifiable virus is already suspected. A minor oddity is that it cannot scan more than one drive at a time without resorting to command line parameters.

The DOS program, sensibly, is as similar to the Windows version as possible and includes optional mouse support. Both have decent online help. Knowing one is as good as knowing both and there's not much to learn.

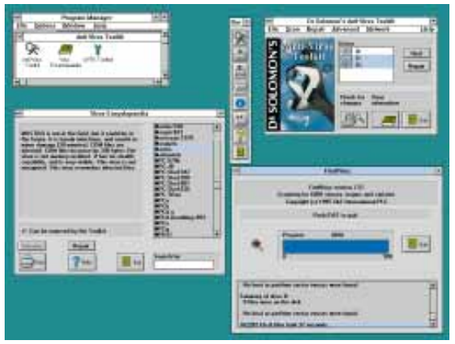
Most virus packages have become considerably more sophisticated since 1993 although one omission in this case is the lack of onscreen information on specific viruses — otherwise a feature of most packages reviewed here.

The TSR, VSafe, can prevent all disk writes and halt low-level formats. It can also flag accesses to executables infected with the limited number of

viruses about which it knows. A feature that doesn't date much is its ability to flag writes to disk boot sectors.

Hotkeyed menus enable you to change these options at any time. The menus can also be skipped using command line switches. Included is the option to remove VSafe from RAM without rebooting. Its Windows companion, VSafe Manager, displays pop-up VSafe messages and access to Vsafe's options from Windows. Its TSR and checksumming are still better than nothing, though anything that's been around this long can be overcome by some of the newer viruses. Without an update to its now obsolete virus data file, the scanner is almost useless and shouldn't be relied on.

Dr Solomon's Anti-Virus Toolkit (for Windows and DOS 7.5)



Version 7 adds a heuristic virus detector which is very handy if you suspect an unidentified virus. Another improvement to Toolkit is its repair feature. Previously, S&S International provided a range of generic tools capable of rewriting the boot sector, for instance, or chopping a fixed number of corrupted bytes from the ends of files: now it applies a clean-up that is tailored to individual viruses. The relevant button is displayed whenever a virus is detected.

To prevent a virus from being loaded into memory, both the Windows and DOS portions of the toolkit are installed by a DOS program. After all, it's no good booting from a clean boot disk and then running a potentially infected Windows executable; you could load an undetectable stealth virus into memory.

The major components of Dr Solomon's A-V toolkit are typical of most virus packages. There's a scanner, to find known viruses, with the useful capability to look for virus signatures that are up to one byte different from those expected. Scans can be scheduled to run unattended and files excluded or included as required. A checksum integrity checker spots changes made to executables and the usual DOS TSR is there. But the companion pop-up message program has been replaced by Winguard.vxd, a low level, 32-bit device driver for Windows 3.1. When Windows is started, it replaces the DOS TSR from memory until Windows is exited. S&S calls this (rather cornily) "the changing of the guard".

A DOS and Windows Hex/ASCII disk viewer is a useful addition even if you don't know how to use one. In an emergency, S&S technical support can guide you by "remote control". The DOS version has the option of attempting to beat stealth viruses in memory that may try to hide the contents of the disk.

The DOS interface mirrors that of Windows. Both provide the same functionality, and all functions of the toolkit can be accessed with DOS command line parameters, as well. All the command line programs return DOS error numbers and this makes it much easier to write sophisticated batch files

A small DOS program called TKUTIL is included that adds considerable abilities to the humble .BAT: it returns a DOS error number for such useful items as day of the week, type of CPU and whether VirusGuard is running, it can search for text in a file or append text to one, and it has another 21 tricks up its sleeve. You also get a small (1Kb) memory resident program that will run any DOS program at a specified time if it sees a DOS prompt. Another places characters in the keyboard buffer at a chosen time.

A standalone toolbar allows quick access to most parts of the Windows package and enables you to begin scans with a single mouse click.

The documentation comes in three parts. The Virus Encyclopedia has a well-written history of viruses and gives good advice on virus prevention — it explains the jargon of the virus-makers and chasers, too. The remainder documents 420 viruses, with a paragraph or two about each. The list isn't comprehensive but you'll learn plenty from it. The user manual is superb and explains everything clearly, with lots of screenshots. There's even more information on virus and anti-virus technology. The changes from version 7.0 to 7.5 are detailed in a slim companion volume. The online version has decent written descriptions of most viruses but the virus data update file does not update the encyclopedia. S&S promises a considerably more verbose version very soon. The software includes a useful and more up-to-date digital version of the virus information in the encyclopedia.

Dr Solomon's toolkit is an outstanding piece of software: it's effective, feature rich, and accompanied by outstanding documentation. A Windows 95 version should be available by the time you read this.

PCW Details

Dr Solomon's Anti-Virus Toolkit
Price £125 DOS and Windows version; £99 DOS only. Both include four quarterly upgrades. Subsequent years' DOS and Windows upgrades: £75 per annum DOS/Windows; £50 per annum DOS only.
Contact S&S 01296 318800

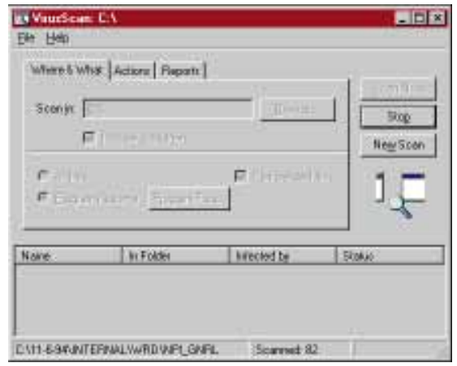
Good Points Good documentation and almost every tool you could wish for, made accessible via an easy-to-use interface and DOS command line.
Bad Points Online virus encyclopedia does not include all viruses.
Conclusion One of the very best A-V packages.

PCW Details

Microsoft Anti-Virus
Price £49 upgrade to DOS 6.2 (from Microsoft); £59 for 12-monthly virus updates (from Symantec); or download from CIS by typing GO SYMANTEC (or phone their Dutch bulletin board 00 317 353 169).
Contact The Microsoft Connection 0345 00 2000; Symantec 01638 592222/5923200

Good Points The checksummer and TSR are still of limited use.
Bad Points The virus data file is now hopelessly outdated. Even with a new data file, its ability to catch the most sophisticated viruses is likely to be affected by the program's age.
Conclusion Don't buy MSDOS 6.2 for its anti-virus capability: even with the virus updates it shows it age.

McAfee VirusScan for Windows 95 1.0



McAfee anti-virus for Windows 95 looks entirely different when compared with the old Win 3.x version. Scan 95 should be faster than the 16-bit version, but version 1.1 is a big improvement. This is because it creates a separate Windows 95 thread for each drive being scanned. If you have an EIDE or SCSI drive you should really notice the difference because they support simultaneous access to more than one drive at a time.

The uncluttered interface uses three 95-style tabs to control what is scanned (using a Win95 file explorer dialogue), event logging, and what action to take when a virus is found. It always offers the option of attempting to repair virus damage, but alternatively it can be set to automatically delete infected files. Sadly, like the 3.x version, there's no option to amend the message that is displayed. Both the DOS product version and the VShield TSR can be customised in this way.

The major weakness of the Windows 95 version 1.0 of VirusScan is that it does not scan the boot sectors for viruses — and there's no warning about this in the documentation. McAfee says this has been fixed in version 1.1.

If a boot sector virus is executed it may well detect the virus in memory. Many stealth viruses are able to evade this method of detection. It is therefore particularly important that WinScan95 is used with Vshield, the TSR. Hopefully, it will spot an infected floppy before you accidentally boot from it. Unlike the DOS/Windows version, specific files cannot be included or excluded from scans. And unlike the Windows 3.x version, there's no onscreen virus information. You'll have to turn to the command line driven 16-bit DOS version (supplied), which can be used to detect viruses under Win95 but could damage data if it's used to remove them.

Installation provides a quick dose of Win95-style clouds and checks for viruses in your system's boot sector and root directories. The install routine adds, if required, a command to autoexec.bat that loads a Vshield. It's the TSR that intercepts access to floppies with infected boot sectors or infected files. At present, this is the 16-bit version: it can't be relied on to spot all infected files under Windows 95. The Windows program that displays a dialogue box, when Vshield finds a virus, is still the 3.x version. McAfee says it will soon be shipped with a replacement .VXD 32-bit windows device driver (the 16-bit version will continue to be included).

The context-sensitive help is sparse and fairly terse but fortunately most options are self-explanatory. The help file is no more than adequate. The product is easy to obtain, install and use, but it's marred by the inability of the scanner to check boot sectors and partitions.

PCW Details

McAfee for Windows 95
Price £89 (includes eight updates per annum, by post); £49 for a registered copy (download the updates yourself). Free evaluation for up to 30 days.
Contact IPE Corporation (formerly International Data Security) 0171 436 2244.
FTP: ftp.mcafee.com/pub/. Bulletin board: 0171 916 1025

Good Points Easy to obtain and use.
Bad Points Significantly fewer features than the Windows 3.1 version.
Conclusion Not to be relied on, though future releases are likely to resolve the criticisms.

McAfee VirusScan for Windows & DOS version 2.2.6

McAfee for DOS and Windows offers more features than its newer Windows 95 stablemate. The DOS scanner is creatively named "Scan", a program that can be operated using command line switches from the DOS prompt.

The Windows version integrates all functions into a single program. Scan checks by default for known viruses. It can optionally check for changes to files and McAfee calls this "validation". Cyclic Redundancy Checksums can either be written to a data file or appended to the end of examined files. CRC data can be removed easily, too.

It can be set up with four profiles to define exactly what is scanned. You can include or exclude specific files, directories, or disks from validation and scanning as required. You can maintain a report file of specified length and decide which events are worth recording, such as warnings of corrupted or modified files. The checksummer attempts to intelligently differentiate between damaged executable code and modified data and the information is then recorded in the log file. The online help is hardly voluble — for instance, it doesn't explain the difference between "corrupted" or "modified" file warnings.

Another feature is the scheduler.

Scans can be configured to scan or validate as and when required, though VirusScan for Windows must be loaded.

The on-screen virus information is minimal: the virus size and type is shown and McAfee tells you if it can zap it. Many viruses only list a name, but fear not as the missing information is available to the scanner.

Vshield can be set to load into EMS, XMS or high memory where it takes up 30Kb. If allowed to swap its data file in and out of memory as required, only 8Kb is needed. When started up, it checks master boot records, boot sectors, system files and itself for viruses. It remains in memory checking program files for viruses as your computer executes but not when it copies them. And it checks floppies when they are accessed. A small windows program displays in a dialogue box any messages generated by Vshield.

The manual, also supplied as a text file, contains all the information required to operate the program but is not suitable for a novice — there is very little hand-holding.

PCW Details

McAfee for Windows and DOS
Price £89 (including eight updates per annum, by post). £49 for a registered copy (download the updates yourself). Free downloading and evaluation, up to 30 days.
Contact IPE Corporation (formerly International Data Security) 0171 436 2244. FTP: ftp.mcafee.com/pub/. Bulletin board: 0171 916 1025.

Good Points Everything that should be there is included.
Bad Points Confusing for those not familiar with anti-virus terminology. Very limited onscreen virus information.
Conclusion Certainly a respectable, if not the best, anti-virus package.

Sophos Sweep

Sweep has changed little over the years and there's still not a lot of it. (It has a big user-base in UK Government circles.)

When installed, the Sophos anti-virus consists of only two DOS programs: a command line scanner, SWEEP.EXE; and an interactive shell, SW.EXE. There are only three additional files: a Windows icon, a .PIF file and the virus data file.

Sweep's only concession to Windows 3.x is its setup: a Windows version of its DOS install program. It copies the files to a specified directory and installs an icon in program manager that starts the DOS shell. It doesn't check for the presence of viruses before installation.

Sweep is supplied uncompressed on a single floppy. With the aid of an uninfected boot disk, a virus can be tracked down before installation.

Customising the package is rather unfriendly — to add extra DOS file extensions to its list of files, it considers executables. A text file must be edited or command line parameters used. The same applies to the default message which Sweep displays when looking for a virus. It can be changed by adding a text file named SW.MSG.

Sweep offers the default option of deleting infected files. This is not to be encouraged, as apart from encouraging the removal of infected files that could be repaired with another package, it reduces the likelihood of a virus being saved for examination by a virus company. And it could turn out to be a hitherto unknown strain of an existing virus. The police also need viruses as evidence. Fortunately, this option can be switched off.

Sweep's command line arguments are based on the shortcut letters used to select menu options within the interactive shell. It's not exactly user-friendly but the letters are shown in the manual. Usefully, it can return DOS error numbers so that appropriate action can be taken by a batch file if Sweep finds a virus or compressed file. It can't examine the contents of .ZIPs but does know about some other compressed formats. There is an optional parameter to warn when ZIPs are encountered.

Options include "shredding", overwriting and deleting files, or just deleting them. It offers two types of scanning: "Full Sweep" steps through every byte in a file, while "Quick Sweep" (like most anti-virus packages) looks at particular points in files where viruses are expected.

Sweep includes basic information on all the viruses in its data file. There's no description of effects but there is information such as dates that triggers a virus, methods of infection, and file types affected.

A useful bonus is the inclusion of Sophos' 382-page 1995/6 data security reference guide. It's an excellent guide to the world of viruses — who creates them and why. There's useful stuff like data security law and relevant organisations. There's a summary of Internet security issues, and half of the book is dedicated to a technical summary of Sophos products.

The box sensibly includes a dozen prominent virus warning stickers for infected floppies. Additionally, you get 45 datable stickers for disks that pass the test: if they're infected later, the stickers might be the only clue as to when things went wrong.

Online help is pretty basic but the manual is clear and detailed: many of the program's features can't be used without it.

Sweep is perfectly adequate as a pocket virus detector for technical support staff, or to run on a standalone, shared virus-checking PC in an office.

PCW Details

Sophos Sweep
Price £295 (including 12 monthly upgrades) or £145 (including quarterly upgrades). Subsequent years are the same price. Virus data upgrades can be downloaded free from their bulletin board or FTP site.
Contact Sophos 01235 559933

Good Points Good documentation. It does the job it claims to do.
Bad Points DOS only and it can't look inside compressed files.
Conclusion Why not buy something else that offers twice as much for the price?

Norton Anti-Virus for Windows 95 and Norton Anti-Virus for Windows and DOS

Personal Computer World HIGHLY COMMENDED

Both DOS/Windows 3.1 and Windows 95 versions are very similar. The 95 product is a true 32-bit application that knows about 32-bit file access. Things have only changed in cases where the standard Win95 user interface rules affect the style. For instance, option pages are now tabbed which is a marginal improvement over the Windows 3.x version.

The memory-resident Auto Protect program pops up an alert when a file infected with a known virus is run or loaded. It does so irrespective of whether the GUI is loaded. As well as looking for known viruses, the Windows 95 TSR also uses what Symantec calls "virus sensor technology". It's designed to intercept unknown viruses by looking for virus-like behaviour, such as an attempted format of your hard disk or suspicious writes to program files. It also performs a system area check of any floppies left in the drive when Windows 3.x or 95 is shut down. "Virus sensor" can be switched off, but if left on it's unlikely to cause false alarms. To prevent the TSR loading at startup you can specify a hotkey to be held down during bootup.

All versions of Norton Anti-Virus (NAV) have the usual three lines of defence. The scanner and checksummer (which Symantec calls "inoculation") are well integrated and the scanner, which examines files for known viruses, is reliable. The Win95 version is marginally quicker than McAfee's WinScan 95.

The main screen provides four large buttons: the first, "options", leads to a multipage options screen. All parts of the program can be controlled from here including which buttons are displayed within virus dialogues. There's also the (obligatory) ability to insert a "Please call your friendly corporate help desk on extension 12345" message and to sound an audible alarm. Almost every control you can imagine is here, which makes for more decisions. Fortunately, the online help is plentiful and well written. The Win95 version supports right mouse clicks to call up relevant context-sensitive help.

Both scanning for specific viruses and "inoculation" can be performed in a single operation. There's the usual animated icon (the Win95 version is prettier) and both display a handy percentage bar to tell you how long you've got left to make the tea. Neither version scans compressed files within compressed files but they do warn of this.

"Inoculation" by default sensibly protects only boot records and system files. Starting up Navboot, the TSR, generates a warning if system files change. Switching between DOS or a Windows GUI bootup can sometimes trigger a false alarm but it is difficult to see how Symantec could prevent this without compromising effectiveness.

There's no need to sit around watching NAV: both versions include a standalone program scheduler. It will run any program once a week at a given time of day. For instance, it installs setup to scan for viruses every Friday at 5pm. If you have a copy of the Microsoft Windows 95 Plus Pack you could use the system agent for the same purpose. The Win95 version minimises to a mini-icon at the righthand end of the taskbar.

Installation is straightforward: it offers the usual custom or full install options, and creates a rescue disk if desired. Rescue disks can be created at any time using the standalone program. Setup additionally carries out the usual scan of memory and disks for viruses — if it finds one, NAV insists that the user boots up from an uninfected boot disk.

Sensibly, the Windows 95 version doesn't require a Windows 95 boot disk — any old DOS boot disk will do the trick. The virus can then be removed using the standard emergency rescue disk supplied, on which there's a DOS version of the full scanner/checksummer as well as repair tools. Despite being a 16-bit DOS, the Win95 version knows about Win95's file system.

All flavours of NAV are sophisticated products, bristling with options. They might confuse a novice, but the clearly written manual and plentiful online help should enable anyone to figure it out.

Editor's Choice

The perfect anti-virus package should be able to detect and remove viruses effectively and include a full range of virus detection methods. All of its features should be accessible from Windows and DOS, via both a command line (for batch files) and a more friendly user interface. It should be easy to use and well documented.

Both Dr Solomon's and Norton's products qualify on all these counts. Dr Solomon's has the better documentation: almost everything you could ever want to know about viruses is included and it's more than just a user manual. Nevertheless, Symantec's Norton documentation is certainly a clear and comprehensive guide to the software.

Norton wins on the options it offers: such as which controls are displayed when a virus is detected, or its ability to make a copy of infected files with a .VIR extension before the virus is removed.

If batch file automation is important, then Dr Solomon's has the edge. Three useful utilities considerably extend the power of any batch files while the slightly larger range of DOS error conditions generated provide marginally more control. Both programs return more than sufficiently detailed error numbers, though.

Dr Solomon's DOS TSR wins over Norton's: while both prevented execution of the test viruses, Doc Solly's prevented infected files being copied as well. However, like all packages tested, its TSR will only spot a stealth virus when you try to execute a program already infected with one.

By the time you read this most anti-virus manufacturers, including S&S, will have produced a Windows 95 version of their software. At present, though, there is little choice — Norton Anti-Virus for Windows 95 offers all the benefits of its sibling. The only noticeable change is that the Windows 95 user interface style makes the interface appear a little less cluttered.

PCW Details

Norton for Windows95/3.x/DOS
Price £149 (either version). £99 for 12 monthly virus updates, or free from Symantec's Dutch bulletin board and Compuserve.
Contact Symantec 01628 592222

Good Points More options than you would think possible. Very good at repairing damage. Good documentation both onscreen and paper.
Bad Points Lots of options could mean too many choices for the inexperienced.
Conclusion An excellent product.

Think you may have a virus?

In any organisation it is important to have a pre-planned strategy rather than managing each crisis as it arises. This should be part of a greater disaster recovery plan and include nominated trained staff.

1) DON'T PANIC. The cost to a business of stopping work on a large number of machines can be worse than the effects of the virus. If in doubt, and if the business cost is not large, you can keep the machine turned off until the virus has been identified. If it seems to be doing damage anyway, you may have no alternative but to shut down. Many viruses appear to wipe all the data on a hard disk, but in most cases it can be recovered with minimal effort.

2) To prevent the virus spreading, tape over the floppy drive slots of infected machines and disconnect them from the network.

3) Inform the users of the problem, because the term virus is so emotive. Rumours can spread through a company, causing people at all levels to take inappropriate action. Even worse, rumours spreading outside an organisation can cause serious damage. In rare cases, they have even affected share prices.

4) Many employers state that bringing games to work or downloading software is a "sacking offence". This attitude is self-defeating. Few employees will be likely to come forward with infected disks if they are suspected of being the culprit.

5) It is vital that an infected machine is booted from an uninfected floppy. This is because some viruses, such as "Fish", are very effective at hiding themselves in memory. They may do this as soon as the infected machine is switched on since they infect the boot sector or, as in Fish's case, COMMAND.COM.

6) Use anti-virus software to identify the strain you are infected with. If you have more than one product, use them all. They may produce different answers, usually because viruses are given different names by different software houses.

7) Most packages come with at least some information on each virus. If the virus is known to carry a destructive payload likely to trigger off other machines, your first priority must be to get there and stop it, particularly if it is set to trigger on a certain date. As a temporary measure, taping up the floppy drive and changing the PC's clock date can allow the user to keep working. Make sure the clock won't be changed back to the correct date when it is logged on to a network server.

8) Some viruses are easier to remove than others, so for organisations it makes sense to maintain a range of software. It will increase the chance of successfully identifying a virus and cleaning it up. It is sensible to back up infected files – or indeed the entire hard disk if the boot sector is infected. If a virus is hard to remove using the built in software, an anti-virus vendors helpline may be able to talk you through low-level editing of damaged data using a sector editor. If you lack special software, you can always eliminate boot sector viruses with this technique. First boot from an uninfected disk that contains FDISK and type FDISK /MBR. Most anti-virus packages can do the same.

9) Unless the virus has been intercepted the moment it has arrived, the next, and rather tedious step, is to scan every floppy disk that could have been in contact with an infected machine. It's a good idea to attach a date label on all checked and clean floppies, so that if they are subsequently infected it will be easier to track down the source.

10) When you have all the information about the virus and know how to remove it, contact all at-risk customers and suppliers with the bad news.

11) Before cleaning up the infection, take a copy of the virus — not forgetting to clearly label the infected floppy. If the strain behaves differently to how you expected, it can be analysed. If it's a new strain, it's obviously important to send a copy to the manufacturer of your anti-virus software

12) When the fire-fighting is over, a report complete with a sample of the virus should be made to The Computer Crimes Unit at New Scotland Yard. Call them on 0171 230 1212 and ask for form VAF1. This includes detailed evidence-gathering instructions including full written notes of your actions during clean-up.

If the police are to successfully prosecute virus writers and distributors, they must have evidence that the virus has infected a machine without its owner's permission. Recently 26-year-old Christopher Pile was charged, and pleaded guilty under section 3 of the Computer Misuse Act for the alleged distribution and creation of "Queeg" and "Pathogen". His arrest followed a joint operation by the Devon and Cornwall Police in conjunction with the Computer Crimes Unit. He is expected to have appeared in court for sentencing by the time you read this.

Where do viruses come from?

It has often been reported that a particularly large number of viruses originate in the former USSR, written by unemployed techies hostile to the West. Dmitry Gryaznov, S&S International's Russian virus expert, says this is myth. He claims around a quarter of all viruses originate in Eastern Europe; no more than would be expected, given the number of PCs.

There is, indeed, no single large source of viruses. Most countries (the UK and Russia included) have laws that make the deliberate unauthorised alteration of data a criminal offence. The act of writing one and distributing it is not *in itself* illegal if the recipients are told they are receiving a virus. *Accidentally* infecting a machine is also not illegal. Only *deliberately* releasing a virus into the wild, by intentionally uploading an infected file to a bulletin board or infecting a PC, is against the law. None of these laws have actually had much impact on the numbers of viruses written, but they do give police the authority to stop the deliberate distribution of viruses.

Although there are around 7,000 different viruses, the vast majority are relatively minor variations on previously created types. This is because it is considerably easier for a virus writer to modify a virus they know to be successful than write one from scratch. Many of these strains have never been seen "in the wild", so to speak.

One reason for this is that the underground bulletin boards created to exchange viruses usually require a virus to be uploaded before access is granted. A minor modification to an existing strain is often enough. Many virus writers do this just so they can boast that they have written a virus. Some send them direct to anti-virus software manufacturers to gain some recognition of their feat. The virus is never even released into the wild. Manufacturers nonetheless are forced to waste many hours disassembling them and updating detection data files.

The ultimate answer to almost all computer risks is backup. As hard disks get bigger, a tape drive becomes a must. Owners with just a floppy drive can only hope to back data up on a regular basis. The best type of tape drive is one that can fit the entire contents of the PC onto a single tape. The job is much less likely to be done regularly if you have to hang about changing tapes.

Types of virus

Non-TSR file virus
The is the simplest form of virus to write — and the least effective, so you are unlikely to be too troubled by them. When an infected program is first run, the virus code carries out its task – checking that an executable file is not already infected, then attaching a copy to it. It then runs the original program to which it is attached. In contrast, TSR viruses load themselves into memory when they are executed and are able to infect any executable program they can reach from that point..

Boot sector virus
This is the other major type of virus. Most of the boot sector consists of a simple, small program that is used to start DOS, or whatever operating system is installed. Boot sector viruses replace this with virus code and typically move the boot sector to another part of the disk. When the PC boots, the virus code is executed first. Then the virus runs the real boot sector. A very slow boot from an infected floppy with an excess of floppy disk activity is a common symptom of an infected machine.

Multipartite viruses
These combine both techniques. They can infect both boot sectors and files. The file version of "Tequila", for example, infects the Master Boot Record. Once the PC has been booted from an infected MBR, the virus goes memory resident and infects all accessed .EXE files.

Companion viruses
Companion viruses create a .COM companion to an .EXE file. Because DOS executes .COM files before .EXEs, the virus is run before the .EXE file of the same name. The virus then runs the original .EXE.

Polymorphic viruses
These aim to foil anti-virus packages that search for a specific strain by looking for a known sequence of bytes. No two copies of a true polymorphic virus are alike. When polymorphic viruses run they first decrypt themselves and then behave like any other virus. Programs such as the "Nuke Encryption Device" (NED) and the "Trident Polymorphic Engine" have been written that turn a standard virus into a polymorphic virus. Fortunately, once measures have been taken by an anti-virus company to defeat each "engine", all viruses processed by it are detectable.

Stealth
Stealth covers a variety of techniques that viruses use to disguise their presence — from anything as simple as hiding the increase in files size of executables to full-blown detection of the tools used to detect the virus and the taking of appropriate action to fool them.

Trojans
Trojans are not viruses at all. They are programs that hide a malevolent code within a seemingly innocuous program, but they do not replicate. For this reason the chances of being caught out accidentally by trojans are low.

Macro viruses
Macro viruses have been predicted for a while. The first to appear was recently first seen when it was sent out accidentally by Microsoft on a CD-ROM to OEMs. They called it a "Prank Macro". It is the first virus that will run on both PCs and Macs. It replicates using an auto-executing Word Basic macro embedded in a document. When the document is loaded, it copies the macro to Word's settings file NORMAL.DOT. where it cunningly replaces the File Save command with a routine that also saves a copy of the macro in each document. The only symptom is a dialogue box containing the letter "i". It would not be difficult, though, to add a malicious payload. Microsoft have produced a free program that will scan a disk for infected documents and flag auto executing macros. Most anti-virus companies have added the signature to their data files but because Word documents can have any extension, scanners now have to examine every file, not just executables.

ANTI-VIRUS SOFTWARE

	Dr Soloman's AV for DOS/Windows	Norton AV for DOS/Windows	Norton AV for Win95	McAfee V.1.0 for Win95	McAfee for DOS/Windows	Microsoft AV (suplied with DOS 6.x)	F-Prot Shareware edition	Sophos Sweep
Contact	**S& S International 01296 318800**	**Symantec 01628 592222**	**Symantec 01628 592222**	**IPE Corp 0171 436 2244**	**IPE Corp 0171 436 2244**	**Microsoft Connection 0345 002000**	**Frisk software (Iceland) 00 354 5617 273**	**Sophos 01235 559933**
Detection Technology								
Checksummer (integrity) checker	Y	Y	Y	y	y	Y	N	N
Scans for known viruses	Y	Y	Y	y	y	Y	Y	Y
DOS TSR	Y	Y	Y	Y	y	Y	Y	Y
Windows TSR dailogue box genererator	N/A (1)	Y	N/A (1)	Y	y	Y	N	N
Windows VXD -Virtual device driver	Y	N	Y		N(3)	N	N	N
Heuristic scanner	Y - Scanner	Y (2)	Y(2)	N	N	N	Y	Y
Checks own integrity	Y	Y	Y	Y	Y	Y	Y	
Features								
Scheduler	Y	Y	Y	Y	Y	N	N	N
Virus removal/repair	Y	Y	Y	Y	Y	Y	Y	Y
Virus alerts can be customised	Y	Y	Y	N(3)	Y	N	Y - TSR ONLY	Y
Onscreen virus information	Y	Y	Y	N(3)	Y	Y	Y	Y
Runs from floppy	Y	Y	Y	Y	Y	Y	Y	Y
Scanner can check archive files eg .ZIPs	Y	Y	Y	Y	Y	Y	N	(4)
Emergency recovery disk						N	N	N
Records copy of FAT	Y	Y	Y	Y	Y	N	N	N
Records copy of boot sector	Y	Y	Y	Y	Y	N	N	N
Records copy of CMOS RAM	Y	Y	Y	Y	Y	N	N	N
Lab results								
Time to scan for known viruses (Secs)								
DOS	80	77	N/C	N/C	65	165	N/A	N/A
Windows (5)	100	75	N/C	N/C	66	136	80	126
DOS TSR Virus monitor								
Fish	CE	E	E	E	E	CE	E	N/A
Tequila	CE	E	E	E	E	CE	E	N/A
Smeg (a stealth virus)	E	E	E	E	E	-	-	N/A
Jerusalem	CE	E	E	E	E	CE	E	N/A
Stoned	CE	E (6)	E	E	E	CE	N	N/A

(1)=VXD used instead . **(2)**=TSR and SCANNER. **(3)**=(Included in 1.1). **(4)**=Only dynamically compressed files not zips. **C**=Stopped a copy. **E**=Stopped execution
(5)=Expect a greater difference between DOS and Windows on machines with lower performance graphics cards under Windows. **(6)**= also intercepts warm boot.
Lab Tests (scanners looking for known viruses)
All products tested found 4K (frodo), Anticad 5, Cascade, Form, Green Caterpillar, Joshi, Keypress, Maltese Amoeba, Sampo, Smeg, Spanish Telecom, Stoned, Tenbyte ,except for MS AV which found only 4K (frodo), Cascade, Form, Joshi, Stoned and Tenbyte

On the CUTTING EDGE

Welcome to Cutting Edge, the section in *Personal Computer World* that combines our regular reviews of games, books and CD-ROMs with features bringing you the latest news about computing, and consumer technologies and online services.

We now have the most comprehensive coverage of these topics available in a general computing magazine. Stay with us and we'll take the pain out of keeping on the cutting edge.

PCW Online

comms — The Comms column has moved to a new, regular site in Hands On.

PCW Futures

PCW Media

PCW Fun

Kids' Stuff: Fun with The Fish Who Could Wish

CD-ROMs: Look! It's Larry

Screenplay: Jungle fever in Pitfall - The Mayan Adventure

Guardian angels

With pornography and violence freely available on the Internet, people are increasingly worried that their children may be learning too much. Wendy M Grossman reports on new software designed to give parents peace of mind.

PCW Illustration by Stephen *Caplin*

All the tabloid coverage of sex, drugs, and bombs 'n' guns in cyberspace has convinced many parents that it's not safe to let their kids cross the information superhighway. Every generation of parents has its bugaboos, whether it's TV, comic books, or pocket calculators. But there are legitimate reasons to be worried about what kids might stumble across in newsgroups like alt.sex.stories, or on Web sites.

Many freedom of speech campaigners argue that the best method for handling this situation is parental involvement. Don't, the argument goes, try to block off kids' desire to explore; teach them how to deal with what they see and place it in a wider context. But that presumes that the adults themselves are not shocked by what they see, and that's a questionable assumption.

A new generation of products is springing up to try to set limits on what kids can see in cyberspace. The good side of this is that it is the parents who choose whether or not to use them; a much better solution than government-mandated censorship. The down side is that technology rarely delivers what it promises, and parents may assume these applications are more effective than they actually are. The Internet changes minute by minute, and it's difficult to see how a single software product can keep up.

The alternative to these products is to choose an Internet service provider that attempts to cut out objectionable material for you: the BBC Networking Club, UK Online, or Research Machines. All three of these cut their Usenet feeds to eliminate hierarchies like alt.sex.* and alt.binaries.pictures.erotica.*; additionally, Research Machines blocks Web sites that contain material it deems unsuitable for its primarily educational and family users. However, this option effectively fences in the adults as much as the kids.

Expect to see many more products joining the four we review here in the coming months. Compuserve, for example, has already announced such a product for use with its IP service, and Netscape is

planning to include Web site-blocking in a future release. The real hope for the future, though, may lie in the Safe Surf Initiative, which is asking Web sites to label themselves as safe for kids to play in; this standard labelling can then be used as a filter for Web browsers.

CYBERsitter

Solid Oak's CYBERsitter comes on one disk and installs fairly quickly; a 30-day trial version of the program is available from the UK distributor. The accompanying slim A5 manual explains the basics of the Internet and what CYBERsitter does. You can set the program to block material or simply log information about what material is being accessed — with a note that this might be suitable for covert monitoring in an office situation. You can set it to monitor or block access to files stored on your own hard disk as well. As the manual helpfully points out, this means you can stop your child from fiddling with the File Manager, Alternatively, you can set CYBERsitter to produce a log that shows he or she is playing games instead of doing homework.

The new 1.2 version adds Internet blocking. This is a little tricky to configure: you have to enter your email address and the name of your mail server, then click on the now enabled Filter button to download the database of "bad" sites. You can then choose to block or monitor access to these. You can't, unfortunately, add entries of your own to the database, although you can send these in to the company with a request that they be added.

Because there's no way for the computer to distinguish between a pornographic picture and a weather map, you block whole file types — .GIF, .JPG, or .ZIP, for example — or access to specific files. Blocking access to CompuServe's completely unprotected WinCIM or blocking the download of video files (which tend to be very large) would mean that your child couldn't run up huge bills when you weren't looking, and it would also ensure that your own personal files remained untouched. This blunt instrument approach is awkward but effective. The new version can also be easily configured to stop your child from sending out personal details like address and phone numbers.

CYBERsitter attempts to hide its tracks: when you access a blocked file you just get a standard Windows error message saying the file, or some portion of it, is missing. It can also be set to hide its program group or require a password so that the program settings can't be tampered with. However, the whole thing is easily defeated from DOS, since any moderately sophisticated user (read: child) can figure out how to comment out the relevant lines in system files and reboot. Even if you block editing of those files, there's always the emergency boot disk approach.

CYBERsitter: £29.95 plus VAT, postage and packing, from POW! Distribution 01202 716726 or http://www.pow-dist.co.uk

SurfWatch

SurfWatch is completely Net-orientated: you even have to log on and establish a live connection to your service provider before you can start the software's installation routine. We used a connection to Demon for testing purposes as Demon's reputation is founded in part on the promise that it will censor nothing.

It's a little weird to install software while feeling the phone bills tick up, but the routine was very quick. At the end, you're asked if you want to update the Surf Watch database; we clicked yes, but were unable to find a serial number the program would accept. Somewhere in the updating procedure you're given the chance to subscribe to monthly updates. In this, SurfWatch is (correctly) like a virus scanner: so much new stuff is coming out all the time that without updates the software quickly starts to have large holes in it.

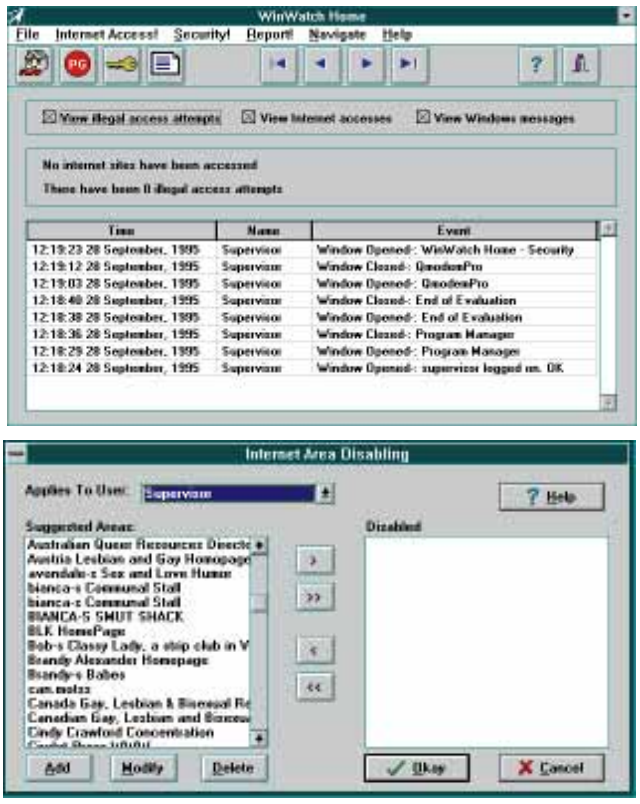
SurfWatch certainly did what it was supposed to do: it blocked our way to a well-known US site that features material on drugs, sex, and conspiracy theories, and it wouldn't let us follow most of the links we found by searching the Web. It was perfectly happy to let us in to look at "Flirty" fashions, however, including the leather outfits. It did block our favourite page of links of banned material.

Someone at SurfWatch clearly spends a lot of time looking into all this stuff. Whoever it is doesn't seem to think information about hacking is dangerous: there's no problem getting into the Web sites for either *2600* or *Phrack* — two hacker magazines.

SurfWatch wants you to know it's there. When you try to log on to a blocked site, it puts up the message "Blocked by SurfWatch." You can turn it off by entering a password and clicking on a radio button. You can't, however, remove it through the Task Manager. And you can't yet configure it by adding sites of your own; although the company says the next version will allow you to do this. The program gives no help with files or Web pages that have been downloaded and saved on your hard disk.

The program does have its limitations, however. Although it successfully blocked us out of newsgroups accessed via public newsreaders, it allowed us access to one of the banned groups through a Telnet session

Out of site



Top *WinWatch records what's been done, and by which user*
Bottom *The "supervisor" can disable unsavoury sites; but how secure is this feature ?*

to a commercial online service with an internal newsreader. Once again, it's fairly easy to defeat the program from a simple DOS edit of system files. Until Microsoft gets around to putting real security into DOS and/or Windows, that limitation is always going to be there.

SurfWatch: £59 including a year's updates, from Research Machines 01235 826868

Net Nanny

Net Nanny is completely dependent on words and phrases. The package consists of two versions on one disk; for DOS and Windows. You have to install the DOS version (which creates a hidden directory on your hard disk) that holds three hidden files. You only install the Windows program if you actually use Windows.

Either way, you run the Net Nanny administration program from the installation disk and configure the included dictionary with the words you want to block. For instance; phone number and address details, names of potentially undesirable contacts, or simply words you think might trigger objectionable material. This gives you all the latitude you may desire — and probably parents should be worrying more about amateur bomb-making recipes than about sexually explicit images, since pictures don't destroy houses.

Net Nanny requires you to specify the number of hits — that is, the number of times the banned word appears on the screen — and whether you want the program to simply log hits surreptitiously, or shut the system down. An adult will find this irritating: Net Nanny shut down Word for Windows after we'd written the word "sex" five times, and refused to let us run the program again until we'd exited and rebooted.

You can run the Windows Net Nanny administration program and disable Net Nanny

temporarily or remove it altogether. So controlling the computer is a matter of controlling access to the floppy disk and its copies. Of course, you can still disable the program by editing the system files.

You could use this method to block specific Web sites if you set a very low number of hits to trigger shutdown. But even so, the program isn't that well suited to blocking access to Web sites or newsgroups. You are dependent on geeks bearing .GIFs to be helpful about assigning explicit file names, and on your own willingness to research sites to block — Net Nanny's Web site does keep a starter dictionary of sites available for users to download. But overall, it's not a sufficiently flexible approach for today's Internet, especially since Net users are the sort of people who would change the spelling of "sex" to "seqs" if they thought it would defeat such a program (and it would, unless you knew about it). The press material promises some useful-sounding features — like blocking the use of unauthorised disks — that the documentation doesn't explain how to implement. Without prompting, for example, how many parents would think to put "format" in the program's dictionary?

Net Nanny, from Net Nanny Ltd: $49.95 from (1) (604) 662 8522 or http://www.netnanny.com/netnanny/

WinWatch

WinWatch is the sole British product in this group, and it's produced by Crawley-based HWA. They won't thank us for saying this, but if you want a relatively recent list of unsavoury Internet sites and newsgroups, this is the one to buy: log into the package as the Supervisor, and you're treated to a complete list of all the sites and services included. Click on the "Modify" button, and you can read the addresses, too. Unfortunately, you can't simply export the database.

We had some trouble getting WinWatch up and running, apparently entirely due to our system's refusal to let it install the ODBC Microsoft Access driver. Once that was installed separately, the product worked as it was supposed to.

Unlike the other programs reviewed here, WinWatch asks you to log on when you start Windows. This has its uses, since it means that you can keep permanent settings for each member of the family: your 15-year-old might be granted access to material that you don't want your 11-year-old to see. However, there's no way to tell at a glance (unless you open up the report module using the Supervisor's ID) which user is currently logged on, and there's no protection against one child starting the system and leaving it running for another to use.

Like CYBERsitter, WinWatch has opted for the subtle approach. Net sites aren't blocked, they're just unavailable for one of a number of reasons (internal transfer error, file not found on this server, and so on). You can add your own sites — Usenet newsgroup, Web pages, and other types of Internet sites. You update the database by downloading a new version from the company's Web page.

WinWatch also monitors all windows within Windows: open WinCIM, for example, and log onto CompuServe using the Send and Receive All Mail command from the Mail menu, and WinWatch records that this has been done and by which user. Reading through this log is a very good way to shame yourself — er, your children — into doing some work. The program can be configured to block access to local files, as well as to stop the transmission of personal details and specified words and phrases.

We found this program a bit difficult to configure and use. Expect to have to take a little time to learn your way around it. If you're just buying it for the database, expect to have to copy and paste the addresses one at a time: the database itself is encrypted.

WinWatch: £40 plus VAT from Crown Computer Products 01704 895815. Database updates available from http://www.pcnl.co.uk/WinWatch

Editor's Choice

Any of the bright kids we knew in school would be able to defeat any of these programs very quickly. DOS's basic lack of security, coupled with kids' natural tendency to break rules, means that parents should not expect to be able to install a single program and walk away leaving their kids' computer use unmonitored.

All these programs require a certain amount of technical knowledge and commitment to get them up and running: which unfortunately means that most kids will understand how to work them better than most parents. So none of them is entirely satisfactory: CYBERsitter doesn't allow you to add sites, WinWatch's logon procedure is flawed, SurfWatch won't block or monitor local file access, and NetNanny gives kids a great new excuse for why they can't do their homework ("But, Mum… the computer shut down on me.")

As we have to pick one, we would suggest either CYBERsitter or WinWatch. But both need some improvement, and parents should still expect to have to spend some quality "net-time" with their kids.

CUTTING EDGE

net.answers

Nigel Whitfield guides you through the Internet.

Q. Our office is connected to the internet and I'm worried about hackers gaining access to the systems. How can I protect them?

A. Firstly, remember that hacking isn't that common: no-one will bother unless they think you have something worth looking at on your system.

There's no simple answer to the question of protection; it depends very much on how your computers are connected and what software they're running. For instance, if you have FTP (File Transfer Protocol) server software that allows other people in your office to get files from your PC, it could potentially be accessed by anyone on the internet.

Unless you really need to, you shouldn't run any such servers on PC systems because they're a security risk. If you do run a server, check to make sure there are real passwords to control access.

You should also see whether the computer, or router, that connects you to the internet can filter out certain types of information, such as incoming file transfer requests. If you're not providing any publicly accessible services, then it's a good idea to make sure that people from outside can't get into your systems.

A popular solution is to use a "firewall" — a computer connected to the internet with special programs to screen out connections to and from some addresses. It acts as an intermediary between your network and the rest of the internet, so that anything going in or out has to pass through this firewall.

Some firewalls additionally act as proxy systems so that you don't have to have a registered network to provide access to everyone in the office. Instead, requests for information are passed to the firewall and the results are sent back to the original computer (just like a proxy web server). In fact, unless you have a very good reason not to, it's probably a good idea to make sure all your computers are hidden behind a firewall server in this way, since you'll help to conserve internet addresses as well.

But where do you get a firewall? One solution is to have a computer running Unix as your firewall system, which can be used to provide many other additional facilities such as a web server, or ftp site. There are various types of firewall software on the internet, which can be installed on your server to protect it from attack.

One popular package is called tcp_wrappers. This checks for connections to your computer and identifies which machine they're coming from. It compares the address to a list of systems that are allowed access (just like using the Caller Display service on your telephone to decide whether or not you'll pick it up) and refuses access to people who aren't listed. It can even be configured to query the remote system to see who is using it — this could provide the information you need to track down anyone attempting to break into your computer. There's also a firewall kit, available from TIS, which provides similar facilities.

For more information on firewalls you can join the firewalls mailing list by sending a message to: `majordomo@great circle.com`, containing the line: `subscribe firewalls`.

Information about tcp_wrappers is available from `ftp.win.tue.nl` in the `/pub/security` directory, and the TIS firewall kit is at `ftp.tis.com` in `/pub/firewalls`.

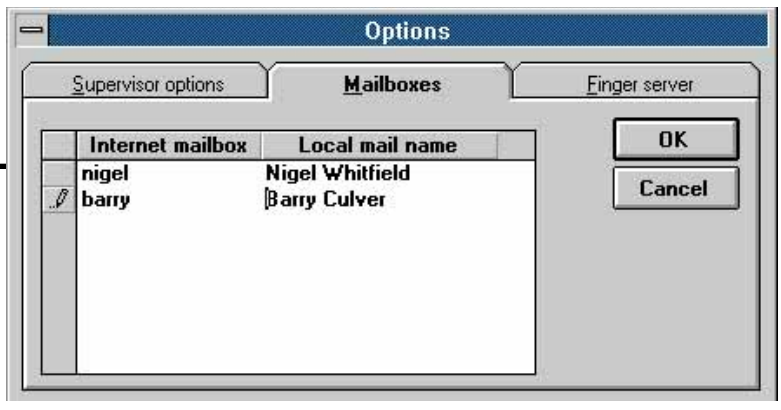
Q. How can we connect the mail in Windows for Workgroups to the internet?

A. The simplest way to connect your Microsoft Mail system to the internet is to buy the Microsoft SMTP gateway, which enables the system to talk to internet mail servers.

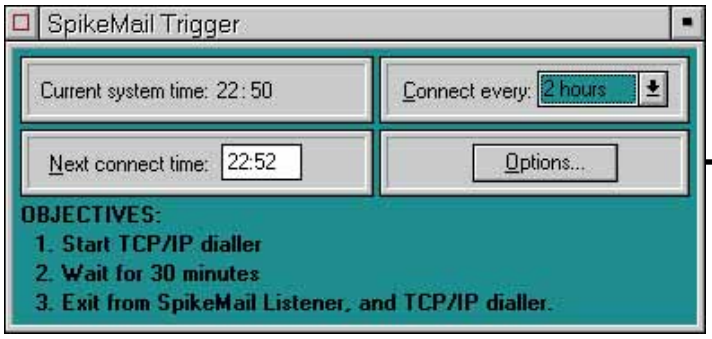
Unfortunately this gateway is one of the most expensive ways to connect your system to the internet, but there are some affordable alternatives: SpikeMail, and Internet Personal for MS Mail.

Both products provide you with similar facilities — most importantly, the ability to send and receive messages using the ordinary Microsoft Mail program supplied with Windows for Workgroups. They'll even handle attachments, so that if someone on the internet sends you a file using the MIME encoding system, it will appear as an icon in your MS Mail. The same process works in reverse too, so you can send files to people around the world just as easily as around your network.

Where the two products differ slightly is in the way that messages are addressed to people on the internet. SpikeMail isn't quite as intuitive, and you won't be able to use your address book. All your messages have to be sent to a special user called "internet", with the real address in the Subject field. Internet Personal allows you to put the address in the "To" field, as long as you put square brackets around it. It can also collect mail from a POP mailbox for you, whereas SpikeMail can only receive via SMTP.



● SpikeMail is one of the simplest and easiest ways of connecting your Windows for Workgroups mail system to the Internet



● Spike includes an automatic trigger to regularly dial up and collect your mail

Both programs can be used on a network, with messages delivered to different MS Mail users. And your internet address won't have to be the same as your Microsoft Mail name. For instance, you could have a mail name of "Nigel Whitfield" but an internet name of "gorgeous".

SpikeMail is probably the easier of the two programs to set up, and it's written in the UK by a company called BiTools. You can find out more by looking at their web page, `http://www.bitools.com/`, or download the latest version via FTP to `ftp.demon.co.uk`. At the time of writing, the current demo version was in `/pub/ibmpc/winsock/apps/spikemail/sm310a.zip`, but there's a new version due out soon which promises even more features. SpikeMail is shareware, but the shareware version only allows you to set up internet mailboxes for five users. Registration is £60 (plus VAT) and allows unlimited users.

Internet Personal for MS Mail is produced by netApp Systems of Ontario and costs US$89 for a single user. The multi-user version is called Internet Office for MS Mail and costs US$89 per user, with discounts for larger networks. You can find out more information by emailing netApp at the address infoinet@achilles.net.

Q. We'd like a space on the internet for customers to talk about our products. How do we get one?

A. Historically, people have frowned on use of the internet for purely commercial purposes, and unless yours is a very large company with a well-known product, the chances of being able to have a newsgroup created to discuss your product are minimal, especially if you want a group in one of the main discussion hierarchies.

If you really want a space where people will talk only about your products and not the competition's, then you might be able to make a case for a newsgroup in the "biz" hierarchy, which was created specifically for that type of discussion. The best way to go about it is to join the newsgroup biz.config and read it for a while, to get a feel for it before proposing your own group.

Remember, though, that some sites simply don't take commercially-orientated groups like the biz ones, so you may find that many people cannot take part in discussions.

As long as you're not posting blatantly commercial messages such as "our product is better than X", you should suggest that people raise their queries in any of the most appropriate mainstream newsgroups. But remember to check the charter of that group first, before using it as a support forum.

While a newsgroup may seem like a good idea, you'll probably find that a lot of your customers simply don't want to bother with it: according to one internet provider, over 80 percent of its customers never access newsgroups.

The best solution for many people is to set up a mailing list, so that customers can send a message to a single address and have it redistributed automatically to others on the list. As well as being quick, a mailing list has the advantage that you can create it easily and then decide who can join.

If you decide that you want to set up a mailing list for your customers, check with your internet provider to see if it's able to run the list for you — some will, for a charge. If not, then you'll either have to find someone who will run it for you, or install a program on your own computer.

Q. What's the difference between SLIP and PPP? Will one give me better performance than the other?

A. SLIP and PPP are methods of connecting two computers together via a point-to-point link (like a modem connection, or a serial cable) rather than the network connections used within a building. SLIP stands for Serial Line Internet Protocol and PPP for Point to Point Protocol.

SLIP is the older of the two and was designed specifically to connect two known systems, providing there was an internet connection between them — for example, a dial-up link between your PC and an internet service provider. When you use SLIP, you'll need to know the internet address at each

end of the connection and configure the link appropriately before it can be used. Modern versions of SLIP include built-in compression options which make sure that as much of the link as possible is used to transfer your data.

PPP is a much newer protocol, but it too is very widely used. There are several reasons for this: firstly, PPP isn't restricted to internet connections. It's capable of carrying information for AppleTalk, Novell and various other networks, via the same link simultaneously.

That's not the reason it's used by internet providers, though. Some of the most useful facilities provided by PPP are those that allow it to automatically configure the link. So you don't, for example, need to know the internet address at either end of the connection: the server you call can automatically assign you an address instead. There are additional features built into PPP to allow it to monitor the quality of the link so that the software will know whether a problem is likely to arise (most versions of PPP provide these facilities).

Partly because of the extra facilities, PPP is a lot more complex than SLIP and, in theory, more information has to be sent backwards and forwards to control the options. In practice, you won't usually notice any difference in performance between SLIP and PPP. So, if you only have one or the other, don't worry too much. But if you have a choice, pick PPP, since it will solve a lot of the configuration hassles that you might otherwise have come across.

Q. Some services on the internet need a port number when you connect. What is that?
A. Port numbers are used on the internet to control which program you connect to on another computer. If you imagine each computer to be like a block of flats with people inside, ports are like the letter boxes at the front of the building. To reach a particular person, you must first put your message into the right box.

All connections between one computer and another on the internet have to connect to a particular port, but for some "well-known services" the port number will always be the same and you won't have to specify it. For instance: port 25 is used for receiving mail, port 79 is the "finger" port which enables you to find out who's using a computer, and port 119 is the news server where you can pick up Usenet messages.

If you're accessing services like a MUD (Multi User Dungeon) or a special login program, you'll usually have to give the port number so that your connection request reaches the correct program on the other computer. If you omit it, you'll either receive a message like "Connection refused", or connect to a different service just as if you'd wrongly addressed your letter, so it goes through the wrong box in a block of flats. ■

The mail always get through...

Q. I've been considering different internet providers, and some say that their mail is POP3 while others have SMTP. What's the difference?
A. POP3 (sometimes known just as POP) stands for Post Office Protocol. SMTP is the Simple Mail Transfer Protocol. POP works a bit like a post office box. When mail arrives for you, it's put in a storage space on a machine run by your internet provider, and your mail program picks it up when you ask it to, by sending a set of commands to retrieve the messages.

With SMTP, messages are automatically transferred from the internet provider's computer to yours, usually just after you've connected to them. If you don't have your mail program running, the messages won't be delivered to you, rather as if you'd blocked the letter box in your front door.

Some Internet providers offer either POP or SMTP only, while others let you choose (sometimes for a price).

SMTP can be a little more complicated technically, but once it's all set up it usually works automatically. And it has an important advantage: a supplier that uses SMTP to send out mail will usually allow you to have as many mailboxes as you like. For instance, you could have mailboxes for "fred@sample.demon.co.uk", "sarah@sample.demon.co.uk", and "max@sample.demon.co.uk", without having to pay extra.

With a POP system you'll usually have only one mailbox, which will not be as useful if more than one person in the family wants to use the internet. But there are a couple of important advantages: firstly, there are lots more programs from which to choose if you want to use POP to receive your messages; and secondly, you should be able to retrieve your mail from anywhere on the internet — all you need is a POP mail program.

If you do have more than one person wanting to use the internet for mail, you may be better off with SMTP; but check what options are available from other suppliers — some companies use POP mail, but will still let you have as many mailboxes as you like.

Q. Now that Windows 95 is available, can I get a full connection to the internet by clicking on the icon for the Microsoft Network (MSN)?
A. In a word; no. Although there is full internet access through MSN in the US, not all the facilities are presently available here. However, you can access a selection of newsgroups and send and receive internet mail from MSN, too. Best of all, to sign up all you have to do is click on the icon on your Windows 95 desktop.

At the moment, the costs on MSN are higher than on some other services, especially if you're using it a lot. But if you're not sure whether you want to go online, it's a great way to start learning without having to worry about the technicalities.

● The Microsoft Network doesn't provide full internet access, but it's very easy for beginners to get to grips with

PCW Contacts

Nigel Whitfield is a freelance writer and maintainer of several internet mailing lists. He welcomes comments via the address **nigel@stonewall.demon.co.uk**. If you have questions you'd like answered, send them to **net.answers@stonewall.demon.co.uk**

net.news

Nigel Whitfield and Clive Akass do a spot of traffic-watching on the information superhighway.

Netscape fixes cracked security

Netscape Communications has acted swiftly to plug a gap in the security of its popular web browser. In late September, two students from Berkeley University, California, posted accounts to the internet explaining how they'd cracked some of the security enhancements provided by Netscape. The problem was confirmed by Netscape's engineers.

In a statement, the company stressed that no customer information protected by their security systems has been stolen, but acknowledged that it was possible to decrypt the messages sent by the browser — potentially including credit card information — with just a few hours of calculations.

Companies using Netscape's security technology to provide online shopping don't appear to have been unduly troubled by the news. Many have actually praised the swift response. Easynet's Grahame Davies pointed out that there are many other ways of obtaining credit card details without the effort involved in decrypting them from the internet. Sainsbury's, which has just launched an online wine store using Netscape Commerce Server, didn't believe that business would be affected.

Updated versions of the Netscape Navigator for Macintosh, Unix, and Windows can be downloaded from the Netscape home page, along with a patch for the Commerce Server software used by vendors. The new security enhancements have also been incorporated into Navigator 2.0, which is due to be released in Beta form shortly.

The original security breach was discovered by reverse engineering of the Netscape Navigator, which revealed that although 40-bit encryption keys are generated by the program, the random information used to generate the keys was much shorter, making them easier to crack. Up to 300 bits of random information will be used in the updated version, and Netscape is planning to engage independent security experts to ensure that the security in future versions of the product is thoroughly reviewed before release.

Free calls come and go

Customers of cable telephone companies look set to get a mixed deal when they use their phone line to access the internet. While some providers have confirmed that users can access the internet using their free local calls, others appear to be backtracking, and referring specifically to voice calls in new contracts.

Videotron, which covers large parts of London as well as Southampton, Eastleigh and Winchester, has confirmed that domestic customers will be able to continue to use free calls with their modems, and estimates that the free access provided could be worth as much as the subscription costs to an internet provider for only 30 minutes of calls per day.

The decision follows research commissioned by Videotron, which showed that 35,000 of its customers owned home computers. The decision will be backed up by an awareness campaign, promoting both cable television and the internet in London secondary schools.

Meanwhile, the small print for Nynex's CommUNITY free local calls scheme explains that it covers only calls made between two residential customers. One Brighton-based internet service provider with Nynex lines said free calls were still in operation at the moment, and are unlikely to change for the forseeable future. However, many users have reacted angrily to the possibility of losing free net access.

Cityscape's move to Demon will improve services, customers assured

Cambridge-based internet provider Cityscape has jumped ship from the Unipalm/Pipex network to Demon Internet, claiming the move will help its provide a better service to its customers. The changeover also involves Demon Internet taking over the 25 percent stake in Cityscape that was previously owned by Unipalm/Pipex.

Reactions from users have been mixed, with some fearing that they'll experience problems becoming part of a much larger network. Cityscape believes that there should be many improvements in the service, including allowing customers access to Demon's dial-up network — currently being upgraded in order to provide customers with local-rate access for any destination anywhere in the UK.

Ceneca and UIT spin new web tools for Windows and Mac

Ceneca Communications has announced a brand new web authoring tool, initially for the Macintosh, with versions for Unix and Windows to follow.

PageMill is claimed to be one of the first design tools aimed at non-technical users, and avoids the need to see any HTML codes. The PageMill editor is designed to be as simple to use as a word processor, automatically converting images that are dragged into the page to .GIF format so that they can be displayed over the web. Existing pages can be imported, and Ceneca claims that the product will even correct errors in the HTML.

Other features include an integrated browser, WYSIWYG creation of forms and ordinary text, and a pasteboard that automatically updates relative links between documents to ensure that they're always correct.

For more advanced users, SiteMill includes all the features of PageMill as well as management tools designed to keep track of all the information on a large web site, automatically checking that referenced pages really do exist. For more information, point your browser at http://www.ceneca.com/.

User Interface Technologies has announced the availability of HoTMetaL Pro 2.0, the latest version of the popular web tool, and includes additional features like the ability to import files from a range of word processors, including Microsoft Word and WordPerfect.

Support for the HTML 3.0 standard and Netscape's own extensions to the language are included, as well as preview modes for a range of different web browsers. Improvements to the interface include floating palettes and a new table editor, as well as speed enhancements.

HoTMetaL Pro costs £179 per user; more details are available from info@uit.co.uk.

● See page 243 for more news of Ceneca Communications.

Compuserve Wallet competes with Netscape

Compuserve's new electronic "Wallet" is set to offer competition for Netscape in the growing online shopping market. Although it's only just been launched and is supported by a handful of retailers, the Wallet has the backing of both Compuserve and Check Free, which provides electronic payment facilities to a wide range of companies, including MasterCard International.

The Compuserve Wallet is built in to the Mosaic for Windows 95 web browser, unveiled by Compuserve in August. It can be used with any internet access provider, and unlike Netscape's encryption technology it doesn't pass your credit card details directly to the vendor. With worries about online security on the increase, this is bound to be welcome.

Instead, the wallet contains all the information needed to make a purchase, including lists of the cards you hold and the billing address. Clicking on the wallet prompts the user for a password and allows them to select the card they want to pay with, before all the encrypted details are sent to the vendor, signed and passed directly on the CheckFree, where the transaction is processed. Compuserve claims that this increases the security of online shopping, but it remains to be seen whether their experience with the Electronic Mall is enough to persuade vendors to adopt the Wallet.

US market researcher Forrester believes that it could take up to 18 months before the internet is safe for commercial transactions. In a recent report, the company claims that VeriFone, which has 75 percent of the US credit card authorisation business, is likely to become one of the most important players in online transactions, following its tie-up with Enterprise Integration Technologies which developed the Secure HTTP protocol. According to Forrester, rather than develop their own transaction systems, people involved in sales over the web should ensure that their systems will be compatible with VeriFone.

First des Web site

NetEstate claims to be the first company providing a searchable UK property service on the world wide web. The pages, found at http://netestate.dsres.com/, include properties for sale and rent in London, as well as a guide to the legal hurdles involved in buying property, and a mortgage calculator.

People hunting for somewhere to live can select an area, number of rooms and price bracket before being presented with a shortlist of properties. Clicking on an address displays more information, including a map with the location marked: if there aren't any properties in the area that match exactly, details of close matches will be shown instead.

Details of properties have been supplied by a range of estate agents who pay a one-off fee for each property advertised. According to netEstate's Matteo Berlucchi, details of over 600 properties are available, though he conceded that at the moment, the bulk of them are in west London. He told *PCW* that discussions are currently under way with some larger chains of estate agents, which should enable them to provide a more comprehensive coverage, extending to more parts of London, but stressed that he wanted to make sure there was a good range of properties in each area before including it on the database.

Newsweek launches Virtual City

Newsweek has launched a new magazine called Virtual City, designed to explain developments in the online world to management and professional people who aren't necessarily computer enthusiasts. According to the editors, "it's a guiding light to take on your forays into the cluttered electronic streets." Readers in the UK will have to make do with an AtoZ, however, until an international edition is launched.

Cyberia in Paris

London's Cyberia internet café is set to open up shop in Paris. The new café will be housed in the futuristic Pompidou Centre, and will open around the same time as a French office of Easynet.

Adobe plans to acquire Ceneca

DTP giant Adobe has signed a letter of intent to acquire Ceneca Communications, creators of the PageMill Web authoring package. The deal will position Adobe as one of the leading players in the world of internet publishing. The company already has agreements with Netscape to include support for the Acrobat PDF (Portable Document Format) in Navigator. PageMaker 6.0, which the company acquired with its purchase of Aldus, now includes the ability to create both HTML and PDF output.

More Net news

The BBC is to set up what it calls an "interactive news service" operating from a new multimedia centre. Users will have access to instant news bulletins, as well as to BBC archives.

"They will be able to download text, radio, television pictures and graphics," promised Tony Hall, managing director of news and current affairs, at the Live 95 show. "We are talking at present to some of the main network providers to try to work out how we might do this, starting off small-scale but learning and growing."

The BBC is already participating in the Cambridge interactive TV trial, which allows users news and current affairs programs at a time of their choosing.

Hall gave few details of the multimedia centre, based at Shepherd's Bush, London, except that the plans had recently been approved by BBC governors. But it is part of a general move towards digital services which should draw the broadcasting and computing worlds together. The BBC launched its first digital audio broadcasting service on 27th September.

Free, live radio news feeds from all over the world can already be heard on the net thanks to a service launched in London by former BBC World Service staff (see *Newsprint*, November). The service, financed by participating radio stations, is at http://www.wrn.org.

The BBC's Web page is at http://www.bbcnc.org.uk

net.surf

Web TV

While we are on the subject of broadcasting, a Tokyo TV station is offering to put web users on television in a series of programs based on the net. So far as we can work out from the information available in Japanese English (try explaining yourself in Japanese before you snigger), it looks like an interesting attempt to put across the idea of the net's internationalism through the medium of a popular TV show. It's only surprising that the two most rapidly growing methods of mass communication haven't linked up sooner.

Producers from a company called NHK TV have set up a web site called Sim TV to act as a meeting point between the net and the show, called SimTV3, which was last broadcast on 13th October. They want people across the world to participate either through TV links or by sending in material. These three suggested items give you a flavour of the language and requirements:

● Moments: When was the most commemorative moment for you? Please send us the most celebrated and memorable moment of your life in a picture through internet.

● A Day In A Life: Tell us about your day. What do you do at 9am or 8 in the evening? We are asking for pictures that show your lifestyle throughout a typical day by time segments.

● NetBeauty: We are looking for somebody who is the most outstanding figure now. It can be yourself or somebody you know. Send us also a picture of that person when he/she is most lively and shining.

You can check Sim TV out for yourself at http://www.simtv.nhk.or.jp

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Net software publisher Quarterdeck and pioneer service provider Demon are teaming up to consolidate their market position in Britain.

Quarterdeck's Mosaic browser and InternetSuite will be sold with 30 days' free use of Demon, which in turn will market the software.

Quarterdeck has priced its Mosaic aggressively at £199.95; the suite will ship later this year for £44.95.

Web sites are www.qdeck.com and www.demon.net.

Demon 0181 371 1234

Quarterdeck 01344 873445

Internet World International

The year's second Internet World International show will take place between the 5th and 7th of December at London's Olympia 2. Following the success of the first show at Wembley in May, the second will be part of the Online/CD-ROM Information Meeting, and the organisers expect the show to be even bigger than the last one — which itself was 300 percent larger than in 1994.

Yearling is the first UK comprehensive "interactive" TV listing available on the web. TV listings are likely to become a big web attraction with recent developments like the move to PC TVs and the announcement of CD-online, an internet package for CDi. Yearling is personalised so you can decide which channels you want listings for, and what type of program. It includes most of the main satellite channels but not all the channels available on cable.
http://www.yearling.com

Waveguide is a general interest magazine on the web. The pages are competently put together, but the editorial content suffers from being too general. Advice on how to buy a laser printer sits uneasily with some rather out-of-date sports news and, when we looked at it, a review of Die Hard with a Vengeance. It's obviously being produced on a shoestring and it shows.
http://www.demon.co.uk/waveguide/index.htm

The search continues for a secure, reliable and simple way of doing business transactions on the net. US-based Viacheck is offering a complete software suite for online business. The $395 ViaCheck Transaction System allows the orders and allegedly secure credit-card payments to be taken by a Web server. A demonstration page is at http://www.theyellowpages/acheck.index.htm

FINEcut is an online resource service for video moviemakers. It contains a mixture of articles, hints and tips, book reviews and listings of international film/video festivals that the amateur moviemaker can enter. For anyone interested in the subject it's well worth checking out:
http://www.rmplc.co.uk./eduweb/sites/terrymen/movie1.html

Grand Central is a US-based site devoted to Britpop fans stranded in America. It apparently started on the America Online bulletin board and has now been reborn as a web site. It contains links to all kinds of British sites including British hikers' pubs, British comedy, and British bands from Blur to Suede and beyond, plus the home pages of US Britpop fans.

http://www.missouri.edu/~c666177/

net.newbies

Getting started on the net

These pages are designed to be an easy-to-use reference guide to the internet for the novice — or "newbie", as hardened netters will call you. Here's an easy-reference guide to the tools which will help you make the most of the internet.

What is the internet?

The internet consists of millions of computers interconnected in a global network. The number of users is difficult to measure, but those worldwide who can at least exchange electronic mail messages is estimated to be 30 million and this appears to be doubling each year.

What is the world wide web?

It is not the internet. It is a service on the internet which uses special software (usually available free) to give users access to pages of information with pictures and multimedia instead of just text. About 15 million people around the world have access to the world wide web.

What do I need to get on?

A PC of almost any age can be connected to the internet as long as you can plug it into a modem. You don't even need to be able to view graphics on your machine to look around (although it helps).

A modem allows your computer to dial in to another computer with a modem and communicate with it. They come in different speeds, from 2400 baud to more than ten times that. When you are using the internet, the speed at which things work is more likely to be limited by the speed of your modem than by that of your computer. Buy the fastest you can afford. An old 2400 baud "V.22bis" model is fast enough to exchange electronic mail messages, but to send and receive files, or use the more exciting services on the Internet, a modem which runs at a speed of at least 14,400 baud "V32.bis" is vital. Fortunately, these have plummeted in price over the past few years and now cost as little as £100. If you have the money, go for a 28,800 baud V.34 modem. Over time you'll get back the added cost by reducing your phone bills.

Okay, I've got a modem. Now what?

For a modem to bring you information, it has to have a number to dial. This is where a "service provider" comes in — you have to subscribe to one if you want to get online. Whatever kind of connection you have set up, you will have to pay your phone costs on top of any subscription, unless you are lucky enough to get free local calls through a cable company. The bigger service providers will have the numbers you dial, PoPs (points of presence) scattered across the country so you only have to dial a local number.

If there's no company near to your home which offers internet access, you may have to pay long-distance phone rates. Once connected, though, it doesn't matter where the information you are accessing is physically located: you are always charged at the same rate. A list of providers and telephone numbers is available below. For more details, have a look at our Internet Service Providers Buyers Guide, *PCW* October 95.

Typically, a subscription that only provides electronic mail costs around £5 a month and Delphi offers this. But full internet access which allows you to use email and internet services for any amount of time, limited only by the size of your potential phone bill costs more, currently between £8.50 and £15 per month. There are dozens of companies offering this kind of Internet access; none of them big enough to dominate the market. The basic service being offered is largely the same, although some higher-priced providers may claim to offer a more personal service or a better selection of access software.

Online services: what do they offer?

Major online services like Compuserve or Delphi now offer Internet access and also have a large number of services of their own to which only their subscribers have access. These services include official technical support for hardware and software by electronic mail, online games, vast indexed software libraries and databases of business or consumer information. A monthly subscription tends to cost between £6 and £10 per month, plus a charge per hour if you are online for more than a set number of hours in that month. Compuserve is more expensive than the other internet providers, but you get what you pay for — it's pretty foolproof.

Demon Internet is the best known and most popular of the standard internet operators but doesn't cater too well for absolute beginners. Perhaps better for the raw newbie is Easynet (although it only has Pops in London and Edinburgh) or UK Online. UK Online is a special case, a cross between an internet provider and an online service. For £8.50 to £12.75 per month it offers unlimited access to the internet, partially "censored" to make it safer for children to browse, plus access to online magazines and other services.

Although programs like Windows Terminal can be used to access these services, it is normally easier to use specially-written online software. Any service provider should provide you with at least some of this software when you sign up, and if you want to choose something different, most of it can be acquired online, free of charge.

PCW Contacts

Compuserve 0800 289378
email:70006.101@csi.compuserve.com
Delphi 0171 757 7080
email: uk@delphi.com
Demon 0181 371 1000
email: internet@demon.net
email: sales@thenet.co.uk
UK Online 01749 333333
email: sales@ukonline.co.uk
Easynet 0171 209 0990

If you don't understand what's written here or have any suggestions, please let us know. Contact **Paul_Fisher@pcw.ccmail.compuserve.com**, or "snailmail" (internet-speak for the post) to the address on page 12.

Innovations

The disk strikes back...

If you thought that the floppy was on its way out — think again! The growth of in-house disk duplication is a major broadside in the war against CD-ROM. Tim Frost reports.

Predictions that the floppy disk will imminently be killed off by CD-ROM abound everywhere, except for the floppy disk industry. There, those companies making diskette copying machines – the sort that create *PCW* cover disks – are experiencing a boom. Several major diskette manufacturers, including KAO and Fuji, are busily opening up new diskette manufacturing plants rather than closing them down.

Blooming marvellous

Two things have given the diskette a fresh bloom of life. First and most visibly is the launch of Windows 95. This has come at a time when the installed base of CD-ROM drives is still relatively small, so much of Windows 95 (including all the new Windows 95 versions of all those software packages we know and love) are going out on floppy. The added bonus for the diskette business is that these programs are now bigger than ever, with some taking 20 or more disks per set. But perhaps a more significant boost for the floppy comes from the fact that it is now possible for small companies to have their own floppy disk duplication plant in-house.

We've been through desktop publishing, now meet desktop duplicating. There are just a handful of duplication equipment manufacturers, mostly based in the States – companies such as Rimage, Trace and CopyPro. In the past they concentrated on the big systems. If you wanted to get a number of disks copied you would go to a duplication company to do it, on a high cost/high volume duplicator. These would take care, not only of duplicating equipment, but also separate diskette printers and labellers too. But with the writing on the wall for the diskette business, these companies started to broaden their horizons. They found that many organisations, not just games companies but banks, corporates and industrial organisations have now discovered that the PC has enough penetration among their employees, branches and customers to start distributing data on floppy rather than on paper.

The nature of the data varies enormously from company to company. An insurance group may send out weekly financial updates to its independent sales force, and an electronics company may well rely on software to control their equipment. They want to produce their own floppy disks to go out with the equipment rather than rely on someone else to do it for them, so they can also control the dispatch of regular software updates. These specialist fields are running in parallel with adventurous marketing departments who are using floppy disks as a sales tools with on-screen magazines, catalogues and interactive promotional "literature".

Using compression techniques, a good couple of megabytes can be stored on a disk – more than enough for an impressive show. To tempt companies into doing it themselves meant bringing the price down to a more approachable level; these machines now start at between £1,000 and £2,000, rather than the tens of even hundreds of thousands for high-volume duplicating systems. More importantly, the systems have to be easy to use, reliable, and with the option to include the duplication checking and labelling processes all in one box that would fit on a desk.

This is what the latest generation of desktop duplicators can do. At one end you have a chute that can take anything up to a hundred blank disks. These drop into a high-speed disk drive that can copy up to 200 disks in an hour. The data isn't sent as file format — an "image" of the data as it will appear on the floppy is stored in memory and placed on the disk on a bit-by-bit basis. In order to make sure all the copies are good, there is a read-after-write process that checks the data on the disk against the master image.

The newer desktop duplicators then pass the finished disk onto the labelling part of the machine. This holds a large reel of blank labels which are fed through a miniature inkjet or dot-matrix printer head, printing out the label in time for it to attach itself to the copied disk.

This all-in-one package normally get all its instructions from a PC, which can deliver disk data and the accompanying label information at the same time. This allows the desktop duplicator to handle several different projects or a multi-disk set without stopping. Since the label is printed and mounted as soon as the disk is copied, there can be no problems with mislabelled disks.

DIY duplication

The desktop duplicator has created its own mini-revolution in data distribution as companies discover the advantages in DIY duplication, the additional speed and control over duplication work, and — important to many financial organisations – the security of keeping their masters in-house at all times. More and more small and not-so-small duplication runs will go out from the desktop every day.

Horizons

Making wavelets

Wavelets is a compression technology whose applications range from astronomy to earthquake prediction. Ben Tisdall looks at what it can do for Intel's latest version of Indeo video interactive.

Intel has announced Indeo video interactive. The latest version of the company's widely supported digital video format uses a new compression technology called wavelets.

Although much of the research for the development of wavelets was carried out as long ago as the thirties, it's only recently that they've begun to be used commercially. Their applications include astronomy, acoustics, earthquake prediction, fingerprint analysis and pure mathematics.

Intel felt that its earlier compression technology, vector quantisation, was coming to the end of its life. "We had milked it to the maximum," says Intel's Raza Zaidi. Wavelets is the new compression technology on the block and as Zaidi explained, "They're new, they're fresh and will allow us to grow the algorithm for a number of years." The other appeal of the technology is that it's a software-only standard which can be updated easily and which offers better image quality, at lower data rates than before. Intel claims that the latest version of Indeo will play back full-screen at near VHS quality, and that it compares favourably with MPEG1 when run on a Pentium PC.

Wavelets in action: A 512 x 512 image was broken into blocks and processed with a wavelet transform to create a 128 x 128 composite

The mathematics behind wavelets is closely related to Fourier transforms, discovered by Joseph Fourier in the early 19th century. Fourier worked out a way of representing functions by superimposing sines and cosines (mathematical functions representing harmonic waves).

Fourier transforms have become a standard method for solving and analysing differential equations, and for analysing and treating communication signals.

Unfortunately, Fourier analysis is not good at dealing with choppy signals or sharp spikes because sines and cosines are, by their very nature, non-local smooth curves which stretch into infinity. Wavelet analysis, by contrast, uses functions contained in finite domains.

The procedure for wavelet analysis is to take a wavelet function called an analysing wavelet, or mother wavelet. Temporal (time) analysis is carried out using a contracted high-frequency version of the function, while frequency analysis uses a dilated, low-frequency version. By choosing the wavelets best adapted to a set of data or truncating some of it below a certain threshold, data will contain repetition and redundancy, and hence be ideal for compression.

Intel has taken advantage of wavelets to add a number of new features to Indeo. Earlier versions were reasonably successful with multimedia titles like Dorling Kindersley, Attica Cybernetics and Microsoft, but the product made few inroads with the games authors. The latest version of Indeo adds an optimised 8-bit palette and chroma-key capability aimed at that market.

Chroma-key is the technique used by weather forecasters. If you saw the film Groundhog Day you'll remember Bill Murray waving his arms around in front of a blue screen. Special software superimposes the forecaster's image over the real weather map. Games authors use this technique to allow an object, whether it's a man or a spaceship, to be moved around on a realistic background.

Intel has taken a close look at scalability, too, with its latest iteration of Indeo. Earlier versions worked on a range of PCs, but if the PC couldn't keep up, the software would drop frames in an erratic way. For the user, this meant a very visible drop in quality.

The latest version uses a similar approach to that used by Netscape on the World Wide Web. When you view a large graphic using Netscape the software makes four passes at the image, building it up bit by bit. Similarly, each Indeo frame has four sub-bands. When the Indeo Codec (compression/decompression) algorithm starts running it tries to decode all four. If it can't manage the best, it falls back to the next one, and so on. Because it never completely drops a frame it looks better, and frames containing little or no movement will play back at the top sub-band even on a fairly sluggish PC.

The latest version of Indeo is designed to work best on a Pentium PC: a Pentium 90 will take about 30 minutes to compress a one-minute clip. Most Indeo users continue to design around double-spin CD-ROM data rates of 200 to 240Kb/sec because the installed base is double-speed, and at quad-speed rates a standard CD fills up rather quickly.

You might think that source quality is unimportant for a video clip likely to end up in a Window on a computer monitor. In fact, video compression is extremely sensitive to the quality of the source video tape. Compression algorithms, including those using wavelets, search for repetition and redundancy and so will tend to interpret noise as important, non-redundant, non-predictable material. This wastes space and means low-quality, lossy, compressed video will look much worse after compression than it did before.

CUTTING EDGE

Bluesky

Making software human

In a world where computers are increasingly relied on to carry out tasks affecting people's lives without supervision, Nick Beard asks: "Can we produce fault-tolerant software?"

Ever more aspects of human life are now touched by software. As we come to rely on technology, we begin to take for granted that it will be there, and that it will behave as we expect. We are frustrated when we are relying on a cash machine only to find it's out of service when we get there (especially when meeting a colleague who has insisted on meeting at the only restaurant in town primitive enough to refuse credit cards).

Similarly, airline reservation systems are so central to the functioning of airlines that airports can become quite chaotic when they go down. Software will become central to the competitive success of many industries, such as oil, banking, insurance, telecommunications, and transport. Yet it will never be error free. The best-quality software still contains around one or two errors per 20,000 lines of uncommented code. This error rate probably represents the quality limit on traditional fault avoidance (such as structured programming, reusable software modules and formal methods) or fault removal (testing, verification, validation) techniques.

Fault tolerance is the ability of computer systems to continue to provide seamless delivery of expected services even after faults have developed in parts of the system. Hardware fault tolerance is well developed — such as redundant (i.e. duplicate) systems and "hot box" standby systems.

Software fault tolerance is less well established. There are two interpretations of the phrase "software fault tolerance". The first, *software-fault* tolerance, implies systems which are developed to cope with software faults (mainly software design and construction faults). The other meaning, software *fault-tolerance*, discusses the control and operation of fault tolerance, usually implemented in hardware, via software-implemented functions. An example would be monitoring software which switches functions from a failed processor to the back-up box.

A key distinction in *software-fault* tolerance is between the single version software and the multiple version software environments. In the single-version world, the key techniques are fault detection and recovery features, based around elements such as program modularity, system closure, systems monitoring, decision verification and exception handling. In more advanced architectures — typically where mission-critical objectives exist — the main approach rests upon design diversity. Here, different programmers are given the job of meeting the same functional specification in different ways. Take for example a program requiring a module which controls a robotic arm, causing it to lift a block in response to an external stimulus. Various control mechanisms could be implemented, along with a monitoring routine which switches the control function between the modules if one of them fails to respond appropriately. This means that if one of the programmers had been on a binge the night before finishing his module (Module A), causing him to miss a glitch in his module, then Module B, written by the woman who drank less, steps in to take over when the glitch occurs. There are many techniques which can be applied in this arena, such as recovery blocks, N-version programming and self-checking programming.

To structure a fault-tolerant system, the system is broken into modules. Each module or component is under the control of a design, which can itself be seen as a component of the overall system. This is a recursive model, since clearly each module may be sub-divided into smaller modules. Each component receives a request for service, and either provides that service or returns an exception. These "interfaces" between requestors and "providers" are at the heart of the control and monitoring function. There are three classes of exception: firstly, there are interface exceptions, where invalid services requests are detected, pointing the finger at the service requester. Secondly, local exceptions occur where a component detects that something is amiss and initiates routines which should return it to its service-providing ability. Finally, failure exceptions, where the component signals its inability to provide services. The difference between local and failure exceptions may be blurred where the component is able to fix itself but not immediately, so that it sends out a message stating "normal service will be resumed as soon as possible", suggesting that attempts should be made to fulfil the service request elsewhere for the time being. Within this basic framework, the various techniques outlined above are applied.

With software increasingly left to do things unattended — monitoring patients in hospitals, flying planes, controlling nuclear reactors — fault tolerance is not just a useful technique for maintaining access to your bank account. It could save your life.

PCW Resource Guide

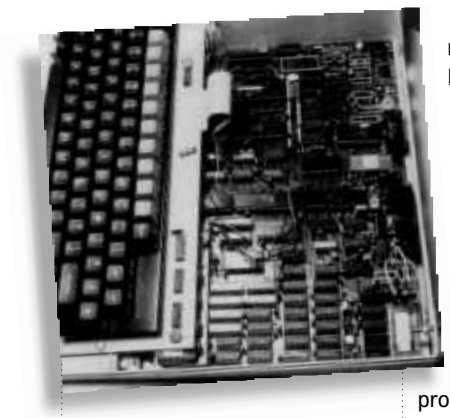
Software Fault Tolerance
Michael R. Lyu; Wiley
An up-to-date survey of techniques for making software fault tolerant, which is an increasingly important topic as software becomes ever more pervasive. From Wiley's Trends in Software series.

Retro

If you can't stand the heat... take the lid off

Overheating and language problems were just a few of the teething problems experienced by the BBC Micro. But even these couldn't detract from the excitement of "a machine for everyone". Simon Rockman reminisces.

What was the most talked about micro of the eighties? Worldwide, it might have been the IBM PC, but in January 1982 Chris Sadler and Sue Eisenbach claimed that it was the BBC Micro produced by Acorn. It was certainly eagerly awaited, partly because of reviews such as those in *PCW*, but mainly because of the huge delays which saw customers waiting months for machines they had already paid for.



The original review was an interesting mix of over-optimistic belief in Acorn's claims, exciting discovery, and some amazingly profound insight into what the future would hold. For example: "Every one of these interfaces is fully documented, and it is possible to imagine a whole industry will be set up to produce and market add-on kits utilising one or the other".

The review rightly praised the wide selection of ports and connectors. To equip a modern PC with these would probably cost as much as the original BBC Micro.

Prior to the launch it was rumoured that the machine would be called the Proton, to tie in with the family name of its predecessor, the Atom. The most naive comment was the belief that the overheating problems experienced in the preview machine (serial number 10) would disappear when the system software was blown into masked ROM for the production machines. In practice, the production machines had Eproms for a very long time and even when masked ROM did arrive, most owners ran them with the lid off. The heat problems led to corrupted programs for both reviewers and users.

The only major complaint the reviewers had about the build quality was that the UHF modulator wasn't good enough. This was great for Microvitec, which sold a lot of rather expensive monitors so that the BBC Micro could make the most of its impressive graphics modes, although this was glossed over in the review.

The debate over which language to use was becoming political. Some educators (being too far removed from reality) wanted Comal, which had no commercial value but produced elegant code. Acorn would have been happy with a version of the Basic used by the Atom and the article hints that the BBC wanted Microsoft Basic. The result was a compromise, but unlike so many compromises it was fast and excellent. The BBC Micro remained one of the fastest machines *PCW* had tested for quite a time after its launch. The review mentioned the BBC Basic ability to mix Basic and assembler – something which I am convinced led the UK to have more and better machine code programmers than any other country.

The review was mild in its criticism of the screen editor, although it pointed out of the full screen editor: "it isn't".

But it is the look to the future which was most impressive: "If Acorn actually produces all the products that have been tentatively hinted at in the media, then this machine could be for everyone. How far the machine can be recommended, though, depends on the way Acorn's future developments go.

"The System seems ideal for a home machine with colour graphics and expansion capabilities including paddles, Teletext and voice synthesis, we would be happier if the case was more robust… Turning to the schoolroom, a classful of BBC machines connected to disks by an Econet (assuming Acorn's current release of Econet software is more extensive than our last view of it) would provide a great deal of hands-on experience for a reasonable cost".

That cost was £205 for a 16K Model A (the machine few people bought) and £292 for the 32K Model B, but by the time the BBC Micro was available, those prices had risen to allow the shops to make a margin – Acorn initially expected shops to sell machines without a profit and to make up for it on software sales.

The review rightly praised John Coll's manual – which Acorn valued at £10, but for which Coll received enough of a royalty to make him a very wealthy man.

The BBC Micro lived up to its promise, and more; but then, back in 1982 there were plenty of exciting machines.

BOOKS

As the dust starts to settle on the media's love affair with the internet, we look at some books which view the net from a different angle. From post-cyber angst to a new HTML guide, to a handbook for budding online entrepreneurs.

Silicon Snake Oil — Second Thoughts on the Information Highway
Author Clifford Stoll
Publisher Macmillan
ISBN 0-333-64787-4
Price £9.99
Rating ✎✎✎✎✎

Since writing *The Cuckoo's Egg*, the dramatic story of how he tracked down an international spy ring which hacked into his systems at Berkeley, California, Cliff Stoll hasn't just had second thoughts about the information superhighway. His second book, *Silicon Snake Oil*, contains third thoughts, fourth thoughts and fifth.

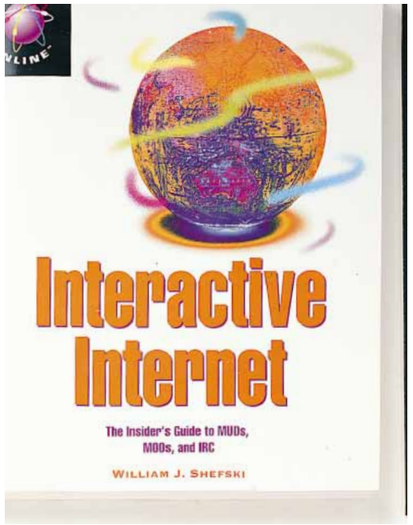
He attacks the use and unquestioning belief in technology in many aspects of nineties life, getting particularly passionate about computers' increasing and, to his mind, increasingly damaging infiltration of education and the library system. But his most heartfelt complaint seems to be that they waste time and that "sensation has no substitute". That is, they have wasted a lot of Cliff's time which he's suddenly realised he could have spent baking brownies or practising the clarinet. The book is not unlike Thomas De Quincey's *Confessions of an Opium Eater*: Stoll, like De Quincey, was an addict, albeit online rather than opium, who has survived cold turkey. After all, just because you are online, you don't have to read useless Usenet groups.

The problem is, Stoll can't be categorised as a Luddite or even one of these neo-Luddites. He likes computers. He likes them a lot — he's got five of them. But he is fed up with them too, and so the book is riven with what he himself admits is a deep ambivalence towards them and the internet, hence some highly conflicting statements.

On the one hand, he refutes the claim that new communications technologies will fundamentally change society; on the other he describes how a universal postal system in the US produced a "blossoming magazine readership, a new value placed on literacy". He decries the erosion of literacy in the modern world that he believes is partly caused by email, but a few pages later prints a very moving communication sent to him electronically from a Croatian girl.

The great thing about the book is that he admits to these contradictions. This is a very personal reaction to the information superhighway. As with *The Cuckoo's Egg*, Stoll himself is very much present in the book, as are his sister Jeannie, some of his friends, and many anecdotes about his work as an astronomer. And it is this sense of humanity rather than the arguments themselves that make the book a successful and readable antidote to the cool cyberbabble of the technocrats who want to drive us down the highway without letting us take a second glance.

Joanne Evans



Interactive Internet — The Insider's Guide to MUDs, MOOs and IRC
Author William J Shefski
Publisher Prima Publishing
Price £18.49
ISBN 1-55958-748-2
Pages 202
Rating ✎✎✎✎✎

With the world wide web and email getting all the hype, it's unlikely that you'll have even heard of MUDs, MOOs or IRC. Most internet books barely give them a mention.

MUDs (multi-user dungeons, or dimensions) and IRC (Internet Relay Chat) channels are the most interactive resources on the internet and the way people can use it to communicate in real time. MUDs offer role-play style gaming but also more serious business or educational applications. MOOs (Muds, Object-Oriented) are a more flexible variation on the MUD theme with extra features.

This book is, of course, American. If you're British it's plain depressing to discover that in the States you can "scope" — pay a small monthly fee to have your local call area extended to adjacent or nearby exchanges.

This book does a good job of explaining where MUDs began and how to use them. Unfortunately, there are two fundamental problems with MUDs. Firstly, they have a tendency to be populated by extraordinarily dull people talking about equally dull topics, and secondly, they're firmly routed in the bad old character-based Unix interface of the internet rather than the friendly point-and-click graphical user interface of the world wide web. As long as you're prepared to swallow these two drawbacks, this book looks like a fine introduction.

Ben Tisdall

The Which? Guide to Computers
Author Richard Wentk
Publisher Which? Books
Price £10.99
Pages 270
ISBN 0-85202-596-3
Rating ✎✎✎✎✎

This one is aimed at novices — people who are still at the stage of wondering whether they need to buy a computer at all. It uses small-business case studies throughout to enable you to decide whether or not a computer is appropriate. For example: "Andrew Kemble runs an advertising agency and uses a database to keep track of sales leads." "We used to use a card index system and a set of diaries, and we had problems all the time... We got someone to install a database for all this. Now we can search for people by their personal details, company name or any other way..."

The main software categories get a chapter each, followed by a "packages to watch out for" box which lists some of the popular ones. The software sections are generally pretty sound and as up-to-date as you can expect from a book written BW (before Windows 95).

Unfortunately, even a week before publication, the hardware section was starting to look dated and, in places, misleading. For example, the author says: "If your computer uses a 486SX/25 chip, you can remove it and replace it with a 486DX2/66 chip." While it is possible to make this upgrade, you would need to have a motherboard capable of being switched up from 25MHz to 33MHz, and such an upgrade involves moving jumpers. Pentium processors, now being heavily marketed as this Christmas's home PC purchase, are described as being for "advanced high-power applications such as photo-editing, CAD and large spreadsheets".

The Which? Guide is, for the most part, full of useful and practical advice on how to go about buying PC hardware, software and peripherals, but the publishers need to look at the lead time between writing the book and publishing it. In an industry as volatile as this one, six months is just too long.

HTML Visual Quick Reference
Author Dean Scharf
Publisher Que
Price £13.99
ISBN: 0-7897-0411-0
Pages 160
http://www.mcp.com
Rating ✎✎✎✎✎

Launching a Business on the Web
Authors David Cook and Deborah Sellers
Publisher Que
Price £36.99
ISBN 0-78970-188-X
Pages 202
Rating ✎✎✎✎✎

From the small stack of internet books which arrived this month, *HTML Visual Quick Reference* and *Launching a Business on the Web* stood out. There's not much to say about the former. The author says he wrote it because he couldn't find a good book on the subject. This is a slim, clearly written paperback full of good general information, from browsers to "what is HTML and how does it work on the web". The bulk of the book is arranged in sets of facing pages or spreads. Each covers a single topic. There are a few on things like where to find servers, how to structure pages and design tips, but most are devoted to HTML coding. Normally there's a description on the left-hand page together with the syntax and a couple of screenshots on the right showing the code on a typical HTML page. Although the book is not arranged alphabetically, there's a decent index at the back and an alphabetical listing of HTML code together with page references. All in all, pretty indispensable.

Launching a Business on the Web, subtitled: "A hands-on guide to successfully bringing your business to a worldwide audience", is a much more substantial volume. It attempts to tackle the question which is currently troubling companies of all sizes — what is the point of putting a company onto the internet in the first place and how to make money from doing so. It attempts to be comprehensive. There are sections on net components and terminology, why the net is good for business, and choosing hardware and software. There's even a lengthy appendix on HTML. If you're serious about putting your business on the internet, this won't be the only book you'll need to look at. But it does deserve to be one of the first. ■

Ben Tisdall

Top Ten Books: December 1995

1	Windows 95 Resource Kit	Microsoft	£46.99
2	Windows 95 Secrets	IDG Books	£38.99
3	Using Windows 95 Special Edition	Que	£32.99
4	Delphi Developer's Guide	Sams	£46.95
5	Delphi Starter Kit	IDG Books	£43.99
6	Using Visual Basic 4 User Friendly	Que	£22.99
7	Windows 95 for Dummies	IDG Books	£18.99
8	Parker Linux Unleashed	Sams	£39.50
9	Using HTML Special	Que	£37.49
10	Delphi Unleashed	Sams	£35.50

List supplied by the PC BookShop, 11 & 12 Sicilian Avenue, London WC1A 2HQ. Tel: 0171 831 0022. Fax: 0171 831 0443

CUTTING EDGE

CD-ROMs

Adele Dyer gets spaced out with Apollo 13, goes to the movies with Corel, and discovers cartoon clip-art as practised by the pros. And all from the comfort of her own computer.

Apollo 13 shows you the entire voyage using original footage and animation

Apollo 13 – A Race Against Time; Space Age Encyclopedia

In a sharp piece of marketing, Apollo 13 has been launched to coincide with the release of the movie of the same title. This seems to have had a rather unlikely, but fortunate influence on the makings of this CD.

Instead of opting for a text-based narrative, there is a huge amount of video and stills footage used to recreate the events. Obviously there are no clips from the actual movie, but instead the original film pictures have been used wherever possible and animation has been used to fill the gaps.

Apollo 13, and the Space Age Encyclopedia bundled with it, were both developed in the States by Computer Support Corporation which normally concentrates on graphics applications. As space enthusiasts they developed the Space Age Encyclopedia, and were spurred on to develop Apollo 13 by the imminent launch of the Hollywood version.

The graphics influence is obvious on Apollo 13. The two main sequences on the CD are highly visual, designed like television documentaries. Add to this the fact that the CD has been put together by space enthusiasts, and the mission is shown at its best. Sensationalism is avoided, and concentration is on how the ground crew solved the problem and kept the astronauts alive.

The three main sections are a pictorial account of the voyage, an interview with the flight commander, James Lowell, and an explanation of how the mission was controlled. These are complemented by a text-based encyclopedia section which, although informative, is less scintillating than the other sections.

The Space Age encyclopedia is a little different. Although a mine of information, it is heavily text based. If you are really into the space program you will love the fact that it's so comprehensive, but for those with only a passing interest it can be a little daunting. There are photographs and video clips to liven it up, but most of them are in a separate section and you will have to move about a fair deal to get the full picture.

If you were to rate Space Age on sheer weight of information, however, it cannot be faulted. It goes right through the history of the space program, from robotic to shuttle missions and nearly comes right up to date, the last entry being 2nd March 1995. It does have brief notes on missions scheduled, but it is disappointing not to find the Shuttle/Mir link-up detailed. In addition to the missions there are other sections tackling launch vehicles, space stations, space centres and the future of space exploration.

Designed for hardcore space enthusiasts, Apollo 13 nevertheless comes highly recommended to anyone.

Apollo 13 – A Race Against Time
Contact DBS 01202 722554
Price £24.95
●●●●○
Space Age Encyclopedia
Contact DBS 01202 722554
Price £49.95
●●●○○
Dual pack £59.95

Grolier Science Fiction

The idea of a CD on science fiction sounds good. With such a potentially exciting visual content, no matter what the

medium, it could have been one of the most fascinating CDs this year. So what went wrong?

The main contents table looks promising. A vaguely gothic yet futuristic design shows the main themes: life forms, time, mind and spirit, about sf, space and science and technology. However, once inside the encyclopedia the predominant feature is text, text and more text.

Finding your way about the screeds of prose is not easy. There is no mapping from one area of the CD to another, so you cannot follow a line of inquiry except through the rather inadequate index. This lists all the subject headings under the theme you are pursuing, but not related ones, so clicking here is pointless if you are trying to get more information. The hypertext tends to direct you to wider issues, rather than to allied subjects, and the bright pink capitals do nothing to keep your eye of the main body of text.

The most disappointing element is the lack of true multimedia content. There are only 12 short videos, six film clips and six interviews, which makes you wonder what the point is of putting it on CD. Despite the inclusion of poster reproductions and original book covers, you might be better off just getting hold of a book with a good index.

But once you have got over the initial disappointment, the actual information contained is excellent. For a non-sci-fi reader there is a lot to interest you, as the wider issues of the genre are discussed. There are short interviews with sf luminaries, such as William Gibson. The main body of text contains a good summary of themes and movements, as well as discussing a host of authors and the whole range of sci-fi products.

For a sf fan this CD is proba bly extremely useful, but for th non-fanatic it's just not excitin enough.

Grolier Science Fiction
Contact MHM 0181 600 6000
Price £44.99
●●●○○

Science fiction becomes an art form in this comprehensive CD

Comprehensive in its listing of films, the Corel All-Movie Guide has a novel way of rating them

Corel All-Movie Guide

Anticipating the release of Cinemania 96, Corel has launched the All-Movie Guide. It takes more or less the same approach as Microsoft's product, but has certain telling differences.

The coverage of movies is probably the selling point of this CD. Over 90,000 films and TV shows are covered, including several foreign titles. All the information on the films is organised logically, each entry mentioning cast lists, plot, an array of categories and a list of alternative movies you may enjoy as well.

Some of this you could do without. The list of alternative films is little short of weird – suggesting Philadelphia Story and Room with a View as alternatives to Withnail and I is laughable. In addition, the categories do not really help to pinpoint the content of the film.

The flags for Mad Max read: "Not for children, medium violence, graphic violence, nudity, adult situations, strong sexual content, acceptable ending, explicit language, profanity". You cannot help but feel it would have been better to include a more thorough plot synopsis and perhaps a critique, rather than these odd labels.

To compound this there are several omissions. There are no film clips or photographs for each film. There are photographs of some of the actors but not all, and some videos of interviews with various lesser luminaries. Neither does the CD include any critics entries, as Cinemania does.

The advantage of this package is its comprehensive list of films. As hard as I tried to find an obscure film not included, I could not manage it. As an encyclopedia it is reasonable, but as a film guide it falls well behind Cinemania.

Corel All-Movie Guide
Contact Corel 0800 581028
Price £49 + Shipping & VAT
●●●○○

CUTTING EDGE

Larry — a PCW reader with a wicked sense of humour

Larry on CD; Famous Magazine Cartoons

Well known through the pages of many a national newspaper, Larry has now been drawn into the computer age via CD. Although Larry reputedly did not know anything about CD-ROM when the project was first mooted, he quickly became involved, drawing specially-commissioned computer-related cartoons and designing icons.

Collected here are 325 of Larry's favourites, grouped into 29 sections under such headings as jobs, office and home. To find the right image you can either go through all the cartoons in the appropriate section, or do a keyword search. There are 1,200 keywords, so you ought to be able to find something to fit your criteria.

This is how clip-art ought to be. At last, someone has seen fit to release good cartoons for your use instead of relying on something that is royalty-free primarily because no-one in their right mind would want to admit to having drawn it. Needless to say, the quality of the cartoons here is exceptional and the breadth of subjects covered is impressive.

One word of warning though: the cartoons are not *entirely* royalty free; they are intended for use in non-commercial documents. You might be able to stick them in the gardening club newsletter, but not in your latest book.

Click Art has joined the club, releasing a series of cartoon and drawing clip-art products which are a little different from the company's normal run-of-the-mill clip-art CDs. One of the collections is entitled Famous Magazine Cartoons. While I did not recognise any of the famous names among the artists, the cartoons themselves are very good. The others include slightly unusual drawings made especially for Click Art, and a general collection of cartoons.

Click Art itself is sure the cartoons will not appeal as much as its regular clip-art collections, but it will be interesting to note how many people in the long term will find amusing cartoons more relevant to their readers than clip-art.

Larry on CD
Contact ePublishing
01865 372111
Price £15
●●●●❍

Famous Magazine Cartoons, Fun 5 Pack Cartoons and Art Parts
Contact Principal Distribution
01706 831831
Price £29.99 each
●●●❍❍

Multipacks

For a long time many CDs have been overpriced for the quality of the products. Now distributors are cutting prices dramatically, especially with the current wave of multipacks. These have been around for some time, but gradually more distributors are getting in on the act and offering packs at knock-down prices. The cynic may argue they have simply found the perfect solution for shifting less popular titles; but do they in fact offer good value for money? The second wave of multipacks are now just starting to find their way into the shops. The first editions were almost entirely entertainment based. The emphasis was on games, games and more games, with the odd dirt-cheap and cheerful DTP package or utility thrown in. Aztech's Blue pack includes such titles as Dune II, Lemmings, Wayne's World and Grandmaster Chess.

Gradually, more "edutainment" titles are being included. Sirius includes Microsoft's Multimedia Mozart and Beyond Planet Earth, and Aztech is planning to include Hutchinson's and PC training CDs in its Green Pack.

Meanwhile, Softkey is honing its multipacks. Softkey still offers the standard long string of ten CDs with quite a few of its own applications and utilities as well as games.

It has also just released a range of three CD packs entitled Power Packs, each aimed at a specific interest group, such as space, cars, or a "weekend" pack including movie, cookery and astrology guides, typically costing £25.

While none of the CDs included on the packs will blow your mind with their brilliance, collectively they offer considerable scope for enjoyment with limited outlay. I will be very surprised if the likes of Cinemania or any of the Dorling Kindersley titles appear in a multipack in the immediate future, but this does not mean they should be written off. Certainly for new software users it could prove the perfect way to expand your general CD collection without breaking the bank.

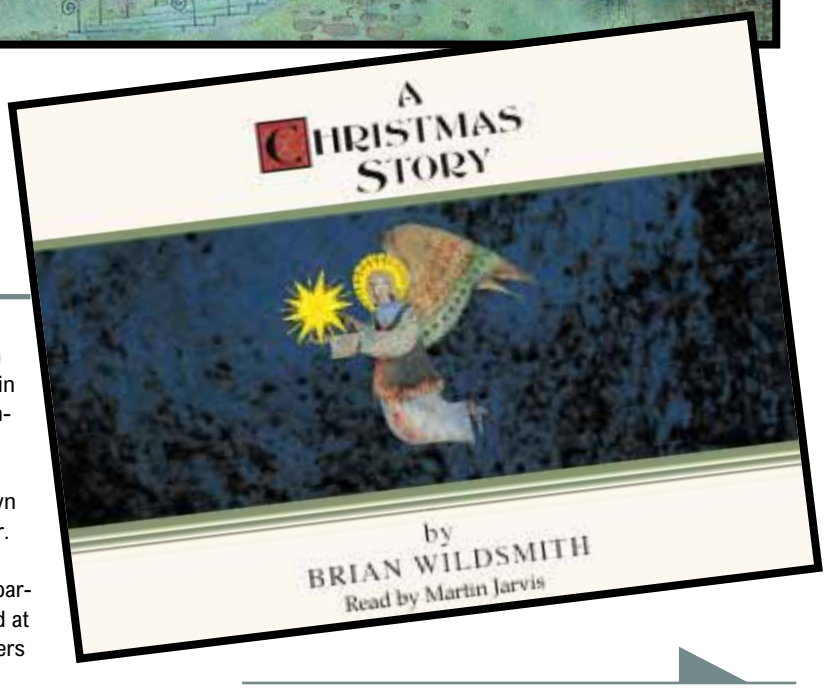
One Stop CD Strips Vols 1 and 2
Contact **Softkey**
0181 789 2000
Price **Vols 1 and 2 £34.95**

Publisher's Pack Blue and Publisher's Pack Green
Contact **Computer Future 01483 282829**
Price **Blue £27.95, Green £29.99**

Sirius 5ft x 10 Pak
Contact **One Stop Direct 0181 947 1001**
Price **£34.03**

Kids' Stuff

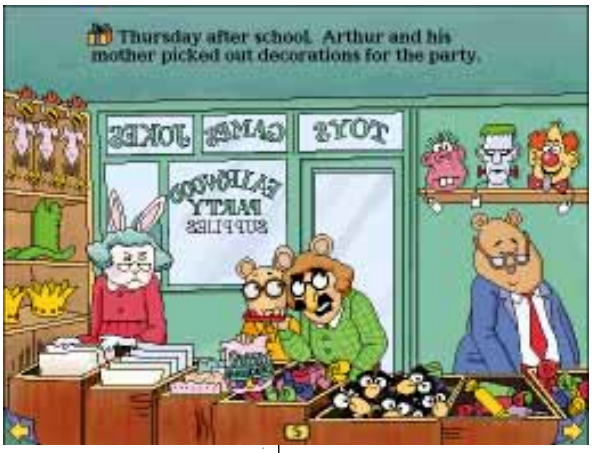
Bah! Humbug! Children shouldn't have presents at Christmas. Send 'em up the chimneys and down the mines. Make 'em work for their software. Paul "Scrooge" Begg has been sorting the over-the-moon excellent from the merely very good.



Above The fish-wished castle: the other fish seem confused by it all **Right** A seasonal story on CD-ROM

There are times when I have trouble sleeping. I switch off the light, close my eyes and... well, my brain seems to go into hyperdrive thinking about work, the lack of money, the leaky guttering, money, the week-and-a-half-old bottle of milk I've still forgotten to throw out from my office. Something always comes along to keep me from sleep. I combat this with camomile tea and talking books – you know, stories read out on tape or audio CD.

Siobán has inherited my love of talking books, has her own collection, and also likes to fall asleep listening to a tape. Probably her very favourite tapes are the five double-cassette collections of Richmal Crompton's William stories read by Martin Jarvis. Although Martin Jarvis is a very accomplished stage and television actor, he is almost certainly known to you as a voice actor. He has done loads of talking books (being particularly accomplished at Dickens) and voiceovers for commercials.



Arthur's Birthday: Mum does a Groucho impression, just one example of the wit of these popular titles

A Christmas Story

This said, I was keen to get A Christmas Story, an interactive storybook from Oxford University Press. Written and drawn by Brian Wildsmith – who seems pretty popular in Japan, where there is a Brian Wildsmith museum that receives 50,000 visitors a year! – and narrated by – yes, you guessed – Martin Jarvis, it tells the story of Rebecca, who was left to look after a baby donkey by her neighbours Mary and Joseph. But when the baby donkey began to pine for its mother, who Joseph had taken for Mary to ride on, Rebecca set out with the little donkey on a journey to find Mary and Joseph in Bethlehem. You can probably guess the sort of thing that happens next.

A Christmas Story is for young children, probably pre- and early school, who are just beginning to acquire some basic reading skills.

You can choose to have each page of the story read to you and, when Martin Jarvis has finished speaking, you can explore the page – clicking on hot-spots à la Broderbund Talking Books to produce an animation. The hot-spots are hidden, some quite cleverly, and the animation isn't always the same each time you click on it. And a further level of mystery and adventure lies in having to find the angel on each page.

The text can be displayed, so you can read along and follow the spoken words. Alternatively, you can simply have the story read to you. Selecting either of these options disables the hot-spots, however.

The disc also contains a collection of twelve carols sung by the choristers of Christ Church Cathedral School, Oxford. The music score and words are displayed on screen and your child can either sing along alone, sing with the choristers, or just sit back and get into a festive mood. The whole package comes with a small but nicely produced little book.

I liked A Christmas Story, but for something with only seasonal appeal I suspect that you might think it's a little on the pricey side.

The Fish Who Could Wish

Seasonal appeal isn't a problem with The Fish Who Could Wish, the second multimedia storybook offering from Oxford University Press. By John Bush and illustrator Korky Paul, and narrated by Robbie "Cracker" Coltrane, it works in much the same way as A Christmas Story. It's the story of a fish whose wishes always come true. Some of the wishes are bizarre:

Once, when he wished
He could go out and ski
It snowed for a week
Under the sea

The Fish Who Could Wish has better animation than A Christmas Story, and won a "Highly Commended" in the 1995 Best Toy Awards. An entertaining disc for young children.

Arthur's Birthday

I mentioned earlier the Broderbund Living Books series. For my money the best titles were Arthur's Teacher Trouble, closely followed by Just Grandma and Me. Now there's Arthur's Birthday.

Arthur's having a birthday party on Saturday, but Muffy's having a party on that day too. And arrangements for both parties have progressed too far for anyone to make a change, so it looks as if the girls are going to go to one party and the boys to another – an arrangement nobody's happy about.

Arthur's Birthday has all the customary on-screen hot-spots, many with multiple responses, and is witty enough for adults to enjoy repeated playing too. The box also contains a free copy of the book, *Arthur's Birthday*, by Marc Brown. I'm not sure about the learning value of these programs, but at this time of year we deserve to sit back and enjoy something frivolous.

Ride 'em, cowboy

Regular readers of this column will know that my daughter Siobán isn't partial to Westerns. Personally I think there's nothing better on a wet Saturday afternoon than settling into a comfy armchair with a John Wayne or Randolph Scott western on the box. I also enjoy a western paperback and among my favourite talking books are a couple of Louis L'Amour stories. You'll understand, therefore, that Oregon Trail II didn't hang around on my desk for very long. No, the silver disc was in the CD-ROM drive faster than you could draw a six-gun.

Get set for a journey across the Old West

Oregon Trail II

Oregon Trail II is both a game and an educational tool,concerning the geography of the Old West. Sadly, the Old West doesn't figure in the National Curriculum, so a full knowledge of the trials and tribulations of would-be settlers on the American frontier isn't likely to help you get through any exams. But this is Christmas, so who cares!

With Oregon Trail II you are at the head of a pioneer family crossing the Oregon, California and Mormon trails to a new life. To start, you choose the town from where you want to embark on your journey. You also choose the year, from 1840 to 1860, so you venture into the unknown or follow a well-trodden route. And you choose who you are going to be. You can be anything from a total greenhorn

The Amazon Trail: the starting point for your journey

to a professional such as a doctor, and you can select some special skills that might help you out along the way.

Next you have to purchase the necessaries for your journey, such as a wagon, draft animals, food and other supplies. In doing this you talk to loads of different people who advise you or rook you rotten. I got through all this, only to discover that I had too few animals to pull the wagon. So it's a matter of bartering and selling. And all this is done in a 3D rendered town that's full of things to explore. The trouble is, if you hang around too long you could get caught in the mountains when the winter snows fall.

En-route you can get advice by consulting what I'm told is an authentic handbook and record a diary of your adventures, and if you're lucky you'll make it to your destination. Then you'll learn what happened to you and your family in the future.

The Amazon Trail

If the Old West doesn't appeal to you, as it doesn't to Siobán, you can journey up the Amazon! The Amazon Trail does pretty much the same as The Oregon Trail, but in this adventure a mysterious disease threatens to wipe out an Inca village. The only thing that can save the village is a medicinal plant, hidden deep in the rainforest, and you have been elected to get it.

It's no picnic. There are dangers all along the way, from poisonous fish to yellow fever, headhunters, poison-dart frogs and vampire bats. There's also this strange blue mist that sends you back in time to meet the real explorers, naturalists, scientists, conquistadors and Inca kings.

Both discs are good fun, enhance computer skills and play a part in improving reading and comprehension skills, but most important they are fun!

Circus!

Circus! is the brightest and most colourful CD-ROM I've seen in a long time, is great fun to explore, and has some skill and memory testing games that will keep you absorbed for hours. It's guaranteed to be a winner with the kids too.

Circus! is designed to be explored. Clicking on something makes something else happen. You can take a quick tour by clicking on the ticket booth in front of the Show Tent and Zippy the mouse will guide you through the program.

There are two main parts to Circus!, the Show and Backstage. You can move from one area to the other at any point during the program. The Show is made up of eight Circus Acts featuring different characters. The Backstage area includes the Music Tent, the Clown's Trailer, the Magic Trunk, and the Lake. The show acts include all your circus favourites: clowns, lions, elephants, the human cannon ball, trapeze act, a magician, and more. But not only do you get to see their act, there's a testing puzzle or game to play. For example, one of the clowns is trapped inside a pile of cylinders by Rex, the magician. You have to get him out by trying to recall a precise sequence of colours you've only glimpsed.

Backstage you get to visit the music tent, and you can have fun in the clown's trailer, exploring the rooms and messing about with make-up.

Circus!'s author, Ayshe Farman-Farmaian, a graduate of the MIT Media Lab, won an award for her interactive movie A la Rencontre de Philippe. She is to be congratuated for creating something so bright and colourful, and which will keep boredom at bay for quite some time. Circus! is heavy on system requirements, though. You'll need a 486SX-33 or better and 8Mb of RAM, and even then you might find it runs a tad sluggishly.

Circus: The magician at work. You really have to see this in action to appreciate it

PCW Details

A Christmas Story
Price £29.99 inc VAT
Contact Oxford University Press
Tel 01865 267679
Fax 01865 267990
Rating ★★★★☆

The Fish Who Could Wish
Price £29.99 inc VAT
Contact Oxford University Press
Tel 01865 267679
Fax 01865 267990
Rating ★★★★☆

Arthur's Birthday
Price £39.99 inc
Contact Broderbund
Tel 0181 296 9454
Fax 0181 296 9455
Rating ★★★★☆

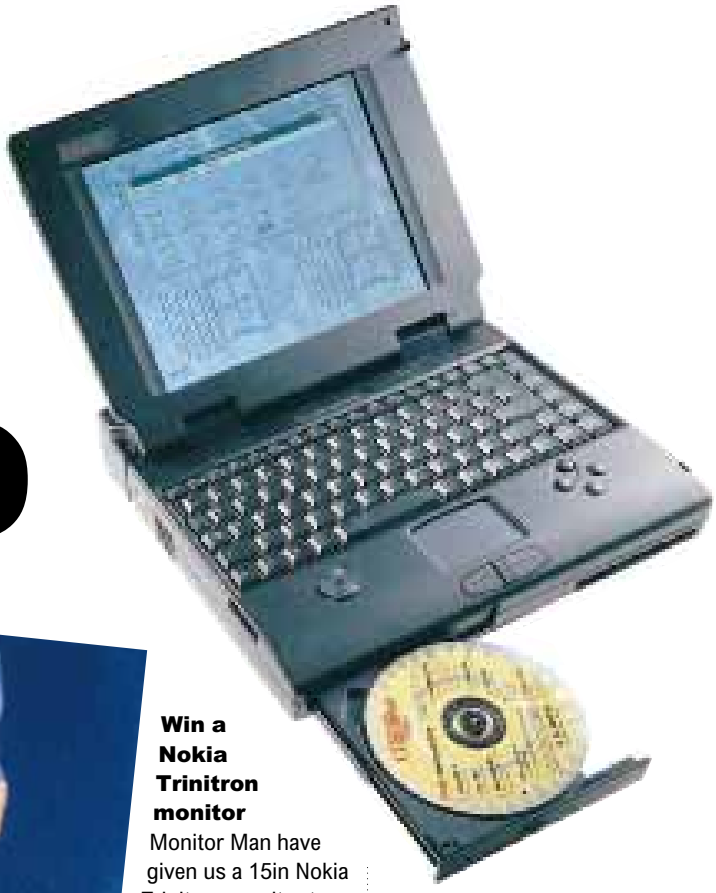
Oregon Trail II
Price £19.95
Contact Iona Software
Tel 0181 296 9454
Fax 0181 296 9455
Rating ★★★★☆

The Amazon Trail
Price £19.95
Contact Iona Software
Tel 0181 296 9454
Fax 0181 296 9455
Rating ★★★★☆

Circus!
Price £39.99 inc
Contact Matra Hachette Multimedia
Tel 0181 600 6000
Fax 0191 600 6060
Rating ★★★★★

CUTTING EDGE

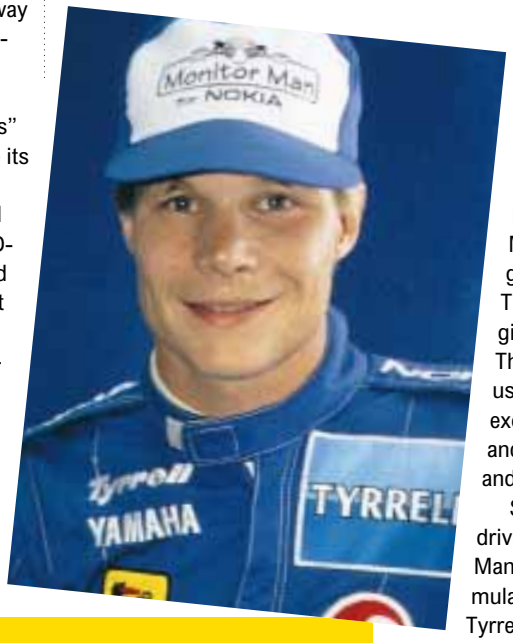
Win a Notino



Hi-Grade are giving away one of their new Pentium notebooks. The Notino P75M is reviewed in "First Impressions" this month, but to summarise its high-spec features, it comes with a PCI bus, an 11.3in dual scan colour LCD display, a CD-ROM drive and a stereo sound system. On top of this you get a plethora of great extras including a trackpad, an infra-red port and built-in joystick controls.

To win, answer this easy question. Where is Mount Ancohuma?

a) Brazil
b) Bolivia
c) Colombia



Win a Nokia Trinitron monitor

Monitor Man have given us a 15in Nokia Trinitron monitor to give away this month. The monitor is in the usual Nokia tradition of excellent build quality, and will run 1024 x 758 and 76Hz.

So why the racing driver? Well, Monitor Man sponsor this Formula One driver from the Tyrrell team. To win the monitor, all you have to do is tell us who he is. Is he:

a) Mika Falo
b) Damon Hill
c) Michael Schumacher

Win Flying Fingers or Mini Office

Europress Software are giving away 20 copies of Flying Fingers and 20 copies of Mini Office, on either floppy or CD-ROM.

Flying Fingers is multilingual, letting you choose to practice in English, French, German or Spanish. You can program it to remind you when to practice, and play games to help increase your speed.

Mini Office includes a word processor, database, spreadsheet, report generator and chart maker.

To win, just tell us which language Flying Fingers does not support:

a) Italian
b) French
c) German

Rules of entry

The competition is open to all readers of Personal Computer World except for employees, and their families, of VNU Business Publications, Hi-Grade, Monitor Man and EuroPress Software. Entries to arrive by 14th December 1995. The Editor of PCW is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of prizes.

PCW/Hi-Grade Competition

To enter any or all of these competitions, fill in this coupon:

Name
.....
Address
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.....
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Postcode
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Daytime Tel
.....
Answers (tick a, b or c)

Hi-Grade:	a	b	c
Monitor Man:	a	b	c
EuroPress:	a	b	c

Send your completed coupon to: December Competition, PCW Editorial, VNU Business Publications, VNU House, 32-34 Broadwick Street, London W1A 2HG.

Screenplay

NEWS

Let Kombat Kommence

Mortal Kombat III, the latest instalment of the hit beat-em-up series from Williams, is all set to make its debut on the PC. The game, which should be out by the time you read this, continues the story of oriental warrior Lui Kang and his quest to save the world from the evil god Shao Kahn.

With full 256-colour VGA graphics, the PC CD-ROM version features outstanding animation, all the characters from the arcade game and realistic stereo sound effects. It is said to be the best conversion yet thanks to hard-disk access speeds and the memory capacity of today's machines. This is backed up by the original programmers, Ed Boon and Oliver Tobias.

Mortal Kombat III will be published by GTE Interactive on 13 October 1995. It will hit the Sony Playstation, Sega Saturn and other console formats shortly afterwards. To find out more about the whole Mortal Kombat story, turn to our feature on page 98, and look for a full review in "Screenplay" soon.

Nintendo: Phone THE on 01782 566566

Charts

1	Command & Conquer (CD)	Virgin
2	Phantasmagoria (CD)	Sierra
3	Championship Manager 2 (CD)	Domark
4	Fade To Black (CD)	EA
5	Need For Speed (CD)	EA
6	7th Guest – White Label(CD)	Virgin
7	Dark Forces (PC & CD)	Lucas
8	PGA Tour Golf '96 (CD)	EA
9	Complete Ultima 7 Classics (CD)	EA
10	Magic Carpet 2 (CD)	EA
11	Full Throttle (CD)	US Gold
12	Star Trek The Final Unity (CD)	Microprose
13	Ultimate Doom (PC)	US Gold
14	Indycar – White Label (PC/CD)	Kixx
15	Ultima Underworld 1&2 (CD)	EA
16	World Cup Year '94 (PC)	Empire
17	Day Of The Tentacle (CD)	US Gold
18	Star Trek 25th Anniversary (CD)	Virgin
19	Strike Commander (CD)	EA
20	Premier Manager 3: Multi Ed (CD)	Gremlin

Ultra unveiled

After 19 months of intense development, the chipset for Nintendo's Ultra 64 games console has been completed. A joint effort between the Japanese games giants and US-based Silicon Graphics, the technology is said to deliver greater graphics performance than Sony's Playstation and the Sega Saturn.

The Ultra 64 will be powered by a 64-bit processor, complemented by a MIPS Multimedia Engine and the Silicon Graphics video chip. Together it is claimed they will deliver over 600,000 texture-mapped polygons per second, with real-time anti-aliasing, real-time tri-linear MIP-mapped Interpolation (TLMMI) and perspective correction.

To produce what it calls true next-generation software for the new machine, Nintendo has put together a "dream team" of early developers. The team includes Rare, producers of Donkey Kong Country, Acclaim, Virgin Interactive, Williams and Sierra Online. Each company has a string of outstanding titles to its name and all see the Ultra 64 as the next big thing in games.

The Ultra 64 is due for release this November in Japan, and is expected to retail for less than $250 US dollars.

Windows worms

Following the successful launch of its Windows 95 title Pitfall – The Mayan Adventure, Activision is converting the console hit Earthworm Jim to this new platform. Originally developed by Shiny Entertainment, the PC version will take full advantage of Microsoft's enhanced video and audio features.

In this madcap action adventure with cartoon-like animation, Earthworm Jim is a worm who inherits superhuman powers when an indestructible cybernetics suit falls out of the sky and lands on him. Defending his right to wear the suit, Jim must battle a variety of baddies in a effort to save Princess What's Her Name. If you think this all sounds a bit silly, you're right.

Earthworm Jim is already available on Super Nintendo and Sega Megadrive, and will swing into action on Windows this November.

Activision 0181 742 9400

Magic Carpet rides again

Magic Carpet 2, the sequel to Bullfrog's bestselling 3D fantasy adventure, is all set to swoop onto the scene this Christmas. The game follows the same format as before, but boasts an improved flight experience with faster response and smoother graphics. Bullfrog has upped the villain count with a positive horde of new monsters, and players have an even greater number of spells at their disposal. Other features include SVGA graphics, night adventures, cavern levels and mission-based scenarios to add an extra dimension to the gameplay.

Bullfrog is on 01483 579399 and Magic Carpet 2 will cost £44.99.

CUTTING EDGE

Pitfall
The Mayan Adventure

The next generation of the classic Atari VCS game Pitfall pits against quicksand and wild animals. He never stops monkeying around.

Chris Cain

Pitfall – The Mayan Adventure is the long awaited update to David Crane's classic Atari VCS cartridge adventures. Those games centred on the exploits of Pitfall Harry, and this time you play the son of the legendary vine-swinging hero.

Designed by Activision for Windows 95, Pitfall – The Mayan Adventure takes all of the fun of its predecessor and brings it up to date. In this game Harry Jr's job is to rescue his famous father, kidnapped in the jungle by the dreaded warrior spirit, Zakelua: Lord of Evil. It appears Dad had recently taken an interest in ancient Mayan treasure, and so Zakelua decided to take an unhealthy interest in him.

Playing the hero, you start your adventure armed only with your wits, your father's journal and a trusty sling. The quest is split into 14 different sections, starting in the outer regions of the jungle and ending up at Zakelua's lair. On each level, the idea is to find the exit to the next, collecting valuables and avoiding a horde of hungry inhabitants along the way. And animals aren't the only danger – you'll have to watch out for Zakelua's army, quicksand, crumbling rock faces and strong river currents.

Pitfall – The Mayan Adventure has you climbing trees, swinging on vines, zooming down zip lines and generally monkeying around. The path from start to finish is never a straight line and careful timing is required to avoid the pitfalls. Your sling can be used to ward off would-be attackers and other weapons can be collected en route. By far the best in the early stages is the boomerang, which can take out a whole batch of bad guys in one fell swoop, turn around and return to you.

The graphics in Pitfall – The Mayan Adventure are a far cry from those in the original 8-bit series, with detailed design, luscious colour and smooth parallax scrolling. The game claims to run best in 256-colour mode, but will work at higher bit depths so you don't need to restart Windows. You can play in either a window or full screen, depending on your preference and the power of the PC you are using. Most people seem to prefer full-screen action, but I was happy with a double-sized window.

Audio has also come a long way, and ambient sounds can be played off the CD to create a real adventure atmosphere. The music's good too, but you can't have both at the same time. Best of all though, the gameplay hasn't changed a bit. This version of Pitfall is just as addictive as its predecessors, with plenty of levels to keep you going and that "just one more go" appeal.

Pitfall has always been a classic and nothing has changed. This game is probably the best of the Windows 95 crop at the moment, although if you play it full screen it's no different to a DOS product. Either way, it comes with my highest possible recommendation.

System Requirements
486/33MHz or higher, 8Mb RAM, Windows 95, double-speed CD-ROM, VESA Local Bus or PCI SVGA video card, mouse
Price £35-£45
Contact Activision 0181 742 9400

Fury3

Nicola Kingsley finds fast and Fury-ous action in the new Windows version of this futuristic showdown. It's full-on warfare all the way.

Hell hath no fury if it can be compared to this new Windows-based 3D shoot-em up from Microsoft. Right from the onset, it's full-on warfare with 24 demanding missions to keep you on your toes.

The date is 2832 and as Councillor for the Terran's Council of Peace, it's your job to stop the Bions ruining a fragile coalition among seven peaceful planets. The action starts on Terran and the idea is to make your way across eight planets to Fury, the homeworld of the Bions.

Your ship is equipped at the start with a ServoKinetic Laser, a high-powered weapon which conveniently regenerates its own ammunition. Other increasingly deadly weapons can be picked up as you progress through the game.

Shields on, and let's get going. Press start and seconds later you're flying over a 3D-bitmapped terrain that looks like a cross between the Alps and the Sahara. Every last ounce of skill is required because not only do you have to shoot down as many enemy ships as possible while being attacked on all sides, you also have to watch the compass to find the main targets of the mission as well as negotiating the ever-changing terrain.

Through the clouds and into the far reaches of the sky the fighting continues. On the ground, even under the ground, targets wait, but a kill is almost enough of a reward with a huge juicy explosion and lots of flying debris. Once three missions are completed, the next planet beckons with its own particular landscape, climate and hidden evils.

Gameplay is similar in feel to Descent, with an up-tempo techno soundtrack. The action feels faster, due to the open space dogfights which leave the horizon spinning around outside the cockpit. Some readers may be reminded of Terminal Velocity, and Microsoft has admitted to using the same graphic engine.

Unfortunately, Fury3 isn't that smooth on the recommended minimum 486DX/66. Graphic detail can be reduced, which helps to increase speed, and the game runs faster when used with Windows 95 – as recommended by Microsoft. It works with Windows 3.1 but can be troublesome to set up.

Fury3 can be fully installed to your local hard disk, which helps speed things up a bit. This is especially important if you have anything less than a double-speed CD drive, but you will lose the video clips. You will need between 55 and 70Mb of disk space for a full install, depending on whether you are running Windows 95 or 3.1.

The game is only available on CD-ROM and at the moment comes bundled with Microsoft's new joystick, the Sidewinder 3D Pro (see this month's Gadgets spread on pages 56-57) which incidentally seems to work best, if only under Windows 95. The cost for the bundle is rather high at £69.99.

Although demanding on hardware, Fury3 makes for a fast and furious experience with lots of challenging flying and shooting into the bargain. I'll try and keep the peace for the price of this bundle, but I think I'll need Windows 95 first.

System Requirements
486 DX2/66, Local Bus SVGA video card, 8Mb RAM, double-speed CD-ROM, Windows (preferably Windows 95), minimum 10Mb hard disk space (95), 14Mb (3.1)
Price £69.99 with joystick, £39.99 on CD-ROM
Contact Microsoft 01734 270001

CUTTING EDGE

Pinball Space Cadet

If you're a pub pinball fan, you'll find Pinball Space Cadet offers all the fun of the real thing without chipping away at your pocket money, says Doug Chapman.

While technological advance changes almost everything around us, the confines and configurations of the average pinball machine have changed very little. Microsoft's 3D Pinball Space Cadet, supplied as part of the Windows 95 Plus pack, adheres to the time-worn plot of these arcade favourites admirably.

The screen layout is simple – a birds-eye view of the pinball table, and the player's actions are limited to controlling the left and right flippers and the ball release. Each game begins with the catapulting of a ball into the table and ends with the loss of the third ball. The aim of the game, apart from the obvious attraction of bettering your highest score, is to continually reach the next level. As the game's title suggests, you start out as a mere space cadet but with each feature passed, a further level is reached and your status rises.

The most outstanding feature of Space Cadet is the option to change your view of the table to 3D, giving you the effect that you really are standing, flippers in hand, at the table. It makes the game harder and more realistic. An aid to this increase in difficulty comes in the shape of a cheat, enabling you to tilt the table sideways or back or forth as you wish.

The graphics are bright and appealing to the eye, and there are enough flashes of light and crash-bang sound effects as the ball rebounds into a variety of ramps and buffers, to maintain the impression of reality. However, whereas the sound effects are rather good, the music is disappointing. There is none of the brash soundtrack that accompanies most state-of-the-art pub machines: this is a drab opening tune that sounds like an afterthought.

Poor music notwithstanding, 3D Pinball Space Cadet is excellent entertainment and highly addictive. The game is difficult enough to make it a long-standing challenge and after several hours of playing I still fell short of its highest levels. It compares favourably with other computer pinball games, and can be compared favourably to Tristan or Crystal Caliburn on the Apple Macintosh.

If pinball is your thing then Microsoft Plus is a worthy investment, providing all the excitement of the real thing without the need to continually feed it coins. If not, the game admirably boosts an already interesting package from Microsoft and is undoubtedly worth checking out.

System Requirements
486 PC or higher, 8Mb of RAM, 25Mb free hard disk space, Windows 95
Contact Microsoft
01734 270001

Leisure Lines

Brainteasers courtesy of JJ Clessa.

This Month's Quickie
What number is twice the product of its digits?

This Month's Prize Puzzle
A nice easy problem in the run up to Christmas, this year. So don't all write in complaining how simple it is – I know already.

My friend has a farm in which he keeps five types of animal – geese, sheep, horses, hens and cows. The number of geese is less than one third of the number of hens, and three less than half the number of cows. The sheep and hens outumber the horses and cows by three; the horses and hens constitute one less than half the total number of animals; and the horses and cows comprise 7/16 of the total.

How many animals of each type are there?

Answers on a postcard or backs of sealed envelopes – no letters and no floppy disks – to: *PCW* Prize Puzzle – December 1995 PO Box 99 Harrogate N Yorks HG2 OXJ to arrive not later than 20th December 1995

Good Luck!

Winner of September 1995 Prize Puzzle
Not a very exciting response to our September logic problem. Perhaps it was the warts, acne and dimples that put people off, or it might have been that many of our regular puzzlers were on holiday. Just over 60 entries came in. Of course, it could have been the fact that the problem was not exactly defined. Two answers – Aaron or David could have fitted the bill, so we accepted either.

Anyway, the winning card – drawn at random – came from a Mr CT Harris, of Poole in Dorset. He also sent us a very nice picture of Kevin Costner in his wetsuit on the other side of the card (can we have Julia Roberts in her swimsuit next time please?).

Congratulations Mr Harris – your prize will be with you shortly.

Meanwhile, to all the losers, our usual message — keep trying, it could be your turn next.

Hands On Contents

Hands On is the place where readers can contribute to *PCW*, and as always we'll pay for anything we use. Macros, sections of code and hints and tips will be rewarded with a £20 book or record token (please say which you'd prefer) and we'll pay hard cash for longer, more involved pieces. Please include relevant screenshots in .GIF format.

All submissions should be emailed to the author of the appropriate section, or snailmailed to Hands On, *Personal Computer World* Editorial, VNU House, 32-34 Broadwick Street, London W1A 2HG. Questions and short hints and tips can be faxed on 0171 316 9313.

We're constantly working to improve the contents of Hands On. If you have any suggestions, send them to the Editor at the address above, or email them to: editor@pcw.ccmail.compuserve.com

Hot **property**

There's no shortage of properties in Windows 95. In fact they're everywhere, as Tim Nott, right-clicking his way around his screen, found out. He's been finding out about fonts, too.

They used to be called tabbed dialogue boxes and first made their appearance in places such as the Word for Windows "Options" command. Now they're everywhere and, confusingly, are called "Property Sheets". I would suggest "Leaflet" or "Book" would more appropriate for something with more than one page, but never mind. Practically every object on the screen has "Properties" — right-click on an empty part of the desktop, and down at the bottom of the pop-up menu "Properties" summons a tabbed dialogue box for display settings — exactly as if you had gone via Control Panel. Right-click on the Taskbar, and "Properties" leads to various options for the Start Menu and Taskbar, such as turning the clock off. Properties of a shortcut tell you where it resides, where it points to and lets you change the icon — a direct descendant of Program Manager's "File/Properties".

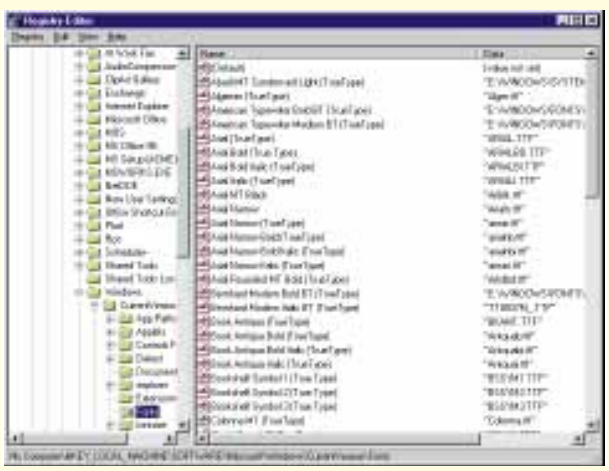
It's really worth spending some time right-clicking on everything in sight. The property sheet for "My Computer" for instance is a quick way to Control Panel/System and the Recycle Bin properties let you set its size for each drive and do away with the confirmation dialogue. Right-click on a drive letter in "My Computer" and you'll get a pie-chart display of free space, and on the second page, access to the scanning, defragmenting and backup tools. Folder properties include, most usefully, the total of nested folders, files and disk space consumed.

There are a few tips worth knowing on property sheets generally. Anything you don't understand, click first on the question mark button, then on the thing. You can also right-click on the thing, then click with either button on the "What's this?" panel that pops up. However, this doesn't always work as there is another curious feature of property sheets. Move the cursor around, and you'll notice that in certain places it changes to an I-beam: not just in the edit boxes, but in the "grey" (or whatever colour you have) area as well. You can't edit this information, but you can select it and copy it to the clipboard. For example, examine the properties of MSPAINT.EXE and you'll find you can select and copy all sorts of data, such as the creation date and version information. Another little trick concerns the "Location" information. This only gives the name of the folder containing the object, but hold the pointer over this and a pop-up appears giving the full path.

Fonts, folders and phantoms

One thing I was hoping for in Windows 95 was an improvement to font management. Well, there's good news and bad news. The good news is that you don't need to separate .FOT and .TTF files cluttering up the system folder anymore. You can also view and print samples of any font — even if it isn't installed. You can add fonts through the "New font dialog" or by dragging from another folder, much as you could with File Manager and the Control Panel Font section under Windows 3.1. If you use the former method, there is, again as previously, a check box for the option to copy the actual file over (you'd probably want to do this if installing from disk or CD), or not (if the font is already on your hard disk, but not in the default Fonts folder).

If you use the latter method (which, after all, is what Windows 95 is all about) you'll find that unlike dragging an .EXE file with the left button, you don't get a shortcut: the whole caboodle is either copied between drives, or moved between folders on the same drive. If you don't want to copy/move the file, use the right button and choose "Create shortcut". Now, in any normal folder you get a shortcut but in the Fonts folder you don't. The icon has the little shortcut arrow symbol, but the filename and size are that of the source file. Moreover, there's no shortcut page in the Properties sheet, and if you delete a



Regedit tells truths about your fonts, unavailable elsewhere

Who's that girl?

The properties for data files vary very much with the type of data — Microsoft Office documents such as Excel and Word have two extra pages for summary information and statistics. Media files also run to three pages, with all sorts of information including copyright, and a player. Which brings me to the great Windows 95 FAQ (Frequently Asked Question). Who is the singer on the "Good Times" video clip? Well, look in the property sheet of Goodtime.avi and all will be revealed. You might also like to check out the authorship of "The Microsoft Sound" in your Windows\Media folder. Not one of his more interesting works, I feel, but it's good to see another Englishman in the Microsoft charts.

font shortcut it goes straight to oblivion, bypassing the Recycle Bin.

So what on earth is going on here? Are these shortcuts, the full files, or some other strange entity? The secret is that the Fonts folder is a "special case" — you can't, for example, create any nested folders. And if you look at it with File Manager (run winfile.exe from the Start Menu "Run" command) the shortcuts don't exist at all. Still, logic is not one of Windows 95's strong suits. What can you say of a system where, to shut down the computer, you click on the "Start" button?

If you'd like a touch of sanity, start the Registry Editor. If you can't find it in the start menu, type "regedit" from the "Run" prompt. Start at the section HKEY_LOCAL_MACHINE and click on the plus sign next to it. Keep clicking on the plusses down through Software, Microsoft, Windows, Current Version, Fonts. You should then see, on the right of the screen, a list of font names, files, and if not located in the default font folder, the path. Why you have to go through this rigmarole to find out what's what on your hard disk is beyond me, but never mind.

So the upshot is if you want to keep separate sets of fonts (say a limited set for word processing and a wider range for graphics or DTP applications), it can be done. Keep your standard fonts in C:\Windows\Fonts. Create a new folder (say C:\Windows\More Fonts) for the fancy stuff, and copy the .TTF files in there. When you want to install the additional fonts, select all, right drag to the Fonts folder, and create shortcuts. To uninstall them you're going to have to pick out each "shortcut" individually and delete it. Not very good, is it? And while I'm in a Windows-bashing mood, check out the screen version of the Symbol font — that's the .FON version with a red "A" icon. Notice anything strange compared to the MS Serif and MS Sans Serif screen fonts?

Gang warfare

But now for something far more important. Having last month found out how to change the start-up and shut-down screens, the next question any seeker of truth asks is "Where's the gang screen?".

Are you sitting comfortably? Right, then right-click on the desktop, create a new folder and name it:

```
"and now, the moment you've all been waiting for"
```

No, I'm not joking. Omit the quotes, but get the rest exactly as printed. Then right-click on the folder once more and rename it to:

Documentary evidence

One thing I like about Windows 95 is the emphasis on documents rather than applications. I find the "Documents" list on the Start button very handy, and I like the way the applets show the file first, then the application in the title bar — so you see "My Picture - Paint" or "My Letter - WordPad" on the Taskbar. So why on earth did the designers of Office 95 revert to the old way, with the program first? It doesn't require tremendous learning effort to remember that the "W" icon stands for Word, and the "X" for Excel. So why the totally redundant "Microsoft Word…" afterwards, taking up the space where you want to see the document name?

At last — the Windows 95 gang screen

```
"we proudly present for your viewing pleasure"
```

Right-click and rename again, including the capitals and exclamation mark, to:

```
"The Microsoft Windows 95 Product Team!"
```

If you really want to impress bystanders, skip all that and just create a new folder called

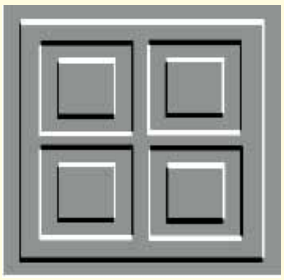
```
"anything.{869DADA0-42A0-1069-A2E7-08002B30309D}"
```

The "anything" can be anything you like, but the stop, brackets and numbers must be just right — again, omit the quotes. You're now ready to go: if you've got sound on your PC, turn it on, open the folder and wonder how much disk space that lot takes up.

Finally, thanks to everyone who has written in with feedback and tips, especially Gareth Cooke, Ian Hayhurst and Ian Abbott who all came up with the gang-screen secret. All further tips will be gratefully received and usually published and acknowledged in the fullness of time. So if you've sent me deep hacks into the registry that haven't appeared in print yet, be patient.

PCW Contacts

Tim Nott can be contacted by post via *PCW* or by email at **timn@cix.compulink.co.uk**



Life before **Windows**

How does DOS affect Windows? Tim Nott examines the ins and outs of the Dblspace and Autoexec.Bat commands, and recommends Recorder for a change of keyboard layout.

Microsoft's bundled disk compression software loads DBLSPACE.BIN automatically prior to processing CONFIG.SYS. DBLSPACE.SYS, usually appearing at the end of CONFIG.SYS with the /MOVE switch, relocates as much as possible into the high memory area, with the rest at the bottom of conventional memory.

That's enough about CONFIG.SYS, because as you no doubt realise there's another file, AUTOEXEC.BAT, that needs to be processed. History has blurred the distinction between the two. The commands in AUTOEXEC.BAT, unlike CONFIG.SYS, are the sort of thing you can enter from the keyboard: a BAT(CH) file is simply a series of DOS commands that can be played back from a file, rather than having to type each one in, and the AUTOEXEC bit means that your PC will AUTOmatically EXECute it after CONFIG.SYS has had its say.

The first line you'll see here is probably

```
@ECHO OFF
```

All this does is to stop the subsequent commands "echoing" (being displayed) on the screen. The @ sign stops the ECHO command itself from appearing.

Next, you might typically get:

```
PROMPT=$p$g
```

This defines the appearance of the DOS prompt. By default (i.e. with no PROMPT command) you get just the current drive and a greater-than sign. The "$p" adds the current directory path, which is useful. You can augment this in all sorts of ways — adding time, date, your own text and so on, and if you really want to get your anorak dirty use "Escape" codes to change screen and text colours or even key assignments — see the DOS help files on PROMPT and ANSI.SYS for more.

You can have a separate prompt for DOS sessions under Windows — useful if the user needs to be reminded that they are in a full-screen DOS session under Windows rather than the real thing. Stick in a line, for example:

```
SET WINPMT=Type EXIT to return to
Windows $P$G.
```

Which brings me on to the SET command in general. This creates and defines "environmental variables". Typical of these are TEMP, showing the directory where temporary files (such as printer output) should be stored, and PATH. If a program file is on the PATH (its directory will be listed to the right of the equals sign) then you don't have to change to that directory (or specify the full path) to run the program. At its simplest, you'll probably have something like

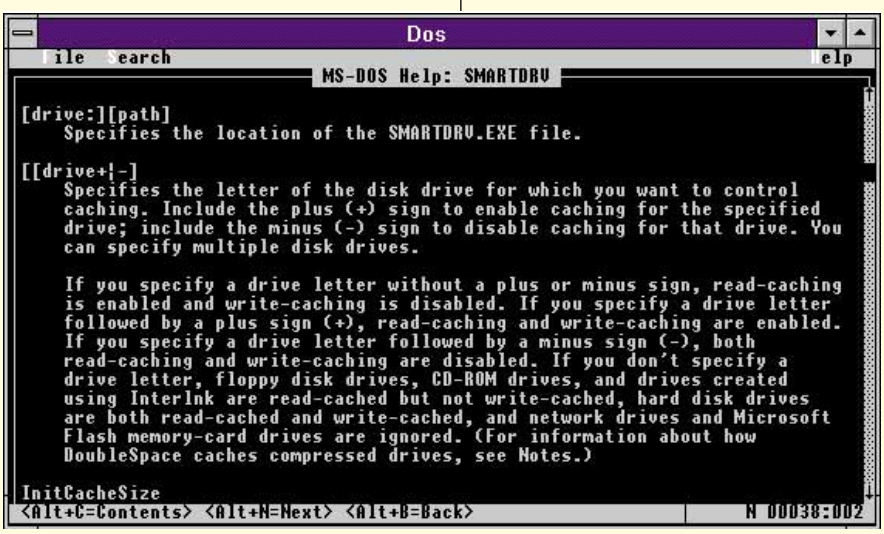
```
SET PATH=C:;C:\DOS;C:\WINDOWS
```

Note that first, you can leave out "SET" and the equals sign, and that each directory needs to be separated by a semicolon. Other applications may add their own paths, either on the same line or by adding a separate line such as

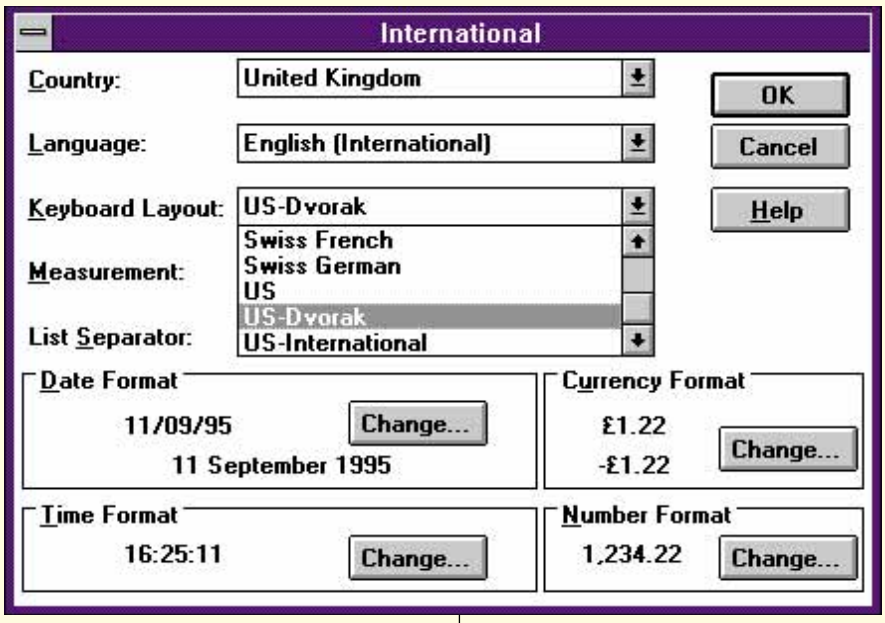
```
SET PATH=%PATH%;C:\WIZZO
```

where %PATH% stands in for the existing path. There may be more system variables defined by using the SET command — examples include SET MSINPUT, which Microsoft mouse and keyboard drivers need, or SET BLASTER which defines the IRQ, DMA and other esoteric settings for a SoundBlaster card.

You don't need a mouse driver loaded in AUTOEXEC.BAT if you're only running Windows. If however you want to use the mouse under DOS (or a Windowed DOS session) you'll either need something like MOUSE.EXE or MOUSE.COM in AUTOEXEC.BAT or a MOUSE.SYS loaded by CONFIG.SYS. The keyboard command is another option — you don't need it in Windows, as the country settings are all in Control Panel — but if you want



All you ever wanted to know about Smartdrive, from the DOS "Help" command



Choose a new keyboard layout — and automate switching with Recorder

your pound sign to stay put at Shift+3 in DOS sessions, you ought to have

```
KEYB UK,,C:\DOS\KEYBOARD.SYS
```

(or sometimes just KEYB UK).

As with CONFIG.SYS there are all sorts of third-party drivers and TSRs (programs that stay in memory) that your particular hardware or programs may need, such as a scanner driver, network drivers, third-party disk compression, or support for a file-transfer program such as LapLink.

SMARTDRV is a process that speeds up disk access by keeping recently-accessed data in memory, cutting out unnecessary disk reads and writes. There are a heap of possible parameters here, and no room to go into detail, but typing "SMARTDRV" at the DOS prompt will show the current settings. Append " /?" to that for a list of what all the options mean or "help smartdrv" for the full help text.

The important settings, however, are the two numbers. The first is the cache size, in Kilobytes, prior to running Windows. The second is that used when Windows is running. If you have 4Mb or less on your machines, Microsoft recommends setting these to 1024/512 — over 4Mb but under 6Mb to 2048/1024, and over 6Mb to 2048/2048. But, if you're running the faster 32-bit file access under Windows 3.11 (check in Control Panel/386 Enhanced) VCACHE will look after hard-disk cacheing and you will only need Smartdrv for floppy disks or CD-ROMs, so a lower value (usually 128) will free up memory. Control Panel should change the Smartdrv settings automatically, but you should check.

Finally, if your machine, heaven forbid, is prone to crashes, you might wish to go for safety rather than speed by disabling "write behind" cacheing altogether, so that data gets written to disk immediately. The "/X" switch after SMARTDRV achieves this. Order doesn't generally matter much, but there are exceptions. If you have a CD-ROM drive, make sure that the command that gives access to the drive (usually MSCDEX.EXE) loads before SMARTDRV, otherwise you won't be able to use disk cacheing on the CD.

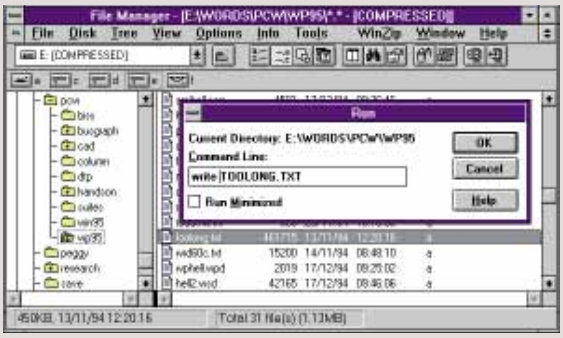
Going back to last month, I mentioned that certain lines in CONFIG.SYS were needed to be able to load drivers and other programs "high" — keeping as much conventional memory (below 640Kb) free as possible. You may also have noticed that some lines in your CONFIG.SYS and AUTOEXEC.BAT are rather more complicated than the examples I've given, with entries starting "DEVICEHIGH" or "LH" followed by a barrage of numbers and letters before the main command.

These two things are not unconnected. DEVICEHIGH and LOADHIGH (which can be abbreviated to LH) attempt to load whatever follows into upper memory. This isn't quite as easy as it sounds, as some drivers and programs need a lot of memory to start, then contract to take up less, and the order in which things are loaded can make a tremendous difference.

Fortunately, trial and error isn't the only way to optimise this process. From the plain DOS prompt (not a Windows DOS session) type "MEMMAKER" and follow the prompts. If, as any self-respecting dabbler would, you want to use the

Run, run, run

While Windows 95 users are gloating over their "Run" command on the Start Menu and "Open with..." from the mouse button, bear in mind that something similar is available in File Manager. With no file selected, choose "Run" from the "File" menu, and you can type in the name of any executable file (even a DOS program) and run it. With a program file selected, the name will appear in the box, highlighted. Move the cursor to the end with the "End" key, type a space, and whatever command-line switches you want to specify or data file you want to load. The counterpart to this is to highlight a data file — say it's one of those annoying .TXT files that are too big for Notepad: choose "File/Run..." again, press "Home" to get the cursor to the beginning of the line and type "Write", plus a space. Hey presto ! The outsize text file appears in Windows Write.



● *With "File/Run..." you can use associated files in a different application*

"Custom" rather than "Express" setup, do press F1 at the following screen to find out what all those settings mean. The "optimise for Windows" option in particular is a trifle misleading, as this actually increases the memory available for Windows DOS sessions while decreasing that available from naked DOS. You'll need to restart your PC twice (or rather, Memmaker does it for you). If all has gone well, Memmaker will have tried several hundred combinations of how and where to load each item (that's what all the numbers mean), and you should have considerably more free conventional memory — experimenting here retrieved 110Kb. Note that if you add or remove drivers and programs in CONFIG.SYS or AUTOEXEC.BAT you'll need to run Memmaker again.

And that, for a Windows column, is quite enough about DOS for now. It does help, however, to have some idea what Windows needs and doesn't need, and to realise it's not just DOS that benefits from as much base memory as possible. We'll have another look next month at how to pick and choose between different setups.

International rescue

Cosmopolitan Windows 95 users have a very neat utility for changing keyboard settings and character sets on the fly. DOS users can just type "keyb" followed by a two-letter code to instantly change the keyboard layout. Windows 3.1 users have the choice of either buying a multilingual word processor such as Accent, that can take this in its stride, or go to Control Panel/International and make the change there — a bit of a nuisance. One curiosity of the keyboard layout settings is that although they are stored in SYSTEM.INI, you don't, as with most changes to this file, have to restart Windows for these to take effect.

For a more streamlined approach to changing keyboard layout, try using Recorder. Start by getting the relevant files in place. Go to Control Panel/International and choose the new keyboard layout in the usual way. If this is the first time, you'll be prompted for an installation disk.

Having done this, change it back to British or whatever you normally use. Repeat these steps and you should find that instead of being prompted for a disk, you are asked if you want to use the current driver or a new one — click "Current". Making sure you're in your default layout, start Recorder from Program Manager.

From the "Options" menu ensure that "Minimize on use" and "Shortcut keys" are ticked. Then from the "Macro" menu choose "Record". Give the Macro a name — say "French keyboard". Check that Playback is to "Same Application", "Fast", with the "Shortcut keys enabled" checked, and "Continuous loop" unchecked. Set the "Record mouse" box to "Ignore" and give the macro a shortcut key — such as Ctrl+F12. Now you're ready to start. Click on "Record" and Recorder will shrink to an icon, leaving you back in Program Manager. Ignoring the quotes, type:

```
"Alt+f" then "r"
```

which will bring up the "Run" dialogue box. In this, type

`"control.exe main.cpl international"` followed by the return key. This will save time when the macro is replayed, skipping the loading of all the Control Panel bits that you don't need. The International settings dialogue will appear, so type "Alt+k" to get to the Keyboard Layout section. Type the first letter of the language you want, and repeat until you see it in the box — you will find that French takes two f's as it comes after Finnish. Press return once to close the dialogue, and again to confirm that the current driver should be used. You can now pick up the mouse again, click on the Recorder icon and save the macro — note that you have to save the macro file as well. You should now be typing in tongues: if you've followed the French example, Q will have been replaced by A, W by Z, M shifted up to the row above and the punctuation will be all over the place.

Now comes the difficult bit. Using the same steps, record a second macro to change everything back. It's hard, because you have to record the macro in the "foreign" language — to save too much agony, the full stop on a French layout is shift+comma on a UK board. By the same token, running the "French" macro when you're already using that layout will grind to a halt, as Windows will be trying to interpret the wrong keystrokes. Similarly, if you want to use more than two layouts, then you'll need a pair of macros for each in order to touch base with the standard layout before loading a new one.

PCW Contacts

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Ten Top Tips for Windows

Wallpaper
Wallpaper uses up memory. An 800 x 600, 256-colour image takes nearly half a megabyte. Small tiled images are far more economical.

Clipboard
If you've been using the Clipboard to copy large chunks of text or graphics, free up memory by clearing it. Use the Clipboard Viewer's "Edit/Delete" command or save time by copying a single letter to the clipboard — it will replace the existing contents.

Paintbrush
When pasting into Paintbrush, first make sure the "Image Attributes" are set large enough to accept the whole picture. If the visible work area is still smaller than the picture, zoom out first — that way you won't lose any of it.

Cardfile
If you've got a modem attached to your PC you can use the Cardfile utility to dial phone numbers. Go to the "Card" menu and choose "Autodial" — you may need to click on the "Setup" button to set the port and dialling method the first time. If you haven't highlighted a phone number, the autodialler will pick the first thing it thinks is a phone number on the current card. It doesn't like spaces, so use hyphens instead.

Screenshots
If you want to have a "Screenshot" — like the ones in *PCW* — for inclusion in documents, or just to produce some very confusing wallpaper, remember the PrintScreen key captures the entire screen to the clipboard, but Alt+PrintScreen just captures the current window or dialogue box.

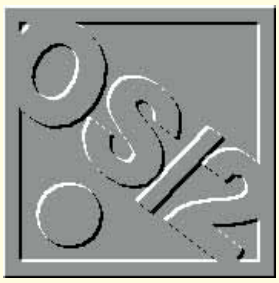
Recorder
You can't edit Recorder macros, but you can see the list of keystrokes and mouse movements, which may be useful for debugging. Highlight a macro, then hold down the Shift key while you select "Properties..." from the "Macro" menu.

System Resources
Some applications gobble system resources and don't give them all back when shut down. If your system slows down as the day goes on, check the "Help/About" box in any Windows component. The only way to retrieve "leaked" resources is to re-start Windows.

Icons
If icons are turning into black squares, or you get an "Insufficient memory" error when trying to move or create them, then the most likely cause is that your display is set to more than 256 colours. Yes, it's another Windows bug — the workaround is to keep fewer icons in each program group.

Paintbrush
Having defined a cut-out with the scissors tool, dragging with the left mouse button makes the cut-out "transparent" — any background colour is left behind. Dragging with the right button copies the background as well…

More Paintbrush
…and holding down the Control key while dragging copies, rather than moves, the selection.



A voyage around OS/2

In the first of a new series of regular columns Terence Green outlines OS/2. He explains what it is, why it deserves serious consideration, and whether you should Warp this way or that.

There's a lot of confusion around as to what OS/2 is, and why it deserves consideration; much of it caused by the fact that most PC-based operating systems are still being designed on the fly. However, the day when a "How do I…" question about some work-related task (such as transferring a presentation between PCs in London and Cairo) doesn't drag the operating system into view as well, has yet to arrive.

To set the scene for my first column in *PCW* we'll take a short trip around OS/2. But initially a word about hardware because, as so many Windows 95 upgraders are discovering, all hardware is not created equal. Reliable hardware is crucial to a reliable operating system function. Inevitably, any large piece of software has bugs and if the hardware is flaky to start with, you're asking for trouble.

Hardware matters

Operating systems are tricky customers. Having assessed several versions of DOS, Windows, Windows NT and OS/2 over the years, the main problem has to be with getting them to a state where you can begin to form opinions about their value as applications platforms.

Having to use IBM PC-compatible hardware doesn't help. Maybe PCI (peripheral component interconnect) and Plug & Play will resolve most of the hardware issues in due course. Perhaps the PowerPC, which has a more clearly-defined hardware specification, will provide a viable alternative choice. By then we'll all be running 32-bit operating systems on 150MHz processors with 32Mb RAM, at a guess.

However, it has taken nearly 15 years for the IBM PC to progress from its insufficiently rigorous initial specification to PCI spec, and Plug & Play is in its infancy, so for now we are stuck with the haphazard PC.

That wasn't so bad when most of us started with DOS or Windows already running on our PCs. That's half the battle won. Problems may arise later but the basic system works. As users upgrade to Windows 95 now, many of us are finding (as did those who upgraded earlier to OS/2 or Windows NT) that hardware matters. Issues that DOS doesn't care about, and Windows glosses over, come to the fore when any operating system attempts to resolve them.

Sound cards that use the same address for a MIDI port as an Adaptec SCSI card don't cause problems under DOS/Windows if you never use the MIDI port. But any operating system that plans to be more reliable than DOS/Windows needs to somehow resolve that conflict. So it's worth remembering that you can improve the reliability of any operating system by dealing with hardware conflicts. Unfortunately, the best way to do this with a standard PC is to make a list of all the IRQs (interrupt request lines), port addresses, and DMA (direct memory access) channels that your peripheral cards use. There's no middle path between this and buying an entirely Plug & Play system.

What is OS/2?

OS/2 began in the early eighties as a Microsoft replacement for MSDOS. IBM got involved as a joint development partner and things went pear-shaped for a while until 1990 when OS/2 1.3 appeared.

By this time, the idea of OS/2 as a DOS replacement had long ago foundered, but OS/2 1.3 is a remarkably stable base for Microsoft LAN Manager and IBM LAN Server which, at the time, shared quite a lot of code. But by this time, Microsoft and IBM's relationship was on the rocks and Microsoft dropped OS/2 in order to concentrate on bringing out Windows NT (which it did in 1993).

Meanwhile, IBM wrestled with the successor to OS/2 1.3. Finally, in 1992, they shipped OS/2 2.0. It supported DOS, Windows, and OS/2 applications. The Windows bit was okay provided you didn't try anything too complicated. Nevertheless, it was quite an achievement when it worked at all.

Wot, no apps?

I must answer the question; "Why does OS/2 have no applications…?" Actually, there are lots, but there are two reasons why there aren't more: one is that most Windows applications run just fine on OS/2 Warp; the other is a developer issue.

Applications which exploit 32-bit operating systems aren't trivial creations. Both OS/2 and Windows NT have suffered from a lack of general applications to match the choice on Windows 3.1. Microsoft developed Windows 95 in part to drive the development of 32-bit applications for Windows NT. For nearly two years now we've known that Windows 95 was imminent. Developers had to keep their existing Windows 3.1 products competitive while developing new Windows 95 applications. OS/2 just didn't get a look in.

Now that Windows 95 is available it will be interesting to see how quickly Win95 applications appear that truly exploit the 32-bit sub-system. And if Windows 95 proves less reliable than OS/2, how soon will those applications be ported over to the other 32-bit desktop OS (OS/2 Warp) given that it is easier to port 32-bit applications between platforms than to port 16-bit applications to 32-bit?

Fig 1 *OS/2 Warp Red Pack runs Microsoft Windows*

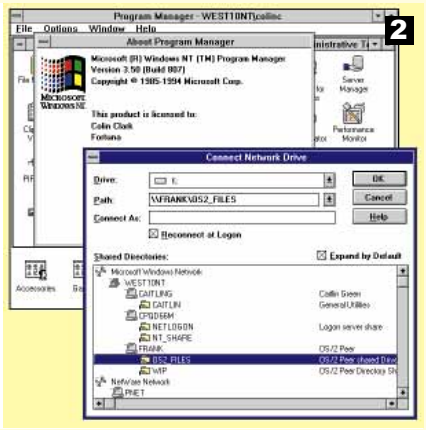


Fig 2 *OS/2 Warp Connect Peer Services, in the Windows NT network browser*

There were few OS/2 applications but the DOS multitasking worked rather well. OS/2 2.0 was a mix of 16-bit and 32-bit code, so IBM gradually reduced the 16-bit components until Warp shipped as a complete 32-bit system.

Initially, OS/2 shipped with the Win-OS/2 sub-system, a special version of Windows which was compiled to run under OS/2. IBM can do this because it owns derivative rights to Windows 3.1 code. Later, IBM shipped OS/2 for Windows which doesn't include Win-OS/2 because it can run Microsoft Windows 3.1 (after a little tweaking). The two versions; one with, and one without Win-OS/2, were carried through to Warp (also known as OS/2 version 3).

Warped or unWarped?

Current products are known as "Warp with Win-OS/2" and "Warp without Win-OS/2" — which might give you an idea as to why people say IBM marketing is not a patch on Microsoft's. Within IBM they're known as Blue Box and Red Box, after the packaging. Blue Box with Win-OS/2 is preferable to the Red Box version, which is an upgrade for Windows users who can install it directly over their existing Windows, or Windows for Workgroups, with a minimum of fuss. The idea is that when these users upgrade, they move to the full-pack Blue Box version with Win-OS/2.

The most recent version of OS/2 Warp to ship is Warp Connect, mainly intended for business users because it includes a bunch of network connectivity options that enable OS/2 workstations to be clients in OS/2, Windows, and NetWare networks.

All OS/2 Warp versions ship with a large set of bundled applications in the Bonus Pack. Some, such as the Internet Access Kit, are rather good; some are "Lite" versions of nifty, full-featured software such as Faxworks; and others just have foolish names like IBM Works.

PCW Contacts

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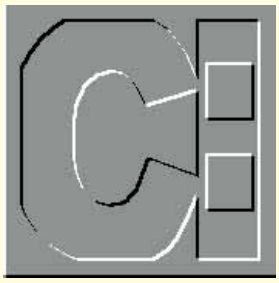
Warp Serrver

At times, it has been hard to decipher IBM's approach to OS/2 — sometimes it seems as if they're aiming it at home users, and other times at large corporates. The next Warp variant to ship will be Warp Server which is going to be pitched against Windows NT and Microsoft Back Office. This seems to suggest that corporate users are Warp's ambition but that's the wrong way to look at the positioning of Warp. The point of Warp Server is that it is an applications server. This is much the same tack that Microsoft is taking with Office 95 and Back Office; focusing on the applications platform rather than the operating system.

So it isn't important whether Warp is a home user or corporate operating system. What *is* important is the applications you run on it. If you want reliable Internet access software you can find it in Warp's Internet Access Kit (IAK). If you want to mount an applications server on a network, you can look to Warp Server. The same operating system is behind both. Warp and the IAK will run on an 8Mb 486 at home, and Warp Server on a dual Pentium SMP box with 32Mb of RAM in the office. Both home and business-critical applications run on Warp.



Start it up...

Windows 95 doesn't *just* affect Windows — Simon Collin suggests ways in which you can use Windows to get the best results from DOS, too.

Windows 95 has overshadowed nearly every other computing event this summer. In past months I've been writing about how Windows 95 will change the way you see and use DOS. Now it's arrived, I can show you how to tune it to make the most of your DOS applications.

One of the confusing aspects of Windows 95 is that, although it's a self-contained operating system, it seems to boot up under good old DOS and then switch to Windows. Several readers have asked whether this is correct and how Windows now processes the old CONFIG.SYS and AUTOEXEC.BAT files.

In many cases, Windows 95 completely eliminates the need for CONFIG.SYS and AUTOEXEC.BAT. In fact, it also knocks COMMAND.COM on the head, freeing up more conventional memory. Windows still uses CONFIG.SYS and AUTOEXEC.BAT to load any non-native drivers or applications — typically a real-mode driver, such as an old CD-ROM or sound-card driver.

When you install Windows 95, it will check what's in the CONFIG and AUTOEXEC files and will treat the commands, in most cases, as if they were native Windows and load them automatically. For example, it will load system drivers like HIMEM.SYS and IFSHLP.SYS directly from Windows. It's the third-party drivers that might be in your CONFIG files that cause Windows to have to switch back to real mode and execute the COMMAND.COM DOS interpreter. COMMAND.COM is used to parse the lines in the two files and act on their instructions.

If your PC doesn't have extra drivers, there's no need for you to keep CONFIG.SYS and AUTOEXEC.BAT. If you do have these two files on your PC, you're wasting RAM since Windows has to load COMMAND.COM to deal with them. To free an extra 8Kb of conventional memory, look in your CONFIG.SYS and AUTOEXEC.BAT files to see whether a real-mode driver is needed; if not, you can delete these files and save some memory.

Before you do this, make sure you have a working Windows start-up disk (that was created during your setup) or create a system floppy disk. Once you have your floppy start-up disk in hand, start by renaming the two files to CONFIG.OLD and AUTOEXEC.OLD and restart your PC to see what difference it makes.

If your PC starts up as normal, you had no real-mode drivers in these files and you've saved 8Kb of precious memory. If you do have problems, insert the startup disk and reboot, then rename the .OLD files to their original CONFIG.SYS and AUTOEXEC.BAT titles.

Multiple configurations

One excellent feature of Windows 95 is its ability to create custom CONFIG.SYS and AUTOEXEC.BAT settings for any DOS session running under Windows.

For example, if you have a particular peripheral that needs a special driver, but you only use it from a DOS application (such as a card to link to a mainframe, a voice synthesiser or a data acquisition adaptor), or if you need particular PATH settings or environment variables for an application, you can use Windows to isolate these requirements from everything else in the system.

If you want to set up a totally different CONFIG.SYS file to provide more BUFFER or FILES statements for a particular DOS application, the simplest way is to create a unique DOS session with its own CONFIG.SYS file. This will be executed by Windows when the DOS session is started.

The route to this solution is to modify the Properties of the DOS session. From the Windows Desktop, start an MSDOS session from the Start button. Alternatively, create a shortcut to a DOS session by moving onto the Desktop, clicking on the right-hand mouse button and selecting Create Shortcut.

Shortcut

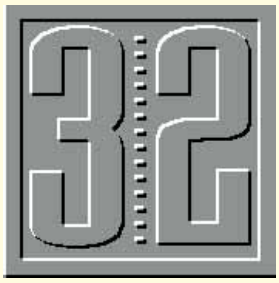
Type in COMMAND.COM as the command line when prompted. This creates a shortcut icon to start the DOS session that you can access directly from the Desktop.

Highlight the MSDOS shortcut icon and click on the right-hand mouse button to view its Properties screen. From here, click on the Program tag and you'll see the basic details about the MSDOS shell. Click on the Advanced button. You are now given the option to define how the MSDOS session is started: it can be automatically set up by Windows or manually defined by you. Select the third radio button and you're given further options to define the AUTOEXEC.BAT and CONFIG.SYS files for this session.

In the two scroll boxes at the bottom of the window are the existing contents of the CONFIG and AUTOEXEC files that Windows is using as a default. If you want to change these to customise the settings (for new BUFFER and FILES statements) just edit the contents in the scroll box. You've now got a totally independent MSDOS session that will only load any memory-hungry driver, or statements, when you start it.

PCW Contacts

Write care of *PCW* or via email to **scollin@cix.compulink.co.uk** or **Compuserve 72241,601**



Linux on the hoof

Chris Bidmead managed to load Linux onto his trusty portable so he could take it everywhere with him. Here, he relates his trials, tribulations and triumphs.

My mate Marcus said "Get a life" when I told him I was taking Linux on holiday. He can talk: he's just bought a Gateway 2000 120MHz Pentium machine with 2Gb disk space and a sub-woofer for making Doom sound more dangerous. And all he runs on it is Windows 16-bit. I ask you; is that a life?

I only told him because I was proud to have got Linux onto Tonto, my trusty portable. Marcus has Linux, too, but he runs it on an old 386 machine (where, unlike Windows, it gets by just fine).

A good conversationalist is witty and wise; a *really good* conversationalist brings out the best in others so that *they* feel witty and wise. In this sense, Linux is a brilliant conversationalist because the exercise of getting it across to Tonto has left me feeling very smart indeed, although really of course I'm only piggybacking on the shoulders of the giants who built (and who are continuing to build) the thing.

Caldera, the Linux in question, comes on a CD-ROM. Tonto doesn't have a CD-ROM drive, and there isn't even a SCSI interface to hang one on. The Caldera manual says you can install the operating system over a network: you make a boot diskette and a root diskette in the usual way, and then evoke NFS (the Network File System) to get the thing across from a CD-ROM installed on another machine running Caldera.

The other machine was standing by, but how to connect to it? Although Tonto takes SCSI or network PCMCIA cards I didn't have any handy and there were only a few hours to go before the taxi to the airport. I dug out an old DLink Pocket Ethernet Adaptor — the kind you screw onto the parallel port. I now had the makings of a network machine.

The preview version of Caldera comes with a selection of ready-built kernels, and there's a map in the 125-page Getting Started booklet that tells you which one to use for the combination of network adaptor, SCSI card and CD-ROM device you're using. There isn't a pre-built kernel for every combination: each kernel contains multiple drivers and sniffer software to home in on your particular hardware. This approach avoids tons of unnecessary drivers being included in your particular kernel but will still leave some redundancy. Linux doesn't (as yet) offer full support for dynamic driver loading.

Recompilation

Alas, the map didn't mention the old DLink adaptor. I hoped it might be in there anyway but when I tried the pre-cooked kernel in the "Other Brand not listed here" category, it wasn't recognised. There was nothing for it but to build my own kernel. It's a condition of the Linux licence (and fundamental to its operation as well as its philosophy) that distributions come with their own source code. To cook up your own kernel you recompile the source — all 13Mb of it.

If you're new to Linux this might sound a formidable task. And yes, it is, but not if you follow the footsteps of those giants. They've made recompilation easy by writing scripts that can be read by "make", the utility that controls compilation. No more about "make" now; suffice it to say that I simply read the instructions in the kernel "How To" document, followed those big footsteps and made a few very simple yes/no decisions *en route*.

New kernel

About an hour later I ended up with a new kernel image called zImage (the "z" is a reminder that it's compressed). Compressed is the standard format for Linux kernels these days — "lilo", the boot loader, is primed to deal with these automatically.

Note that zImage is an image of the kernel — unlike the boot images on the Caldera CD, which are images of the whole floppy you use to boot. It's important to be clear about this if you're substituting a home-made kernel of your own. And don't try using "rawrite" to put zImage onto a floppy in the same way that you initially created the boot floppy.

There are a couple of ways of getting your new kernel onto a boot disk. The simplest is probably to create a boot floppy of some kind (I used the dud one I had already tried) and substitute your new zImage for the file called "vmlinuz" already on the floppy. There should be enough room on the floppy, so all you have to do is rename "vmlinuz" — Unix thinks of this as a "move" operation, so the command is something like

```
mv vmlinuz vmlinuz.old
```

— and copy zImage over to the floppy, giving it the new name "vmlinuz". If you've mounted your floppy on /mnt/floppy, for the Caldera distribution the appropriate command to do this will be

```
cp /usr/src/linux/arc/i386/boot/
zImage /mnt/floppy/vmlinuz
```

Linux copes with a whole variety of file systems. Its standard file system is called "Ext2" but the Caldera boot floppies use the cheap and cheerful Minix file system. When you boot with this diskette it first invokes lilo (the Linux boot manager) which will still be looking for the old kernel (it finds it via a disk map, not through the file system, so the change of name won't fool it). You need to re-run lilo to change the disk map. Ordinarily, if you're installing a new kernel on your base system, all you need to do to fix the map is run /sbin/lilo. But on this occasion we want to fix up lilo on the floppy.

Even if you're not a Linux fan it's worth knowing about lilo because it can boot a number of other operating systems as well, and is more flexible than OS/2's Boot Manager and more economical with partitions. We'll be investigating lilo in the coming months, but let's concentrate on this particular problem for now. In theory

we could close everything down, boot from the floppy and run lilo from there, but it's much simpler to evoke our hard disk-based lilo and ask it to regard the floppy as the root file system on which we want to work. lilo accepts a parameter

```
-r <newroot>
```

which allows us to do this, so we can fix up the map with the command

```
/sbin/lilo -r /mnt/floppy
```

This new boot disk, in conjunction with the standard root disk, was all that Tonto needed to get going. Initially, it still didn't recognise the Pocket Ethernet adaptor, but this was easily fixed by reconfiguring the parallel port as LPT2. A second minor problem (translate this as "a hitch that held me back for the best part of an hour") was that the giant who wrote the Caldera installation script hadn't taken on board an official change in the name of the Pocket Ethernet Adaptor port; from /dev/dl0 to /dev/eth0. The simplest way around this is to lie to the installation script and pretend that you're using an internal rather than an external adaptor.

Hair today

Hooray! I now had a small Linux system connected to the network. The next trick was to use NFS to hook it to the CD-ROM running on the desktop Caldera machine. Like much of Linux, this is one of those things that sounds impossibly hairy yet turns out to be astonishingly simple. As long as the appropriate NFS daemons are running on both machines (which by default they are) there are only two things to be done. Firstly, "export" the CD-ROM from the desktop machine. You do this by naming the appropriate directory (in my case, /mnt/cdrom) in a file called exports that lives in /etc. In the case of a first-time NFS installation you may have to create this file (any text editor will do). Then you simply use the standard mount command to attach this directory to a mount point you create on the other machine (my Tonto) on the other side of the network. In this case the file type will be -t nfs and the source device will include the network name of the desktop machine; caldera:/mnt/cdrom. In fact, because this way of writing the source device name is unique to NFS and therefore implies it, you don't need the -t parameter under Linux. Actually it is even simpler because the Caldera install script acknowledges that you might need to do an NFS install, and automates it all for you. I only got to know about the weird science underpinning all this because of the bug-ettes that needed sorting out in this preview version.

Foreign climes

I ran the rest of Caldera's Express install, which loads and configures everything you need to get going, including the X Window

Fig 1 *An alternative way of evoking emacs with the required font is to use Looking Glass's ability to attach command lines to icons. Unfortunately the dialogue box where you set this up refuses to be a target for cut and paste, so the whole tedious font name must be inserted by hand*

Fig 2 *The Caldera font server can hand out Speedo, Adobe Type 1 and TrueType fonts — one of the key features of Caldera I didn't get to play with on my X-less holiday machine*

System. Because Tonto has a double-scan LCD screen I wasn't surprised that the automated X configuration came unstuck and left me with a text screen full of error messages instead of the colourful windowed display. I knew (well, I thought I knew) that I now had everything I needed on board Tonto and could work out the X configuration later.

Alas, I was wrong. It was only when I got to foreign climes that I discovered that the X server I'd installed by default was the wrong one, and the one I needed was still back home on the Caldera CD. An Internet connection could have fixed this in a jiffy but the holiday home didn't even have a phone. Result: my explorations of Caldera were limited to a character interface.

The bad news is that it turns out there isn't really very much to learn about Caldera from this viewpoint because, apart from the NetWare client software, the added Caldera features like the Looking Glass desktop (*Fig 1)*, the Font Server (*Fig 2*), the Icon Editor and the Control Panel, are all X-based. But if you don't know much about Linux (and I'm still close to being a raw beginner) there's tons to be learnt using a simple text screen. As I discovered, Linux, like other modern Unixes, looks very pretty but the real power is under the hood.

A line about Linux

Here's part of a missive from Mark Jessop (m-jessop@dircon.co.uk) that came in just as I was putting the finishing touches to this month's effort: *"Dear Chris, may I start by saying how good your* Hands On *section is; it's one of the first sections of the magazine I turn to."*

Mark goes on to concur with what I wrote a couple of months ago about Linux support: *"The way I see it, Linux is all about having a go yourself and it rather defeats the object to start screaming for support the minute something doesn't quite work as it should, or when you mess it up. You can't really expect vast amounts of free support on a product that is essentially free."*

Mark reckons that: *"Most of the fun is in learning, and the satisfaction gained from making the thing work. I was under the impression that this was why Linux was created in the first place."*

Of course that's true of Unix too — it started out as a very humble platform for Ken Thompson's Space Invaders game. But like Unix, Linux has grown up. These days it's pretty much a professional operating system; witness the Caldera project.

● Complimentary correspondence about this column continues to arrive at a steady pace, so I must be doing something right — at least I'm getting better at responding promptly. Sorry I haven't the space here to thank you all by name.

PD — Phase Change Dual Drive

Add an extra parameter to the AHA15XX device driver so it can handle logical unit numbers (LUNs) and a new DEVICE=OPTICAL.SYS line, and the job's done.

I was roundly impressed with OS/2's ability to cope with the new PD drive that turned up for review. The Plasmon PD 2000 is a curious hybrid: a standard quad-speed CD-ROM drive that also takes 650Mb read/write optical cartridges. I don't normally rave about hardware, but this is a handy SCSI peripheral that you'll probably see a lot of during the coming year or so.

Everybody needs a CD-ROM drive these days and everyone has always needed more storage space. The PD-2000 fits the bill on both counts and unlike previous read/write opticals it isn't frighteningly expensive: street price is around £550 and the cartridges cost about £35 each.

One of the supposed advantages of being a computer journalist is the steady parade of manufacturers touting their wares in front of you — this may sound good but the crunch comes when you ask: "And what operating systems does it work with?" At which point the product manager will usually look at you as if you'd accused him of beating his wife: "Windows," he says. "And?…" you ask encouragingly. The product manager shakes his head — you're obviously too weird for further consideration.

Not so with the new Plasmon drive. A driver for OS/2 is included along with all the usual DOS and Windows utilities. Actually it's a generic IBM optical drive driver but it works fine, giving you a pair of drives; one for the CD-ROM and another for the phase change optical drive.

They both use the same tray and laser but OS/2 handles the changes automatically, as long as you don't jump in and try to access a drive before it has run up to speed. A pair of LEDs on the front panel helps you to track this: the busy light flashes while the new disk or cartridge is settling in, and the PD/CD light shows orange or green according to the media loaded and hence the drive letter you'll be accessing. It would be nice if the operating system could block access to whichever drive happens to be invalid but the generic driver isn't capable of such refinements. The other catch is that it only handles FAT (file allocation table) formatting, not HPFS (high performance filing system).

The PD-2000 also works with a Mac but I was more interested in seeing what Linux would make of it. Because it's SCSI I was moderately hopeful — the various Linux docs breezily state: "All SCSI-based drives should work if the controller is supported." I guessed that Linux would be able to handle the PD-2000 as a SCSI CD-ROM but would be baffled by the optical read/write side of things. But when I swapped out my faithful old NEC CD-38 attached to the Caldera machine and installed the PD-2000, this assumption turned out to be upside down.

I created a mount point called PD in the /mnt directory, and the command

```
mount -t msdos /dev/sda /mnt/PD
```

gave me 650Mb of instant new read/write disk space. It's somewhat slower than a hard disk drive (categorising it as secondary storage) but is actually faster than most of the hard disks among which I spent my early computing years, and perfectly usable as a primary drive if you're pushed. Don't mix this up with the older magneto-optical drives that need a separate turn to erase each track before they can write to it again. Phase-change writes a lot faster because it can overlay old data immediately.

The reason I haven't managed to get it working as a CD drive could simply be that I might just need to recompile the kernel for a Panasonic/Matsushita device. The problem will be more complicated if the SCSI hard drive doesn't know how to give way to a second logical unit on the same SCSI address.

But the joy of Linux is that the source code is all there to be hacked if a problem like this arises. Unfortunately, the joy of Bidmead is that he's a hopeless C programmer. Or perhaps *hopeful* C programmer might be more accurate. Anyway, one way or another I'm fairly optimistic about sorting this out and I will report back to you in next month's column.

PCW Contacts

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It's a **bug** that's going round…

There's a prank macro virus on the loose which affects some Word 6.0 users. Tim Phillips tells you about it, how to spot it and outlines a few simple safeguards.

As I write, we've just emerged from a profoundly uncomfortable time for all enthusiastic WP power users. Microsoft's "prank macro" problem needs addressing.

In case you missed it, Microsoft recently admitted that many Word for Windows 6.0 users had been suffering from what it called a prank macro — a macro contained in a WinWord document, that changes the Normal template to include itself. The macro simply displays a dialogue box with one option: a button that you press, with "OK" on it.

This one's not destructive and it's a good job, too, because what Microsoft calls the "prank" is really a new type of virus. Imagine that instead of a harmless dialogue box, the command the macro was running was more serious: it could alter your files without your knowledge. It doesn't have to trash the hard disk — in fact, it's more damaging if it doesn't.

Anyone who opens a document containing this macro gets the new virus. Infected documents contain a set of WordBasic macros, one of which is autoloaded when you load the document. The macros are then copied into the global environment and another macro is invoked when the document is saved. This allows the macros to attach themselves to clean documents. Finally, when you exit Word, the macros attach themselves to your global environment — it's immune to detection from most traditional virus-checkers.

How to check for the virus

You can check to see if you have the virus: look under Tools/Macro, and see if you have macros called AAAZAO, AAAZFS, AutoOpen, PayLoad and FileSaveAs. That's the virus. Delete these macros if you have them.

This virus is notable for several reasons, as follows:

• Viruses have so far only spread via executable files and this has been a significant plank in company security policies. The virus affecting Microsoft spreads as part of a data file.

• Data files are shared more readily than executables. In fact, software companies have been telling us to share as much

Changing default file formats

A couple of months ago I suggested a nasty bit of hackery for changing the default lookup file in the DOS EDIT program, so that it would look for *.* instead of looking for *.TXT. As usual I've been out-hacked by a reader; in this case, Guy Simmons, who contacted me via Compuserve.

"I did this a while ago but didn't use DEBUG, in fact I've never used it," he says. "If I recall, all I did (after backing up QBASIC.EXE) was to load it into WRITE, not converting it to WRITE format, and did a search and replace operation, substituting [space].* for *.TXT. The space is important. I've similarly modified NOTEPAD and have several versions on my disk. It seems to be a lot easier than using DEBUG <g>."*

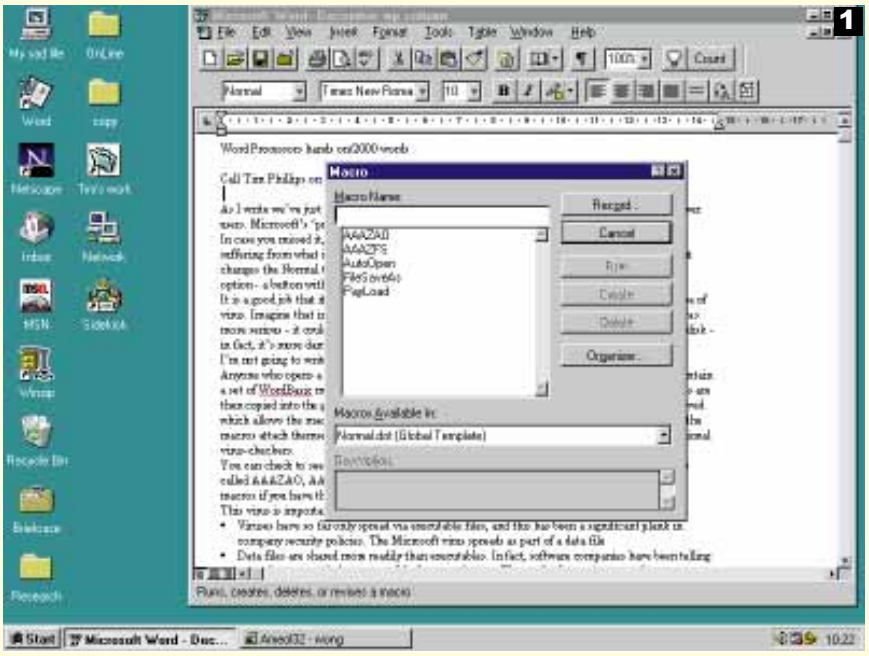
I've tried this, and it works. Remember to always back up your executables before modifying them. (I've carried this forward to Windows 95, just to check, and it doesn't work for WordPad.)

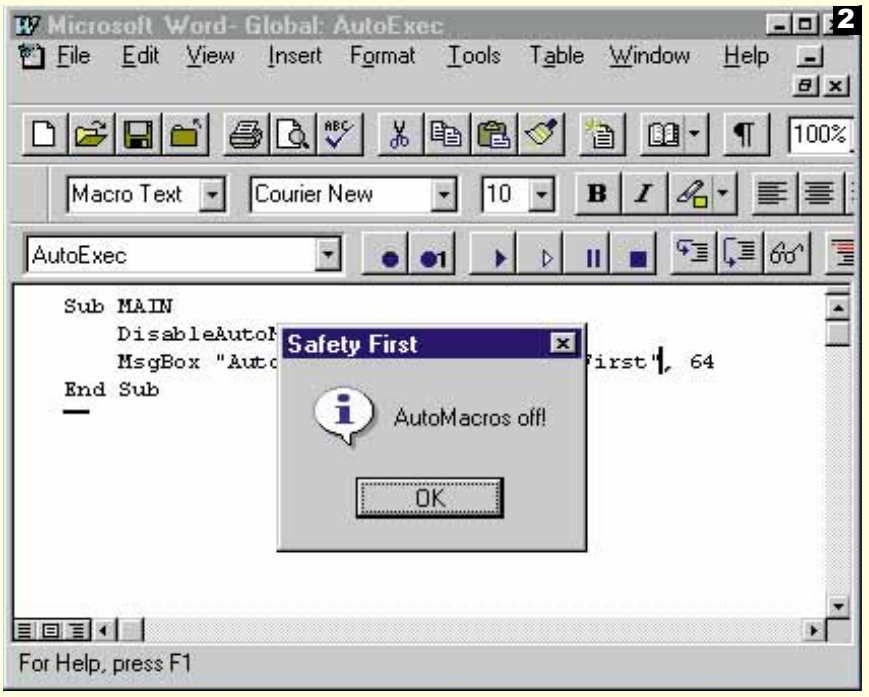
Furthermore, Tim Goldingham emailed me with the following query: *"Thanks for the edit to QBasic in the October issue Hands On column. I don't suppose you could manage the same thing for Works — to stop it looking for *.w*?"* Guy's quick and dirty fix doesn't do the trick here and I'm sure I don't know enough about DEBUG to consider helping, so I'll throw this one open to you readers. Do any of you possess the detailed knowledge to help out?

And, there is help for an Ami Pro user. Ami has always been a little erratic, and here's a problem that has a bug fix file available from tech support. James Mendlin of Southport has an erratic spell checker: *"In AmiPro 3.0, when Ami Pro finds a word and you choose to 'Skip All', my file occasionally gets corrupted. Is this something to do with the size of my document, or the hardware setup?"*

The happy answer is no, it isn't. This falls into the category of "known behaviour" — that is, call tech support and they've had this reported before. They'll send you a file. If you use Compuserve, then you can get the file from there. Actually, that's where I found the solution, as there were a couple of other users in exactly the same position as you. Of course, you might want to upgrade to Word Pro, because it's a big improvement. It's even quite good at stripping out carriage returns. Aaarrggh!

"Out, damn Prank Macro"





1 *The telltale signs of the Word for Windows "Prank Macro" — a virus to you and I*
2 *Use this macro, from Sophos, to disable autoloading of macros. It runs when you start WinWord, and should help to immunise you*

data as possible for several years.
• Existing safeguards don't work.
• The viruses aren't hard to write…
• …and now they can be passed on-line, and cross-platform to the Mac.

Safeguards

So how do we stop the sky falling on our heads? There are a few simple safeguards:

1. The simplest way to avoid stray macros is to load all your documents that might be suspicious, in text format. This isn't practical on a network though, because you never know whether someone else has introduced the virus and, of course, because you'll keep losing your formatting.
2. Use a switch to load documents without their associated macros. To do this, you hold down shift while loading Word or

Tim's macro club

Here's another bumper crop, but in future I will positively discriminate in favour of Ami Pro and WordPerfect macros — you Word Basic programmers are just too prolific.

● Jonathan Payne has the first good solution for scrolling two word processor windows: *"This macro will scroll two windows for Word 6.0 together. This copy scrolls down a line and with a simple change to the 'vline 1' it could be made to scroll up a line, or lots of lines."*

"It could also be modified to scroll down every few seconds — maybe by using the very useful On Time command to call itself (although this would require you to write a second macro to issue another OnTime call to stop it!)" he says, adding that *"To make it usable, it's probably best to have a macro for up and a macro for down assigned to the keyboard, or on the Toolbar. To arrange the windows, I use the TileVertically macro from WINWORD\MACROS\LAYOUT.DOT."*

(Send in your comments, please.)

```
Sub MAIN
ScreenUpdating 0
For Windows = 1 To CountWindows()
        VLine 1   'Change this line
        NextWindow
Next
End Sub
```

● Lee Curtis from the delightfully-named town of Idle, near Bradford, has a fine hint here:

"When using tables, pressing TAB takes you to the next cell. What if you want to put a TAB inside a cell? This macro does it:" (I'd like versions of this for Ami Pro and WordPerfect, please. I could do them myself, but that's not the point, is it?)

```
Sub MAIN
Insert Chr$(9)
End Sub
```

● Another development from Storm Dunlop: *"In your October column you give a macro to reverse letters. I find one to switch words as useful. Here's mine: 'TransposeWord'. You position the cursor in the second word, then run. I've assigned shortcut keys of Ctrl+Shift+C to TransposeCharacter and Ctrl+Shift+W to TransposeWord."*

```
Sub MAIN
      WordLeft 1
      ExtendSelection
      ExtendSelection
      EditCut
      WordLeft 1
      EditPaste
      WordRight 1
End Sub
```

● I know I said no more carriage return stripping macros, but this one's an Ami Pro macro so it's an endangered species (joke). Thanks to Chris Wright of the Bradford Diocesan Computer Group, who will receive his reward in heaven: *"As soon as you try stripping carriage returns on a biggish document, Ami Pro crashes out with a 'Maximum Paragraph Size Reached' message. Often a reboot is the only way out. Much angst. My solution is to write a pair of macros as follows:"*

```
FUNCTION PARAS()
loop:
TYPE("[ctrldown]")
c=CurChar$()
TYPE("[RIGHT]")
IF(AtEOF())
EXIT FUNCTION
ELSEIF(c=CurChar$())
TYPE("[DEL]")
ENDIF
GOTO loop
END FUNCTION

FUNCTION PARAS1()
loop:
TYPE("[ctrldown]")
c=CurChar$()
TYPE("[RIGHT]")
IF(AtEOF())
EXIT FUNCTION
ELSEIF(c<>CurChar$())
TYPE("[LEFT] [DEL]")
ENDIF
GOTO loop
END FUNCTION
```

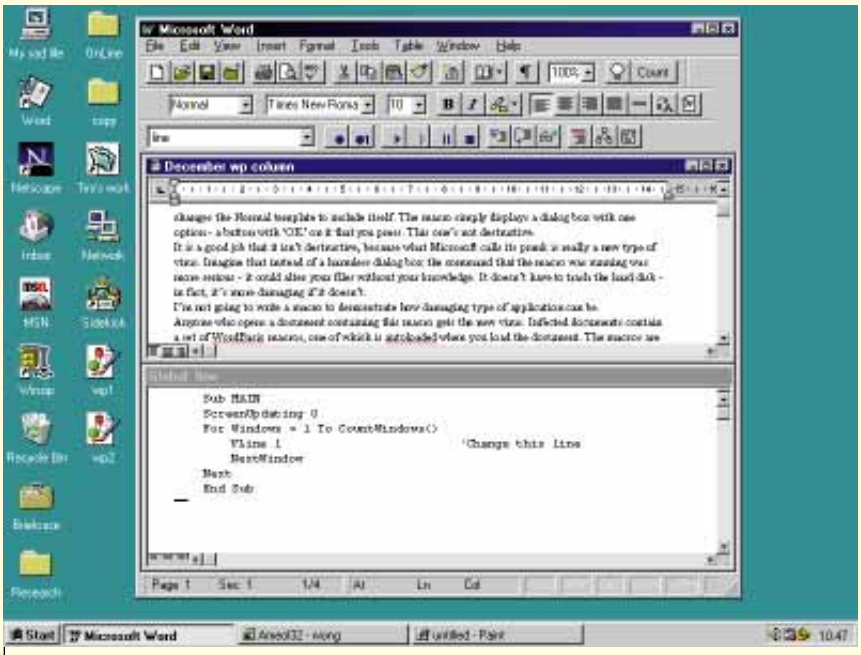
PARAS.SMM removes double returns, while PARAS1.SMM deals with the single ones.

when clicking on a document icon. Unfortunately, I tried this with the macro and it didn't work. The text equivalent is WINWORD/M as the command line.

3. A basic precaution is to go to Tools/Options/Save and enable "Prompt to Save Normal.dot".

4. Word's AutoExecute macros can help too. Thanks go to virus protectors, Sophos, for this macro:

```
sub MAIN
        DisableAutoMacros
```



The scrolling macro may be simple but it works. Tile your two files manually first

The upgrade question

As we wait with baited breath for 32-bit versions of our fave word processors, a question arrived, via Compuserve, from Kevin Fox: *"I am at present using Windows 3.1 and SmartSuite. I can easily get around in Ami Pro 3 and it does most of the things I want. However, I am considering upgrading to Windows 95 and I like the look of WordPro, which will presumably be part of SmartSuite for Windows 95. However, the thing that concerns me is that as Microsoft Office is out first, is Lotus SmartSuite liable to become the poor relation, with poor take-up and poor support? My experience with Office, and particularly Word 6, is of a slow program that hogs system resources. Will the Win95 situation be the same?"*

My opinion is yes. Word for Windows has a dominant market share, but this has been a problem for Microsoft in providing support since Windows 95 came out — the volume of calls has overwhelmed the company. WinWord 7.0 is mostly similar to 6.0; so for 6.0 users, don't upgrade your hardware and operating system because you think you are missing a great deal.

Word Pro does have an excellent set of group-working functions, which is great if you work on collaborative documents. Microsoft Office does hog system resources, but as Kevin is one of the Pentium rich with pots of RAM, this may not be an issue.

Apart from these considerations, word processors are becoming functionally very similar. If in doubt I'd go for WinWord because then, at least, all the helpful people who deluge me with WordBasic macros can help you out.

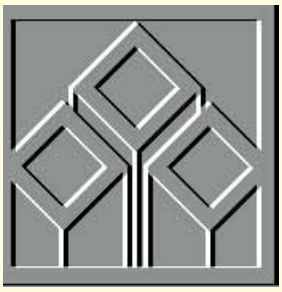
```
        MsgBox "AutoMacros off!",
"Safety First", 64
End Sub
```

Call it AutoExec, and it will trigger when WinWord starts to disable AutoMacro loading.

Ami Pro and WordPerfect users shouldn't be smug — this is a potentially serious problem. Andy Campbell, managing director of virus specialist Reflex tells me he's seen another similar virus and is taking it seriously. And WordPerfect admitted its product was vulnerable too.

PCW Contacts

And that's that for this month. Surface or airmail to PCW, otherwise I'm on email at **wong@cix.compulink.co.uk** and **CompuServe 100436,3616**



All **change**

An increasing number of spreadsheet users are changing from DOS versions to Windows-based. Stephen Wells offers advice and comments on how to achieve a smooth changeover.

One of the gratifying things as a result of writing this column, is the mail I receive. The hardest part is trying to decide whether a reader's problem is unique to that reader or common to all.

Lately, there have been more questions about the spreadsheet module of Microsoft Works: probably because at the moment it is so frequently packaged with new PCs. As Excel and its competitors grow bigger, Microsoft too has recognised Works' suitability for family and small business use by making it one of the first applications revised for Windows 95.

Print Works

Dr E. Noy Trouson of Southam, Warwickshire, writes:

"I use the spreadsheet in MS Works simply to maintain a list of stocks and shares. It updates prices and values in successive columns. But Works does not seem to select an area for printing and the print command results in many pages of obsolete material."

You don't say which version you have. The earliest one I've got is MS Works for Windows 2.0 — in that, you just highlight the block you want to print, then choose File, Set Print Area. To change it later, choose Select, All, File, Set Print Area. Alternatively, when you click the Print button on the Toolbar, you can choose the page you want to print after the Number of Copies box.

If your version doesn't offer those options, you could always highlight the area you want, Copy it to the Clipboard, open a new file and Paste. The new file doesn't have to be in the spreadsheet module as well — you can open a new Works database file and select View, List, Edit, Paste. Then you can use the database report building features.

Excel fix

Here's a question I received via the Internet just signed "Nikos, Greece":

"I use Excel 4.0 and didn't upgrade to 5.0 because I don't have time to learn its extra features, and it would only take more disk space. My problem is that when I write something like 2/4 in a cell, Excel automatically transforms it into a date. How can I avoid that?"

One quick way is to precede it with an "equals" sign if you want a decimal entry; or a zero and a space to display your entry as a fraction.

Changing spreadsheets

Several readers have asked me to comment on moving from a DOS spreadsheet to another publisher's Windows-based one. A common application is for a club, parish, or home budget, or small business book-keeping system.

For many years there was a bias towards DOS-based accounting systems as many people thought that a graphical interface was unnecessary and just slowed things down. But the times they are a-changin'. They do say that the successor to Windows 95 (probably to be code-named Memphis) may be the last Microsoft operating system which will recognise DOS software without special translation.

But let's concentrate on the present. A typical move would be to go from, say, SuperCalc to Excel. If your financial year coincides with the calendar year, then this is a good time to consider making the change. You can't easily carry forward formulae but you can export and import labels (your account names) and values (last year's totals).

The file to translate might be called TOTAL95.CAL. For safety, I'd copy it into a directory like C:\windows\temp. Then, in SuperCalc 5.1 you just enter

```
//Export,DIF,c:\windows\temp\total95,
  Colwise,All
```

Open Excel. In the search box, select Data Interchange Format and c:\windows\temp. Now you can open your file and it will be headed TOTAL95.DIF. Choose File, Save As, and select the file type Normal. The extension will change from DIF to XLS. Now you can save it as a properly-named Excel file. You may now wish to choose Options, Display, and uncheck Zero Values.

When changing accounting software, it is a good idea to run both old and new versions until you're utterly confident in the new system. In Windows 95, you can do this by creating an icon for your SuperCalc file and running it (with SuperCalc) in a desktop window.

A typical SuperCalc setup might have five files: one for each quarter and another for the year. Each quarterly file has four pages: three of them have accounts down the rows, and days across the columns. The fourth page shows monthly totals for each category and totals for the quarter. The file for the year, which is completely comprised of linked formulae, shows the totals for every category for all four quarters, and annual totals.

In Excel this can best be arranged all in one workbook, with one worksheet for each month and another for the year's totals.

One advantage of Excel is that you can perform a Group Edit. Any changes to the January worksheet can (optionally) apply to every other month's worksheet, automatically.

And with Excel being Windows-based, you can outline levels to be displayed or printed. It is on the worksheet of annual

EXCELlent shortcuts and longshots

• SKIP 'EM	To make a list of dates which skip the weekends, enter a date in cell D1, then enter this formula in cell D2: `=D1+(MOD(D1,7)=6)*2+(MOD(D1,7)=0)+1` Now drag the fill handle down the column.
• MARK 'EM	Highlight a range with Ctrl+Shift+appropriate Arrow keys.
• ADD 'EM	Highlight a range as above. Then press Shift+F8. Then highlight a second range. Press Shift+F8. Highlight a third range. And so on.
• COLOUR 'EM	Highlight as many areas of your worksheet as you like, as above. Then press Alt+T P Tab Alt+Down Arrow Up Arrow to colour of your choice.
• HIDE 'EM	Hide columns quickly by highlighting them and pressing Ctrl+0. Restore them with Ctrl+Shift+0 when the columns either side are highlighted. Use Ctrl+9 to hide rows. Ctrl+Shift+9 restores them when the rows above and below are highlighted.
• EXPLAIN 'EM	To switch from displaying values to displaying formulae (and back) press Ctrl+` (the key to the left of the top row numeral 1).

totals that this is most useful. You might have an account for each car expense like petrol, insurance and maintenance. Expanded, all this detail would be shown. Collapse the outline and only the subtotal Car Expenses would appear.

Similarly, you can outline across the columns: expanded, every month would be shown; collapsed, only the quarterly and year's totals would appear.

Times total

Geoff Dickinson of Wickford, Essex says he wants to total a list of times. These are entered in the range B1:B6 with colons, like this: 4:24, 12:18, 15:23, 1:06, 18:18, 6:36.

Geoff asks for a formula which will give him a total which reads: 2D 10H 05M.

All leading spreadsheets convert dates and times into a number. It is this number which the program stores. What is displayed or printed depends on the formatting you apply.

With Excel, a new worksheet uses the General number format as the default. But if you enter a number with a "/" in it, Excel initially displays it as a date, as Nikos discovered (see "Excel fix", opposite). If there is a colon in it, Excel displays it as a time. If you add a bunch of times, like Geoff wants to, you would think the program (actually working in the underlying large numbers) would get confused. But Excel doesn't. So, Geoff, the only formula you need in cell B7 is

```
=SUM(B1:B6)
```

That will immediately display 10 05. But you'll get the result you want if you enter the custom format for the cell:

```
d"D" h"H" mm"M"
```

Financial analysis

Going back to the August issue, we ran out of space so there wasn't room for anything on financial analysis — readers who are entering the template from the listings (rather than receiving them on disk) will be interested in *Fig 1* which is carried over from then. It's the balance of the definitions of the Names on the template.

Also intended for that column were the formulae for rows 24, 27, 30, 31 and 32. These are now provided at the top of the listing in *Fig 2*.

The second part of *Fig 2* gives the listing for this month's subject: rows 53 to 58. These calculate the Activity Ratios which are usually recorded as percentages. Rows 52 and 59 are blank. The same Names in column B are copied across to columns C through F. Column G, as before, is for the company's industry averages if available. The first two ratios are collected for service businesses only. Salaries and staff benefits is the major expense for a service company. In the advertising agency example (which we have been using in this series) it has hovered between 60 and 65 percent of the company's income *(see Figs 3 and 4)*. This is about normal for large advertising agencies, but because it outweighs any other item of expense it can directly affect

Fig 1

Listing of remaining names in the service template

```
Ave._Accounts_Receivable =$B$32:$G$32
Billings                 =$B$21:$G$21
Commission___Fees        =$B$22:$G$22
Compensation             =$B$23:$G$23
Income_taxes             =$B$27:$G$27
Interest_Expense         =$B$26:$G$26
Net_Income               =$B$28:$G$28
Net_Worth                =$B$31:$G$31
Operating_Profit         =$B$25:$G$25
Overhead                 =$B$24:$G$24
Working_Capital          =$B$30:$G$30
```

SERVICE.XLS

	A	B	C	D	E	F	G
52							
53	ACTIVITY RATIOS (%)						
54	Compensation/Commission & Fees	61.00	60.07	65.01	64.95	64.02	
55	Overhead/Commission & Fees	23.07	23.96	25.05	24.95	24.06	
56	Fixed Assets to Net Worth	26.43	21.54	19.42	19.44	20.74	55.50
57	Asset Turnover	120.49	125.00	114.51	110.50	135.10	65.20
58	Accounts Payable to Billings	11.27	10.15	8.20	8.76	9.93	9.30
59							

Fig 3 *Example results for the activity percent ratios on the template for service companies*

Fig 2 Financial analysis template listing

```
A24 Overhead
B24 =Commission___Fees-Compensation-Operating_Profit
A27 Income taxes
B27 =Operating_Profit-Net_Income-Interest_Expense
A30 Working Capital
B30 =Current_Assets-Current_Liabilities
A31 Net Worth
B31 =Stockholders__Equity
A32 Ave. Accounts Receivable
B32 =(Accounts_Receivable+C4)/2

A53 ACTIVITY RATIOS (%)
A54 Compensation/Commission & Fees
B54 =Compensation/Commission & Fees*100
A55 Overhead/Commission & Fees
B55 =Overhead/Commission & Fees*100
A56 Fixed Assets to Net Worth
B56 =Net_Plant_Equipment/Net Worth*100
A57 Asset Turnover
B57 =Total_Assets/Commission & Fees*100
A58 Accounts Payable to Billings
B58 =Accounts_Payable/Billings*100
```

an agency's profitability so agency managements watch it very carefully.

Clients want to see the best available talent working on their accounts, and top talent costs money. At the same time, some of the most creative advertising agencies often have a slightly lower ratio (compensation/commission and fees) than other companies in the industry — whose strength lies in, say, marketing — because younger creative people will often work for less money at an agency which will allow them to do their best work. That's because creative people, who get the largest piece of the salary pie, are measured by their portfolios and awards. They rise to the top of their profession by being recognised in their trade papers and shows, and by being able to present proof of their published work at interviews.

The next ratio compares overheads with commissions and fees. Service companies must also take firm control of their other expenses. The days are over when advertising agencies would buy houses adjacent to prospective clients, so that an account executive would become a neighbour. But office rents, phone bills, client entertainment and travel expenses soon mount up. In the example shown in *Fig 3*, it's running between 20 to 25 percent of real income. That's why this is a ratio which is carefully monitored by the experienced managements in profitable companies.

The Fixed Assets to Net Worth ratio measures the extent to which stockholders' funds are being used to buy plant and equipment. If these investments exceed the company owners' equity, it can restrict flexibility. That's why many companies prefer to lease facilities and hardware.

To summarise: if this ratio is higher than desirable, a company can sometimes work its way out of the situation by speeding up collections, thus generating a higher profit and allowing it to carry the excess capacity.

A declining ratio, or a ratio lower than comparable businesses, is desirable. More funds are available for working capital. Depreciation charges are reduced, thereby enabling competitive fees and higher profits.

An Asset Turnover ratio of a higher percentage than the industry, or increasing percentages for the company, suggest poor sales management so a more aggressive sales policy is necessary.

Significantly lower percentages than the industry can indicate over-trading, which can lead to financial difficulties.

To summarise: ideally, this ratio will stay fairly constant over the years, trending neither up nor down, and remaining in line with the industry.

If the Accounts Payable to Billings ratio is high for the industry, it indicates that the company may be using suppliers to help finance operations. This might be positive for a time but negative for short-term creditors, who would be concerned about the company's potential problems in paying suppliers. A low ratio indicates that the company is in a good position to pay its suppliers.

In the case of an advertising agency, the agency is liable for all of its clients' media bills. Naturally, it invoices its clients in advance of the month and pays the media after the end of the month. If all goes well, the agency can earn short-term interest on the money. If their clients are slow payers then the agency won't be in a position to pay the media and can get a bad reputation.

To summarise: This ratio is simply a restatement of the Payables Turnover. That ratio is expressed in days. The Accounts Payable to Billings ratio gives the same result as a percentage. Both ratios measure how the company is paying its suppliers in relation to the volume transacted. Some industries use one version, some use the other. Service companies differ from stock companies here. Stock companies compare Accounts Payable with Purchases of stock for their Payables Turnover, and with Net Sales for the other ratio.

Next month, in the last instalment of the series, we'll consider the four most commonly monitored Profitability ratios.

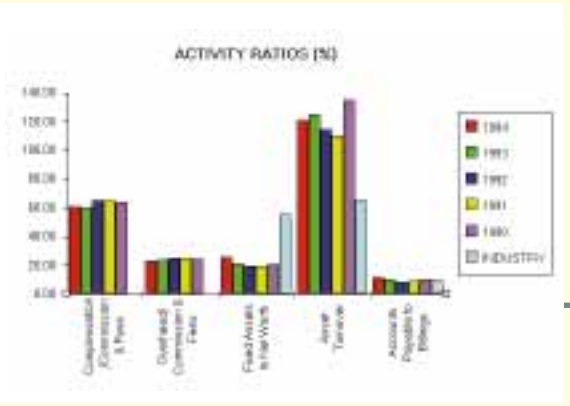
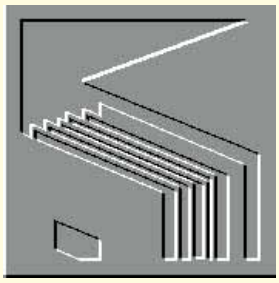


Fig 4 *Chart of the results for the activity percent ratios*

PCW Contacts

Stephen Wells welcomes comments on spreadsheets and solutions to be shared. Send them to *PCW* Editorial at the usual address or to **stephen_wells@pcw.ccmail.compuserve.com**. For the financial analysis Excel templates for service companies and those which carry stock, send a formatted 3.5in disk and a stamped, self-addressed envelope.



This **Codd** be the last time

Mark Whitehorn **wraps up the last of the list of suggested rules for modern, PC-based RDBMSs. There's Postcode, too, in shareware and full versions to help you get addressed correctly.**

Rule 10. The RDBMS must have a comprehensive control language (for example, SQL).

In order to act as a front-end to a database server, PC-based RDBMSs must have a control language and SQL is the obvious choice. Yes, I know SQL is flawed and that it is incomplete; I know it has many variations; but at least it is well established.

In addition, an RDBMS which has any pretensions towards use for serious work needs its own internal control language. While SQL can be squirted to remote database servers, the internal language is used to drive the interface, link forms and performing data validation. Whether this language is based on Basic, Pascal, C or any other reasonably common language doesn't matter too much as long as it is reasonably comprehensive. Support for macros is not, in my opinion, an acceptable substitute unless the DBMS is going to be used only for very simple databases.

Simple tasks

11. In addition, it must have a GUI interface which allows end-users to perform simple tasks like querying, reporting, etc.

The underlying language is essential for serious work, but who wants to code the bread and butter work (forms, queries and so on) by hand? GUIs have proved themselves remarkably well-suited to the task. I must admit to a personal liking for systems (like dBase for Windows) which allow you to use a GUI to build a form, say, but can then use your work to generate a code description of the form which you can then hand-tweak.

Results

12. The results of queries (answer tables) should, whenever possible, be editable.

This is, essentially, as Codd's Rule 6: "All views that are theoretically updatable are also updatable by the system". A "view" is essentially the same as an answer table.

As discussed in an earlier issue, actually determining whether each and every view is updatable has been shown to be impossible. However, it is easy to decide about most views and the RDBMS should allow us to update all of those views where it is clearly safe to do this. Of the current crop of RDBMSs, only Access and Paradox provide editable answer tables and of these Access has the more extensive implementation.

Multiple records

13. It must be possible to alter multiple records with a single command.

And this is essentially Codd's Rule 7: the "High-level insert, update and delete" rule. Most of today's PC-based RDBMSs provide this facility though some of the more simple DBMSs don't.

Cascade

14. The RDBMS must support referential integrity, with cascade update, cascade delete, etc.

Primary keys help to ensure that the data within tables is internally consistent. By something of the same token, Referential Integrity is a way of ensuring that the logical relationships between tables are maintained.

Given the two tables in *Fig 1*, it is clear that the numbers in PATIENTS.[Gp No]

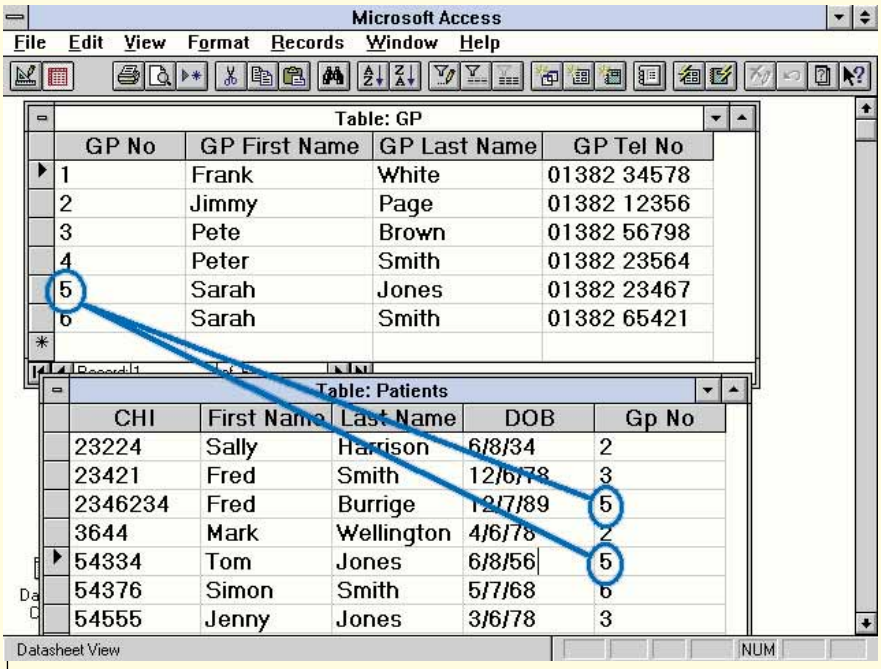


Fig 1 *Showing the association between GP.[GP No] and Patients.[Gp No]*

refer to those in GP.[GP No]. So both Fred Burrige and Tom Jones share Sarah Jones (no relation, at least in the kinship sense) as their GP. Considering that the GP table only contains six GPs, numbered one to six, it would be meaningless to place the number seven in the PATIENTS.[Gp No] field; unless of course we added another GP with that number to the GP table. Referential Integrity provides this check, and refuses to allow an entry in PATIENTS.[Gp No] unless there is a corresponding value in GP.[GP No]. Referential Integrity will also forbid the deletion of a GP record if it refers to one or more PATIENT records which exist. To allow this deletion would leave "orphaned" records pointing to a non-existent GP.

• *Cascade Delete*

So, what of cascade delete? This is an option for referential integrity, an add-on if you like, which says that if you do delete an existing GP record, referential integrity is maintained by deleting all of the PATIENT records which refer to that GP record. Typically, if cascade delete had been set for this join, when you tried to delete the GP record the system would warn you that Patient records would be deleted as well, and offer you the choice to proceed or abort the process.

You, as the database designer, may decide that cascade delete is inappropriate in this case (which it clearly is) but it can be really useful in other circumstances: in order/sub-order systems, for instance. RDBMSs should offer it to us as an option so that we can decide if and when to apply it.

• *Cascade Update*

"Standard" Referential Integrity will also not allow you to delete or change the value in GP.[GP No] when that value is referenced by records in PATIENTS. Cascade Update, like Cascade Delete, is an optional extra which can be added to Referential Integrity. It will allow you to change the value in GP.[GP No] and it will then seek out and update all the values in PATIENTS.[Gp No]. This will be entirely inappropriate for some applications while for others it will be an essential requirement. On those occasions, you will be pleased that you chose an RDBMS which supports it, and so will your employers when you casually let them know all about the excellent choice you made.

Support and sort

15. The RDBMS must support the maintenance of indices as well as sorting.

Human beings like their data to be sorted

Postcode — an interesting new toy

Postcode, from AFD Software, is a system which looks up addresses from postcodes. Suppose that you are developing an application in, say, Delphi. Your client wants to be able to type in a postcode and have the address magically appear on screen (great for telesales operations). As the programmer, you could, over the next three years or so, dutifully type in all of the known addresses and postcodes… or you can simply plug the Delphi version of Postcode into your application. Sample code is already provided for Visual Basic (for DOS or Windows), MS Access, Delphi, Paradox and others. If you want Postcode for other, less well known systems, AFD says it will write sample code for you. The datafile is about 18Mb, which includes the indices which reduce typical search times to less than one second.

Nildram Software has been appointed as distributor for the shareware release of Postcode. It ships with a DOS TSR version, a Windows version supporting DDE and direct pasting into applications, plus programming interfaces for the languages described above. Due to licensing restrictions the shareware version of Postcode doesn't supply addresses down to street-level detail — just towns and counties. Happily, for those intending to download it via a modem, this also reduces the size of the data file to about 600Kb. This version can be registered for just £42.50 (plus VAT) with no other licensing costs. If you want the full version which works down to the street level, it is still only a modest £99 (plus VAT) for the software and an annual licence fee of £55.

A Unix version of Postcode is currently under joint development between Nildram Software and AFD, and is expected to ship in the early Autumn. Pricing has yet to be announced but should be as competitive as the DOS and Windows version.

You can try out Postcode on-line at http://www.nildram.co.uk/nildram/postcode.html. On this Web page you can test out the Unix version of the software while on-line, download a copy of the shareware version, and even register it there and then. For users who only have FTP access, a shareware version of Postcode can be obtained from ftp://ftp.nildram.co.uk/pub/nildram/afdpost.zip. Nildram also runs a BBS where users can download the software for free, on 01442 891109 with your modem for access.

either numerically or alphabetically. But records in a table are rarely entered in alphabetical order so if we look at the table "in the raw" the records are usually not in the order we want. The answer is to get the RDBMS to order them for us.

One way in which the RDBMS can do this is to sort the records by physically moving them around in the table — that is, by changing their position within the file on disk. Given a file of any size this process is horribly slow because of the disk I/O involved. In addition, as soon as more records are added, the entire process has to be redone. Worse, what happens if you want to see the data sorted in different ways? You might sometimes, for instance, want the data sorted alphabetically by name, yet at other times by telephone number. If this is done by physical sorting on the disk, the RDBMS will have to maintain two tables, each sorted by a different field. Clearly this is wildly inefficient.

In the light of this problem, indexing was born. An index is essentially a list of numerical values which gives the order of the records when they are sorted on a particular field. For example, in *Fig 2* you can see the GP table in its original state: the records are in "entry" order. If we generated an index on the [GP Last Name] field, it might look like the table on the right called Last Name Index. This shows that given the required sort, the last record would be [GP No] = 1, Frank White. To save you the trouble of verifying this, the table shown lower left contains the same data actually sorted by last name. Another "index" is also shown (bottom right) for Tel. No — if you are feeling dedicated you can check to see whether it is correct.

Fig 2 *On the right are two tables mimicking the way in which indices work. The upper one shows how an index based on how [GP Last Name] would look; the lower one represents an index based on [GP Tel No]*

Compared to physically moving records around on disk, indices are much easier and faster to generate and maintain. In addition, you can have as many indices as there are fields in your table without wasting too much disk space.

It is worth stressing that indices are maintained internally by the RDBMS — they don't appear as small tables, as I have shown here. I constructed these small tables by hand simply to illustrate the principle — you won't find them appearing like this if you index a table.

Quick queries

Indices are really useful for sorting data for human consumption but they are also invaluable for speeding up processes like querying. A word of caution however: despite their efficiency, indices do take *some* processing power to maintain and shouldn't be used indiscriminately.

So how do you know which fields you need to index? The answer to this question comes under a more general heading, namely "How do I speed up my database?" Readers have asked me to discuss this more general topic, so I will return to the subject of indices in a couple of issues' time.

For the moment, the bottom line is that any RDBMS worth its salt must allow you to mark one or more fields as indexed. This is usually done during table design, and once you have done that, the RDBMS should construct and maintain the indices transparently.

Tips & Tricks

Tips and tricks are proving popular, so let's have some more — I'll supply the ones I find and if you have any good ones, for whatever RDBMS, please send them in.

Grid tip

From Shane Devenshire, Walnut Creek, California: *"Access uses a Snap to Grid feature to help align controls on forms and reports. Unfortunately, it may appear not to have any effect when you first begin to use Access because the default is 64 gridlines per inch. At this resolution Access chooses not to display the grid on screen (even if you have selected "Show Grid" to be on); and the impact of this very fine grid on the positioning controls is negligible.*

The spacing of the gridlines are Form Properties. You can set the spacing to less than 64 but you will find that you still can't see the grid until the Grid X and Grid Y properties are set to less than 18."

The screenshot alongside shows the property setting for a form and the relevant grid settings are visible. It also shows (on the right) the place where you can see and alter the "Show Grid" option. This is a property for the entire database so you set it by popping down the View menu, selecting Options and highlighting Form & Report Design. If you don't want the controls to line up with the grid, set the "Snap to Grid" option (found in the Format menu) to Off.

In my experience, Access 1.1 defaults to Grid X = 5 Grid Y = 5 for blank forms, and Grid X = 64 and Grid Y = 64 for wizard-generated forms. My copy of 2.0 defaults to Grid X = 10, Grid Y = 12 for both, but I haven't examined this extensively, so "your mileage may vary".

This take-home tip is excellent. Whichever version of Access you are using, be aware that you can alter the grid size, which in turn affects how controls line up on the form.

Broad search

In the very simple DBMS called Q&A you can use the search facility to find data in fields, but the search, by default, is exact. To find, say, all data containing the word "Penguin" use:

```
..Penguin..
```

which should find entries such as: "The Adventures of Penguin Penguinsson".

Setting the Form Properties in Access so that objects snap to grid

PCW Contacts

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Layering it on a bit thick

Gordon Laing looks at what layering can do for paint and photo retouching applications, and finds some funky fonts, too.

This month I'm going to look at a technique that can be used in layout, vector drawing and even some bitmap paint packages. The layering facility is apparently universal and extremely useful.

Like many other well-programmed electronic publishing tools, layers are best understood and used if you imagine you're working with conventional art materials. Each layer acts like a sheet of transparent acetate onto which various items may be placed. The cunning part is that layers can be reordered (placing certain elements over or behind others), moved, or even deleted altogether without affecting the layers above and below — experimentation without commitment.

Layers have been a staple part of vector drawing and DTP packages like FreeHand, Illustrator and CorelDraw since day one. Who could consider PageMaker or Quark XPress without the facility to place pictures over text or vice versa? Many thought that's where it would end, and while layers would be nice on bitmapped packages they would probably remain a pipe dream.

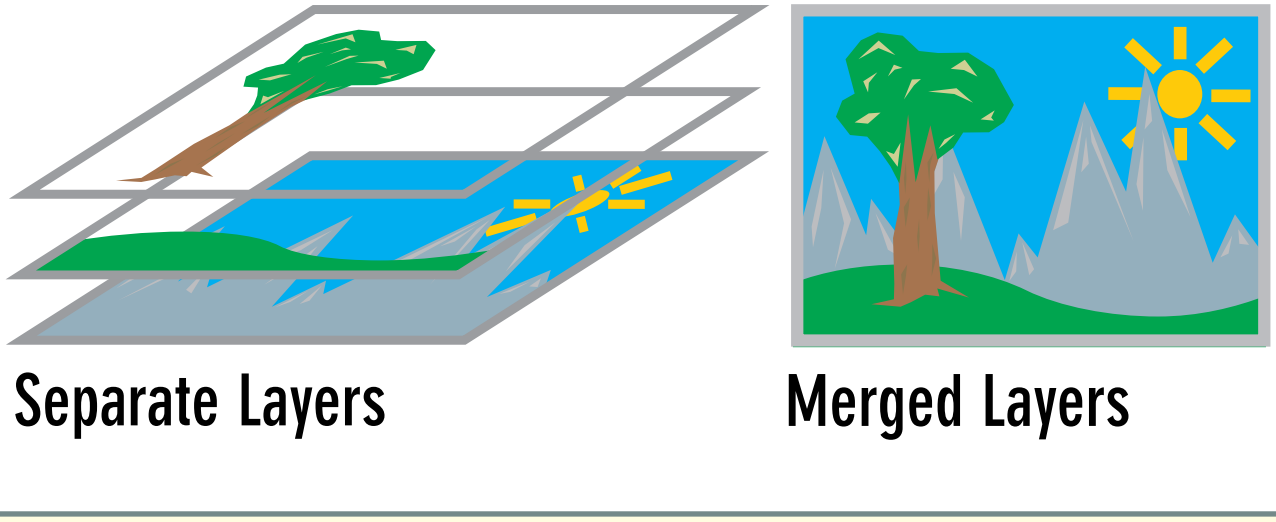
In the past year or so innovative programmers have incorporated layers into such bitmapped paint and photo retouching applications as Fauve Matisse, which inspired Micrografx and Adobe to include the facility in Picture Publisher 5 and Photoshop 3.0. Incidentally, MacroMedia (the company which took up the FreeHand reins following the Adobe/Aldus merger) has recently acquired Fauve. This expands MacroMedia's portfolio substantially with two excellent bitmap packages, Matisse and, particularly, Xres.

Layers in bitmap packages work in exactly the same way, allowing you to manipulate layers to create the desired effect. Most packages also allow you to temporarily "switch off" one or more layers, in order to get a clearer view.

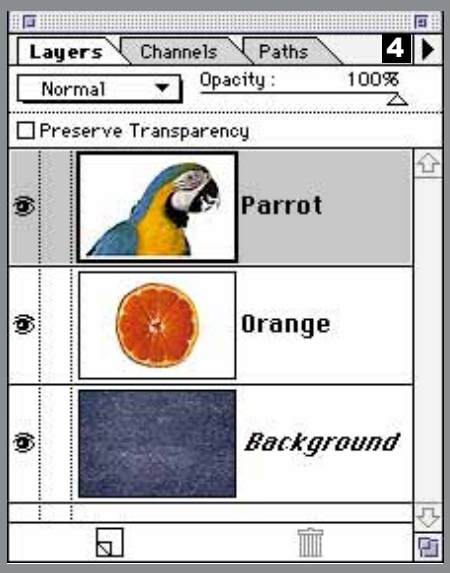
Prior to layers, any modifications made to bitmapped images were permanent and rarely reversible beyond a few levels of undo. This could be a real problem when you pasted an element on to the image which, once deselected, became a permanent fixture. If you'd wanted to move it a bit to the left, you could forget it. You could experiment to a certain extent with channels, but it wasn't an ideal situation.

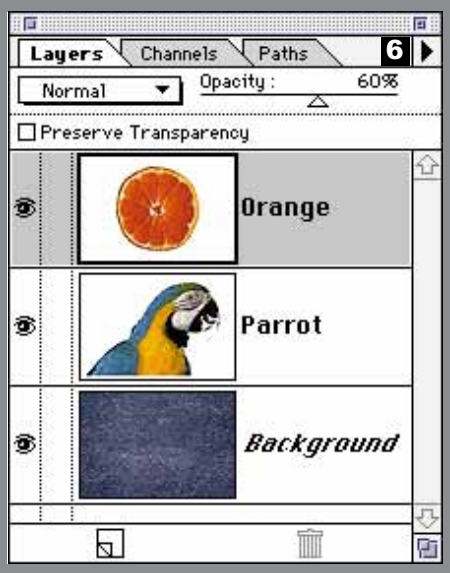
So that's the theory; what about the practice? With bitmaps still in mind we'll begin with the ubiquitous Photoshop 3.0, although as usual any techniques discussed will be applicable with little modification to any other layer-equipped bitmapped package.

How layers work



Layers In Photoshop 3.0





This montage was assembled in Adobe Photoshop 3.0 for Windows running on a P90 with 16Mb. Layers are memory hungry, so I switched to my Mac 8100/80 with 32Mb to take the palette screenshots; this configuration was much faster.

When creating a layered document, it's handy to have elements without backgrounds. The parrot originated on a dark background (1). I removed the background using the magic wand tool, resulting in the cut-out (2).

Starting with a textured asphalt background, I added two new layers: orange first, followed by the parrot (3), and palette (4). Above is the orange over the parrot (5) but set with 60 percent opacity; see palette (6). After playing around, merge the layers together; see palette (7).

Layers in Photoshop 3.0

Three options are presented at the bottom of Photoshop 3.0's new document dialogue box, referring to the background of that new image. Background colour, not surprisingly, returns the background to the colour that existed prior to the new document command. White colours the background white but the really interesting new option, exclusive to version 3.0 and upwards, is Transparent.

Transparent backgrounds are just that — they act as sheets of acetate. You can draw or place images on these transparent backgrounds as you would a solid coloured background, with the advantage that if it's used as a layer you'll be able to see through unoccupied areas.

Layered documents are often best started with a background, which could be a picture, a solid colour, or perhaps a blend. Opening the layers palette shows just one layer, labelled background, with a thumbnail of your image. The arrow in the top right corner of the palette presents all layer options.

Adding a new layer prompts for a name, after which a new thumbnail appears above the original background. Since there's nothing on this layer as yet, the thumbnail is blank. Each new additional layer appears above the one that is currently selected in the palette.

The layers palette arranges each layer from top to bottom — the first thumbnail is the top layer. You can rearrange the layers by dragging them around the palette.

To the left of each layer's thumbnail is a little eye. When the eye is there, the layer is being displayed. Clicking it hides that layer, which can help when things get a little complicated.

Double-clicking a layer in the palette brings up a dialogue box including options to vary the opacity of that layer. At 100 percent opacity nothing will be visible below the layer, while zero percent renders it invisible. Unless you want to place images on top of each other as a montage you'll probably opt for, say, 40 percent opacity where the layer is clearly visible but whatever is below shows through.

So you'll have a whale of a time merrily adding new layers for pure experimentation, until at some point your system grinds to a halt. The reason is that each layer is effectively a new document at the same resolution and in the same mode as the first. If your background is a 4Mb CMYK document, each new layer will be 4Mb in size, so four layers would then be 16Mb. Layers in bitmap packages may be fun, but they're more than a little demanding on your system. Photoshop 3.0 shows both the size of the layered file and what it would be, post-merge, at the foot of the screen.

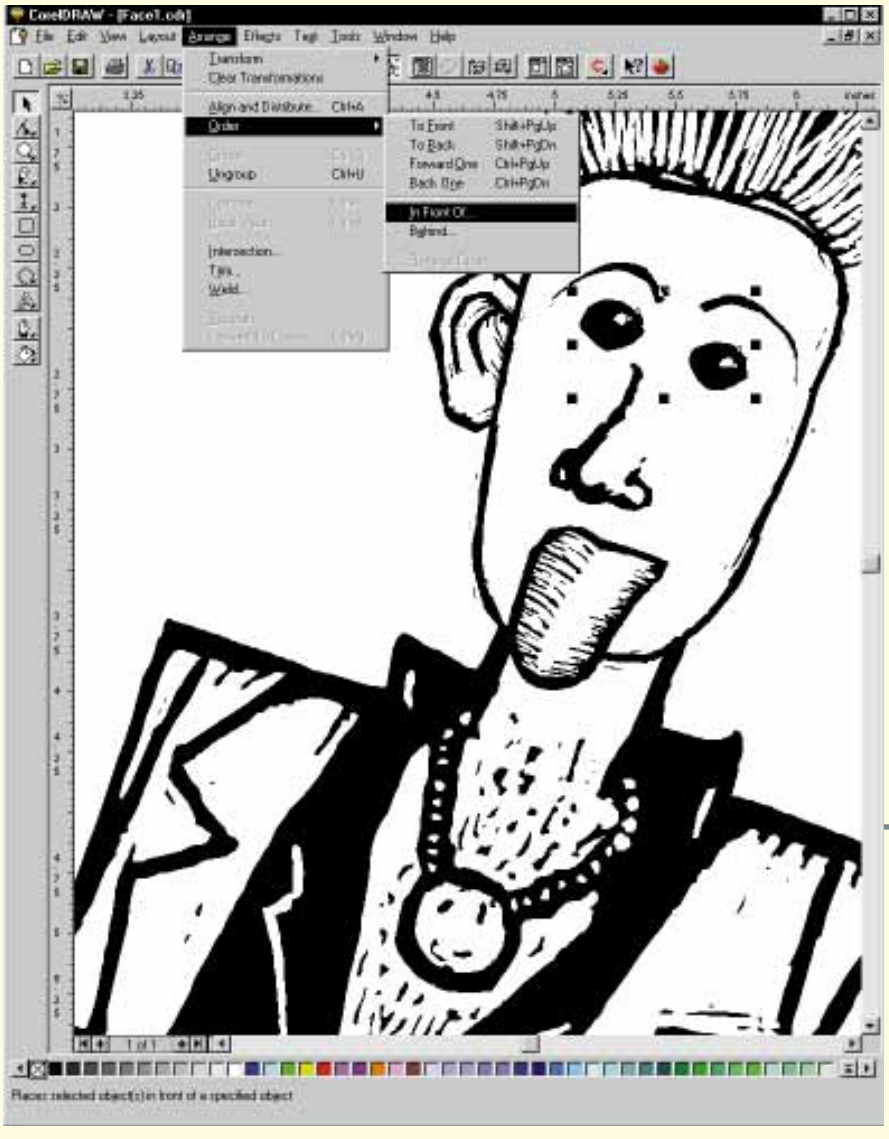
Layers are also proprietary to that application. Photoshop 3.0 can only save its layered documents in .PSD format, which can only be reopened in Photoshop 3.0. You won't want to keep them in this format for long however. Once all your work is done and you've finished switching layers on and off and moving them around, select the merge command to combine all the layers into one standard bitmap. In our earlier example, the four-layer 16Mb file will be reduced to a 4Mb document, exportable as a bog-standard TIFF. Much more manageable in size and compatibility.

Layers in DTP and drawing packages

When working on a layout, you'll unintentionally be adding a new layer for every element you place on the page. Unlike bitmapped packages, multiple layers in DTP applications are a standard way of working and don't result in huge files.

The way to understand them is to consider each new element, be it text or a picture, as being on its own layer. As you place them on the page they sit on top, obscuring everything below: imagine a block of text on one layer, then placing a picture on the top (effectively on another layer).

As it stands, the picture would be



Left *There's no such thing as a free lunch, or a layers palette in a drawing package for that matter. Just select the desired element, then send it forward or backward a level, or all the way to the back or front*
Right *CorelDream 3D; the latest module in CorelDraw version 6 for Windows 95. Who knows what'll be in version 7…?*

obscuring the text below. This may or may not be the effect you would want.

Some layouts would place the text on top of the picture, particularly if it's a large type heading. It's not uncommon to place white or lightly coloured text over a predominantly dark picture. With text over picture, or picture over text, you are dealing with two separate layers.

But then there's the third option of wrapping one element around another; usually text around a picture. In this instance the two layers are merged, with one element repelling the other. There's usually an option to set the space around the edges of both elements. This is called the "runaround" and could typically, taking *PCW* as an example, be 8mm.

Runarounds aren't just useful for visible objects in DTP. Usually text is fitted in square boxes with vertical columns. Sometimes you want the edges to be anything but vertically straight. How about a diagonal or a wavy line? These effects can be effective. Unless you have the facility to create irregularly-shaped text boxes, you'll have to force the text to runaround in the direction and manner you desire by plonking a suitable shape in the way.

In most cases you won't want this shape to be visible. All you do is draw the line or shape you desire, force the text to runaround it, then give it the colour of the background (or no colour at all). The line disappears from view but still forces the text to flow as desired.

There's no such thing as a layers palette to navigate in DTP or drawing applications. Instead you have to click on the desired element, then from an Item or Element menu choose to send that selected object one layer forward, one layer back, all the way to the front, or all the way to the back.

Sometimes its difficult to select the element you require if loads are popped on top, so some applications allow you to cycle through stacked items while mouse clicking with a key held down.

It's very easy to find yourself just doing layout with a DTP package, but some fairly sophisticated shapes can be made using layers and basic tools. Remember that almost every package will be able to do squares, rectangles, circles and lines — experiment and you may not need that drawing package after all. Try placing rotated white squares over part of a filled-in circle and hey presto, you've got a cheese, or a Pacman character. Okay — not spectacular, but perhaps sufficient for some people's needs.

Font of the Month

Flo Motion

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdéfghijklmnöpqrstuvwxyz 1234567890

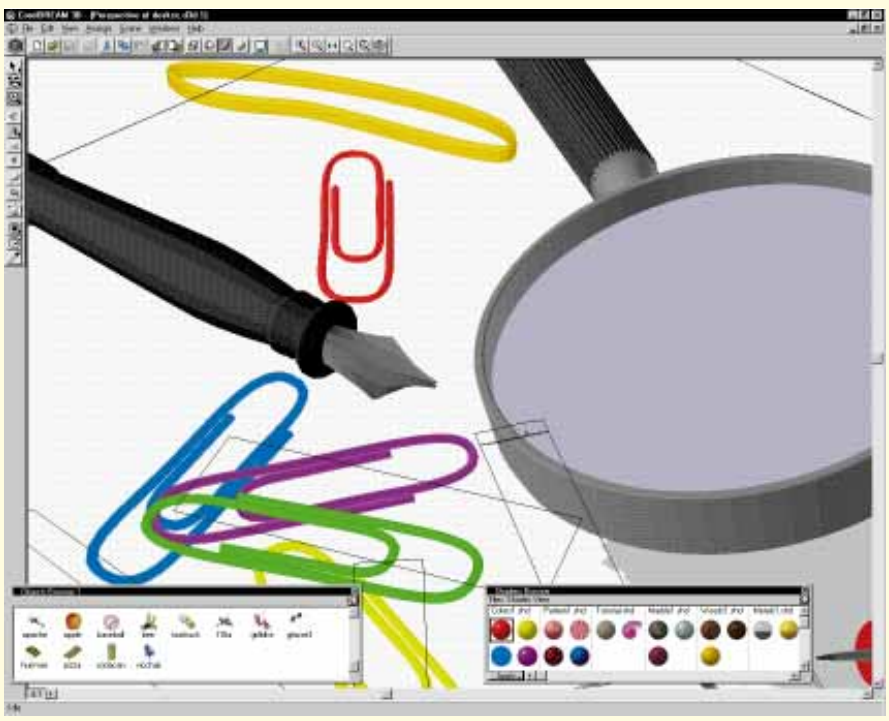
Just my type

Some of you may have come across *FUSE*, FontWorks' quarterly typographic promotional pack. Each costs £30 and contains a selection of fonts, posters and information. It's all great fun and highly recommended. So far it's Macintosh only, but plans are afoot for Windows versions.

FUSE is over 15 issues old, but back issues are available. We recently got hold of *FUSE* 5, which includes Flo Motion by Peter Saville, Spherize by Lo Breier, Alphabet by Paul Elliman, and Scratched Out by Pierre Di Sciullo.

This issue's font of the month is Peter Saville's Flo Motion. After graduating from the faculty of Art and Design at Manchester Polytechnic in 1978, Peter Saville was co-founder of Factory Communications. He worked there as art director for 14 years, working with New Order, a band on the Factory label.

FUSE 5's theme was virtual reality (VR), and Flo Motion was inspired by the unresolved shapes that may be found in a low-resolution VR scenario. Saville took a traditional serif typeface, put each character through a gaussian blur, then adjusted the contrast to create Flo Motion. In fact, I think I might take an existing face and muck about with it in Photoshop and export the results into FontoGrapher. You never know; you may even see my work on sale one day. But it's not quite that easy: Saville's work is excellent and *FUSE* is an essential purchase for type fanatics. Let's hope FontWorks sorts out a Windows version soon.



PCW Contacts

Next month it's our Christmas issue and I'm already polishing my baubles. If you've any festive thoughts, write to the usual *PCW* address or email me as **gordon_laing@pcw.ccmail.compuserve.com**

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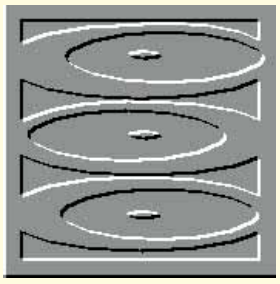
FontWorks 0171 490 5390
Adobe 0181 606 4000



Authors, directors and **fast** movers

Choosing an authoring package can be confusing; for instance, should you use Authorware, or Director, or both? Panicos Georghiades and Gabriel Jacobs help you make the right decision.

Andy Tinton (<andy@dcomms.demon.co.uk) writes: *"I read with interest your article about Authorware and Fast products (*Hands On*, August issue). I have been toying with the idea of buying both of these products, and have managed to get a quote from a Scottish supplier for Authorware for £3,280 — about £500 cheaper than all the other dealers. But I don't know whether I can really justify the cost of Authorware, and instead just go for Director."*

He goes on to raise a couple of queries which we think will be likely to interest a number of other readers too: *"I have commercial programming skills (C, Basic, Assembler language when I was a youth writing Commodore 64 games commercially), but I may feel more at home with Director rather than stick to the stringent programming of Authorware. And by the way, Authorware is not for non-programmers. For basic multimedia applications, yes; but I have seen some quite complex code in Authorware programming too.*

"Is there anything that can be done in Authorware that cannot be achieved in Director? It is clear that for large-scale projects (e.g. an interactive encyclopedia or visual glossary) it's much better to plan a project and maintain the code and elements in Authorware. Largish projects will tend to get lost in marker headings and hidden scripts with Director. I have also been trying to get out of Macromedia the cost of calling Director Movies from Authorware in terms of memory, and start-up time for movies.

"And I have another query: I hope to buy a Fast board quite soon, but I cannot get a straight answer from the Fast UK office about which is the best (MMII + MJPEG board, or FPS60) at capturing AVIs. MJPEG AVIs can be captured, but what about normal AVIs that I can give to other people on CD-ROM? To make normal AVIs, I will have to first transfer the MJPEG AVIs in Premiere, which I suppose will be a time-consuming process."

Macromedia's views on the two products are (and we agree) that you can do just about everything you want with both of them. It's really a matter of how easy it is to do particular things with one as opposed to the other. So, what you have to decide is what type of applications you'll be developing. That's true with almost every type of multimedia development scenario, but in this case even more so.

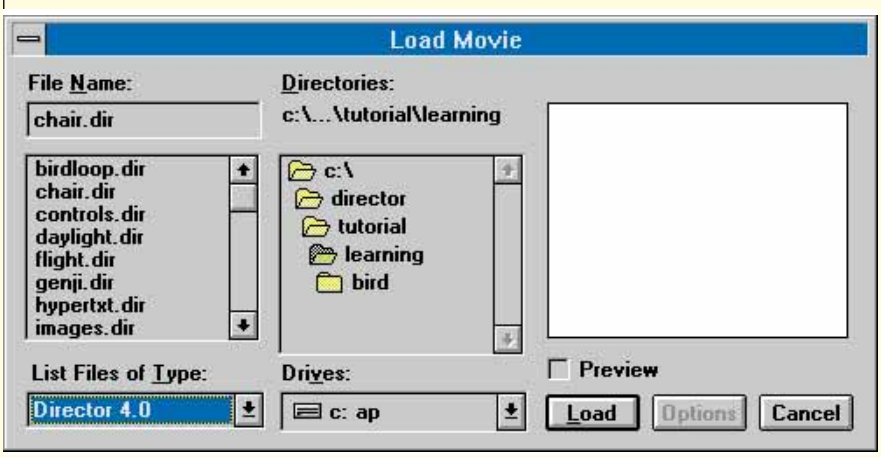
Director is certainly better for creating visual impact and is one of the best products on the market for this purpose. It's also very strong on animation, so we would suggest using it when power of presentation is an important requirement.

With its enhanced hypertext facilities Authorware is very good for reference applications, especially those that require interactivity such as education and training. You can design carefully structured courses with more sophisticated logic and branching than in Director, and there are built-in facilities for measuring student performance. This is probably part of the reason why some universities, colleges and training agencies have standardised around it, although Toolbook still seems to be holding its first place in the world of home-grown computer-assisted learning.

As for importing Director movies into Authorware, the cost in memory is more dependent on the size of the movies than anything else. The cost in time depends on the performance of the computer as well as the size of the Director movie you're importing.

If the Director movies you want to import [into Authorware] don't have any interaction, you can first export them to a series of bitmaps, then import them directly into Authorware. But we should mention that there are some specific things which Authorware will do and Director won't, such as accessing database information via ODBC. If such things

Director movies imported into Authorware have a serious memory overhead



are important for the work you intend to do, then the other considerations become secondary.

Regarding your second question on the Fast video capture cards, both models use the same Zoran compression chip (the FPS60 has it built-in, while for the Movie Machine II it comes as an add-on extra), so really there's no difference in the quality of the captured video.

There are differences in the facilities offered by the two boards: notably, the Movie Machine includes a TV tuner and a video mixer. However, both include an overlay facility and an add-on to play MPEG-1 video files.

Finally, to the point you make about grabbing "normal" AVI files (for distribution) in one go. Firstly, there's no such thing as a normal AVI file: even the Motion JPEG files captured by the Fast boards you mention — as well as by many other boards using this type of compression — have an AVI extension. AVI is a generic file extension for Video for Windows files.

There are many types of compression methods used with Video for Windows. Some are based on hardware methods, some on software, others on both. They're listed in the Drivers icon in the Control Panel (Win 3.x), and in the Multimedia icon of the Control Panel (Win95).

What you're clearly referring to are AVI files using software-only decompression methods distributed freely with the runtime version of Video for Windows (for instance, MS Video 1, Cinepak, and Indeo).

None of these provide such good quality as M-JPEG at low compression ratios (up to about 20:1). Additionally, M-JPEG is an editable video format (it's what's used in professional hard disk-based video studios) and you may well need to do some editing work before getting your video clips to the finished state, even if you don't mean commercial distribution when you talk of giving CD-ROMs to other people. The idea is to carry out any editing work at the best available quality, which means keeping as much as possible of the original information content (i.e. less so-called lossy compression, where some of the information is inevitably lost), and compressing down to the levels required for distribution only at the very end.

If your material has already been edited using analogue methods (and no further editing will be done after capturing) you could consider boards offering Indeo 3.2, such as the Creative Labs Video Blaster RT300. These compress in real time using hardware during capture, and the results can be played using software-only drivers freely distributed with Video for Windows. The quality is pretty good.

The compression method you choose for your final results once again depends a great deal on your application. Here we're thinking about such things as transfer rate, frame size, frame rate, whether your material is fast moving (action) or slow moving (talking-head type), whether you want the best picture quality for the smallest file size or the fastest turnaround.

However, your choice to go for a board

Aimtech/IconAuthor news

One of the main advantages applicable to both Authorware and Director is their platform compatibility — you can develop applications that will work on different platforms using the same code (typically, Mac and PC).

Another program that does this well is Authorware's main competitor, IconAuthor (made by Aimtech), which works on Windows, Windows NT, Mac, OS/2 and Unix. In the past few years we've heard comparatively little about Unix in the world of the personal computer. But recently, with all the fuss about the Internet where Unix servers are the kings, a number of companies are beginning to add Unix machines to their existing range of platforms.

Not long ago we talked to Leo Lucas, Aimtech's chief technology officer. He told us that as part of a new initiative funded by the US government — the National Information Infrastructure Education and Training project — IconAuthor will be available on the Internet to deliver multimedia training and authoring on demand.

A new version of IconAuthor (with Internet access) will be available next year which will include HTML (HyperText Mark-up Language — the programming language used for creating pages on the World Wide Web). The new IconAuthor will, we're told, enable training-course developers to access Internet resources, and it's aimed at providing training facilities at remote sites all over the world. And the good news for developers is that there will be transferability of applications from other existing IconAuthor platforms to the Internet, so that programming effort can be saved.

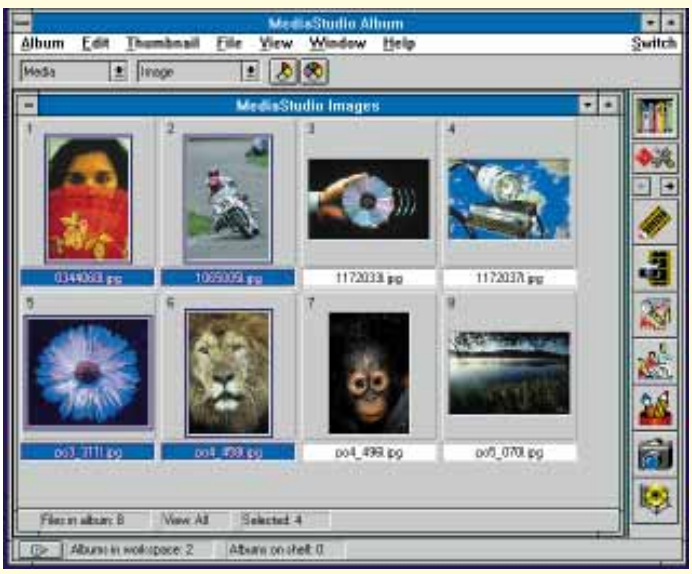
that uses M-JPEG compression (such as the Fast boards) is a good one. It's flexible, and will provide you with good-quality video. We haven't come across better for the money. And last month in *Hands On Multimedia,* we looked at Spea's Crunch It, which uses the same Zoran chip as the FPS60 and the Movie Machine II.

ULead Media Studio Pro 2

The "multi" in the word multimedia is what makes applications interesting, but it's also the cause of the developer's nightmare. Handling more media requires faster and bigger machines, more development time and effort, and thus higher costs. It also requires more computer hardware and programs for editing and preparing the different media — you need at least a word processor, a sound capture and editor program, a bitmap scanning and retouching/painting program, a video capture and editing program, and an animation program. And then there's the multimedia authoring program you need in order to put the stuff together. Some programs may offer a few of the facilities found in dedicated utilities, but there are always limitations. In any event, we're talking thousands of pounds.

Recently we've had the opportunity to evaluate one of the very few (and probably the most affordable) bundles of programs you need for capturing and editing all the different types of media you're likely to use in a multimedia application. This is ULead Systems Media Studio Pro. It includes screen capture, batch-file conversion, image cataloguing, audio editing, image and video capture and editing, and a module to carry out morphing effects.

ULead: one of the few bundles of utilities for capturing and editing multimedia file formats



The video editor is on the lines of Adobe Premiere and supports 101 video and audio tracks, 2D and 3D moving paths which allow images and text to be mapped to spheres and cylinders, anti-aliasing of fonts, and titling. There are 50 video filters and over 100 transitions (more than what you get in either Premiere or Asymetrix' Digital Video Producer). An Album module enables you to visually catalogue video, animation and image files, and even audio files (by using thumbnails).

The batch-file conversion program works on video, audio and animation files as well as image files, and can handle attribute changes such as compression formats, colour depth, size, and data and frame rates.

Media Studio costs £279. And although it's marketed as a video editing package, it does provide a complete solution.

PCW Contacts

Panicos Georghiades and **Gabriel Jacobs** will be glad to answer your questions. Either write to *PCW*, or email **g.c.jacobs@swan.ac.uk**

Authorware (Peritas) 01753 604057
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Macromedia 01344 761111
Fast Electronic 0171 221 8024
Creative Labs 01734 344322
Aimtech 0171 702 1575
ULead Media Studio (BIT) 01420 83811

Keeping **Score**

...it's 2.0 to Cubase – Steven Helstrip gives you a sneak preview. Plus more tips for programming percussion tracks, and the New York sessions...

Programming Percussion Tracks (Part 2)

Last month we looked at sequencing rhythm tracks using a standard kit consisting of kick, snare, hi-hats and tambourine. This month we'll be introducing more percussion elements including cabassa, ride cymbal, bongos and congas to add more texture and rhythmic interest.

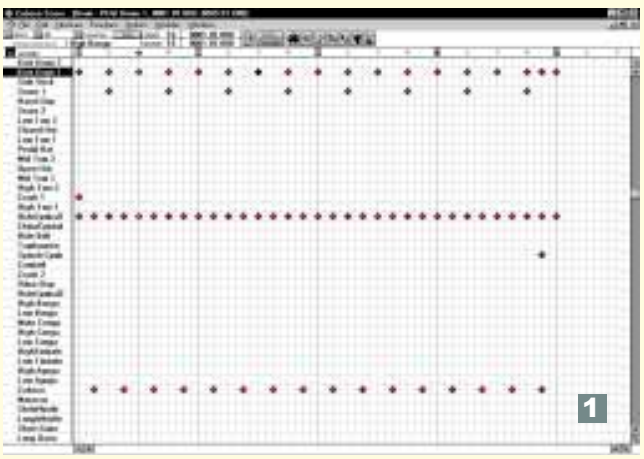
Before programming percussion, or any other sequenced part, it's worth setting up a metronome, or click track, to help you keep in time. Every sequencer has a metronome with several options allowing you to choose which instrument plays the click (usually a side stick on C sharp 1), how many bars count-in you want, and whether or not you want the sequencer to play a few bars of the arrangement before you start to record – called "pre-roll".

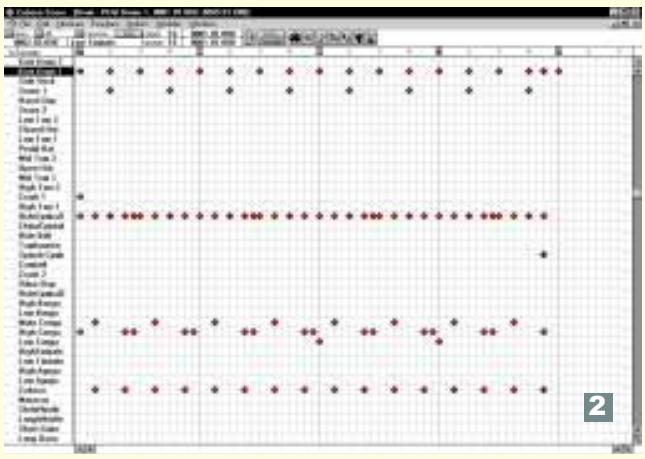
Fig 1 shows a simple four-bar pattern based on last month's examples. This time round, instead of playing quavers or eighths on a closed hi-hat, quavers are being played on a ride cymbal giving the track a different feel. To add further interest, the ride cymbal is accented on the off beat. Off beat simply means not playing on beats one, two, three and four. A cabassa is also playing on the off beat.

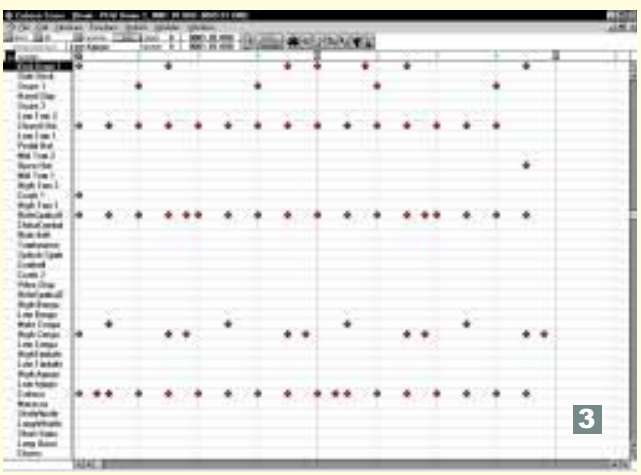
Towards the end of the four-bar section (bar four, beat four, second quaver) there's a splash cymbal with a kick drum underneath. This helps to set up the next four-bar phrase which has a crash cymbal on beat one.

Congas can be used in most styles of

The beat goes on







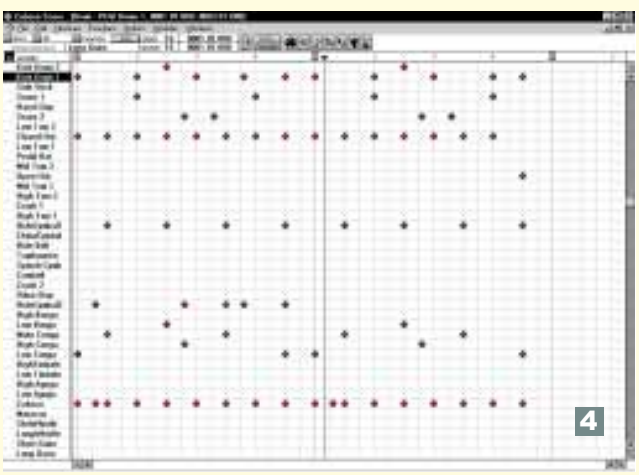


Fig 1 *A variation on last month's examples using a basic kit with ride cymbal.* **Fig 2** *A simple conga pattern can add rhythmic interest to a percussion section.* **Fig 3** *The kick drum in this example is playing a different rhythm, and there's a simple hi-hat pattern.* **Fig 4** *Don't be afraid to have two snares and two kick drums, so long as they don't clutter up the track and their levels are mixed well*

Cubase Update

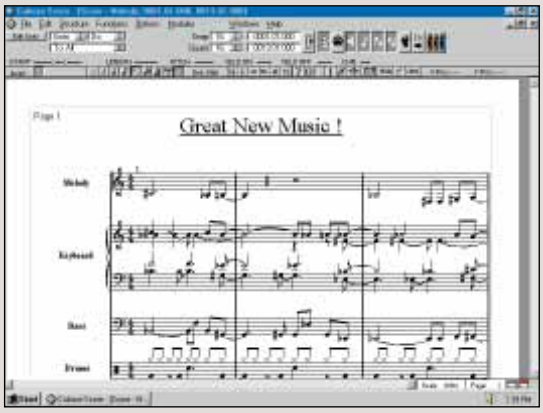
Users of Cubase Score will be chuffed to know that version 2.0 is now in a shop nearby, or on the end of a telephone line should you have access to a modem. This first major PC upgrade has full-colour interface allowing tracks and parts to be coloured separately; guitar tablature and 200 new symbols in the score editor; support for Video for Windows, and plenty more.

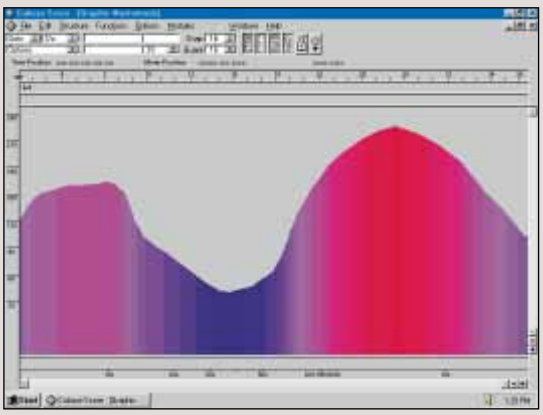
Not only does the colour interface look better, it has some serious benefits. Percussion tracks can be coloured red, string arrangements maybe in yellow, vocal triggers in a nice purple, making the Arrange window much easier to work with. The transport bar has been revamped and now looks identical to the Mac. If you work with tape, or even tapeless tape (disk-based recorders, etc) the new SMPTE reader will be welcomed as it can be displayed in two sizes, large and extra large. Your PC could be sitting at the opposite side of the studio and you'll still be able to read the timing references.

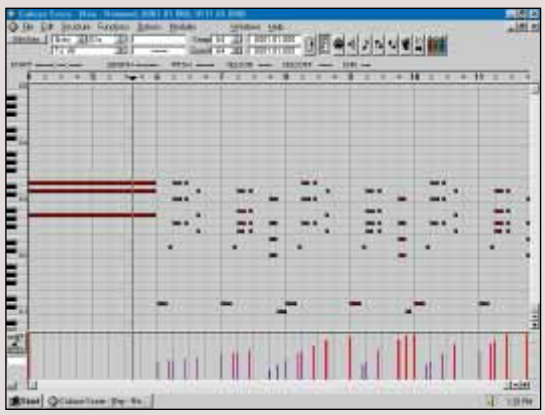
One area where Cubase has fallen behind is the tempo map, or master track editor. Version 2.0, however, fixes this. The master track now has a graphical interface, enabling changes in tempo to be drawn in the same way as controller information in the piano role editor. Alternatively, arrangements can now be recorded without a metronome, allowing you to work out changes in tempo later. That said, it does need a little help – first you have to mark the start of each bar, then the software makes its calculations.

Score 2.0 is available on disk and CD-ROM, the latter contains a video tutorial and costs £499. Upgrade prices have not yet been set.

Contact Harman Audio *(see "PCW Details", page 321)* for more information .







Cubase 2.0 is now available for the PC. Seen here running under Windows 95

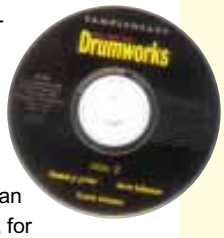
music, from chilled-out jazz tunes through to dance. *Fig 2* shows a typical pattern playing yet another off beat-ish rhythm. A low conga plays on beat one, followed by a mute conga on beats one and a half, and high congas on the last two semiquavers of beat two. Although this sounds daunting, it's fairly straightforward: hear how it sounds by loading the MIDI files on this month's cover CD-ROM. The files can be found in *hands\sound*.

The ride cymbal is boosted here, as a skip, or push, has been introduced just after the third beat of the bar. Try different rhythms on the ride to create different feels. Quantising to 16 triplets, or a slow shuffle, will give the part further interest. Try adding a clap to beats two and four, or simply replace the snare drum with a side stick to slow down the pace.

When placed in context with your music, it should become obvious whether this pattern works. If it doesn't, play around with each element until it sounds right. As I mentioned last month, the kick drum needs to work with the bassline. Also, if you quantise the percussion track to a slow shuffle, do this for each other part.

Fig 3 is a variation on the previous examples. Although the conga pattern is the same, the track has a different feel as the kick drum is playing a different rhythm. A hi-hat track has been introduced that simply plays quavers, and an open hat on the second quaver of beat four adds more interest. In this example, the cabassa is playing the same rhythm as the ride cymbal, only the skip comes after beat one as opposed to beat three.

New York City Drumworks



Six of New York's top session drummers play 146 minutes of inspiring rhythm. Miles, Sting, Luther Vandross and Manhattan Transfer are just a few of the credits. There are over 730 loops (copyright free) each played with a New York vibe. Styles covered include funk, rock, house, hip-hop, Latin, Cajun, R&B ... the list goes on. Not only are all these styles covered, but at every tempo you could wish for and with six different drum kits from vintage Ludvig up to the current Yamaha Recording Series.

This two-CD set kicks off with Kenwood Dennard playing rock, reggae, Brazilian and African styles. Tempos here range from 72 to 156bpm. Not only have "full kit" loops been recorded, there are hi-hat loops, loops without the kick drum, and so on. Each percussion instrument in the kit has been sampled seperately, both dry and with effects. This way you can loop a four section and add, for example, your own snare pattern. At the end of each drummer's section there are several tracks of fills, an invaluable production tool.

This is the best live drum CD I have heard in a long time, covering every contemporary style. Three of the tracks are on this month's cover CD as .WAV files in the *hands\sound* folder.

It's important to match the instrument levels to get the best possible balance. In a live situation each instrument would have its own input on a mixing desk, with a fader to enable you to get a decent mix. When sequencing, however, there are no faders for each instrument – just numbers, or velocities.

Although it's important to hear what each part is playing, no one instrument should stand out. If you find that the congas and ride are too prominent, reduce their velocities; in Cubase, this can be done in several ways. The quickest is to use the drum editor to highlight the notes you need to "turn down" by dragging across them with the mouse, then hold down Ctrl H and type "– 10" in the velocity box. Do this again if they're still too loud.

The rhythm track now has some good patterns, but you can spice it up even more. In *Fig 4* there is a second kick and snare giving the track a hip hop/acid jazz feel. The levels of the second kick and snare are quite low compared to the original idea. Try changing them, as this will allow you to create different feels. Also, have a go at changing individual velocities and try different quantisation grooves.

PCW Contacts

Readers' contributions to the Sound column are music to our ears. If you have any hints or tips, any MIDI-related items or general comments, send them in to the usual *PCW* address, or to **shelstrip@cix.compulink.co.uk**

Time + Space 01442 870 681
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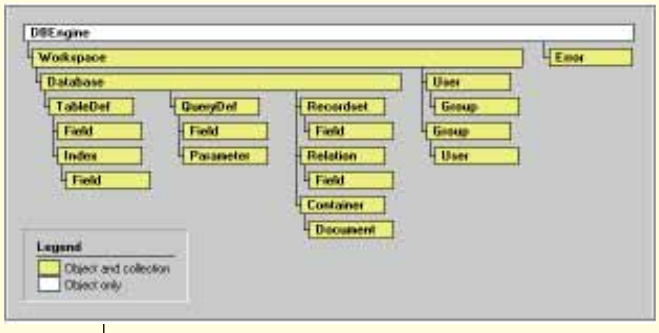
Dealing with **data**

Tim Anderson **explores data access in Excel 7.0, why Designer Widgets was released full of bugs, and how to access text properties in VBXs within Delphi. Plus, seven tips for visual programming.**

Version 5.0 of Excel introduced Visual Basic for Applications, the common macro language that is intended to unify the programming of Microsoft applications. VBA's migration to the main Office components is slow. Access 7.0 now includes it, but unbelievably Word 7.0 remains stuck with WordBasic. The WordBasic language is not so bad, although there are annoying differences; but more seriously Word is not an OLE automation client. It works as an OLE automation server but does so crudely, compared with Excel or Access. The only object made available is Word.Basic, through which you can call WordBasic routines.



The hierarchy of data access object classes; essential information for database programming in Visual Basic for Applications

While we wait for Word to catch up, there's plenty to do with VBA in Excel. In particular, the new Data Access Objects (DAO) open up the JET database engine for OLE automation, giving Excel excellent database features and, without the use of the old ODBC add-in, XLODBC.XLA.

There is a natural synergy between spreadsheets and databases. Spreadsheets are well suited to analysing and modelling temporary data, while databases are ideal for robust, permanent storage. Using DAO you can easily write programs that transfer data between Excel and database tables. For example, an Excel application could obtain a customer's order history, feeding the details into a spreadsheet for charting or sales projections. Here's how you might go about it.

The first step is to insert a macro module into an Excel 7.0 workbook. Then, from the Tools menu, choose References and check DAO 3.0 Object Library. This enables Excel to use all the DAO classes and constants. The procedure to retrieve order details might look like *Fig 1*.

This simple example returns a query result as a snapshot and enters the results into a worksheet. The data access code works exactly as it would in Visual Basic 4.0. But DAO will do more than just execute queries: using the data definition language you can create databases with security, encryption and referential integrity. The workspaces collection lets you set up simultaneous data access sessions, with support for transactions. Data can be written as well as read, either by opening an editable recordset (a table or dynaset) or by executing SQL statements. VBA and DAO, combined with a good knowledge of SQL, gives Excel full-blown data management features. All we need now is VBA in Word to open up the same possibilities there.

Designer Widgets

The migration of VBX add-ons to OCX components continues with the arrival of 32-bit Designer Widgets from Sheridan. Version 1.0 of this product is widely used to add dockable toolbars and tabbed dialogues to VB applications. Evaluating this new version, which comes in triplicate (VBX, 16-bit OCX, 32-bit OCX), proved

Seven tips for VB and Delphi

Visual Basic

1. JET loves SQL. If you can use SQL Select or an Execute method, rather than navigational database code, performance is almost always better.

2. There are experienced VB programmers who do not realise that the code window can be split: place the mouse just above the thin grey line at the top of the window, and drag down to obtain two separate scrolling sections.

3. Avoid variants by declaring all variables. Set Require Variable Declaration to Yes in Environment Options to ensure that Option Explicit appears at the top of all modules.

Delphi

4. Windows 3.x uses co-operative multitasking, which means your application must regularly yield control back to Windows to avoid locking the user out of other tasks. In Delphi you can use Application.ProcessMessages to give processing time to other applications.

5. Re-use your code by developing your own utility functions for frequent tasks. Place these in one Pascal unit, and add it to the Uses clause of any other units that call these functions.

6. Use Inc and Dec to generate tightly optimised code, instead of statements like

```
iVar := iVar + 1;
```

7. Delphi has no direct equivalent to VB's useful App.Path. You can obtain the same information (the location of the application) by parsing Application.Exename. This returns the application name with its full path. Search the string for the last occurrence of "\" to find the path alone.

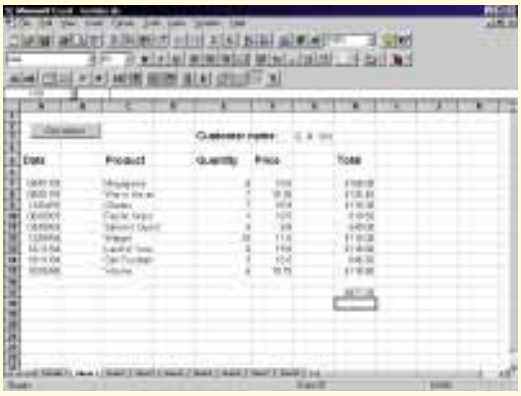
frustrating. This was the release version, not a beta.

The Readme informed me that the product did not work quite as documented. Two major problems were that the tab and notebook VBXs did not work data-bound, and that the FormFX control did not work under Windows 95. Then I tried some of the controls using a late beta of VB 4.0, 32-bit version. Using the tab control first, I noticed that the property page took an age to appear. When it did, I found that altering one of the properties caused an obscure error message, followed by a complete shutdown of Visual Basic 4.0. Presuming this to be a problem with the VB 4.0 beta, I reverted to VB 3.0 and tried the VBX controls. Performance was improved; but I soon managed to crash VB 3.0 as well.

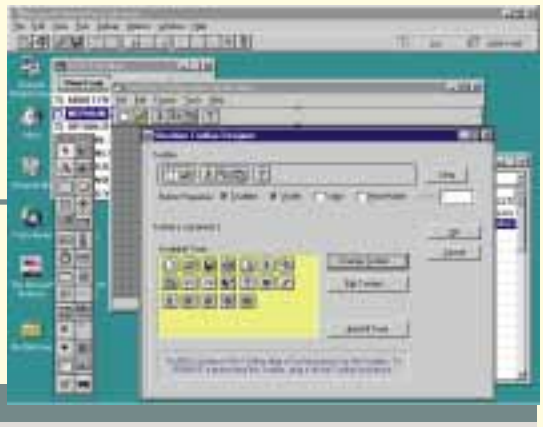
Guessing something was up, I logged on to Sheridan's forum on Compuserve. There I found a host of angry messages from attempted users of Designer Widgets 2.0, a 1.2Mb patch file in the library, and a further string of messages claiming that the patched version was little better. The concerns were mainly to do with stability (as I had discovered), but also incompatibility with projects built using Designer Widgets 1.0.

To be a supplier of third-party tools is a difficult and dangerous game. Just at this moment it is more difficult than ever. Windows 3.x is dying, and Windows users are moving to some combination of Windows 95, NT, or OS/2. On top of that, the main VBX container environment, Visual Basic itself, has just been released in several new versions. Until recently, long delays in Windows 95 and VB 4.0 have made it hard to release new products.

Finally, companies like Sheridan are in the ridiculous position of having to support three component standards — VBX, 16-bit OCX



Above *Using Excel 7.0 and data access objects, data can be extracted from database tables as easily as in Visual Basic itself*



Right *Designer Widgets 2.0: good when it works. The toolbar designer is a neat way to assemble your own dockable toolbar*

Fig 1 Procedure to retrieve order details

```
Sub GetOrders()
Dim db As Database
Dim snOrders As Recordset
Dim sSql As String

Dim sCustNo As String
Dim iOrderCount As Integer
Dim iCountVar As Integer

Clear sheet
Worksheets("sheet1").Cells.ClearContents

'Get a customer reference number
sCustNo = InputBox("Enter customer number")

'Construct SQL query
sSql = "Select * from customer, orders, products "
sSql = sSql & "where customer.cust_no = orders.cust_no
"
sSql = sSql & "and orders.prod_no = products.prod_no "
sSql = sSql & "and customer.cust_no = '" & sCustNo & "'
"
sSql = sSql & "order by orders.date_rcd"

' Open the database
Set db =
DBEngine.OpenDatabase("C:\TESTDATA\MAINDB.MDB")

'Create a snapshot based on the required customer num-
ber
Set sn = db.OpenRecordset(sSql, dbOpenSnapshot)

' Check for no results, find record count
If Not sn.EOF Then
sn.MoveLast
iOrderCount = sn.RecordCount
sn.MoveFirst
End If

' Enter customer name into worksheet
If iOrderCount <> 0 Then
MsgBox "There are " & Str$(iOrderCount) & " orders for
this customer"
Worksheets("sheet1").Cells(3, 7).Value = "'" & sn!Cust-
name
Else
MsgBox "There are no orders for this customer"
End If

' Enter order details into worksheet
For iCountVar = 0 To iOrderCount - 1
With Worksheets("sheet1")
    .Cells(7 + iCountVar, 1).Value =
DateValue(sn!Date_rcd)
    .Cells(7 + iCountVar, 3).Value = "'" & sn!Product
    .Cells(7 + iCountVar, 5).Value = Val(sn!Quantity)
     .Cells(7 + iCountVar, 6).Value = Val(sn!price)
    .Cells(7 + iCountVar, 8).Value = .Cells(7 + iCount-
Var, 5).Value  * .Cells(7 + iCountVar, 6).Value
End With

sn.MoveNext
Next

' Close database
db.Close
```

and 32-bit OCX, and these are meant to work in a variety of different and not completely compatible environments. Sheridan's president Bob Wolf had the grace to post an apology on Compuserve, and pointed out that, "The permutations between versions (VBX, 16- and 32-bit OCX), host environments (VB 3.0, VB 4.0, Access, etc.) and operating systems (Win 3.x, WFWG, NT, Windows 95) turn out to be 71 separate test environments." Sheridan therefore deserves some sympathy, although it remains extraordinary that a product as unsteady on its feet as Designer Widgets 2.0 should acquire shrinkwrap status.

And what about the product? Presuming Sheridan soon delivers a solid release, and improves performance, it has good potential. There are many small improvements: the index tab control can be data-bound to give an instant card-file database; and a new notebook tab control allows creation of a comforting spiral-bound interface. Its appeal is a little reduced for users of VB 4.0 and Windows 95, since toolbar and tabbed dialogue controls come as standard, but the Designer Widgets 2.0 versions offer many extra features. Just make sure you get one that works.

Delphi, VBXs and strings

If you have used VBX controls in Delphi, you may have come across a problem when trying to use string properties. When you set up Delphi to use a VBX, using the Install Components dialogue, it creates a Pascal wrapper unit in your Windows System directory. Among other things this wrapper converts VB property types into Delphi types. In the case of VB strings, properties are converted to Pascal strings limited to 256 characters in length. For example, the TX Text control, which is supplied by Borland in the Delphi RAD pack, has several string properties such as Text and SelText. The Pro version of the same control has an RTFSelText property, needed for programmatic access to formatted text. Delphi exposes these properties, but helpfully truncates them to fit into a Pascal string, rendering them useless.

There are solutions. First, note that all Delphi controls support two methods, SetTextBuf and GetTextBuf. These methods work with pchars, solving the 256-character limit. Internally they work with the API messages WM_SETTEXT and WM_GETTEXT. These are straightforward to use, although before calling GetTextBuf you must first determine the size of buffer required with GetTextLen. *(Fig 2.)*

This works fine if it is simply a text property which you need to obtain. But what text you set or obtain depends entirely on how the control has implemented the WM_SETTEXT and WM_GETTEXT messages. If there is more than one text property, as with the TX Text control, this solution is not enough. There is another way. A number of functions in the BIVBX unit give lower-level access to VBX properties. Two of these are declared in BIVBX.INT, as follows:

```
function VBXGetPropByName(Ctl: HCTL;
 lpszName: PChar; lpValue: Pointer):
 Err;
function VBXSetPropByName(Ctl: HCTL;
 lpszName: PChar; lVal: Longint):
 Err;
```

These functions enable you to get and set properties using pointers. You will need to put BIVBX in the Uses clause of any unit which calls them. For example, to retrieve the SelText property of a TX Text control, use the code in *Fig 3*.

Be warned that calling functions in BIVBX is uncharted territory, not documented by Borland. You should also note that the code will need amending according to the type of property you are accessing.

Fig 2 Determining buffer size

```
procedure TForm1.Button1Click(Sender: TObject);
var
  lpzTextString: PChar;
  lSize: Longint;
begin
  lSize := TextControl1.GetTextLen;
 {allocate memory allowing for null character}
  GetMem(lpzTextString, lSize + 1);
  TextControl1.GetTextBuf(lpzTextString,lSize);
 {...do what you want with lpzTextString}
  FreeMem(lpzTextString, lSize);
end;
```

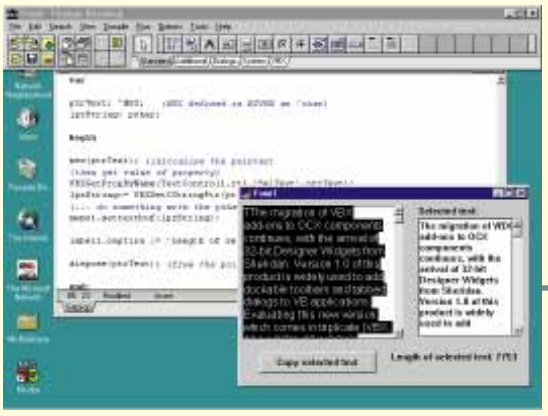
Fig 3 SelText property in TX Text control

```
procedure TForm1.Button1Click(Sender: TObject);

var
ptrText: ^HSZ;   {defined in BIVBX as ^char}
lpzString: pchar;

begin
new(ptrText); {initialise the pointer}
{then get value of property by name}
VBXGetPropByName(TextControl1.ctl,'SelText',ptrText);
lpzString:= VBXGetCStringPtr(ptrText^); {convert to pchar}
{... do something with the pchar}
dispose(ptrText); {free the pointer}

end;
```



Obtaining the value of the seltext property in a VBX is not straightforward, but it can be done

PCW Contacts

Tim Anderson welcomes your Visual Programming comments and tips. He can be contacted via *PCW* at the usual address, or **freer@cix.compulink.co.uk**

Designer Widgets costs £99 from Contemporary Software on **01727 811999**.

Scratching the surface

With a little know-how, Visual Basic can give the programmer more control over Windows' behind-the-scenes operations. Mike Liardet looks at ways to access DLL files, the backbone of Windows, through a Visual Basic program called VBAPI.

Visual Basic shields the programmer from many of the complexities of Windows programming. This is both a strength and a weakness in the language — a strength because it makes Windows application development comparatively easy, and a weakness because it prevents the programmer from controlling what happens beneath the surface of the programming environment. Or does it?

Anything to Declare?

The VB "Declare" statement is the escape clause that allows a program to get to grips with Windows internals. It provides a great way to extend Visual Basic's functionality. In essence, "Declare" can be used to specify a linkage to the routines in any Dynamic Link Library (DLL) file, so that the DLL routines can then be called from the VB program in the usual way. "So what?" I hear you say. The point is that virtually the whole of Windows is implemented on the back of a handful of DLLs. Knowing how to use them opens doors.

There lies the catch. Ideally, to make full use of the DLLs you should have a good understanding of the way Windows works beneath the surface, and have access to some good supporting documentation for reference and guidance. Visual Basic (Professional)'s API (Application Programming Interface) Help file contains all the common Declares and provides a valuable tool. There is also a useful SDK (Software Development Kit) Help file that gives a description of how the routines can be used from within a C programming environment.

To get a better picture of what to do with these routines, the *Visual Basic Programmer's Guide to Windows API* (Daniel Appleman, Ziff-Davis Press) makes for ideal bedtime reading. The Microsoft Developers Network (MSDN) CD-ROM is another option. It is packed with hints on useful API calls for the Visual Basic programmer, alongside a lot of other information on C, Access, FoxPro and other Microsoft development tools. In an inspired move, Microsoft has extracted the VB-specific material from the MSDN and made it available directly to VB programmers by including the material on the VB 4.0 CD-ROM. Unfortunately it has been excluded from the Standard Edition, but Professional and Enterprise users get it.

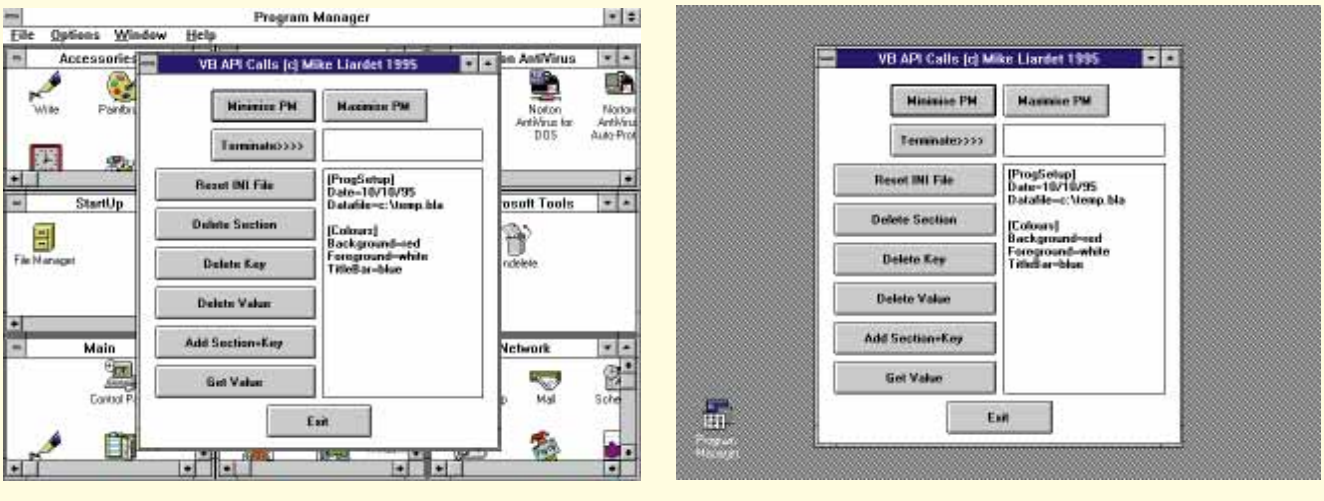
Back to Basics

This month we will pick up on some of the hints given on the MSDN/VB 4.0 and show how they can be applied to a plain and simple Visual Basic program, called VBAPI. It is worth mentioning that there is no need to upgrade to VB 4.0 in order to try out these techniques. They will work quite happily with version 3.0.

Figs 1 to 3 illustrate VBAPI in action. *Fig 1* shows how it can be used to minimise the Program Manager. This is something that might be required just after a program is loaded, as it gets rid of distracting background clutter. In a real application the code to do this would probably be put in the Form_Load event handler.

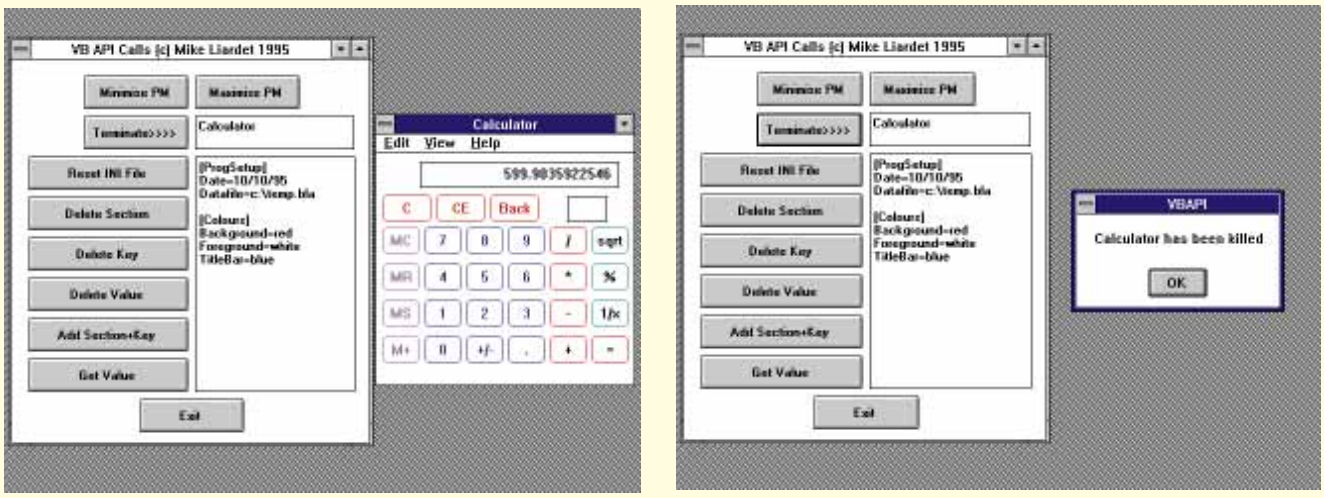
Fig 2 shows how another application can be terminated under VB control. In a real application this could be a useful trick for freeing up memory, or for preventing an application from running alongside some

Fig 1 Minimise/Maximise PM



"Minimise PM" minimises Program Manager to an icon, and "Maximise PM" brings it back to full size. The code behind the "Minimise PM" button would normally be put into an application's Form_Load

Fig 2 The "Terminate" button



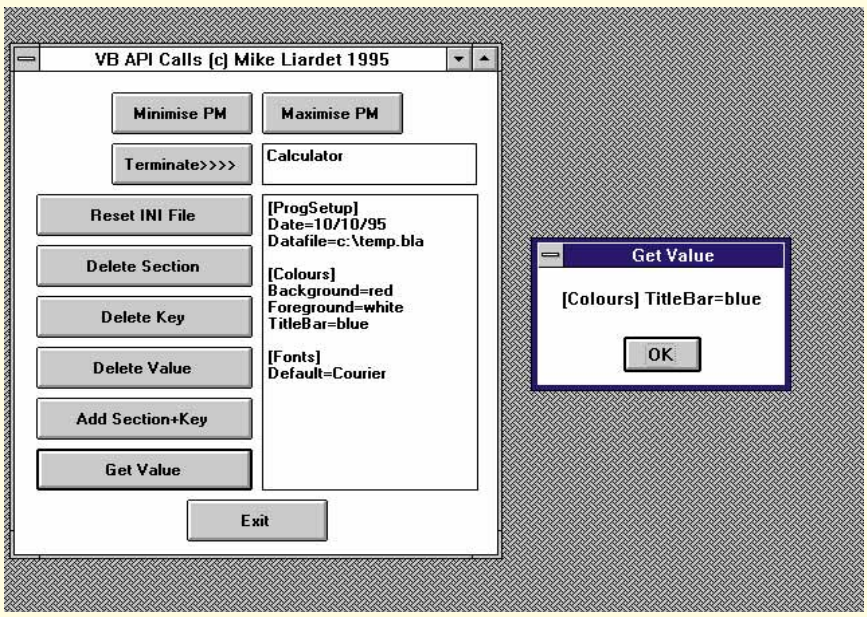
Now you see it, now you don't! The "Terminate" button can terminate any application — just give it the window title

other incompatible task — such as a Backup application. *Fig 3* shows the manipulation of an INI initialisation file. Just about every VB application could make good use of an INI facility. Although it could be implemented by using standard VB file I/O, it is much simpler and more elegant to use the standard Windows APIs instead.

In pure VB terms there is nothing fancy going on behind the scenes in VBAPI. We just have a number of Declare statements to provide access to the necessary API calls, and each command button is implemented with a few lines of code making the necessary calls. *Figs 4 to 6* give the details of the API calls needed. These show a few of the possibilities, once you get to grips with the Windows API. The major Windows DLLs offer around 1,000 others, then there are other supporting DLLs, DLLs from third-party suppliers, and so on — thousands of calls which are just a declaration away.

Unfortunately, information on DLLs is usually directed at the C programmer, so the VB coder needs to read between the lines when figuring out a DLL's declaration and use. C is richer in types than VB, so a 16-bit quantity in C might be typed as "hWnd", "int", "UINT" or "BOOL", and so on. Visual Basic has to make do with just "integer" for all of these types, but in practice this does not cause major problems. There is a similar variety of C types for "strings" and "longs", but in all cases the API call can still be made to work in VB if plain old "string" or "long" are used in the declaration, as necessary. Notice that all the parameters to API calls must be declared in VB as "ByVal" — this just makes sure that VB delivers the arguments in the right form to the underlying C routine.

Fig 3 Manipulating an INI file



Accessing an INI file. The various command buttons alongside the big text box show how sections, entries and values in the INI file can be added, deleted, changed or accessed

Callbacks

Although most of the DLLs are up for grabs, there are one or two API calls that simply cannot be handled by Visual Basic at all. For example, some Windows functions do "callbacks", which means that one of their parameters takes the address of a function. As Visual Basic functions are compiled differently from C, they cannot be called from it. Thus there is no meaningful address that can be given in this case. This means that API calls with callback cannot be used, or at least not used directly (there is a way round the problem but we won't go into it here).

Also, Visual Basic itself suppresses some of Windows' functionality, and this can render some calls unusable. For example, there are Windows functions to change the shape of the mouse pointer, but the VB environment has its own ideas about mouse display. This means that in general these functions won't work, and you are likely to be stuck with the dozen or so shapes that are predefined in VB itself.

For most common Windows functions the only awkward area is the handling of

Fig 4 Manipulating windows

```
IsWindow

C Declaration
BOOL IsWindow(hWnd)
HWND hWnd; /* handle of window, */

VB Declaration
Declare Function IsWindow Lib "User" (ByVal hWnd As
Integer) As Integer

Parameters
hWnd: identifies a window.
Returns: non-zero if the window handle is valid, other-
wise, returns zero (false).

GetWindow

C Declaration
HWND GetWindow(hWnd, wCmd)
HWND hWnd;/* handle of original window*/
UINT wCmd;/* relationship flag, */

VB Declaration
Declare Function GetWindow Lib "User" (ByVal hWnd As
Integer, ByVal wCmd As Integer) As Integer
'Values for wCmd...
Const GW_CHILD = 5 'Identifies the window's first child
window.
Const GW_HWNDFIRST = 0 'Returns the first sibling win-
dow for a child window; otherwise, it returns the first
top-level window in the list.
Const GW_HWNDLAST = 1 'Returns the last sibling window
for a child window; otherwise, it returns the last top-
level window in the list.
Const GW_HWNDNEXT = 2 'Returns the sibling window that
follows the given window in the list.
Const GW_HWNDPREV = 3 'Returns the previous sibling
window in the list.
Const GW_OWNER =  4 'Identifies the window's owner.

Parameters
hWnd: identifies the original window.
wCmd: specifies the relationship between the original
window and the returned window. It can be set to one of
the constant values given above.
Returns: the handle of the window if the function is
successful, otherwise NULL (integer 0 in VB) - indicat-
ing either the end of the system's list or an invalid
wCmd parameter.
```

An extract from a selection of Windows (with a big "W") functions for manipulating windows (with a small "w"). With the given declarations these can be used from Visual Basic, either to manipulate the VB application's own windows, or the windows belonging to another application

routines that return strings. The problem here is that Visual Basic and C handle strings differently. With C, the memory for the string needs to be allocated before the call, whereas a VB routine can find the space dynamically.

The GetPrivateProfileString routine *(Fig 9)* is a good illustration of this. It returns a string in its fourth argument. To call it from VB, an appropriate-length string must be initialised before the call and passed to the routine in this argument position, with the length given as its next argument. The function itself returns the number of characters it placed in the string, and these characters can easily be extracted using the VB left$() function.

Fig 4 gives a selection of the Windows functions which are used in the VBAPI program by both the commands that minimise and maximise Program Manager, and the command that terminates other applications. IsWindow and ShowWindow are straightforward. IsWindow determines whether or not the given window handle is valid, as opposed to being some arbitrary integer value. ShowWindow sets the given window's visibility state (maximised or minimised).

Can you handle it?

Unless the windows functions are being used to manipulate a VB application's

Fig 5 Definitions of Windows profile functions

```
WritePrivateProfileString

C Declaration
BOOL WritePrivateProfileString(lpAppName,lpKeyName, lpString, lpFilename)
LPCSTR lpAppName;/* address of section*/
LPCSTR lpKeyName;/* address of entry*/
LPCSTR lpString;/* address of string to add*/
LPCSTR lpFilename;/* address of initialization filename*/

VB Declaration
Declare Function GetPrivateProfileString% Lib "Kernel" (ByVal lpAppName As
String, ByVal lpKeyName As Any, Byval lpDefault as Any, ByVal
lpReturnBuffer As String, cbReturnBuffer as Integer, ByVal lpFileName As
String)

Parameters
All string parameters point to null terminated strings, which are case
independent, and so can contain any combination of upper and lower case
characters
lpAppName: specifies the section containing the entry.
lpKeyName: specifies the entry whose associated string is to be retrieved.
lpDefault: specifies the default value for the given entry if the entry
cannot be found in the initialization file- must never be NULL.
lpReturnBuffer: receives the character string.
cbReturnBuffer: receives the size, in bytes, of the buffer pointed to by
the lpReturnBuffer parameter.
lpFilename: names the initialization file.
Returns: the number of bytes copied to the specified buffer, not including
the terminating null character.
```

Definitions of two of the Windows "profile" functions that can be used to manipulate INI initialisation files

Fig 6 PostMessage

```
PostMessage

C Declaration
BOOL PostMessage(hWnd, uMsg, wParam, lParam)
HWND hWnd; /* handle of the destination window*/
UINT wMsg; /* message to post, */
WPARAM wParam; /* first message parameter*/
LPARAM lParam; /* second message parameter*/

VB Declaration
Declare Function PostMessage Lib "User" (ByVal hWnd As Integer, ByVal wMsg
As Integer, ByVal wParam As Integer, ByVal lParam As Long) As Integer
'Alterantive value for hWnd
Const HWND_BROADCAST = &HFFFF

Parameters
hWnd: identifies the window to which the message will be posted
wMsg: specifies the message to be posted.
wParam: specifies 16 bits of additional message-dependent information.
lParam: specifies 32 bits of additional message-dependent information.
Returns: nonzero if the function is successful, otherwise, zero (= false).
```

The PostMessage function, used for communicating with other windows or applications

own windows (where the control's hWnd property can return a window handle), it is first necessary to find the window's handle. FindWindow is needed here. It retrieves the handle of a window given either its class name (not so useful from VB) or title. GetWindowLong retrieves extra information on a window, as a long value at the specified offset into the extra window memory. There are many ways of using this, but in VBAPI this function is just used to determine whether or not a window is disabled.

It is often necessary to iterate through all the windows to find one with a particular attribute, or else to process them all in some way. GetWindow can be used for this. It retrieves the handle of a window that has the specified relationship to the given window, searching the system's list of top-level windows, their associated child windows, the child windows of any child windows, or any siblings of the owner of a window.

Windows has several APIs for manipulating INI files, but there are just two main functions that can do almost everything between them — WritePrivateProfileString and GetPrivateProfileString (Fig 5). WritePrivateProfileString copies a character string into the specified entry of a section of the specified initialisation file. If the file does not exist, it is created. If the section does not exist, it is created; and (surprise, surprise) if the entry does not exist in the specified section, then that too is created. It is also possible to delete information from the INI file using this function. If the entry parameter is given as 0, the entire section is deleted. If the string parameter is given as 0, then only the entry specified by the lpKeyName argument is removed.

INI file manipulation made easy

WritePrivateProfileString can also help track down the INI file. If the lpFilename argument does not contain a fully qualified path and filename for the file, it searches the Windows directory for the file. If the file does not exist, it creates

Fig 7 ShowWindow

```
Sub cmdMinPM_Click ()
    Dim hWnd As Integer, I As Integer
    hWnd = FindWindow(0&, "Program Manager")
    If hWnd <> 0 Then
        I = ShowWindow(hWnd, SW_SHOWMINNOACTIVE)
    End If
End Sub
```

ShowWindow can be used to minimise any application. Here is how it minimises the Program Manager

Fig 8 The PostMessage API

```
Sub cmdTerminate_Click ()
    txtTerminee = Trim$(txtTerminee)
    Select Case TaskKill(txtTerminee)
    Case TASK_NOT_FOUND
        MsgBox txtTerminee & " is not running"
    Case TASK_KILL_FAILED
        MsgBox txtTerminee & " is not answering"
    Case TASK_WAS_DISABLED
        MsgBox txtTerminee & " is disabled"
    Case TASK_WAS_ME
        MsgBox txtTerminee & " is myself"
    Case TASK_KILLED_OK
        MsgBox txtTerminee & " has been killed"
    End Select
End Sub

Function TaskKill (ByVal vsTaskTitleOrClass As String)
As Integer

    (Our cover disk has full details of the remainder of this code)

End Function
```

Using the PostMessage API call to terminate another application

the file in the Windows directory. If lpFilename contains a fully qualified path and filename and the file does not exist, it creates the file in that directory as long as the directory exists. Note that it is considered bad practice to create INI files in the Windows directory, as it makes it difficult to fully de-install an application.

GetPrivateProfileString retrieves a character string for the specified key from the specified section in the specified initialisation file. It searches the file for an entry that matches the name specified by the lpKeyName parameter under the section heading specified by the lpAppName parameter. If the entry is found, its corresponding string is copied to the buffer. If the entry does not exist, the default character string specified by the lpDefault parameter is copied. If the key is given as 0, all entries in the section specified by the lpAppName parameter are copied to the buffer specified by the lpReturnBuffer parameter. If the filename parameter does not contain a full path, it searches for the file in the Windows directory.

Much of the low level communication between applications, and even within an application, is handled by "messages". Windows message handling is a complex topic, but you don't need to know the ins and outs in detail to use messages. PostMessage *(Fig 6)* is the key routine. It places a message in a window's message queue and returns without waiting for it to process the message. Messages in a message queue are retrieved by calls to GetMessage or PeekMessage (neither needed by VBAPI). If the hWnd parameter is set to HWND_BROADCAST, the message is posted to all top-level windows, including disabled or invisible unowned windows. The routine should not be used to post a message to a control.

Figs 7 to 9 show how these functions can be put together to implement the various commands in VBAPI. Only the key code is shown, but the full program is available on the cover disk. *Fig 7* shows how to minimise Program Manager. First, find the handle for the window whose title is "Program Manager", then use ShowWindow with the command SW_SHOWMINNOACTIVE to minimise it. This code won't work if the title of the Program Manager window is changed, as it is for example when running under Windows NT, but there are ways around this.

Fig 8 shows how to kill a task. The main code to do this is in the routineTaskKill, which kills the window with the given task or class name. Again, FindWindow is used to find the window. There is some extra complexity in the routine to handle the case when the task being killed is the application itself or if the window is disabled, but for most cases it posts two messages, WM_CANCELMODE and WM_CLOSE, to the window, in order to kill it. Note the use of DoEvents: this makes sure that the recipient window gets a chance to clear its message queue and process the two new messages, when VBAPI relinquishes the processor.

One example of the INI file manipulation code is given in *Fig 9*. The other INI commands are very similar to this. Notice the RefreshINI command at the end of the routine. This is placed at the end of all the INI commands. It reads the INI file, using standard VB file I/O, into the VBAPI form's text box alongside the command buttons, providing instant verification that the command is working correctly.

Fig 9 Accessing an INI file value

```
Sub cmdGetValue_Click ()
Dim FileName As String
Dim lpAppName As String
Dim lpKeyName As String
Dim lpDefault As String
Dim lpString As String
Dim nBytes As Integer
Dim x As Integer
    FileName = app.Path & "\demo.ini"
    lpAppName = "Colours"
    lpKeyName = "TitleBar"
    lpDefault = "Not Found!!!"
    lpString = Space$(100)
    nBytes = 100
    x = GetPrivateProfileString(lpAppName, lpKeyName, lpDefault, lpString,
nBytes, FileName)
    MsgBox "[Colours] TitleBar=" & Left$(lpString, x), 0, "Get Value"
    RefreshINI
End Sub
```

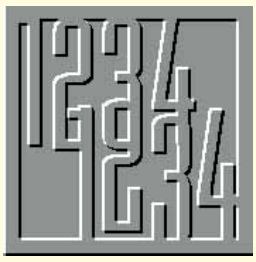
GetPrivateProfileString can access any value in an INI file, but it's a little tricky to use from within VB

PCW Cover Disk

The full code for this month's Low Level is on the cover disk given with this issue of *Personal Computer World*.

PCW Contacts

Mike Liardet is a freelance programmer and writer. He can be contacted via the *PCW* Editorial office or on email as **mliardet@cix.compulink.co.uk**



Wondrous Numbers

... a sight to behold! Steer your gaze towards these number nuggets, presented by Mike Mudge.

This topic is believed to have originated with Charles Ashbacher: *J. Recreational Mathematics*, Vol. 24(1) 12-15, 1992. However, readers beware — this article contains a serious misprint which has been self-propagating to the present day.

WONDROUS numbers are members of a series of integers (positive?) which always converges to 1. This series is given by:

```
If n be even, the next n = n/2:
If n be odd, the next n = 3n+1
```

Hofstadter used the term "Wondrous" as these numbers are so simple and awesome and can be produced in a solitaire-like game. See D.R. Hofstadter, Godel, Escher, Bach: *An Eternal Gold Braid*, Basic Books Inc, New York, pp400-402, 1979. Now B.C. Wiggin, *Journal of Recreational Mathematics*, 20:1, pp52-56, 1988, Wondrous Numbers a Conjecture about the 3n + 1 Family, extended the concept as a genus for the numbers 2 through 12. For example, he defined the (n/3, 4n+1) WONDROUS NUMBERS as:

```
Divide n by 3
```

If there is no remainder, the quotient is the next n: If the remainder is 2, the next n = 4n - 1: If the remainder is 2, the next n = 4n + 1.

This series also converges to 1 and has been tested at least upto 100000. Now Wiggin extended the concept further to (n/D, (D+1)n + 1) as follows:

Any integer n greater than or equal to (D - 1) may be directed through a series of iterations as a function of n congruent to R modulo D:

If R = 0 then the next n is the quotient n/D: if R = 1(1) (D-2) then the next n is n(D + 1) - R (*NOT* n/(D + 1) - R as in the Ashbacher paper), and finally, if R = D - 1 then the next n is n(D + 1) + 1. This series (more correctly referred to as a sequence — M.M.) ultimately converging to n less than D.

Now, Ashbacher is quoted as originating this topic (M.M. line one) despite the earlier references, on account of his extensive computer investigation... using nine computer programs, one for each of the species three through twelve and searching to 14000000 for each divisor. No infinite series were found, for divisors 3 to 8 all numbers terminated before 1000 cycles, for divisor 9 only 13655938 passed the 1000-cycle mark with 1035 cycles, for divisor 10 there were exactly 1000 cycles for 5646474 and 1037 cycles for 13667102. Ashbacher challenged readers to investigate further...

A challenge recently taken up by Brendan Woods of Dublin, who has failed to get termination with (D,N) = (13,70), (14,75), (58,59), (82,83), (198,199)...

PROBLEM W. Readers are set the task of investigating these generalised WONDROUS NUMBERS, confirming the findings of Ashbacher & Woods, considering further empirical evidence and (hopefully) producing a complete theory of the behaviour of these sequences.

Feedback from readers

The M500 Society publishes *M500* six times a year for Open University students, staff and "friends", the subscription is £8 per year, the membership secretary is Sue Barrass, 17 Newhall Road, Kirk Sandall, Doncaster DN3 1QQ. Tel 01302 882476.

Harvey Dubner and Harry Nelson announced c.29th August 1995 that they had found SEVEN CONSECUTIVE PRIMES in ARITHMETIC PROGRESSION. Upto 7 computers, believed to be 486/66s, were used over a two-week period to obtain the estimated 52 computer days, the common difference of the A.P. is 210 and the first term has 97 digits.

Simon Jackson of Hackney has expressed an interest in the behaviour of the function ph(p,x) which essentially counts the number of positive integers less than or equal to x which remain when the complete set are depleted in turn by the multiples of all primes less than or equal to prime p. Thus ph(11,25) commences with the list 1...25, removes the even members (multiples of 2), then the multiples of 2 and so on upto the multiples of 11: leaving 1,13,17,19 and 23. Thus ph(11,25) = n(1,13,17,19,23) = 5. Does any reader have practical experience of this function which is believed (S.J.) to be of importance in certain aspects of data compression?

Any investigation of Problem W may be sent to Mike Mudge, 22 Gors Fach, Pwll-Trap, St. Clears, Carmarthen, Dyfed SA33 4AQ, tel 01994 231121, to arrive by 1st March 1996. All material received will be judged using suitable subjective criteria, and a prize in the form of a £25 book token or equivalent overseas voucher will be awarded by Mike Mudge to the "best" solution arriving by the closing date.

Review, May 1995

Problem CJ_1 produced a number of complete proofs, that of Roger Tirtia of Belgium including a method for finding all solutions even when a cube is not present. Roger lists the least numbers that can be written in exactly k distinct ways as the sum of two non-zero squares. For k = 29 N is greater than 10^{15} but not difficult to find as there are only five candidates!

Iain M. Davidson of Carlisle examined $a^2 + b^2 = c^n$ but additionally posed questions about general factorisation of

$A^n + B^n + \ldots + Z^n$,

about the solution of

$X^3 + kY^3 + k^2Z^3 - 3kXYZ = 1$,

and (possibly more relevant to most *Numbers Count* readers) also requested information on algorithms used to carry out multi-length integer arithmetic. HOW DOES UBASIC DO THAT? Anthony Stobart of Cheltenham and Mr. Kennedy of Rotherham submitted creditworthy material associated with CJ_1... details on request.

David Broughton of the Isle of Wight generated a superb analysis of the "two person game" in CJ_2 finishing with a hand-held programmable calculator to check his manual theory.

After suitable soul-searching, the prizewinner is Iain M. Davidson of 4 Carliol Close, Carlisle CA1 2QP.

PCW Contribution Welcome

Mike Mudge welcomes readers' correspondence on any subject within the areas of number theory and computational mathematics, together with suggested subject areas and/or specific problems for future **Numbers Count** articles.

Cleaning up the **Office**

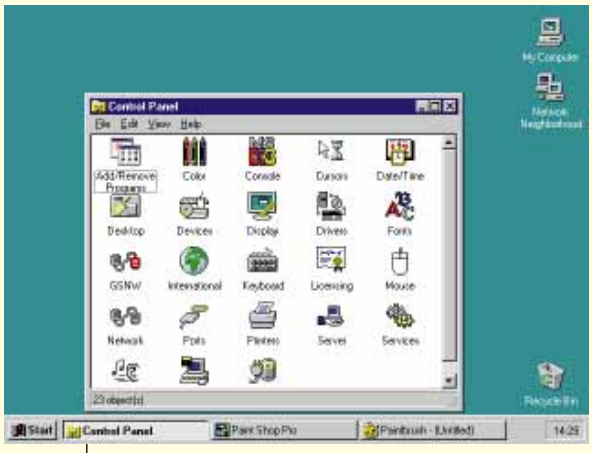
When Office 95 arrived on Stephen Rodda's doorstep he polished off a scratch on the CD with Brasso and loaded it under NT. Here, he tells you how and why he did it and passes on a dodge for setting up the NT Service Pack.

Recently, I almost had difficulties getting out of the front door without being waylaid. Not by creditors, you understand, but by hordes of postmen (male and female) bearing CDs of the latest Windows 95 releases and their associated programs.

I received Office 95 first — well you would, wouldn't you? It can't run without the release version of Windows 95, so you'd expect Mr Murphy's law to take effect… which of course, it did. Unfortunately, Murphy had a couple of other nasty surprises up his sleeve for me. The first was that Office 95 was on floppy disks: 24 of the perishing things, to be precise.

But of all the tricks he played on me, the unkindest of all was when the Windows 95 disk arrived two days later with a large scratch radiating from the centre of the CD to the outside. Now, remembering that CDs start from the inside and work outwards, you'll quickly grasp the upshot — the dratted thing was totally unreadable. I examined the CD once again. The scratch didn't look too deep to me, so I went into the kitchen and raided the cupboard under the sink for some Brasso. (Does everyone keep their Brasso under the sink? Everyone I know does.) A few minutes later I was furiously polishing the CD, wondering whether the Brasso would have been better utilised internally.

Although the original scratch had disappeared, the surface looked as though it had been smoothed down with sandpaper. Undeterred, I rummaged around under the sink again and produced some Silvo (a slightly less harsh abrasive). A few minutes' further work produced a CD which looked pristine. I dusted the metal polish off, popped it back in the CD drive and bingo! Windows offered to install itself for me.



NT Server, looking for all the world like Windows 95. The new shell is available both on CIS and the Microsoft Network.

Of course, by the time Windows 95 arrived I had installed Office 95 under NT, and I must admit I was impressed. Less impressive, however, was Windows 95's handling of Office — NT seemed much faster in comparison to Windows 95. And this was running it on the same machine, with three flavours of NT networking support installed simultaneously. I had applied Service Pack 1 for NT (a copy is on this month's *PCW* CD-ROM) and had also added the Windows 95 shell to it. I didn't really want to go back to using the Program Manager and File Manager if I could help it. Once NT has all the nice bits like built-in fax, complete Novell interconnectivity, Microsoft Network and the Adobe Type Manager, I don't suppose I shall be using Windows 95 that much. But for the moment, it is necessary that I do.

NT Service Pack

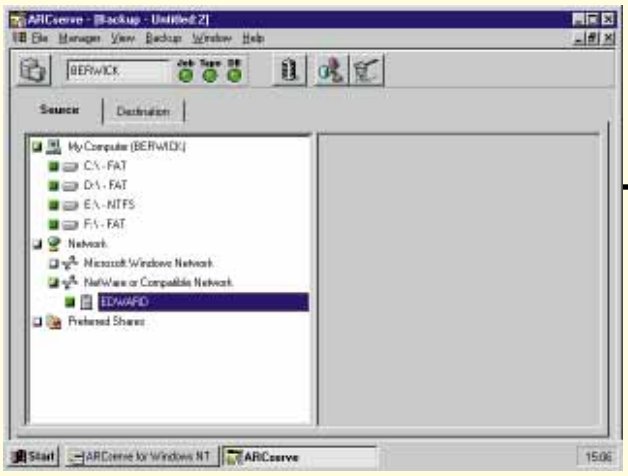
The NT Service Pack didn't seem to run for me — well, not first time. I kept getting a help message from setup, informing me of the correct command-line switches for use with the program. Since I had started it from UPGRADE.EXE this message wasn't very helpful.

I moved the directory in which it was expanded to the root and renamed it SP1, mainly to make it easier to get at from the command line. I don't know why but it then installed without problems. I'm inclined to believe the reason for this was that the directory containing the upgrade had a long name. If you have trouble installing it, I suggest you try this dodge.

You might find my NT setup a little weird: the picture of my Windows 95, er, NT setup appears in *Fig 1*. I'm running the new version of the NT shell, available from Compuserve and the Microsoft Network. At the moment, I'm impressed. I really can't stand Program Manager any more, now that I've been spoilt with the new GUI. From now on, I shan't even bother with Windows 3.1x.

DeskWriter 600

Another box turned up on the doorstep this week; it contained a Hewlett-Packard DeskWriter 600. This printer (and its DOS counterpart, from which it scarcely differs)



ArcServe for NT likes to run as engines in the background, but it's secrecy perhaps doesn't make for good comms

comes with 600dpi black output and 600 x 300 colour output. For simplicity's sake, I asked to be allowed to borrow the Apple version of the printer: I simply hooked it into the LocalTalk wiring (happily bridged by Novell) just beside the DeskWriter C — the DeskJet 500C type printer which we occasionally use.

Of course that was fine for the Macintosh machines — they saw it instantly. A little later, having edited ATPS.CFG, and having unloaded and reloaded ATPS on the Novell server, the two Windows 95 machines saw the queue. Unfortunately, I haven't got the correct drivers for the DeskJet 600 and although I tried the DeskJet 500 driver, it didn't even want to print. Try as I might, I still can't access it from Windows — perhaps it's had the DeskJet compatibility removed.

ArcServe for NT

Additionally, I tried out the new version of ArcServe for NT. Installation was a real pain in the neck: I'd copied the disks into network directories, one for each disk like you're supposed to, but installation still bombed out towards the end. Luckily, I thought that I'd got it on a network drive. I eventually found out from the software house, Cheyenne, that I should have put all the directories (Disk1 to Disk5 and Support) in a directory off the root, called Install. Talk about being inflexible…

Anyhow, once the program was installed, I tried to get it to back up a Macintosh, running ArcServe Macintosh. It wasn't having any of it. I think it's only ArcServe for Windows which will see the Macintosh version. At a time when manufacturers are trying to integrate all their backup software, Cheyenne seems

Problem Solving

Extended Memory under NetWare 2.2

I've been asked to run a program which requires extended memory on a non-dedicated Novell server, and I can't see a way of limiting the amount of extended memory that the file server program takes up. Please help.

GJT@cix

I'm sorry, it can't be done. There is just no way of limiting the high memory that NetWare takes up in non-dedicated mode. If you really want to use a non-dedicated server, I'd make a couple of suggestions.

You could re-examine your requirements and buy a new machine so that there's another workstation, making the file server into a dedicated machine. Alternatively, depending upon the size and data throughput of the network, you could examine the possibility of using Windows for Workgroups (especially as Windows 95) or of NT Server, both of which allow non-dedicated working and supply you with extended (and indeed, expanded) memory.

Infinite loop

Stephen, help! At one of our sites we have a NetWare server (v3.11) which was subject to a couple of unscheduled powerdowns over the weekend. Now when it boots up, after checking binaries it prints a message to this effect: "This server has been shut down — please reboot". Is there a way out of this infinite loop?

JRS@cix

Depending on the DOS version you've got, you'll need to boot the server without running the AUTOEXEC.BAT. There are a few ways to do this, ranging from using a boot disk through continuous control-C, to pressing F8 (if CONFIG.SYS allows it). Whichever way you choose, once at the DOS prompt run SERVER -NA, which will prevent the AUTOEXEC.NCF from running: this might solve the problem so that you'll be able to see the AUTOEXEC.NCF and edit it.

to be releasing semi-usable versions without a full set of features — black mark there, Cheyenne.

Once running, it seemed okay although I should have liked to have seen the statistics on backup showing in the same way as any other backup program does. For my taste, ArcServe for NT seemed a bit too secretive, preferring to run as background engines (all well and good under NT) but the communication with the front-end seemed to be a little shaky. Contrasting this with Arcada backup, which I reviewed a couple of months ago, I thought it a little unwieldy and, dare I say, bloated. It needed 16Mb of memory to install. Contrasting that with Arcada, which seemed to be happy with 12Mb (which is what I like to supply a review machine with), I felt it was rather greedy. And slow. Don't forget slow.

CONTINUED FROM PAGE 339

If this doesn't solve the problem, then you'll have to reboot and run SERVER -NS-NA. This will stop the SYSTEM.NCF running as well. Remember you'll have to load a disk driver (such as ISADSK.DSK) before you can see the disk. Look at the SYSTEM.NCF before you run SERVER, too. Once at the server's command prompt, you can then run VREPAIR (either from the SYSTEM directory) or from the C: directory, or even from floppy disk if necessary. The disk should then be repaired so that you can reboot and carry on as if nothing had happened.

Of course, you really should have had a UPS attached, but that's another story.

Mirroring and duplexing

I've heard about mirroring and duplexing server disks. What's the difference, please? If I do decide to duplex or to mirror a disk, is it easy to do on an existing setup?
AP@cix

There's not a lot of difference, really. Both methods keep data totally backed up on the fly between two hard disks with partitions of exactly the same size. It's how the hardware is arranged which makes the difference. In the case of mirroring, you have two disks hanging off one controller (nothing other than SCSI in your NT and NetWare machines, please) with the operating system set to duplicate data between them at the time it gets written to disk.

Disk duplexing is exactly the same, apart from the fact that you have each disk hanging off a different disk controller card, which gives an added level of safety, protecting the data and allowing immediate recovery even if a disk controller card goes down. Remember, if you're duplexing multiple drives, make sure that each member of each pair of disks is on a different controller.

Once you have a stable networking setup, all you have to do is to add another disk which is either exactly the same size or larger than the old one (or a disk and a controller), making sure that the new controller is supported by its correct NetWare DSK or NT driver, and create a volume or partition of exactly the same size as that which you want to mirror. Now select the two partitions and start the mirroring off. It's probably better to allow the server to get itself sorted out during a slack time — perhaps overnight. Even better to make sure that it's on a Friday so that if something does go wrong during the process (unlikely, but possible) you've got the next day in which to revert to the original configuration. Oh, and make sure you're backed up — at least three times.

Small networks

I'm considering a small network for five or so users who will want to share resources occasionally. Which would you recommend?
RT@cix

Anything which works for you. *There are the normal run-of-the-mill programs like Personal NetWare, Windows for Workgroups, Windows 95 or Windows NT, also not quite so mainstream packages like PowerLAN (from Performance Technology) and the Little Big Lan to which we gave the Networking award in 1994.*

I'd be inclined to stick to a Microsoft product, probably Windows 95. If the use of the network became much heavier, I'd probably think of using Windows NT instead, on one of the machines, in order to act as a server as it will copy all the networking settings from a Windows operating system (if you install it in the same directory). Remember, though, that NT won't currently share a fax/modem like Windows 95 whereas Windows for Workgroups will, so there is added expense if you want to do this. It can range from a comms-port sharing program called WinPort — which I have reviewed (although not the NT incarnation yet) and which is available from lansource@cix for about £100 — to a complete fax package, costing thousands of pounds.

Error reading volume directory

We have a Novell NetWare 3.12 server which gives this error. We tried running VREPAIR and it completed, telling us that there were 32 errors. We tried to mount the disk and got the error: "Mirror copies of the directory don't match". We ran VREPAIR again and this time it flagged five errors.

When we tried to mount SYS: we again got back to the same state as the first error message. We ran VREPAIR once more and then the error message was displayed again. What should we do?
PC@cix

I suspect that either your hard disk or the disk controller is on the slippery slope to death. You have got good, verified, recent backups of the data, haven't you? If not, and you can't get the disk on line long enough to get them, you're either going to be talking to those nice people at Dr Solomon's or Ontrack recovery with chequebook and a pen – or, you may just be able to get around the problem with a copy of NetUtils. This is a lot cleverer than VREPAIR, but I'd suggest you take another backup just to be extra safe and run something which should examine the thing exhaustively, such as the surface scan option of install. Then you'll know whether it was just a glitch or the disk subsystem dying.

If you're using both OS/2 and Macintosh name spaces, there could be a problem with using some versions of the name space NLMs. Remove the OS/2 name from the volume with VREPAIR, and this should alleviate the problem. Failing that, do a backup and then get a copy of the latest OS/2 and Macintosh name space NLMs from your NetWare dealer or from your favourite ftp site.

Addendum

Sorry. In my October column, I didn't list the address of **Performance Technology**, the manufacturer of Instant Internet. The company is on **01344 382020**. Email as **sales@perftech.com**

PCW Contacts

Stephen Rodda is an independent computer consultant specialising in DTP and networking. He may be contacted as **the_bear@cix.compulink.co.uk**

Help wanted

Readers have written to Stephen Cobb asking for advice on all sorts of comms-related subjects, and here he soothes some troubled brows. Plus finding forums, and help with HTML coding.

Answers to your questions make up most of this month's column, starting with this from Barry Stanley: "I read your pages in *PCW* and you obviously understand many people's frustration trying to get anything to work on the Internet or CompuServe, so I thought I'd send you my example from today. You have described an interesting Corporate Logo screensaver which can be found on a Windows Audio Visual Forum. I have just tried to locate it with no success."

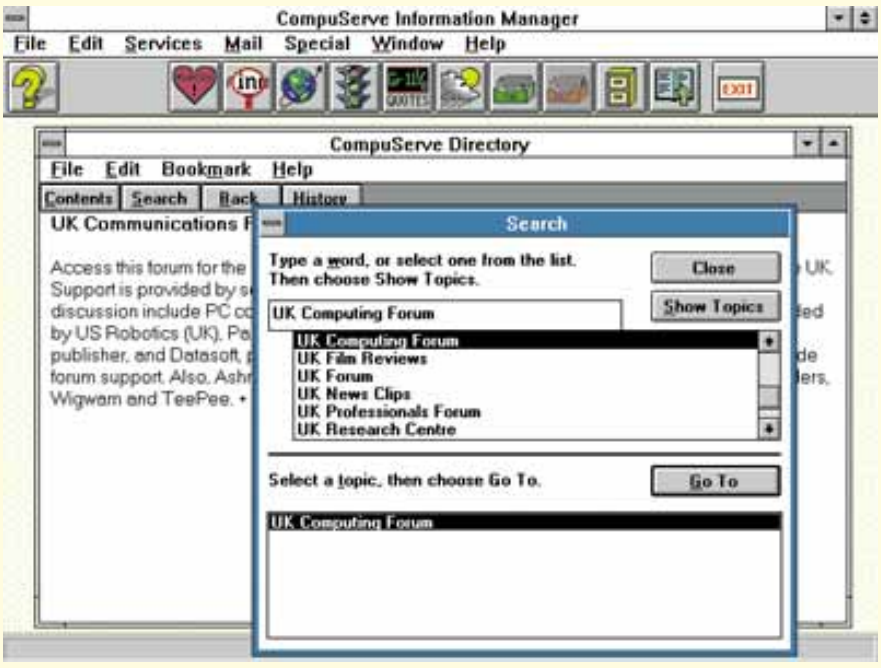
Mr Stanley then provides a list of failed commands, followed by these remarks: "As an aside, I have a physics degree and work in the semiconductor industry. If I can't get much joy, how do non-technical people manage? Of all my friends/colleagues I've spoken to, none have found any use for the Internet at all (except email which we use extensively). It seems to be just for complete PC nerds using a telephone line that someone else is paying for. Thanks again for your *PCW* articles, however don't ever underestimate the need to explain things in ABC style."

Obviously this letter was written during a moment of frustration, but it raises some important points, besides the very practical question of how you find things on CompuServe, which we will get to in a moment. Having spent several fruitless weeks trying to install Windows 95, frustration is something I understand. I also understand that the frustration factor is amplified by glib remarks from those who have somehow managed whatever techno-feat it is that you are banging your head up against.

In this particular case I am guilty of tossing out a remark like "you can find this software in the Windows Audio Visual forum on CompuServe" without providing sufficient clues as to how you would actually do that. In the "old days", before graphical user interfaces were invented, CompuServe users navigated the system with text commands, one of which was "GO" followed by the code name of the forum. For the most part these "GO codes" were logical, but like DOS they did not work unless you spelled them correctly. As the number of forums climbed from the dozens into the hundreds, the GO codes became more arcane. The GO code allocated for the Windows Audio Visual Forum is GO WINAV.

You can still issue the GO command using WinCIM and MacCIM (the following commands are for WinCIM, please check the MacCIM Help for the equivalents). I usually access GO by typing Ctrl+G but you can also select Go from the Services menu, or click on the traffic-light button (graphical user interfaces may be easier to use, but when they offer three different ways of doing the same thing they are definitely harder to explain).

If you use WinCIM to visit a forum and decide it is likely to be a regular stop on your tour of the infobahn, then you can add it to the Favorite (sic) Places list. If you click the Add button in the Favorite Places dialogue box immediately after accessing a forum, the appropriate GO word and forum description are already entered for you and you can simply click OK to add this forum to the list. This allows you to visit the forum by double-clicking on the entry in the Favorite Places list (this can be presented in alpha order or ranked by number of accesses — that is, most popular at the top). If you want to add a forum at some other time you will need to type in a description and enter the GO word.



You don't have to go on-line to find the right forums in Compuserve, but you do need to make sure you have a recent listing

Finding out

So how do you find interesting forums? Again there are several paths to enlightenment, none of them immediately obvious but all fairly effective. The most obvious path is a suggestion from a friend, or from an article like this (if the writer remembers to include the GO word). If you are searching from scratch, the cheapest place to start is the CompuServe Directory icon that is placed in the CompuServe program group when you install WinCIM. This loads a hypertext directory of CompuServe services in the form of a Windows Help file (either almanac.hlp or compudir.hlp). You can use the standard Search button and enter subject-related words to locate forums of interest and their GO codes.

Since new forums are being added on a regular basis it is worth checking the date of your copy of almanac.hlp. I was surprised to find mine was dated back in 1994, even though I upgraded to WinCIM 1.4 earlier this year. I am not sure if all of the floppy disk 1.4 upgrades include the latest version of the file. The CD-ROM upgrades appear to include it but I cannot find a version of almanac.hlp anywhere on CompuServe itself. You would think that the most recent version would be readily available for downloading (I am also unclear as to why some versions use a

Windows on the Web

Ian Fitzpatrick wrote to say: "I have been reading your very informative columns in *PCW* and was interested to see your mention of WinHTTPD which appears to allow a Windows PC to act as a Web server." This is true: Windows httpd 1.4 is available free to non-commercial users and is only $99 for a commercial licence (however, Windows httpd it is not the only path to a PC-based Web service).

Ian continues: "I would be most grateful if you could provide me with some sites or addresses where I could get hold of WinHTTPD." The short answer is http://www.city.net/win-httpd/. A less direct route is to head for the home page set up for the excellent Prima Online book Building a Web Site. This trip is worth taking since it provides links to a wide range of Web server software sites (http://www.netgen.com/book). There are also links to a range of Web server utilities.

Free Web server software for Windows? That's Windows httpd 1.4, on the Web

The fact is, you may want to consider something besides Windows/DOS if you want to run a Web site with a 486 PC. A rapidly-emerging favourite in this field is Linux, a freeware version of Unix that runs on 386 and 486 machines (as well as Acorns). You can download Linux from various sites (although it is very large and you might want to buy it on CD — for sources check http://www.linux.uk.org).

A CD-ROM containing the full Linux code, plus a compatible version of X Windows (which is a Windows-like graphical user interface for Unix systems) may even be available from your local bookstore. There is one included with the Ventana Press *Web Server Book* by Magid, Matthews and Jones. This very handy book/CD package provides everything you need to set up a Web site, including version 1.1 of NetScape Navigator and both the CERN and the NCSA http Serve software.

While the idea of learning a whole new operating system might seem daunting, there is plenty of documentation available and the basic commands will not be too much to handle if you already know DOS. What is the point of using Linux on a PC as opposed to Windows? Speed. Although many Web pages are highly graphical, you don't need to be running a graphics machine to serve up the pages. Operating in character mode Linux is very fast, particularly if you can afford 16Mb of RAM (it will work as a Web server with 8, but the more the better). With a good high-speed phone line you should be able to handle thousands of "hits" per day, achieving performance equivalent to lower-end Sun SparcStations, with a box that dual-boots to DOS and uses all your peripherals.

version of the file called compudir.hlp — perhaps I can get answers by next month).

If you cannot find what you want in the directory, try the Find command (on the Services menu). This does a simple online search for forums and definitely uses an up-to-date version of the forum list. The results of your search are presented in a list alongside current entries in your Favorite Places list. This allows you to see which forums are already in your FP list (marked with a tick) and add new ones directly to the FP list.

HTML tips

Recently I spent several weeks coding about 60 HTML (hyper-text markup language) pages for a new World Wide Web site. In the process I picked up several tips. While html coding is the focus of an article elsewhere in this issue of *PCW*, I think these tips will also help users of Web pages to understand them better.

For example, most people know that Web pages are specially-coded text files that are stored on a computer system called a Web server. The operating system on many Web servers is Unix, rather than DOS/Windows. This means they can use the file extension .html which is one character too long for DOS or Windows 3.11 (both Windows 95 and the Macintosh OS can handle longer names, as can OS/2).

Consequently, if you are coding pages on a DOS/Windows machine you have to store the files as filename.htm. However, on the system that ultimately stores and displays the pages, the Web server, the file extensions may be changed to html. This means you need to write the references in your file links in the filename.html format, which naturally gives rise to some errors and inconsistencies. For example, the person who writes the pages may leave some links pointing to filename.htm when the correct reference is filename.html. As a Web user you may click on a link with your browser and get a "page not found" message when in fact the problem is simply a missing "l" in a link. If you enter the location or URL by hand, you may be able to overcome this error and get to the desired page.

You might wonder how the person who created the error in the link could have missed it. I mean, don't these people test their work? Well, this is easier said than done. For one thing, some browsers make testing difficult because they are so smart. Recent versions of NetScape actually overlook the differences between htm and html. In fact, they even overlook missing code elements, such as closing brackets and quotations. This means NetScape will present a "faulty" page as though it were written correctly. The result can be pages that look terrible in Spry Mosaic or other, less "intelligent" browsers.

So why not test with Spry Mosaic? I tried this, but it's a pain because Spry will not read local files if they have the htm extension and your link specifies html. You have to do a lot of search and replace (in my case, 60 pages worth) to switch between the two extensions. In fact, I decided it was easier to go live with the pages, browse them with Spry to spot mistakes, then immediately correct the code. If anybody else has a better method I would be happy to hear it.

I did try proofing pages with HoTMetaL Pro, but that found so many errors (due to incompatibilities between different versions of html) that it was slow going. Besides, that approach does not show you what pages look like under the different browsers. It is quite disappointing to spend hours on an effect, such as centred images, only to see what a mess they look in a browser that does not do centred images.

One final tip: remember that there are still a lot of users who browse the Web with Lynx, a non-graphics Unix browser. I was reminded of this when I received an email feedback from the pages I designed (at www.ncsa.com) politely listing all of the code changes needed to optimise the pages for Lynx viewers.

UK Forums

If you haven't been there lately, there have been some major changes to the UK forums on CompuServe, specifically: UKIT (GO UKIT) and UKVENA (GO UKVENA). The UKIT (UK Information Technology) and UKVENA (UK Vendor A), open as the old UKCOMMS and UKCOMP forums close, to allow more space for UK-based vendors in UKVENA and increased UK-centric coverage of subjects such as the Internet, comms, mobile phones, and so on (note that the old GO words UKCOMP and UKCOMMS will both take you to UKIT, but this only a temporary arrangement and you should change your software settings to GO UKIT and GO UKVENA).

PCW Contacts

Stephen Cobb can be reached on CompuServe as **72662,546** or the Net as **cobb@iu.net**

Send in the **clones**

Which would you buy: one of Apple's PowerSurge Macs or a Power Computing Mac clone? Chris Cain weighs up the pros and cons, reviews the latest software updates — including the exciting Photoshop 3.0.4, and revisits Pfhor.

Undoubtedly, the biggest news in the Mac world this month is the arrival in the UK of the Power Computing Mac clones. Top London-based distributor Computer Warehouse (CW) is the first to bring these to our shores and it will be interesting to see how they fare against Apple's new range of competitively priced PowerSurge Macs. The clones are fully compliant with Mac OS and come complete with a large number of bundled software titles.

The basic specification on offer from CW is a 100MHz PowerPC601, 256Kb level two cache, three NuBus slots, a 365Mb hard disk and 8Mb of RAM. Ethernet and enhanced SCSI are also included in a PC-style desktop case for a mere £1,299. This compares favourably with an official Apple 8100/100 which, with 8Mb and a 700Mb hard disk, is likely to set you back around £2,300. (Both prices exclude VAT.)

Neither machine comes with a keyboard or screen as standard (something I had hoped the clone makers would fix) but even when these are added, the price difference between the products is astounding. Given the choice between them, I can think of no reason to go for the official Apple model other than one of brand loyalty.

PCI power

Nevertheless, there are plenty of reasons to buy one of the new PowerSurge Macs instead. Firstly, they have Intel's Peripheral Component Interconnect (PCI) architecture, which is definitely the expansion bus of the foreseeable future. All of Apple's business machines now have this as standard — only consumer-orientated Performa models still use the ageing NuBus architecture.

Secondly, all machines from the 7500 upwards are designed to use the next-generation PowerPC604 processor. This gives a further degree of future proofing — something very important in the minds of today's users. Nobody wants to spend lots of money on a machine, only to find that

Power Computing 100: technical specifications

Microprocessor
100MHz PowerPC 601 RISC microprocessor with integrated floating-point processor and 32Kb on-chip cache. 256Kb Level 2 cache (512Kb and 1Mb also available).

Memory
8Mb RAM, expandable to 200Mb.

Graphics
RAM-based built-In video supports all Macintosh-compatible and VGA displays up to 17in (VGA requires an adaptor). Optional high-performance video card.

Floppy Disk Drive
3.5in 1.44Mb self-ejecting floppy drive which supports Mac OS, Windows, DOS, OS/2, and ProDOS diskettes.

Hard Disk Drive
Internal 3.5in 356Mb - 4Gb hard disk. Support for one 5.25in full-height drive and two 3.5in drives, or four 3.5in drives. Optional CD-ROM drive. 4x rotational speed. 600Kb/sec sustained transfer rate. CD XA/PhotoCD, multi-session compatible.

Networking
Built-in Ethernet (AAUI port). Two high-speed serial ports for LocalTalk, modems or other devices (both can be used with Apple's GeoPort telecom adaptor).

Audio
CD quality, 44.1kHz 16-bit sound input and output capabilities. Microphone and headphone jacks. Built-in speaker.

Expansion
Three NuBus expansion slots. Clock/calendar. Custom real-time clock IC with long-life lithium battery. I/O ports. Dual-channel SCSI interfaces for high-speed disk I/O and RAID solutions. ADB ports for keyboard and mouse.

Power Supply
200W. Input: 90v-240v.

MPEG playback

Sparkle provides MPEG playback in software. The quality depends on the power of your CPU

they need to upgrade the whole thing in a year's time. By providing the processor on a daughtercard, Apple has significantly extended the lifespan.

Another reason is the price: a 7500/100 8/500/CD costs £1,749 (plus VAT) — slightly more money for much greater performance.

In theory, the arrival of products like the Power Computing machines should threaten Apple's business, but in reality it can only help to further establish the Mac as the only serious competitor to the WinTel alliance. It also forces the company to remain competitive with regard to specifications and pricing, which is good news for everyone.

US-based Newer Technology has launched a range of products for the 5300 series of Powerbooks, including memory upgrades, PC cards for modem, Ethernet and fax functions, and an external monitor adaptor called Colour Palette which gives a 16-bit colour display.

Photoshop update

Mac users wanting to keep their systems in tip-top shape will be interested in three recent software updates. First up, Adobe has released Photoshop 3.0.4 which, among other things, adds direct support for the PowerPC604 processor. At last, users who've splashed out on the new systems will see what this workhorse is capable of.

Among the new features are faster Skew, Rotate and Gaussian Blur facilities on all PowerMacs, a fat version of Adobe Type Manager, support for TWAIN 36/48-bit scanners and on-line registration. There is improved importing of Illustrator files and a scratch-disk efficiency indicator to let the user know the amount of time Photoshop is spending with the scratch disk.

This looks like an essential update and registered users in Europe will receive it free of charge on floppy disk.

Speed doubler patch

Updated too is a patch for Connectix Speed Doubler, which was my choice for the November issue's "Utility of the Month". The patch, downloaded from eWorld, brings your master disk up to version 1.1 and solves problems with all three extensions. It should cure the crashing associated with some PowerPC upgrade cards, incompatibilities with Microsoft Word 4.0, PrintShare and Virex 5, and desktop rebuild crashes.

The Speed Doubler software updates can be obtained either from a distributor such as Computers Unlimited, or via the company's Internet support site at http://www.pcworld.com/connectix/techsupp.html. Updates for both Mac and Windows 3.11 RAM Doubler can be obtained from here, too.

New version QuickTime 2.1

The biggest update, of the three items reviewed here, is to QuickTime 2.1. As usual, this new version of Apple's multimedia architecture claims to provide smoother video playback with full-screen 30fps video on PowerMacs. I'll believe that when I see it.

A new sprite animation track has been added so that developers can create Sonic the Hedgehog-like interactive characters, and there's support for the MPEG file format, too. Apple's Multimedia Tuner extension feature has now been incorporated into Version 2.1.

QuickTime comes as three extensions: QuickTime, QuickTime PowerPlug, and QuickTime Musical Instruments. All can be downloaded as one archived file from Apple's software support Internet sites. Apple has updated its Movie Player application too, and the new version can be obtained from the same place. Movie Player 2.1 has a Present Movie option which replaces Print to Video for full-screen movies, and support for the new features in QuickTime.

While on the subject of movies, I've been playing around with MPEG files, (having performed a test with accelerated PC graphics cards in last month's issue). I was impressed by a utility for Windows called Xing that played back these files using the raw power of the processor without the need for any specific decoding hardware, so off I went in search of a Mac equivalent.

Sparkle

The most promising program I found was a small application called Sparkle, available from eWorld and currently on version 2.4.2. As with Xing, Sparkle provides software decompression and playback of MPEG files on both 680x0 and PowerMacs. The file is encoded as FAT binary and will therefore take advantage of whatever hardware is at hand.

The only limitation I've found with Sparkle is that sound support is limited to playing AIFF data. Files in this format can be associated with MPEG pictures and the two are then played simultaneously. There is no support for playing direct MPEG compressed audio which is normally included in a movie file (the author says he is working on this). If you have files in

.WAV format, as commonly used with Windows, you can also use these by running them through a converter such as Balthazar.

I found that Sparkle produces reasonable results on anything from a PowerMac 7100/80 upwards, and can provide what looks like full 25fps playback on a 9500/132. As processors get more powerful, software MPEG could become a real alternative to buying extra, and often expensive, hardware. If any Mac users know of a better way to replay MPEG files using software alone, let me know.

Mighty machine

Mentioning the 9500/132 was a sneaky way of boasting that *PCW* now has access to one of these mighty machines. Having tested an early model when the hardware was first announced, I can report that the finished product is just as good. It comes with the latest version of Mac OS System 7.5.2 pre-installed, although not all of the latest native extensions are included in this release. Sound Manager 3.1, QuickTime 2.1 and Native SCSI Manager have to be added separately.

So far I've found no major compatibility problems, apart from a small problem with RAM Doubler which means having to reinstall it if, for any reason, I switch it out with the Extension Manager. Some software problems have been reported with the PowerPC603, as used in the Performa 5200, so I'll be seriously testing the mettle of the PowerPC604.

Cor! more Pfhor

Visit Apple UK after hours and the chances are you'll find everyone armed to the teeth and trying their best to kill each other. It's nothing to do with the water supply or the company's close proximity to Heathrow airport; it's all down to that wonderfully addictive pastime, a networked game of Marathon.

This was the original Mac answer to Doom on the PC and has built up a considerable following since its release last year. Marathon 2 is due to be released soon and an early demonstration has found its way onto my hard disk.

Marathon 2 sees the return of the Pfhor, the nasty alien race hell bent on man's destruction. They didn't like it too much when you stopped them from taking over the starship Marathon in the first game, and now you have to face them again in an all-new conflict.

To find out what Marathon's "Bobs" are up to now, you'll have to wait for the full review of the game — but I can reveal that it looks and plays better than the original. The high-resolution texture mapping is superb and a wide-screen display gives you even more of what the Americans like to call "in ya face" action. The sound has also been beefed up with 16-bit stereo panning and ambient effects to make you feel as if you're really exploring an alien world.

My demo came from Mac clone makers, Power Computing (and was distributed at the Boston Macworld 95 show), but another demo should be freely available on the Internet by the time you read this.

The Pfhor are back for more in Marathon II: Durandel

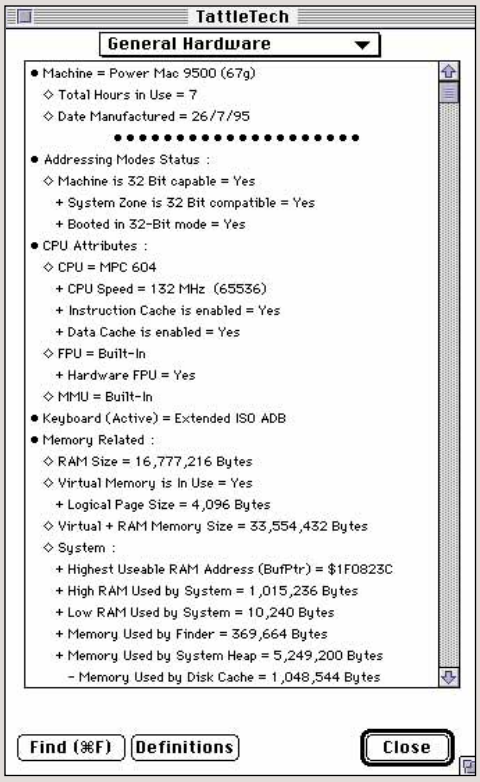
Utility of the Month

Here is a little shareware number I pulled down from eWorld, called TattleTech. No sooner was it downloaded, it saved the day.

TattleTech was originally known as "TattleTale", a program I first encountered in my Mac IIsi days. Much improved since then, it is a semi-diagnostic program that investigates your machine's configuration and reports the findings. TattleTech can tell you about general hardware, such as what kind of processor your machine has, what speed it is and how much RAM there is, and also about more complicated issues such as system patches, extension version numbers and open files. A complete list can then be printed for your records.

TattleTech is ideal for keeping track of what's in and on your system, seeing what parts are written in native PowerPC code, and for tracking down problems with extensions. It costs nothing to try out and could save you a lot of time if you have a software conflict.

TattleTech currently resides in the ZiffNet Hot Downloads section in the eWorld Computer Center. It doesn't support PCI at the moment, but the author claims that this will be addressed as soon as he gets his hands on a PowerSurge Mac [see main text].



PCW Contacts

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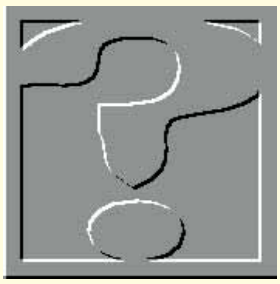
Apple **0181 569 1199**
Connectix utilities available Computers Unlimited **0181 200 8282**
Power Computing clones from Computer Warehouse **0171 724 4104** or Newer Technology **001 316 685 4904** (US)

Any **questions?**



If you've got a PC problem or think you could help out other readers, contact Frank Leonhardt.

For anyone who's just spent six months marooned on a desert island, the news is that Microsoft has finally released a new version of Windows called Windows 95. To make sure everyone knew about this earth-shattering event, Microsoft's publicity machine went berserk, going as far as buying a certain well-respected newspaper and converting it into an advertising freebie for the day.

Everyone knew something had happened, but most were a little unsure as to exactly what it was, and most of them have phoned me for clarification (it feels like it, anyway).

This has had two immediate effects: firstly, my answering machine has broken down for the first time since 1986; and secondly, I have noticed the same questions constantly arising.

Here, then, are my thoughts on the subject.

Q. Is Windows 95 any good?

A. *What kind of a question is this? Yes, in many ways it is an improvement on 3.11. It is faster (in some circumstances) and it promises to be more robust. It could be easier for some people to get to grips with, and the low-level redesign allows for future expansion. What this means to you, in practical terms, is probably very little.*

Q. Should I upgrade to Windows 95?

A. *Changing operating systems almost always means grief. If you buy a new machine it will probably come with Windows 95 as standard. If, on the other hand, you have a perfectly serviceable computer running Windows 3.1 there is no real need to upgrade; at least for now.*

Q. Will I need to upgrade my PC's memory?

A. *One supposed advantage is improved performance. This has been realised, but the increased RAM requirements completely negate this on systems with 8Mb or less of RAM. This is caused by the use of virtual memory; the process by which hard disk space is used as a substitute for real RAM. Once your real RAM is full up, Windows will swap areas of RAM to and from an area on the disk. Swapping is a very slow process in computing terms and its avoidance is to be desired. Because Windows 95 uses more RAM than its predecessor, you will find that you can load less applications before swapping starts. Microsoft may be right when they say a system with 8Mb of RAM will run Windows 95 at the same speed as Windows 3.11, but the question you should be asking is whether your applications will run faster or slower.*

If you were happy with the level of

performance you got with Windows 3.11 in 8Mb of RAM, you will need an extra 4Mb to stop Windows 95 from swapping. If you do stop it swapping, however, it is noticeably faster than 3.11.

Q. What advantage will upgrading to Windows 95 give me?

A. *Apart from performance, an important perceived advantage of Windows 95 is its ease of use. This might make a difference to new users, but if ease of use had been a priority in your case you would have bought an Apple Macintosh in the first place. To take advantage of the new front-end you'll have to convert to a different way of thinking about files and applications, and you may be better off with the devil you know.*

In the future, Windows 95 will be supported by new application software. This is the most compelling reason most people will have for upgrading. Windows 95 will handle the so-called 32-bit applications in a different way from the existing 16-bit versions. At present, a rogue 16-bit program can cause everything running on the machine to crash. Windows 95 can physically keep the 32-bit applications apart, so the dreaded system crashes may become a thing of the past. If you really need a reliable system, however, Windows NT has been multi-tasking all types of application in a robust manner, for a long time.

In theory, 32-bit applications can run faster, too, but I'll believe it happens in practice when I've seen it for myself.

Windows 95 can handle resource-hungry applications far more effectively than could 3.1. This may be of interest to Microsoft Office, which eats up system resources as if it were never designed to fit on Windows 3.1. Considering the lengthy delay in releasing Windows 95, this may be the case.

Q. Is there any good reason why I shouldn't upgrade?

A. *One very good reason for not upgrading a system is backward compatibility. Microsoft has gone to a lot of trouble to make existing DOS and Windows 3.1 software work with Windows 95, but they haven't accommodated everything. For new machines and users this is not a problem — simply buy software and hardware which works with Windows 95. If, however, you bought your software more than a few months ago you're not going to want to fork out to upgrade again.*

Q. Can I install Windows 95 along with Windows NT or OS/2?

A. *This is generally not a problem. If you have DOS and another operating system installed on your hard disk, Windows 95 can be installed over DOS. Boot Manager, NT loader and so on should keep working. If you want to select between DOS and Windows 95 you can simply press F8 at startup to get back to a DOS prompt. In my experience, absolutely everything which worked under DOS 6 works from a Windows 95 DOS prompt (before Windows 95 proper is allowed to start), including Windows 3.11.*

Q. I want to keep my old version of Windows after installing 95 — does this

mean I need to buy the full version of Windows 95?

A. *Not at all. The only difference between the full and upgrade versions is that the upgrade checks to see that you have an old copy of Windows somewhere before it installs. If you no longer have Windows 3.1 or Windows NT on your hard disk, it will accept the first installation floppy disk as proof.*

Q. Should I install Windows 95 over my old system as the documentation suggests?

A. *No — unless your old system is fully backed up. My recommendation is to make a boot floppy for your existing version of DOS (see* Computer Answers, *October issue) and then install Windows 95 to a new directory. This has the disadvantage that you will have to re-install most of your Windows applications, but after a few years' use most machines could do with a fresh start.*

Make sure you keep backups of your old AUTOEXEC.BAT and CONFIG.SYS files. Your existing DOS and Windows directories will remain intact during the process but you may need to move them elsewhere to make space on your system partition. To avoid having two swap files on your disk, use the Windows 3.1 Control Panel 386 Enhanced option to set the swap file type to "Temporary" (if it is currently set to "Permanent").

By not overwriting your existing version of Windows, you will find you can switch between old and new by pressing F8 when the "Starting Windows 95..." prompt appears at startup and selecting the Command Prompt option from the menu which appears. This is very useful while you are finding out what works with Windows 95 and what doesn't.

Q. How can I get my machine back the way it was before?

A. *If you haven't installed Windows 95 in the way I've suggested, you will have to rely on Microsoft's uninstall utility. The documentation for this is supplied with the floppy disks and on the CD-ROM in \README.TXT. During installation you will have been asked whether you wanted to create uninstall files, assuming you opted to overwrite your original system. If you installed to a new directory then you wouldn't have been asked.*

To get rid of Windows 95 without using the uninstaller, simply boot from your DOS floppy and transfer the system back to drive C: using the command "SYS C:". Then copy your AUTOEXEC.BAT and CONFIG.SYS files, together with your old Windows and DOS directories if necessary, back into place and delete all the Win95 stuff.

If you didn't make a DOS boot disk before installing Windows 95; don't say I didn't warn you.

SIMM conversion device

In the September issue, I said that there was no way to convert 30-pin SIMMs to work with a 72-pin SIMM motherboard. But apparently, Tim Nott had mentioned (on page 290 of that issue) a device called SIMM Swapper which did just this... Oh well, you can't win 'em all. Although I haven't yet seen this new device, there are a couple of points which worry me. For a start, high-performance memory systems can be a bit fussy about their SIMMs so this may not work for everyone. Additionally, most Intel PCI Pentium motherboards are set out with the SIMM sockets right under the drive bay metalwork; clearance, even for normal SIMMs, can often be a problem.

Thank you to everyone who wrote to tell me about this.

All things considered

I've only considered practical issues of Windows 95 so far. If you are the type of person who simply enjoys computers then Windows 95 is a lot of fun. It will transform your old machine into something different; a new toy to play with. Windows 95 will inevitably displace Windows 3.1 in the future but, for now, if you rely on your computer to make a living you'd be mad to fix something which isn't broken.

P60 gets the boot

"I have a Dell Pentium computer. Both MSD.EXE and INFOPLUS identify the processor as a 486. I am a little disturbed by this. At boot, the operating system displays P60, so why does both MSD and INFOPLUS say it is a 486?"

Joseph M Farrugia
<JoeF@harlon.demon.co.uk>

Programs like these identify processors using heuristic methods. They try out a few things which produce different results on all the processors which the programmers know about and take a guess at what they are running on.

As the Pentium didn't exist when the programs were written, and is backwards compatible with the 486, the heuristic tests performed to detect a 486 would have passed. Newer versions of the software will try things which only work on a Pentium (or a P6) and thus be able to tell the difference.

Upgrade options

The honour of being the most far-flung correspondent this month goes to Adb-El-Kadir M.M, from Baghdad:

"I currently have a 486 DX2/66, with an ISA motherboard, using an Xtechnology Xgraphic graphics board which I need to upgrade. I don't want to spend money on a new ISA graphics board because the technology is outdated. I want to upgrade my motherboard to either VESA or PCI: I'm not sure which is the recommended architecture.

"I've seen boards available with and without CPUs — although those without CPUs state that they are ZIF. My current board is LIF and I'm not sure if I could make use of my current CPU on one of these new boards. I'm considering an upgrade in processor as well, to a DX4 100 VESA/PCI board.

"This leads to my next problem: the DX4s seem to be 3.3v, and I'm sure my power supply is 5v. Do these 3.3v motherboards have the ability to 'step down' the voltage or would my power supply fry a 3.3v CPU?

"What do you recommend I do?"

Gary Mot
<100072.1661@compuserve.com>

PCI has some theoretical advantages over VESA but in practice your choice should be dictated by the expansion cards you wish to use. If you want to upgrade your processor too, I'd suggest you forget about the DX4-100 and go straight to a Pentium. The price/performance ratio definitely favours a P60. Personally, I'd prefer a P75 because it's a second generation Pentium running at 3.3v instead of 5v. And it's faster.

The 3.3v motherboards have a built in voltage regulator for their CPU and support chips only. The rest of the board must still run at 5v, otherwise all the expansion cards wouldn't work. The power connection is just the same as for the 5v boards. There may well be jumpers on the motherboard to select different CPU voltages.

PCW Contacts

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Hard facts

When your old PC needs a Zimmer frame to cope with new software, it's time for action. Eleanor Turton-Hill helps you along the road to deciding what you should do and explains the issues involved in upgrading your hard disk.

Computer technology changes fast: every year, processor speeds increase and hard drive capacity grows. Before you know it, there's a new generation of feature-rich software waiting to cripple your poor, aged PC. Sooner or later, you'll have to face up to the fact that your machine is becoming outmoded and find some way of dealing with it.

Connecting a Caviar 2540 IDE hard disk

Dig your heels in

One approach is to ignore all new technological advances and carry on using the software you've got. This is not a completely silly idea. Most software "upgrades" do not transform your current application into a superior product – they just add lots of extra features which you don't necessarily need. Ultimately, this takes up lots of disk space and strangles your system. So if your software does everything you want it to, that's a good argument for leaving it alone.

The problem with the "dig your heels in" approach is that eventually your hardware and software become obsolete. There's no chance of making any kind of minor upgrade, let alone running the current generation of software or adding some whizzy new peripheral. One day, you'll pick up a computer magazine and realise that no-one knows of your PC anymore.

Most people, especially computer enthusiasts, can't bear to be this out of touch. But they can't necessarily afford to splash their money around on new hardware either; so what they do is push their current systems to the limit. In fact, this is the option which most people unwittingly take. Although you may benefit from some of the new features provided in the constant software upgrades, your system will soon let you know that it can't cope with the continual effort of churning data from memory to disk. The signs are often subtle: "Out of memory" messages start to flash up on the screen and your favourite applications inexplicably refuse to save any more files.

Upgrade or not?

This is a sad state to get into, but once you've arrived at this point, there are only certain options available

The first is to clean up your machine, and there are dozens of techniques for squeezing more life out of your system. The most effective, however, is to delete old files (that you no longer use) from your hard disk and compress any "archive" files which you seldom use but would like to keep. There are hardware and software utilities which will do this. The software variety is generally cheaper; the hardware type, generally faster.

Second on the list is to buy a new machine. Whether or not you decide to do this will depend on the state of your current machine. If your PC has become truly medieval, it's the only sensible solution. But before you do this you should consider the third option, which is to upgrade some of your machine's over-worked components.

Hard disk upgrade

Last month we looked at simple upgrades, like adding more memory and improving graphics cards. This month we'll look at

some of the issues involved in upgrading your hard disk.

Although the price of RAM has remained constant for about two years and is showing little sign of change, the price of hard disks has plummeted in the past six months. Giving your machine a boost, in the form of a new hard drive, is now an option well worth consideration.

The speed of your hard disk has a major impact on overall machine performance. Hard drives found in old (or really cheap) computers tend to be physically large, slow, power-hungry and of limited capacity. If your machine is *really* ancient, then a modern IDE hard disk would greatly improve its performance.

Before splashing your money around, there are a few basic things you need to know about your PC. First, take the lid off it (there's no way of doing this without a screwdriver) and take a look at the arrangement of the components. The first and most obvious thing to find out is whether you actually have room for another hard disk.

If there's no spare space, don't panic. You can still add hard disk space using a "hard card": literally a "plug-in" card with a hard disk and controller circuitry attached to it. Hard disks of all types come on hard cards, so if the whole idea of replacing your hard disk or adding one to your system brings you out in a rash, a hard card may be the ideal solution for you. You can use it as a replacement for a dead hard drive or as a second drive. People with slimline PCs which generally lack extra drive bays may have no alternative but to use a hard card. The drawback with hard cards is that they tend to have rather low capacity and poor performance, but they're just as reliable as conventional disks.

If you find that you do have a spare drive bay, the next thing to check is the interface standard used by your machine. If your hard disk is of the MFR (Modified Frequency Regulation), RLL (Run-Length Limited) or ESDI (Enhanced Small Device Interface) type, then you have several upgrade options. With a bit of phoning around you can still get hold of RLL and MFM drives. The major problem with them is they tend to be painfully slow (compared with modern IDE drives) and of low capacity. The more sensible choice is to replace your old drive with an IDE hard disk, but make sure you get a matching controller with it. This goes for any type of hard drive. You cannot plug an MFM drive into an RLL controller and expect anything other than smoke.

Check up on the manufacturer of your hard drive, and the drive's type (if you've lost your manual look in the machine's setup screen) before you go shopping for a new hard disk because the BIOS (basic input/output system) in some older machines do not officially support IDE (integrated drive electronics). Ask the dealer if the new drive will work in a "master/slave" configuration with the old one. And finally, cover yourself by checking that the drive you buy has a "no questions asked" return policy.

Which drive interface?

There are basically two types of modern drive interface: SCSI and IDE (see the panel, below left). Here we'll concentrate on the more common IDE variety. Unfortunately, adding a second IDE drive is not always a simple procedure because they don't all work to the same standard. If both your drives adhere to the ANSI standard (ATA) they should happily co-exist. But if they are incompatible, you could well end up throwing your old one away.

IDE drives can control two hard disks on the same cable, and in order to make them work together one must be set up as a "slave" and the other as a "master". This is done fairly simply by moving a jumper at the back of the drive from one position to another. When you plug in the drive, make sure that the cable is plugged in the right way round, otherwise your machine will appear dead when you turn it on. Pin 1 is usually marked so that you can align the cable correctly.

The hard disk you buy will generally be faster than your current one, so set up the new one as the master and the existing one as the slave. They'll work more efficiently together if you store your applications on the faster disk and data on the slow one.

Once you've physically connected your new hard drive to the machine, you will have to configure the PC's BIOS. The BIOS contains a series of entries such as number of heads, cylinders and sectors per track which define the type of hard drive in the machine. Generally, you can get into the BIOS setup utility by pressing a key combination when you boot up. Here you'll need to configure the hard drive type number as well as other system configuration details. Make sure you have all the information you need before you go anywhere near your BIOS, or you could spend many frustrating hours (even days) trying to put it right.

IDE and SCSI: the next generation

If you've leafed through a *PCW* computer group test, you couldn't have failed to notice lots of incomprehensible acronyms like those above. These acronyms refer to interface standards which define the way in which the hard drive connects to your PC.

The first generation of computers stored the electronics to manage the hard disk, on a separate controller card. But technology has moved on since then and the same advances in microchips which have led to faster processors and cheaper memory, now enable the controller function to be placed on the disk itself. Integrated Drive Electronics (IDE) is currently the most common hard drive interface. It's also the least expensive.

IDE disks are connected to an interface card by a cable which extends the signals from the bus inside the PC. The cable does not plug directly into the ISA bus (industry standard architecture), so it either goes into an interface port on the main board or into an interface card. The IDE standard supports two connected disks, the first acting as controller, the second as a slave, with both disks sharing a single I/O address and interrupt.

Enhanced IDE (EIDE) is a much upgraded version of IDE. All computers built since 1994 should have an EIDE hard disk controller, and this provides many advantages over IDE. Firstly, EIDE can support four devices (instead of two) and they don't necessarily have to be hard disks — they can be CD-ROMs or tape drives that are compatible with the EIDE standard. Secondly, IDE was always restricted in that it would not support hard disks larger than 528Mb. The third improvement was in the massive increase in data throughput compared with standard IDE. This massive speed enhancement puts EIDE on an equal level with SCSI (pronounced "scuzzy") as a high-end drive interface.

SCSI stands for Small Computer Systems Interface — it is another standard for connecting hard drives and peripherals to your PC. SCSI hard drives are very fast and very expensive. They act as good interfaces for high-capacity hard drives used as network file servers and for very high-powered scientific and engineering applications. For the average user, it's not really worth spending lots of extra money on a SCSI, especially as EIDE now provides similar performance results.

PCW Contacts

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ChipChat

Congratulations to: E Chambers of London, JM Rickard of Ashford, EJ Saunders of Romford, Chris Branch of Ilford, Richard Parnham of London and Mr I McIntosh of London. They all won prizes in our October Live 95 competition.

Every computer journalist in the world is giving you a hard time because you haven't launched Windows 95. Manufacturers have just launched a zillion new CD-ROM drives, sound cards, software packages and the rest. What do you do, and how do you decide which products to test? For senior Microsoft vice president, Brad Silverberg, the solution was to send someone down to Egghead, the local PC dealer in Redmond, and order one of everything. The next guy in line apparently wasn't too happy waiting for $15,000 worth of kit to be rung up on the till…

● Communications giant Motorola sent out a pamphlet called "Prepared for the future". In the accompanying copyright, the company insists that "No part of this publication may be transmitted in any form, or by any means electronic", with all the usual American copyright riders on electronic storage.

This is only to be expected, but the pamphlet states that the report can also be found on the World Wide Web. A neat trick if it can't be transmitted electronically…

We all know that the postal service can be a bit slow, but even we were surprised at the late arrival of a Readers Survey form. Admittedly it had come all the way from Sweden, but seven years is a bit much…

Next time an Office 95 user loads up Excel, you might want to make sure that they're really working. For with the right keystrokes, the application can be turned into a copy of the best-selling shoot-em-up game, Doom. Well, almost. The Excel programmers decided to hide a picture of themselves inside, along with a small 3D game called Hall of Tortured Souls.
Obviously the code for the spreadsheet didn't take up enough hard disk space for a Microsoft product…

If Operating Systems Were Beers...

DOS Beer
Requires you to use your own can opener, and that you read the directions carefully before opening the can. Originally only came in an 8oz can, but now comes in a 16oz can. The can is divided into eight compartments of 2oz each, which have to be accessed separately. Soon to be discontinued, although a lot of people are going to keep drinking it after it's no longer available.

Mac Beer
At first came only in a 16oz can, but now comes in a 32oz can. Considered by many to be a "light" beer. All the cans look identical. When you take one from the fridge, it opens itself. The ingredients list is not on the can. If you call to ask about the ingredients, you are told that "you don't need to know." A notice on the side reminds you to drag your empties to the trashcan.

Windows 3.1 Beer
The world's most popular beer. Comes in a 16oz can that looks a lot like Mac Beer's. Requires that you already own a DOS Beer. Claims that it allows you to drink several DOS Beers simultaneously, but in reality you can only drink a few of them, very slowly, especially slowly if you are drinking the Windows Beer at the same time. Sometimes, for no apparent reason, a can of Windows Beer will explode when you open it.

OS/2 Beer
Comes in a 32oz can. Does allow you to drink several DOS Beers simultaneously. Allows you to drink Windows 3.1 Beer simultaneously too, but somewhat slower. Advertises that the cans won't explode when you open them, even if you shake them up. You never see anyone drinking OS/2 Beer, but the manufacturer (International Beer Manufacturing) claims that 9 million six-packs have been sold.

Windows 95 Beer
Only just out, Windows 95 Beer looks a lot like Mac Beer but tastes more like Windows 3.1 Beer. It comes in 32oz cans, but when you look inside, the cans only have 16oz of beer in them. Most people will probably keep drinking Windows 3.1 Beer until their friends try Windows 95 Beer and say they like it. The ingredients list, when you look at the small print, has some of the same ingredients that come in DOS beer, even though the manufacturer claims that this is an entirely new brew.

Windows NT Beer
Comes in 32oz cans, but you can only buy it by the truckload. This causes most people to have to go out and buy bigger refrigerators. The can looks just like Windows 3.1 Beer's, but the company promises to change the can to look just like Windows 95 Beer's. Touted as an "industrial strength" beer, and suggested only for use in bars.