

Personal Computer World

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McGraw-Hill Business Publications

Delphi
Tutorial p180

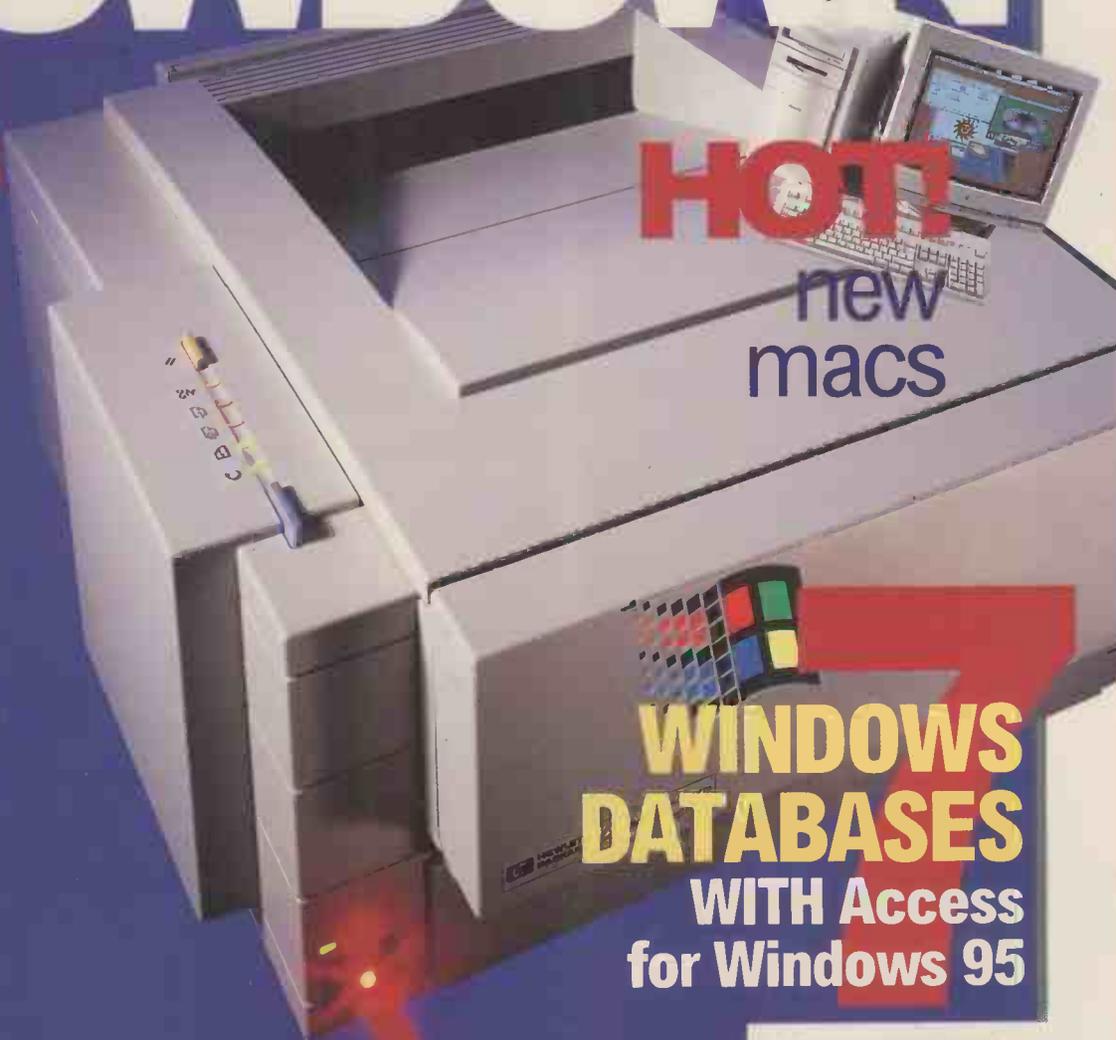
Britain's favourite personal computer magazine

SOFTWARE
REMOTE CONTROL,
OCR APPLICATIONS

LASER
great printers from £280

SHOWDOWN

MPEG
GRAPHICS CARDS

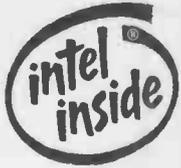


HOT!
new
macs

WINDOWS
DATABASES
WITH Access
for Windows 95



DIMENSION DESKTOP PCs



pentium
PROCESSOR

Designed for



POWER PLATFORMS

DELL DIMENSION P75†

- Intel® 75MHz Pentium Processor
- 8Mb EDO RAM
- 3.5" Diskette Drive
- 525Mb Hard Drive
- Integrated 64-bit PCI Local Bus Video with 1Mb Video Memory
- 14" Colour SVGA Monitor
- 4 PCI and 3 ISA Expansion Slots (1 shared)
- Mid-Sized Desktop Chassis

Dell Finance 3 year rental: £9.81 per system, per week, excluding delivery and VAT.

POWER PLATFORMS

DELL DIMENSION P90†

- Intel 90MHz Pentium Processor
- 8Mb RAM
- 256Kb Secondary Pipeline Burst Cache
- 3.5" Diskette Drive
- 525Mb Hard Drive
- Integrated 64-bit PCI Local Bus Video with 1Mb Video Memory
- 14" Colour SVGA Monitor
- 4 PCI and 3 ISA Expansion Slots (1 shared)
- Mid-Sized Desktop Chassis

Dell Finance 3 year rental: £10.68 per system, per week, excluding delivery and VAT. (P90†)

POWER PLATFORMS

DELL DIMENSION XPS

- Intel 120MHz Pentium Processor
- 8Mb EDO RAM
- 256Kb Secondary Pipeline Burst Cache
- 3.5" Diskette Drive
- 525Mb Hard Drive
- 9FX Vision 330 64-bit PCI Graphic 2Mb Video Memory
- 15" Colour SVGA Monitor
- 4 PCI and 4 ISA Expansion Slots (1 shared)
- Mid-Sized Desktop Chassis

Dell Finance 3 year rental: £14.13 per system, per week, excluding delivery and VAT.

DELL DIMENSION P75†

£899

excl. delivery, handling & VAT

DELL DIMENSION P90†

£999

excl. delivery, handling & VAT

DELL DIMENSION XPS P120†

DELL DIMENSION P100† (P100† with 15" Super VGA Monitor)

£1,199

excl. delivery, handling & VAT



ALL DIMENSION SYSTEMS INCLUDE : MICRO

ENHANCEMENT PACKS

CONNECTIVITY UPGRADES

MULTIMEDIA UPGRADES

Ready installed Internal data/fax

Fast Quad speed multi-session CD

LATITUDE MOBILE PCs

DELL LATITUDE LX 475D

- Intel 75MHz 486 DX4 Processor
- 10.4" Dual Scan STN Colour Display
- 4Mb RAM Upgradeable to 20Mb
- 2 PCMCIA type II slots
- 420Mb Hard Drive
- 19mm trackball mouse
- Local Bus Video with 1Mb Video Memory
- NiMH battery pack with second battery option
- 3.5" removeable Diskette Drive
- Easily upgradeable Hard Drive
- Microsoft Windows 95

Dell Finance 3 year rental: £14.84 per system, per week, excluding delivery and VAT.

DELL LATITUDE XP 475D

- Intel 75MHz 486 DX4 Processor
- 10.4" Dual Scan STN Colour Display
- 8Mb RAM Upgradeable to 40Mb
- 2 PCMCIA type II slots
- 420Mb removeable Hard Drive
- 19mm trackball mouse
- Extra High performance Local Bus Video with 1Mb Video Memory
- Advanced intelligent Lithium Ion battery pack
- 3.5" Diskette Drive
- Microsoft Windows 95
- Advanced Port Replicator options

Dell Finance 3 year rental: £19.16 per system, per week, excluding delivery and VAT.

DELL LATITUDE XPI P75D

- Intel 75MHz Pentium LM Processor
- 10.4" Dual Scan STN Colour Display
- 8Mb RAM Upgradeable to 40Mb
- 2 PCMCIA type II slots
- 420Mb removeable Hard Drive
- 19mm trackball mouse
- Extra High performance Local Bus Video with 1Mb Video Memory
- Advanced Intelligent Lithium Ion battery pack
- 3.5" Diskette Drive
- Microsoft Windows 95
- Advanced Port Replicator options

Dell Finance 3 year rental: £23.48 per system, per week, excluding delivery and VAT.

DELL LATITUDE LX 475D

£1,399

excl. delivery, handling & VAT

DELL LATITUDE XP 475D

£1,899

excl. delivery, handling & VAT

DELL LATITUDE XPI P75D

£2,399

excl. delivery, handling & VAT

Designed for



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EVEN EASIER TO ORDER. **1** YOU MAKE THE CALL TO OUR EXPERIENCED FRIENDLY SALES STAFF. **2** YOU SELECT AND ORDER THE SYSTEM.

RMS READY-TO-RUN READY-TO-RUN READY-TO-RUN

P120c	DELL DIMENSION P75†	DELL DIMENSION P90†	DELL DIMENSION XPS P133c
<ul style="list-style-type: none"> Intel 75MHz Pentium Processor 8Mb EDO RAM 3.5" Diskette Drive 525Mb Hard Drive Integrated 64-bit PCI Local Bus Video with 1Mb Video Memory 15" Colour SVGA Monitor 4 PCI and 3 ISA Expansion Slots (1 Shared) Mid-Sized Desktop Chassis Quad Speed CD-ROM Drive Microsoft® Office 95 <p>Dell Finance 3 year rental: £11.54 per system, per week, excluding delivery and VAT.</p>	<ul style="list-style-type: none"> Intel 90MHz Pentium Processor 8Mb RAM 256Kb Secondary Pipeline Burst Cache 3.5" Diskette Drive 525Mb Hard Drive Integrated 64-bit PCI Local Bus Video with 1Mb Video Memory 15" Colour SVGA Monitor 4 PCI and 3 ISA Expansion Slots (1 Shared) Mid-Sized Desktop Chassis Quad Speed CD-ROM Drive Microsoft Office 95 <p>Dell Finance 3 year rental: £12.40 per system, per week, excluding delivery and VAT. (P90†)</p>	<ul style="list-style-type: none"> Intel 133MHz Pentium Processor 8Mb EDO RAM 256Kb Pipeline Burst Cache 3.5" Diskette Drive 525Mb Hard Drive 9FX Vision 330 64-bit PCI Graphics Card with 1Mb Video Memory 15" Colour SVGA Monitor 4 PCI and 4 ISA Expansion Slots (1 Shared) Mid-Sized Desktop Chassis Quad Speed CD-ROM Drive Microsoft Office 95 <p>Dell Finance 3 year rental: £15.43 per system, per week, excluding delivery and VAT. (P133c)</p>	

£1,399 excl. delivery, handling & VAT	DELL DIMENSION P75†	£1,099 excl. delivery, handling & VAT	DELL DIMENSION P90†	£1,199 excl. delivery, handling & VAT	DELL DIMENSION XPS P133c	£1,549 excl. delivery, handling & VAT
			DELL DIMENSION P100†	£1,299 excl. delivery, handling & VAT	DELL DIMENSION XPS P120c	£1,449 excl. delivery, handling & VAT

SOFT WINDOWS 95 • 102 KEY SPACESAVER KEYBOARD • DELL MOUSE

modem	£95 + VAT	3COM 3C509 network card	£89 + VAT
CD-ROM drive, 16-bit Sound Card and Altec Lansing ACS5 stereo speakers	£189 + VAT	16-Bit Sound Card and Altec Lansing ACS5 stereo speakers	£90 + VAT

DELL LATITUDE XPI P90D

- Intel 90MHz Pentium LM Processor
- 10.4" Dual Scan STN Colour Display
- 8Mb RAM Upgradeable to 40Mb
- 2 PCMCIA type II slots
- 810Mb removable Hard Drive
- 19mm trackball mouse
- Extra High performance Local Bus Video with 1Mb Video Memory
- Advanced Intelligent Lithium Ion battery pack
- 3.5" Diskette Drive
- Microsoft Windows 95
- Advanced Port Replicator options

Dell Finance 3 year rental: £27.80 per system, per week, excluding delivery and VAT.

£2,899
excl. delivery, handling & VAT

LATITUDE ENHANCEMENT PACKS

LX UPGRADES

Road Warrior Communications Pack
PCMCIA V32bis Data/Fax Modem, 4Mb RAM upgrade and attaché carrying case
£349 + VAT

Dell Desktop Conversion Pack
Dell Ultrascan 14XE monitor, notebook monitor stand, keyboard & desktop mouse
£299 + VAT

XP & XPI UPGRADES

Road Warrior Communications Pack
PCMCIA V32bis Data/Fax Modem, spare battery and attaché carrying case
£275 + VAT

DELL DESKTOP READY

Dell UltraScan 15TE monitor, DeskDock, 102-key keyboard and desktop mouse, 10 base T advanced port Replicator and attaché carrying case
£549 + VAT

MOBILE ESSENTIALS PACK

Spare battery and attaché carrying case
£125 + VAT

EXTENDED SERVICE PACKS

Extension to 3 year 'Collect & Return' service
£99 + VAT

Extension to 3 year on-site next business day service
£319 + VAT

marks or registered trademarks of Intel Corporation. Microsoft, Windows and the Windows Logo are registered trademarks of the Microsoft Corporation. Dell Finance 3 year On-Site Service. The prices listed reflect the information available at time of going to press. Prices change frequently. All prices are in pounds sterling. The picture is not intended to be representative of the actual screen image quality. In common with other manufacturers, Dell Computer Corporation Ltd, Milbank House, Western Road, Bracknell, Berkshire, RG12 1RW. The Dimension offers



Pick up on **mighty** Pentium® Processor power.

Just as you'd expect from one of the world's leading computer companies, Dell offers a range of powerful Pentium Processor based PCs. In both desktops and notebooks, Pentium chip performance gives you the power you need to work with greater productivity.

Powerful PCs, tremendous value. You pick up a mighty

Pick up on **outstanding** value for money.

There's no simpler, more cost efficient way to buy one of these advanced computers than by talking to Dell. Because we deal direct we can keep our overheads down, develop a fast, responsive relationship with our customers and continue to supply PCs at very competitive prices. And we do it without sacrificing the inherent high quality of our computers or our award-winning service and support.

Pick up on **better** desktop choice.

Turn over the page to find examples of the Dell Dimension range, a pick of 'Power Platform and Ready-to-Run' PC packages. All come with Microsoft Windows® 95, designed to speed up everyday tasks and make complex ones easier. At Dell, we make it as easy as possible for you to tailor your system to suit your requirements. So we've also included Dell enhancement packs for both desktops and notebooks. And while you pick up on better choice we just pick up the odd quote or two. Here's what the August issue of PC Pro had to say on the XPS P133c: *"the fastest Pentium 133 on test, the Dell (XPS P133c) handled everything thrown at it with ease"*.



Pick up on **increased** mobility.

Have a look at the specifications for the Dell Latitude™ XPs and see how cleverly the best has got better. Or just take a look at what the July issue of PC User had to say on the XPi P90T *"...Wins a gold award." "a superb price/performance ratio." "...Very impressive..."*. And like our Dimension range, Dell Latitudes now come with Microsoft Windows® 95 making mobile computing even easier. The benefits of our long life Lithium Ion batteries also give you the freedom to work, travel and communicate like never before. Add to this bigger, brighter, clearer displays, more storage and, in the case of the XPi, Pentium Processor power and the result is Dell has the pick of the crop.

Pick up on **assured** peace of mind.

It's not only our computing systems that are designed to suit your requirements, our legendary Openline™ Hardware Technical Support is available to all our customers. Our 'Collect and Return Service' is also included for 1 year giving you added peace of mind. In fact, for all your computer needs, no other company can match our commitment to customer satisfaction. Maybe that's why we've grown since 1984 into one of the World's leading personal computer companies. Because we've always made quality service and innovation a priority. Given the choice shouldn't you pick Dell?



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Between 8am and 8pm weekdays, 10am to 4pm Saturdays

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With laser printers now available for as little as £300, there's never been a better time to buy. Gordon Laing explains all you need to know and finds the best in budget and mid-range models.



Cover Photography by Bruce Mackie

Cover Disk or CD-ROM 8

● **Cover Disk**
Phew, check out the Cheesy Invaders! Plus, Future Lock, a security system for Windows, Spell Write, and Smart Checker that audibly reads back spreadsheet cells.

● **PCW Interactive CD-ROM**
Software, music and more. PLUS the final phase of the SuperScape competition.

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by MICHAEL HEWITT

When the unthinkable happens and hard disks go down, the phones start ringing at Adam Associates. Find out how the UK's only business continuity service helps its clients pick up the pieces.

OCR Software 9 2

by PAUL BEGG

Often shrouded in mystery, OCR software is getting better and cheaper all the time. We explain all and look at the best ways of getting your words into Windows.

Powersurge PowerMacs 1 1 2

by CLIFF JOSEPH

Hot on the heels of Apple's high-end 9500 are three new mainstream PCI-based PowerMacs. Do the 7200, 7500 and 8500 PowerSurge models have what it takes to compete with Pentium PCs?

Remote Access 1 2 4

by NIGEL WHITFIELD

As more and more people need to work away from the office, Remote Access software has become increasingly interesting. We look at the latest products attempting to gain control.

Group Tests

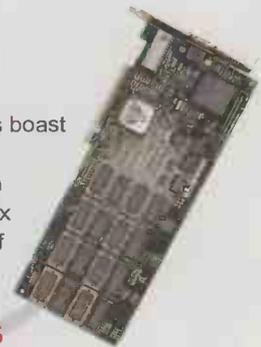
194 Databases

● No longer dogged by crude interfaces and meaningless jargon, databases have become friendlier, easier to use and more powerful than ever before. Eleanor Turton-Hill puts the record straight and finds out what the top Windows packages have in store.



118 Video Graphics Cards

● The latest PC graphics cards boast hardware video acceleration, scaling, and MPEG playback in software. Chris Cain looks at six of the best to find one worthy of an Editor's Choice.



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● Eleven leading lasers on test.

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Christian groups are discovering that the Internet is a cheap and efficient way to get their message across.	
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A superb combination of speed, power and ease of use: Borland's Delphi is rapidly becoming the way to program in Windows. Follow our tutorial to become top of the class.	
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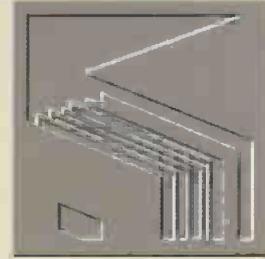
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*Kids' Stuff:
Spiderman*



*Screenplay:
Star Trek —
The Final Unity*



MICROSOFT
WINDOWS
COMPATIBLE

CD-ROMs: Wine Guide

WINE
Your Essential Multi...



PCW Cover Disk

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

Installing and running the PCW Cover Disk

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

Future Lock

Future Software Developments

[Minimum requirements: Windows 3.1]

A powerful security system designed for all Windows users and currently in use by businesses and the educational sector. Note that this program will precede your usual Windows shell program (normally PROGMAN.EXE) with a password input

screen. If the correct password isn't entered, what can be done within Windows is highly restricted. Remember that the default password is LETMEIN.

Spell Write

Future Software Developments

[Minimum requirements: Windows 3.1]

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

Bubble Help

Future Software Developments

[Minimum requirements: Windows 3.1]

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

Shareware

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

because Bubble Help is always there with information and advice.

Smart Checker

Oakley Software

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

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

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

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

Important Details

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

You should note, however, that if your problem is not due to a faulty disk, and a phone number is shown for the publisher of the program in question, then it will probably be quicker for you to call them first as they will be able to provide direct assistance on their own programs faster than might otherwise be possible. Alternatively, ring our hotline on week days between 10.30 a.m. and 4.30 p.m. on 0891 715929. Calls are charged at 39p per minute cheap rate and 49p at all other times.

PCW Interactive CD-ROM

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

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

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

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PCW INTERACTIVE: NOVEMBER 1995 Entire Contents List

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

BIBLOS: 15 Complete Shakespeare plays and a versatile reader program

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

COVER DISK
The contents of this month's floppy disk, including Future Lock, Spell Write, Bubble Help and Smart Checker

DEMOS
A Christmas Story — A child's tale for Christmas
Apollo 13 — Learn about the near disaster in space
The Fish who could Wish — Another superb child's story
NYACK — Follow Nyack in this demo of the first ever CD-Plus release
Kiyeko — Our last, but certainly not least, offering for children this month.

FROM THE MAGAZINE
Multimedia Hands On — The Rosetta Stone
PCW Back Issues index
Tutor — Freespace and Hello programs
Visual Basic Tips and Tricks — Superb ideas for programmers

MOVIES
COOL — A cartoon and... Bill Gates!
The Making of Phantasmagoria — Digital documentary

MSCDEX
Latest Microsoft CD-Rom Extensions (Not for use with Windows 95)

QUICKTIME
Version 2.00 of Apple's QuickTime for Windows runtime

SELL BUY LINES
Electronic classified advertising

SHAREWARE
Cheesy — Superb arcade action game
Chess — Challenge your PC at Chess
Maxtris — Like Tetris? Well... more hexagonal, really.
Othello — That's right, a board game with three "l"s in its name...

Paint Shop Pro — Possibly the best Shareware graphic editing package: ideal for loading in all the clipart images

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

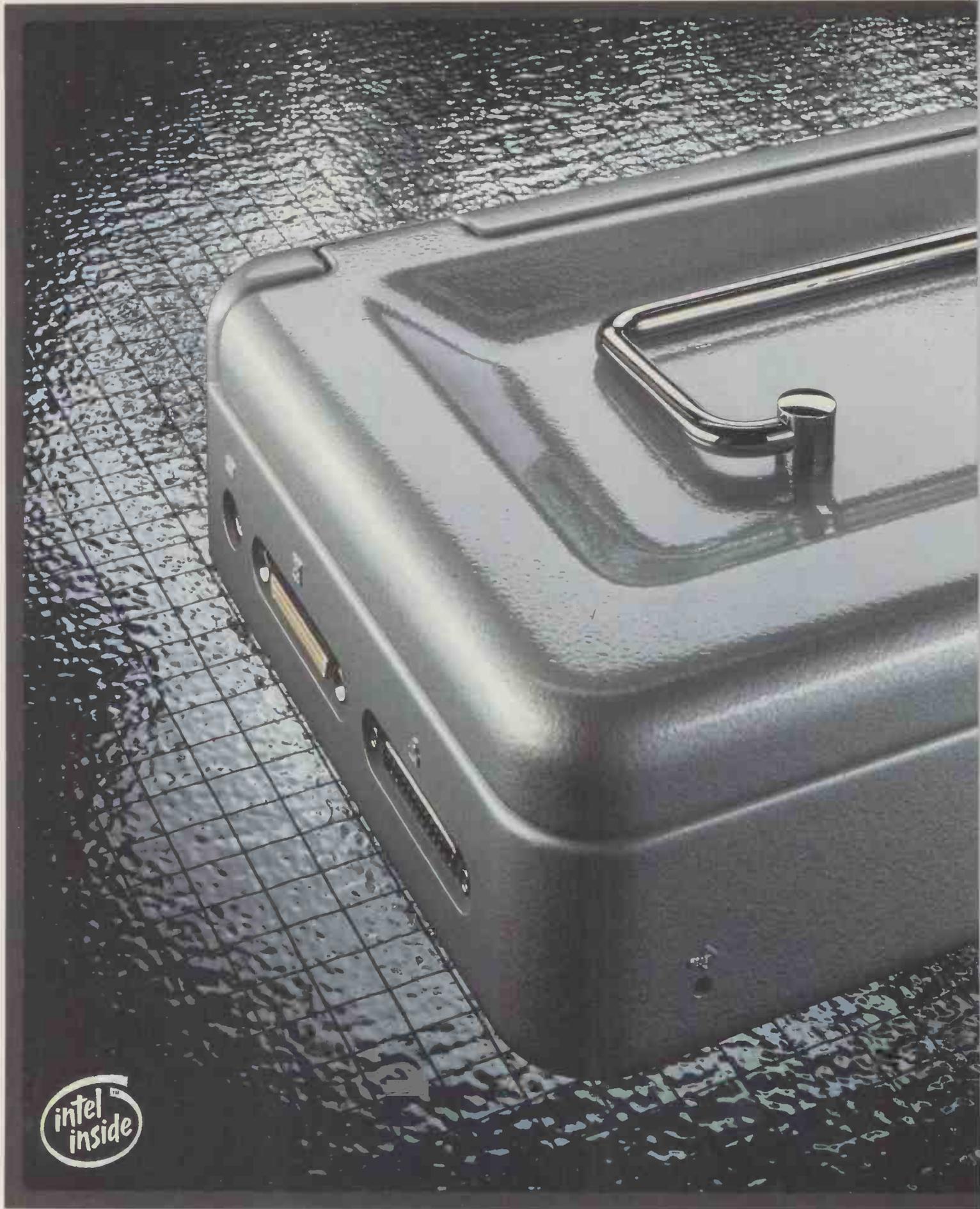
SUPERSCAPE
The final two worlds from this impressive three part series

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

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

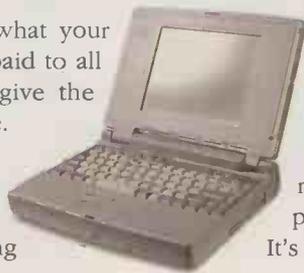
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CUT OUT THIS LABEL AND KEEP WITH YOUR CD-ROM



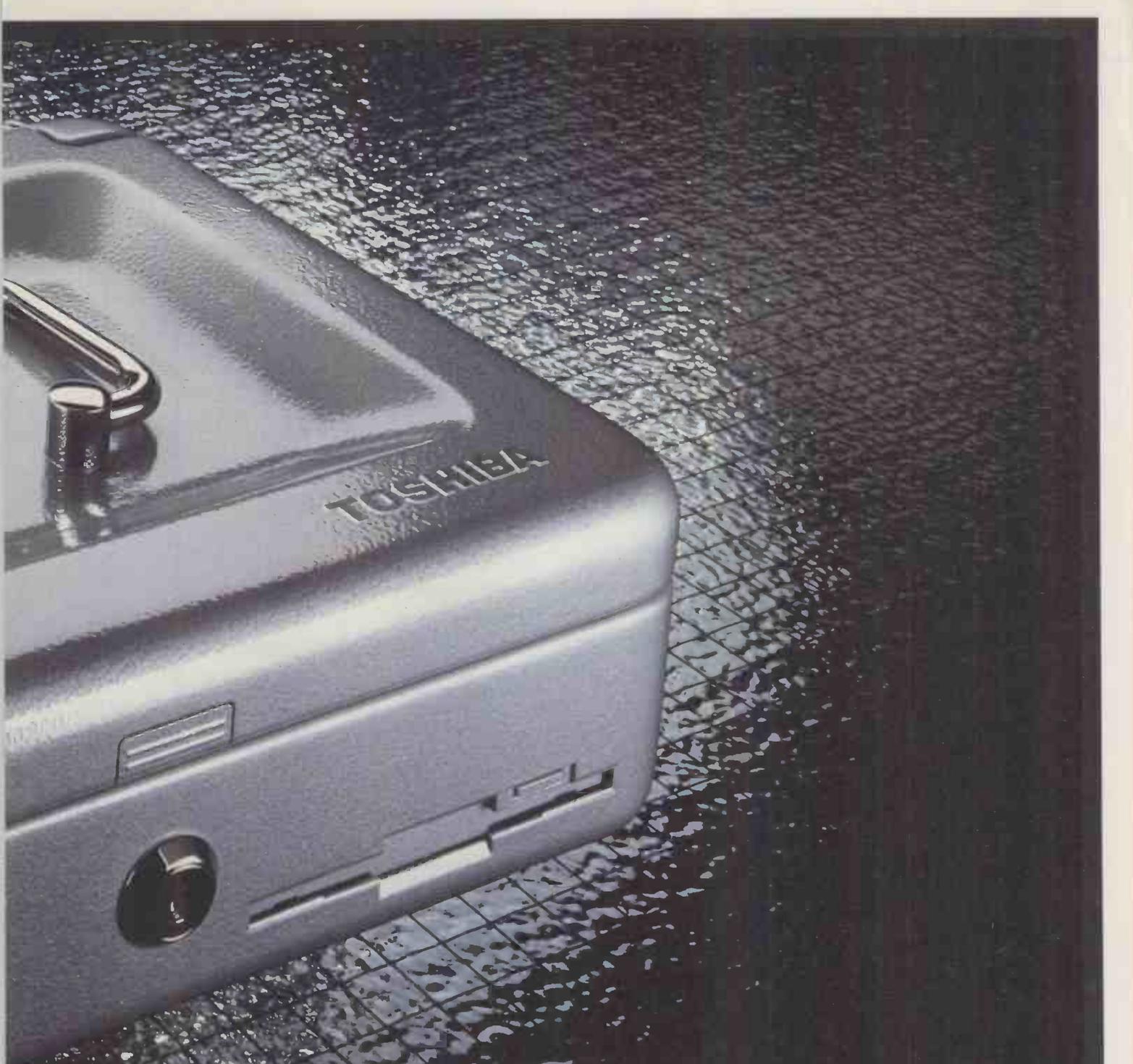
In the past you only got out of a portable what your pocket put into it. The new T2100 series has put paid to all that. Starting at under a £1000 these portables give the performance you'd expect from ones twice the price.

In fact, the T2100 series is stacked up with features that just a few months ago you'd only find in top of the range models. That's because we always give you change, constantly updating



specification, design and technology. The only thing that doesn't change is Toshiba's award winning attention to build quality ensuring you get a portable you can bank on.

To raise interest still further, our entry level range of portables provide full connectivity, with a port replicator and two PCMCIA slots. It's also the first time that a quality entry level portable



**THE ONLY THING PETTY ABOUT
THE NEW TOSHIBA IS THE PRICE.**

has had a 10.4" screen, and that's big. Screens are available as mono or colour, STN and TFT, so you can put your money on one that's right for you.

In addition all machines have a fast DX4 processor with a built-in numeric coprocessor as standard, to help you count the savings you'll be making.

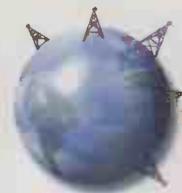
If you'd like more information on the world leader in portables call 01932 828 828. When it comes to quality and

truly portable computing on a budget there's only one name that counts, Toshiba. Anything else just doesn't compute.

In Touch with Tomorrow
TOSHIBA

Toshiba Response, Dept., PCD Marketing, Freepost, KT4625, Addlestone, Surrey KT152BR.

Personal Computer World



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

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

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

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

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

- Windows 95 backlash, see: News Analysis p34
- Barry Fox p42
- Nick Beard p43
- Letters p44



Ben Tisdall
Editor

Next Month Accountancy software

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

Printer-cum-Fax-cum-Scanner

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

Back-up devices



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

Six-speed CD-ROMs

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

December issue

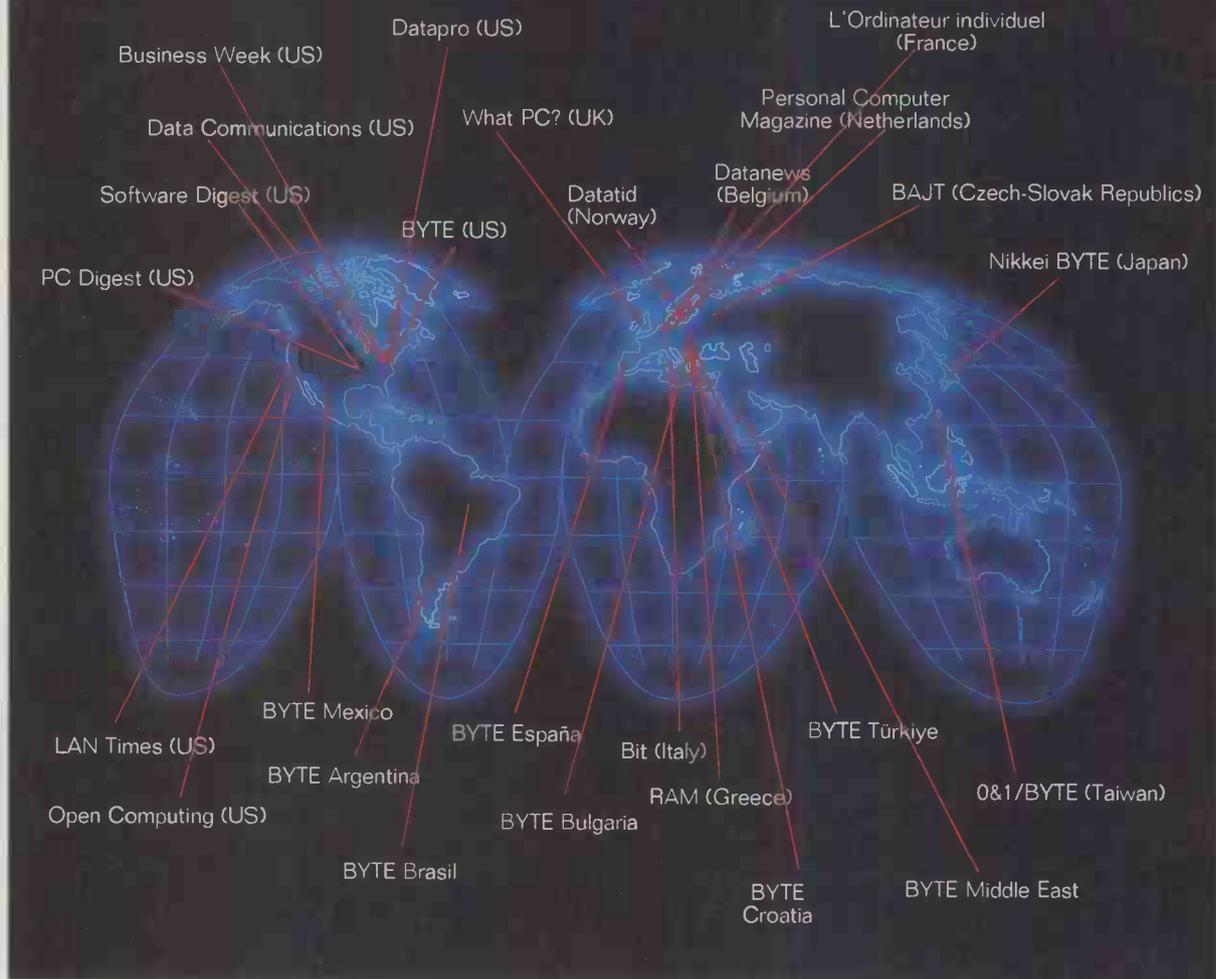
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Pentium Processor	75	90	100	120
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SCSI 1.04GB	£1501	£1577	£1622	£1717
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Pentium Processor	75	90	100	120
525MB	£1366	£1442	£1487	£1582
850MB	£1390	£1466	£1511	£1606
1GB	£1417	£1493	£1538	£1633
1.6GB	£1537	£1613	£1658	£1753
SCSI 1.04GB	£1772	£1848	£1893	£1988
SCSI 2.10GB	£2046	£2122	£2167	£2262

All SCSI models use the Adaptec AHA-2940 Controller that uses an extra PCI Slot. 4 GB & 9GB SCSI Hard Disk drives are available

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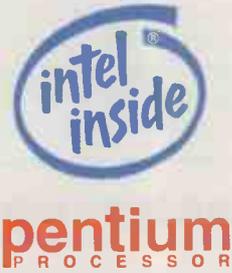


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dan Ultimate PC RECOMMENDED

"Recognising the value of a fully-configured system designed with the power user in mind, we can recommend the dan ultimate PC (£3,338). As well as a 100MHz Pentium and 1GB hard disk, you also get a quad-speed CD-ROM, SoundBlaster AWE32, network interface card, data/fax modem & DAT drive. This excellent mix of components earned it the highest feature score in this review, and should largely remove the need for disruptive upgrades." *PC Magazine (dan Ultimate100), June '95*

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

Epson 01442 61144

Windows 3.11 beats Win95 unless you are RAM-rich

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

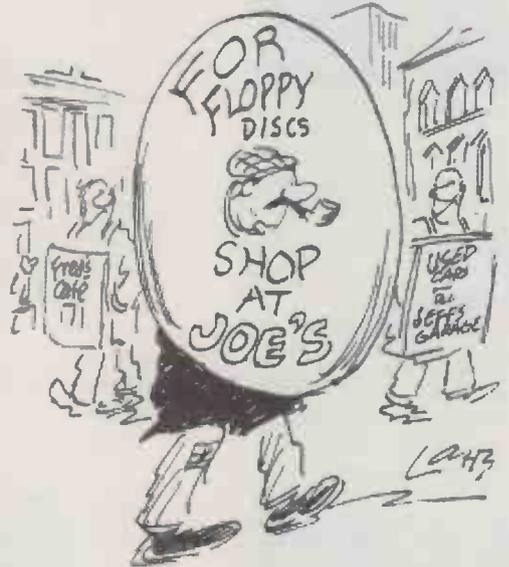
The latest 16-bit versions of Windows applications from Microsoft and WordPerfect, and the database FoxPro for Windows, actually ran 11.5 percent faster under Windows 3.11 (admittedly the faster Workgroups version) than under Win95 on a 100MHz DX4 Compaq Prolinea with 8Mb of RAM. The Win95 slowdown is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

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

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

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

The tests, involving a set of routine tasks, could be done meaningfully only with final releases because beta versions contain debugging and unoptimised code. The picture is very much more complicated than the bare figures suggest: the new Word and Excel, not to mention Win95, do more



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

than their predecessors and cannot be judged on performance alone. But the fact remains that an average user, with 16-bit apps and 4Mb of RAM, would need to spend more than £400 on RAM and apps to gain much speed under Win95 – even when using only one app at a time. Microsoft originally designed Win95 to run on 4Mb; later it said 8Mb was preferable.

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

Clive Akass

Microsoft 01734 274001

Exchange closes UK stocks service

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

The stated reason was an alleged "breach of confidentiality" by Electronic Share Information which was providing a real-time listing of the

changing prices of 4,461 UK stocks. But the London exchange was believed to be concerned about Net security.

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

Win95 Prankster highlights peril of boobytrapped email

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

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

The news broke as last month's *Newsprint* was on the

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

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

The final macro in the chain, labelled Payload, contains only the REM statement "That's enough to prove my point" –

indicating the motive of the writer. But the line can be easily edited to do something worse, like wiping a hard disk. Microsoft dubbed it the Prank macro; virus hunter Alan Solomon, who issued a fix for users of his toolkit, called it more aptly the Concept virus.

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

● *Are you infected? See page 22.*

Clive Akass

Short Stories



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

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

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

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

POW! 01202 716726

Fauve bought

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

CD format talks

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

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

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

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

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

Both companies have also



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

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

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

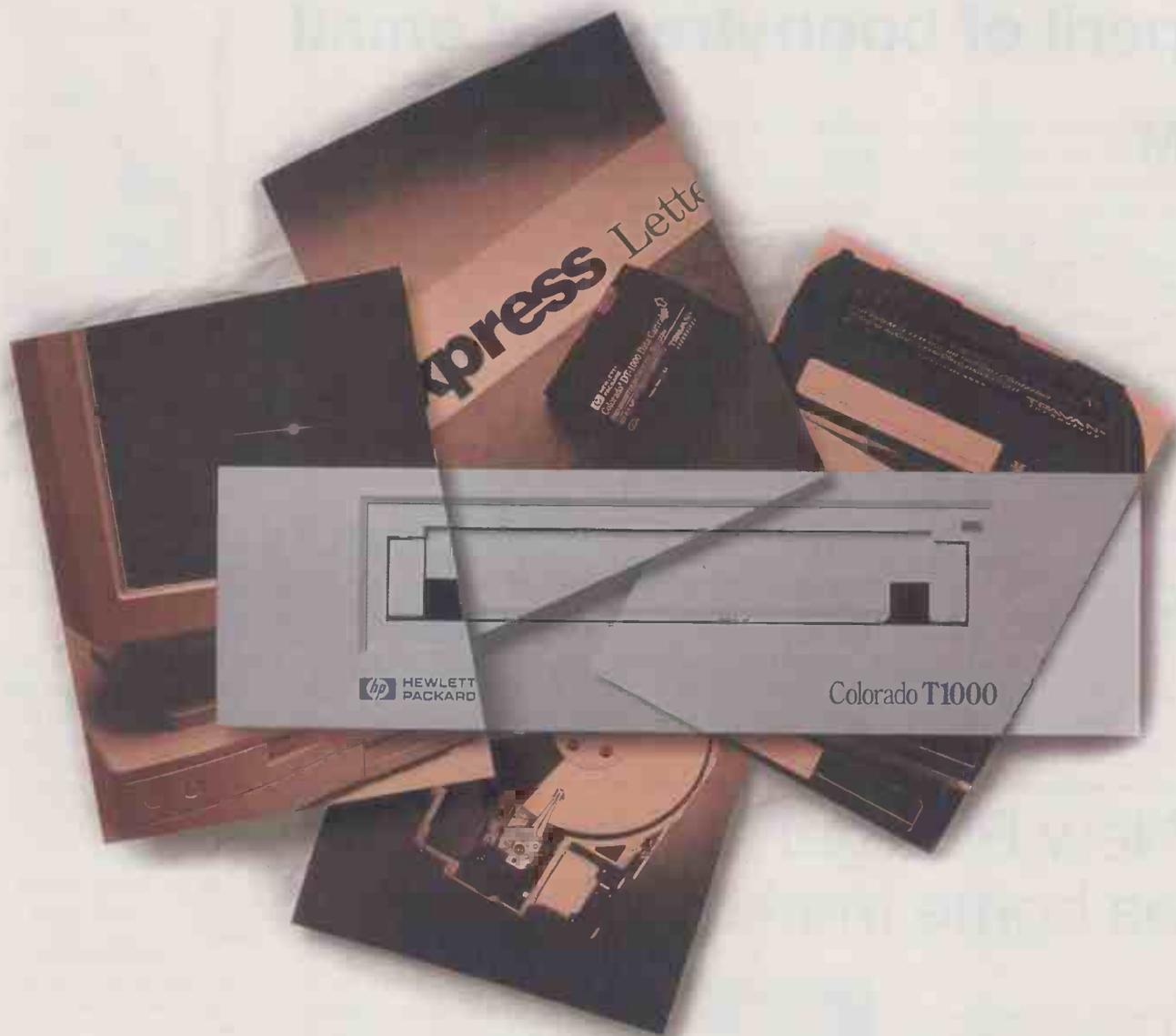
Prices start at £1249, for the Presario 7106.

● *News analysis, page 32.*

Compaq 0181 332 3000

Packard Bell 01753 831914

It's new. It's more than tape backup.



The easiest, most reliable way to protect and manage your PC's most valuable component... Your Data.

Protecting critical files is important, but it's not the only reason for buying a tape system. Use it to free up disk space, archive old records or move large files from home to the office. Once you



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Using the new high capacity Travan™ Technology cartridges and Colorado Backup for Windows™ one-button automated software, the T1000 is the perfect match for your data.



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HP Colorado T1000

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Net link could revive CD-i

Philips could see its billion-dollar investment in Compact-Disc Interactive (CD-i) players pay off following the release of a program providing Internet connectivity. Only a million units are in use after

five years on the market, because of competition from PCs, and Nintendo, Sega, 3DO, and Sony games machines (though CD-i can be used for more than games).

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

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

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

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

New Pentium upgrade chip



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

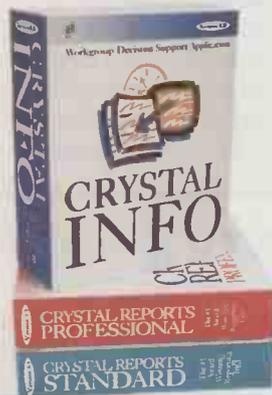
The chips can be used in machines with type 2 or 3 sockets; there's a faxback guide of suitable models at 01793 432509.

Intel 01793 431155

Seagate goes soft on storage

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

All the products being sold by the new Seagate Software have been acquired through the purchase of the developer companies, and cover the needs of



both small users and large companies.

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

Seagate Software +33 1 47 86 10 00

Olivetti takes M6 corporate route

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

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

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

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

Olivetti 0181 785 6666

Nick Lawrence

Short Stories

Elonex suspends Scotland line

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

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

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

Electronic recycling

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

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

ICER 0171 729 4766

Irish plea

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

Cheap TV

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

Silica 0181 309 1111

Lumina landing

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

Westwood Distribution 01753 887161

Short Stories



Tim
Bajarin
in the US

Rich rewards of Netscape 2

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

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

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

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

Beast of a fighting game

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

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

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

FAST action on fears of Win95 crimewave

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

He said: "It would be wrong

Hitchhiker's guide to sour grapes...

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

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

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

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

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

Webster said it was not clear whether the greatest threat would be from professional counterfeiters or individuals. But FAST estimates three out of



Suitable case for treatment

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

four PC users use software pirated from friends or the office.

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

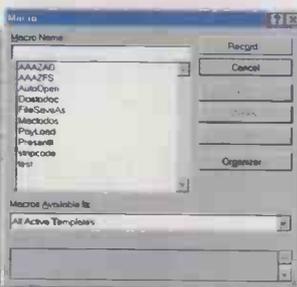
Joanne Evans

Prank virus is not your only worry

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

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

Self-replication might actually draw attention to a rogue emailed macro; malicious or



criminal users might get it to do precisely the opposite — wipe itself out, after performing some task. An obvious use would be industrial espionage. You could send out self-destruct macros that email you documents from

a rival's hard disk or even a network.

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

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

Clive Akass

Sales 'bigger than expected'

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

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

"Many of the press stories about long waits were coming from the US," said Stuart Andersen, support marketing

manager in the UK. He said about half the support-line callers simply needed handholding through the installation process.

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

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

"I called the support line and they told me that there is no fix unless you upgrade to Office 95. I don't have any reason to

upgrade and it costs more than the operating system," he said.

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

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

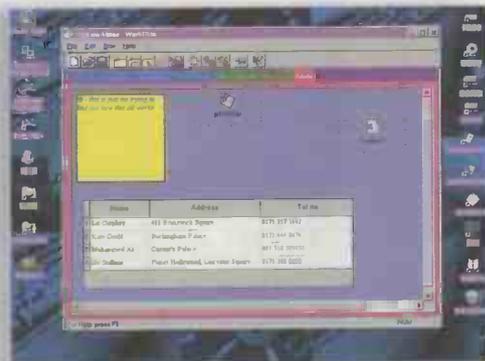
A spokesman for Software Warehouse said that shop sales were up but mail orders were about as expected. Win95 also seemed to have boosted the sales of other software, although this may have been because buyers had been waiting for its release.

Maverick suite goes to pieces

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

Adele Dyer

AlphaBlox 01628 777475



Gates makes biggest ever sales pitch

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

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

Even allowing for hyperbole, and discounts for volume

purchases, that amounts to business worth hundreds of millions of pounds including sales and upgrades of Microsoft Office.

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

Gates diverted little from the party line on the benefits of Windows 95, Windows NT and

Microsoft Office, except to say that comms will drive the next big changes in computing.

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

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

Short Stories



Softkey in mega CD launch

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

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

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

Softkey 0181 798 2000

Netware link

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

It includes the Netware application launcher.

Novell 01344 724000

Law guide

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

Gea Publishing 0171 538 5386

Mac reader

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

Xerox 01734 668421

Short Stories

P6 power for supercomputer

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

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

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



Cryptic solution

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

Amber Logic 01274 585483

Hayes gets more time to raise cash

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

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

Hayes 01252 775500

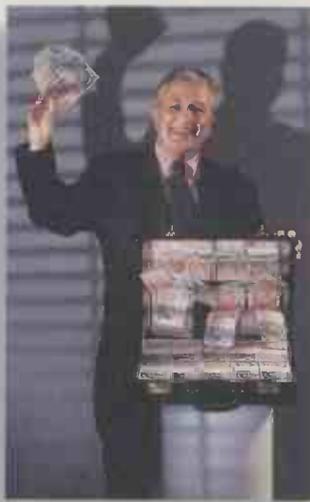
Hewlett-Packard hits back at Murphy's lore on laser 'rip-off'

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

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

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

"The reason these costs are so high is that one or two well-known printer companies make more money selling consumables than they do



printers," he said. The drum on Kyocera printers, though it is more expensive, is designed to last the lifetime of the printer, so that users need only replace the toner.

But Murphy's claims were dismissed by Hewlett-Packard corporate program manager

Peter Urey, who said the all-in-one cartridge was the best way of delivering toner, which is filthy stuff for people to touch.

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

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

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

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

Kyocera 01734 311500

Hewlett-Packard 01344 360000

Lotus goes half way on 32-bit applications for SmartSuite

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

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

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

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

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

shelf and 32-bit versions of 1-2-3 and Organiser in the hands of key evaluators.

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

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

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

Fonts for the visit...

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

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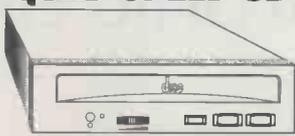
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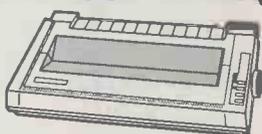
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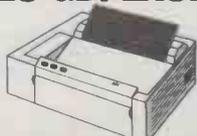
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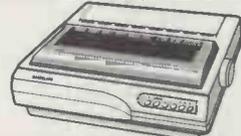
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Short Stories

Online u-turn
by US banks

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

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

The change of mind has been prompted by moves onto the World Wide Web by the Bank of America, Wells Fargo, and Microsoft, and by the latter's attempted purchase of the finance software specialist Intuit. • NatWest has started an experimental online service on Online Media's interactive TV trial at Cambridge.

Forrester 001 617 497 7090 (US)



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

Premier Developments 01487 823684

World radio
on the Net

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

Email scanner

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

Integralis 01734 306060

Battle over UK research
into electronic snooper

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

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

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

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

ties in fighting terrorism and crime."

Fred Piper, Professor of Maths at Holloway and one of the UK's leading cryptographers, revealed the existence of the programme on Channel 4's Equinox. He was quoted as saying: "The project is being used as an excuse to try to develop the British key escrow system and they've been looking for ways

to get a people like me involved without making it obvious."

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

Joanne Evans

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

Also on the pages is a virtual exhibition on Flemish mathematics in the 16th century.

The site is at <http://www.ox.ac.uk/departments/hooke/>



The man who started it all

Tape companies fight back as CD
writers drop in price

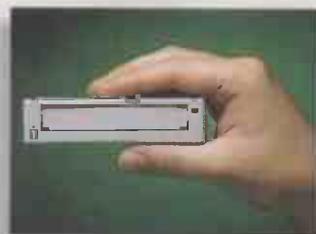
Hewlett-Packard has come up with a read-write CD drive for just £800 — half the price of many rival models.

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

The price is still not low enough to threaten devices like Syquest's EZ 135 drive and Iomega's Zip which take cheap removable disks of 100Mb or more. It is also more than twice the price of Iomega's promised Jaz drive which will take 1Gb

removable disks. Plasmon's twin drive, which will read CDs and write to magneto-optical disks of similar capacity, is selling for less than £600.

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



ordinary disk drive. One aim is to encourage the use of Travan tapes and transporting multi-media files.

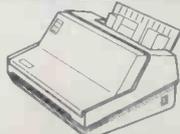
Several manufacturers offer QIC80-compatible drives like Iomega's Ditto 800, for about £150, that take £25 Travan mini-cartridges storing uncompressed 400Mb.

3M 01344 858000; HP 01344 360000

SURPLUS COMPUTER STOCKS

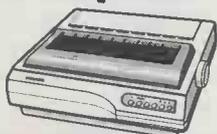
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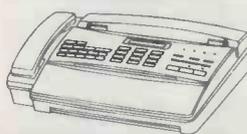
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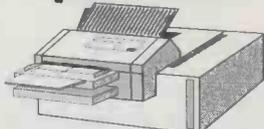
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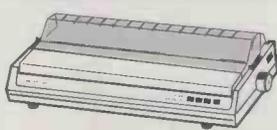
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IBM 486SX 25



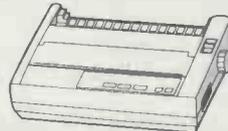
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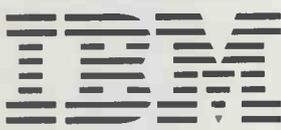
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Apple keeps its Windows 95 cool

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

It will also spend \$100 million on advertising.

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

Production is being boosted to feed a 30 percent sales growth up to Christmas. Eilers said the home market is wide open and Apple is actually gaining ground in it — though he admits Wintel PCs

dominate. He was remarkably open about the Win95 launch, and was clearly concerned about it.

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

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

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

Short Stories



Tiny guide

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

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

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

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

Primax 10235 559922

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

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

Invasion of the US clones

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

First in the Power

Computing range is the Power 100, a desktop machine with a 100MHz PowerPC601 processor and NuBus expansion slots. With 8Mb of RAM and a 365Mb disk, it sells for £1299. A



machine with an additional CD-ROM costs £1499, and £1799 with a 1Gb drive. The machine is directly aimed at Apple's PowerMac 8100/100 8/700, which often sells for over

£2000. But the new 7500/100 8500/CD retails for £1749 and includes the new PCI expansion architecture.

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

percent, according to tests by the independent Competitive Assessment Services.

Chris Cain

Computer Warehouse

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Top 10 Windows and DOS				Top 20 Windows							
Product	Manufacturer	Last month	Product	Manufacturer	Last month	Product	Manufacturer	Last month			
1	Windows 95 U/G	Microsoft	-	1	Windows 95 U/G	Microsoft	-	1	Windows 95 U/G	Microsoft	-
2	MS Plus	Microsoft	-	2	Plus	Microsoft	-	2	Plus	Microsoft	-
3	First Aid for Windows	RMG	1	3	First Aid for Windows	RMG	1	3	First Aid for Windows	RMG	1
4	Office 4.2 U/G	Microsoft	2	4	Office 4.2 U/G	Microsoft	2	4	Office 4.2 U/G	Microsoft	2
5	RAM Doubler	Computers Unlimited	-	5	RAM Doubler	Computers Unlimited	-	5	RAM Doubler	Computers Unlimited	-
6	Autoroute Express	Microsoft	-	6	Autoroute Express	Microsoft	-	6	Autoroute Express	Microsoft	-
7	Sidekick for Windows v2	RMG	3	7	Sidekick for Windows v2	RMG	3	7	Sidekick for Windows v2	RMG	3
8	Business Plan 2	RMG	4	8	Business Plan 2	RMG	-	8	Business Plan 2	RMG	-
9	Truespace V1	RMG	-	9	Truespace v1	RMG	12	9	Truespace v1	RMG	12
10	Office 95 V7 U/G	Microsoft	-	10	Office 95 v7 U/G	Microsoft	-	10	Office 95 v7 U/G	Microsoft	-
Top 10 DOS				11	Uninstaller v3.0	Microhelp	5	11	Uninstaller v3.0	Microhelp	5
1	PCDOS Version 7	IBM	1	12	Smartsulte	Lotus	8	12	Smartsulte	Lotus	8
2	QEMM v7.5	Quarterdeck	2	13	Office Pro U/G	Microsoft	10	13	Office Pro U/G	Microsoft	10
3	Flight Simulator v5.1	Microsoft	2	14	Cleansweep	Quarterdeck	7	14	Cleansweep	Quarterdeck	7
4	Turbo C++ v3.0	Borland	8	15	Dr Solomon's Antivirus Quarterly	S&S	13	15	Dr Solomon's Antivirus Quarterly	S&S	13
5	DOS 6.22 U/G	Microsoft	5	16	Quickbooks v3	Intuit	9	16	Quickbooks v3	Intuit	9
6	Dr Solomons Antivirus Quarterly	S&S	-	17	Family Tree Maker	RMG	-	17	Family Tree Maker	RMG	-
7	Solo Payroll	Pegasus	4	18	Softkey	Wordstar v2	-	18	Softkey	Wordstar v2	-
8	Gardeners World	Europress	6	19	Norton Utilities 95 Trade Up	Symantec	-	19	Norton Utilities 95 Trade Up	Symantec	-
9	Checkit Pro	S&S	-	20	Multimedia Bible	Comptons	-	20	Multimedia Bible	Comptons	-
10	Bailey's Book House	Iona	-	Figures, supplied by Software Warehouse, relate to bestsellers for August, 1995.							

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The CD shapes up

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

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

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

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

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

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

the standard video tape recorder altogether.

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

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

After eating a lot of humble pie, executives from both groups have taken the advice and started talking about merging the two standards. This is good news. There are a lot of issues involved, such as how the royalties would be shared and which technology from each camp must be in any combined standard. However, people in

both camps see the need for a single standard and are under great pressure from the PC, movie, consumer electronics and games industries to come up with one. All are keeping their fingers crossed.

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



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

Chip off the old block

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

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

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

ANALYSIS

The PC goes home

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

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

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

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

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



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

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

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

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

home furniture.

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

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

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

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

Home truths

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

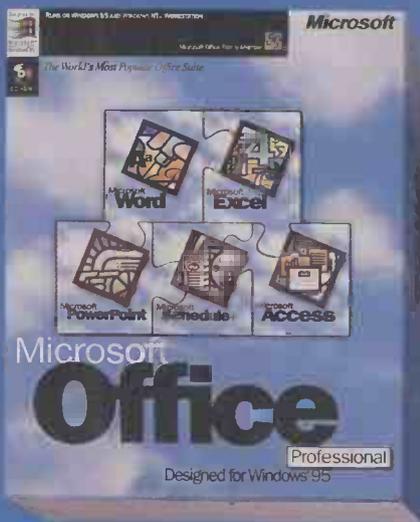
Compaq's David Clark highlighted these percentages indicating some curious differences between nationalities. Nearly seven in ten of the efficient Germans put their PCs into a home office; nearly one in four Americans have machines in the living room. Clark asked: "Thirty percent of people in this country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

ANALYSIS

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Where do you mainly use your PC? Home Work Both No. of PCs on site: 1-9 10-19
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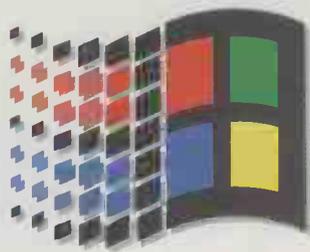
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Now is the autumn of our discontent

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



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

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

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

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

bought the software the week it was released.

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

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

Like many early adopters, Wynn-Jones is thinking twice about continuing to use Windows 95 — at least until glitches are sorted out. Analysts say that those glitches will severely delay Windows 95 purchases until next year. Forrester Research predicts that by the

end of 1995 Microsoft will sell close to 12 million copies of Windows 95. That seems like a large number, but represents only one in six PCs actually capable of running the operating system. By the end of 1996, according to the analysts, sales will top 35 million. But that still leaves 89 million Windows 95-ready PCs running without the operating system's alleged benefits.

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

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

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

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

Gripes of wrath

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

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

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

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

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

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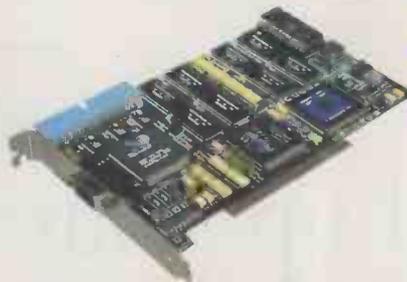


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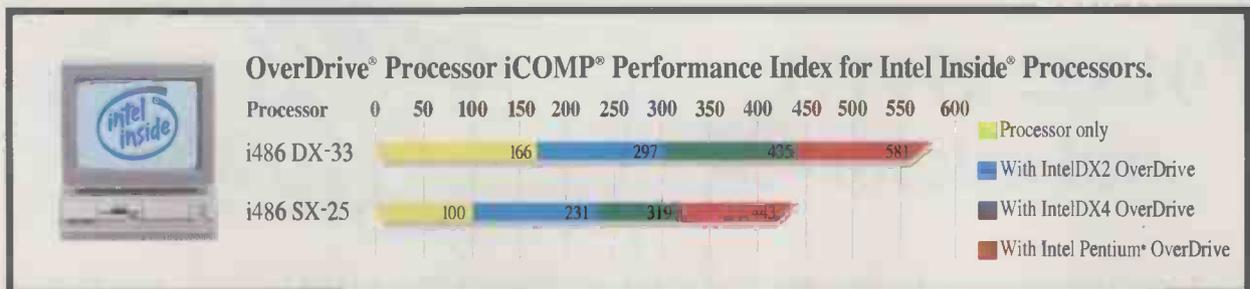
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Michael Hewitt

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

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

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

But at the 1995 barbie, for a change, there was an overwhelming preponderance of what I'd term "normal" people. By this, I mean the sort that advertisers can rely on to

Sounding off

genuinely *not* be able to tell the difference between margarine and butter, and who think Maltesers are low-calorie. Traditional nuclear families with 2.4 children, in other words. Whether this reflects a demographic shift in the Cyberspace population as an increasing number of non-techies fall for the Internet con, or whether these types have been in the majority all along and no-one's noticed, I'm not really qualified to say. Whatever, their presence was quite refreshing.

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

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

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

Another curious thing is that online feuds tend to be forgotten, or at least temporarily overlooked, when the online feuders meet in the flesh. When connected to the Net, you can call a

person all the names under the sun, question the legitimacy of his parent's marriage, and even suggest that he uses WordStar. But none of this matters on the day. In this respect, CIX meets seem to fulfil the same function as those inter-trench Hun vs Tommies football matches during the First World War.

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

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

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

PCW

Homefront



Tim Nott

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

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

The upshot is, what with replacements for bits that fell apart and bits that just couldn't cut the mustard anymore, it's now on its third hard disk, fourth motherboard, third keyboard, second CD-ROM drive and sound card, second modem, fourth display card, third I/O card, second case, second monitor and fourth mouse. Oh, and somewhere along the line, rather a lot more memory. It's still a fine PC though, adequate for what I want, and I've built another machine for my children with all the left-over bits. Well, when I say adequate,

perhaps that 486 DX2/50 is a trifle underpowered. And I could definitely do with a bigger hard disk — who couldn't? And a graphics card with fast, stable Windows 95 drivers...

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

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

Unfortunately, the upgrade path doesn't stop there. And this time, I'm not talking about hardware — in general a machine that runs Windows 3.1 well will also run Windows 95 well. No, it's the knock-on effect of the software that's going to cost. You want long filenames and enhanced Open/Save dialogue boxes in Microsoft Office? The cheapest upgrade to Office 95 I've seen is £149 plus VAT. You want the full 32-bit glory of CorelDraw 6?

Sorry, I don't have the UK pricing, but the US price is \$249 from version 5, \$425 from earlier versions. And so it goes. But it's not just the main-course upgrades that are going to lighten the wallet. What about all those add-ons you've spent the last few years amassing? Windows 3.1 versions of alternative front-ends such as Norton Desktop or Dashboard don't really make the transition, do they? Time to upgrade.

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

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



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Barry Fox

Straight Talking

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

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

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

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

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

Lees brushed aside my reminder of what PCW had already warned — the PC needs 8Mb, ideally 16Mb, along

with a hard disk with at least 250Mb capacity, a ROM drive for loading, and "plug-and-play" BIOS. For many SoHo users, it will be far easier to replace a PC than try to upgrade it. No wonder hardware companies like Windows 95 so much.

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

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

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

A couple of days before the event, Microsoft's PR company, Text 100, was trying to uninvite some journalists

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

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

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

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

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

PCW

Business Matters



Nick Beard

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

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

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

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

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

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

This month's scribbles were eventually penned in Word 95.

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

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

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

PCW

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Letters

September editorial

With reference to your editorial I have to question your comment re Microsoft:

"...this insistence suggests an unhealthy compulsion to grab as big a share of the online market..."

I question this because of

MSN's pricing structure outside the US. Surely, if grabbing was their intention then markets outside the US would not be charged the rates proposed. In the UK, for example, twice the US rate at £3.25 per hour with one less free hour. I, like many other pre-

Focus on Windows 95



Not so fast

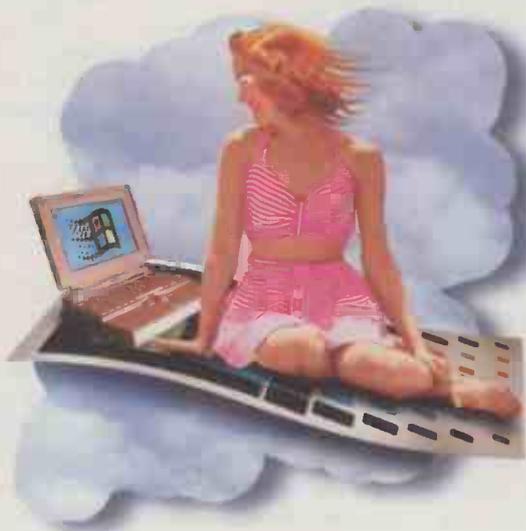
While I can understand the hype surrounding the release of Windows 95, I really must protest the claim that it can be used in 8Mb RAM. Admittedly, Windows 95 is technically better than Windows 3.11 in many respects, and I can even admit to liking certain aspects of the new user interface, but I cannot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

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

If more than two applications are opened, swapping between them requires yet more hard

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

While reading your September issue, I wondered if we were in fact thinking of the same product (build 490)? In 36 pages there was not one mention of the fact that users without huge amounts of RAM will be sorely disappointed. I can't be the only



person in the world to have noticed this, can I? Just to prove the point, I fired up my old DOS 6.22/Windows 3.11 setup the other day and found it fast and responsive (two words I never thought I would apply to

Windows) by comparison.

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

Marc Evans

Marc@leviathn.demon.co.uk.

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

Unbiased opinion

I took a deep breath before reading the article comparing Windows 95 with OS/2-Warp ("Windows in the land of OS", PCW September). In a magazine renowned for its IBM

bashing the article was a return to the old days of objective reporting in all things Microsoft, so it wasn't necessary to brace myself after all.

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

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

**Norman Walsh
100427.3130@compuserve.com**

Must try harder

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

The Win95 interface is a disappointment: it copies slavishly from the Mac and yet doesn't become as friendly. The legacies are still there — the File Manager, the glorified "Explorer", the filename extensions,

Win95 release users of MSN, have been left in disgust at these charges.

I trust your magazine will bring this disparity to the attention of its readers to help prevent Win95 users being sucked into paying such high rates, and that you can assert your influence to try and have Microsoft rethink their pricing, or at least explain their actions. Is MSN too unstable to go online worldwide yet?

Are these prices aimed at limiting the number of users until it is stable? Or are they just being greedy?

Eddie
eddie@strat.thegap.com
Bangor, Northern Ireland

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

Save As dialogues... And its graphic design is tacky.

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

Alexi X. Cawson
info@simi.co.uk

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

Quick quip

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

Peter Martin
00255.3101@compuserve.com

Waste of space

Although the main units of measurement in computing are the

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

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

Alan C Bonnici
Malta

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



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

A similar equivalent

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

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

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

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

Surely the retailer has a responsibility to make the differences crystal clear to cus-

tomers who may otherwise not be aware of them.

Christopher G Beeson
cbeeson@cix.compulink.co.uk
Ribbleton, Lancs

Online registration

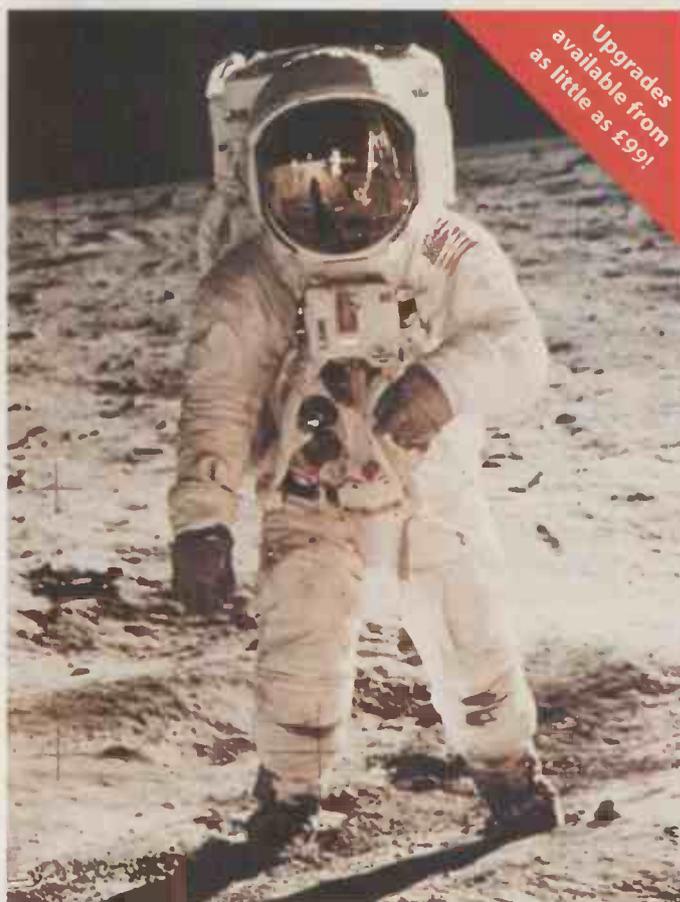
In this computer-driven world that tells us we must have a modem for all sorts of reasons, as well as for using the huge all-singing, all-dancing, Internet; sending mail... doing this... doing that... It makes you wonder whether it has any weaknesses?

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

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

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

It's just a 'small step' from drawing board to CAD — with AutoCAD LT.



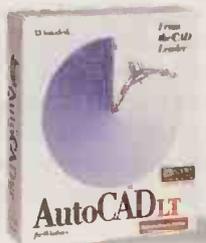
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money to good use? Our lives could be made much easier if organisations could utilise the PC more.

Al Smiles
100522.3501@
compuserve.com

The true meaning

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

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

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

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

Gabriel Egan
g.j.egan@bham.ac.uk

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

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

Atari lives!

It was pleasant to find your *Retro Computing* correspondent extolling the virtues of Atari's fifteen-year-old 8-bit machines (*PCW*, September). You may be surprised to discover that there remains a

sizeable base of Atari 8-bit users in the UK and (especially) abroad. New software and hardware add-ons are still being produced. Users are also supported by a dedicated magazine (Page 6 — 01785 41153), which has been going since 1982, and a handful of other enthusiastic organisations.

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

PJ Rixon
Shefford
Bedfordshire

Weighing up PCW

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

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

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

RE Walford
Sevenoaks, Kent

Hindsight



Ten years ago —
November '85

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

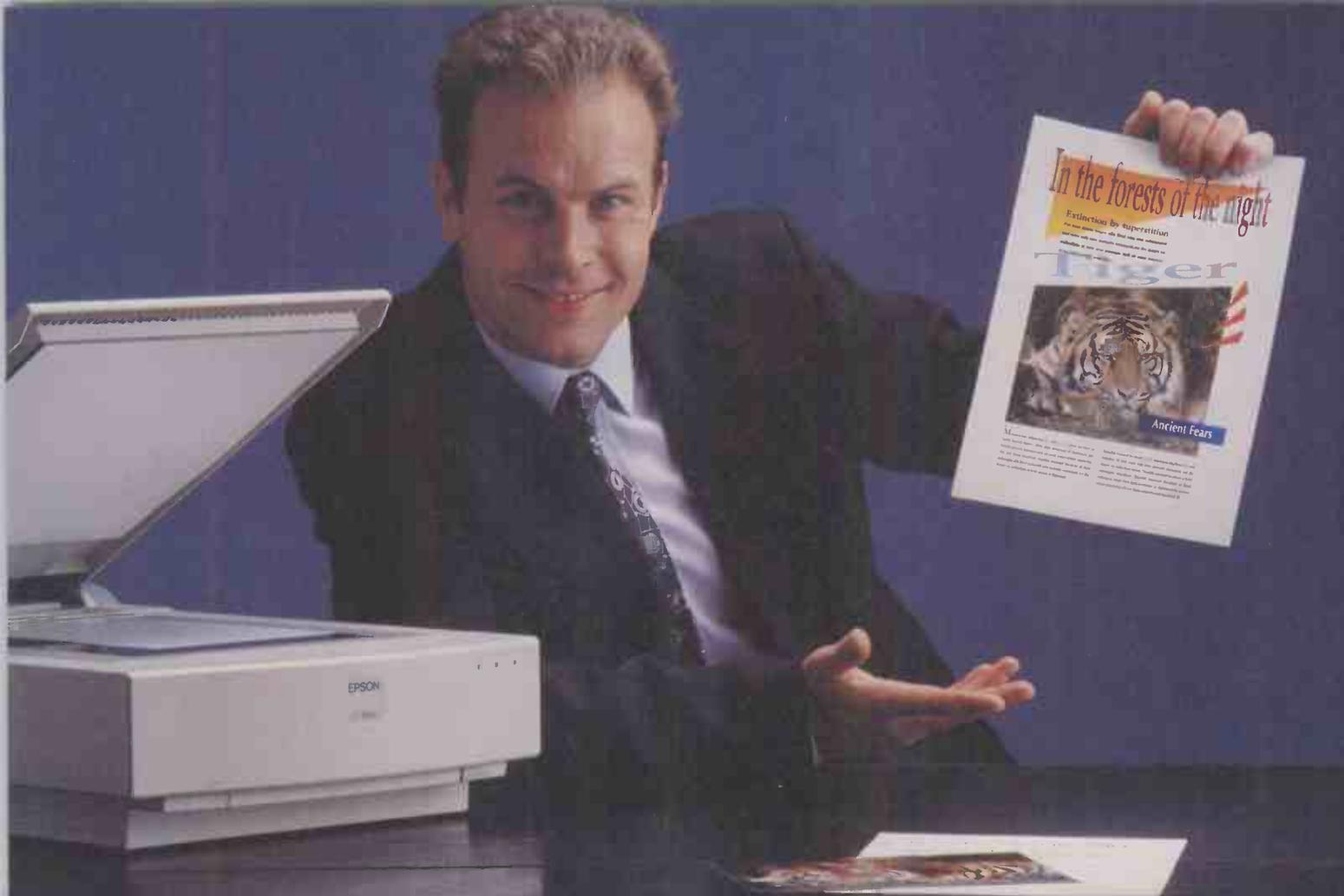
The problem of having to send off your Mac to the States is now ended with P&P Microsystems supplying the 10Mb system, through agents, in this country for around £2,000."

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

Five years ago —
November '90

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

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



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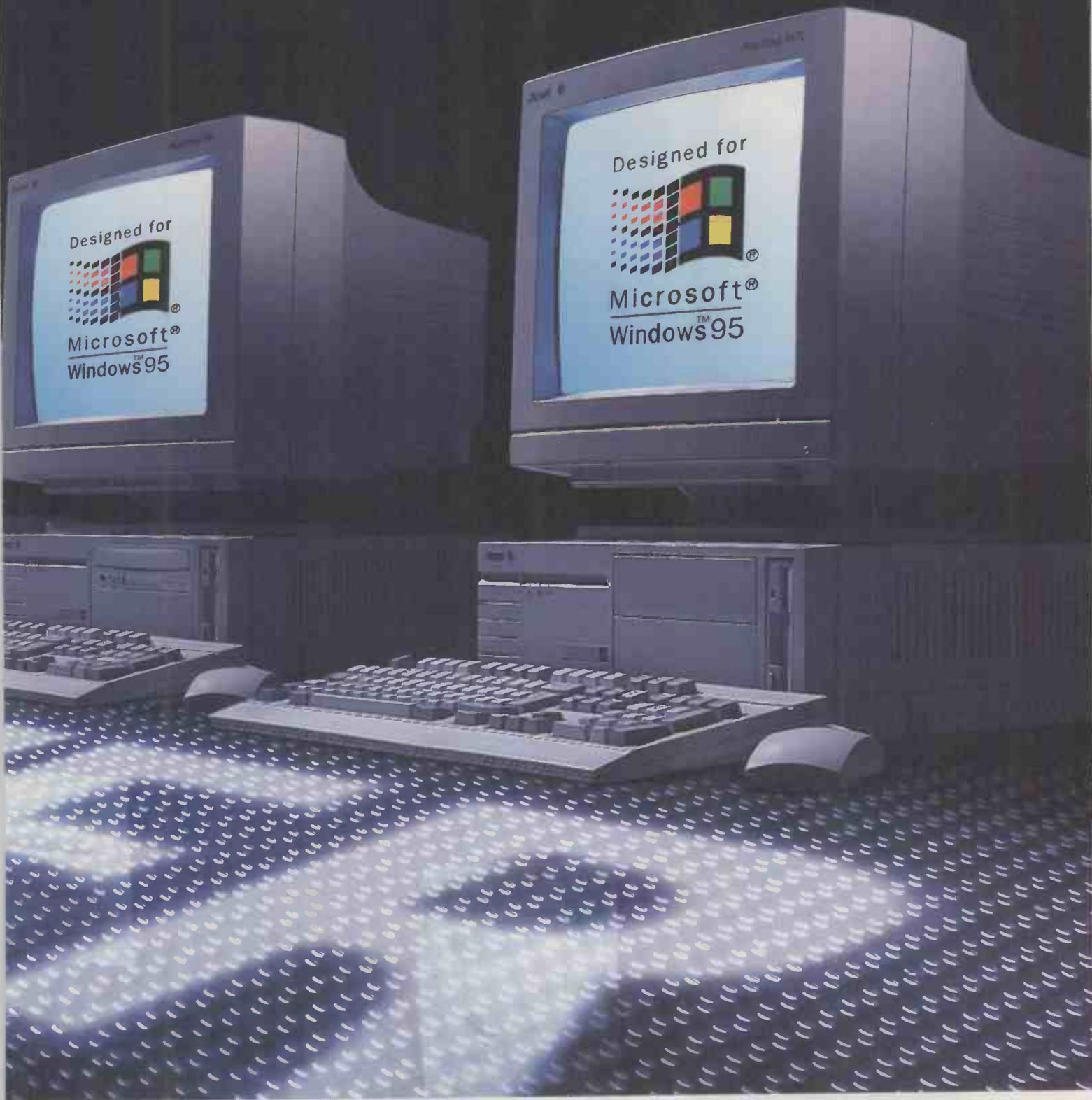
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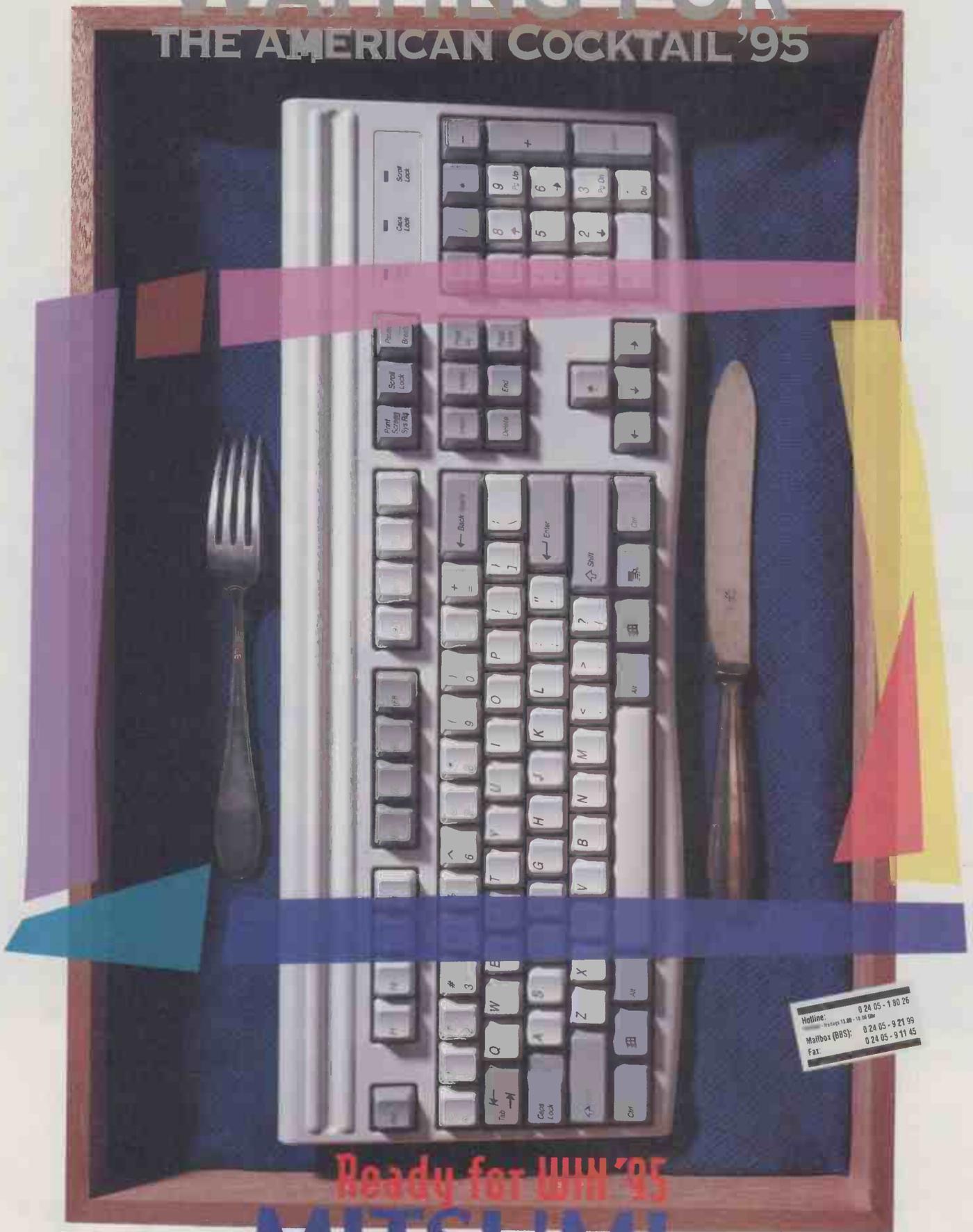
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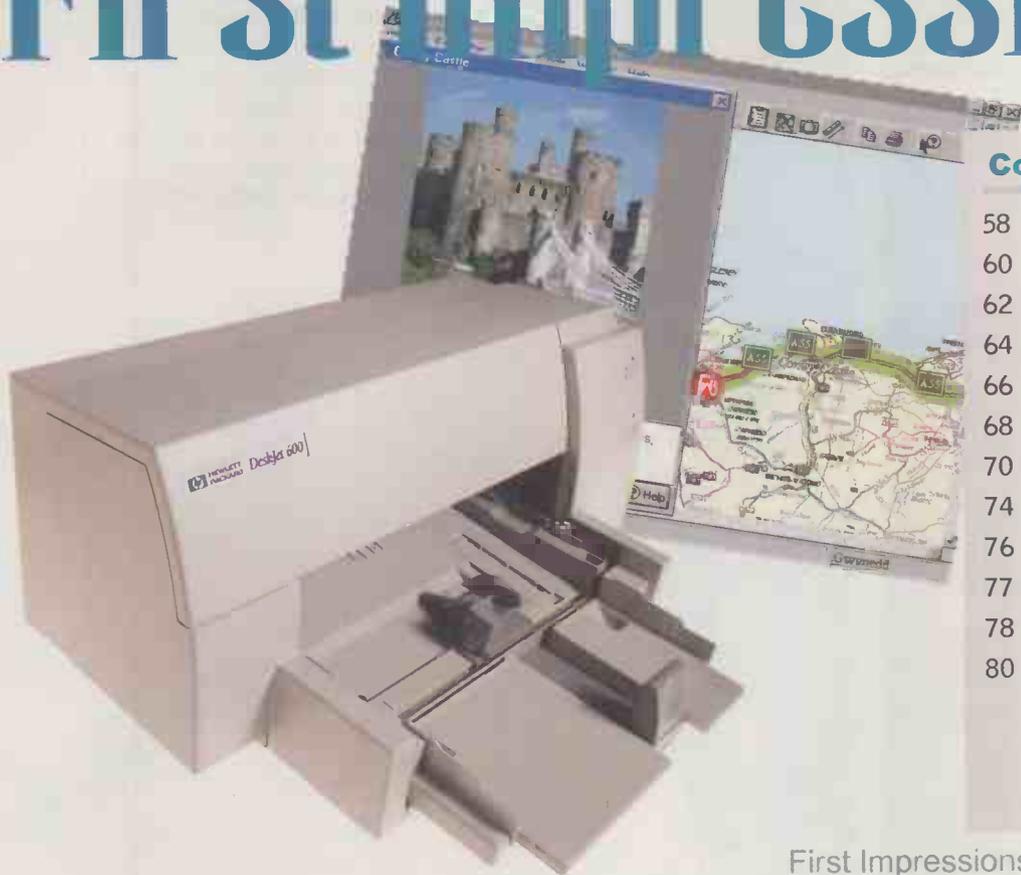
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First Impressions



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



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

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

time in minutes and seconds to print a page in a comparative test of printers.



SuperScape SpaceMouse

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



Kodak DC40

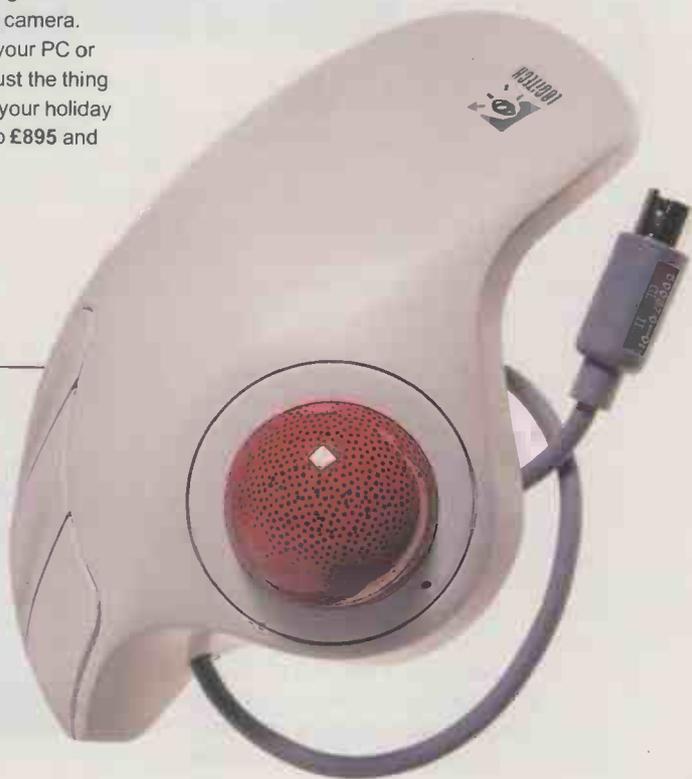
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Gadgets
and Bruce Mackie
PCW Gadget Photography by David Whyte

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Tri-Pro Cycle Computer

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

£26.99 from Caratti Sport on 01454 273733



MicroSpeed WinTRAC

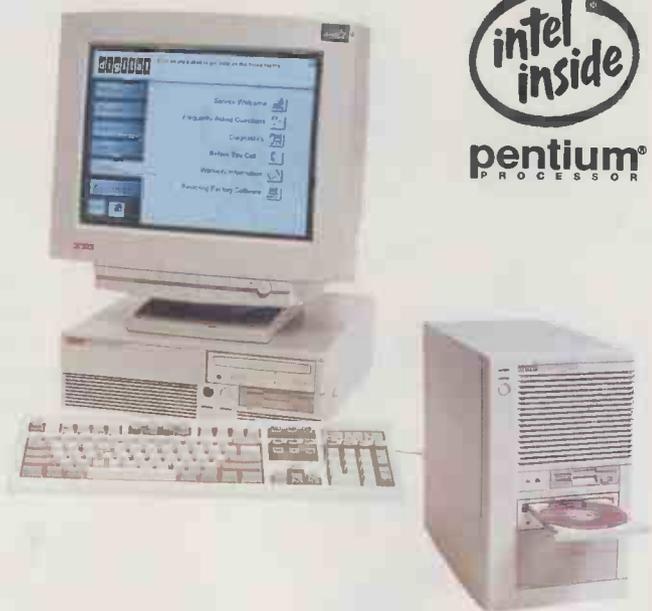
MicroSpeed is best known for ergonomic input products and the WinTRAC trackball is no exception. Not only is it extremely comfortable, but the WinTRAC boasts three programmable buttons. It costs £73.95. MicroSpeed 0171 720 0592



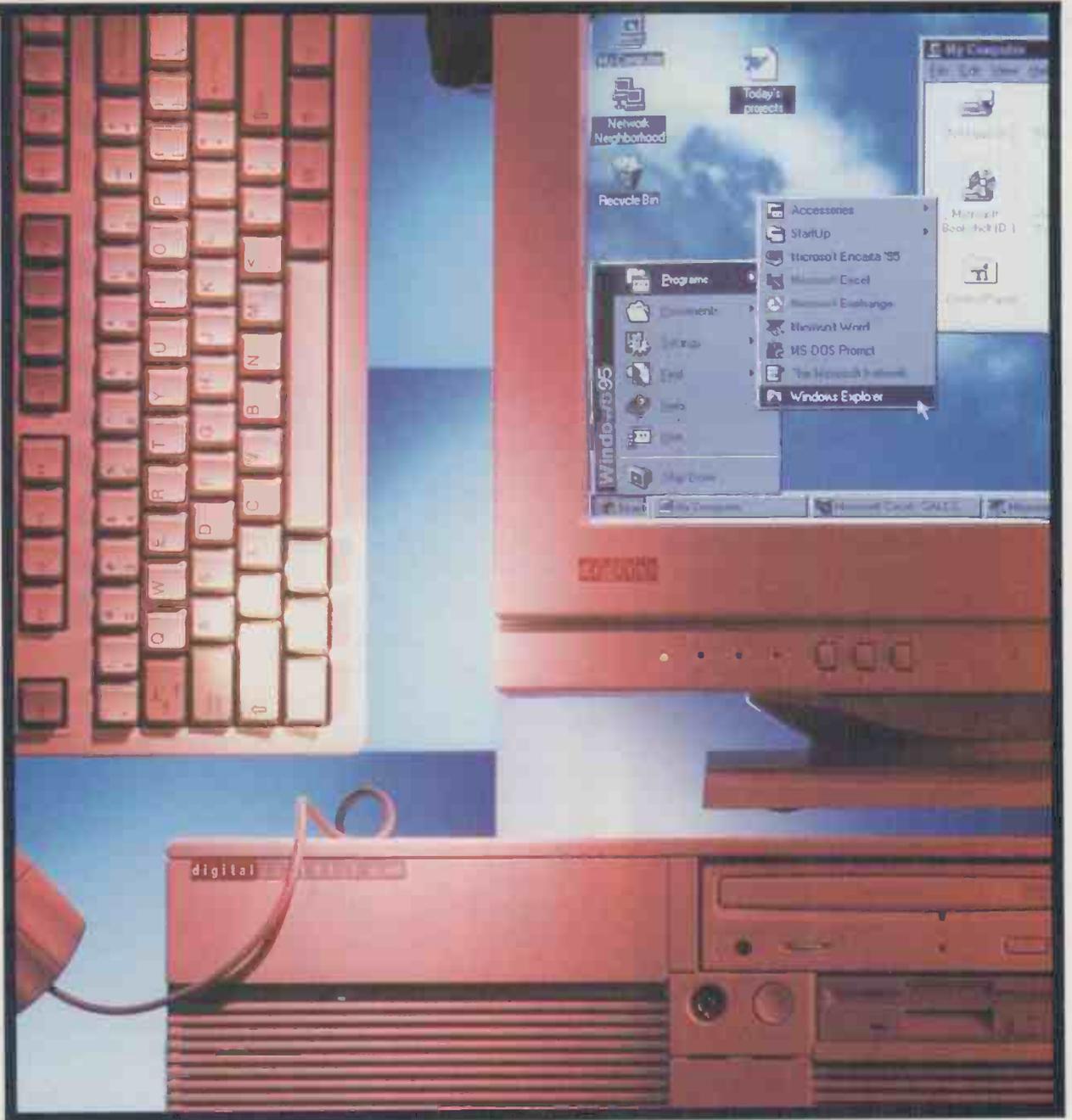
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IBM Warp Connect

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

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

It might not come with any network

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

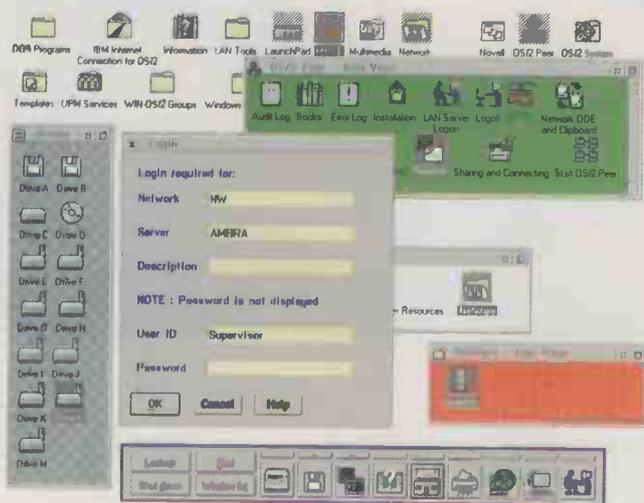
The installation routines used by Warp

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

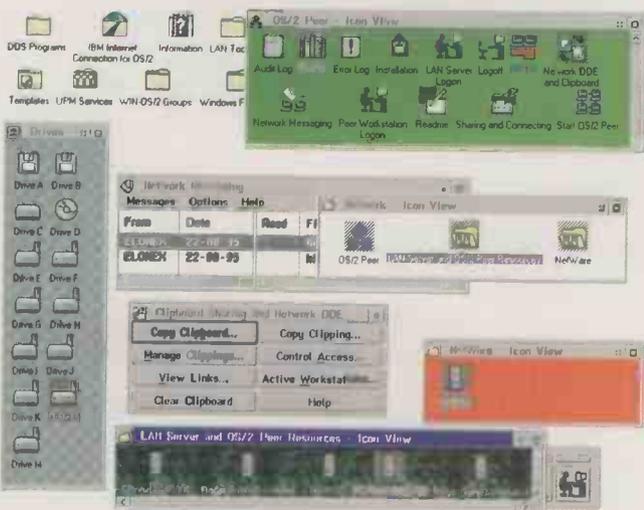
While Warp is able to detect most common CD-ROMs, be they SCSI, IDE or proprietary, it came to a halt when it couldn't detect the Elonex's NEC quad-speed drive. This was because the Elonex uses the NCR PCI SCSI chipset and Warp Connect lacks a driver for this particular SCSI chipset. The solution was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

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

At this point you can select the network support that you want, be it peer, NetWare or TCP/IP or any combination thereof. If you select TCP/IP, the Internet Access Kit (IAK) is installed as well. But you must ensure that you don't install the IAK that comes with the BonusPak, as this includes a reduced version of TCP/IP. My 3Com network interface card was correctly identified. After you've



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



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

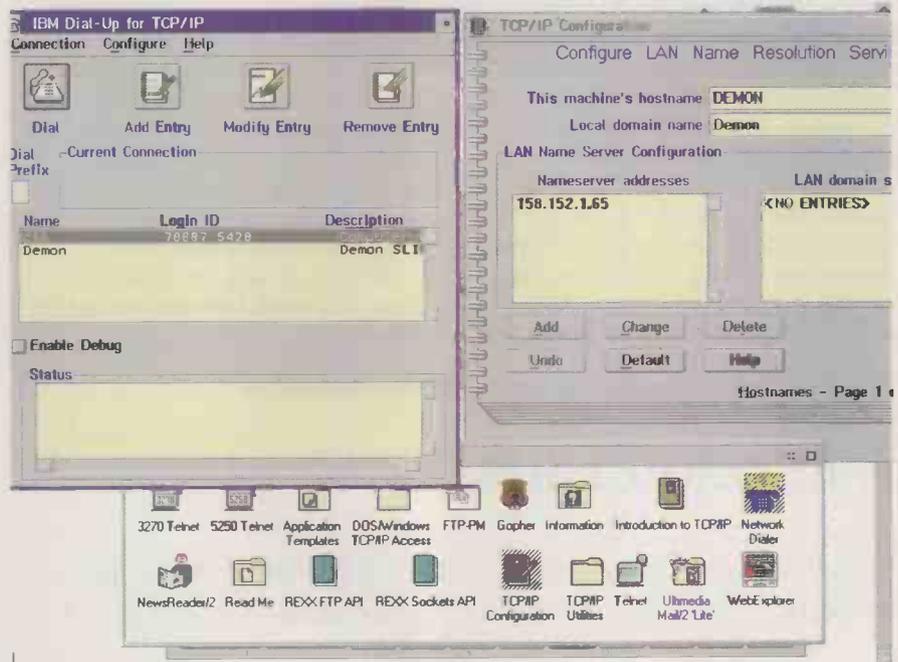
given your PC a name and specified a password and the workgroup name you want to attach to, the install is complete. From start to finish it took me about an hour, but if you don't run into difficulties then installation will probably take half this time.

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

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

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

Connecting to shared peer resources using Warp Connect is as simple as it is with Windows for Workgroups 3.11 —



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

you open the OS/2 Peer folder and click on the Sharing and Connecting icon. You can then create a connection, browsing from a list of servers or resources. This is much better than LANtastic for OS/2, which lacks a browsing facility and so forces you to explicitly enter a name for the server in order to make a connection.

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

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

Windows originally got into difficulties

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

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

Comparisons with Windows 95 are a little unfair — Warp Connect is better compared with the likes of Windows NT 3.51 Workstation, with which it has much in common, e.g. true 32-bit architecture, support for SMP and multiple hardware platforms and a high performance file system. The server version, which replaces LAN Server, has just entered beta testing. While OS/2 Warp may be pitched as a consumer product, I can't see Warp Connect being too attractive to

the SoHo market — its needs are best served by Warp or Windows 95. However, in the corporate sphere Warp Connect is a much more attractive proposition and its robustness and stability will be valued above the more cosmetic elements of, say, Windows 95. I experienced a modicum of installation headaches but these were soon overcome. It remains one of the best operating systems for mixed networking environments.

PCW Verdict

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

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

Contact IBM Personal Software Products
01329 242728

SOFTWARE

Microsoft Plus!

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

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

Moving on, the next component is the System Agent. This doesn't actually enable your PC to do anything it couldn't do before, but it does automate the process of keeping your hard disk tidy, by running ScanDisk (to fix disk errors), and the Disk Defragmenter (to optimise the ordering of files) at regular intervals. It also notifies you when disk space is getting low. This works completely transparently — all the user sees is a new icon in the "Notification Area" next to the clock on the Taskbar. Double clicking on this will summon a window allowing you to change the schedule. You might well want to do so, as the defaults take tidiness to the point of obsession, with a



Theme for a dream — back to the psychedelic sixties



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

disk scan and defragmentation every weekday, a check on free disk space hourly, and a complete surface scan of

your disk on the first of each month. Although it's not immediately obvious, you can also schedule other programs to

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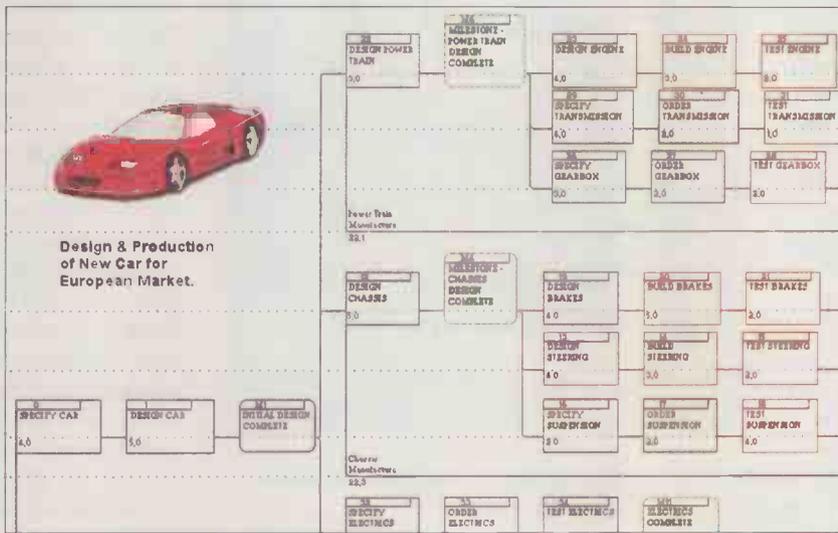
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Resource ASSEMBLER

Name: ASSEMBLER Type: Normal Calendar: Five Day [X] Scheduled

Accrued: Not Accrued Usage: Man days Charge: £/h: 100

Accrual Period: 0

No.	Date	Available	Threshold	Used	Unused	Overtime	Overload
1	3-Jul-95	4.00	200.00	200.00	250.00	275.00	
2							
3							
4							
5							
6							

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Adrian Dooley, Project Manager Today



Resource Usage

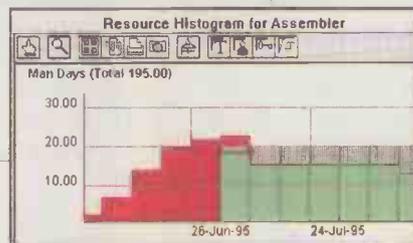
Resource	Start	Finish	Method	Quantity	Units
1 ASSEMBLER	0.2	3.0	Rate	1.00	
2					
3					
4					

Planned Usage Actual Usage

Copy Planned to Actual [OK] [Details...] [Help] [Cancel]

Assign resources to the ENTIRE DURATION or SPECIFIC WORKING periods on a task.

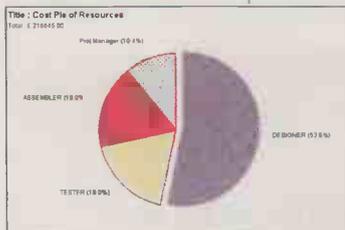
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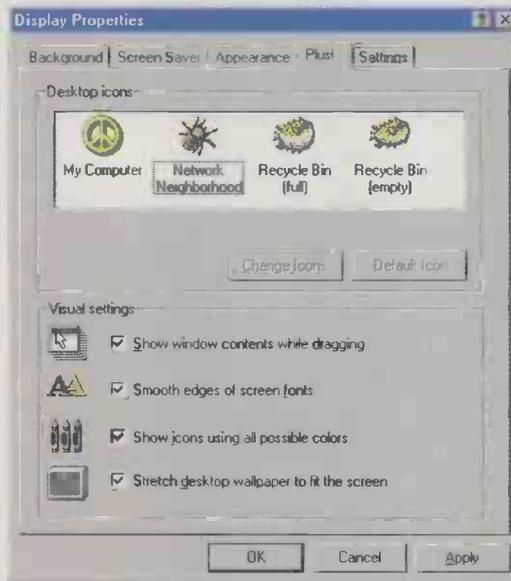
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run at intervals ranging from hourly to monthly.

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

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

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



More options — the elusive full-window dragging returns

automatically stretch wallpaper to fit the full screen. A fast PC and display card are recommended here.

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

The dial-up networking server is the counterpart to the dial-up networking client software built in to Windows 95. Install this on your home or office PC and you'll be able to connect to it via a

modem, even if it isn't on a network.

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

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

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

PCW Verdict

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

Price Around £35

Contact Microsoft 01734 27000

HARDWARE

Hewlett-Packard DeskJet 600

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

The DeskJet 600 didn't arrive at the PCW office in time for August's colour printer group test, but once we'd seen it we thought we should let you know about it. If you know your printers,

then you will no doubt have already noticed it's almost identical to the DeskJet 540. There are subtle differences, though. Well, at least two — the print head and ink. And after all,

they're the bits that do the printing. Although you can still buy the 540, the DeskJet 600 and its Mac equivalent (the DeskWriter 600) are now replacing it.

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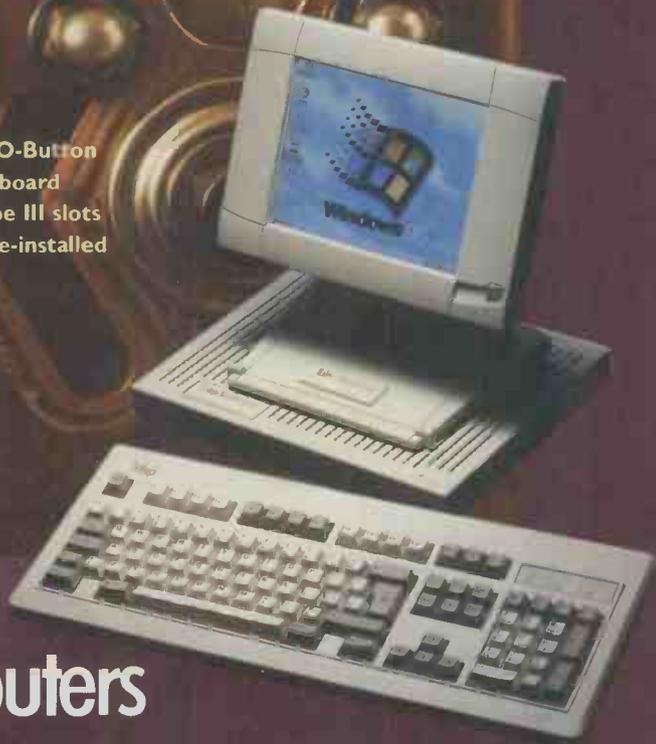
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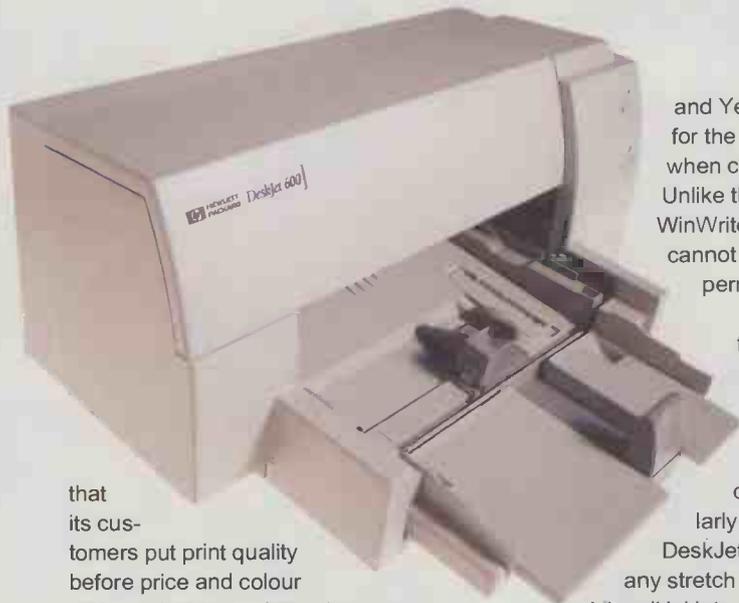
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that its customers put print quality before price and colour options. As it turned out, the new DeskJet is competitive in all these areas with its £289 price tag and colour capability. As for print quality, we haven't laid hands on anything quite so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

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

Both the DeskJet and DeskWriter can be easily upgraded to colour by adding the Colour Kit, which consists of a snap-in cartridge and storage container. The three-colour cartridge (Cyan, Magenta

and Yellow) is swapped for the black cartridge when colour is needed. Unlike the Lexmark WinWriter 150C, the two cannot be installed permanently.

Composite blacks from the colour cartridge are not as rich as those printed in mono. However, when compared to similarly priced inkjets, the DeskJet 600 is not poor by any stretch of the imagination.

Like all inkjets, the quality of colour output is hugely dependent on the media. Glossy or coated paper gives best and near photographic results, whereas standard office paper will give dull and blurred images.

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

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



The DeskJet 600 driver screen

point. Colour output is resolved at 600 x 300dpi.

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

PCW Verdict

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

Price £289, Colour Kit £35

Contact Hewlett Packard 01344 360000

SOFTWARE

Autoroute 4.0

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

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

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

Journeys can now be split into days, which is more useful for transcontinental travel than for driving around the UK. The greatest addition has come from the more expensive versions of Autoroute: bitmap graphics loaded in from the CD. A high-quality Ordnance Survey map can be overlaid, revealing the inaccuracies of

the standard vector maps. Some roads listed as "local road" in the Autoroute directions actually turn out to be several roads and go in a different direction.

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

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

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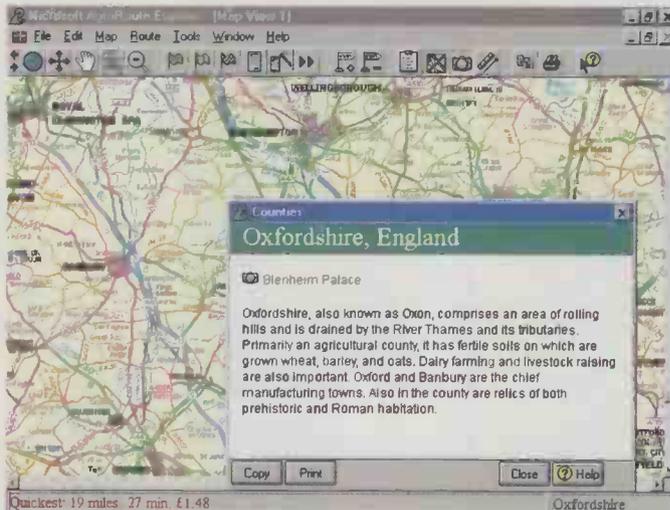
65
PERSONAL COMPUTER WORLD

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

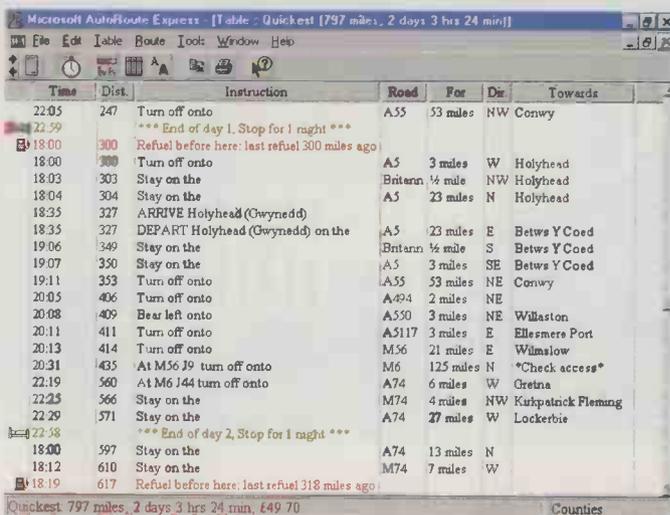
New features include more stops per journey. Autoroute now handles up to 25, including refuelling stops which warn you when you're running low on juice – although this does not seem to take into account the position of petrol stations. You can avoid whole areas by dragging a box around that area on the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

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

The wizard takes you step by step through the task of planning a journey, but in any case there are only eight



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



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

stages and the important ones are start and finish. The program is available in floppy and CD versions; the CD is well worth having for its bitmaps and photos, but for simple planning the floppy version is fine.

PCWVerdict

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

HARDWARE

Aztech Home Office Multimedia Kit

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

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

The best way to get multimedia

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

Aztech has yet to establish itself in the UK, but over in the States it's becoming

serious competition to the likes of Creative Labs by producing high-quality equipment at affordable prices, and this package is no exception.

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

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- * Conforms to IEEE 802.3 and fits Type I, II, III PCMCIA slots
- * Media type auto detection (BNC & UTP)

EN-5100 32-Bit PCI Bus Ethernet Adapter

- * Single-chip solution for 32-bit PCI bus
- * Supports Windows 95 plug & play function
- * Low power consumption for green PCs
- * 3-in-1 design supports AUI, BNC & UTP

2000 PXA Plug & Play Full-Duplex NE2000 Combo Turbo Adapter

- * Full-duplex design doubles performance
- * Plug & play, auto setup IRQ and I/O
- * Configuration by jumpers or software
- * Auto detection for media (BNC/UTP)
- * Uses NE2000 drivers; no additional drivers needed

SNMP Smart Hubs

- * Stack up to 16 hubs to form a logical hub
- * 12 UTP ports on each hub
- * In-band, out of band SNMP management
- * Supports MIB I, MIB II and repeater MIB
- * Windows-based management software

ER-5390T 8-Port Ethernet Hubs ER-5396T 16-Port Ethernet Hubs ER-5397T 32-Port Ethernet Hubs

- * Automatic partitioning of bad ports
- * Automatic polarity detection
- * Hub status LEDs for easy diagnostics
- * Conforms to IEEE 802.3 10Base-2, 10Base-5 and 10Base-T standards
- * Supports 8 UTP ports + 1 BNC port for 8 port hubs
- * Supports 16 UTP ports + 2 BNC/AUI ports for 16 port hubs

- EP-3020 EPP Pocket Ethernet Adapter
- EP-3390 2-Port Ethernet Repeaters/Hubs
- EN-3200 EISA/MCA Bus Ethernet Adapter
- EN-4300 32-Bit VESA Bus Ethernet Adapter
- 2000RA Jumper + Jumperless NE2000 Adapter



SNMP Smart Hubs £499

16 PORT HUB £195
32 PORT HUB £399

8 PORT HUB
£99

PCMCIA
£99.95

PCI COMBO
£75

NE2000 COMBO
£27.50



REPEATERS
2 PORT £149
4 PORT £199

EISA

VL-BUS

PLUG & PLAY
£65

POCKET ADAPTER



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MANUFACTURER'S
WARRANTY

Edimax has a staff of 160, serving international LAN customers since 1986. Represented by Netland in the U.K. From Arcnet EtherNet and Token Ring to fast Ethernet, Edimax is dedicated to providing the correct hardware for your network environment.

Unparalleled service, prompt shipping, and unlimited technical support are just a few good reasons why professionals choose LanPro from Edimax.

If you are in LAN business, you should be acquainted with Edimax, and their complete line of LAN professional communication products.

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RING FOR FREE CATALOGUE

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

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

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



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

At the back of the card there's the usual joystick/MIDI connector and ports for line in/out, speakers and microphone. The powered speakers supplied with the system will deliver eight watts. For home

and office use they're more than adequate, although for larger presentation bigger monitors would be needed.

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

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

PCWVerdict

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

Price £269
Contact Aztech 01734 814121

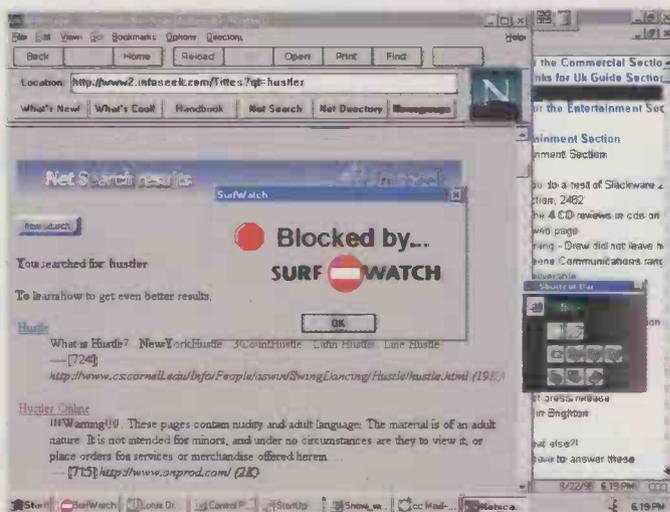
SOFTWARE

SurfWatch

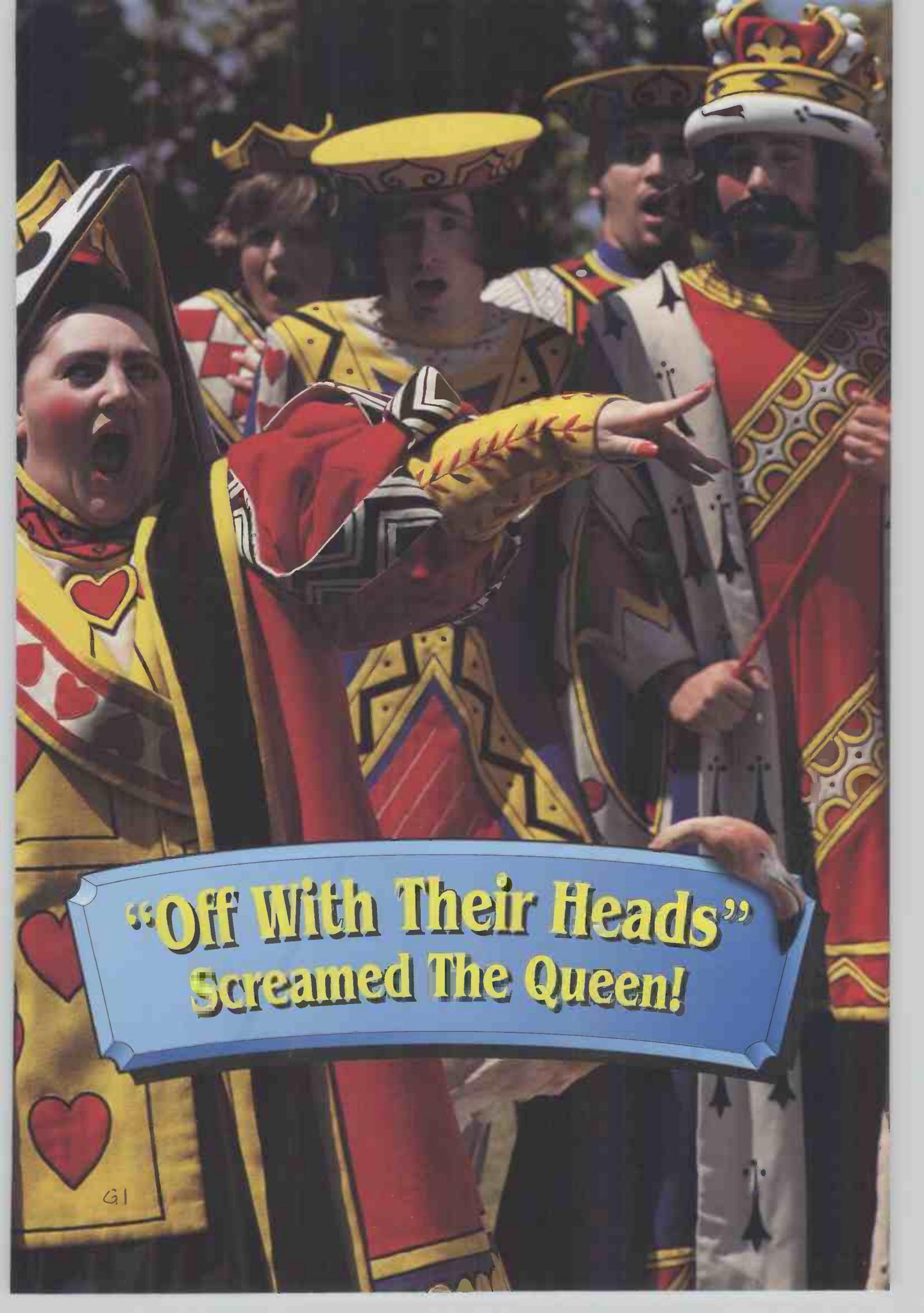
For Internet users anxious to practise safe surfing, Ben Tisdall reviews SurfWatch, one of a new wave of programs designed to bar access to pornographic material.

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

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



Surfwatch does its stuff

A group of people in medieval-style costumes, including a queen and kings, are shown in a scene. The queen, on the left, is wearing a yellow and red dress with a heart pattern and a black hood, and she has a shocked expression with her mouth wide open. Behind her are several men in ornate, colorful costumes, including crowns and capes. One man in the foreground is pointing towards the right. The scene is set outdoors with trees in the background.

**“Off With Their Heads”
Screamed The Queen!**

"Oh Don't Worry" Said Alice "Everyone Loses Their Heads Over Gateway"

Take a look at what Gateway 2000® have to offer and you'll believe you've slipped into a Wonderland of value! What's more, Windows® 95 is here! Available as an option on all our systems at no extra charge, Windows 95 takes you into a fantastic new world of personal computing. It's faster, easier to use and even more reliable than previous operating systems and it gives you access to all the new 32 bit programs. You can multi-task, run multi- programs and save time and effort with real 'plug & play' capabilities. Once again Gateway 2000 brings you the latest technology at the best prices.

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All Gateway 2000 systems come with freephone support for the lifetime of the system.

Our aim is to give you the best value systems in the land and support them with the best service you'll find this side of Wonderland!



0 8 0 0 1 7 2 0 0 0

G2







GATEWAY2000 PS-133

Drink
me

Eat me

G4

"Gateway's PCs are **HUGE**
on value and performance" said Alice

We hold the key for you to unlock the door
to the best value systems around!

Whatever system you're looking
for, you should take a good
look at Gateway 2000.

You'll find we're
perfectly sized

processor and the 120MHz Pentium processor, these systems deliver serious power. Each features 16MB EDO RAM, the latest 'pipeline burst' cache technology, quad-speed CD ROM and a huge 1.6GB hard drive with PCI enhanced IDE interface. Both systems include the Matrox Millennium video card, and the P5-133 has a triple deck CD changer. And with the 28.8 BPS internal desktop modem available as an option on all systems, it's a piece of cake to stay in touch from

Wonderland to Sunderland!

These systems sound as good as they look through Altec Lansing speakers and a sub-woofer. The 17-inch Vivitron™ monitor is pretty special too, and utilises the latest Sony® Trinitron™ tube technology, making every colour as vivid and sharp as any seen in Wonderland!



to provide for your every need as the largest
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(source: IDC) and the second fastest growing PC company
in Europe (source: Dataquest). There's no reason to be curious as
to why – our service and value speak for themselves.

You'll find it hard to believe your eyes when you see the amazing
value Gateway 2000 offer across our whole range of systems.
Our P5-133 Elite and P5-120 Elite have the power to deal with every
situation you may find yourself in, however curious.

Based on Intel®'s latest, fastest CPUs, the 133MHz Pentium®

But what's even madder than a hatter is our pricing! The P5-120
Elite is yours for only £2,299 and the P5-133 is just £2,599.

Quad speed CD ROMs are standard on all Gateway PCs from one
end of the scale to the other, and every system is ATAPI compliant,
giving Windows® 95 compatibility. Every system comes with the
choice of Windows 95 and most have Microsoft Office 95,
Professional Edition too. All our monitors, from the 14-inch through
to the optional 21-inch offer you the best view and brightest colours
you'll see!

"It's all enough to set your lobster quadrilling!"



0 8 0 0 1 7 2 0 0 0

“NO ROOM, NO ROOM” Said The Mad Hatter

With our multimedia systems, you won't have to gatecrash the party. You'll have everything you need right at your fingertips! And, as with all our ranges, they're amazing value for money too.

With a throughput of 600KB per second, the quad speed CD ROM gives you full screen, full motion video from a CD, perfectly served.

Your spreadsheets, multimedia, video and design applications will fly onto your screen. Large complicated graphics files load quickly and redraw effortlessly, whilst the quality of the superb Vivitron monitors enable you to see everything in truly glorious colour and clarity.



 **GATEWAY2000**

"You've got a friend in the business."

0 8 0 0 1 7 2 0 0 0

"There's Always Room For Gateway's Liberty" Said Alice

You're guaranteed there'll always be room for the Gateway 2000 Liberty™. It's compact, weighs only 4.2 pounds and has a full colour 10.4-inch dual scan STN display screen giving you sharp clear colours however curious your location!

There's no footsie under the table here, this is a serious portable! The Liberty

has an Intel 100MHz DX4 processor, removable hard drive, up to 16MB RAM and an excellent power management system. And the latest infrared connectivity lets you swap files, download data and go straight to print – without any wires!

The Liberty is served to you complete with the option of Windows 95 and Microsoft Office Professional 95. The optional extras menu includes an external floppy drive, fax modem, lithium ion batteries and Ethernet adaptor.

As one of the tastiest notebooks around the Liberty will keep up with every move you need to make!



G7



Its Always A Good Time For Service With Gateway 2000

We give our customers kid glove treatment! Our pledge is to bring you the best value for money systems possible and to back them up with the best service and support in the industry. When you call Gateway 2000 our highly trained sales people will take the time to give you expert advice and talk you through all the systems on offer, to determine which best suits your needs. We'll then build this system for you!

Every Gateway 2000 desktop carries a three year warranty on major components. Desktops carry a one year on-site service. This is provided at our discretion in the unlikely event of our technicians not being able to solve your problem over the phone. Portables carry a one year back-to-base warranty. Every system carries freephone technical support for its lifetime. If you call our Technical Support department our technicians are trained to deal with your query and offer expert advice on every hardware or software item we sell.

If it becomes necessary to replace any component within the warranty period, a replacement part will hare its way to you free of charge, and we pay for the overnight delivery.

Our Customer Service department is here to handle any queries you may have with regard to your order, extended warranty options, the delivery process, any question you may have. Unlike poor Alice, we promise not to leave you feeling dreadfully puzzled!

We offer a choice of methods of payment, giving you the opportunity to select the one best suited to your circumstances.

Should you be dissatisfied with your Gateway 2000 system for any reason, you can return it to us within thirty days under our no-quibble money back guarantee. We will refund you the amount you paid for the system less the shipping charge.

Our wish is for you to be entirely happy with both your system and the service you receive from us.

Whether you're buying for the home, the office, a school, college or government department we're here to satisfy your PC needs. We promise you that once you experience the Wonderland of Gateway 2000 value and service, you'll never want to leave and unlike Alice's adventure, the world of Gateway 2000 is not a dream, it's a reality!



"You've got a friend in the business."

0 8 0 0 1 7 2 0 0 0

"Oh Do Be Quiet" Said Alice "Everyone Can Join The Party With Gateway's Multimedia"

Sounds almost good enough to eat, eh? But there's more. Altec Lansing speakers, and a separate sub woofer on the high-end machines, ensure sound quality to make any party go with a swing!

Invite your family to the party with the Family PC™, and we'll serve them with some tasty helpings of software, including Microsoft® Encarta '95.

Our top-of-the-range multimedia systems come complete with the very latest software, including Encarta 95 and the option of Windows 95 and Microsoft Office Professional 95.

There's plenty of fare at the Gateway table for every taste, and there's always room for one more!



pentium
PROCESSOR



"You've got a friend in the business."

0 8 0 0 1 7 2 0 0 0

**WINDOWS 95
AVAILABLE NOW
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Prices You Won't Believe

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- Intel® 75MHz Pentium® Processor*
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- Desktop Case
- 125-Key AnyKey® Keyboard & MS Mouse
- MS Windows 95
- MS Office Professional 95
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- Ensoniq Wavetable Sound Card with Premium Speakers
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Portables

LIBERTY™ DX4-100

- 1.9kg (4.2 lbs)
- 25.4 x 20.3 x 4.1cms (10 x 8 x 1.6")
- Intel 100Mhz 486DX4 Processor
- 8MB RAM
- Infrared Capability
- 720MB Removable IDE Hard Drive
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- NiMH Battery & AC Pack
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- 16MB RAM
- Infrared Capability
- 720MB Removable IDE Hard Drive
- 10.4" Dual-Scan STN Colour Display
- 2 NiMH Batteries & AC Pack
- Instant On
- 2 PCMCIA Type II Slots
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- MS Office Professional 95
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All Gateway 2000 systems come with award-winning service and support including:

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*Intel Verified:
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Printed on Environmentally Friendly Paper

In Our Wonderland Of Value

SOFTWARE

All Gateway 2000 systems are preloaded with Windows 95, Microsoft's newest operating system. Software masters, are provided on either diskette or CD. Documentation is also provided (either printed or on CD). Software is tested and optimally configured for your system, eliminating potential installation and set-up errors.

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Many of our systems come with Works, the integrated application that combines all the tools you need to run a business: word processor, spreadsheet, database and electronic communications. It's simple to use, yet powerful.

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Many of our systems now include Microsoft's Office 95 on CD-ROM as standard. This is the very latest version of one of the leading application software suites. It includes new and enhanced versions of Microsoft's most popular applications: Word, Excel, PowerPoint and Access.



■ Family PC Software Bundle

Gateway 2000 Family PCs come with Microsoft Works, Money, Golf, Publisher and Musical Instruments. Now you also get Creative Writer, the perfect writing tool for children.

PERIPHERALS

■ Basic Audio Multimedia Kit

Creative Labs 16-bit Sound Blaster sound card. 2 Altec Lansing ACS5 speakers. **£70**

■ Wavetable Audio Multimedia Kit

Ensoniq Soundscape 16-bit Wavetable sound card (compatible with MT-32, FM mode and General MIDI Sound Blaster, AD Lib, Roland MPU 401), MS Windows Sound System, Altec Lansing ACS31 speakers. **£170**



■ CH Flightstick

Engineered to look and feel like a real jet joystick. Includes two fire buttons and seven foot cable. Durable and ergonomic. **£29**

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Internal data/fax modem, 28,800bps modem, V.34bis, 28.8 fax capability. Software included. **£199**

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New PCMCIA Network Cards available. Call us for details on our range of 'ISA and PCI' Ethernet or Token Ring adapters.

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If your system comes with CrystalScan® 14" monitor you can upgrade as follows:

- 15" Vivitron colour monitor for **£80**
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- 21" Vivitron colour monitor for **£1160**

■ Hewlett Packard DeskJet 600

Here's a high-quality business printer which also offers great versatility and value. Prints 600 x 300 dpi black text at up to 3ppm or add a low cost optional Colour Kit and add colour to your documents. **£249**

■ Hewlett Packard 660C Printer

Fast, professional-quality black printing for crisp, sharp characters at 600 x 600 dpi. Also prints clear and vivid colour at up to 600 x 300 dpi. **£349**

■ Hewlett Packard LaserJet 4L

HP's best value-for-money laser printer, the 4L runs at 300 dpi, 4ppm. With 1MB memory. **£449**

■ Jumbo 1400 Tape Backup Unit

Internal tape backup unit stores 680MB native and up to 1.36GB compressed. Back up speed 9.4MB per minute. With the scheduler feature, you can back up at any time. **£139**

■ 2GB SCSI Bundle

Kit includes 2GB SCSI drive and Adaptec AHA-2940 PCI SCSI Controller. **£588**

■ SCSI DAT Tape Drive

Colorado Memory Systems drive stores up to 4GB typically on a single cassette tape, at up to 44MB per minute. **£649**

PORTABLE OPTIONS

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- Memory upgrades.
- Liberty 720MB removable hard drive.
- 3.5" 1.44MB external floppy drive for Liberty.
- Padded, soft-sided case custom designed for the Liberty.
- Additional NiMH or Lithium Ion batteries.

Call us for pricing today!

SERVICE

Every Gateway 2000 system comes with excellent after-sales support. Our technical support staff is renowned for being friendly and helpful. When you buy a Gateway 2000 system, you get:

- 30-day money back guarantee.
- 3-year limited parts warranty – first year on-site (desktops only).
- Freephone technical support.
- On-site service (desktops only).
- Extended warranty options available.

If our technical support staff determines that an on-site service call is needed, we will send a technician to most locations in the UK at no charge during the warranty period. Please call for more information on our guarantee, warranty and on-site service programmes.

WARRANTY OPTIONS

	1 Year	2 Years	3 Years
Next Business Day On-Site Repair Service At GW Discretion	Free/Std	£75	£150
Same Day On-Site Repair Service At GW Discretion	£40	£105	£210



We also offer several payment options including advanced payment and major credit cards. We charge your credit card only when your system is despatched. Net 30-day credit terms are also available to qualified commercial customers.



The software, peripherals and upgrades listed here are sold only with the purchase of a Gateway 2000 PC.

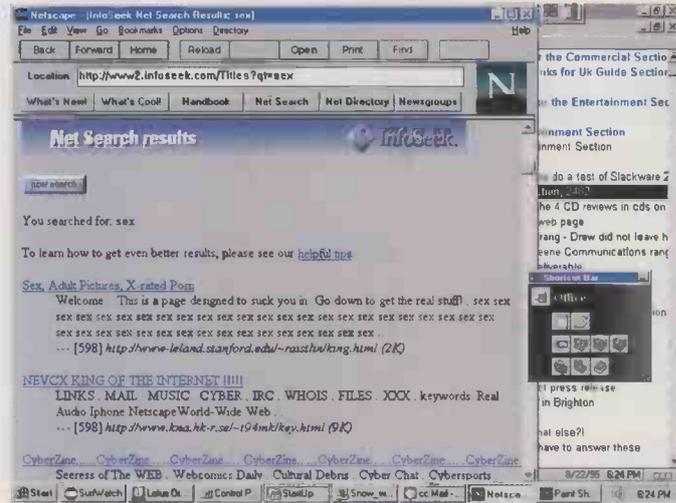
0 8 0 0 1 7 2 0 0 0 6 9
PERSONAL COMPUTER WORLD
NOVEMBER 1995

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

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

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

The one thing SurfWatch does have trouble censoring is the IRC "Chat" channels. Although SurfWatch does its best to block inappropriate channels, it's impos-



Not the real thing: sex on the Internet

sible to stop people from saying inappropriate things in the wrong chat channels. SurfWatch is password-protected and armed with the password you can turn it off as necessary. To remove the program completely you need to use the installation disk, and of course to enter the correct password. If you come across a site that you think should be blocked, but isn't, you can mail sites@surfwatch.com to get it added to the database.

The authors of SurfWatch argue that the program is actually a means of preventing censorship, because children can be protected from the worst excesses of free speech without relying on

state intervention. Visitors to Surfwatch's Web site will even find a petition to sign against state censorship of the Internet.

PCWVerdict

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

HARDWARE

Umax Page Office

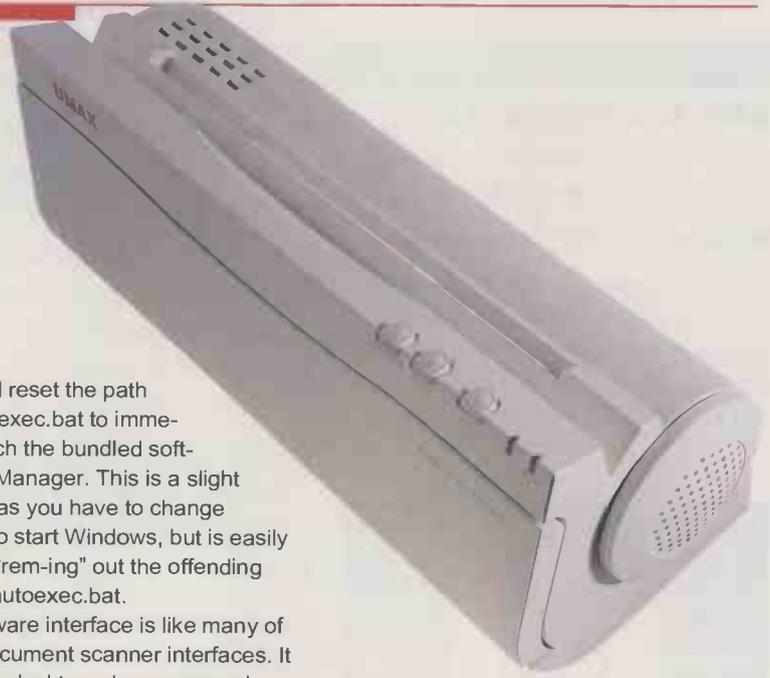
Small document scanners are flooding onto the market. Adele Dyer runs her eyes over the latest offering from a leader in the field.

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

Operating via its own ISA SCSI-II card, the Page Scan Device couldn't be easier to set up. However, installing the

software will reset the path in your autoexec.bat to immediately launch the bundled software, PageManager. This is a slight annoyance as you have to change directories to start Windows, but is easily rectified by "rem-ing" out the offending path in the autoexec.bat.

The software interface is like many of the other document scanner interfaces. It consists of a desktop where scanned documents appear and a system folder to file them. A row of buttons onto which you can drag and drop images feature the various software packages included



in the bundle, as well as your printer, fax and email facilities. If you have Write, this will also appear and you can assign other

**"LET ME MAKE IT QUITE
CLEAR WHO'S RUNNING THIS
COMPANY."**



intel
inside
pentium
PROCESSOR

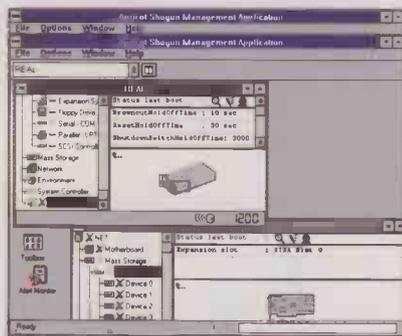
THE NEW SHOGUN WHAT EVERY COMPAN AND ST

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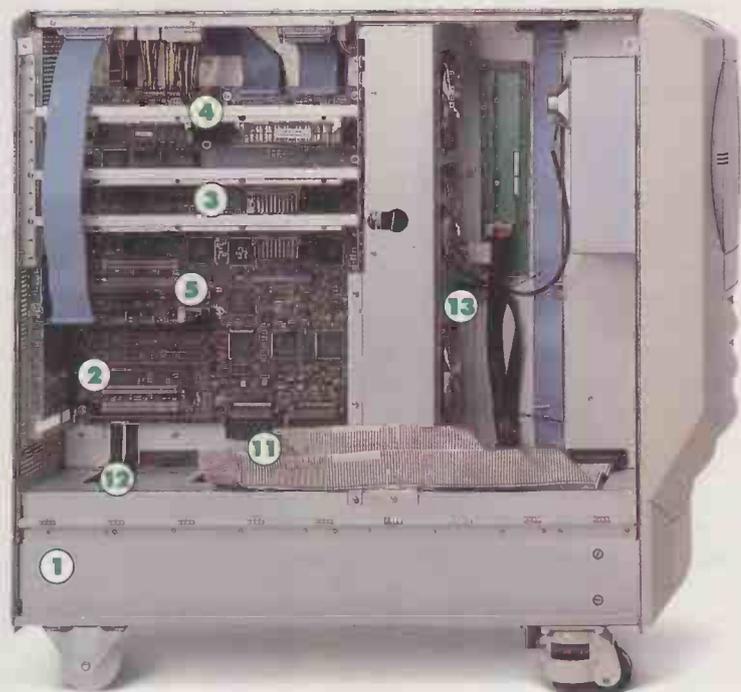
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applications to free buttons, such as Word.

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

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

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

As the Page Office is TWAIN-compatible, you can of course bypass the bundled OCR package and use another standalone package, such as WordScan. This turned out to be quite a good option, although adding your chosen package to

the row of buttons on the desktop is not so problem-free; presumably it was a case of too many OCR packages spoiling the broth. WordScan was quite happily accepted, but crashed when I tried to import an image file by dragging and dropping. However, if you save an image in one of the PageManager files you can happily open it up in your OCR package.

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

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

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

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

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

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

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

PCW Verdict

A very good scanner bundled with versatile, if not perfect software.

Price £399 RRP, £299 street

Contact IMC 01344 872800.

Fax 01344 872868

SOFTWARE

Disk Historian 2.11

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

The first thing to observe is that Disk Historian won't work with Windows 95. A Win95 version is scheduled for later this year, so is it worth getting Version 2.11? In my opinion, probably not, and certainly not if you plan to switch to Windows 95 in the near future. The reason is that Disk Historian isolates files that never get accessed and which you may assume are therefore safe to delete or archive. However, to be really sure a file isn't being used you need time. Disk His-

torian's value therefore lies in the long term. Since it is probable that you will have switched to Win95 before Disk Historian has done its stuff, you probably won't get even your £50 worth out of it.

Unlike conventional uninstallers such as Uninstaller 3, reviewed a couple of issues ago, Disk Historian tracks file usage — program files as well as document and graphics files. This makes it ideal for either compressing little-used files and programs or deleting them alto-

gether. It is also very useful for isolating system files that you never use and those files dumped hither and yon by Windows applications, such as those sampled from magazine cover disks and ROMs.

The way it works is that Disk Historian keeps a database of all your files and records when the file is accessed. The database is updated every day. Over time you build up a good idea of which files you use and which you don't, and you can move, compress or delete

unused files. To help you make the best decisions, Disk Historian gives you comprehensive file information and even a viewer for popular text and graphics file types.

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

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

The screenshot shows the Disk Historian application window with a menu bar (File, Details, Operations, Help) and a toolbar. Below the toolbar is a navigation pane with 'Accesses' selected. The main window displays a table with columns: Status, File Name, Access, Last Date, First Date, and Size. The table lists various system files and their access history.

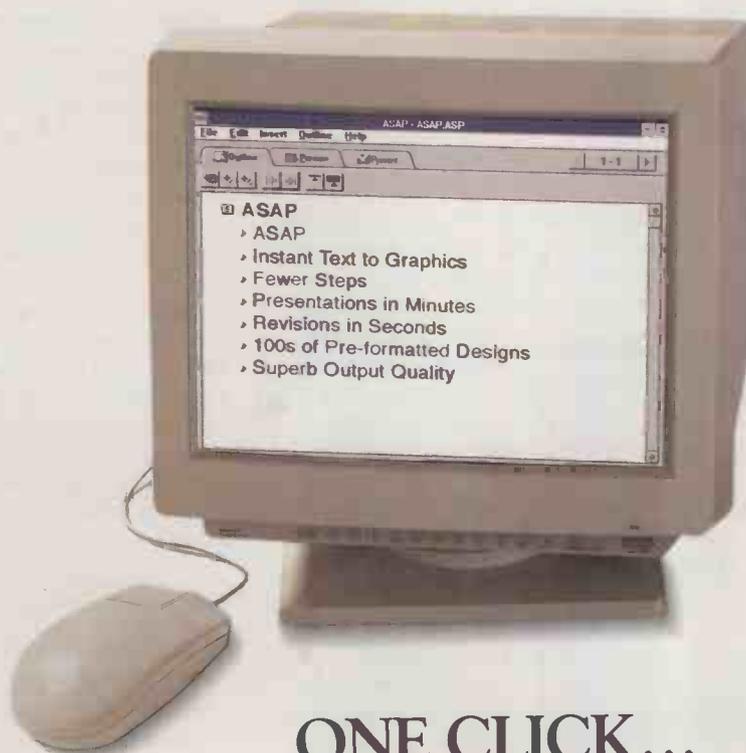
Status	File Name	Access	Last Date	First Date	Size	
1	c:\hibitspace bin	1	11/7/95	9:25a	11/7/95	70775
1	c:\command.com	1	11/7/95	9:26a	11/7/95	90970
0	c:\ndi2aspi.asi	0	11/7/95	9:23a	11/7/95	2
0	c:\msdos.sys	0	6/6/95	12:13p	11/7/95	583
0	c:\msdos.sys	0	15/3/94	10:41a	11/7/95	292
0	c:\msdos.sys	0	11/7/95	8:26a	11/7/95	9076
0	c:\msdos.sys	0	7/1/95	12:00a	11/7/95	2195
0	c:\msdos.sys	0	11/7/95	2:00a	11/7/95	2308
0	c:\msdos.sys	0	11/7/95	1:00a	11/7/95	2420
0	c:\msdos.sys	0	11/7/95	1:18p	11/7/95	0
0	c:\msdos.sys	0	11/94	9:45p	11/7/95	190361
0	c:\msdos.sys	0	13/5/95	5:05p	11/7/95	50
0	c:\msdos.sys	0	8/6/95	10:21a	11/7/95	47390
0	c:\msdos.sys	0	30/9/93	6:20a	11/7/95	40555
0	c:\msdos.sys	0	8/6/95	3:50a	11/7/95	37076
0	c:\msdos.sys	0	8/6/95	8:13p	11/7/95	22182
0	c:\msdos.sys	0	28/2/95	4:26p	11/7/95	23
0	c:\msdos.sys	0	8/6/95	12:13p	11/7/95	989
0	c:\msdos.sys	0	11/7/95	3:07p	11/7/95	525
0	c:\msdos.sys	0	11/7/95	12:07p	11/7/95	0
0	c:\msdos.sys	0	11/7/95	6:48a	11/7/95	1346
0	c:\msdos.sys	0	11/7/95	10:13a	11/7/95	523
0	c:\msdos.sys	0	11/7/95	12:34p	11/7/95	63004
0	c:\msdos.sys	0	29/3/95	8:44p	11/7/95	458
0	c:\msdos.sys	0	29/3/95	7:57p	11/7/95	640

A simple idea: Disk Historian simply lists file usage

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

PCWVerdict

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



ONE CLICK...

HARDWARE

Roland SCP-55

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

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

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

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

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

there are 640 covering a wide range of musical styles.

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

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

The quality of instruments on the synthesiser, from the pianos through to the percussion samples, is consistently good. If any one area lets the card down then it's the lack of good bass patches, but when used for nothing more than adding

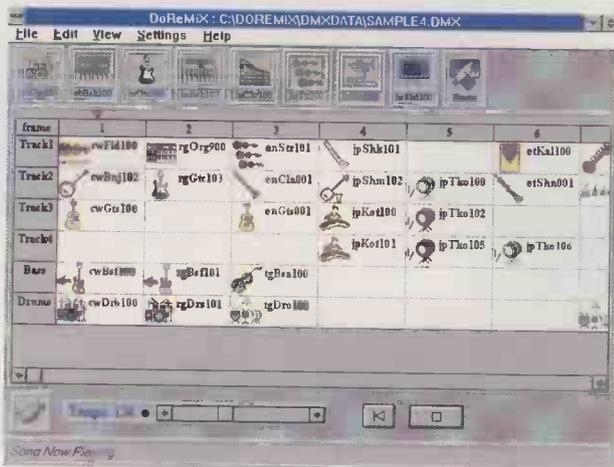
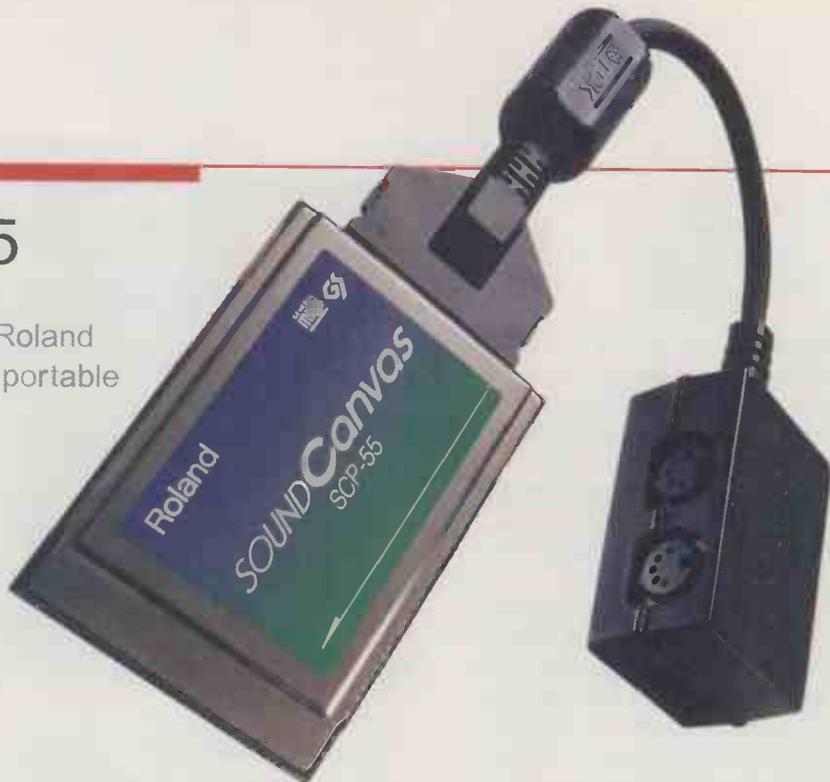
high-quality sound to business presentations, games or pre-producing sequenced tracks, the SCP-55 is more than capable.

The on-board DSP enables you to add reverb and chorus

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

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

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



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

PCW Verdict

The best portable sound solution for both business and pleasure.

Price £322 (MCB-3 Connector Box £51)

Contact Roland 01792 702701

SOFTWARE

FuziCalc 1.5

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

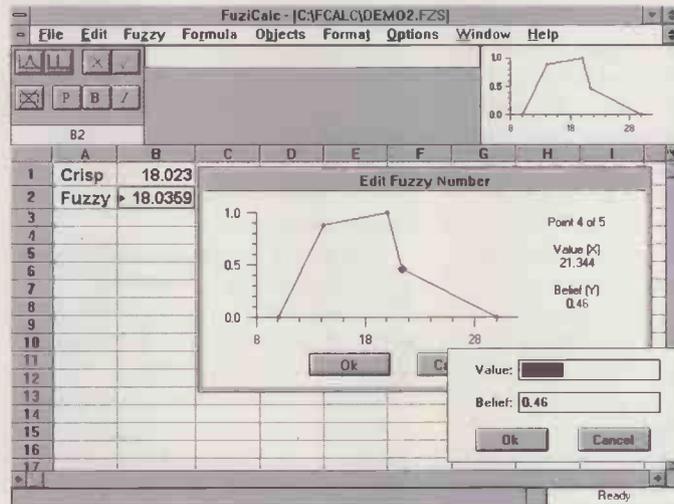
Have you ever noticed how annoyingly precise numbers are? If you have, then the world's first "fuzzy" spreadsheet, FuziCalc, could be for you.

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

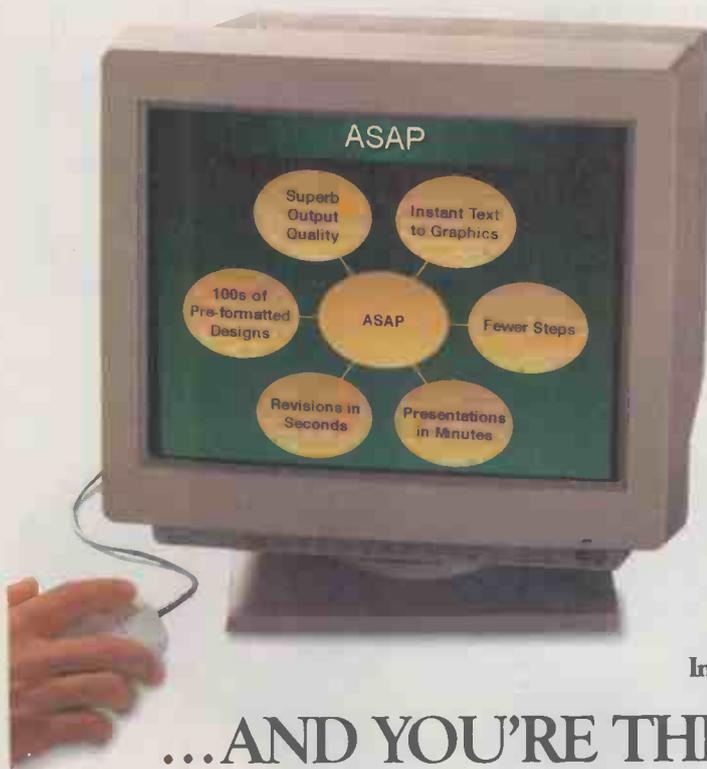
While conventional spreadsheets work only with precise, well-defined numbers, and produce precise, well-defined results; FuziCalc v1.5 from FuziWare Inc is a spreadsheet which works with both pre-

cise (crisp) and imprecise (fuzzy) numbers, allowing you to perform

spreadsheet functions with conventional and fuzzy mathematics. The results are



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



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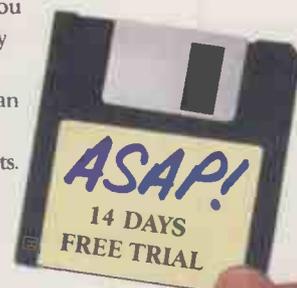
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fuzzy numbers that are more meaningful and simple to interpret.

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

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

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

results that allowed me to confidently identify a ballpark value, the fuzzy duration period and a costing range.

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

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

The great strength of the way in which FuziCalc uses fuzzy numbers is that it

allows a problem to be broken down into its component parts to such a degree that meaningful results can be produced. It is a specific tool for specific tasks, and is not pitched against general spreadsheets. Primarily, FuziCalc is intended for financial analysts, business planners, engineers, scientists and innovators who encounter uncertainty.

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

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

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

PCW Verdict

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

Price £129 (plus £2.50 P&P + VAT) with 90-day refund if not satisfied.

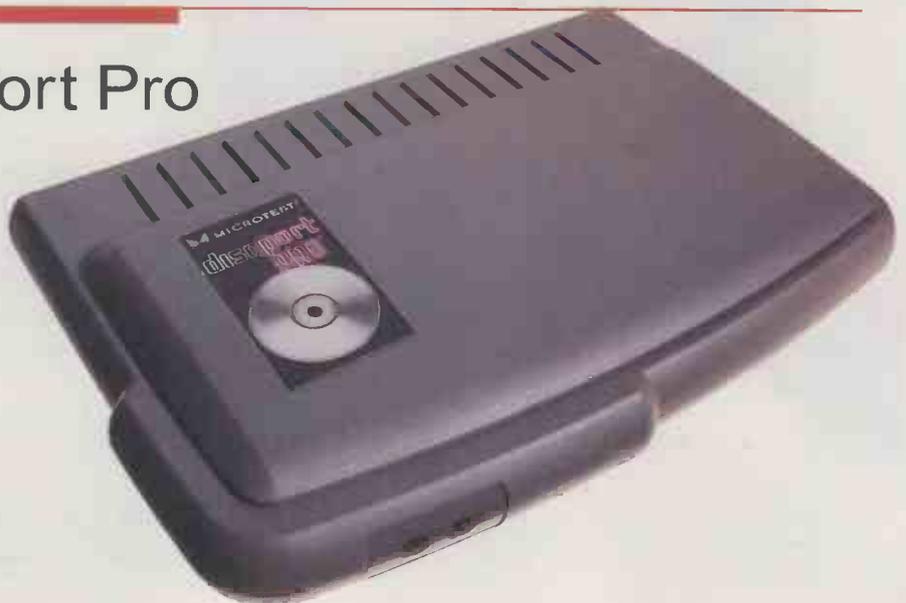
Contact Different Angle 0181 200 9980

HARDWARE

Microtest DiscPort Pro

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

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



CD-ROM drive.

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

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

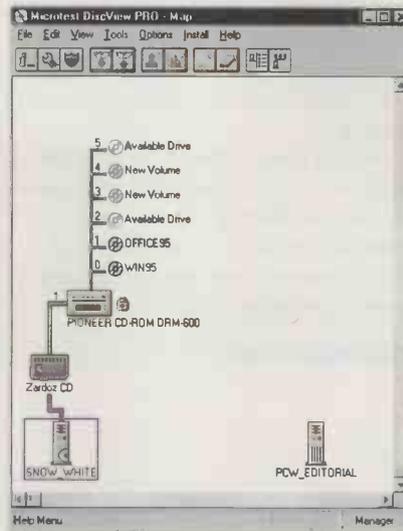
Microtest DiscServ takes the most obvious route of supporting and configuring CD-ROM drives physically connected to the server's own SCSI adaptor.

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

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

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

I managed to borrow a Pioneer DRM-



The DiscView Pro configuration utility

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

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

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

To configure the system launch

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

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

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

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

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

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

daisy-chained. Expensive, but ideal.

This is the only problem with the DiscPort Pro and it is one that can't really be blamed on the equipment, and which can be solved with a little patience, or a collection of CD-ROM drives. Either way, the DiscPort Pro does its job perfectly. I set up the entire system in less than half an hour without any server downtime. Security features were excellent, allowing sep-

arate access lists for each disc. Novell is even using Microtest's software for handling CD-ROM drives in future versions of Netware.

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

PCWVerdict

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

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

SOFTWARE

Pegasus Capital

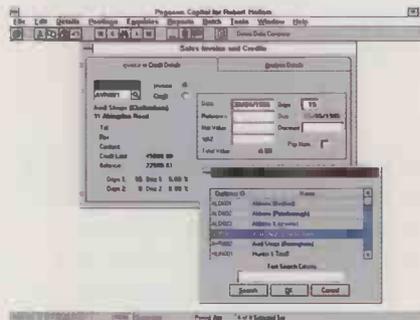
It isn't every day you get a new fully-featured accounting package from a major supplier. Capital, recently introduced by Pegasus, is audited by Robert Hallam.

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

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

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

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



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

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

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

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

One of Capital's more welcome features is sales order processing, because it lets you store details of sales and purchase orders from reception to despatch and invoicing, however long that may take. Most of the information needed can be entered from your customer's order

and, if it's a previous customer, Capital will add information from the customer account record, including credit limit and current balance. It also automatically allocates the next sales order number and notes the date on which the goods are due to be delivered, any settlement discount already agreed, any overall discount to be applied to the whole and the carriage details.

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

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

PCWVerdict

A versatile accounting suite with features and functions galore that will satisfy most small to medium businesses, especially with the inclusion of sales order processing.

Price £550 plus VAT
Contact Pegasus Software
01536 410044. Fax 01536 81796

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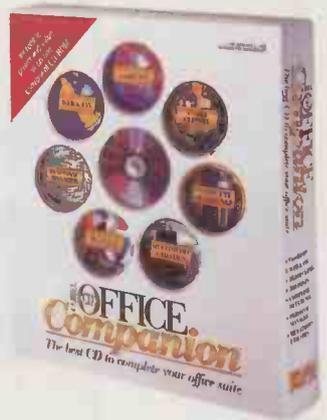


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PCW How You Can Contribute To The Long Term Tests Section

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

HARDWARE**HP DesignJet 600 plotter****2** YEAR
TEST

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

The HP 600: reliable and easy to maintain



At last, in April 1993, digital mapping became affordable for my department following the "service level agreement" between the Ordnance Survey and local government. We identified the need for a large format (up to A0) output device capable of handling OS maps and other drawings both on paper and translucent film. In June that year we

bought a DesignJet 600 mono inkjet plotter with 4Mb of RAM, and we have generally been very pleased with its performance since then.

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

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

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

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

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

PCW Verdict

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

SOFTWARE

Quattro Pro 6 for Windows

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

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

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

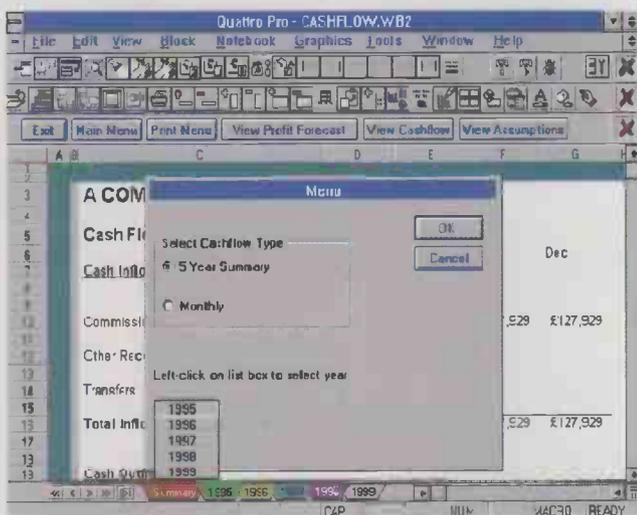
Quattro Pro was thrust upon me when I took up my present employment. Prior to this, I had been using Excel 5 and SuperCalc 5.5 — no, I am not kidding.

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

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

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

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



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

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

In the past, Quattro Pro has

6 MONTH
TEST

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

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

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

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

PCW Verdict

Easy to learn and versatile, with its own unique features. Well worth consideration, even by the more sophisticated spreadsheet user.

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GIVE YOU ROOM TO THINK

Back from the brink

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

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

Fortunately, you can take comfort in the fact that you're covered for this. You've got a maintenance contract that specifies a four-hour response. It's now 10.00 a.m. You get on the telephone: "My hard disk has failed," you inform them. "No problem," they say, reassuringly. "Our engineer will be with you by 2.00 p.m." And sure enough, four nail-biting hours later, said engineer turns up and pokes the PC's innards. "You're right you know, your hard disk has failed," he informs you. "Yes indeed" you agree, "how long will it take to fix?" He sucks his teeth and shakes his head. "I haven't got the parts, mate. I'll have to get back to my

depot and see if there are any in stock." "And how long will that take?" "Well, if they're in stock, I could get back to you (what is today, Monday?)... Wednesday afternoon. If we haven't got them in, mind you, it could be two weeks. We have to import them from Taiwan, you see." And off he goes, leaving you to your woe.

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

offing later in the morning?

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



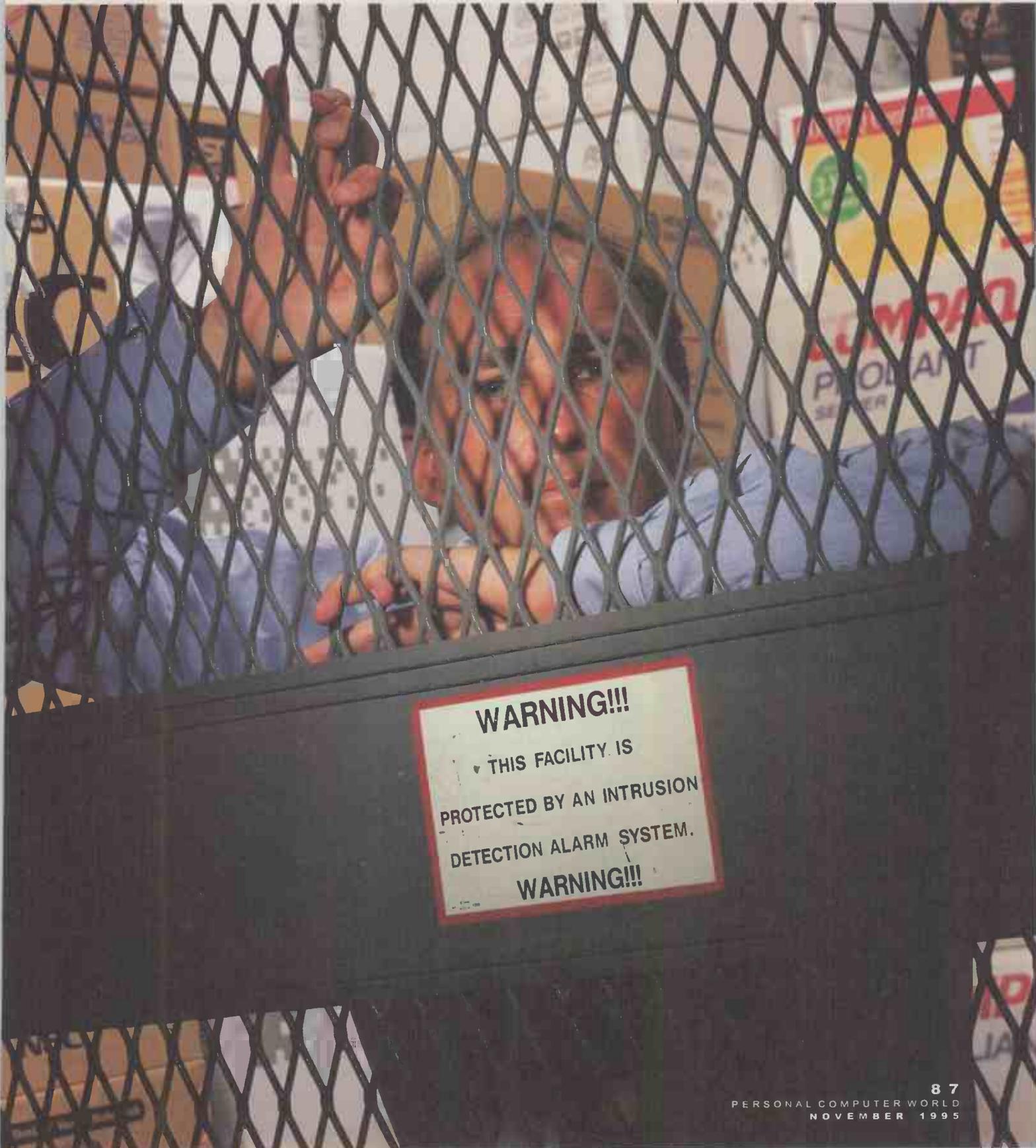
The first thing that managing director, Richard Pursey, shows visitors is his vault. I suppose if I had a bomb-proof, radiation-proof, oxyacetylene-proof vault the size of my bedroom, I'd want to show it off, too. It used to store millions of dollars' worth of cash in the days when the building was the US base's central bank. Today, it helps protect the millions of

pounds' worth of computer hardware that Adam Associates always keeps to hand to replace clients' deceased equipment. "No-one is going to get in here in a hurry," says Pursey. (Even in the unlikely event of someone being so impolite as to try, Greenham Common Business Park is still nominally an MOD-registered facility so has 24-hour armed guards who

apparently don't take kindly to uninvited guests.)

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

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



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

It's all down to psychology, explains Pursey. "Some 20 years ago or more, companies would entrust their lives and wellbeing to massive IBM and Cray mainframes with an RRP in excess of £3m apiece." They were extremely delicate pieces of kit. If you stood too close to one and belched, you risked putting the whole system out of action. So given this, and the extortionate cost of the thing in the first place, companies were

like the tea-boy. Often, the higher echelons don't even realise it's there or what it does. And because PCs are usually sprawled around the whole building on desktops, as opposed to being a single, expensive unit in an environment-controlled room, they don't rate the same level of attention as the old mainframes. They're almost invisible. People don't realise that their company can nevertheless be totally dependent on this 'invisible', comparatively inexpensive kit. So they're unprepared when things go badly wrong."

soggy computers. They can't claim insurance in the interim, because they can't prove to the insurers that their machines are damaged beyond repair until they've dried off and been given the once-over by an engineer. The result is therefore extended downtime; downtime that causes loss of business and consequent loss of revenue.

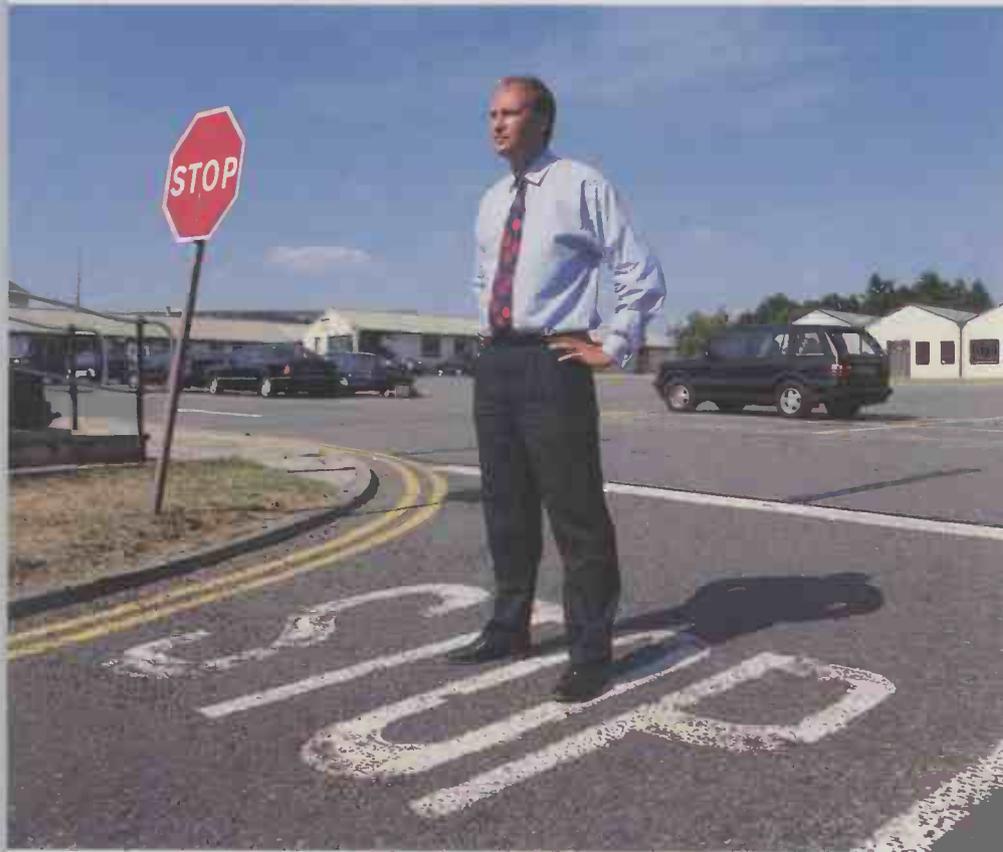
Computer theft

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

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

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

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



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

willing to spend an equal amount of money keeping it healthy. Therefore their computers were stored in specially segregated and secure air-conditioned facilities, their every whim pandered to by a round-the-clock team of maintenance engineers who regularly instigated backup and fallback routines.

Soggy computers

"Today, however, things are different", Pursey continues. "Whereas the purchase of a £3m leviathan had to be a Board decision, buying a sub-£1,000 Pentium can be entrusted to someone

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

Sprinkler systems are apparently great fun, too. "They tend to go off for the strangest of reasons, mainly when there's no fire at all." (Maybe they are manufactured by the same people who make car alarms.) Whatever, companies are understandably reluctant to switch on

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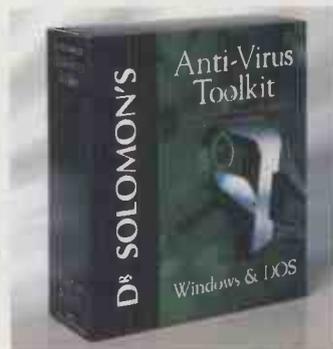
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† (As of July 1995)



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Company _____

Job Title _____ No. of PC's _____

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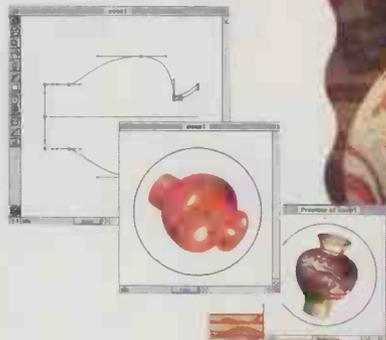
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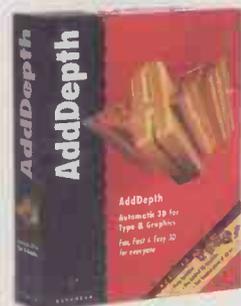
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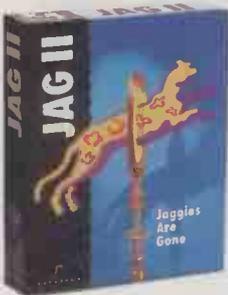


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There are, however, some more forward-thinking maintenance companies around who will "guarantee" both to respond within a given time period and also to fix the kit.

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

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

Vulnerability

So how come Adam Associates can do it any better?

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

So what constitutes a disaster as far as client companies are concerned? "Everything that isn't covered by usual maintenance companies: viruses, spilt coffee, and so on. In all traditional

maintenance contracts there is a *force majeure*, which says: if you've experienced a fire, a flood, an act of terrorism, theft, or accidental damage, we won't come out. But with our service, we don't define the word 'disaster', our clients do. If they ring us with a problem, we'll come out. It doesn't matter what it is. It could be that their hard disk has failed, it could be someone has poured coffee over the keyboard, or simply that the PC just doesn't work properly."

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



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

Teleporting

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

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

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

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

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

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

PC Contacts

Adam Associates is on 01635 521500.



Hey, good looking

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

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

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

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

With a scanner you wouldn't have to do either: you could just scan it (that is, copy it) into your computer and file it in a free-text database such as AskSam. Then, when you want to

review all complaints about either widgets or grommets, all you have to do is ask the database to find every letter or document on the database containing the relevant word. Even in small business environments, document scanning is a valid proposition — and especially so in small businesses where filing and retrieving relevant information can be costly and time-consuming.

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

Case study

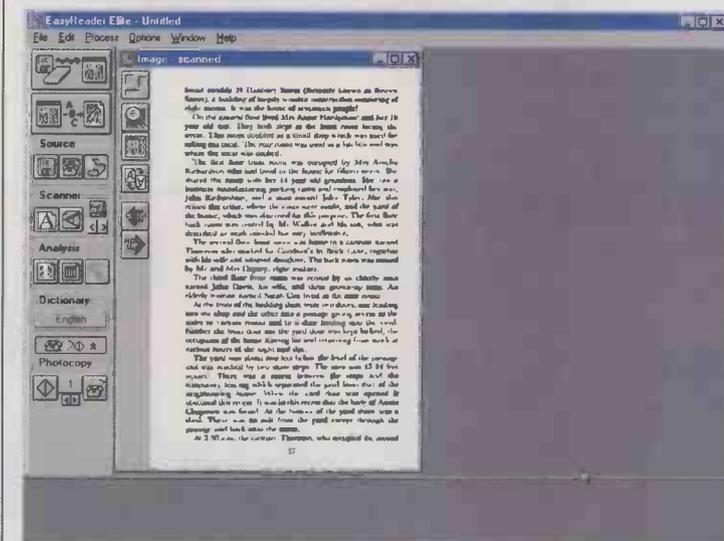
As a writer, I find the possibilities of OCR one of the most exciting things about owning a computer. A few years ago I carried out a lot of research for a book. I won't bore you with the details, but I was concerned to give the fullest and most accurate report of what was said by various witnesses to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

It was important to me to fully and accurately record the witness testimony, noting additions and variations to the story. Now, because I was dealing with a dozen or more sources, the only satis-

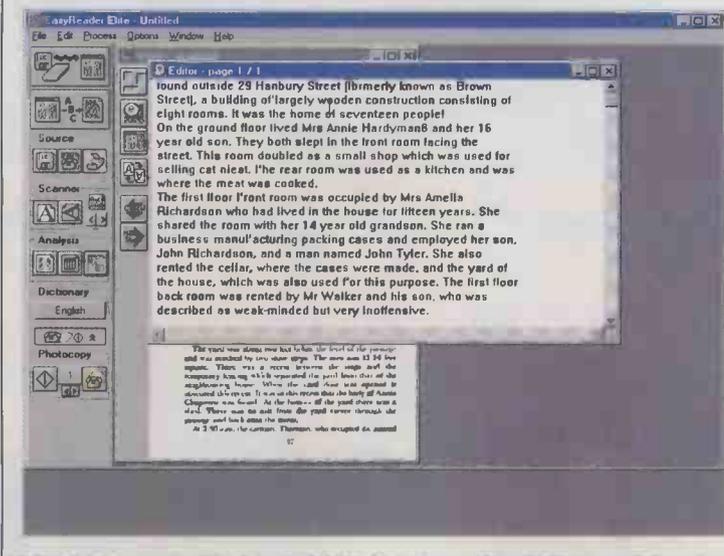
factory way to do this was to copy the different accounts into a single document, whereupon I could compare them. The copying took several months.

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

EasyReader



The scanned image



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

Making the choice

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

EasyReader Elite and EasyReader Classic

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

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

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

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

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

OmniPage Pro 6.0

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

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

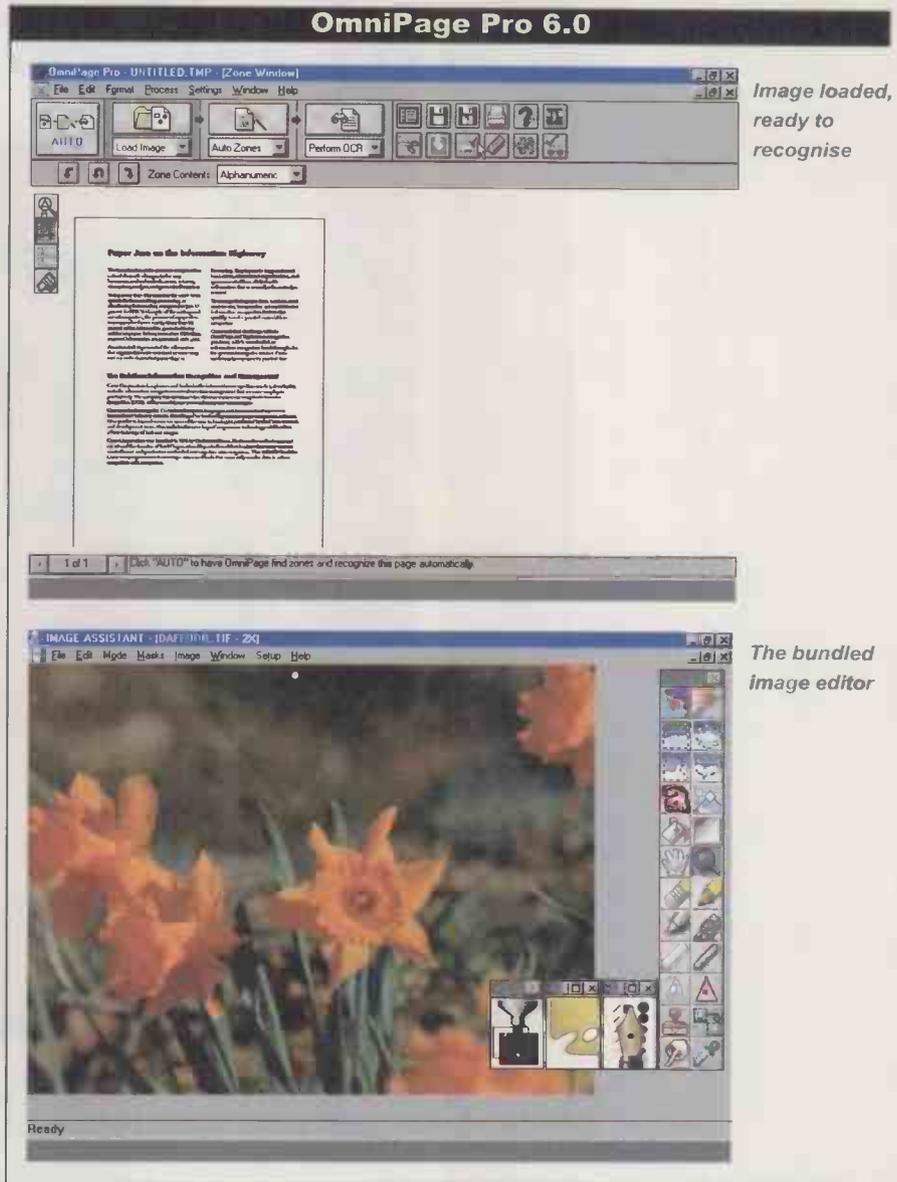


Image loaded, ready to recognise

The bundled image editor

PCW Details

EasyReader Classic

Price £199

Contact Prestige Network 01344 303800. Fax 01344 303801

Good Points Neat, very compact. Works well.

Bad Points Basic. Expensive for what it does.

Conclusion Needs to be more aggressively priced (say cut by half) to be recommended.

PCW Details

EasyReader Elite

Price £399

Contact Prestige Network 01344 303800. Fax 01344 303801

Good Points Compact and well-featured. Good accuracy. Speedy.

Bad Points Very overpriced.

Conclusion A personal favourite, but price weighs heavily against it.

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

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

The new Page Parser analyses page

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

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

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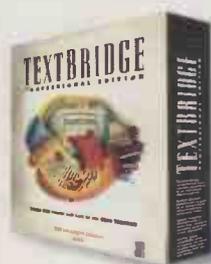
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Pro can most effectively interpret any characters that may be faded, touching other characters, or distorted after having been printed, copied or faxed.

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

Dynamic Access Panel).

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

Overall, this is a very impressive package. It looks good, is easy to use

OCR — How Is The Magic Worked?

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

Matrix matching

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

Feature extraction

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

Noise elimination

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

Voting

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

AccuPage and AnyPage

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

PC Details

OmniPage Professional 6.0

Price £595

Contact Caere 0171 630 5586.

Fax 0171 650 5587

Good Points Feature-rich, powerful, easy-to-use, and as accurate as can be expected.

Bad Points Ridiculously expensive.

Conclusion Far too expensive for the SoHo and educational markets, but if you have pots of money and want to perform serious OCR, you can't do better.

and produced good results over a range of test documents. Unfortunately, when it comes to price, we are talking seriously silly money.

Readiris 3.05i

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

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

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

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"OmniPage Pro is accurate, swift and has a great set of features." PC Magazine, June 1995.

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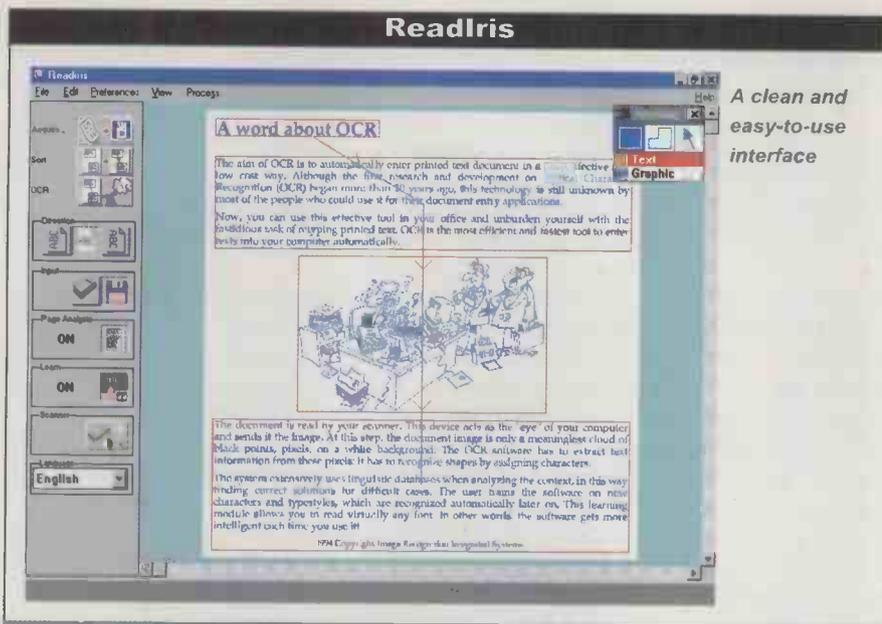
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June 1995
OmniPage Professional 5.0
Caere Corporation



A clean and easy-to-use interface

PCW Details

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

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

PCW Details

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

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

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

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

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

WordScan Plus 4.0

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

recognised document data (text and pictures) directly into an open host application document. That is, you can launch TextBridge from within Word for Windows, and after the recognition process the scanned document will automatically be imported into Word with all the text and page layout intact. Xerox claims that TextBridge Pro is the only high-end document recognition program that can do this, and it seemed to work well.

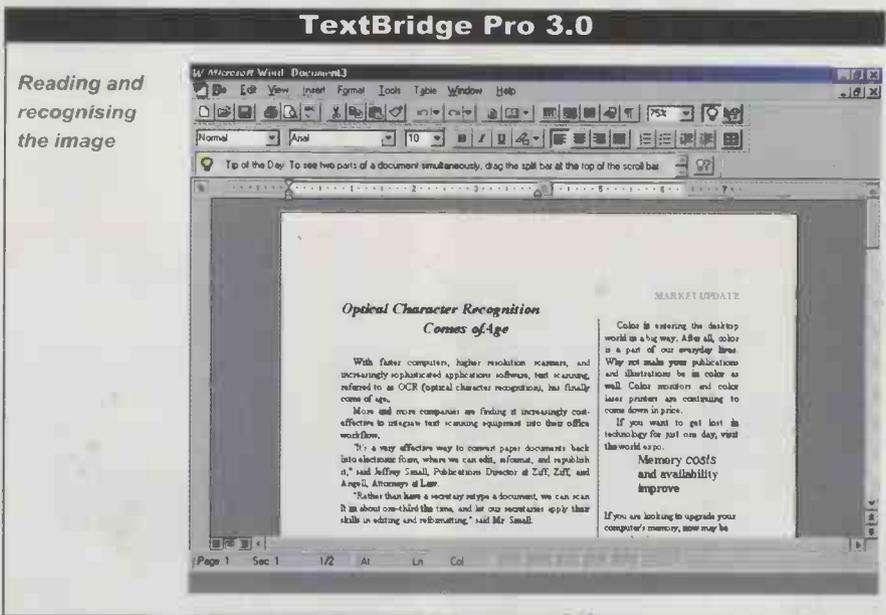
Another new feature resulting from TextBridge Professional's integration with other software is the ability to proof-read directly from within a host application. Unfortunately, this post-recognition proofing and editing is currently only available from within Word for Windows 6.0 and WordPerfect for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

To improve recognition accuracy with

TextBridge Pro 3.0

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

Xerox is particularly proud of its Instant Access OCR facility in the TextBridge Professional edition. Instant Access lets you run TextBridge Pro from within virtually any Windows-based text application, then after the recognition process, TextBridge automatically pastes



OCR — How Do You Perform The Magic?

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

- 1 Acquiring** — this basically means sticking a paper document into your scanner and "photocopying" it into your computer.
- 2 Page Decomposition** — this is the process by which the OCR software analyses the scanned image to distinguish between text and graphics.
- 3 Recognising** — that is, performing OCR. This is when the OCR software sets about trying to associate a shape with a known letter. Although this sounds easy it is in fact the difficult bit. Once completed, you can export the text into your word processor for editing.

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

columns of text, or boxed text such as this. And in this instance, Page Decomposition is an important factor; deciding the correct order in which to read the columns.

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

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

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

is a significant upgrade because the recognition engine has been rewritten. The new Predictive Optical Word Recognition (POWR) engine is designed to recognise whole words, just as humans do, instead of letter by letter. As a result, version 4.0 improves recognition accuracy by a claimed 40 percent across a wide range of document types, with

many pages showing up to 80 percent fewer errors compared with the previous WordScan engine. POWR is built on something called the Hidden Markov Model (HMM), which mathematicians use to model complex predictions. Caere is the first OCR developer to apply HMM to OCR word recognition.

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

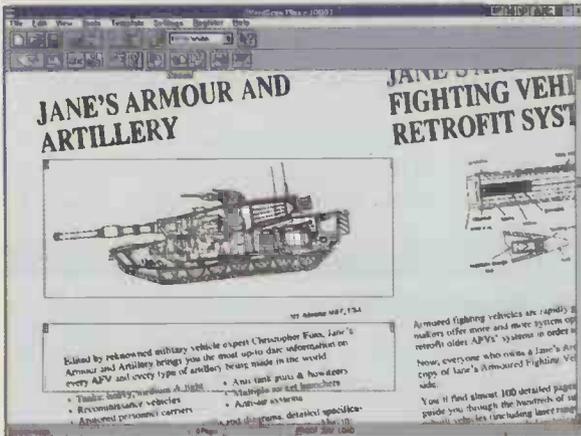
You'll need a 386 or higher processor with 6Mb

WordScan Plus: Excellent recognition



of hard disk space and 4Mb of total system memory (8Mb recommended). At least 8Mb of permanent virtual memory (10Mb recommended), DOS 5.0 or higher, and Windows 3.1 (but no higher).

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



PCW Details

WordScan Plus 4.0

Price £495

Contact Caere 0171 630 5586.

Fax 0171 650 5587

Good Points Fast, efficient, handled difficult text well.

Bad Points Won't load under Windows 95.

Conclusion Powerful and feature-rich. Expensive

Conclusion

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

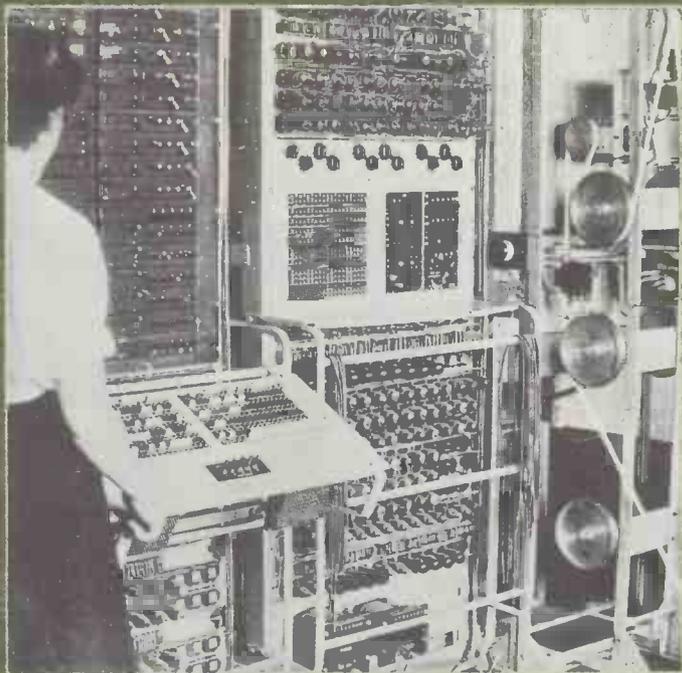
Without question, the best OCR package reviewed here is OmniPage which receives our Editor's Choice award. It's easy to install and use, was acceptably accurate with everything we threw at it (by which I mean it fell down where we didn't expect it to jump the hurdle anyway), and is feature rich. On the down side, you have to be rich to

afford it. With the cost of scanner hardware falling, manufacturers are going to have to bite the bullet and be more aggressive with their pricing in future.

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

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

"The earliest programmable electronic computer was a 1500 valve giant code named 'Colossus'.



Formulated by Professor Max HA Newman and built by TH Flowers, it was installed at Bletchley Park, Bucks in December 1943 to assist Britain's secret code breakers during World War II.



Today, 52 years on, we are proud to announce 'System 95' by Colossus,



the ultimate new range of PC systems that release the power, compatibility and versatility of Windows® 95."



COLOSSUS

Colossus unlock the power, compatibility and the versatility of Windows 95.



Meet our new 'System 95' by Colossus



SYSTEM 95 by COLOSSUS

Make no mistake about it "System 95" by Colossus is special, even unique, and heralds a breakthrough in 32-bit computing. Since the birth of the IBM compatible in the early 80's that remarkable and time resilient bolt-on system has demonstrated, time and time again, its ability to adapt and access extra features via third party add-in cards. These "add-in" cards were most times, highly innovative, sometimes expensive, but more often than not they could not perform to their full capability because of conflicts and bottlenecks when installed in the existing system. Our research team at Colossus, while examining and evaluating the potential of Windows 95 took a long and hard look at these incompatibilities and bottlenecks and with the collaboration of some of the world's technology leaders have developed and integrated new configuration procedures that take Plug and Play compatibility, ease of use and indeed raw speed and power to the ultimate. Hand on heart "System 95" by Colossus is state of the art in a PC and there is nothing around (we know) to touch it.



All Systems are fully plug and play compatible and include:

- PCI Bus
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- 256k burst mode SRAM cache
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- Orchid NuSound sound card featuring 3D spatializer surround sound effects and voice recognition
- Six speed CD-ROM drive 190m/s access time
- 70 Watt premium stereo speakers
- 8 or 16Mb EDO RAM memory expandable to 128Mb
- 2 Enhanced serial and 1 parallel port
- Mouse and keyboard
- 3.5" floppy disk drive
- 15" or 17" Non interlaced SVGA colour monitor
- Windows 95
- Novell PerfectOffice (for details see opposite page)
- Encarta® '95 plus 6 CD multimedia titles
- Choice of desktop, midi tower or full tower case styles



'System 95' by Colossus model P100

- Intel 100MHz Pentium® processor
- 16Mb EDO RAM
- 1.08Gb 11ms EIDE drive mode-4 F80A-2
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- 15" Non interlaced SVGA colour monitor
- Midi tower case

Plus all the specifications listed alongside

£1999 +VAT

£2729 +VAT

P150 model £2999+VAT



'System 95' by Colossus model P133

- Intel 133MHz Pentium® processor
- 16Mb EDO RAM
- 1.6Gb 11ms EIDE drive mode-4 F80A
- Diamond Stealth 64 3200 4Mb VRAM video card
- 17" Non interlaced SVGA colour monitor
- Full tower case

Plus all the specifications listed above



'System 95' by Colossus model P75

- Intel 75MHz Pentium® processor
- 1.08Gb 11ms EIDE drive
- 8Mb EDO RAM
- Diamond Stealth 64 3200 2Mb VRAM video card
- 15" Non interlaced SVGA colour monitor
- Desktop case

Plus all the specifications listed above

£1589 +VAT

ENGINE SPECIFICATION

- Intel Pentium® P75/100/133/150 CPU
- 8/16Mb of memory, expandable to 128Mb
- Intel Triton chipset, full PnP compliant PCI bus
- SMC 37C665 Multi I/O chip
- Enhanced IDE interface supporting up to 4 EIDE devices fast 4-mode
- Two high speed 16550 serial ports
- One high speed enhanced parallel port
- 256Kb mixed mode fast burst SRAM cache exp. to 512Kb
- 4 ISA (PnP) and 4 PCI (PnP) expansion slots
- Memory to PCI bus transfer rate of up to 100Mb p/sec

VIDEO SPECIFICATION

- Diamond Stealth 64 video 3200 graphics engine
- 2Mb fast VRAM expandable to 4Mb
- 64-bit graphics performance
- Flicker free refresh rate up to 120Hz
- MPEG playback
- Fully PnP compliant
- Accelerated video playback
- MPEG, INDEO and CINEpak compatible
- Full support for DCI (Digital Control Interface)

AUDIO SPECIFICATION

- Orchid NuSound PnP Audio Card
- Plug and Play 16-bit sound card
- CD-quality 16-bit audio with 64x over sampling
- Hardware wave table synthesis and MIDI support, 3D Spatializer audio technology giving surround sound
- MPC level II, Soundblaster pro, Roland MT-32 and MPU-401 compatible
- 1Mb Wave table in compressed ROM
- Up to 32 simultaneous voices, 190 instrument sounds and voice recognition
- 5 Channel sound (4 stereo, 1 mono)

Meet the New Colossus SBF Office Series

We are good at building PCs and could easily build Colossus down to a price, for example, we could offer you just 4Mb RAM, but how are you going to run Windows 95? (included in the price with anything less than 8Mb. We could offer you a dual speed CD-ROM drive, or no CD-ROM drive at all, but we include a fast access quad speed drive. We could offer you systems without PCI bus and without PCI cards, or no external cache, or perhaps a monitor that was interlaced. Even a cheaper chassis... but we don't. We offer you "the business, the best", because, to take advantage of Novell PerfectOffice (also included in the price) and new 32-bit software that is just around the corner, it makes no sense to consider anything less. Add-on for add-on, specification for specification, price for price, check us out. You might just get a surprise.



Now with DX4-100 processor and 850Mb hard disk as standard

Colossus SBF Office Systems Standard Specification

- 486DX4-100 processor
- High performance PCI bus
- Pentium* upgradeable
- 64 bit PCI graphics 1Mb
- 256k fast cache
- 8Mb RAM
- 3.5" 1.44Mb floppy drive
- 7 bay desk top case
- 14" low radiation 0.28 DP colour monitor non interlaced SVGA
- 1 parallel and 2 serial ports
- 850Mb 11ms enhanced IDE disk
- Quad speed CD-ROM drive
- 102 Keyboard and mouse
- Latest MS Windows 95 (or MS DOS and Windows for Workgroups 3.11 optional)
- Novell PerfectOffice with 6 leading software applications pre-loaded and ready to use

£999 +VAT

Colossus SBF Office Series Processor Options (specifications as above)

DX4-100 £999 +VAT	Pentium* processor models are inclusive of the Intel Triton Chipset	75MHz Pentium* £1099 +VAT	100MHz Pentium* £1259 +VAT
DX2-66 £949 +VAT		90MHz Pentium* £1179 +VAT	133MHz Pentium* £1499 +VAT

Colossus SBF Upgrade Options (add the following amount)

Card upgrades	Monitor upgrades
16-bit sound card and stereo speakers +£50	14" to 15" +£70
16-bit ethernet LR2000 combi card +£40	14" to 17" +£300
14,400 BAPT internal fax/data modem with fax and data software +£80	Memory upgrades
Hard disk drive upgrades	System RAM upgrade for each 4Mb RAM +£100
From 850Mb to 1.08Gb +£50	Video DRAM upgrade to 2Mb +£40
From 850Mb to 1.60Gb +£150	Video upgrade to 2Mb VRAM +£140
From 850Mb to 540Mb -£30	Video upgrade to 4Mb VRAM +£260
	Six speed CD-ROM drive +£100

Colossus Finance Example:

Max APR 19.8% Example: DX4-100 £999 +VAT
 Delivery = £1196.16, 10% Deposit = £119.61, Balance = £1077.00
 or 12 monthly payments of £98.73, or 24 monthly payments of £53.85
 or 36 monthly payments of £38.89

For further details please ask for our finance brochure. Finance is available subject to status. Written quotations are available on request.



Certificate No. FS 28122
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Colossus Computer Corporation Ltd. Colossus House, Travellers Lane, Welham Green, Hertfordshire. AL9 7DA

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Facsimile 01 707 26 74 00

About Colossus

We are Colossus Computer Corporation Ltd, a wholly owned subsidiary of the Granville Technology Group of Companies, the UK's premier direct PC supplier, with a customer base approaching 200,000. While we are fascinated about the early history of electronic computers (and happy to send you more information), our main task, of course, is to ensure that you, our customer, get the best deal around.

The Colossus Company is uniquely positioned in the PC marketplace in that we enjoy the stability of being part of a thoroughly and financially sound parent company, however, at the same time we have the flexibility of a manufacturing base that enables us to build and formulate system(s) and solution(s) specifically and, indeed, individually to our customers needs.

Colossus Quality and Service

Our manufacturing facility is streamlined. We use the most advanced design and engineering techniques and our "Burn In" testing procedures coupled with the fact that we buy only the finest components for our systems will guarantee "Award Winning" Colossus reliability. As far as our service is concerned, from placing your order, through the delivery process, right through to free Technical Support, you will find at Colossus only knowledgeable and helpful people to advise you.

The Colossus Range

Whatever system or systems you choose, you will discover that we can meet your every need to enable you to cope with today's, and importantly, tomorrow's fast moving developments in software and hardware technology. At Colossus we build every PC, client server, workstation, and transportable using our "Building Block" principle of upgrade paths right through to full solutions. Our Networking Division provide advice on complete range of advanced networking services which include Mission Critical Raid Level 5 Fault Tolerant Systems. Our service also includes consultancy, comprehensive quotations, full installation, cabling, implementation of multi-user network applications, training and support.

Colossus BS5750

Having achieved BS EN ISO 9002 (BS5750 Quality Standards), we at Colossus have proven beyond doubt our ability to build, configure, install and maintain computer systems, and it is testament to the quality of our service and the reliability of our product, as well as our consistent value for money that the majority of our business comes from existing and recommended customers.

Colossus Warranties

In our book "The Customer is King". (that's part of our mission statement), so, customer satisfaction and peace of mind are key objectives for us at Colossus. All our systems carry a full back-to-base 12 months parts and labour warranty as well as technical telephone support and we also offer a choice of on-site maintenance options and extended warranties.

Colossus Terms of Trading

We offer credit facilities and business leasing to corporate customers (according to status). Official Government and Educational orders are welcomed. Payment can also be made by Visa, Access, Amex, cheque, etc. We can also offer finance facilities for individual customers, please ask for our Finance brochure.

The Colossus Range - Want to know more?

Just give us a call on the number below and you will be in touch with one of a team of knowledgeable and highly trained sales staff.



All prices exclude delivery and VAT (17.5%). Delivery: Systems £19, Lasers and large items £15, software and small items £10. Visa /Access/ American Express /Switch and Government orders welcome. Prices, specifications and offers are subject to change and subject to our conditions of sale copies of which are available on request. Mail order only. No collections please. Goods are normally despatched within 7 days. All orders will be fulfilled within 28 days unless otherwise specified. Software is pre-loaded, back-up CD and manuals are available as options. Intel* Inside and Pentium* processor logos are trademarks of Intel* Corporation. All trademarks are acknowledged. E&OE.

Sales lines are open Monday - Friday 9.00am - 6.00pm

COLOFF1A

Meet the New Colossus SBF Power Notebook Systems

The New Range of Colossus "on the move" Power Notebooks incorporate advanced features and high specifications such as exchangeable hard disk drives up to 1.2Gb, RAM capacity up to 32Mb as well as multimedia capabilities. With advanced touch pad mouse, Vesa

Local Bus Graphics, a choice of upgradeable screens and pre-loaded with Novell PerfectOffice (with its six leading applications), the high specification Colossus Notebook systems can be specifically built and formulated (SBF) by us for you at prices that are highly competitive.

Colossus SBF Mono



£1159_{+VAT}

- 486DX4-100 processor
- 4Mb RAM expandable to 32Mb
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- Removable 340Mb hard disk drive
- Choice of mono, dual scan or TFT screen
- 1Mb VESA local bus graphics
- 86 Key keyboard, 12 function keys
- One DB-25 pin parallel port, bi-directional with EPP/ECP support. One 9 pin serial port (16550 UART), keyboard, external monitor and mouse ports PS/2 type
- Additional ports for docking and optional IRDA and TV tuner modules

Colossus SBF Dual Scan



£1529_{+VAT}

- Two speakers built-in (Soundblaster and Windows Sound System 2.0 comparable). Optional - sound card module
- Two type II, or one type III PCMCIA slot
- LCD icon indicators
- Nickel metal hydride (NiMH) battery, 120/240 auto-switching adaptor. Full APM support. System supports suspend to RAM and suspend to disk functions
- Phoenix Systems BIOS, Flash upgradeable. Includes setup in ROM, user-defined power management options
- 8.85"(D) x 11.62"(W) x 1.97"(H). Weight 6.2 pounds
- Windows 95 (MS DOS & Windows for Workgroups optional)
- Novell PerfectOffice suite pre-loaded

Colossus SBF TFT



£1999_{+VAT}

STOP PRESS! JUST ARRIVING Colossus SBF Pentium® Notebook Systems

We are pleased to announce the arrival of our new Colossus SBF Pentium® Notebook Systems. These, our fastest notebooks feature:

- Intel Pentium® 75 or 90MHz processor
- Minimum of 8Mb RAM
- Minimum 540Mb hard disk drive
- 16-bit sound card, built-in internal speakers
- Quad speed CD-ROM drive
- Built-in MPEG
- Choice of dual scan or SVGA
- TFT screens
- Windows 95 and Novell PerfectOffice pre-loaded
- Prices from around £2000

Colossus 75MHz Pentium® Multimedia Notebook Computer

Hard Disk	8Mb	16Mb	32Mb
540Mb	£2179	£2259	£3029
810Mb	£2299	£2579	£3139
1200Mb	£2509	£2799	£3359

For 90MHz Pentium® CPU model +£500
For 10.5" SVGA TFT model +£200

Upgrades & Options

RAM upgrade per 4Mb	+£140
From 340Mb to 540Mb hard disk	+£90
From 340Mb to 810Mb hard disk	+£260
From 340Mb to 1.2Gb hard disk	+£480
12v DC car adaptor	+£60
Additional NiMH battery	+£99
Docking station	+£329
SMART battery pack	+£120
Sound card module	+£80
TV tuner module, infra-red & port replicator	ETBA
28.8 PCMCIA modem	£199
486DX4-75	

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The new Colossus Power Portable range provides substantial computing power for users who need desktop performance in a portable package. They are designed for mobile and industrial applications that require speed, expandability, and ruggedness and the most popular uses are in

network management, instrumentation, data capture, presentations and multimedia applications. Add a 14.4 BABT voice/data fax modem card and you transform your power portable into a state of the art comms system.

Colossus SBF CRT Colour



£1679_{+VAT}

- Colossus CRT portable features 9" Sony SVGA colour monitor
- Colossus "Lunchbox" portable case features LCD VGA mono, dual scan colour or TFT colour screens
- 486DX4-100 processor
- 8Mb RAM expandable to 128Mb
- 256k external cache & PCI bus

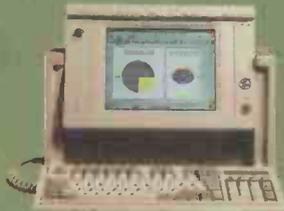
Colossus SBF Mono



£1399_{+VAT}

- 540Mb IDE hard disk
- 3 drive bays and 5 slots
- 3.5" 1.44Mb floppy drive
- PCI s3 64-bit 1Mb graphics on CRT model (special card in others)
- Parallel & 2 serial ports and keyboard
- Windows 95 (MS DOS & Windows 3.11 for Workgroups optional)

Colossus SBF Dual Scan



£2099_{+VAT}

- Colossus Portable Upgrades
- From 540Mb to 850Mb +£30
 - From 540Mb to 1.08Gb +£80
 - From 540Mb to 1.60Gb +£180
 - From 540Mb to 2Gb SCSI II +£580
 - Adaptec 2940 PCI SCSI controller +£200
- Processor Upgrades
- From 486DX4-100 to P75 Triton +£100
 - From 486DX4-100 to P90 Triton +£180
 - From 486DX4-100 to P100 Triton +£260
 - From 486DX4-100 to P133 Triton +£500
- Alternative Processor
- From 486DX4-100 to 486DX2-66 -£30

Colossus SBF TFT



£2999_{+VAT}

- Other Options
- NEC 6XI SCSI CD-ROM +£300
 - NEC SCSI/AT adaptor +£60
 - 16-bit sound card +£40
 - Soundblaster AWE 32 Value +£130
 - 14" additional screen +£160
 - 15" additional screen +£230
 - 17" additional screen +£460
 - 14.4 BABT fax/data modem +£80
 - 28.8 BABT fax/data modem +£150
 - 800Mb tape back-up +£150
 - 1.7Gb tape back-up +£220

Additional RAM

COLNOTIA RAM per additional 4Mb +£100

Meet the New Colossus SBF Servers & Workstations



We did think about giving you lists and lists of specifications of our Novell Server options, but, frankly, server specifications are so unique to each individual business, our philosophy of specific build and formulation (SBF) means that we will build you a server (or servers) that are unique to your requirements. We list here examples of popular configurations; a typical file server and some workstations.



Colossus SBF 90MHz Pentium® Processor Server

- Intel 90MHz Pentium® processor
- Intel Triton PCI chipset
- Heavy duty power supply
- 9 drive bay full tower
- 16Mb RAM
- 256K fast cache
- 1.6Gb IDE hard disk
- SCSI II drive options with Adaptec 2940 PCI SCSI controller available
- 16-bit ethernet card
- 3.5" 1.44Mb floppy drive
- 64-bit PCI bus graphic with 1Mb
- 14" SVGA 0.28 colour monitor
- 102 keyboard and mouse
- Select desired Novell Netware operating system
- Select required server options

£1439 +VAT
Intel 100MHz Pentium® +£80

Colossus SBF Desktop Network Workstation



- 486DX2-66 processor
- PCI bus
- 8Mb RAM
- 256K fast cache
- 540Mb 11ms IDE hard disk
- 3.5" 1.44Mb floppy drive
- 64-bit PCI bus graphics with 1Mb
- 14" 0.28 colour SVGA monitor
- 16-bit ethernet card
- 102 keyboard & mouse
- MS Windows '95 (MS DOS and Windows for Workgroups 3.11 optional)

£809 +VAT

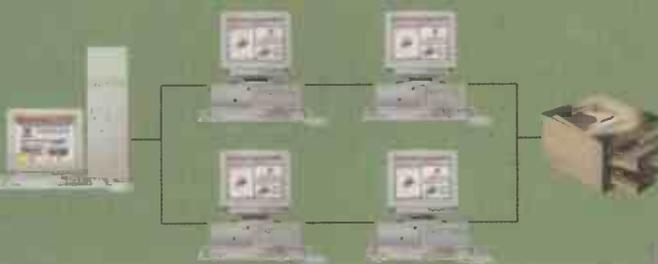
Processor Upgrades

DX4-100 +£50 +VAT	75MHz Pentium® +£150 +VAT	90MHz Pentium® +£230 +VAT
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Midi Tower case +£10.00

Networking Example

Network configurations are infinite. Whether you require a peer to peer Network or a Client Server Network, we can offer you a complete Network Solution. Just call the number below and ask for the Network Division. Our typical Client Server plus 4 Network Stations plus software can cost as little as £5,000.



Colossus SBF Server & Networking Upgrade Options (add the following amount)

Hard Disk Upgrades

540Mb to 850Mb	+£30
540Mb to 1.08Gb	+£80
540Mb to 1.60Gb	+£180
850Mb to 1.08Gb	+£30
850Mb to 1.6Gb	+£130
1.08Gb to 1.60Gb	+£80
1.6Gb to 2Gb SCSI II	+£380
Adaptec SCSI controller	+£200

Memory Upgrades

System RAM per 4Mb	+£100
1Mb video RAM to 2Mb	+£40
Monitor Upgrade	
14" SVGA to 15" SVGA	+£70
14" SVGA to 17" SVGA	+£300
Case Style	
Midi tower case	+£10
Full tower case	+£50

Multimedia

Double speed CD-ROM	+£60
Quad Speed CD-ROM	+£100
16-bit sound card	+£40
Soundblaster AWE32 Value	+£130
Network Cards	
16-bit ethernet card combi	+£40
16-bit ethernet 3COM	+£70
32-bit PCI ethernet card	+£150

Modems

14,400 BAPT fax/voice/data modem including software	+£80
28.8 fax/data Modem	+£150
Tape Back-up	
800Mb tape back-up	+£150
3.2Gb tape back-up	+£220
2Gb SCSI DAT drive only	+£600
4Gb SCSI DAT drive only	+£750

Server Options (Call for details)

Novell Netware 4.1 5 User	
Novell Netware 4.1 10 User	
Novell Netware 4.1 25 User	
Cheyenne ARCServe Software	
APC Smart UPS 600	
APC Smart-Ups 900	
Powerchute Plus for Novell	
Network installation & cabling	

Mylex Raid Level 5 (12Mb cache) Controller £1899

Colossus SBF Stand Alone Workstation 1



486DX2-66
£799
+VAT
DX4-100 CPU +£50

- 486DX2-66 processor with PCI bus
- 8Mb RAM
- 256K fast cache
- 850Mb 11ms IDE hard disk
- 3.5" 1.44Mb floppy drive
- 64-bit PCI bus graphic with 1Mb
- 14" 0.28 colour SVGA monitor
- 102 keyboard and mouse
- MS Windows 95 (MS DOS and Windows for Workgroups 3.11 optional)

Colossus SBF Stand Alone Workstation 2



75MHz Pentium®
£999
+VAT
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100MHz Pentium +£160

- Intel 75MHz Pentium® processor
- PCI bus with Intel Triton chipset
- 8Mb RAM
- 256K fast cache
- 1.08Gb 11ms enhanced IDE hard disk
- 3.5" 1.44Mb floppy drive
- 64-bit PCI bus graphics with 1Mb
- 14" 0.28 colour SVGA monitor
- 102 keyboard and mouse
- MS Windows 95 (MS DOS and Windows for Workgroups 3.11 optional)

Colossus SBF Stand Alone Workstation 3



100MHz Pentium®
£1499
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120MHz Pentium +£160
133MHz Pentium +£240

- Intel 100MHz Pentium® processor
- PCI bus with Intel Triton chipset
- 16Mb RAM
- 256K fast cache
- 1.6Gb 10ms enhanced IDE hard disk
- 3.5" 1.44Mb floppy drive
- 64-bit PCI bus graphics with 2Mb
- 14" 0.28 colour SVGA monitor
- 102 keyboard and mouse
- MS Windows 95 (MS DOS and Windows for Workgroups 3.11 optional)

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COLWKIA

Meet the New Colossus Home/Office High-Spec Multimedia & More

If you are taking the plunge on multimedia, PLEASE DO IT PROPERLY. We have taken a long, hard look at the minimum specifications we believe make sense for our systems. We have decided to make Colossus High-spec's Internet ready and so include PCI plug and play, a fax/data modem, as well as a PIPEX Internet 30 day trial pack. We have also included a top quality quad speed CD-ROM drive and, indeed, Novell PerfectOffice.

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- 102 keyboard and mouse
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- Novell PerfectOffice Software
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Pack now includes MS Encarta '95

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- EZ Language CD
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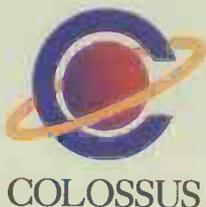
- Intel 90MHz Pentium processor
- Intel Triton PCI chipset
- 16Mb RAM & 256K fast cache
- 1.08Gb 10ms enhanced IDE hard disk
- 3.5" 1.44Mb floppy drive
- 64-bit PCI bus graphics with 2Mb
- 7 bay desktop case (Midi tower optional)
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- 16-bit sound card and speakers
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using Windows 95, just insert the CD into your CD-ROM drive and wait for the program to load.

Using the CD-ROM from DOS

If you don't have Windows, or if you experience any problems running some of the DOS software from Windows, exit to DOS and run the batch files which you'll find in the root directory of the CD-ROM.

Using PCW Interactive

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

AM for Windows Special Version

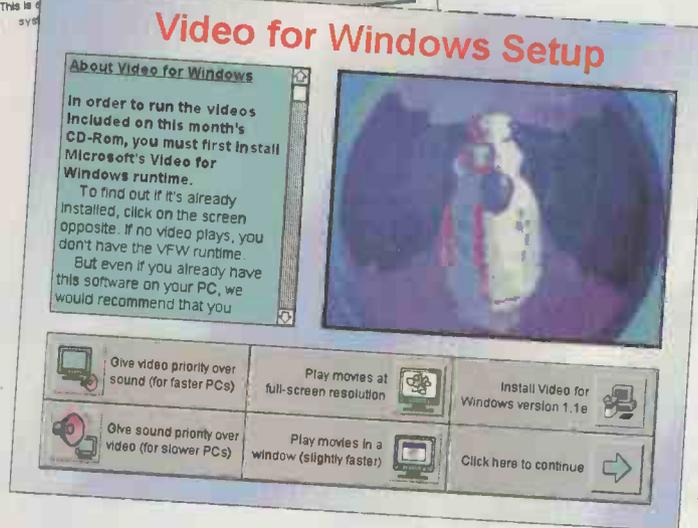
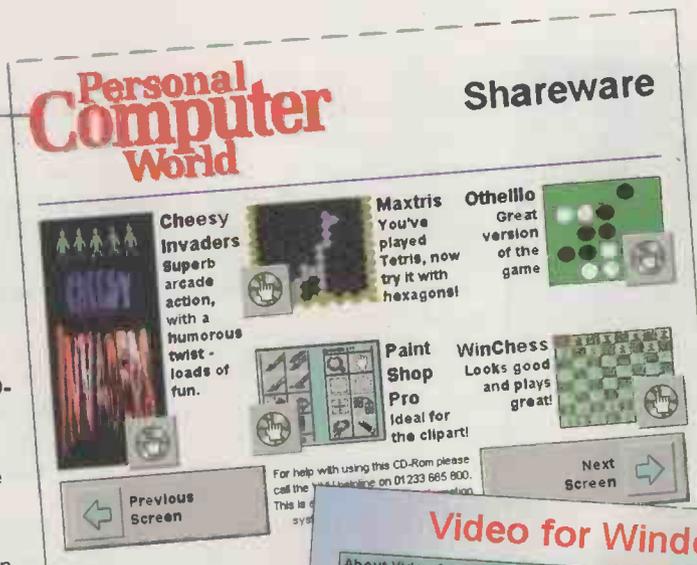
[System Requirements: Windows 95 or NT 3.51 or later, 15Mb free hard disk space, VGA display, 486DX/33, 8Mb RAM (Win 95) / 16Mb RAM (NT)]

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

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

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

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



Top Cheesy Invaders — not a game to be sniffed at

Above You'll need this to view the digital movies

Installing AM for Windows

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

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

Getting started

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

Further information

For further details on AM for Windows

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

Mac Software

This month sees the second selection of Mac software on the CD-ROM: New Media Schoolhouse, a superb selection of demos of children's educational games, the Marathon 1 Demo, a

fascinating multimedia demo of Wrath of the Gods, and a brilliant video from Greenpeace about global warming.

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

Video for Windows Enhanced Setup

On the first page of PCW Interactive you'll have the opportunity to install the latest version of Video for Windows runtime, so that you can view the digital movies on the CD.

If you haven't installed Video for Windows from a PCW Interactive CD before, then you should install this new version as it contains the latest drivers which deliver higher quality, a larger size and a faster playback rate. If you don't install the new version, some videos will display the message "Cannot display this video", or similar warnings.

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

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

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



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

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

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

Testing your CD-ROM

If you suspect your CD-ROM may actually be faulty or damaged you can run the file CDTEST.EXE in the SYSTEM directory of the CD-ROM. The program will then examine every byte of data on the disc to see if it can be correctly read.

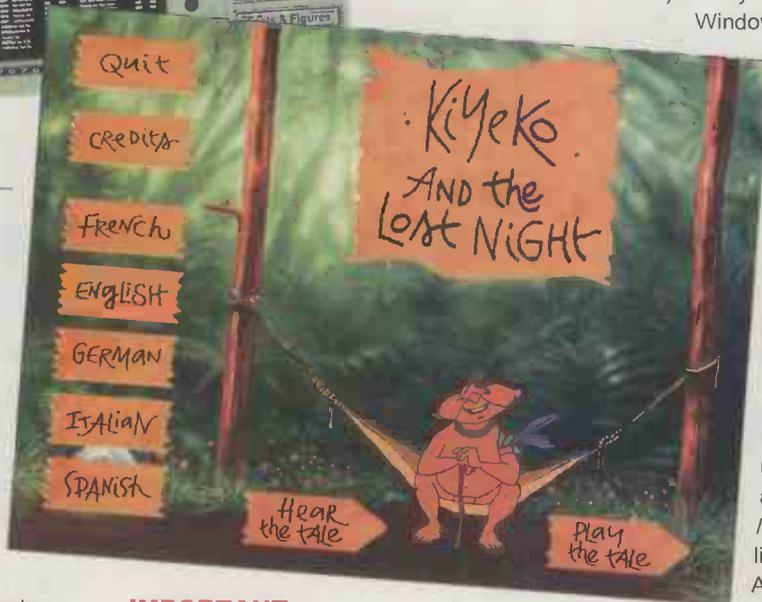
The process takes up to 35 minutes and generates a verification code if the disc passes the test.

If the CD-ROM fails this test try cleaning it with a light solution of washing-up liquid, dry it with a lint-free cloth and run the test again. If it still fails, return your CD-ROM to the magazine for a free replacement.

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

CDTEST D:

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



IMPORTANT — READ THIS!

• General Protection Faults

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

- 1) Run "Windows Setup" from File Manager, then select "Options" followed by "Change System Settings".
- 2) Scroll through the list of displayed graphic drivers until you get to the final entry "Other Display (Requires Disk from OEM)", and select it.
- 3) Insert this month's CD-ROM into the drive and replace the "A:" prompt with "D:\SYSTEM\SVG256" (changing the D: to the correct letter if your CD-ROM is not in drive D:), then press Return.
- 4) Scroll through the new drivers until you find the ones beginning "Super VGA..." and select the one for the resolution you prefer to use. The driver will then be installed and Windows restarted. PCWI and Video for Windows should then have no further problems.

If this works (which it should in

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

• Video for Windows install fails

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

• PCWI is slow to load or runs slowly

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

manuals for full details.

• Windows NT and OS/2

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

PCW

CD-ROM Advice & Contacts

The PCW CD-ROM is virus checked at every stage of production. However, neither VNU nor Ultimedia will accept liability for any problems arising from its use. You are advised not to install software on a networked PC before checking the disc. For technical support on the CD and the programs on it call our 24-hour Support Line on 01233 665800. This is a computerised touch-tone advice system providing tips and hints on a wide range of topics. It also offers you the opportunity to speak to a member of our technical support staff during office hours. If you prefer you can email rnixon@cix.compulink.co.uk, or on CompuServe: 70007,5547.

Superscape Part 3

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

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

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

Please note that this will require a modification to your AUTOEXEC.BAT file where a line similar to
`SET VIS=C:\SUPERSCP\PROGRAMS`
 is added, which sets the environment variable VIS to point to the SUPERSCP directory. However, this means that you will need to restart your PC in order for this change to take place, before you can run the visualiser.

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

If the visualiser fails to run, it is likely that you do not have enough environment space free for the SET VIS= command to work. Check that the directory containing the Superscape visualiser program is in your path statement within the AUTOEXEC.BAT file.

You may need to edit your CONFIG.SYS file and find the line that begins SHELL=, and look along it until



you find an option such as /E:512. When you have found it, change it to /E:1024 (or a number that is 512 bigger than the previous setting).

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

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

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

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

The Petrol Station Virtual World
 The petrol station illustrates how Super-

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

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

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

The Street Virtual World

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

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

Further information

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

Competition: Win 2 days' Superscape Training

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

The Questions

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

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

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

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

SUPERSCAPE COMPETITION ENTRY FORM: NOVEMBER PCW INTERACTIVE

Answer 1 _____ Answer 2 _____

Name..... Title.....

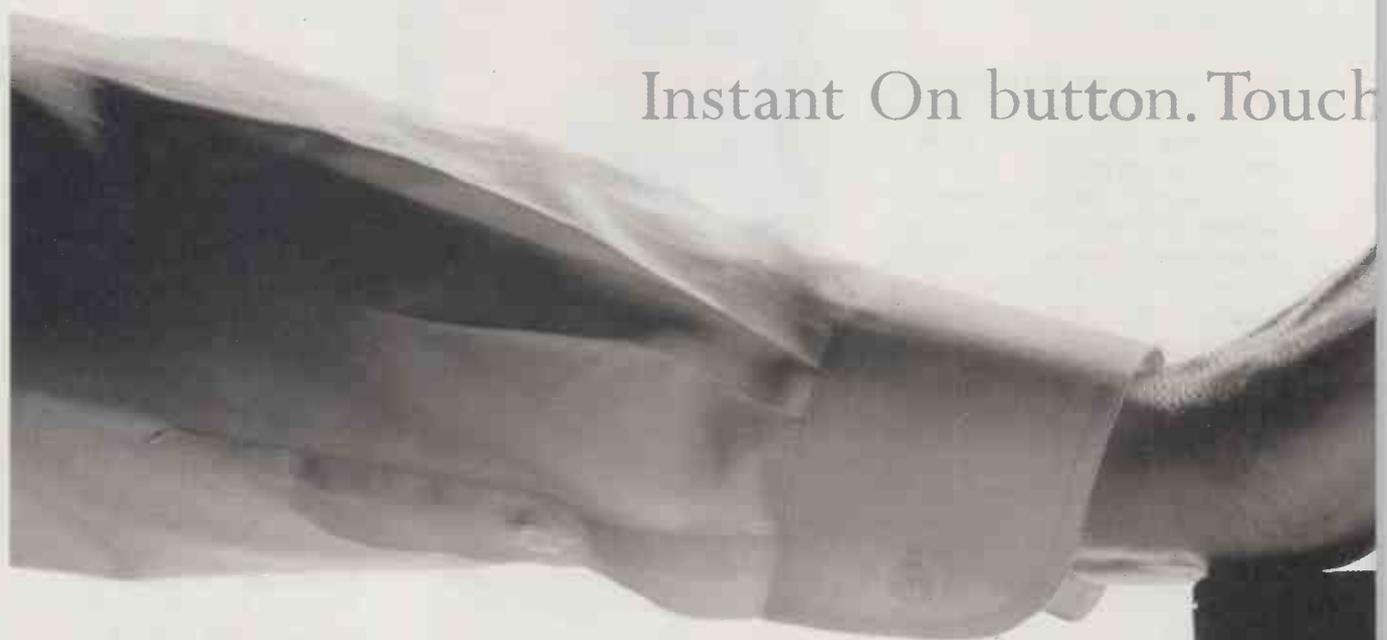
Company.....

Address.....

Postcode..... Telephone.....

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

The new Compaq Contura is designed to make
desk as simple as possible. Top left, just above

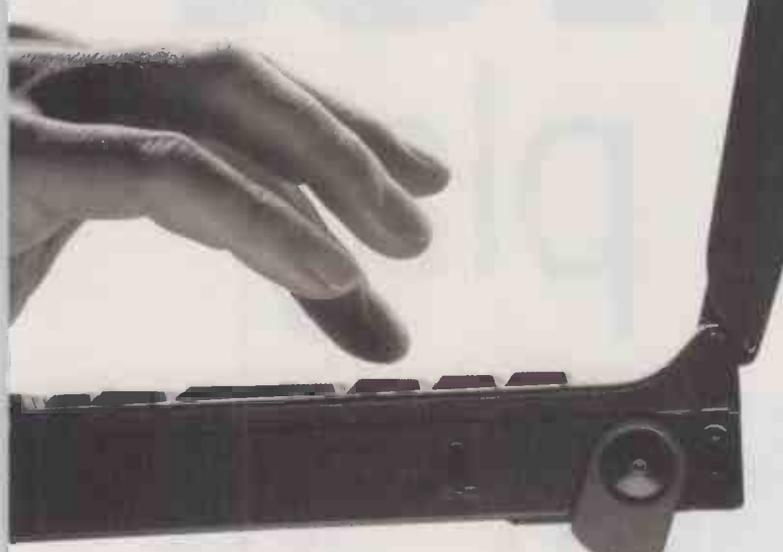


Instant On button. Touch

goes to sleep. Touch it again, and in a
couple of seconds you're back working. Powe
have to wait for Windows to load, and you c
applications or documents. Everything is there
way you left it. With all the Contura models, i
describe as carry on without any carry-on. Techn

For more in

omputing away from your
 he function keys, is the
 once and the Contura



On. Carry On. You don't
 n't have to open up any
 on the screen, exactly the
 a case of what you might
 ology gone sane. **COMPAQ**

PRODUCT SPECIFICATION

PROCESSOR

 486DX4/75MHz and 486DX4/100MHz with integrated 8KB cache to run even the most demanding software.

MEMORY & HARD DISK

Up to 32MB of memory (excluding 420C model 350).
 Up to 720MB. 3.5 inch, 1.44 MB Diskette Drive. 

WEIGHT

 At just 6.25 lbs, the Contura is one of the lightest notebooks in its class.

DISPLAYS

10.4 inch Colour STN and TFT displays. Full size notebook keyboard, integrated palm rest and 4 degree tilt feet to make typing more comfortable. Isolated inverted "T" layout, special feature "Hot Keys." 

LED LED status panel displays vital information such as remaining battery life and power.

POWER MANAGEMENT

Up to 3½ hours typical battery life with rechargeable Nickel Metal Hydride (NiMH) Duracell Battery Pack (Dependant on usage and configuration). 
 Compaq-unique power conservation features including user-initiated hibernation and up to 168 hours of Standby.

PCMCIA SLOTS

 Two Type II or One Type III industry-standard PCMCIA slots which allow you to connect a fax modem, extra storage or a network card without rebooting or reconfiguring your machine.

PRE-INSTALLED SOFTWARE

MS-DOS 6; MS Windows 3.1; Compaq Welcome Centre; Control Centre and Learning Centre (includes on-line documentation); drivers and utilities. Contura 420C model 350 includes Tabworks, Lotus Organiser, MS Works for Windows and game pack. 

DESKTOP EXPANSION OPTIONS

 Contura Docking Base provides: pass through connections for parallel serial ports, power, external monitor, keyboard and mouse; docking lever; separate AC adaptor; spare battery charger; monitor support and keyboard tilt and additional security features. Integrated Ethernet model also provide RJ-45 and BNC connectors.

Three year worldwide warranty; local CompaqCare Centre telephone support.

Mr/Mrs/Ms (Initials) _____ Surname _____
 Title _____
 Company _____
 Address _____
 _____ Postcode _____
 Telephone _____

 Number of employees at your place of work? _____
 We'd like to advise you of future products and offers. If you do not wish to receive these, tick here. Send to Compaq Computer Ltd, FREEPOST, Mitre House, Canbury Park Road, Kingston-upon-Thames, Surrey KT2 6BR.

ation on Compaq products, phone 0990 23 24 25. Then carry on from there.

NEW POWERMACS

Power play

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

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

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

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

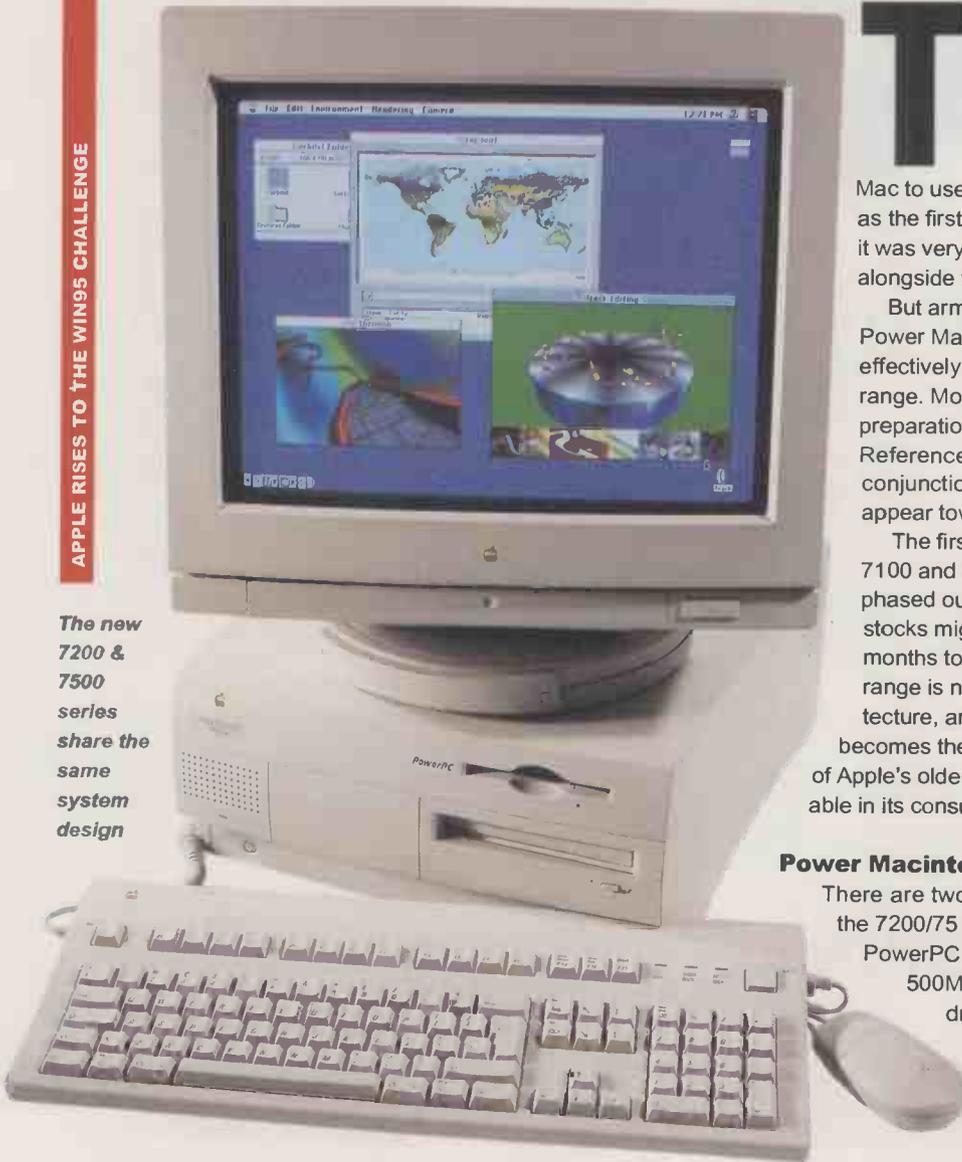
Power Macintosh 7200/75 and 7200/90

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

55 Photographed by Bruce Mackie

APPLE RISES TO THE WIN95 CHALLENGE

The new 7200 & 7500 series share the same system design



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

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

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

Power Macintosh 7500/100

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

As with the 7200 no secondary cache card is supplied with the 7500, which is a little disappointing in a mid-range system especially if you're paying £2,000 or more for the higher configuration. Even so,

the 7500 still outperforms the NuBus-based 7100/80 that it is replacing (which did have a cache card) so you're getting good performance with the option of a cheap upgrade, if you decide to add a cache card at a later date.

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

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

With the built-in video hardware, software and network interface, the 7500

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

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

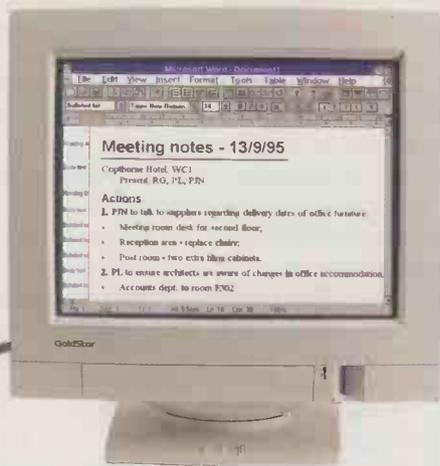
The 7500 will probably turn out to be Apple's next big seller, and deservedly so. Speed apart, the integration of its various hardware and software features make it enormously versatile and prove that Apple's version of "plug and play" is still streets ahead of Windows 95.



The 8500/120 boasts outstanding multimedia features

PsiWin makes

your PC



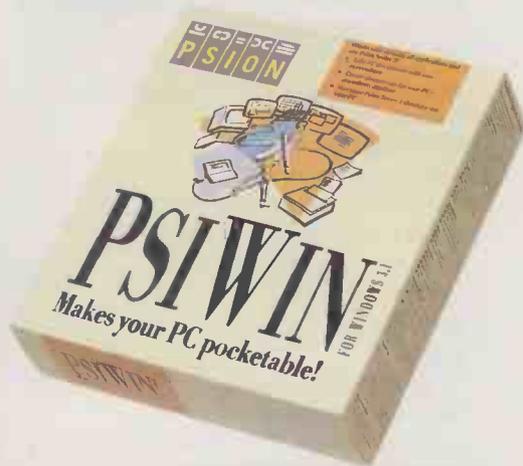
pocketable!

Now you can have the freedom to use and actively work on your PC files, anywhere, anytime

With PsiWin and the award-winning Psion Series 3a, Windows files can now be kept in your pocket. You can refer to them, work on them - and even create new files, anywhere, anytime. A simple drag'n'drop is all it takes to transfer files back and forth between PC and a Series 3a: file conversions are taken care of automatically.

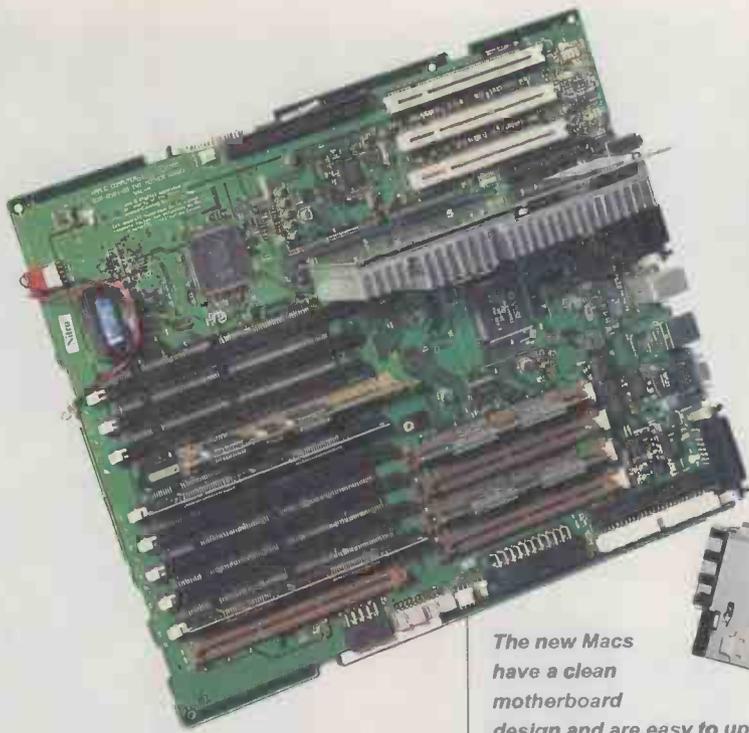
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The new Macs have a clean motherboard design and are easy to upgrade



Power Macintosh 8500/120

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

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

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

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

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

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

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

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

95 and counting...

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

The integration of video technology in the 7500 and the 8500 keeps Apple ahead in the multimedia stakes, while the adoption of PCI paves the way for the next generation of Macs as well as opening up the Mac

market to companies like Diamond and ATI who are preparing Mac versions of their PC products. The only disadvantage of the move to PCI is that owners of NuBus Macs and PowerMacs can't upgrade their existing machines as the design differences are too great.

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

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

Overall system performance

(Benchmarked using Norton System Info: higher is better)

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

PCW Contacts & Prices

Apple is on 0181 569 1199.

7200/75 8/500	£1055
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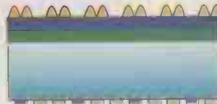


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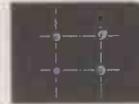
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A fresh deck

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

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

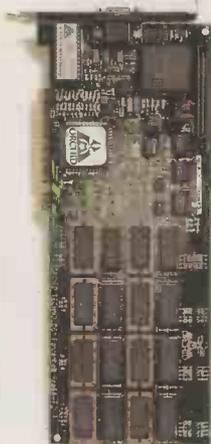
MPEG was going to revolutionise multimedia with VHS quality video on your desktop, but one year down the line and we're still waiting for it to happen.

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

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

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

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



Orchid Fahrenheit ProVideo64

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

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

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

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

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

Software drivers supplied by Orchid include Windows 3.11, Windows for Workgroups and OS/2. The hardware will

work with Windows 95 using standard S3 968 drivers supplied by Microsoft.

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

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

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

PCW Details

Price £246 for 2Mb, £376 for 4Mb

Contact Orchid 01256 479898

Verdict Even better than the original. An excellent product.

Number Nine 9FX Motion 711

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

of cards



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

The card boasts resolutions from 640 x 480 pixels up to 1600 x 1200 pixels non-interlaced. It delivers the latter with a refresh rate of 83Hz thanks to a high-quality 220MHz

IBM RAMDAC, which boasts a 64-bit pixel bus for maximum performance.

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

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

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

As with the Orchid product, the 711 proved itself under Video for Windows with excellent playback using both integer and non-integer scaling and different compression methods. Performance with Xing was exactly the same, too — not

surprising given the hardware configuration. The 968 chip is used to full effect but no additional interpolation is provided.

PCW Details

Price £225

Contact Number Nine 01256 381194

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



VideoLogic GrafixStar 700

Just like the Number Nine card, the GrafixStar 700 sits at the top of the range and is based around the S3 968 chipset. The difference is that this UK-designed product includes an advanced expansion

architecture called the "VESA Media Channel". Once an optional controller is installed the card can provide improved video performance, and users can add low-cost options such as hardware MPEG playback or a TV tuner module.

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

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

The GrafixStar comes with a few utilities, including Video for Windows 1.1e runtime, Xing and SmartScale. The

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

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

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

PCW Details

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

Contact VideoLogic 01923 260511

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



miroVideo 20SD

The miroVideo 20SD was miro's entry in this test: a low-cost S3 board designed around the older 868 processor. Despite its age this is still a fine

graphics engine with video scaling and acceleration built in, and has the advantage of being cheaper than its bigger brother.

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

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

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

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

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

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

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

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

PCW Details

Price £139

Contact miro 01494 510250

Verdict Affordable, but outclassed by other products here.



DataPath Tornado Media

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

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

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

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

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

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

PCW Details

Price £299

Contact Datapath 01332 294441

Verdict Great performance in Windows. Needs work in DOS.

Diamond Stealth 64 Video VRAM

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

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

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

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

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



PCW Details

Price £196 (2Mb), £324 (4Mb)

Contact Microtonica 01732 592820

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

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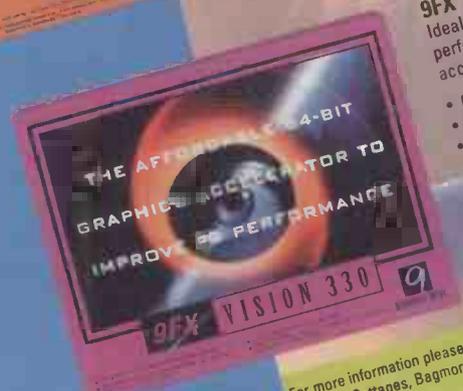
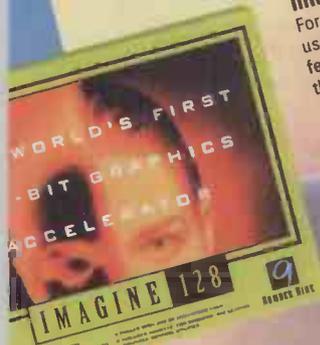
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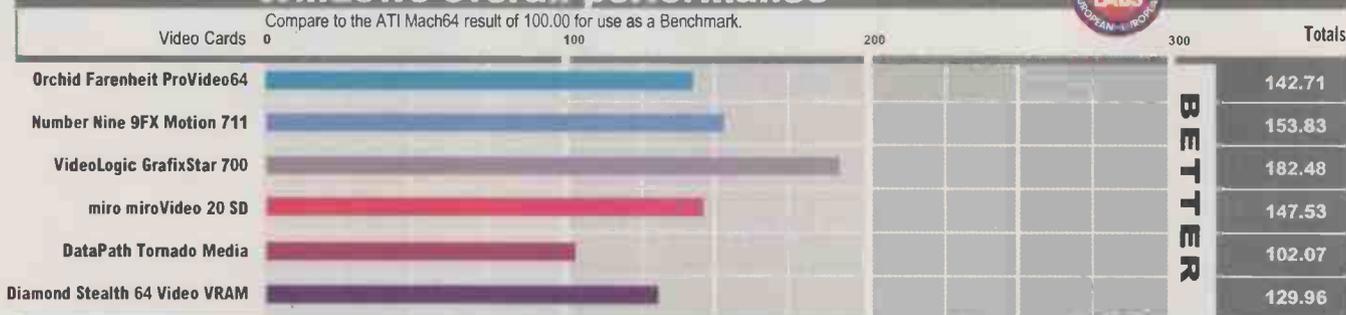
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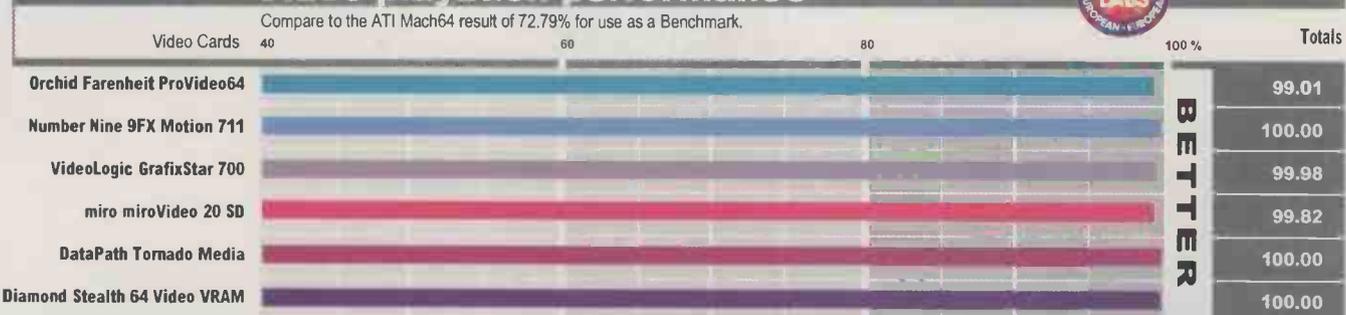
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Performance Results

Windows overall performance



Video playback performance



DOS graphics performance

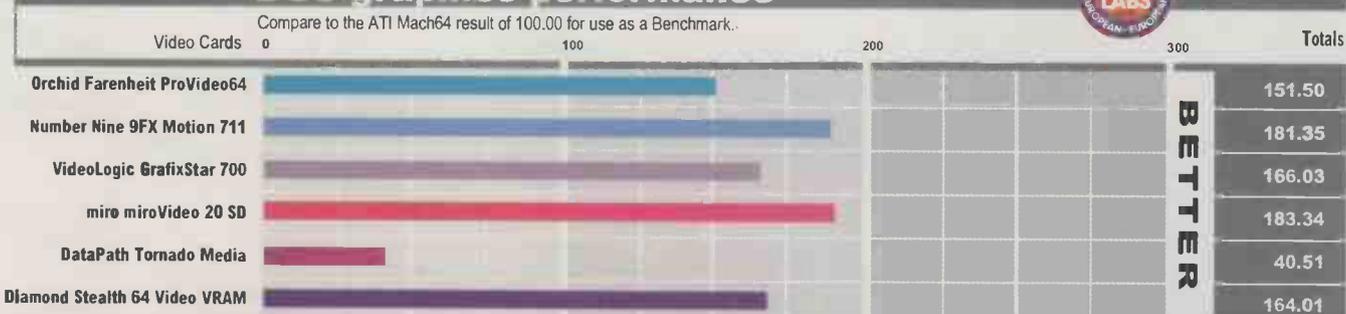


TABLE OF FEATURES VIDEO CARDS

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

Conclusion

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

As they stand, each card vastly improves Video for Windows performance under Windows 3.11. The results are excellent and once you've tried any one of them you won't want to go back to non-accelerated hardware. Unfortunately, none of the

cards will work properly under Windows 95 until Microsoft releases an upgrade with Direct Draw and full DCI.

When it comes to MPEG playback, tests show that it is the speed of the processor that matters more than the video card. Typically, a 90MHz Pentium is required to achieve a good level of performance, and a 120MHz machine to achieve the 30fps playback needed to

match a hardware solution. Nevertheless, these cards do improve playback by allowing you to scale movies without loss of frames.

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

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Remote possibilities

ON THE HOME FRONT

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

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

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

A cursory glance at the boxes suggests that most of the packages available have remarkably similar functionality — file transfer, remote control, drive sharing and even terminal emulation. The differences lie in the bells and

whistles, and in the networks supported. Whichever package forms the best solution for you will depend on your network, the version of Windows you're running, and a number of other factors.

Carbon Copy for Windows 3.0

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

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

It worked flawlessly on one system fitted with a Tricom Tempest fast modem

but on the other system it incorrectly set the serial port to a higher speed than the modem was capable of responding to.

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

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

There are two main programs in Carbon Copy, Host and Guest. An

uninstaller is provided as well and the box reassuringly informs you that your existing Windows drivers won't be interfered with (though for modem communications a replacement serial driver is used and your original is left in place).

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

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

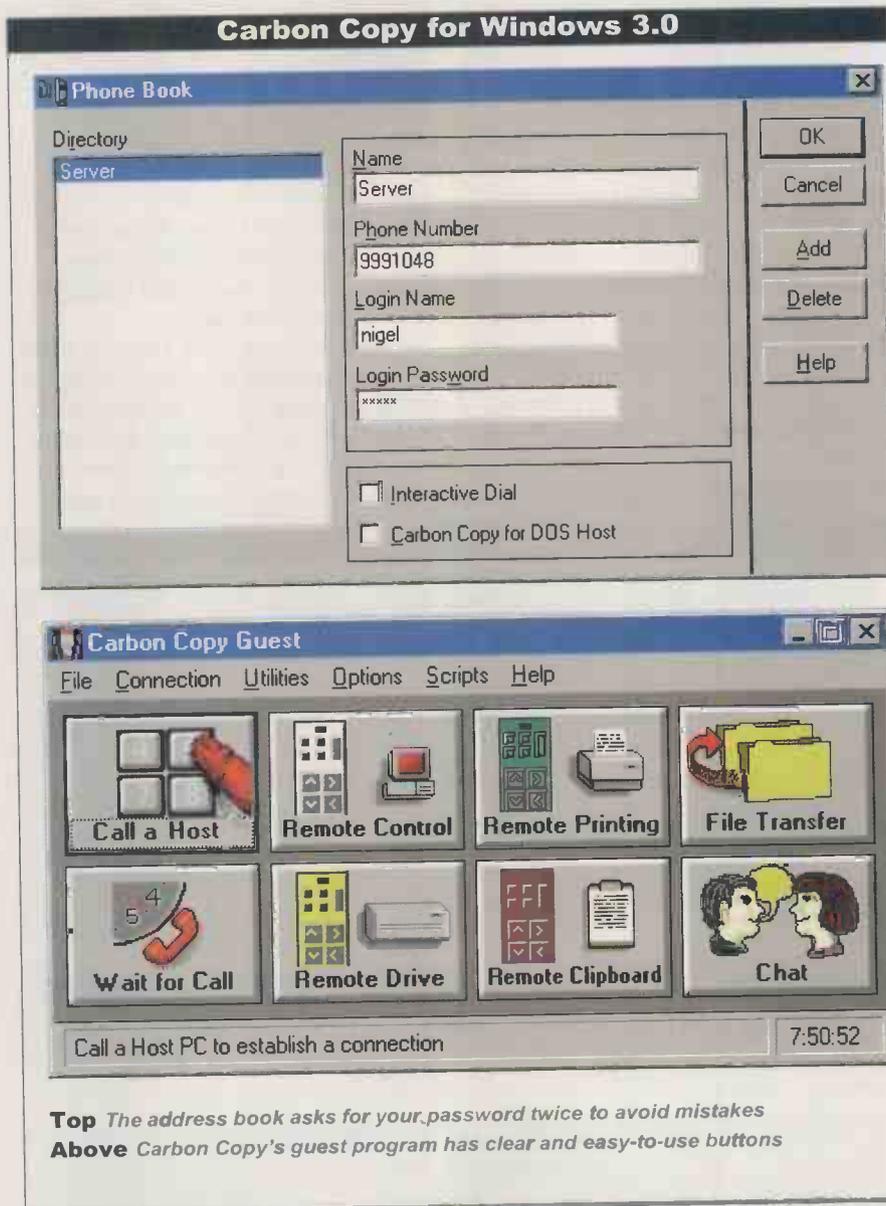
Performance of remote control over the network didn't seem quite as good as with ReachOut, though it was a little more responsive via the modem. Even so, you will need a machine with a reasonable amount of memory as your guest system: it does just about run in the 4Mb of memory claimed on the box.

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

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

ReachOut 5.0

ReachOut, from Stac Electronics, includes both DOS and Windows versions of the program. Like Carbon Copy it claims to work under Windows 3.1 and Windows 95. It comes on three disks with a manual that's just under 200 pages long and very clearly written, with lots of explanations as to why you might



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

want to choose a particular program option. Installation is straightforward, although it hung on one of the Windows 95 systems. During installation you have to select the type of connection you'll be using and assign an initial password.

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

A few applets are provided with ReachOut. The two main parts are the

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

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

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

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

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

There were some problems however, particularly with Windows 95. Firstly, an incorrect modem configuration led to the system locking up so extensively that only the reset switch would work —

hardly ideal if you're stuck at home while the other system is 20 miles away. And although file transfer and chat worked perfectly under Windows 95, remote control would often hang, whether connected via the network or by modem. There was no problem at all under Windows 3.1. Perhaps these are teething problems, but for now at least Windows 95 users should be wary.

Those problems aside, ReachOut was the most fully-featured of all the packages tested with more support for different networks: the terminal emulation is simple to use and puts the Windows 3.1 terminal to shame. If you want a flexible and powerful

system, this is well worth looking at. For those wanting to provide access to systems on a network, the virus-checking and multiple security settings make it the most sensible choice. And if all you want to do is connect from one PC to another via modem, it's quick and easy to use. Check it out.

Timbuktu Pro for Windows 1.0

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

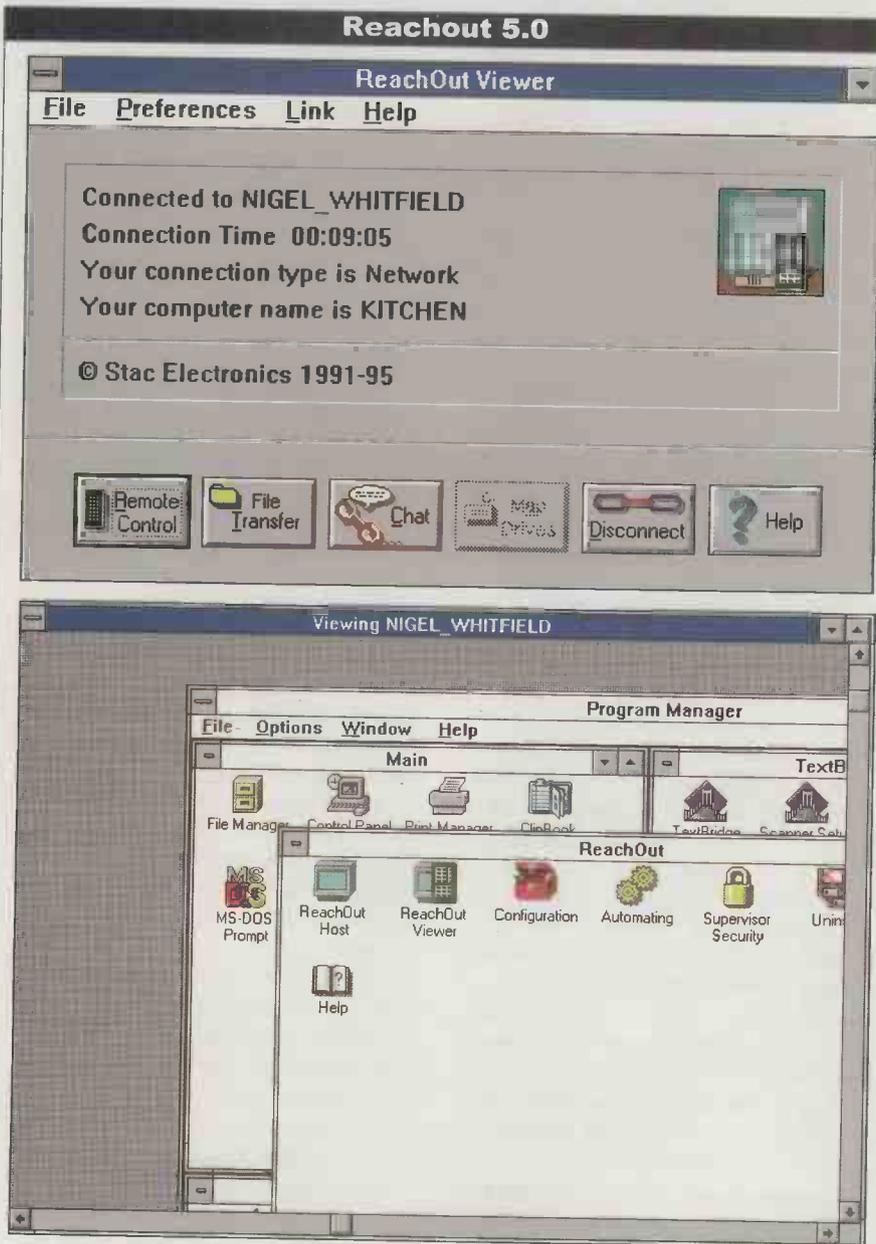
To help make telephone working easier, Farallon bundles a copy of Shiva's PPP dialer with Timbuktu Pro allowing you to dial out from your PC and connect to any network that has a PPP dial-in server, such as the Windows 95 or NT Remote Access Server (RAS).

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

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

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

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



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

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

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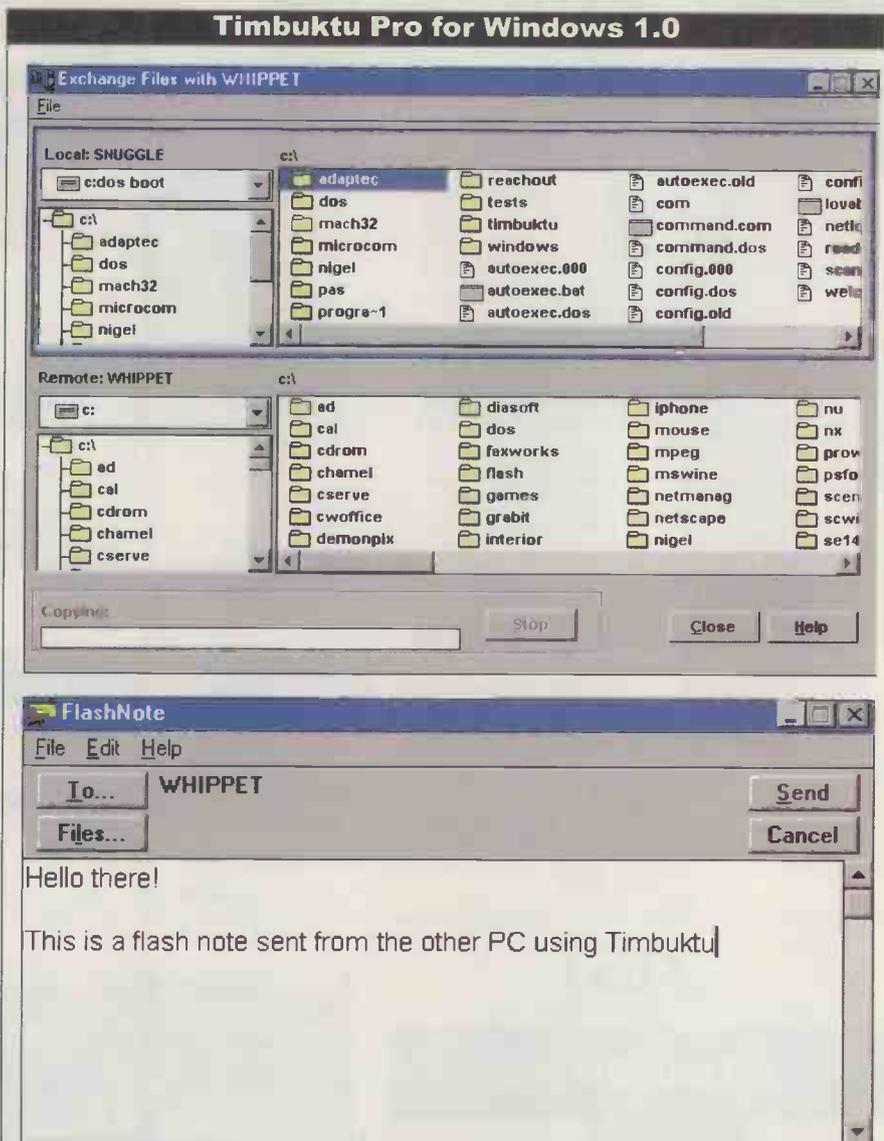
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Top File exchange in Timbuktu is limited to copying and deleting, with no directory synchronisation

Above Flash Notes are like simple email with attachments but Timbuktu must be running on both systems. Use your mailer instead

Conclusion

For portable users, all three packages share the common feature of being able, in marketing terms, to run on a system with 4Mb of memory. That might well appeal, but real life is different — unless you want to spend a lot of time in Swap City, forget it or upgrade now.

It's hard to identify a clear winner from these packages. There's certainly a clear loser, and that's Timbuktu Pro for Windows, which is just too slow and lacking in features to be worthwhile for anyone who doesn't want to control a Macintosh. But if you do, then it's worth a look.

The other two packages have a pretty similar set of features and in some respects similar problems when it comes to working with Windows 95: perhaps that's the inevitable result of releasing "compatible" programs before the operating system itself has appeared.

For my money I think I'd take Reach Out. Carbon Copy may have big, friendly icons but they got on my nerves after a while and it simply doesn't support the same range of networks as the former. In particular, support for TCP/IP and Internet connections may seem like an odd thing to want, but it could provide you with a great way of accessing a remote PC without having to spend a fortune in long-distance phone calls.

If automation is important, then I'd choose Carbon Copy which is much more flexible in that regard, but for me it's hardly an issue: Reach Out's virus checking, clean, simple interface and the best manual of the bunch win the day for me and, I would think, most people.

Exchange, Control and Observe. And these are the only features you've got. The send button allows you to transmit a "flash note" to another user, which can have files attached to it, avoiding the need to start a full-scale file transfer. This was my first impression of the system's speed, or lack of it: admittedly one end of the link was running on a 4Mb system but it was still a shock to find that I could walk from one room to the next before the text appeared on the receiving PC.

The Exchange, Control and Observe buttons require that you've selected a system from the connection tabs at the bottom of the screen. These are possibly the least intuitive address book systems ever produced. You can't enter details of a system in the Personal section by pressing the Add button. You have to select the network tab (either TCP/IP or Netware) and enter the details there, then press Add to copy it over, at which point you can edit it again if you like.

Thankfully, information can be imported from a text file to avoid this hassle.

Having selected the address you can connect to one of the other systems by using one of the buttons. The Observe button will be useful for trainers or help desks: it allows one user to watch another's screen without being able to interfere with what's happening.

File transfer is a pretty standard file manager clone but both that and the remote control window share the curious feature that they couldn't be resized to make the remote window larger. File transfer is conspicuously lacking in features such as directory synchronisation, too, so you'll have to pick and choose which files you want, the old-fashioned way.

When compared with the other packages Timbuktu Pro doesn't seem that advanced. If you need to control a Macintosh it's your only choice, but the limited range of networks supported, lack of direct dial-up support and poor performance leave the others streets ahead.

PCW Details

Carbon Copy for Windows 3.0

Price £110

Contact Microcomp 01483 740763

ReachOut 5.0

Price £149

Contact Stac Electronics 01344 302900

Timbuktu Pro for Windows 1.0

Price £139 (street price)

Contact Gomark 0171 731 7930

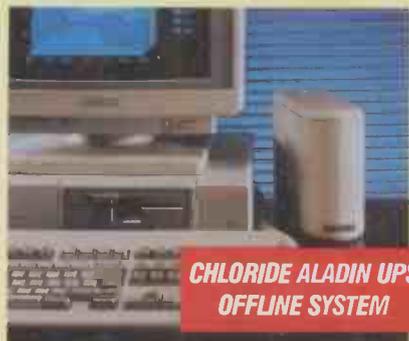


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PRAISE THE NET

Christian groups are flocking to the Internet as the perfect medium for spreading their message. Drew Cullen joins the congregation, while Joanne Evans hears a different message emanating from the Church of Scientology.



he Reverend Ian Morrison is getting to be a dab hand at the media game. This year, the *Scotsman*, BBC Radio Scotland, STV, a local radio station in Dundee,

and now *Personal Computer World* have all beaten a path to the West Lothian home of Morrison, an electronics engineer turned Church of Scotland minister. And all because the man loves computer technology.

Morrison, 46, spends much of his spare time working on a bulletin board which he has designed to deliver information resource for his colleagues in the Church of Scotland. The BBS, called Logos (Greek for the Word) contains more than 2,000 files containing everything you need to put together a Church of Scotland service. And much, much more: prayers, Windows utilities, assorted religious software and bible study packages, catalogues, even children's games all jostle for attention.

Mostly financed by Morrison, Logos has been up and running since February, and Morrison, a quietly spoken man, appears a little bemused by all the press interest. "The bulletin board is still in the building-up stage," he says, almost apologetically. "There is still development

to do, so we don't advertise it yet."

He now hopes to make his service available on the Internet. His bulletin board could form the basis of a formal Internet site for the Church of Scotland, he says, although funding is an issue.

Logos is typical of the activities of UK Christian groups which are joining the Internet in rapidly increasing numbers. Five Church of England dioceses — Ely, Blackburn, Southwark, Manchester and Oxford — have set up their own pages on the Net. The Baptists use it to maintain contact with their missionaries throughout the world, and the Salvation Army links up with its US branches using the Net.

The Tear Fund, a Christian relief charity, uses the Net to appeal for relief workers. This is cheaper and better targeted than advertising, according to the Reverend Richard Steel, chairman of the Church of England Internet working party and a communications officer for the Church of England in Lancashire. "The Internet is a pretty good place to be when you are looking for a logistician," he says.

Steel is a member of the management committee of Church Net UK, set up in July by the University College of St. Martin, Lancaster, to offer World Wide Web sites for all UK churches and Christian organisations which accept the doctrinal position of the Churches Together ecumenical movement. Mormons or Jehovah's Witnesses, in other words,

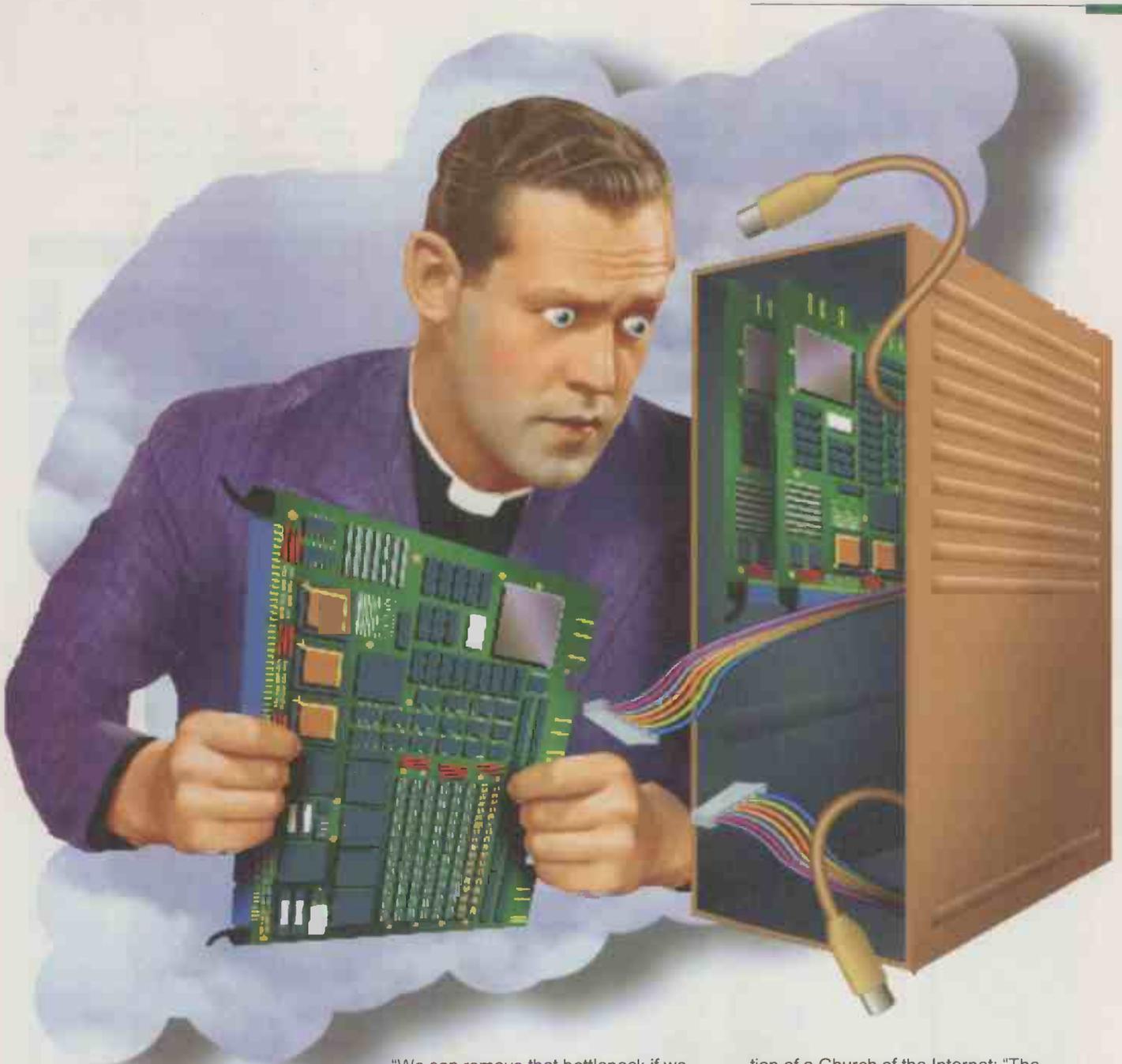
need not apply. "We have thought very carefully about this," Steel says. "We think it is very important that Church Net UK is kept within the broad Christian ethos."

He is encouraged by the response to Church Net in the first month: it has seen 300 visitors logging on each day. Several Christian organisations have also signed up with Church Net to use its server for their own Web pages.

Enormous Christian interest is developing in the Internet, according to the Reverend Stoker Wilson, a vicar based in Washington, Co. Durham, and also chairman of the Church Computer Users Group, a 1,500-strong ecumenical organisation set up in 1982.

The group's aims are encapsulated, appropriately enough, in a mission statement which says that it seeks to "support all in the churches who are exploring the use of computers and their associated technology for the glory of God and the work of the churches".

The CCUG publishes a magazine three times a year on church-specific computing issues, and from time to time it also updates its own directory of religious and church administration software. Now it is concentrating its development focus on the Internet. Wilson hails the Internet as a tremendous technical revolution which will be "as life changing as the introduction of printing".



For the Christian churches, the Internet provides cheaper and more efficient internal communications as well as a distribution mechanism to proclaim the Christian message to a wider audience. Steel describes the Net as a wonderfully democratic medium, which makes it more difficult for repressive regimes to operate. "I often use a quote from Margaret Mead, which sums it up perfectly: 'This is the first generation which is seeing history made before it is censored by their elders and betters.'"

More prosaically, the Internet can also be used to break through one of the greatest communications bottlenecks in the Church, namely the vicar. "All sorts of literature is sent to the diocese, but often it just stops with the vicar," Steel says.

"We can remove that bottleneck if we make the material available for electronic access."

Steel is encouraging other vicars in the Blackburn CoE diocese to sign up to the Internet. "We are selling the idea to them on the basis of its email capabilities," he says. He is also delighted with the study potential of the Internet. Church Net UK, for example, maintains hotlinks with the British universities library network. "Just think," Steel says. "No vicar's sermon need ever be limited by the books in his study again."

He is particularly enthusiastic about the Internet's evangelical potential, and is confident that the Church will stand its ground against consumerism and other faiths — "as long as we can put our message across in terms that people can understand."

Steel quickly dismisses any sugges-

tion of a Church of the Internet: "The church should always be there for the people. The idea of gathering around your computer at a set time for a service with live links appalls me. But the churches can offer a stimulus, a support mechanism through the Internet. The information on that screen can point you in the right direction."

Steel is more relaxed than one might expect about the pornographers, the paedophiles, the Satanists, the Nazis and other assorted unsavory characters who peddle their wares on the Net. Their presence, he says "makes it even more important that we are there making our voice heard... We can offer truth and light in a world that can sometimes seem dark and messy".

Nicholson agrees. "I am very much a supporter of technology, but I recognise that all technologies can be abused.

Technology only mirrors life," he argues. "It is the responsibility of the Christian community to make sure that technology is used for good purposes."

Wilson opposes any notion of censorship on the Net. "It could also be to the detriment of the Church. The Church faces tremendous censorship in the UK," he claims. "The Christian voice is rarely heard on television, except for a few sanitised programmes."

Steel takes a similar line: "We need to engage with other groups," he says. "The Mormons and the Scientologists are already on the Net, and the Koran is there too. Jesus and Paul were there in the markets, competing against other orators to make themselves heard. And now we have to be in the electronic marketplace."

These Christian technophiles display palpable enthusiasm for the Internet. And their energy and sentiments seem entirely

admirable. But one has to question the ability of the Church at large to persuade an increasingly secular and mostly indifferent British public to listen to its message, Internet or no Internet.

PCW Contacts

Church Net UK is on http://cent.1lan.ac.uk/church_net_uk
Logos 01506 846250



An unholy row

Since the Internet began its invasion of the popular conscience in the early nineties, no organisation has better exposed its strengths and weaknesses than the Church of Scientology, albeit unintentionally. The Church of Scientology is not a church in the sense of being Christian: Scientologists don't worship God. It is the organisation founded by third-rate science fiction writer L. Ron Hubbard in the late fifties. Now beloved of movie stars like John Travolta, it is best known in the UK for members popping out of its office on London's Tottenham Court Road and asking unwary passers-by if they want a "personality" test. Described as a religion by its supporters, denounced as a cult by detractors, it has been fighting a crusade against Internet users with something approximating holy fervour for more than a year. And there's no sign of a peace settlement. Indeed, it's a miracle everybody online hasn't received a letter from the CoS threatening legal action by now, so many of them have been flying around.

For those who have not been directly involved in the conflict or damaged by it, the story of the CoS versus the Net has helped to raise and perhaps eventually solve many of the burning issues surrounding the Net. Will copyright law apply in exactly the same way as it has to other media? Will service providers be legally responsible for the material they carry? Do Net users have a right to anonymity? And most important of all, will the right to freedom of speech upheld by so many users be tempered by other considerations — as it is in real life.

The central battleground of the war is located at alt.religion.scientology (ars), the newsgroup dedicated to debate about the religion/cult. Ars had been going for years with no-one taking too much notice until postings that were clearly from ex-Scientologists and which contained detailed information about CoS teachings started appearing there last year. At first, the CoS's only response to intense activity on ars was to request some of its members to flood the newsgroup with positive postings. But when

Dennis Erlich, a Los Angeles-based ex-minister of the CoS began posting on ars last summer, all hell broke loose.

Both Erlich and Tom Klemesrud, the system operator of Erlich's local Internet service, received letters from CoS lawyers demanding that Erlich stop posting and that Klemesrud shut down Erlich's connection. At the same time the CoS began using the Internet's own weapons in an attempt to stop the barrage of criticism. Its lawyers sent requests to Internet system operators around the world asking them to remove the newsgroup. Many also accuse Helena Kobrin, the most prominent of the CoS lawyers fighting the Net, of sending fake cancel messages to remove particular messages from ars, a tactic she denies.

Then on the morning of 13 February, Erlich's house was raided, his computer files seized and he was landed with a lawsuit accusing him of breach of the CoS's copyright and violation of trade secrets. Klemesrud and Netcom, the Internet access provider, were also sued, bringing the question of service providers' culpability into the debate. The Electronic Frontier Foundation decided to help fund the defence because it recognised the landmark nature of the case.

A few days later, the home of Julf Helsingius, system operator of anon.penet.fi, the Internet's longest running and most trusted anonymous remail system, was raided in Finland. This time it was to find the identity of an anonymous poster on ars connected with Erlich's case, thereby dragging the question of anonymity on the Net into the maelstrom. Helsingius gave up the name under the threat of having to relinquish the identities of all his users. Subsequently, many more letters threatening legal action have gone out to active posters on ars. In August another poster and ex-member of CoS, Arnaldo Lerma, was raided and both he and his system operator sued for breach of copyright.

The CoS claims to have copyrighted almost all the writings of L. Ron Hubbard and its other teachings through one of its off-shoot companies, the Religious Technology Center, and has long used copyright law

to prevent people quoting and criticising these teachings in other media. It currently has a large unresolved suit against *Time* magazine, for instance. It has simply tried to apply the full force of copyright law to the new media. Erlich is still fighting his case so we do not yet know if it will succeed.

It is bizarre that a so-called religion is so desperate to keep its "scriptures" secret. The CoS says it must because people should not be allowed to read its higher levels of teaching until they are "ready" and can fully understand them. Critics including Erlich say they must be kept secret because the teachings are so silly no-one who wasn't entirely indoctrinated would be daft enough to believe them — and the CoS charges a lot of money for helping people to reach its higher levels of teaching.

Erlich claims his right to freedom of speech is denied if he is not allowed to quote CoS teachings. The CoS cries: "Free speech or fair use does not mean free theft and no one has the right to cloak themselves in the First Amendment to break the law." Whatever the outcome, it is clear that the power of the Internet to spread information beyond any organisation's ability to control it, is currently unsalable. The CoS will never be able to get L. Ron Hubbard's words back in the bottle.

To appreciate the full drama of the Church of Scientology debate on the Net, you must tune into alt.religion.scientology itself, but it's a major download, especially if you've missed a couple of days. If you haven't much time, check out Rod Keller's review of the most interesting postings of the week at http://amazing.cinenet.net/ars_summary.html. A new Web site dedicated to covering the furore seems to spring up every week, but one of the oldest and still the best is Ron Newman's at <http://www.cybercom.net/~renewman/scientology/home.html>. For the pro-Scientology view, there's no better place to look than <http://www.theta.com/goodman/>. This is the home page of Leisa Goodman, media relations director of the CoS, no less.

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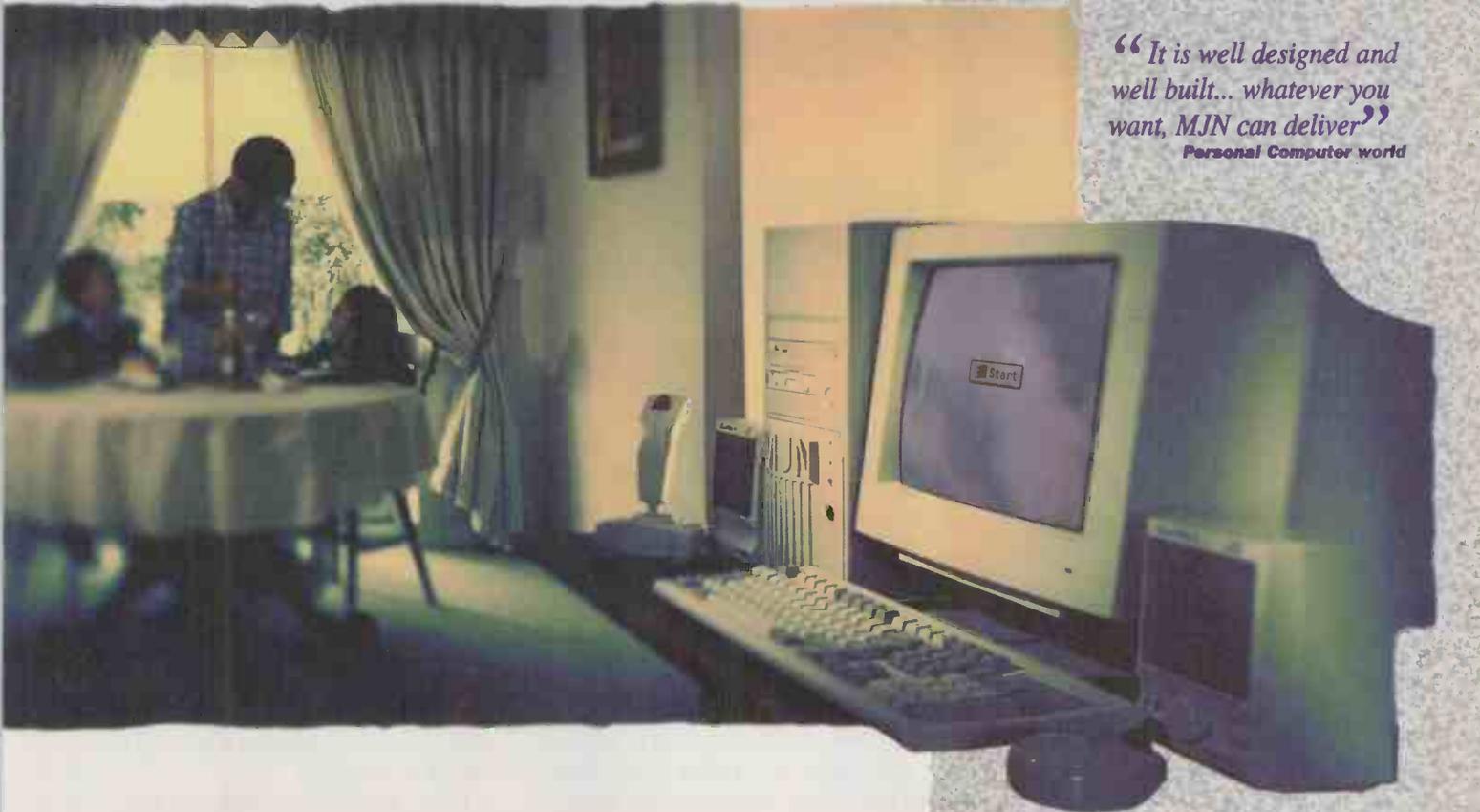
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The Daemon from Demon

Cliff Stanford, co-founder and MD of Demon UK, talks to Ben Tisdall about his company's rapid transition to Internet Provider and its current challenges.

PCW Photography by Johnny Millar

It was 31st May 1992 and Demon was about to start operating as an Internet provider: eight modems were connected into the live phone lines. Cliff Stanford and Giles Todd were about to start testing when they noticed that one of the modems had started flashing. One of Demon's founder subscribers had logged on, connected, and was off FTPing around the world before Demon had had a chance to run a single test: Demon had pre-announced the numbers and Amiga enthusiast Neil Jones had set his computer up to dial in at regular intervals until the system came on line.

Three years later, and Demon's 120-something employees now fill two floors of a nondescript office block in Finchley. The MD's office is a drab glass box on the fourth floor, inside which sits the 41-year-old co-founder and managing director of Demon UK; greying, bearded and frantically busy, running to keep up with the growth of Demon.

Stanford stumbled into computing, back in the seventies, in what seems to be the traditional manner for UK techies: he bought a Texas programmable calculator in '77 and taught himself to program it, then traded up to an 8Kb Commodore Pet a couple of years later. That was when he decided that this computer lark was more interesting than accountancy and started a programming company.

The company, which somewhere along the line became Demon Systems, ran quite happily until 1992. In fact, *PCW* Associate Editor Simon Rockman's first job (in 1980) was working for what was then ImPETus.

Then in 1991 a chance conversation on CIX led to a change of direction for Demon. CIX was then (and to some extent still is) an electronic coffee bar for the UK's community of programmers, developers and IT journalists. EU Net had just launched an Internet service in the UK and was charging £20,000 a year for leased line access aimed at corporates.

Stanford says: "I divided £20,000 by 200 people and realised that for £10 a month we could share a line... I'd been friendly with Peter Dawe [from Pipex] for some time previously." When Stanford heard that Pipex had launched a leased line Internet service, Demon pitched in with a dial-up service, "with the very clear idea of taking the little bit of dial-up service there was, while Pipex would take the leased line service that was going to make Peter's fortune."

Pipex, says Stanford, was right that the leased line stuff was going to make Peter's fortune but wrong about the little bit of dial-up business. "We had a projection at the beginning to aim for 200 users on start-up rising to 400 within six months and maybe 1,000 users at two years. We never saw Internet as mainstream; we saw it as a hobby club. It took us by surprise at the beginning. The difference is we suddenly realised exactly what was happening and completely diverted every resource we had — which was mainly my time in those days, and Giles's time to the Internet business."

As the Internet business took off, Demon's book-keeper (Stanford's mother) came out of retirement to deal with the rush of new business. In the first

two months new subscribers were noted down in her desk diary. "At that stage we really thought that would be a good enough book-keeping system," says Stanford. Pretty soon the tail was wagging the dog as the Internet business took over from Demon's traditional business of writing software for finance houses.

Demon's initial eight users have mushroomed to 130,000. But this represents three years of constant struggle to keep up with the growing user base. Ask Stanford what has been the biggest challenge and he's unequivocal: "Keeping ahead of the growth. The growth is what's caused us more problems than anything else. And in the future it's the same problem — staying ahead and getting back the quality of service. Whatever you build today breaks tomorrow, and the 15 percent growth that we've been seeing on average doubles our size every five months — delivery times on a lot of the hardware is five months."

What Demon has never done is to turn subscribers away, and that was very nearly the company's undoing. Demon reached its nadir close to the beginning of this year when, for a while, the volume of subscribers far outstripped the company's capacity to deal with them.

The experience of the managing director of a small multimedia company which signed up for Demon at the time is fairly typical: "I called up to say I wanted to join and they told me I could download the software I needed using a standard comms package. I downloaded a whole lot of shareware and freeware but no overall instructions on what to use. I called them and somebody tried to talk me through it — you had to wait for ages to get through."

Since the dark days of early 1995, things at Demon have improved. When PCW visited, Demon proudly showed off gleaming racks of new Ascend Units: each one containing 48 V.34 modems and the computer power to deal with them. Each unit is about the size of a hi-fi amplifier. The ten rack units Demon has installed will allow it to fit 4,800 units into a fairly small space and the company is now in the process of investing £2m in its infrastructure.

The problems associated with a company growing at a geometric rate remain. "People's resources are the biggest problem: everybody is overworked, everybody is under pressure, constantly." Yet Stanford is bullish about the future: "In Europe we should be bigger than

Microsoft," he says. "By the time they come in we will be trans-European. We've got Amsterdam ready to roll and France planned out on paper, and we've got the finance organised."

Over the next couple of years Stanford expects the Internet business to consolidate to two or three major players for each side of the business: dial-up, and leased line. On the dial-up side he thinks the players will be Microsoft, Netcom and of course Demon. On the leased line side, whatever Pipex becomes plus BT and Demon — not necessarily in that order. Currently the leased line business represents 10 to 15 percent of turnover but Demon hopes to push it up to something like 40 percent by launching a corporate service. He makes no distinction between a conventional leased line and ISDN: "Really it's 64Kbits/second end to end,

with immediate ring-up in both directions — leased line, ISDN or a piece of string. That's the whole point of the Internet; the transport doesn't matter." And like most industry pundits he expects ISDN, fast and digital, to gradually replace conventional analogue modems even for home users of the Internet.

Stanford believes that the present level of Internet fever won't last. Share prices, he reckons, cannot keep shooting up while the companies themselves continue to lose money: "You saw what happened to Netscape shares. They got floated at \$28, then went up to \$75 before going back down to \$50... it's unsustainable. NetCom are making huge losses every month and their share price keeps going up. Here at Demon we're growing gradually, sensibly, at the rate of between eight and fifteen percent per month."



"In Europe, we should be bigger than Microsoft... By the time they come in, we will be trans-European"

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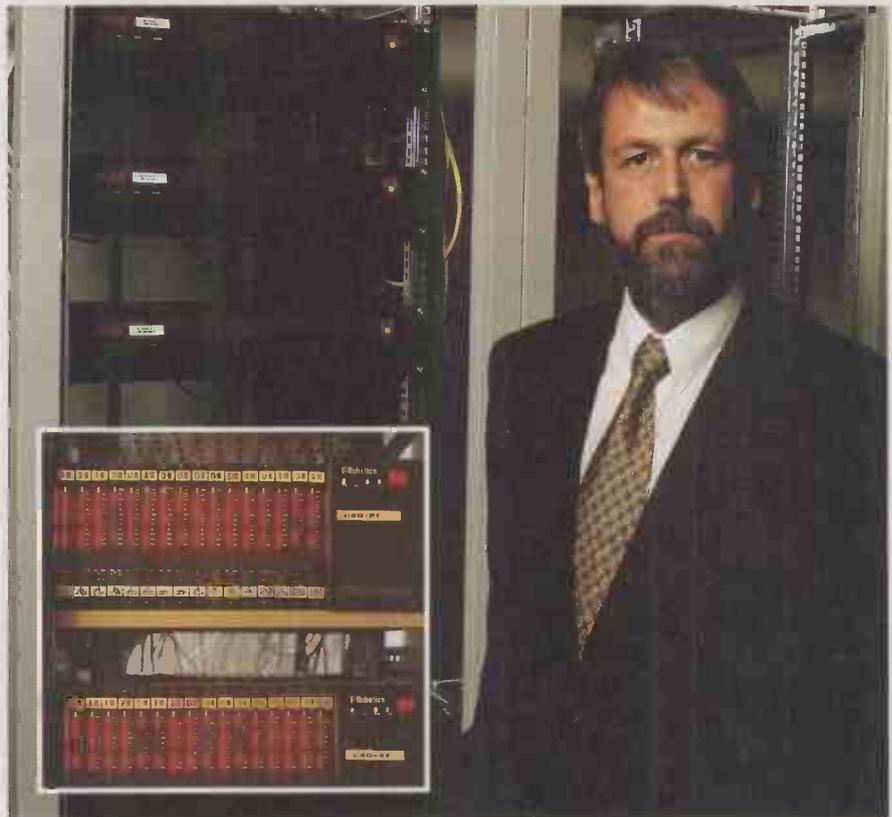
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Demon itself is in two minds about whether to use Netscape: "My inclination is not to use Netscape" says Stanford. "Not that it's not the best browser — it is, but the deals are all wrong. We got halfway through trying to negotiate a deal, at which point it all went cold. We wrote to them to ask what had happened and got a message back to say they'd just appointed Unipalm as distributors in the UK and to go and talk to them. There's no way that, as Unipalm/Pipex's main competitor, we can talk to them about a deal to provide us with Netscape because it's got to be in their interests to raise the price above what is sensible for us to pay. Commercially, Netscape has absolutely lost it in Europe.

"I can see us and all the other big Internet providers having their own browsers, just as good as everybody else's, by sticking to standards — rather than what Netscape is doing which is generating standards on the fly. The browsers will look as much the same as a Telnet screen looks the same."

Stanford continues to see email as the compelling application. "Email is by far the most important product," he says.



Demon's Technical Director Giles Todd beside the new 48 V.34 modem Ascend units, and inset, the older, bulkier racks they replace

"Usenet will die out eventually, because it's of no great interest to the average person. It's going to die under its own weight. IRC [Internet chat lines] will become a useful tool rather than a waste of time. The first generation is enthusiasts, the second generation is bozos, then the third generation finds a use for it — whether it's telephones, CB radio or anything else."

For Demon, a company whose origins are the hobbyist, enthusiast end of the market, coping with the bozos is bound to be a problem, and Demon has received its share of criticism for a service being hard to use. Stanford is adamant that he doesn't want to force users towards a certain type of software: "We will not, as long as I'm involved in it, go to a position where users are forced to use a particular kind of software. As long as people use Internet standard protocols, we'll support them." That said, Demon is talking to some companies about supplying some decent Windows software as a directly supported alternative to finding your own software. "We're finding that as more and more people come into the market, we've got to make it easier," explains Stanford.

Demon's PoP (point of presence) coverage of the UK will soon be above 90 percent. But will a company which started out with hobbyists be able to adapt as the Internet matures into a consumer service? Getting onto the Internet with Demon has a long way to go before it's as straightforward as turning on a TV. **PCW**

Stanford on BT:

Q *Isn't there a danger for you, that BT will finally get its act together and blow away all the smaller Internet providers?*

"BT aren't able to support a service like the Internet. The old joke used to be a technical support person spending 20 minutes on the phone before he thought to ask the caller whether he had a modem. Now it's becoming the first question. These people are at the technical level where it doesn't occur to them they're going to have to make a connection, to connect to the information Superhighway."

Stanford on CompuServe:

Q *CompuServe has over three million subscribers worldwide. Is it going to be able to adjust quickly enough to hang on to its market share?*

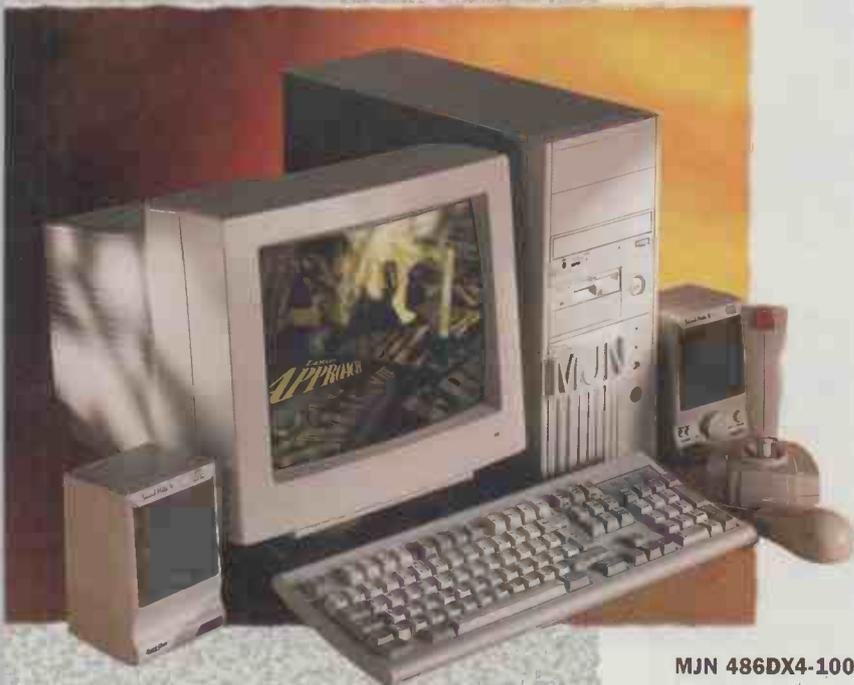
"I have no vision of whether CompuServe is going to bend or break. They're trying very hard to bend. My personal feeling is that they will break, but I don't know. It really depends on whether they get their act together and whether they can make the right sort of acquisitions and the right sort of infrastructure changes. I think the market is becoming much more price-sensitive and CompuServe is the most expensive of any dial-up service anywhere in the world. And as more and more resource goes out onto the Net and the Web, the use of CompuServe forums will become meaningless."

Stanford on Cable companies:

Q *Why isn't Demon doing deals with cable companies?*

"We can't find cable companies who understand enough about telephony. Cambridge Cable are the only ones who understand it. Nynex and the others are playing it very close to their chests and we don't know whether they're merely ignorant or if they're looking to launch their own Internet services."

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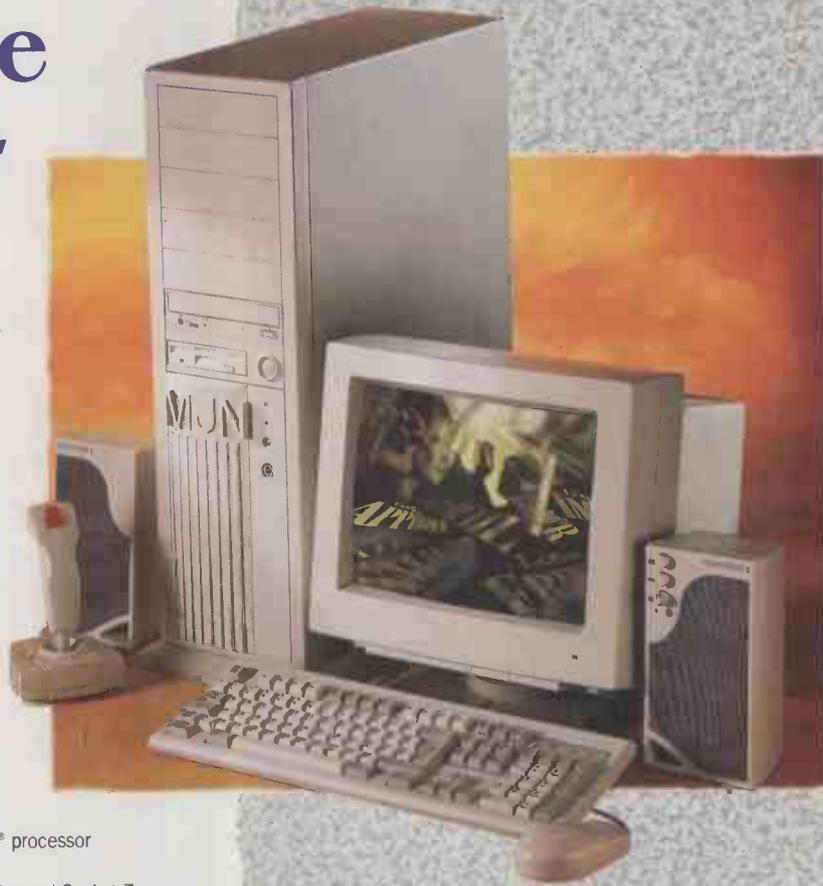
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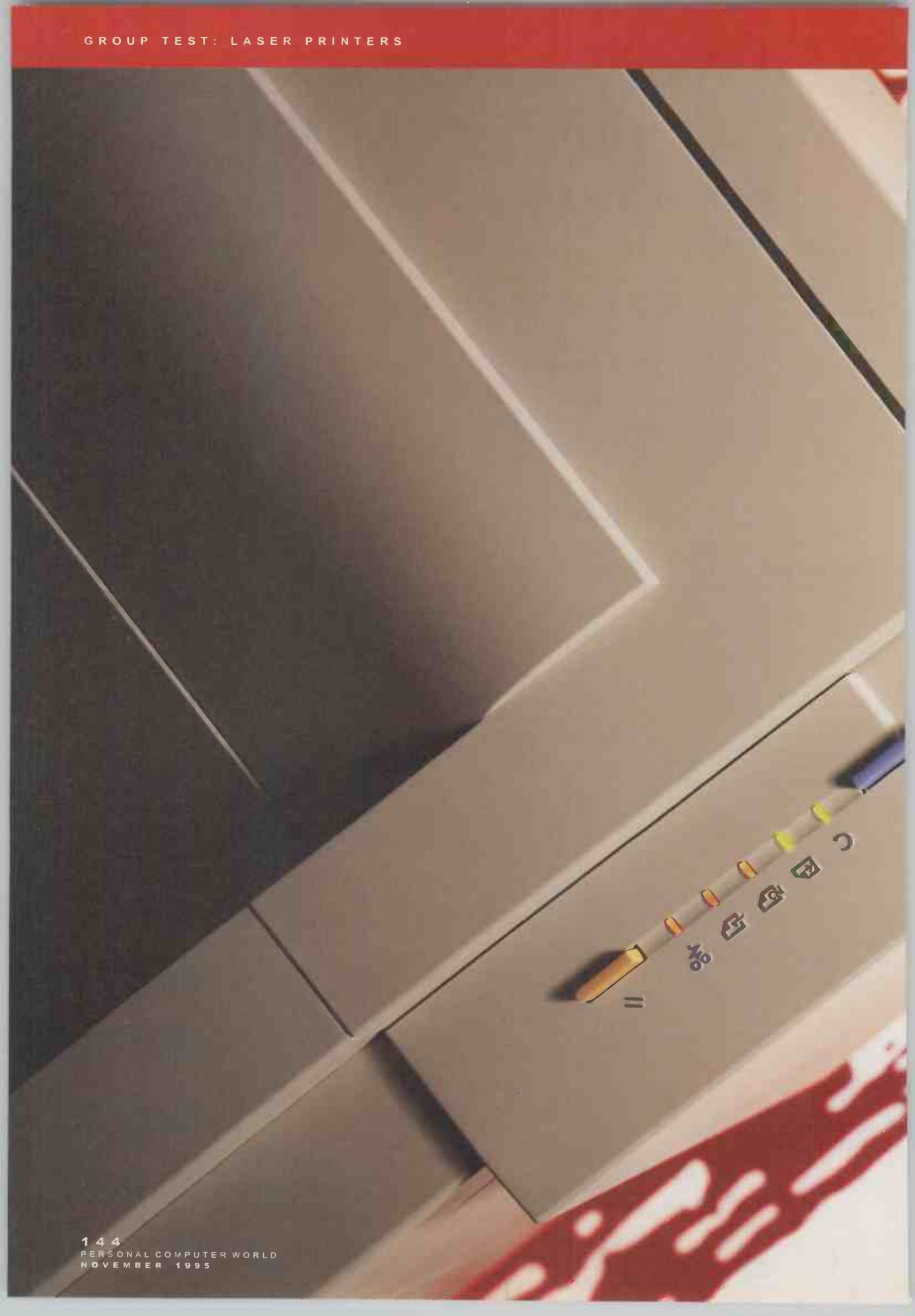
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Believe it or not, laser printers are no longer beyond your price range or the limits of your desk space. Gordon Laing has 11 to show you.

PCW Photography by Bruce Mackie

Not so long ago a laser printer was a huge beast of a peripheral, affordable only by large organisations or extremely wealthy individuals. Over the past couple of years however the laser printer has become truly personal in both size and price: it's not uncommon to find one smaller than your PC and in some cases costing less than £300.

That's not to say you can't buy a fridge-sized printer; indeed, we've seen some that could feed a family for a week, so we've divided our latest group test into three distinct laser flavours. First up are those rock-bottom budget printers that may even produce change from £300 on the street. Secondly, there's the mid-range personal lasers upgraded to 2Mb memory and costing around £600 on the street. We specified 2Mb since some graphics-intensive documents struggle on lesser configurations.

Next month we'll look at the third and final category: network laser printers. As a brief taster, all these must fall between 8 and 16 pages per minute, come with 8Mb memory, PostScript and an Ethernet network connection. A round-up of truly fridge-sized proportions.

This month we've looked at four lasers that cost less than £300 and seven which fit into the second category. Along with picking out the best, we have explanations of how laser and LED printers work, features on new technology that allow you to talk to your printer with infrared light, and discussions on environmental issues. Nothing less than everything you would ever want to know about buying a laser printer.

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How laser printers work

Considering what goes into a laser printer, it is amazing they can be produced for so little money. In many ways, the components which make up a laser printer are far more sophisticated than those in your computer. The RIP (raster image processor) might use an advanced RISC processor; the engineering which goes into the bearings for the mirrors is very advanced; and the choice of chemicals for the drum and toner, while often environmentally unsound, is fascinating.

Getting the image from your screen to paper requires an interesting mix of coding, electronics, optics, mechanics and chemistry. It isn't all done with mirrors but they play an important part. The image starts in the memory of your computer and what is sent out depends on the type of laser printer you have.

The crudest arrangement is a bit image. This sends a dot for every dot the computer wants to print. If you have a bitmap picture there is not much the computer can do to improve on the quality, so sending a dot for a dot is all it can do. But if the system knows more about the image than it can display on the screen there are better ways to handle your data.

A standard A4 sheet is 8.5in across and 11in deep. At 300dpi, that is more than eight million dots compared with the eight hundred thousand pixels on a 1024 by 768 screen. There is obviously scope for a much sharper image on paper — even more so at 600dpi, where a page can have 33 million dots. Just consider the number of dots a 2400dpi image setter has to play with.

The major way quality can be improved is by sending a page description consisting of outline/vector information and allowing the printer to make the

best possible use of it. If the printer is told to draw a line from one point to another, it can use the basic geometric principle that a line has length but not width, and draw that line one dot wide. The same holds for curves, which can be as fine as the resolution of the printer allows. The idea is that one single page description may be sent to any suitable device, which would subsequently print it to the best of its ability — hence the much-touted term, *device independent*.

Text characters are made up of lines and curves so can be handled in the same way, but a better solution is to use a pre-described font shape, such as

amount of information — one byte per character — and produce great-looking text, but of course the printer needs to be told what the font looks like. Fonts can be stored in the printer or on the computer, to be sent over with the document and held in the printer's RAM. In some cases the printer will store fonts on a dedicated hard disk attached directly to the printer.

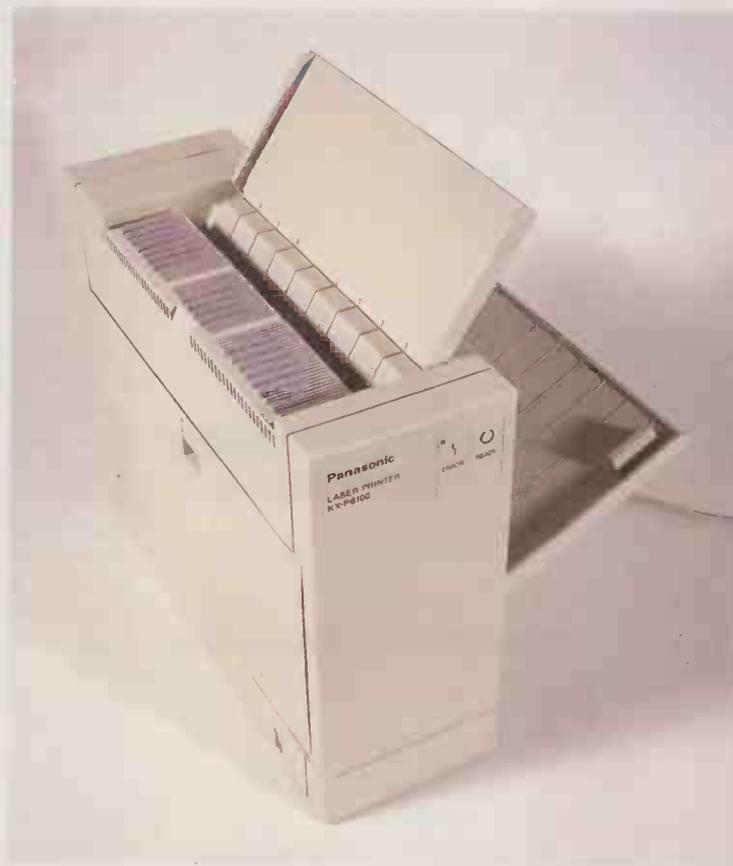
Some documents use a combination of line drawing, halftone images and outline fonts, so the printer needs to know what's what. This is the job of the printer driver. It sends the details of the page to the printer in a language the printer understands. The most common page description languages are Adobe's PostScript and Hewlett-Packard's PCL (printer control language), but there are several others.

Page description languages

Talking to your printer many years ago used to be very different. Text was sent in ASCII along with simple character codes instructing bold, italic, condensed or enlarged type. Fonts consisted of those built into the printer, distinguished more often than not by a switch selecting serif or sans serif; and this if you were lucky. Graphics, so long as you didn't have a daisywheel, were produced line by line, slowly and streakily.

The one big advantage of ASCII-described text is that it happens quickly and easily: the electronic document contains a letter A,

sends the ASCII code for an A and the printer, recognising the code, prints an A. The big problem is that without careful planning, the printed letter rarely ends up in the same position it held on the screen. Worse, you're limited to the font shapes and sizes offered by the printer. Printing your document on a different machine produced even less predictable results. This system is known as device-dependent.



TrueType or Type-1 formats. Along with precise placement, the page description language may take a font shape and scale it, rotate it, or generally manipulate it to its heart's content. There's the added advantage of only requiring one file per font as opposed to one file for each point size.

Having predefined outlines for fonts allows the computer to send a tiny



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Real colour printers

In the mid-eighties Adobe came to the rescue with arguably the first standard multi-platform device-independent page description language, PostScript Level 1. PostScript describes pages in outline, vector form which is sent to the display or printing device to be converted into dots (rasterised) at the device's best ability.

A monitor could manage 75dpi, a laser 300dpi and an image-setter up to 2400dpi. Each one produced more faithful representations of the PostScript description than the last, but all had the sizes and positions of the shapes in common. Hence device independence and the birth of everyone's favourite acronym, WYSIWYG – What You See Is What You Get.

Adobe's font format is known as Type 1 and is rasterised on PC and Mac screens by ATM, Adobe Type Manager. This results in display PostScript for text only. The NeXT operating system offers full display PostScript, guaranteeing 100% WYSIWYG for text and graphics.

PostScript Level 1 appealed to the

high-end publishers, thanks to its many professional features including halftone screening and the fact that proofs made on a 300dpi laser would be laid out identically to those on the image-setters.

You can send the PostScript instructions from any platform, too. All you need is a driver to turn your document information into PostScript which is then understood by any PostScript printer. Send from a Mac or a PC — it doesn't matter so long as you have a PostScript driver. Pop the PostScript description onto a disk and have it printed at a high resolution or a colour bureau if you like; indeed, this is the way many publications are produced.

These features along with graphics snobbery (particularly on the Mac) and the fact that Adobe is the only licencer, made PostScript-equipped devices ultimately desirable and consequently expensive. Hewlett-Packard saw a gap in the market and in the seventies came up with its own device independent-ish page description language based on its Printer Command Language, PCL. The recent

PCL 5, developed for the LaserJet III, offers a similar feature set, with scalable fonts through the Intellifont system and vector descriptions giving WYSIWYG on your desktop. PCL 5 also utilises various forms of compression which speed up printing times considerably compared to PostScript Level 1.

HP's marketing has been very different to Adobe's, targeting mass cloners rather than exclusive licensing. Like the IBM AT concept, there are now many printers equipped with clones of PCL 5 costing much less than their PostScript-licensed counterparts. PCL 5 printers produce great-looking output until you compare results on other PCL 5 machines.

The problem with having so many PCL 5 clones around is that you cannot guarantee 100% identical prints on all printers. This is not a problem unless you intend to use high-resolution bureaux and want an exact proof before you send files. Only PostScript can offer you a complete guarantee.

Canon LBP 430W



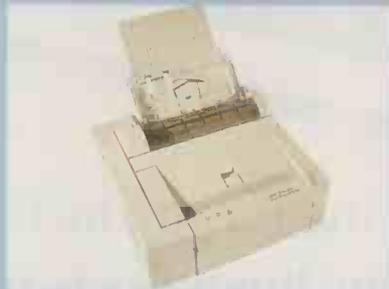
Not GDI, the 4ppm Canon LBP 430W uses the official Microsoft Windows Printing System; PCL level 4 is offered as well. Like GDI, the WPS requires a reasonable-specification host PC to do the thinking. Even using our 486DX 33 with 16Mb RAM, this Canon was pretty sloth-like and did not appear to cache the fonts in repeated documents. It was not the slowest, however. Up to 100 sheets of paper are fitted in a slide-out tray in the base and emerge face down in the top – nothing sticks out. Unfortunately the Canon failed to run our quality tests, but in normal use output looked good: sharp, without streaking. The 430W is replaced by the improved 460W in October, costing £349 RRP.

PCW Details

Canon LBP 430W

Price RRP £399, Street £320
Contact 0500 246246

NEC SuperScript 610 Plus



The 610 Plus is NEC's cheapest printer, starting at under £300 on the street, and sporting the square, pizza-box design NEC likes so much. The 610 was one of the original GDI machines and the 6ppm 610 Plus still relies on this as its primary language. PCL level 4.5 is offered for backup. Only 50 sheets may be loaded in the standard hopper. Like the 660i there's no PostScript or Ethernet options, but NEC is working on Mac and Windows for Workgroups (for sharing) drivers. Again, like the 660i and unlike the other GDIs, the 610 Plus was a fast mover, even on the bitmap test. Quality results were also good, making this a great all-round Windows printer.

PCW Details

NEC SuperScript 610 plus

Price RRP £349, Street £299
Contact 0345 300103.
Fax 0181 235 4930



Panasonic KX-P6100



Congratulations to Panasonic for a completely original stand-up design – perfect for those with little spare desk space. You will need at least one tray unfolded however. PCL level 4.5 is offered, but the 6100 is primarily a GDI machine. By the time you read this Panasonic should have finalised its Windows 95 drivers, but phone Panasonic to confirm this. Under Windows 3.1 the 6100 was surprisingly quick, beating every other machine on test, GDI or not. It was good on the quality tests too, with very smooth outlines and solid blacks beaten by few. And the best thing of all? At an RRP of £369 and a street price of around £279, the 6100 is officially the cheapest on test.

PCW Details

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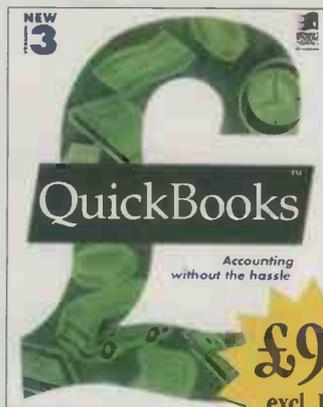
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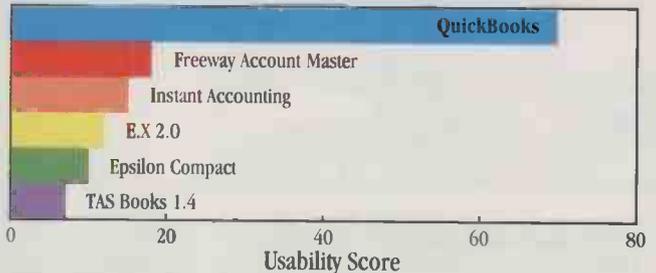
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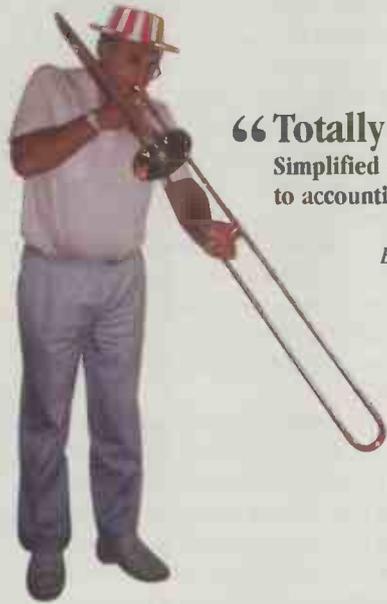
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Fonts and speed of printing is another aspect. Currently there are two main font formats, Adobe Type 1 and MS/Apple TrueType, with HP tagging along with Intellifont. Type 1 fonts can only be displayed on screen by ATM, but can then be printed on any machine. The fastest results with Type 1 fonts come with a PostScript printer. PCL drivers include the Agfa Compugraphic Intellifont system, which scales fonts on-screen and in the printer; this works fastest with the internal printer fonts from Agfa Compugraphic.

Software exists in System 7 and Windows 3.1 which scales TrueType fonts, but the only printer language specifically designed for the job is Truelmage, recently developed by Microsoft.

Truelmage is a PostScript clone which can process both Type 1 and TrueType fonts quickly within the printer. One downside is that since it's missing the official Adobe word of honour, there's no guarantee of compatibility.

The story doesn't end there. HP

developed an extension named PCL 5e specifically for its LaserJet 4, offering among other things a TrueType rasteriser (along with Intellifont) within the printer. PCL 5 and 5e are entirely compatible with previous versions of PCL. Particularly serious users may be interested in the LaserJet 4L which additionally offers PostScript Level 2.

PostScript Level 2 is the latest offering from Adobe. Key features include device-independent colour based on the CIE 1931 international standard, data compression using CCITT Group 3, 4, LZW, JPEG and ASCII-85 for faster printing, improved halftone algorithms, improved memory and resource management. Level 2 uses form and pattern cacheing which look for repeated use of elements stored and used again. In practice, Level 2 offers a considerably higher degree of colour matching between devices, particularly on photographic, continuous-tone images. Level 1 code may be sent to a Level 2 printer or Level 2 code to a Level 1 printer successfully, but

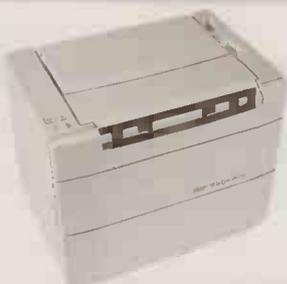
without the advantages outlined above.

One thing PCL and PostScript have in common is the translation stage. Take your document information, pass it through the printer driver for conversion to the appropriate description language, and send this information to the printer for rasterisation and printing. But hang on a minute – isn't one of the points of a graphical user interface to scale and generally manipulate vector objects, such as font outlines? Something in your GUI is doing much the same job as PostScript and PCL...

This something in Windows is the graphical device interface, GDI, which could actually drive a printer by itself. Cut out the middle man. Why waste time converting a perfectly good page description into another page description, when the first could quite happily drive a printer unadulterated?

The answer is compatibility and distribution. The whole point of PostScript is that it will print identically from any platform or operating system on any

Star WinType 4000



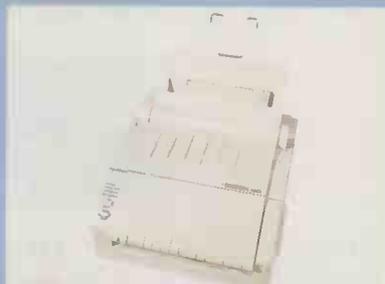
Star's 4ppm cube-shaped offering is one of the cheapest printers in this test, costing around £299 on the street. The fold-out paper tray holds up to 100 sheets of paper, but in our tests the machine struggled with this amount, occasionally screwing up pages. The WinType's primary language is GDI but it also supports PCL level 4. In GDI mode it was average in speed with other GDIs but slow compared to PCL printers, and this was on a 486 DX33 with 16Mb RAM. Quality results were very good with sharp definition and solid blacks. A great budget choice.

PCW Details

Star WinType 4000

Price RRP £399, Street £299
Contact 01494 471111.
Fax 01494 473333

Brother HL-660



If ever a printer were inspired by a breadbin, this is it. The HL-660 is a fairly compact design but has protruding trays for both the paper feed and output support. On the plus side, the paper is kept virtually flat through the process, allowing thicker sheets to be used. True 600dpi resolution and 2Mb memory come as standard, above the average 1Mb. PCL Level 5e is supported, while PostScript, Ethernet and AppleTalk are optional extras. In our performance tests the HL-660 scored very well, being one of the fastest all round. It failed to produce some of the quality tests, but those that emerged showed very fine detail and excellent overall quality. Good value for money.

PCW Details

Brother HL-660

Price RRP £639, Street £499
Contact 0161 330 6531.
Fax 0161 308 3281



Epson EPL-5200+



Epson's 6ppm EPL-5200+ is a gracefully curved printer, a little larger than its contemporaries. Up to 150 sheets may be loaded into a tray at the base, which emerge face down at the top of the machine – no protruding flaps or trays here. Out of the box, the 5200+ comes with 1Mb and supports PCL Level 5e. Up to 5Mb may be fitted with bog-standard SIMMs. Other options include Ethernet, PostScript and Macintosh AppleTalk interfaces. In our quality tests the 5200+ scored highly with excellent resolving power, sharpness and solid blacks. Performance-wise it was one of the fastest, zipping through the graphics pages. Recommended.

PCW Details

Epson EPL-5200+

Price RRP unknown, Street £500
Contact 0800 289622.
Fax 01442 227227

PostScript printer. A GDI printer will only print from the operating system using the same GDI. In real terms, a Windows GDI printer will operate under Windows only; no DOS printing, unless it's running in a Window, and then only with additional emulation (usually an early version of PCL). Is that such a limitation? Why not produce a Windows-only printer? After all, there are a huge amount of Windows users out there and the number is increasing every day.

There are many advantages to a GDI printer. The most obvious is the time saved by not converting the GDI information into an emulation such as PostScript. The second is one of cost. Traditionally, the printer would have a whole load of electronics built in to process the description into dots. Rasterisation of the GDI information takes place within the PC, resulting in a cheaper printer. There's the added advantage that upgrading your PC thereby increases your printer's performance. More memory, faster processor? All will benefit, so long as you stick

with Windows.

On the downside, a GDI printer being so reliant on your PC and operating system really is a personal printer for you and no-one else. If you're after a network printer or any kind of sharing, GDI is currently out of the question. Future drivers may allow sharing over a Windows for Workgroups network, but certainly not Novell. And unless you have at least a mid-range 486, you could find GDI printers intolerably slow. Minimum spec is claimed to be a 386SX which can run Windows Enhanced mode, but this is about as usable as a 286 running Windows 3.1. There's also the worry that if your operating system does something strange, this could affect the printed page.

As far as Windows 95 is concerned, all the GDI printer manufacturers were rushing to release suitable drivers at the time of writing. Contact them direct for latest information.

The choice between the different page description languages is based on

which OS and platform you need to print from, which format most of your fonts are in and whether you absolutely require guaranteed device independence. PostScript accuracy and consistency is nice, but PCL works out a lot cheaper on the same printer, offering the same quality of output. GDI again offers the same potential quality of output but has the enormous advantages of great speed (with a decent PC), value for money and automatic upgradability when you upgrade your machine. Sadly, Windows-specific GDI printers will only work under Windows and connect to just one machine at a time; non-Windows for Workgroup network users should look elsewhere, as should Macintosh owners, although some manufacturers were developing Mac GDI drivers at the time of writing.

Rasterisation

Once the information — a combination of lines, fonts and bits — reaches the printer, it has to decipher the codes and

HP LaserJet 5P



A large but good-looking machine from HP, the latest 6ppm LaserJet comes in two flavours: the 5P reviewed here and the 5MP with added PostScript and Apple LocalTalk. Ethernet is an option on both machines. The 5P's primary emulation is PCL Level 5e and comes with 2Mb as standard. Both models are fitted with an IRDA-compliant infra-red port. Performance was good overall, turning out fast times on everything other than the bitmap test. The quality tests revealed all however. The 5P's true 600dpi resolution with enhancement looked superb, with the finest and sharpest lines, while the superiority of the bitmap image over the others explained the relatively slow printing times. This aside, a clear winner.

PCW Details

Hewlett Packard LaserJet 5P

Price RRP £799, Street £619

Contact 01344 369222.

Fax 0171 735 5565



Kyocera FS 400



Kyocera is well known for its adverts claiming low running costs, thanks to its refillable cartridges described in the environment feature among these pages. The 4ppm FS 400 is a personal printer, using 300dpi LED technology and offering PCL Level 5 emulation. Economy is additionally provided by adjusting toner levels and power sleep modes. Physically it's a compact design without any protruding flaps or trays unless you want the paper to emerge face up out the rear. A variety of options include Ethernet and other network flavours, PostScript Level 1 and AppleTalk. In performance tests the FS 400 was one of the slowest, particularly on text. Quality results were good however with crisp outlines and solid blacks.

PCW Details

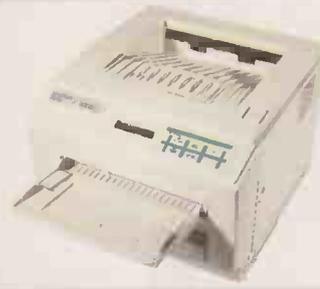
Kyocera FS 400

Price RRP £558, Street £417

Contact 01734 311500.

Fax 01734 311108

MT T9005 Plus



Mannesmann Tally has opted for an almost cube-like design without protrusions, in a slightly old-fashioned style. The paper cassette will hold up to 250 sheets. The 5ppm LED printer comes with PCL Level 5 but does not offer the option of PostScript emulation, AppleTalk or Ethernet connections. Despite being fitted with extra memory, the T9005 Plus reported being low on memory in our font caching test, curiously printing the last page twice. Performance-wise it was fairly average, falling around the middle of our top and bottom range. Quality tests were output with solid blacks and confident outlines, if with a little obvious stepping. A reliable but unremarkable machine.

PCW Details

Mannesmann Tally T9005 Plus

Price RRP £888, Street £750

Contact 01734 788711.

Fax 01784 791491

produce something which can be printed. The process is called rasterisation and is performed by the raster image processor, RIP. Rasterisation produces a bitmap at the resolution of the printer, from the original page description. This bitmap is traditionally stored within the printer's own memory. Since a mono laser printer can only lay down a dot, or no dot at all, the bitmap depth is 1-bit. That's why the printer's memory may not seem all that much compared with your graphics card which allocates much more of its memory to colours, say 8-bit (256-colour) at 1024 by 768, instead of 1-bit at a much higher printing resolution.

Even so, the RIP will need portions of its memory for processing space, which is why some complex images may only half-print. Additionally, a true 600dpi printer creates a bitmap four times the size of a 300dpi printer, thereby requiring at least four times as much memory. Downloaded fonts take up precious memory if you don't want to flood them out at every new job.

Different emulations require different amounts of processing space too: PostScript is traditionally memory hungry, which goes some way to explain why its page descriptions often take longer to print than identical pages described by PCL. It doesn't take long to realise that a printer hungers for memory as much as your own computer, particularly if your documents contain complex graphics requiring lots of halftone processing or many fonts.

The exception to the rule are GDI printers which are in effect dumb mechanical devices. Here, the rasterisation takes place within your own computer, using its built-in processor and RAM. No need to download those fonts, and all that printer-upgrading budget could be just as effectively spent on the computer itself.

During rasterisation, various resolution or edge enhancements may take place. These are used by some laser printers to adjust the arrangement of dots on the page so that stepped edges are

smoothed out, making the resulting print appear to have a higher resolution. This works by modulating the power of the laser to fill in the dots at the edges of characters with smaller dots to produce crisper-looking text and smoother images.

Different manufacturers have their own implementations. RET (Resolution Enhancement Technology) belongs to Hewlett-Packard but another you may come across is PQET, used by Lexmark and HRC. While enhancement can significantly improve output, it's still not up to that of a true 600dpi machine. One laser printer may implement enhancements better than another, but in rare cases a genuine horizontal upgrade to 600dpi may be achievable with the appropriate hardware. This feature is usually only offered on genuine laser printers and not those using LEDs.

Once the page description has been rasterised, the bitmap is sent direct to the printer's engine for output.

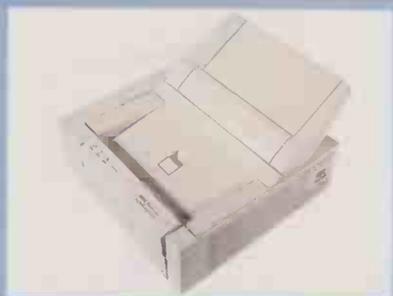
Mechanics

It is important to realise that a laser printer draws one dot at a time, moving down one line at a time like a TV picture; it cannot back up on itself. The printer has to decode the whole page before it can start printing. If it got to the end of the page and reached an instruction to draw a line from the bottom right to the top left, it would be stuck.

With the whole page in memory, the mechanical process can begin. The laser is used to draw on a photocopier drum. It takes the image from memory, and as it tracks from left to right the laser is turned on and off. Moving the whole laser would be a major mechanical task and is unnecessary; all that has to be moved is the light, and this can be done with mirrors. The printer has a small eight-sided drum; as this spins, the laser tracks across the photocopier drum. You can see a similar principle at work if you look at a mirror ball at a disco: the lights bounce off the ball onto the floor, track across the floor and disappear as the ball revolves. In the printer, the mirror drum spins incredibly fast and is synchronised with the laser turning on and off. A typical laser printer will have to perform millions of switches every second.

LED printers, where the single laser and directing mirror are replaced by a fixed line of LEDs, are a cheaper alternative to conventional lasers. A 300dpi LED printer will have 300 LEDs per inch, over the required page width; if 8 inches is the

NEC SuperScript 660i



This short, flat 6ppm printer from NEC is the only one in this category to offer GDI as a primary emulation. Not to leave anything to chance, NEC has also fitted PCL Level 5e and 2Mb memory as standard. There's no option for PostScript or Ethernet, but NEC is working on a Macintosh driver and software which will allow sharing under Windows for Workgroups. The 660i sped along in the performance tests and this was in GDI mode; but when it encountered the bitmap, it paused for an eternity before finally printing. Like the HP 5P, this could be due to the additional processing required for the true 600dpi resolution. The quality was superb, and the 660i comes highly recommended.

PCW Details

NEC SuperScript 660i

Price RRP £699, Street £599

Contact 0345 300103.

Fax 0181 235 4930



Panasonic KX-P4430



The 5ppm Panasonic KX-P4430 is showing its age today. Stylewise its large, protruding paper tray is less than chic. Options are few, with no upgrade possibility of PostScript, Macintosh AppleTalk connection or Ethernet. Primary emulation is PCL Level 4, and Panasonic recommended we use a standard Windows LaserJet III driver. It was compatible, but it would have been nice to have a disk supplied. Performance tests were average to fairly slow with no evidence of font caching, despite the 2Mb memory fitted. Although it failed on one of our quality tests, the 4430 still put in a good show, with clear and smooth output.

PCW Details

Panasonic KX-P4430

Price RRP £925, Street £700

Contact 0500 404041.

Fax 01344 853707

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printable width for a typical A4 LED printer, that would total 2400 LEDs in a row.

The advantage is that a row of LEDs is cheaper to make than a laser and mirror with lots of moving parts. The disadvantage is that the horizontal resolution is absolutely fixed, and while you can apply some resolution enhancements, none of them will be as good as the possible resolution upgrades offered by some true lasers, described earlier. This aside, LEDs effectively work as lasers and from this point on in the text, both will be referred to as lasers.

The laser works like a stick drawing in dirt; the dirt is a static charge on the drum. Where the laser is turned on, it hits the drum and knocks the charge off. Where it is turned off, the charge remains. You could try the same thing with your monitor: turn it on and trace your name on the screen with the tip of your finger. You will feel it crackle as you knock the charge off.

Inside the printer, the drum rotates to build up the next line. Clearly this has to be done very accurately; the smaller the rotation, the higher the resolution of the printer down the page. Similarly, the faster the beam is turned on and off, the higher the resolution across the page. An

on-off switch is easier to engineer than an accurate step, so resolution enhancement using this technique will only improve the horizontal resolution, and then only on true laser printers.

As the drum rotates to present the next area for laser treatment, the written-on area moves into the dirt — the laser toner. This is attracted to those areas which have not had the charge knocked off them by the laser. If you were to dust the monitor you'd traced your name on to with talcum powder, your name would appear as a clear area.

The same thing goes on with the drum picking up toner. This is a very fine dust — much finer than talcum powder, and very black. The image builds up on the drum as the toner is attracted to it. As the drum rotates, it is pressed against the printing paper which is fed in by a set of rubber rollers. The toner rubs off onto the paper — imagine pressing a sheet of felt against your talcum-covered screen. But a page of dust isn't going to last long, so the page passes under a heated roller to melt the toner on.

Toner trouble

Toner is specially designed to melt very quickly. If you spill some, you should not try to clean it with hot water or you will

have a worse mess. The only thing better than cold, soapy water for cleaning up toner is not to go near the stuff in the first place. A vacuum cleaner is a very bad idea because the toner is finer than the holes in the cleaner bag and you end up spreading the fine dust. Most modern printers build the drum and the toner into a sealed cartridge so you should not have to mess with the powder.

The page, having been smeared with toner and heated, then slides out of the printer. The drum rotates and has to be cleaned. There are two forms of cleaning; physical and electrical. With the first, the toner which was not transferred to the paper is mechanically scraped off the drum and the waste toner collected in a bin. Electrical cleaning takes the form of covering the drum with an even electrical charge so the laser can write on it again. This is done by an electrical element called the corona wire. Both the felt pad which cleans the drum (and usually lives under a green flap at the front of the printer) and the corona wire should be changed regularly to give good-quality prints.

Refilling cartridges is a good way to save money, but the cleaning pads will wear the drum and you cannot expect the same quality as you get with a new drum.



How we did the tests

Printers are assessed separately for quality and speed using VNU European Labs methodology. Overall scores for text and graphics printing speed are combined using standard weightings, giving an overall performance result. The quality scores are presented separately.

Windows 3.1 is used as a unifying platform which supports printer drivers: a VNU European Labs benchtest tool is used to provide accurate timing.

The quality tests were done at the printer's maximum resolution, using PostScript test files. Any printer which does not support a native PostScript mode is driven using ZScript, a Windows-based software PostScript interpreter. Speed is not measured during the quality tests.

The PostScript test files exercise every conceivable aspect of print quality. Large black areas are a good measure of a printer's toner distribution. The "blackness" test also

includes a graduated greyscale which is calibrated with a standard Kodak grey.

Further quality tests draw fine, detailed lines and half-tone bit-mapped photographic-quality images. The Edge test measures exactly how close to the edge of the page the printer can print.

Font rendering is a vital aspect of print quality: we also run a selection of font tests which use the standard PostScript fonts at a range of point sizes, starting at 0.5 points and increasing in size. Very few 300dpi printers produce legible text at point sizes below 2.5, especially when white text is printed on a black background.

The speed tests were using the printers' primary emulation. Text and graphics performance are measured separately, as most printers should be able to print out many pages of text rapidly, whereas graphics pages generally require more processing by the printers' internal controllers.

A 33MHz 486 PC was used to drive the printers, ensuring that there are no parallel-

port bottlenecks and that GDI-type printers have enough processing muscle to compete with the more intelligent models.

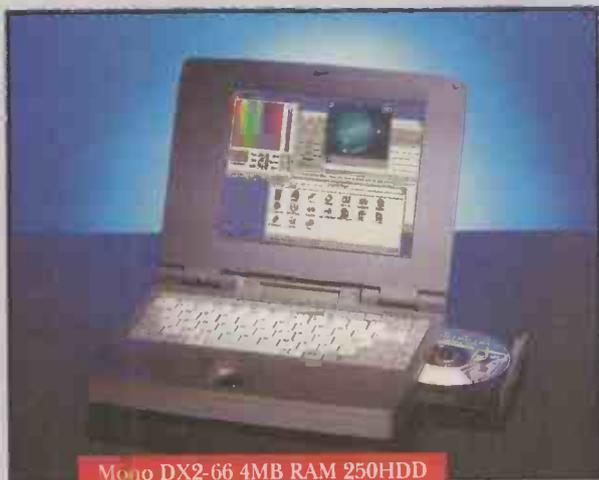
The Text Speed score is derived from a geometric mean of the results of four different tests, two of which involve runs of ten identical pages. The other two text tests are based on a variety of fonts, thus exercising the controller's font-caching capabilities.

Graphics Speed performance figures are based on timings for printing three different graphics metafiles, one of which is actually a bitmapped font. The other two are simulated half-tone graphics generated by a graphics package.

Finally, the Engine Speed bar-chart shows the results of one test in which a simple native font is printed using PCL5 or other native-mode emulations, except in the case of native GDI printers which are tested in GDI mode. Ten identical pages are printed to get an accurate idea of true maximum engine speed.

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Tripping the light fantastic

Every printer manufacturer is looking for an edge, something they can add to their product that will make it better than their rivals. If an addition were genuinely useful, cost little to add and was simple to operate, the average printer manufacturer would include it faster than something very fast indeed.

This utopian feature exists, and it is the Serial Infra Red link, SIR.

You will be able to print from your notebook, pocket computer or maybe even the address book in your mobile phone, just by pointing it at the printer. In an office it allows printer sharing as a number of people can use the same printer so long as they all have line of sight, although this needs some co-operation between users.

To this end Hewlett-Packard organised the Infra-Red Data Association (IRDA) which now has over 100 members including chip makers and computer and printer manufacturers. The whole thing can be driven by a standard 16550 UART, a part needed for any serial device. The IRDA estimates that the additional cost of adding data is between \$1.50 and \$4.50.

This initial specification was launched in March 1994 and is just beginning to spread in popularity. It works at short range and being light-based is of course line-of-sight, with a speed of 115Kbps.

The IR LED peak wavelength is specified to a range from 0.85µm to 0.90µm and is a half-duplex system. Just as the new standards start to become popular, a new standard which allows faster rates of transmission — 1.5Mbps and beyond — is being written for the IRDA specification. This is not quite as damning as it seems, since the new specification allows backwards compatibility to run at the old speed, and devices like the Apple Newton and Sharp IQ use older standards at 9600bps through software.

A disadvantage of the standard is that there is no security. IRDA relies upon the limited distance and line-of-sight transmission to stop unwanted snoopers from reading your beam. If you are concerned, you can add software encryption. IRDA argues that users who are familiar with the directionality of TV remote controls will be happy with the 30° field of view.

Unlike a TV remote control the IRDA system has to be two-way. It consists of an encoder/decoder and an IR transducer. The encoder/decoder interfaces to the UART. This can be shared with the UART for the wired serial communications since you are unlikely to want both at the same time. The specification takes as standard asynchronous serial character stream using 8 bits no parity and a stop bit, and encodes the output with a 0 being a pulse and a 1 being no pulse — like Morse code but backwards. Each pulse lasts at least 1.6 seconds. These pulses drive the



infra-red emitter.

On top of the hardware is a software protocol, establishing a master/slave relationship between the ends. You can have more than one slave but only one master, although any station can take either role as long as it has been determined dynamically at collection and can be swapped without closing the connection. All communication goes through the master and takes the form of one of three types of frame: unnumbered U frames, supervisory S frames and information-bearing I frames.

U frames are used for functions such as establishing and removing connections and the discovery of other stations — essentially an "I am here" alert. I frames contain the meat of the message and S frames are used to make sure

everything is handled neatly, containing information on the acknowledgement of I frames.

When you want to establish a link, the initialising device — say, the notebook you are printing from — will assume that it is to be the master and will send out a request for information at 9600bps. The slow rate is to ensure compatibility with as many infra-red systems as possible. The response from the slave will include information as to the best possible data rate.

On top of these protocols are others for multiplexing data, client server protocols, a transport control layer and even plug and play, which is odd: the great advantage of IRDA is that you don't have to plug before you play.

Simon Rockman

PCW IRDA Devices

Adaptec AIRPort adaptor range
Adaptec 01252 811200

Citizen Notebook Printer II
Citizen 01753 584111

HP LaserJet 5MP
Hewlett-Packard 01344 369222

IBM Thinkpad 755CX
IBM Enquiry line 0345 727272

Jet-Eye Printer Connection ESI-9580A
Jet Eye PC File Transfer ESI- 9680A
Extended Systems 01705 875075

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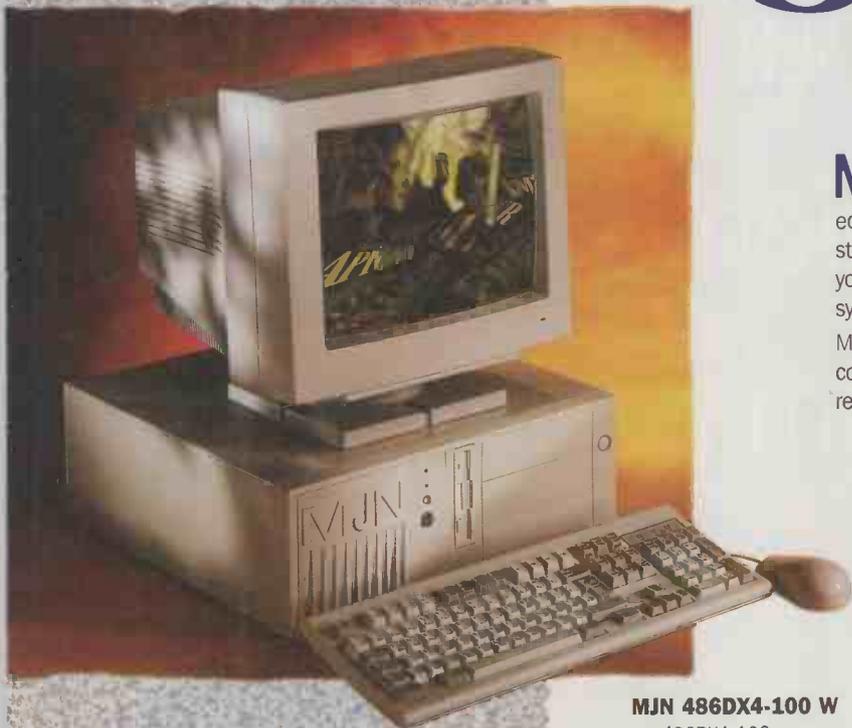
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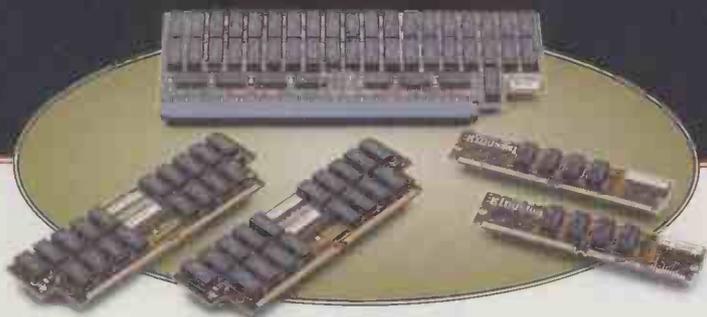
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Halftones

Clever outline descriptions don't do anything for continuous-tone, photographic images which traditionally start in electronic form as bitmaps and remain that way to the bitter end. Page description languages banter with lines and curves, but when they come to a continuous-tone image they just plonk a large bitmap down at the desired location.

Bitmaps have fixed resolution and will print with the same number of dots on every device. If you plan to print to a high-resolution device, make sure the bitmap is suitably fine. If you only ever want it printed on a 300dpi device, there's no point in working with a huge file.

In fact, anything other than solid black, or no black at all, poses a problem for laser printers, and this affects shades of grey, colours represented by shades of grey, as well as photographic images. A printer's lack of ability to reproduce shades is addressed by halftones.

Halftoning is the process of converting a continuous-tone image, such as a photograph, into patterns of dots suitable for printing. Large dots placed closely together represent dark areas, while sparsely-placed small dots represent the light. It's a process that's been used for years and can be seen most obviously on coarse-quality newspaper photographs.

Computer printers are not only unable to print shades, but cannot print different-sized dots either. The exception to the first rule is the dye sublimation printer which works in an entirely different way. Computer printers cope with the dot-size problem by creating halftone cells or raster dots, each made up from a square matrix of pixels.

The fuller the matrix of pixels, the darker the dot appears. Increasing the maximum number of pixels per cell in turn increases the number of greyscales possible. A cell consisting of a 4 x 4 array of pixels is capable of up to 16 shades of grey. 256 shades of grey requires a 16 x 16 cell of pixels.

The resolution of the actual printed image is its screen frequency, measured in lines per inch (lpi) or number of halftone dots per inch. Newspapers typically use screen frequencies of 75lpi, while glossy magazines range from 133 to 150lpi. In order to print a greyscale image with 256 shades at a resolution of 150lpi, you would need a printer capable of laying down 150 x 16 — that's 2400 pixels per inch.

With 300 pixels per inch to play with, you could have a 4 x 4 cell offering 16 shades at 75lpi. That's why a 300dpi laser printer isn't great at printing photographic images. 600dpi lasers significantly improve the situation, offering 8 x 8 cells — that's 64 shades at 75lpi. Just check out the sample printouts of the bitmapped image to see the dramatic difference between the 300 and true 600dpi lasers. 1200dpi lasers are becoming more common on higher-end network laser printers. At this resolution on decent paper, output begins to approach camera-ready artwork.

Since every shaded object in a page description is laboriously halftoned by the RIP, incorporating such elements considerably slows down printing. Bear in mind that 600dpi places four times and 1200dpi 16 times as many dots as 300dpi. Consequently you'll need four or 16 times the amount of memory, and a proportionally faster processor to RIP through it at the same speed.

Gordon Laing



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Laser printers and the environment

Laser printers have always been fairly unenlightened creatures when it comes to the environment. They churn out nasty gases, use up lots of power and periodically spit out used cartridges which get dumped in landfill sites.

Ozone is a byproduct of the laser-printing process. Some printers contain filters which are designed to limit ozone concentration to levels below endorsed standards (such as those of the American Conference of Governmental Industrial Hygienists). After a certain number of pages have passed through your printer – usually about 150,000, the filter should be replaced by an authorised service engineer. The ozone level emitted by your printer can also be affected by where and how you keep it. Areas with large concentrations of dust, small, enclosed offices or poorly ventilated rooms will result in high ozone intensity.

Power-saving abilities are also becoming important in laser-printer design. An independent US body, the EPA, has stipulated that in order for a printer to gain Energy Star Compliance it must dramatically reduce its power consumption when not in use. The power saver usually works by only warming up the printer when you send a job to it. If the printer is left idle for a certain period of time, its power consumption is reduced. Usually this period of time can be altered by the user, and if you are in a real hurry to print the first page faster, the power saver can be turned off altogether.

Laser printers produce radiation. Manufacturers often claim that their printers conform to Class B limits – satisfying European safety standards, meaning there is never any human access to radiation above a prescribed level during normal operation.

Normal operation includes any kind of user maintenance carried out according to directions in the manual, and there is usually a serious warning somewhere in your printer documentation reminding you that anything you do with your printer outside of these boundaries may result in hazardous radiation exposure.

Most lasers use cartridge technology based on an organic photoconductive (OPC) drum coated in light-sensitive material. During the lifetime of the printer, the drum needs to be periodically replaced as its surface wears out and print quality deteriorates.

The cartridge is the other big consumable item in a laser printer. Its lifetime depends on the quantity of toner it contains. When the toner runs out, the cartridge is replaced. Sometimes the toner cartridge and the OPC drum are housed separately, but in the worst case the drum is located inside the cartridge. This means that when the toner runs out, the whole drum containing the OPC cartridge needs to be replaced, adding a considerable amount of money to the running costs of the printer and producing large amounts of waste.

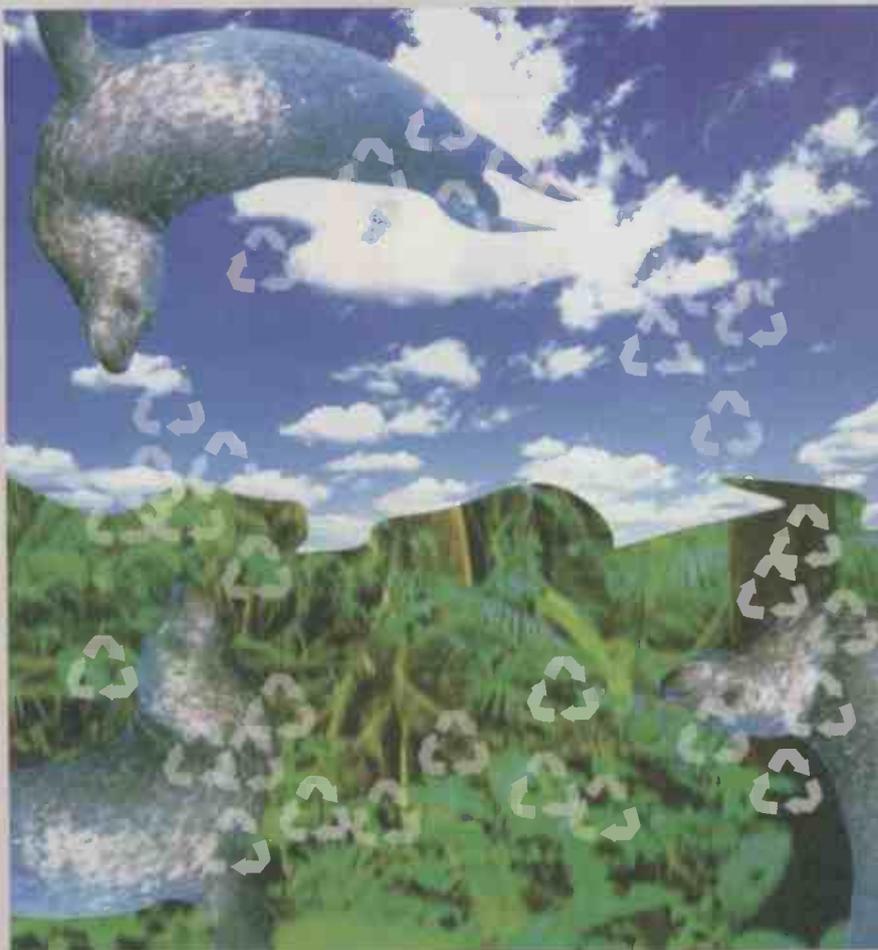
Some printer manufacturers have tried to improve this situation by making drums more durable and eliminating all consumables except for toner. Kyocera, for example, has produced a "cartridge-free" printer which makes use of an amorphous silicon drum. The drum uses a robust coating which lasts for the lifetime of the printer, so the only item requiring regular replacement is the toner. This comes in a package made from a non-toxic plastic designed to be incinerated without releasing any harmful gases.

Kyocera's technology as described above is featured in the FS-1600 model reviewed next month, while the FS-400 reviewed this month uses different materials for the same effect. Unfortunately, Kyocera's technology costs a little more than conventional means, but if you want a printer for heavy office use it may be worth your while spending slightly more on the initial cost to save money in the long-term. The running costs of a laser printer can be high, so it's worth looking into this before investing your money in something which superficially looks like good value.

Some organisations offer toner-cartridge refilling services, but while this sounds honourable, the reality can often be less than desirable. The problem is that many manufacturers are using special toner, such as Hewlett-Packard's Microfine. Fill a cartridge with something different and you may at best produce poor print quality, or at worst damage your machine.

Frustrated environmentalists may seek some consolation in handing their spent cartridges back to selected manufacturers for recycling. You don't get any money, but you do feel that you've done the right thing. Hewlett-Packard, Canon and IBM/Lexmark are three manufacturers that accept their own spent cartridges for recycling.

Eleanor Turton-Hill



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Paper

High-resolution printers are all well and good, but their performance is restricted by the quality of paper you use. The jagged edges of unenhanced 300dpi print are visible when using ordinary copier-grade bond paper. At 600dpi or enhanced 300dpi, the quality improves, but any higher resolution than this will not be noticed unless you invest in higher-quality paper.

Having said this, laser printers are not affected by paper quality to the same extent as inkjet printers. The way that inkjets fire ink directly at the paper means that poor-quality absorbent paper leads to visible feathering of characters. On laser printers the print quality never suffers quite to this extent, but smoother paper will noticeably improve resolution, especially when using very high dpi levels.

Using poor-quality paper has other side effects when used in laser printers. The drum inside the printer can become scratched, rapidly wearing out the surface and leading to deterioration in print quality and the inevitable drum replacement. It's important to follow the manual's guidelines as regards paper quality and weight: most recommend 75g copier paper which costs about £2.50 for 500

sheets. Higher-quality paper at 80 or 90g costs more than twice this amount for a smoother print.

The way paper is stored is also important, as extreme heat or humidity can affect the way it feeds through the printer. Curled or damp paper soon causes paper jams and seizes up the system.

There are other considerations when it comes to paper. If you do a lot of printing on heavy weight paper or card, then you should take note of the way that the paper passes through the printer. The normal paper path involves turning the sheet through an S-shaped bend, but many lasers include a straight-through path which prevents the paper from curling as it travels through the machine. Others provide an envelope feeder which will allow you to stack and feed multiple envelopes so that you don't have to manually feed them one at a time. Remember that feeding your printer paper that is heavier than the recommended maximum weight will invalidate your guarantee, along with the more disturbing prospect of seriously damaging the machine itself.

Eleanor Turton-Hill

Connectivity

Yes, that's right, everyone knows that you have to connect your printer to your computer for it do anything. Or do you? There are numerous connections in the computer industry and it's clearly important to know which you have in order to plug the right thing in the right place.

The most common printer connection in the PC world right now is without a doubt Parallel, AKA Centronics. There can't be many PCs made today which don't have a parallel port and it is also standard for printers to have a parallel port.

Serial used to be the most common connection in the computer world but was taken over by the wider connection of parallel. Serial, by definition, only transmits one bit at a time, whereas centronics parallel squeezes as many as 36. That's not the whole story, since some serial standards such as MIDI or Apple LocalTalk transmit that 1 bit many times faster than parallel does its 36 bits. On the PC however centronics parallel is much faster than its standard serial interface.

The PC's parallel port has become quite sophisticated in recent years, offering bi-directional communication between the device and the host machine. In real terms, several new printers are now able to send helpful messages back to your computer such as "out of paper" or "paper jam", rather than Windows Print Manager blankly stating "there is a problem with your printer". A special printer driver supplied by the manufacturer is required to make use of this facility.

As mentioned earlier, Apple Macs communicate to their printers through a serial connection called LocalTalk, using the AppleTalk protocol. Interestingly, LocalTalk may additionally be used

to connect several Macs and/or printers together in a small network.

Some printers boast a SCSI connection. SCSI is like a super-parallel with 50 pins, offering fast data transfer and daisy-chaining facilities between other SCSI devices. Typical SCSI devices are CD-ROM drives, scanners and hard drives and it's the latter which is traditionally connected to a printer's SCSI port. Such a hard drive would be used to store fonts. Sadly, the SCSI port is rarely used to connect your printer to its host for super-fast transfer.

Finally there's the option of Ethernet, traditionally used for sharing resources over a network. Ethernet offers very fast data transfer and is supported by numerous platforms. On the Macintosh it is referred to as EtherTalk, again using the same AppleTalk protocol.

What they all have in common is a cable which, if you're lucky, will be included with your device. If not, you're looking at spending an additional £10 to £20.

The future holds the possibility of no wires at all, with devices communicating by infra-red. This isn't years away either: a standard has been formed in the shape of IRDA, and most new notebooks and printers are suitably fitted. The first printer we have seen with infra-red is the Hewlett-Packard LaserJet 5P, reviewed in this feature. Check out the IRDA box (page 159) for more details.

Gordon Laing



The rear of a typical printer. At the top is an Apple LocalTalk port for Macintosh computers, in the middle a standard PC parallel port. At the bottom is Compaq's new proposed standard for parallel ports

Canon LBP 430W

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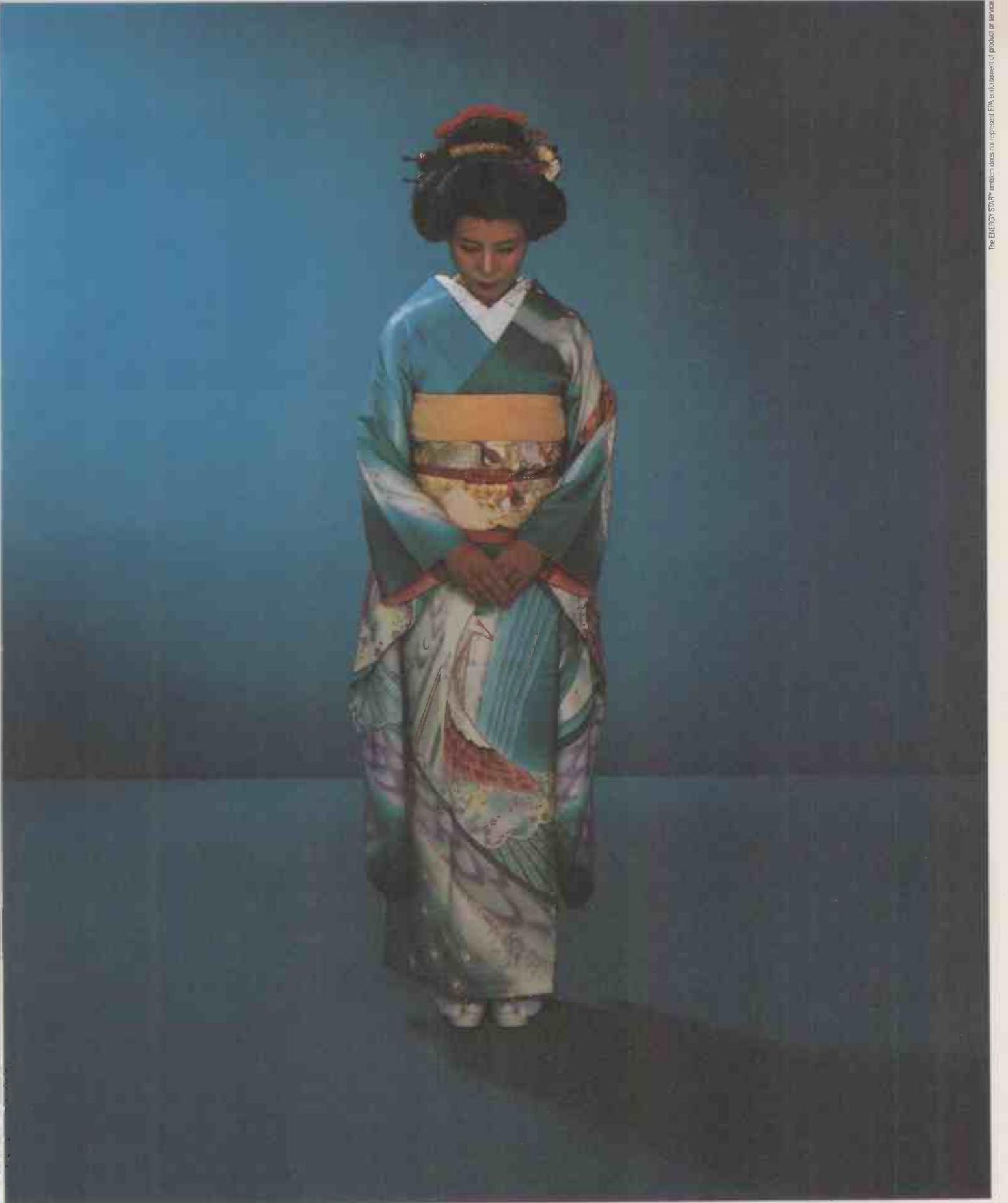


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Panasonic KX-P4430



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These samples are a small selection from the suite of tests used to determine print quality. The two text samples show, firstly, the printer's ability to produce very small text (2.5 point) and hence its ability to resolve fine detail; and secondly, the quality of a more typical text size (8 point). Both have been enlarged to reveal any artifacts. Look out for any particularly jagged or stepped edges: higher resolutions and enhancements will smooth the edges.

The sample photograph shows the printer's ability to handle bitmapped graphics. Reproduced here enlarged, the halftone pattern is clear.

In both text and graphics examples, notice the difference between the 300 and 600dpi machines. It is additionally obvious that one manufacturer's resolution enhancement technology is more effective than others.

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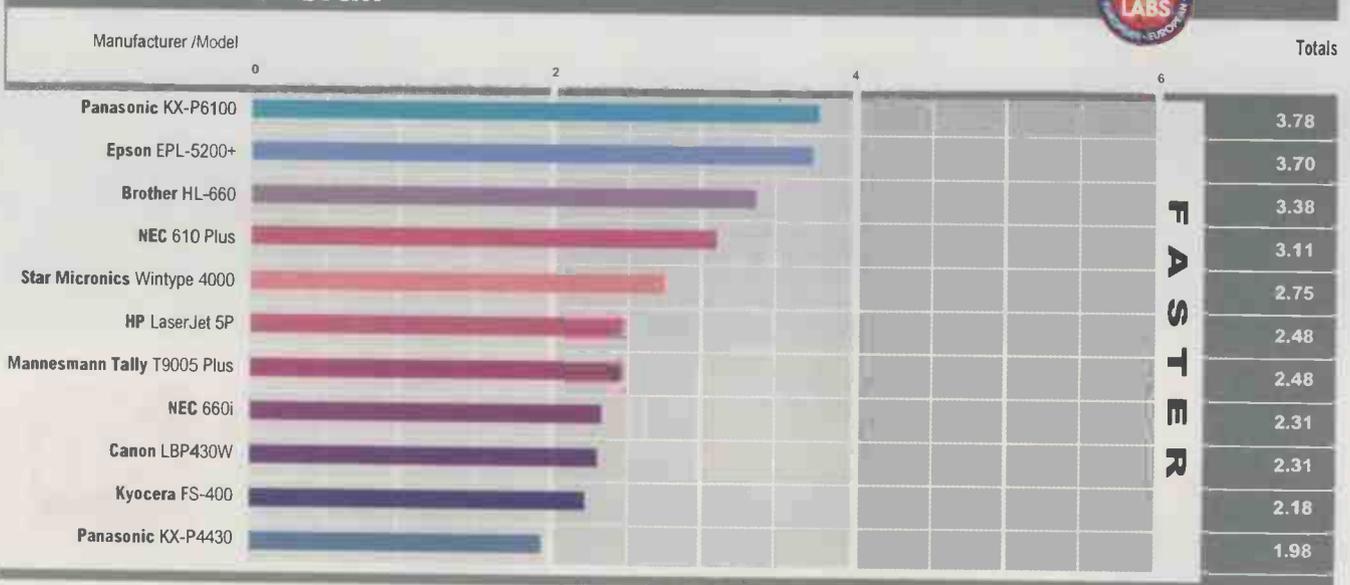
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Graphics



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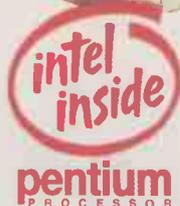
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Editor's Choice

Last October we published a budget laser printer group test with prices starting from around £350 on the street. The cheapest were the first generation of GDI printers, with their then largely undocumented quirks. We've learnt a lot about GDI since then and in the meantime, prices have dropped yet further. This year we have four GDI printers available at under £300 on the street, and these are all laser, not LED devices.

GDI, as described in the main body of this feature, is a wonderful idea which uses Windows' own description of the desktop to drive the printer, and the host PC's own memory and processor to do the thinking.

Consequently a GDI printer is little more than a dumb engine, manufactured cheaply since it has so few electronic parts of its own.

In theory wonderful, but in practice there are a few key points to bear in mind. First is that in order to match the processing speed of a normal printer, you'll need quite a good host PC. We used a 486DX/33 with 16Mb RAM and found some GDIs lagging behind their conventional counterparts. While GDI manufacturers tend to recommend at least a mid-speed 386DX, we'd go as far as to say don't bother with less than a 486DX with 8Mb RAM unless you don't mind hanging around.

GDI printers also require that you run in Windows Enhanced mode, and there is certainly a feeling of paranoia that if something goes wrong with Windows, this will be reflected on the page. During our tests however we have not experienced anything to support these concerns.

While the GDI information of Windows 95 should be able to drive the same Windows 3.x GDI printers, we recommend that potential buyers contact the manufacturers about specific Windows 95 drivers. At the time of writing all GDI printer manufacturers were writing dedicated Windows 95 drivers, but could not supply any to us in time for testing.

GDI has been described as the ultimate personal printer since it absolutely relies on the host PC and operating system to work. Consequently it has never been possible to share them on a Novell-type network, or drive them with anything other than Windows. Interestingly, while we were testing, we heard that some manufacturers were writing Macintosh GDI drivers and ones which would allow sharing over a Windows for Workgroups network. In this latter

scenario it would be best to dedicate a single PC to serve the printer.

Out of the four budget printers we tested, two stood out: Panasonic's KX-P6100 and NEC's SuperScript 610+. Both are 6ppm 300dpi lasers with GDI as a primary language and PCL Level 4.5 in reserve. Both have been seen on the street between £280 and £300. There's not a great deal between them and both are highly recommended, but we feel Panasonic has the slight edge thanks



primarily to its tiny footprint. This is really something to consider if you're running out of desk space. The Panasonic could also hold more paper as standard and was a little quicker. Editor's Choice for the Panasonic KX-P6100 and Highly Commended for the NEC SuperScript 610+.

Moving swiftly on to our second category finds the competition as fierce as the first. Our original requirement was that all contenders be fitted with 2Mb memory to ensure few printing problems, and be available for around £600 on the street. Most in fact came in very close to that price, but the differences between options and configurations was considerable.

When choosing one of these printers, decide what you are expecting from it now and in the future. Some machines may come across as a great buy, but limited expansion could prove intolerable for certain users. Do you need PostScript? Do you need Ethernet? Do you want to connect a Macintosh, although this is usually covered by a PostScript upgrade.

Memory is a big issue. If you go for the true 600dpi printers, they'll come across as very slow with just 2Mb, while adding PostScript, especially at 600dpi, will necessitate a memory upgrade. The problem is rarely the maximum amount of memory you can fit, but the type, supplier and cost of it. Some print-

Personal
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EDITOR'S
CHOICE

ers take standard SIMMs, available relatively cheaply, while others require prohibitively expensive memory, sometimes proprietary, sometimes infuriatingly familiar apart from the asking price.

Kyocera should have an honourable mention for its work in making environmentally-friendly printers. As described in these pages, its printers are cheaper to run and have fewer disposable parts. Hopefully one day all manufacturers will consider the environment to the same degree.

But without further ado, down to our recommendations. It was certainly a tough decision, since all were excellent printers capable of producing superb results. Three did have the edge however. Our first Highly Commended goes to NEC for its SuperScript 660i. This is the only GDI printer in this category, but the 660i additionally boasts PCL Level 5e and 2Mb as standard to cope with every situation. The 600dpi print quality is excellent, and performance times surprisingly good in GDI mode. We've seen it for around £600 on the street.

The second Highly Commended is awarded to Brother for its HL-660 model. Another 2Mb 60 dpi laser with superb-quality results, the Brother offers considerably more expansion possibilities than the NEC, with options for PostScript and Ethernet, the former allowing a Macintosh to be connected. All this for £500 on the street.

Winner of this category and the award of Editor's Choice goes to the Hewlett-Packard LaserJet 5P. Available for around £600 on the street, it is fairly similar to the Brother in that it's true 600dpi at 6ppm with 2Mb as standard. Options include Ethernet and PostScript with Macintosh interface (this latter called the 5MP). Users wanting faster performance particularly with graphics should upgrade the memory, however.

The 5P has the edge on the others on two counts. First is that HP's resolution enhancement technology really produced the best-looking results of all the printers here. Second, the 5P is the only printer tested here to feature an IRDA-compliant infra-red port as standard. It really has all bases covered for now and the future.

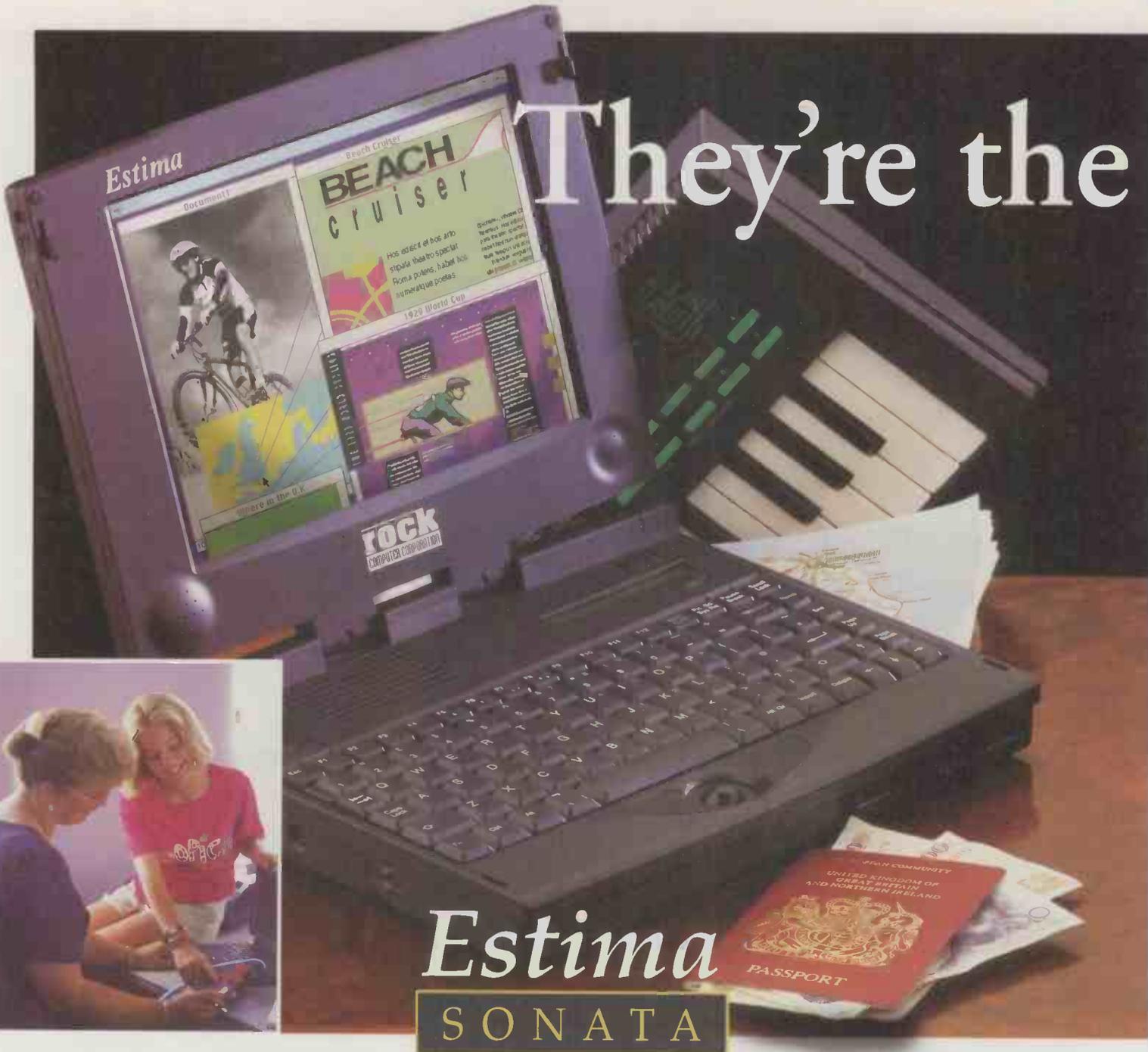
TABLE OF FEATURES LASER PRINTERS

Manufacturer	Canon	NEC	Panasonic	Star	Brother	Epson
Model	LBP 430W	SuperScript 610+	KX-P6100	WinType 4000	HL 660	EPL 5200 +
Laser or LED	Laser	Laser	Laser	Laser	Laser	Laser
Max resolution	300	300	300	300	600	300
GDI	WPS	Yes	Yes	Yes	No	No
PostScript	No	No	No	No	Optional	Optional
PCL level	4	4.5	4.5	4	5e	5e
Engine speed, PPM	4	6	6	4	6	6
Standard memory	512Kb	256Kb	256Kb	512Kb	2Mb	1Mb
Maximum memory	4.5Mb	4 Mb	N/A	N/A	10Mb	5Mb
Apple LocalTalk	No	No	No	No	Optional	Optional
Ethernet	No	No	No	No	Optional	Optional
Max paper weight (gsm)	105	105	90	135	135	100
Maximum sheets in input tray	100	50	100	100	200	150
Toner life at 5% coverage	3000	4000	2000	4000	3000	6000
Size inc trays (WDH, mm)	366 x 377 x 155	370 x 358 x 120	132 x 378 x 287	330 x 235 x 265	365 x 183 x 363	368 x 456 x 226
Weight	7kg	8kg	6.5kg	6.5kg	7.5kg	10kg
Telephone number	0500 246246	0345 300103	0500 404041	01494 471111	0161 330 6531	0800 289622
Fax number		0181 235 4930	01344 853707	01494 473333	0161 308 3281	01442 227227
RRP as reviewed	£399	£349	£369	£399	£639	n/a
Street price as reviewed	£320	£299	£279	£299	£499	£500
Laser Printers under £320 (Street price)					Under £750 (Street price)	

Manufacturer	Hewlett-Packard	Kyocera	Mannesmann Tally	NEC	Panasonic
Model	5P	FS 400	T9005 Plus	SuperScript 660i	KX-P4430
Laser or LED	Laser	LED	LED	Laser	Laser
Max resolution	600	300	300	600	300
GDI	No	No	No	Yes	No
PostScript	Optional	Optional	No	No	No
PCL level	5e	5	5	5e	4
Engine speed, PPM	6	4	5	6	5
Standard memory	2Mb	1Mb	1Mb	2Mb	1Mb
Maximum memory	50Mb	5Mb	6Mb	64Mb	5Mb
Apple LocalTalk	Optional	Optional	No	No	No
Ethernet	Optional	Optional	No	No	No
Max paper weight (gsm)	105	90	120	105	100
Maximum sheets in input tray	250	100	250	200	200
Toner life at 5% coverage	4000	1200	2500	4000	3000
Size inc trays (WDH, mm)	401 x 442 x 201	353 x 350 x 170	351 x 375 x 271	370 x 358 x 120	370 x 394 x 236
Weight	7kg	7.3kg	13kg	8kg	14kg
Telephone number	01344 369222	01734 311500	01734 788711	0345 300103	0500 404041
Fax number	0171 735 5565	01734 311108	01784 791491	0181 235 4930	01344 853707
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Street price as reviewed	£619	£417	£750	£599	£700
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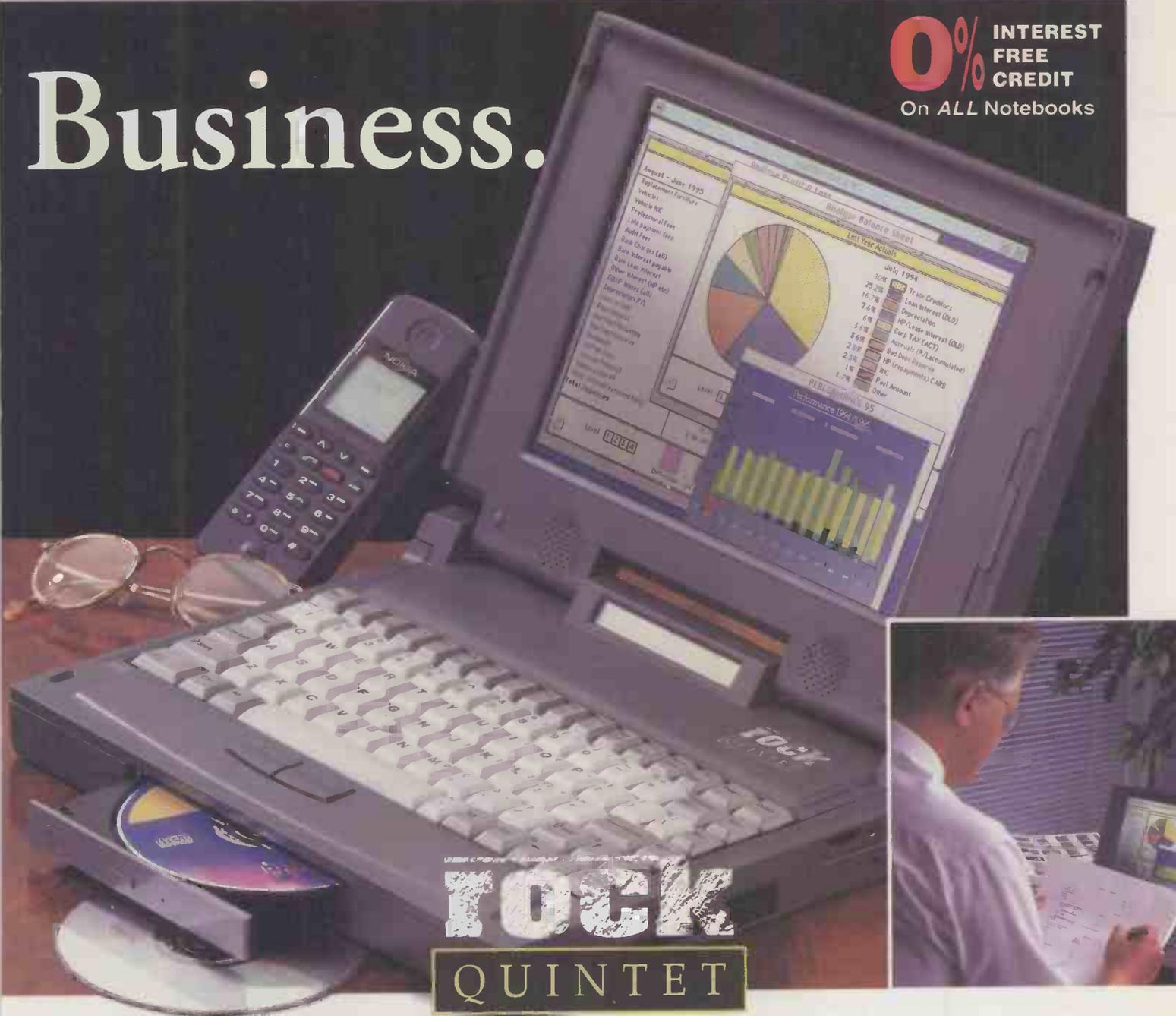
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Delphi for all

Borland's development tool is taking the programming community by storm. Learn it fast with this new tutorial series by Tim Anderson.

If you are interested in programming for Windows, you should learn Delphi. Borland's development tool is a superb combination of speed, power and ease of use. Like C++, it is object-oriented; and like Visual Basic, it uses pre-built components that you can drop into your project as needed. Unlike VB's VBX add-ons, you can build Delphi components in Delphi itself, which means you no longer need to learn two languages to get the best out of one.

Delphi is a dream come true, and since Borland is developing it aggressively it looks a safe bet for the future. This tutorial series will get you up and running quickly. No previous Pascal or Delphi skills are assumed, and the series is based on the cheaper Standard edition. During the course of the tutorial we will be building some useful utilities, and full code will be included on the cover disk.

The four faces of Delphi

Borland endeavoured to make Delphi look like Visual Basic, but the similarity is no more than skin-deep. Delphi has four key aspects:

Delphi the compiler

Unlike VB, Delphi compiles to native machine code. There is no runtime Delphi. What the run button does is to

Fig 1

```

Program Project1;
{Demonstrate some Pascal features}

uses
WinCRT;

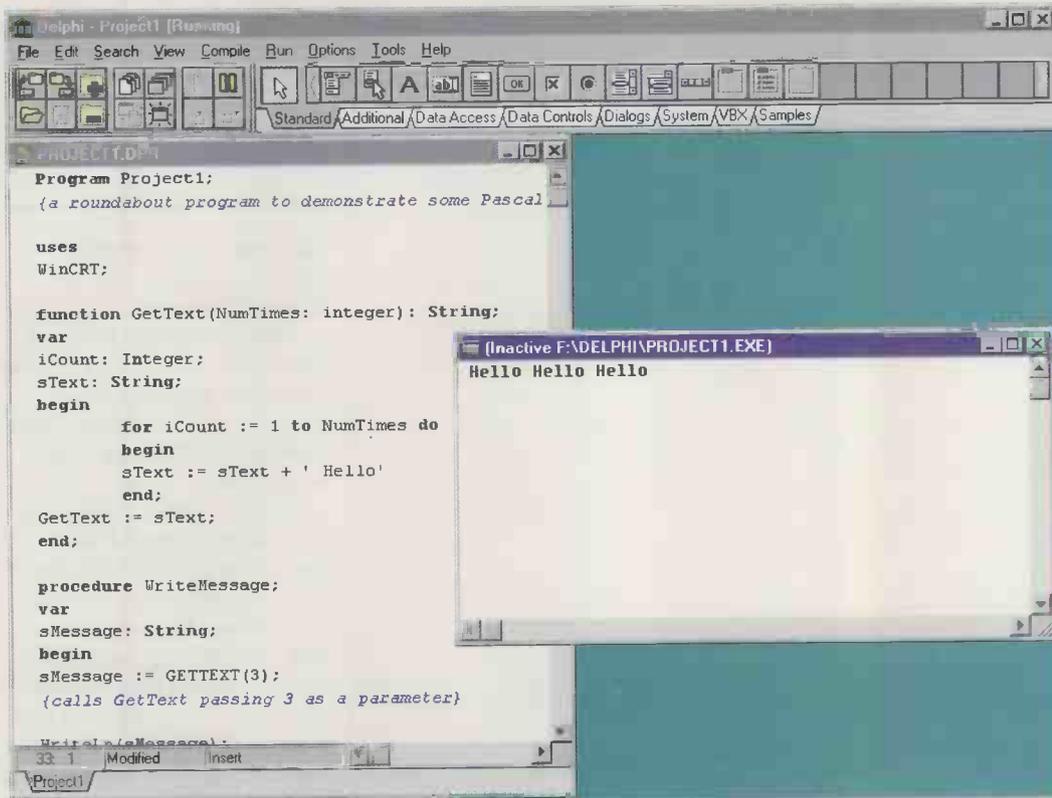
function GetText(NumTimes: integer): String;
var
iCount: Integer;
sText: String;
begin
    for iCount := 1 to NumTimes do
    begin
        sText := sText + ' Hello'
    end;
    GetText := sText;
end;

procedure WriteMessage;
var
sMessage: String;
begin
sMessage := GETTEXT(3);
{calls GetText passing 3 as a parameter}

WriteLn(sMessage);
end;

{The program begins running here}
begin
WriteMessage;

```



compile and execute your code, which then runs as a true Windows executable, independent of the programming interface.

To see this, try the following example:

1. Run Delphi. By default, Delphi starts a new project based on a single form, and entitled Project1.
2. Click the green Run button on the toolbar. The design-time form disappears, and Delphi displays a blank form. The only visible difference is that the dotted grid does not show.
3. Now press and hold down Alt, and press Tab to cycle through running applications. Note the two Delphi items. There is the design environment, called Delphi - Project1 (Running); and your application, called Form1.
4. Switch to Form1, and close the form by double-clicking the top left corner. If you Alt-Tab again, you will find only Delphi - Project1.

Delphi the language: Pascal

Just when it seemed Basic and C/C++ were the only two languages with a future, Delphi has put Pascal back in the limelight. Created by Nicklaus Wirth in the seventies, Pascal has been greatly extended by Borland. Unlike Basic, it is highly structured and requires all variables to be declared. It shares with C features like pointers, typecasts and compiler directives. Object Pascal as

By hacking the project file, Delphi can be made to compile character-based applications. This program demonstrates some simple Pascal code

used in Delphi adds many of the features of C++. But Pascal is easier than C for beginners, and more intelligible and safer for any developer.

Here's a minimal Pascal program:

```
program Project1;
begin
end.
```

Delphi will happily compile this into a 3Kb executable that does nothing at all. Note that to compile code like this you need to remove the Unit1 and Form1 files and put the code into Project1.DPR. You won't normally want to hack a Delphi project like this, but it does illustrate the bare bones of the language. The example in Fig 1 does a little more:

When this program runs, it calls the procedure WriteMessage. This in turn calls the function GetText, passing an integer as a parameter. GetText returns a string, which WriteMessage prints to a terminal-type window.

The example demonstrates the following features of Pascal:

- Delphi statements are terminated with a semi-colon. This means you can break lines anywhere there is white space,

except within a character literal.

- The Begin and End keywords identify a block of code.
- Outside the Begin-End blocks are clauses. The Uses clause identifies other Pascal units that are called by this one. The Var clauses are used to declare variables. The scope of variables depends on where they are declared.
- The ":=" operator, not "=", is used to assign a value to a variable.
- Literal character strings are enclosed in single quotes, not double.
- As in Visual Basic, you can declare both functions and procedures. Functions have a return value, created by assigning a

value to the function name or to the Result variable.

- Pascal is not case sensitive.
- In Pascal, you normally have to declare functions before you call them (unlike VB, which will search through all available modules).
- Comments are enclosed in curly brackets.

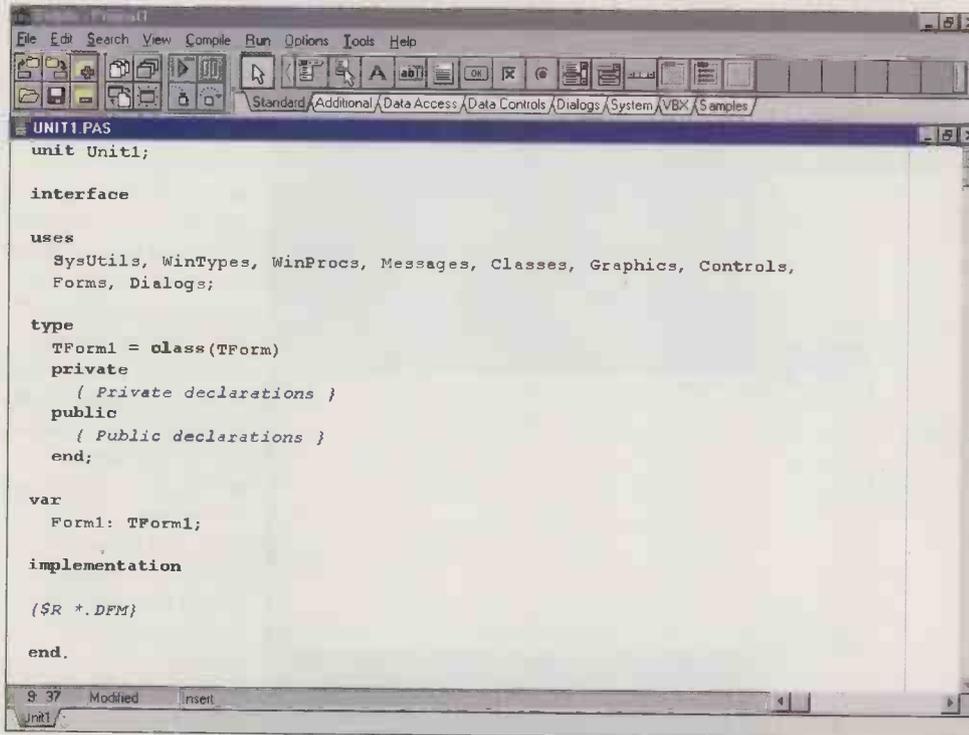
Pascal has many more important features, but the above will help you get started.

Delphi the class library

Windows programming used to be horribly complex. Actually it still is; the only change being that environments like Delphi succeed in hiding the complexity. This is done with object orientation and a class library. To see this in action, open up Delphi and start a new project. Click the Unit1 tab, and there you will see the following:

```
type
  TForm1 = class(TForm)
private
  { Private declarations }
public
  { Public declarations }
end;
```

This short code does a lot. It is declaring a new type of object, TForm1, based on an existing type of object, TForm. By convention, object types in Delphi begin with the letter T, for Type.



Delphi generates this code by default in order to display a form. It also creates a form description file on disk, with a .DFM extension

ing line to the definition of TForm1:

```
Button1: TButton;
```

Through that one line, your application knows how to display the button, depress it when clicked, and all the other characteristics of a Windows button. As a Delphi developer, you need to remember that an enormous amount of code lies behind these object types. Most of the time the details need not concern you; but from time to time it can be very useful to open the lid and poke around the engine. You may even find a bug or two. Borland makes

These object types are called classes and are essential to object-oriented programming. For the moment, all you need know is that the TForm class contains code that defines the behaviour of a Delphi form. Because TForm1 is based on TForm, TForm1 gets the benefit of, or inherits, this same intelligence.

TForm1 is a type of object, it is not an object in itself. Later on in the unit, the following line appears:

```
var
Form1: TForm1;
```

This statement declares an object of the new type. Finally, if you click the Project1 tab you will see the following line:

```
Application.CreateForm(TForm1,
Form1);
Application.Run;
```

This is the code that actually creates the object, so that the form appears on the screen. If you are new to object oriented programming, this may seem a roundabout process, but bear in mind that it was Delphi that generated the code — you didn't have to write it. The brains of Delphi are in its class library, where objects like TForm are defined. This is

code which you don't have to write, including the whole range of standard Windows objects like buttons, scrollbars and edit boxes. It is called the Visual Component Library (VCL), and Delphi displays most of its object types as items on its tabbed toolbar.

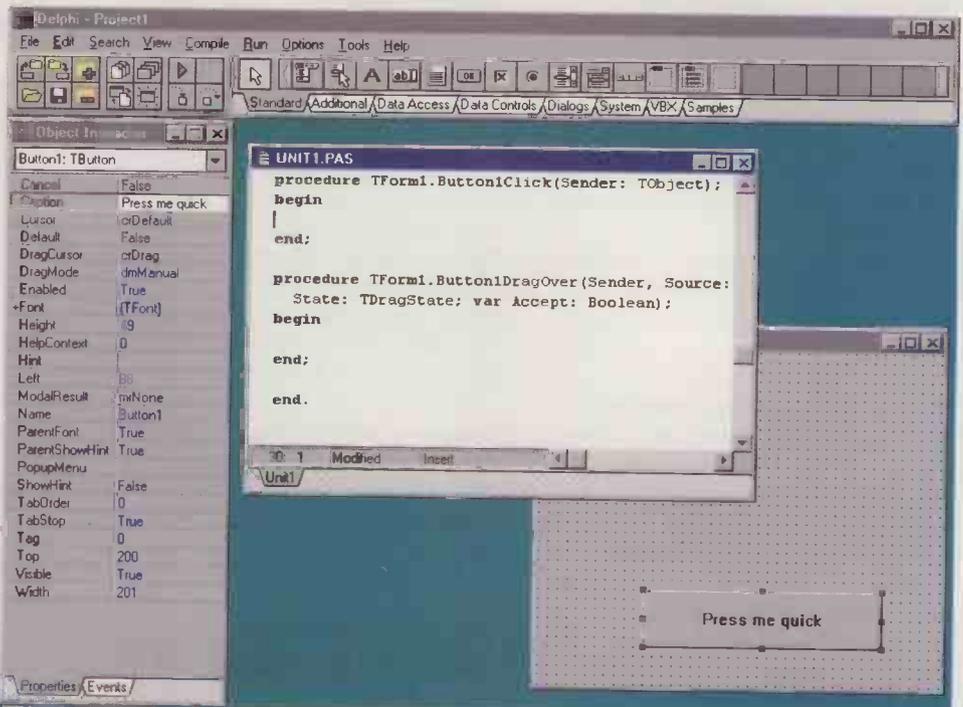
Now select the Standard tab in the toolbar, click on the button icon, and then click and drag on the form to create a button. Look at the code in Unit1. You will see that Delphi has added the follow-

the VCL source available at modest extra cost, for exactly that reason.

Delphi the interface

Delphi's charm comes from its highly elegant and productive interface, which was created with Delphi itself. Here are the elements you will use most:

- Menu bar with standard Windows menus.
- Speedbar with shortcuts for the most common menu choices.



The Delphi features you will use most often are shown here. Note the speedbar, the component palette, the object inspector, the code window and the form designer

- Tabbed component palette. Click a component icon to place it on a form with the mouse.
- Object inspector. This displays properties and events for the currently selected object on a form, or for the form itself. For example, if a button is selected, the properties include the caption for the button, and the events include OnClick. Properties can be edited directly. To write code for an

event, double-click the event in the list. Delphi automatically creates the appropriate empty procedure.

There is a strong link between the object inspector and the visual programming done on a form. For example, if you move a button down a form, you will see the Top property in the object inspector change to show its new position.

- Code editor with syntax highlighting. For example, comments appear by

default in blue italics. It is highly configurable from the Environment Options dialogue.

PCW Contacts

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A First Delphi Application

It is vital to keep track of free space on a hard drive, since many applications create huge temporary files. This first application displays the space on drive C. To create it, proceed as follows:

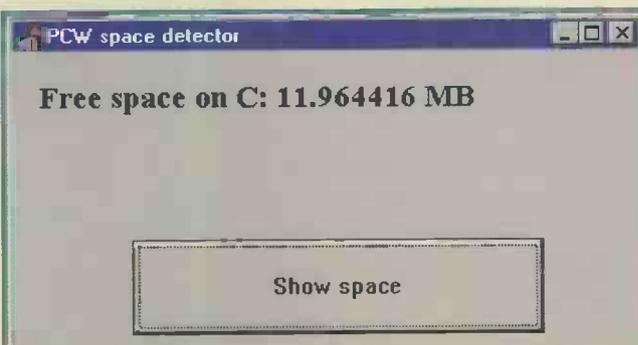
1. Start a new project in Delphi. Choose the button component from the Standard tab in the component palette, and click and drag on the form to create a button. Repeat with the label component.
2. Click on the form to select it, then edit the Caption property with the object inspector, for example "PCW space detector". Select the label and edit its caption and font properties.
3. Select the button and either double-click it directly, or double-click next to the OnClick event in the Object Inspector. The latter is preferable, since it offers the full range of button events. Now enter this code:

```
procedure TForm1.Button1Click(Sender: TObject);
{Code could be more concise - done this way for clarity}
```

```
var
  sSpace: String;
  lFreeSpace: Longint;
  iMegFree: Integer;
```

```
begin
```

```
  lFreeSpace := DiskFree(3);
  iMegFree := trunc(lFreeSpace/1000000);
  {Note - without the trunc function you will
  get a type mismatch error}
```



```
  lFreeSpace := lFreeSpace - (iMegFree*1000000);
  sSpace := IntToStr(iMegFree) + '.'
    + IntToStr(lFreeSpace) + ' MB';
  label1.caption := 'Free space on C: ' + sSpace;
end;
```

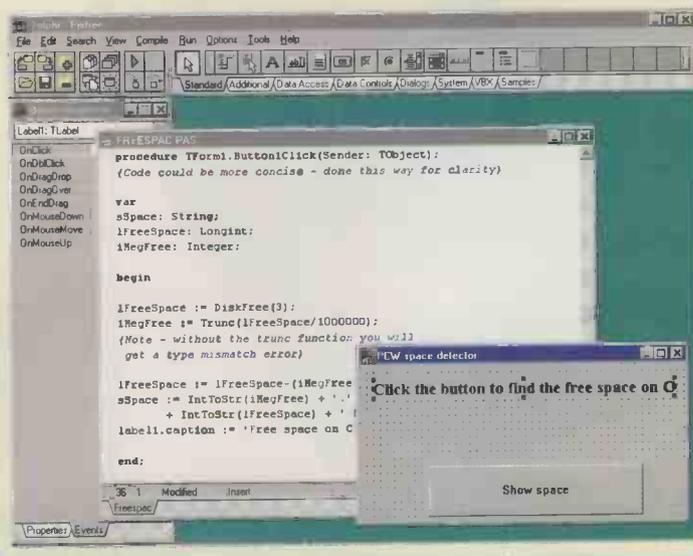
This code calls the DiskFree function with a parameter of 3 to specify the C drive. If you look up DiskFree in Delphi's on-line help (which you can do by double-clicking the word in your code, then pressing F1), you will see that it is defined in the SYSUTILS unit and that it returns free space as a Longint. SYSUTILS is included by default in the Uses clause of a Delphi project, so you need do nothing further in order to call it. Run and test the code by clicking the green run button.

Next, try running the code without using the Trunc function, for example:

```
iMegFree := lFreeSpace/1000000;
```

You will see Error 26 - Type mismatch. A more tolerant language like Visual Basic would simply throw away the numbers after the decimal point. In Delphi you need to do this specifically with Trunc. This is a typical problem encountered when converting code from VB to Delphi.

Finally, save the project. Delphi requires a different name for the project and for the form. Compile it again, and you will find a .EXE in your source directory which you can run any time to check your free space.



Top The space detector in operation. The executable is just under 200Kb in size, and could be reduced by removing debug information

Left Entering the code for the disk space application. Program lines can be broken at any sensible point

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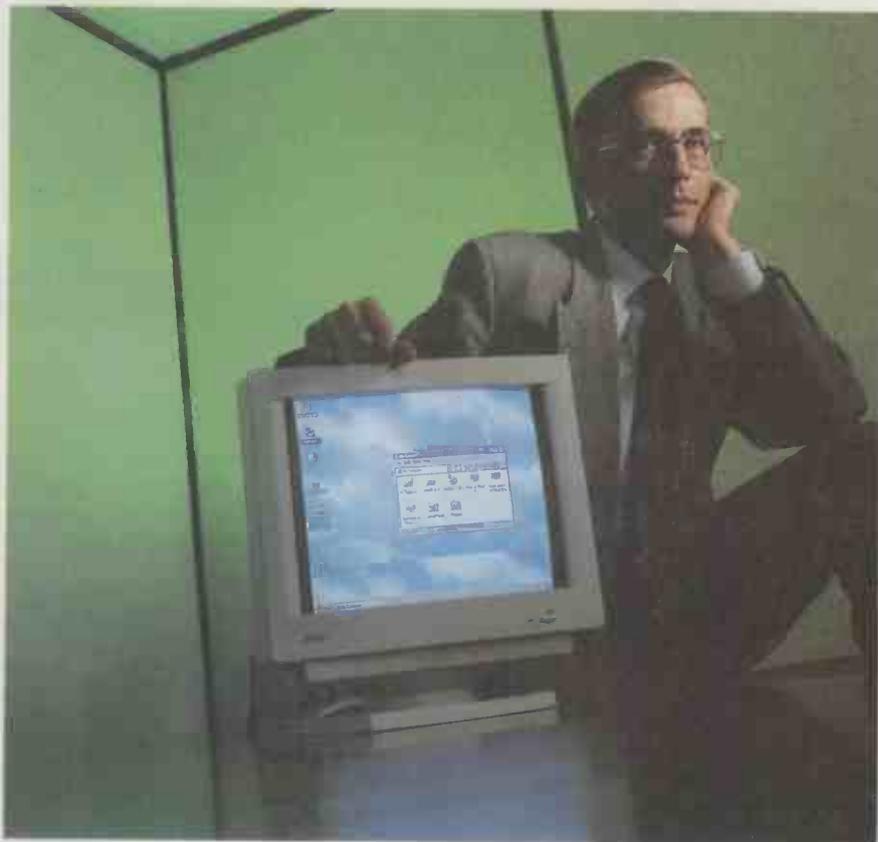
Going for broke

You could be forgiven for thinking that moving an entire computer system over to Windows 95 pre-launch is a foolhardy thing to do. Well, accountants Haines Watts did just that, and as George Cole reports, with good results.

Accountants are well known for their caution, but some might describe the latest move by the Haines Watts accountancy firm as brave, bold or just plain reckless. It's one of the first companies to move its computer system over to Microsoft's Windows 95 operating system — a decision made long before Microsoft had even settled on a launch date.

Haines Watts is one of the UK's top 20 chartered accountants, with 24 offices around England and Wales. The decision to move to Windows 95 was taken by the largest office, which has over 70 employees and is based in Slough.

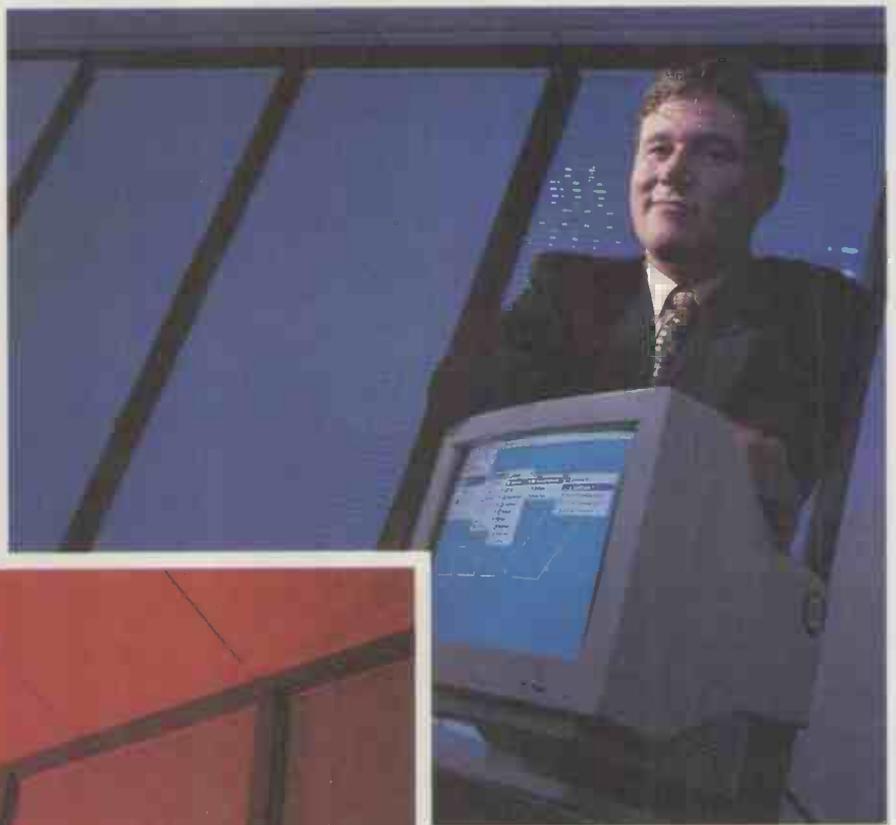
"An accountant is someone you wouldn't want to get stuck in a lift with," says Haines Watts partner Paul Gough, "but we try to be different." Gough describes his company as aggressive and forward-looking, but admits that for a long time, its information technology policy left a lot to be desired: "Throughout the office there was a series of disjointed, small networks or standalone machines. Back-ups, if taken, were sporadic, except for the tax department. The development



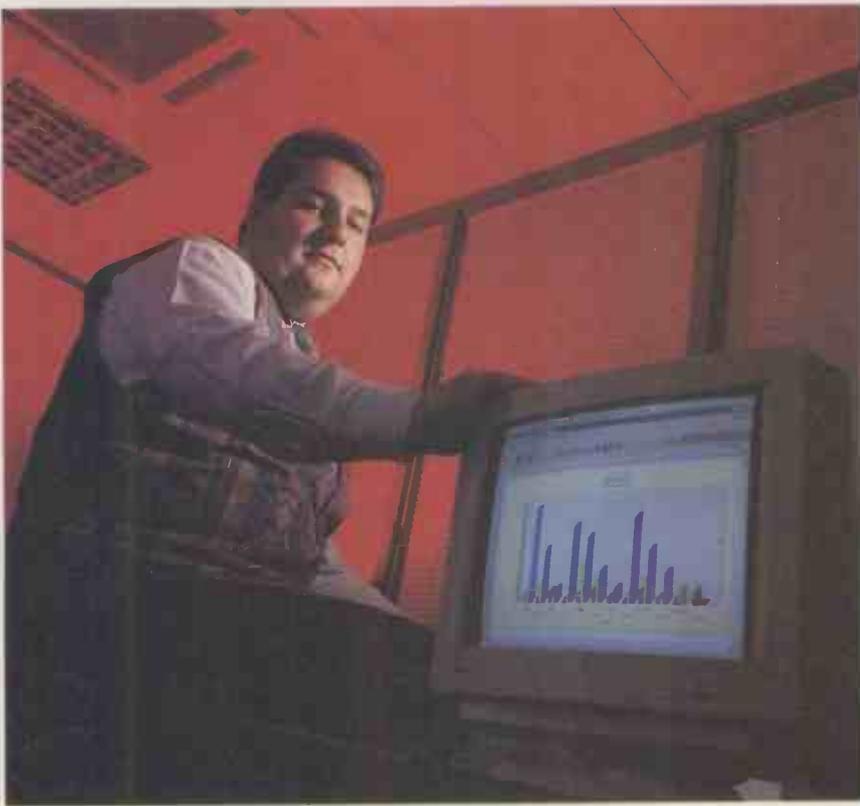
Photography by Johnny Miller

was tactical rather than strategic. Everything was done on a fire-fighting basis, we had a PC under one arm and a fire extinguisher under the other, and this tended to inhibit decisions because it was like being on a diving board — you never quite took the plunge, realising that you were letting yourself in for a lot of expense and aggravation."

Gough's description of Haines Watts' old IT set-up is no exaggeration. The



Above Paul Gough, Haines Watts partner: No doubt that it was worth it
Left Unorthodox approach: Lee Buckland, Haines Watts IT manager
Far left Buckland's decision worried David Reynolds of Star Computers
Next page Staff reaction has been positive



company used a variety of hardware and software in different areas. The tax department had a mix of 12 PCs (from 286s to 486s) on a Novell network. These ran specialist tax software under DOS. The audit department had a Unix server controlling PCs running specialist audit software under DOS and Windows 3.1/3.11. The financial services department had a Novell network and PCs running WordPerfect 5.1 and Lotus 1-2-3 version 4.01 under DOS and Windows 3.1. The company secretaries used WordPerfect 5.1 and 6.0 on standalone PCs. And all this is without mentioning the secretarial department or the miscellaneous PCs dotted around the building.

According to Gough, Haines Watts

had reached a stage where its mish-mash of IT was in danger of affecting the company's competitiveness: "We were reaching a point where we were beginning to fall behind our clients' expectations in terms of hardware and software," he says. "They wanted to be able to send us data on disk and for us to be able to process it, and looking ahead, things like email and videoconferencing were going to become requirements of our service. We needed to make the practice more competitive, we needed software that was more efficient than paper, and we needed to co-ordinate things like diaries and networking."

Around the end of October 1994, Haines Watts put its IT contract out to

tender and heard proposals from three companies. It settled on Star Computers, based in Watford: "We normally come in and do an audit of the IT a company has and then sit down and discuss the business issues — not the IT issues — and see how the technology can solve the issues and problems. We also like to look at the company's evolution and see where it wants to be in five years' time," said David Reynolds, a consultant at Star Computers.

Star decided that the key server in the new IT set-up should run under Windows NT: "If you look at what the company had, there were three Novell networks and a Unix server, so you had two different protocols being used. We opted for NT because the multi-protocol support in an NT environment mode is slightly more straightforward than with NetWare. NT gave us the clearer solution for this particular situation," says Reynolds.

At this stage Reynolds' plans were taking him towards a Windows 3.1/3.11 route, but he hadn't reckoned on Lee Buckland, who Haines Watts appointed

as its IT manager soon after it had signed the contract with Star. Buckland is a 28-year-old who was programming computers while other boys of his age were collecting stamps. His feeling was to opt for Windows 95: "Although Star had decided to go for the tried-and-tested Windows 3.1 solution, we were always looking towards Windows 95," he says. "One of the things I had to do was to change users from a primarily DOS environment to Windows. A lot of these users were used to simple menu systems — they'd switch the PC on in the morning and it would automatically boot up to WordPerfect and stay there until they

operating systems were the future, we hadn't had any companies banging on our door and asking for OS/2." Even so, Reynolds rejects the argument that opting for Windows 95 was a giant leap into the dark: "Microsoft is on a hiding to nothing when it comes to Windows 95. If it says it's got thousands of lines of code from Windows 3.11 and NT, the press say it's not new. If they say it's X-percent new, people say it's not stable. The fact is that there is a lot of code in there from these two environments, so the core operating system *is* stable.

"People talk about bugs, but if the average user finds more than two of them

software, but wait for later versions, when most of the bugs have been ironed out. Gough rejects this view: "The problem with hardware and software is that unless you're an early adopter, you miss out on a large period of the benefit. Bugs are a downside of course, but if a product has a shelf life of 12 months and you buy it after nine, you're effectively using it for three months before you have to upgrade, and you've lost nine months of potential benefit."

"One of the first things we did was to explain to staff what our strategy was, so they could get a feel for it," says Buckland. Haines Watts opened an account with Microsoft's open licensing programme, which gave them access to the latest Windows 95 upgrades. According to Microsoft, Windows 95 should run fine on a 386DX with 4Mb of RAM. So did Buckland opt for these low-end machines? He smiles ruefully: "You can get it to run on a PC like that, but snail's pace is an understatement — you can watch the screen being drawn pixel-by-pixel. Even with 8Mb of RAM, it takes 20-30 seconds to draw a WordPerfect screen on start-up. Users were typing something on one PC and using another for spell-checking — we got rid of the machine."

Haines Watts has two 486SX PCs running at 25MHz and with 8Mb of RAM. These are primarily used for running DOS software and email. The bulk of the new machines (around 60) are 486DX2-66s with 8Mb of RAM. There are also ten Pentiums with 8- and 16Mb configurations: "We find that the DX2s are fine for running WordPerfect, 1-2-3 and Exchange clients concurrently," says Buckland. "I'm not sure whether a faster processor or extra RAM will improve performance." Buckland has also tried Windows 95 on the company's Dell 486 notebooks, although he hasn't yet tested the docking capabilities and automatic configuration system.

The networking process began in June. The tax department didn't communicate very much with other departments, so their cabling was simply tidied up. An outside cabling company cabled the rest of the building and introduced a number of hubs. Buckland says he was concerned about the amount of traffic that could build up on the network, thus overloading it and slowing down the processors. He was especially concerned about the tax department, which is very database dependent. After monitoring its traffic, he decided to add a bridge to act



switched the machine off and went home. I had to take them into an environment that would open more doors in terms of communication throughout the practice and make them more Windows-aware."

Buckland adds that another consideration was that the company would have to continue using its existing Unix and Novell servers because some of the specialist applications were not portable. "The technical complexity of all this in a Windows 3.1/3.11 environment was looking very messy. Also, you can't control what users can change on their desktop in terms of the control panel. Sixty percent of the support calls I received were from users who had changed something they shouldn't have." Windows 95's network control and security capabilities greatly appealed to Buckland.

By this time it was Spring 1995 and Buckland's decision worried Reynolds: "We didn't have a launch date for '95 and while we always believed that 32-bit

he's been unlucky. Corporates running Windows 95 on umpteen versions of PCs and networks will obviously find more. The bugs we have seen have been with specific plug-and-play DLLs (Dynamic Link Libraries) and a particular SCSI control DLL hasn't worked."

But how did Paul Gough think about committing his company to a system that was still under development? "It's the way we work. We sell a lot of new things and it would have been inconceivable that we didn't do the same thing internally. Also, it got us rapidly from where we were today, to where we wanted to be. The other route (3.1/3.11) would have been an interim stepping stone from A to Z. We discussed the issues and considered the risks, and decided to go for it. If things had gone badly wrong, we could have always gone back to our old system. We never closed any doors behind us."

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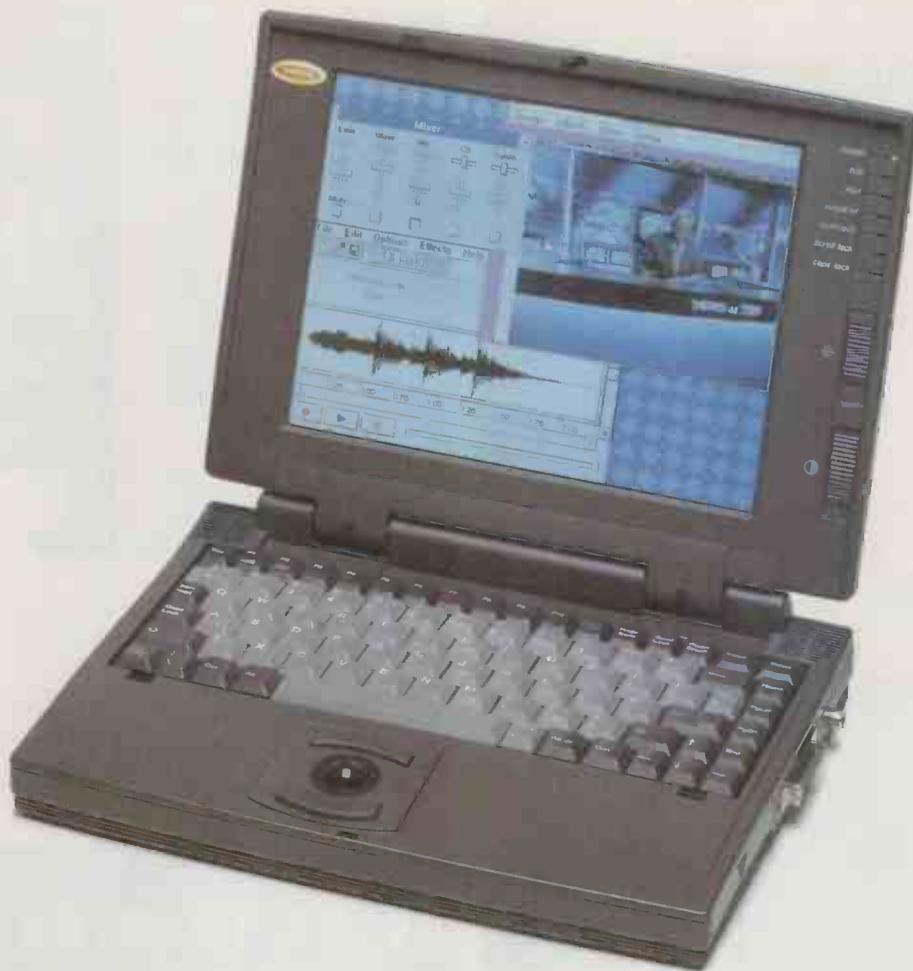
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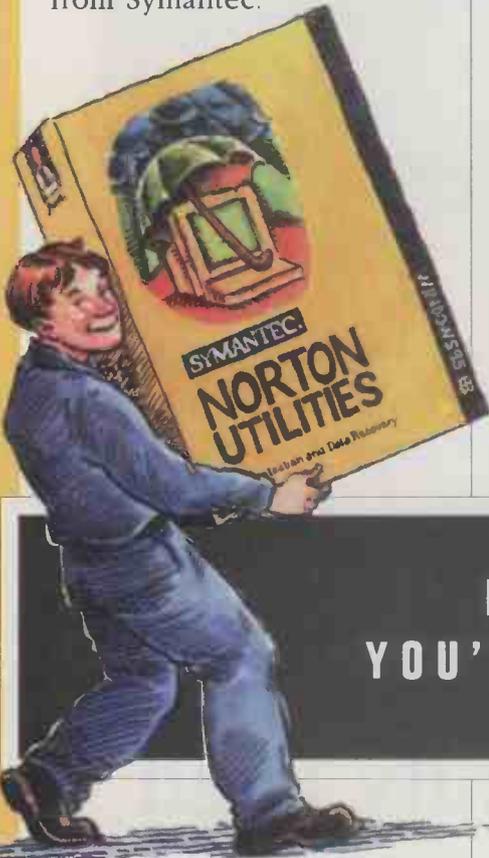
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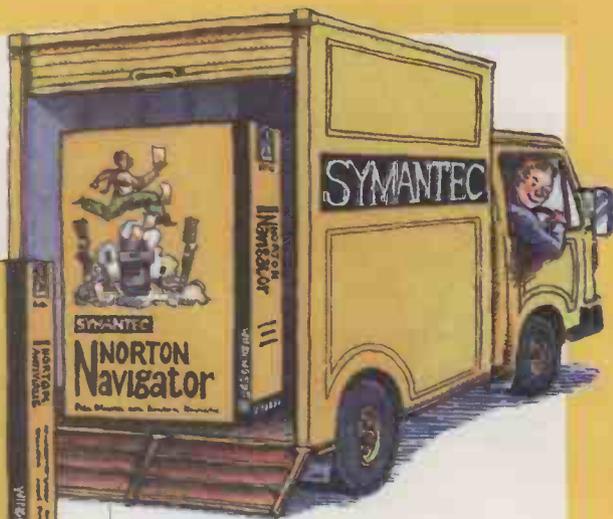
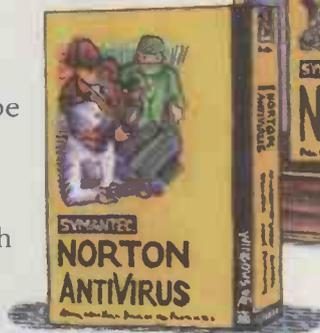
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When the cabling was complete, the NT server was linked to the Unix server and PCs were brought online. The next stage is to bring the smaller servers online and reconfigure them. The aim was to have the networking completed by the end of August, but building work caused delays. Before installing Windows 95, Buckland reformatted the hard disk on each PC: "I didn't want to put it on a machine which already had 3.1, because you can get problems if the odd system file is lurking around."

Training

The time scale meant that there wasn't time to offer staff a structured training programme. "We couldn't start training too soon in case Windows 95 wasn't available. The last thing we wanted to do was to use Windows 3.1 and WordPerfect for Windows," says Buckland. Each PC was set up so that users could only use the facilities they needed to complete a task, such as word processing. The initial training was done on a one-to-one basis.

Buckland would spend 15 to 30 minutes with a person and run through the functions they needed. Then he left them to it. Buckland says he was

About Haines Watts

Largest Office Slough, 23 other offices around England and Wales. Established 1946.

Activities Audit and accountancy, taxation, financial services, management advice, corporate services, insolvency services, company secretarial services, seminars.

IT Goals To make the practice more efficient, improve office communications, increase competitiveness.

Former IT setup Mixture of Novell and Unix networks, standalone PCs with DOS and Windows 3.1/3.11.

New IT setup Novell and Unix networks linked to Windows NT server. PCs upgraded to 486 and Pentium, and Windows 95.

Advantages Increased efficiency and improved communications. Ability to offer new services to clients.

Lessons learnt It is very easy for a company's IT strategy to become fragmented as each department uses IT to solve its own particular needs. A co-ordinated approach reaps benefits. It sometimes pays to be bold.

Hardware costs Around £60,000 for PCs, NT server, cabling, software, network cards.

Star Computers

Star Computers is 22 years old and has 120 employees. It has an office in Watford and a support centre in Birmingham. Star's main market is the accountancy sector, where it offers IT solutions. It also offers its own application, Time and Fees, practice management software for accountants, which can be used for time recording, billing and database management. It runs under a Unix environment.

Around five years ago, Star moved away from simply selling a Unix box and dumb terminals, to Unix networks with PCs that ran both Time and Fees and Windows applications. The company also became a NetWare and UnixWare reseller and a Microsoft Development Centre. Star also supplies the commercial marketplace with a third-party application called Tetra, which is used for accounts, and sales and purchase ledgers. Star has around 800 clients, each one typically has around 20 to 100 PC users. As more and more companies become multi-branch operations, Star's work is moving from LAN to WAN consultancy.

surprised by how little support was needed: "Of course there were some problems. People found that their function keys no longer worked. They couldn't get their DOS prompt to install a piece of software or access the A drive to copy files before coming to see me."

David Reynolds adds that Buckland's approach was unorthodox in other ways too. "Rather than concentrating on getting one department up and running with Windows 95, Lee would train one or two people from each department and so spread it wide. I expected to see lots of calls for help." Buckland says that training people across the board meant that he could identify each department's needs more quickly and it actually saved me support time." Later on, staff will be given more structured training.

Staff reaction has been very positive, says Gough. "The jump from DOS to Windows 95 has created a lot of excitement. People want to use the functionality because of their enthusiasm. It's not just new toys on Christmas Day syndrome. A number of people have been asking Lee if they can use more features, like email."

Buckland says the greatest challenge has been to change the way people think about their work: "We are saying to people 'yes, you can use that server, but you can use that one over there as well. You don't have to write down telephone messages, you can send them via email.' Their roles are changing too. Secretaries are now producing tables and spreadsheets. OLE technology lets them do this easily."

The biggest frustration, says Buckland, is the lack of 32-bit applications: "We tried a Beta version of Office 95 but it didn't address our concerns. About 60 percent of our work uses indentation and this can be done with existing versions of WordPerfect for DOS. To replicate this basic feature on

Word takes three steps. Microsoft has speeded up the process on Office 95 but hasn't made the process any easier. We feel that this is a performance loss we cannot tolerate."

One of the problems with using 16-bit applications is that users can't take advantage of some of Windows 95's new features like long filenames, says Buckland. "We're having to use eight-character filenames and it's a pain in the neck. But what's worse is that WordPerfect is very flexible in terms of point three extensions (.DOC, for example) and you can put whatever you want, and some of our users have been doing this for years. This messes up things like email which works by association. As a result we've had to re-name over three and a half thousand files."

Technical support

Buckland was not too impressed with Microsoft UK's support, particularly in the early stages: "We'd ask them a technical query and they would say 'That's not possible' or 'It's in the upgrade', but nine times out of ten we'd find the answer ourselves. I don't think they knew the product in the early stages."

The changeover to Windows 95 cost Haines Watts around £60,000 for the hardware, software, NT server, network cards and cabling. It took Buckland over 70 hours to configure all the PCs for Windows 95 and the whole project has used up around 300 man-hours. Gough has no doubt that it was worth it: "It has highlighted how inefficient our previous system was. We're now ready to grab the opportunities that this new technology will offer us. And this is only the beginning." Buckland agrees: "Windows 95 has given us a lot more than it's taken away."

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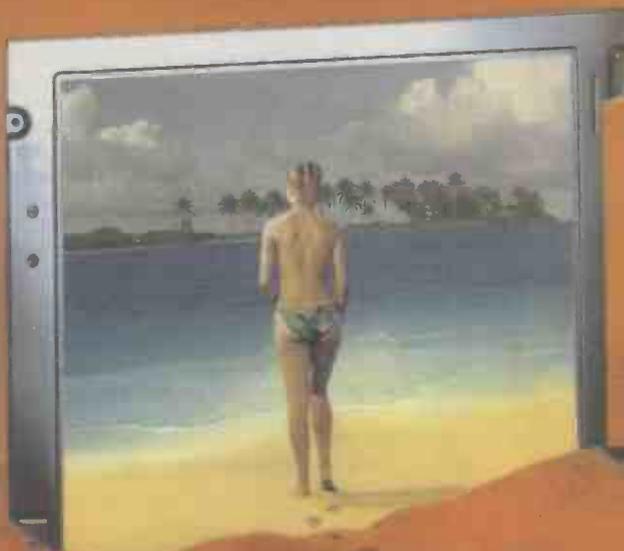
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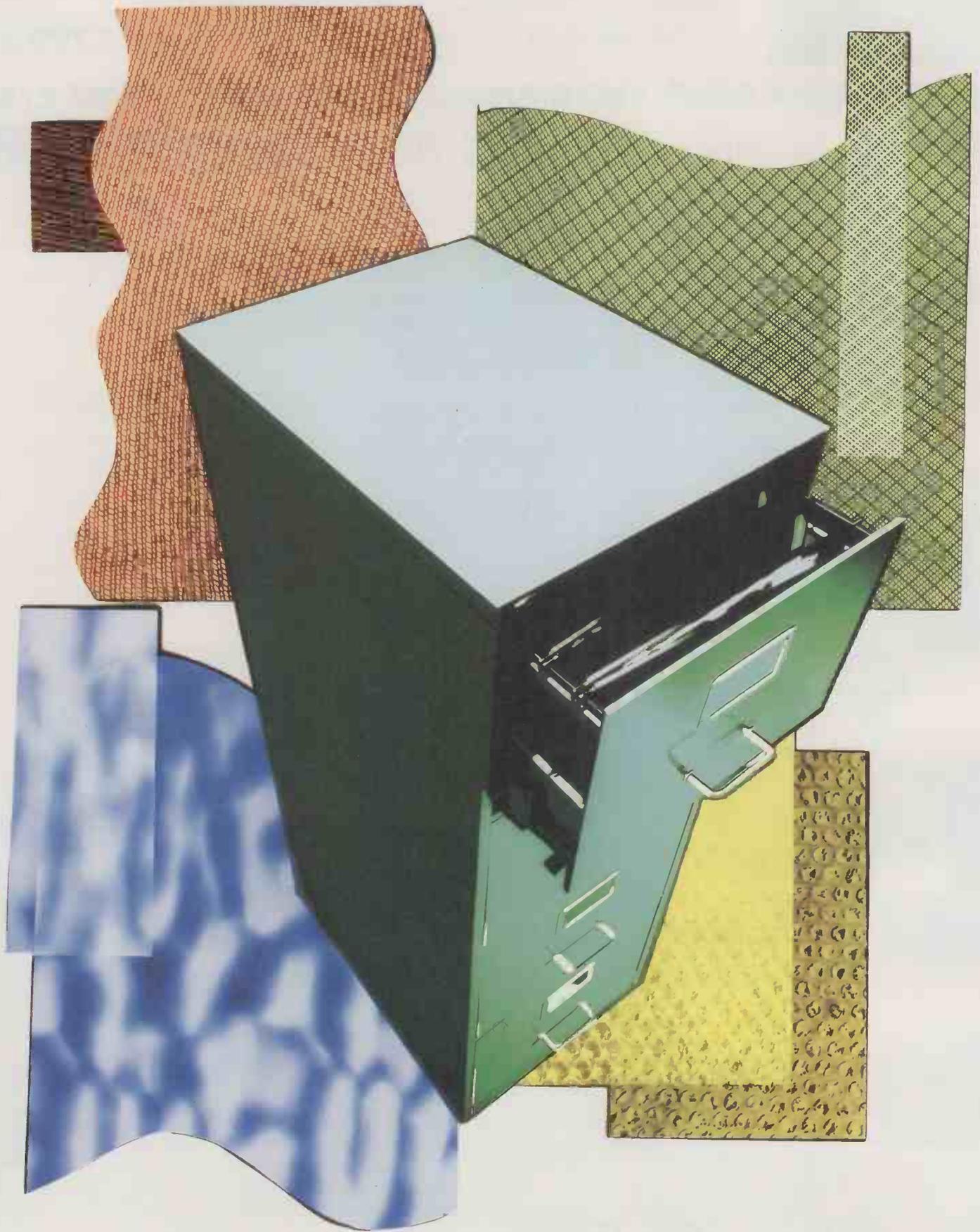
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Seven up

PCW Photography by David Whyte

Having suffered a bad image in the past, times have changed and database management systems are now available which are far friendlier and easier to use than ever before. Eleanor Turton-Hill runs seven top-selling Windows databases through their paces.

Most PC users have a database application sitting on their system; not because they've purposely gone out to buy one but because it's been thrown in as part of an application suite. But unlike the average graphics package or word processor, database applications have developed a bad image problem over the years which has led most people to give them a very wide berth.

For the average person, the word "database" conjures up a series of negative images: old interfaces, complex technical wizardry, meaningless jargon, and lines of incomprehensible program code. Consequently, most have a pretty strong aversion to databases — so the general business of creating and maintaining them has remained largely in the hands of specialists.

However, this situation is not nearly as bad as it was before the birth of the PC, when the only access people had to computers was to their company's mainframe. In those days users were resigned to the fact that the only kind of interface which a computer could offer was a nasty luminous green menu with a command line. Operators of large corporate databases were at the mercy of IT departments who had ultimate control over how the system looked and what facilities it provided.

Although, thankfully, things have moved on since then they have moved very slowly. The history of database management systems is closely allied with that of the computer industry and the reason that database systems have changed so slowly is because of the huge investment made by big corporations in mainframe and mini computers during the past 30 years. The complexity of

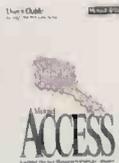
database management software also required a massive investment in people, and as the expertise in big corporations has grown over the years, so has the reluctance to move to a new technology. Consequently, old mainframe systems are still running today.

The PC database has not so much taken over but rather has developed alongside older technologies. In the early eighties it started to dawn on people that the PC was more than a toy and could actually be used to develop useful applications. Then, in 1984, dBASE for DOS came along providing an extremely popular programming language for developers and at that time the PC database became one of the most important applications you could have on your system. But then personal computers, as well as databases, were still in a pretty specialist market and non-experts had very little to do with either.

As PCs began to grow in popularity, so did the whole idea of file management systems. People wanted to be able to manage lists of their own personal information and various utilities appeared on the market to meet this need. Most provided simple tools for managing flat files containing personal information which people wanted to keep on their own systems and away from the mainframe.

Two types of application began to develop from here: the RDBMS (relational database management system) for serious programmers, and the spreadsheet as a general user tool. This made a clear division in the database market between flat file utilities and fully-fledged programmable databases. Despite the arrival of Windows, this division persisted fairly rigidly until the past year or so. This was partly due to the delay in the development of Windows databases and partly because of the lack of faith which many developers had in the Windows environment.

Times have now changed and the need to move to a more user-friendly environment has become more pressing as users have familiarised themselves with Windows word processors and other office tools. Expectations of what a user interface should look like have been raised. But a far more interesting development is happening: RDBMSs are at last starting to provide tools for people of all skill levels. Many of the database management systems in this feature have been designed as user-tools as well as developer tools and we'll be looking at the seven top-selling Windows databases to assess how successful they are in achieving these goals.



Access 2.0

When Access first appeared on the market in 1992 it set high standards for ease of use, and provided Wizards to guide you through the design of graphs, forms and reports, and allowed tables to be linked together by dragging and dropping. Many of the features provided in that first release gave users a whole new way of thinking about database design concepts — especially those who had struggled long and hard with previous DOS packages. Having said this, the massive success of the product was partly due to the similarity between Access Basic and Visual Basic. Unlike Paradox, Access provided a programming language with which people were already familiar.

In the early days, Access and Approach were seen as natural rivals, both aimed at the novice-user end of the market. To a certain extent, this is still the case. There's no doubt that for the end user, Access and Approach are the two major players. But unlike Approach, Access has also become a serious, highly functional, developer's database.

When you start up Access you're presented with the "Cue Cards" dialogue box offering various tours of the application. This gives first time users the opportunity to get to grips with the package guided by an online coach. Cue Cards walk you through tasks from start to finish giving illustrated examples, guidance and access to online reference material. There is also a comprehensive help facility which gives "how to" information for all Microsoft Access tasks as well as providing a complete alphabetical

reference to Access objects, properties, actions, functions, statements and methods.

Tables, forms, reports and all other related elements of an application are stored in a single monolithic file with an MDB extension. These elements are not formally linked to each other, they merely belong to the same application. This centralisation encourages an organised approach to application development and enables entire projects to be moved around with ease. On opening an existing database or creating a new one, the Access database window appears with its various tab-activated holders for tables, queries, forms, reports, macros and modules.

Data files are simple to set up using the Wizards which guide you through the process step by step, offering a set of predefined tables each with its own set of optional fields. If you want to set up your tables from scratch, there are eight datatypes to choose from, including "currency" and "OLE object". The OLE object data type allows you to store graphics as data: when you build forms, those graphics will display for each record as you scroll through the data.

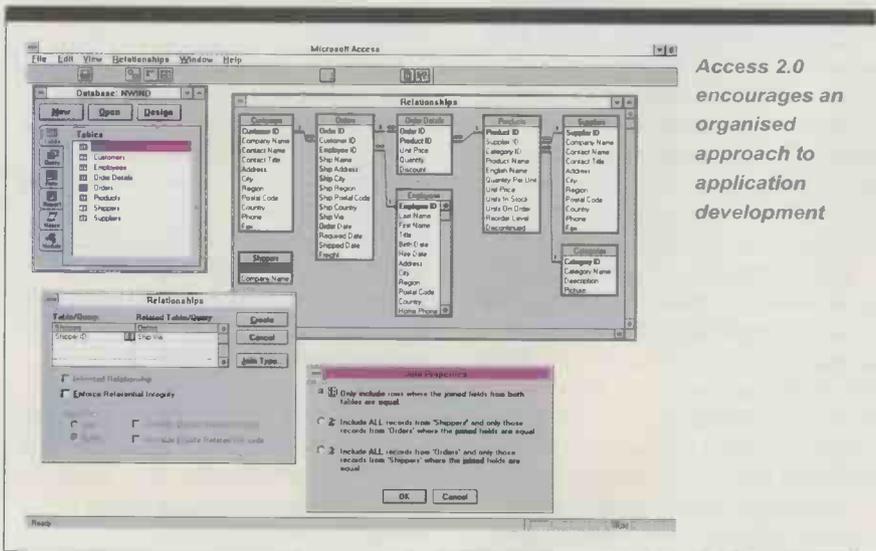
Linking files to each other is done via a Relationships window. All you do is specify key fields by dragging and dropping the related fields from one table to the other. If you have several files you can use this window to visually sketch out the design of the database and get an overview of all the relationships defined in the application. New referential integrity rules included in this version help to keep

data relationships in check so that you cannot delete a row or change a primary key value if there are any related records in linked tables.

The query designer in Access combines drag and drop visual editing with the standard SQL-type "Select CustomerID where..." kind of syntax. If you're not too sure how to use it, there is a report design Wizard which will hold your hand throughout the process: this enables you to create complex queries for common data management tasks such as seeing a crosstab view of your data or finding all the duplicate records in a table.

It is also possible to use the Wizards for creating sophisticated front ends in the form designer but if you want a level of control over your application which goes beyond the basic Access interface functions then you'll need to start using some code. Access Basic provides the tools for writing event-driven code which can be attached to forms to create interactive front-ends. Any event procedure attached to a form is stored in the form module. This makes the code a part of the form's design. The manuals give clear, sensible advice on how to create intuitive front-ends which enable users to focus on specific tasks rather than on how to operate the program.

Access Basic recognises more events than it did in version 1.1 and reacts to them in much the same way as Microsoft's Visual Basic. Additionally, it provides ODBC support for linking to SQL database servers. The manuals provide an excellent training guide for anyone who wants to learn how database applications are designed and implemented, but Access is also a powerful developer's tool; equally suitable for heavyweight projects as for home use.



Access 2.0 encourages an organised approach to application development

PCW Details

Price £220 (upgrade £99)

Contact Microsoft 01345 002000.

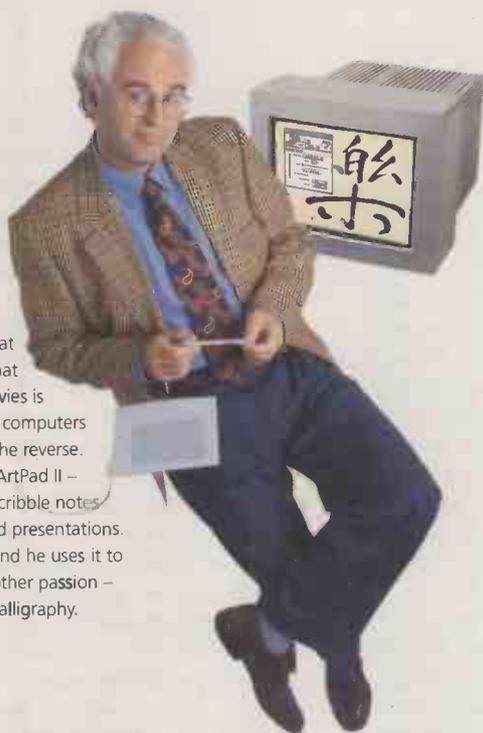
Fax 0181 977 5465

Good Points Excellent manuals with a healthy emphasis on design principles. Adheres strongly to principles of relational integrity.

Bad Points None worth mentioning
Conclusion Good all-round package appropriate for novice users and developers. Excellent programming tools and good training facilities.



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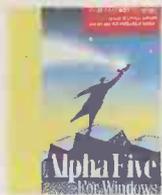
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Alpha Five

An RDBMS package can be as simple or as complex as the manufacturer wants to make it, depending on the target market at which it's aiming. Several have tried to make database management systems which provide visual tools to help non-experts in the creation of simple flat-file or basic relational databases. Alpha Five (launched in 1994) is the latest product to make its mark as an RDBMS product at the low end of the market.

There's no programming language with Alpha Five: everything you need to do in a database application is provided in the form of some built-in or pre-prepared function. There's a certain amount of flexibility if you want to customise the applications you build, but many of the common database operations you use come in the form of pre-configured utilities.

A central Control Panel holds the current database and associated files. Instead of arranging the application in terms of forms, reports and tables, Alpha Five's Control Panel divides into four tabbed categories: Views, Tools, Database and Apps. The filename at the top of the Control Panel shows the currently selected database or "set".

Alpha Five uses this concept of a set to hold all the tables and definitions in a database application. Once the relationships between all tables belonging to a set have been defined, this set can be treated as if it were a single database. You can view, enter and edit related records via a single form and create reports based on the set without having to redefine links between individual files.

Unusually for this kind of low-end product, there is an editor which allows tables and their relationships to be defined graphically. Unsurprisingly, this is called the "set editor" and here the structure of your application is illustrated in terms of lines and boxes — like an entity relationship diagram. If you have a complex table structure, the set editor can be used to sketch out all the relationships in the application. The joins defined between tables can be re-defined by double-clicking on a line and resetting the key fields in the link information dialogue box.

The link information dialogue box allows referential integrity rules to be set up as well, between parent and child tables. The manual gives excellent, simple advice on how to structure groups of tables into a coherent set so that your application makes the most efficient use of the data, avoiding any redundancy or duplication. You can press F1 at any point to get context-sensitive explanations and instructions.

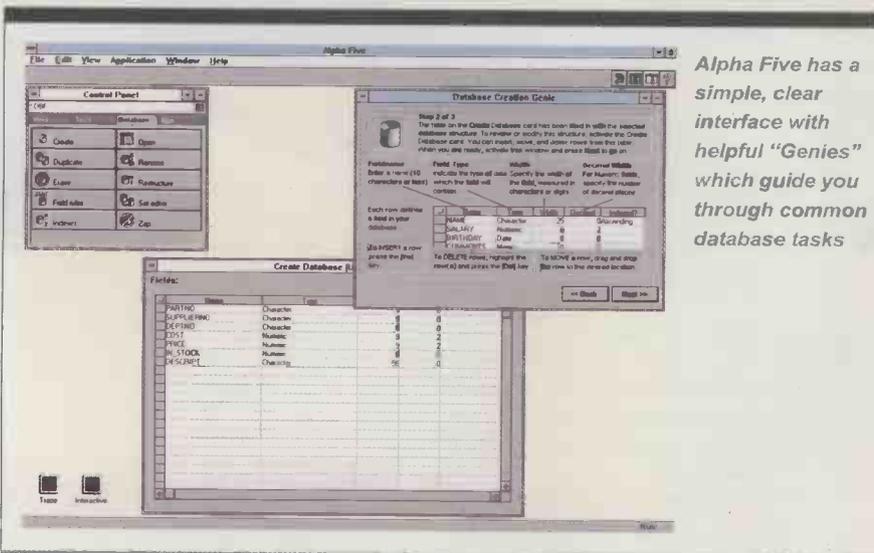
An Application Launcher utility provides a pre-prepared menu of runnable Alpha Five programs. You can add your own programs to the list simply by picking out an application file of your own and giving it a title. Several applications which come with the package have already been placed on the Application Launcher. One of these, the Database Documenter, provides a data dictionary utility which documents all of an application's related components in three different reports. The Database Structure option lists all fields defined in the database, their data type and length, and all

form and report layouts are documented in the Layouts and Saved Settings option. A third option records all scripts which have been used in an application. This kind of documenting facility can be invaluable when it comes to keeping track of the details of your application as you are build it.

Forms, reports, letters and mailing labels can be created using a selection of layout editors, each with functions specific to the object being created. A floating toolbar allows all the usual types of object to be placed on forms, such as buttons, bitmaps, list boxes and radio buttons. There's a limited list of pre-prepared events designed to sit behind push-buttons and you can use xBase script to perform all kinds of database operations. Implementing this is confusing to say the least and despite the existence of a script recorder, there is very little on-screen guidance when it comes to incorporating scripts into your applications. But if you are willing to persevere, the inclusion of xBase script does enable you to extend the complexity of applications.

Queries and reports are set up using Genies (equivalent to Microsoft Wizards). These present all the currently available fields in the database and allow you to place various constraints on how data is ordered, filtered and presented. The interface is easy to follow and produces professional-looking and sometimes quite complex reports using a series of points and clicks.

If you are new to databases, Alpha Five is one of the best end-user products on the market. The easy point-and-click style interface makes application building genuinely easy and the manuals provide well-written explanations of database theory to guide you in the design and structure of applications — an ideal package for small- to medium- size databases but not a serious developer's tool.



Alpha Five has a simple, clear interface with helpful "Genies" which guide you through common database tasks

PCW Details

Price £99

Contact Alpha Software

01752 897100. Fax 01752 894833

Good Points Easy for non-experts to get to grips with. Provides limited form tools for creating simple but effective Windows front-ends. Excellent design tool for defining relationships.

Bad Points Unsuitable for large or complex databases. Not a programming tool for serious developers.

Conclusion Unlike Approach, Alpha Five is not pretending to be anything else but an RDBMS for non-experts and it is in this capacity that it really scores.

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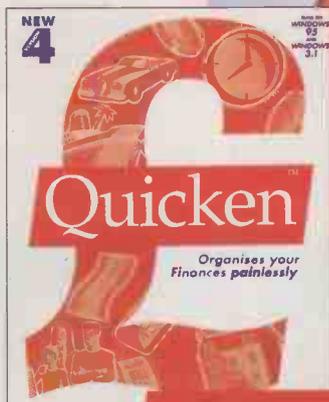
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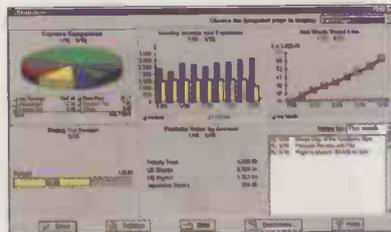
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finances and pay the bills. In fact, all I do now is check my bank statement with Quicken to make sure that the bank have got it right. **I even let Quicken print my cheques for me**, it types the addresses for me, and I can be sure that my cheques match my records because Quicken does it all for me.

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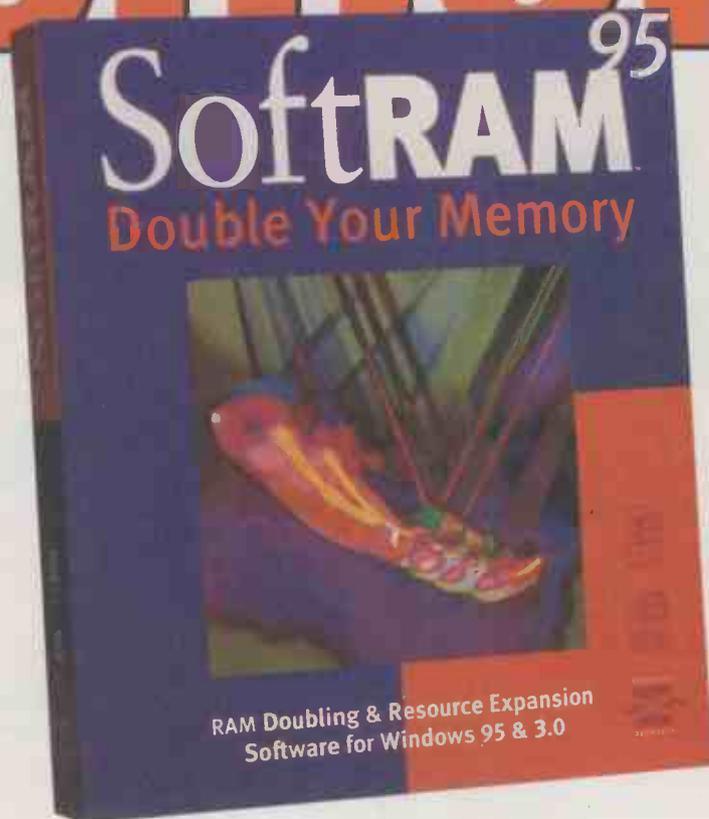


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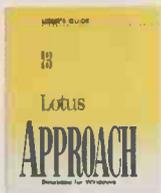
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Lotus Approach

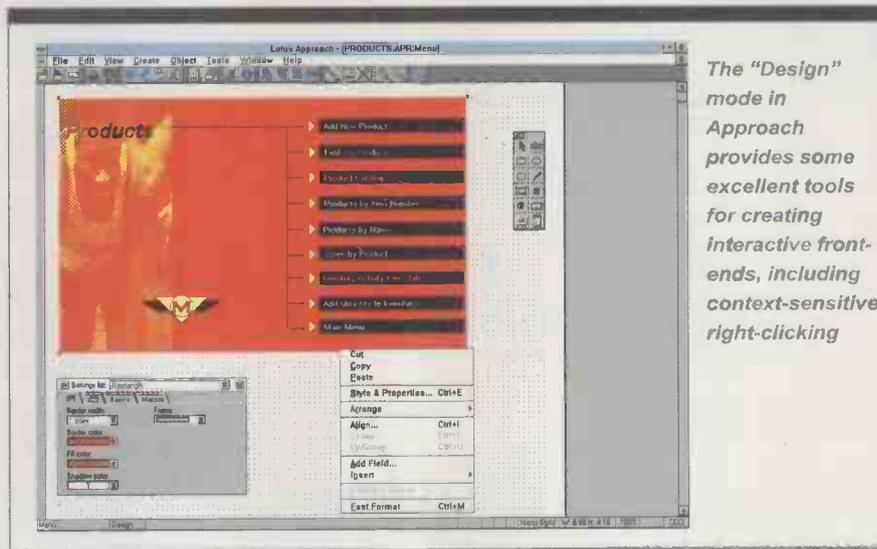
Lotus Approach was originally the product of an independent software company, founded in 1990 by a group of ex-Oracle and ex-Clarisc software engineers. This team managed to combine the best in user-interface design with relational power, resulting in one of the best end-user database products on the market. In 1993 Lotus bought Approach (the company) and within three months the new "Lotus-ized" product (version 2.1) appeared. Version 3.0 (released last summer) incorporated more advanced analysis tools, cross-product integration capabilities and a new macro language.

Lotus Approach does not attempt to please every type of customer — its architecture has been constructed from the ground up, to meet the needs of the end-user. It has been designed for Windows and thus takes full advantage of Windows features without being troubled by those problems associated with cross-platform development or compatibility with a previous DOS version.

When you create a database in Approach, you automatically create a holding file which gathers together all the forms, reports and queries related to a particular project. This is called the Approach file and it provides a Window through which you can create various views of data. Editing, sorting and reporting is done in the Approach file while the actual data is kept behind the scenes and updated transparently.

The neat thing about this arrangement is that it allows you to open up, combine, analyse and report on any type of data available to you. It does this using what Approach calls "Power Keys". These allow databases of practically any format to be opened directly without having to perform imports, or use any kind of intermediary file or filter. PowerKeys allow direct access to a range of formats including Paradox, FoxPro, Oracle SQL, dBase and DB2. When you create a file the file type defaults to dBase IV but you can create files which conform to dBase III Plus, FoxPro and Paradox.

For creating a database, a whole list of predefined templates has been set up for common types such as Accounts, Customers or Expenses plus some more imaginative titles like Guest List, Friends and Family, Musical Groups and Wine List. Each one of these contains relevant



The "Design" mode in Approach provides some excellent tools for creating interactive front-ends, including context-sensitive right-clicking

fields and a simple form ready for data-entry. All of the preset characteristics can be modified to suit your needs, and files can be created from scratch.

There's no need to worry about indexes in Approach — you don't have to understand how they work or even have the faintest idea what they are. The first time you use a particular field for a sort or find operation, the values of that field are automatically compiled into what Approach calls a Smart Index.

You can move into the Design environment by clicking on the appropriate icon at the top of the screen. The "design" symbol consists of a protractor, ruler and pencil and has become a standard symbol in Windows databases.

Version 3.0 has been beefed up with added macro capabilities which allow you to automate common sequences of tasks. The "Define Macro" dialogue box provides all the possible commands along with explanations of what they do and which parameters each can use. This makes it easy to enhance applications with small amounts of code but the language does not have the fine-tuning capabilities to allow the development of sophisticated database applications.

When it comes to relational integrity, Approach has a few holes. The facilities are there to ensure that data arranged in a one-to-many relationship is kept synchronised, but it nevertheless remains possible to link files together in illegal combinations creating unsound database structures. Even more outrageous is the fact that Approach will allow you to join

fields of different data types.

Approach is very different to the other RDBMSs here, combining genuine ease of use with powerful data analysis tools. Although this sounds like the perfect combination of characteristics, it is unfortunately the perfect recipe for disaster, too. Any file which is accessible to the user can be opened transparently, manipulated, and joined to any other using fields of any data type. If you're new to databases, the doors are wide open for you to go wrong far quicker and on a much larger scale than ever before.

If you're not a database expert and you want to create simple, small- to medium-sized databases, then Approach may well suit you. But if you wish to progress towards building more complex applications, you'd be better off investing in an RDBMS which has a fully-fledged programming language and provides more guidance in database design.

PCW Details

Price £99

Contact Lotus 01784 445808.

Fax 01784 469342

Good Points Genuinely easy to use and has powerful data analysis tools, ODBC capability and good cross-package integration.

Bad Points The macro language is rather limited. Not enough guidance on design principles.

Conclusion One of the best products if you're new to RDBMSs and want to create small- to medium-sized applications, but it is not suitable for large or complex projects.

PCW

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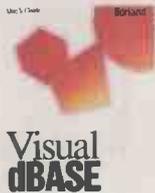
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Visual dBase

dBase has been around for a long time now. The first PC version, dBase III, launched in 1984 by Ashton-Tate, gained such popularity among PC users that it nearly became regarded as an industry standard. Borland bought out Ashton-Tate in 1991 and two years later claimed that a massive 55 percent of the world's installed PC databases were developed with dBase — that's 6.7 million dBase developers and users.

The long-awaited Windows version of dBase became available last year. It had been carefully designed to retain some of the familiar tools and concepts from the DOS version so as to protect existing investments in software, experience and training, in addition to being compatible with dBase III Plus and dBase IV, thus enabling complete conversion of existing applications.

Visual dBase (codenamed Voyager), which started shipping in early August, is Borland's first major upgrade to dBase for Windows and is the first product to conform to some of the new GUI features of Windows 95. It's not a fully-blown Win95 RDBMS because it is still on 16-bit code, but it does have what Borland refers to as the Windows 95 "look and feel".

On the surface this looks rather like a half-hearted upgrade, but several important features have been added to the application which were believed to be missing from dBase for Windows. The most obvious improvement is the .EXE compiler which will make the distribution of applications for developers much easier. The compiler is able to link all the relevant files without the need for a central

project file and then packs your application onto floppy disk or CD-ROM images. From these images your program will install complete with a pop-up readme file and an optional splash screen to give the installation a more professional look.

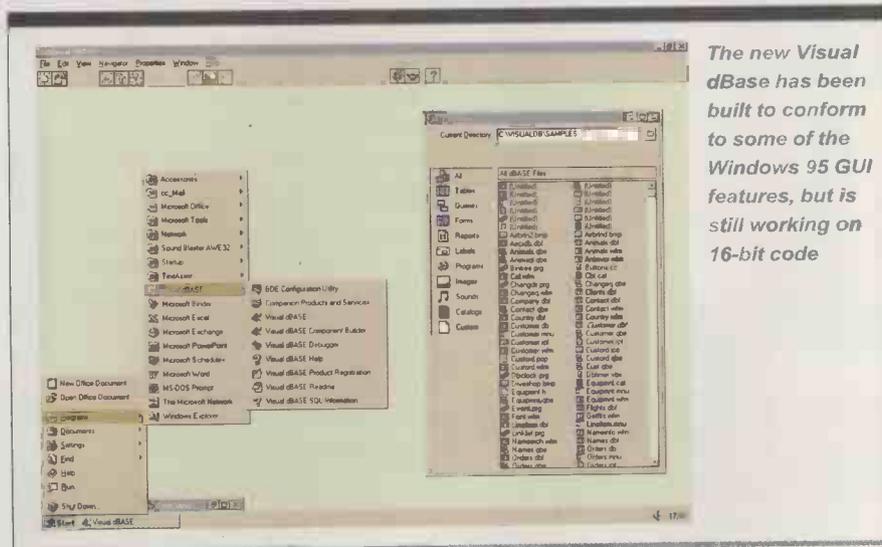
This solves a serious problem for dBase developers who have been crying out for some way to distribute their applications since dBase for Windows first appeared. The "Distribution Kit" which came with the package was a temporary fix to this fundamental problem and the fact that Borland has now provided a way of packaging applications for distribution will help to gain the product more respect as a serious developer's tool.

Just as in version 5.0, Visual dBase allows you to generate code interactively when you create queries, reports or forms. Interestingly this also works in the other direction: if you alter the code used to generate a form, the changes will be reflected graphically in the associated query or form. This is a neat feature but not unique to this product (even Superbase, the first Windows database, included a similar two-way tool). It is extremely useful though, as it provides non-programming users with a way of generating working pieces of code from a graphical interface. When users come to analyse the code, they do so with an understanding of what it does. It also helps experienced programmers speed up development time.

dBase for Windows added object-orientated extensions to the dBase language, providing strong support for Windows features and encouraging

developers to build applications by integrating predefined or custom objects. Borland claims that its Object dBase is more truly object-orientated than Paradox's ObjectPal because it provides all the traditionally recognised tools such as encapsulation, inheritance and polymorphism (see panel, page 212). These object-orientated capabilities have been beefed-up in Visual dBase: you can save your own custom forms as base forms, for instance. Other forms which are derived from the base form inherit all its characteristics and when aspects of the base form are changed these are carried through to all the relevant derivatives.

The SQL command set has now been integrated into the dBase language allowing embedded SQL to work with any data source, including those attached using ODBC or SQL-links. This creates a slightly uneasy alliance with the existing dBase procedural language. The SELECT statement which forms much of the meat of SQL does not behave entirely as it does in its native form. It's not possible, for example, to manipulate returned data from a SELECT statement one row at a time; instead, the entire batch of filtered data is returned into a table. From there it can then be processed row by row using the familiar dBase commands. There's no reason why data should not be filtered and processed in this way but slight variations of this kind will affect the way in which SQL and dBase programmers use the hybrid language to work effectively. A certain amount of rethinking will undoubtedly take place before programmers from different backgrounds are able to reach a fruitful and consistent method of working.



The new Visual dBase has been built to conform to some of the Windows 95 GUI features, but is still working on 16-bit code

PCW Details

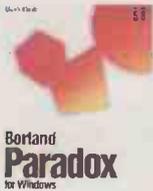
Price £349 (£59 for upgrade from dBase or Paradox)

Contact Borland 01734 320022

Good Points Serious development tool with a rich programming environment and an excellent interface builder.

Bad Points Despite the recent revamp it does not work as well as FoxPro in performance tests.

Conclusion If you're a database developer with a smattering of "C" knowledge and want to get into object-orientated code writing, dBase for Windows is the obvious choice. For extremely large databases where performance is important, FoxPro would be more suitable — although this may mean retraining.



Paradox 5.0

The DOS version of Paradox was a very popular product, so when Borland decided to develop a new Windows version the company was faced with the same problem Microsoft had when developing FoxPro: how to create a Windows version of a successful DOS product without losing popular features or creating backward compatibility problems. Borland took the plunge and re-wrote Paradox from the ground up — exactly the opposite strategy to that taken by Microsoft when developing FoxPro.

This gave Borland some advantages in the design of the package. Unlike FoxPro it is free to exploit Windows features without being hampered by the difficulties of cross-platform development. The disadvantage is that it requires more effort for DOS users to make the transition to the Windows version. There's a lot to learn about the Windows environment, and there's a radical conceptual leap to make in programming terms, too. Windows provides the foundations for event-driven object-based code writing which requires a very different kind of thinking when it comes to building applications.

Paradox has always been committed to visual programming whereby predefined objects such as fields, choice lists, drop-down edit lists and buttons are placed on forms and later edited if their default behaviour doesn't suit your needs. The incorporation of objects into the language makes ObjectPAL (Paradox 5.0's programming language) utterly different from its predecessor PAL, especially as regards the sequence in

which statements are executed. Traditional programmers are used to having a single source file where the sequence of execution is linear, whereas in ObjectPAL the whole context is defined by objects and "methods" which execute in response to events.

Paradox version 5.0 has added more ease-of-use facilities for novices as well as an improved set of client/server and developer tools. Particular emphasis is placed on the requirements of companies who need to upsize their databases to a client/server environment and there is a collection of SQL link drivers which enable connection to Oracle, Sybase/Microsoft SQL Server, Borland's Interbase and Informix.

All the extra help facilities are extremely demanding on system resources. The full installation takes up 18Mb of hard-disk space and requires a minimum of 6Mb of RAM (8Mb is recommended). There is a whole range of services designed to help the ordinary user get to grips with common tasks, and a Data Model Designer which provides an overview display of the application and allows you to make links between tables.

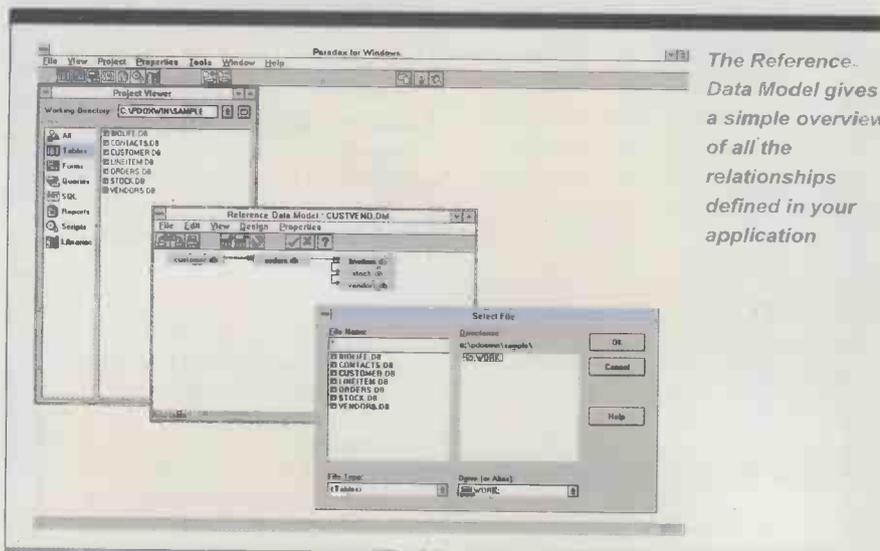
Other ease-of-use facilities include Coaches which guide you through ordinary database procedures using your own live data. They show you how to open tables and edit records, and how to create queries, forms and reports. And, surprisingly, they also explain some of the more conceptual foundations behind database design, like how to effectively create and use indexes.

Paradox automatically enforces refer-

ential integrity if you specify this during the creation of a table and maintains the validity of all data entered in the child table of a one-to-many relationship. Like most other RDBMSs Paradox will only allow you to define referential integrity between fields of the same data type which contain matching values, and only between tables which reside in the same directory. This latter condition forces you to store all the files for a given application in the same directory and prevents you from accidentally setting up relationships which join tables right across your hard disk, or even your network.

Beneath the GUI of Paradox, and dBase for Windows, lies the Borland Database Engine (or BDE) which provides both products with a consistent development platform. But more specifically it has enabled them to embody the SQL translation facility directly into the engine. This means that dBase for Windows and Paradox 5.0 for Windows access SQL servers directly, rather than going through a translation process via ODBC.

The improvements made to the client/server capabilities of Paradox for Windows reflect the effort Borland has made to fulfil the changing needs of the market, and the improvements to ObjectPAL make it a serious programming tool both for developers and power users. ObjectPal is not as intuitive as Access Basic and does not have the same universal feel which attracts beginners into programming. But it does have a high degree of functionality and anyone who makes the effort to learn the language will undoubtedly reap the rewards.



The Reference Data Model gives a simple overview of all the relationships defined in your application

PCW Details

Price £349 single-user version (£129 upgrade for Paradox and dBase users)
Contact Borland 01734 320022.

Fax 01734 320017

Good Points Provides powerful tools for building event-driven, object-based applications and excellent learning tools for power users.

Bad Points The proliferation of help facilities makes the interface feel bulky and overloaded. The programming language is something of an acquired taste and lacks the user-friendly feel of Access.

Conclusion Serious contender in the Windows database market with a dedicated band of followers. Provides powerful development tools for building fully-featured Windows applications but may prove difficult for anyone new to Windows programming.



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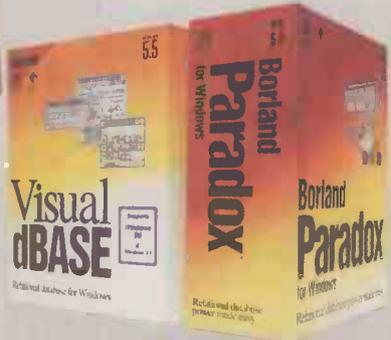
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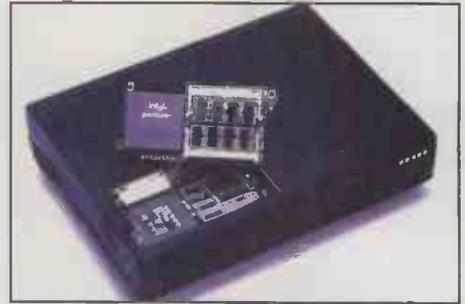
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User's Guide



Visual FoxPro

FoxPro started life in DOS as a dBase clone but was later extended to the multi-user Unix environment. It was bought by Microsoft who enhanced the product and transported it to the Mac and Windows. In the past the Windows version was built in such a way that it maintained complete compatibility with its DOS predecessor, providing developers with a common interface and common code compatibility across both supported platforms so that programs from the DOS version could be transferred to Windows with little or no change.

The obvious disadvantage of this design methodology is that the interface on the Windows version has always been rather DOS-like. In version 2.6 the installation program even asked whether you would like to use DOS-style keystrokes.

A new 32-bit version, called Visual FoxPro, has now been developed and the design focus of the product has clearly changed. This new version has been built to be used in Windows NT and 95 environments but will also run in Windows 3.x with the Win32S extensions. Full cross-platform compatibility is ensured so that an application designed on one of these platforms can be run on any of the others. However, the DOS, Macintosh and Unix versions are not available at present and it is still not clear exactly when these products will appear. There are no current plans for upgrading version 2.6 for Unix and nothing has been announced regarding the DOS version, but version 2.6 for the Mac is planned for release six to eight months later than the Windows version. So be careful if you

intend to create cross-platform applications for the Mac, Unix or MSDOS as they each have platform-specific features which are not available in Windows.

This version of FoxPro has been built to take full advantage of the Windows GUI. Visual FoxPro 3.0 is a major generational leap from version 2.6 with substantial improvements made to the client-server capability, visual design tools, and general compatibility with other Windows applications via OLE. The programming language has been beefed up with improved object-orientated extensions and a much extended event model which allows access to all Windows-based events.

Version 2.x applications can be run directly in version 3.0, or they can be converted using the new built-in Converter tool which puts them into version 3.0 format so that they can be manipulated in the native environment. Elements of 2.x code can be modified to give it version 3.0 functionality.

If you're a FoxPro 2.x user then the first thing you'll notice when starting up FoxPro 3.0 is the Project Manager. This acts as a central holding device for application development, very much like the MDB file concept in Access. This acts both as a file organiser and an application compiler, combining the functionality of the catalogue manager and project manager from version 2.6 as well as adding some extra new features. A project in version 3.0 is a collection of files, data, documents and FoxPro objects, all saved together with a .PJX extension.

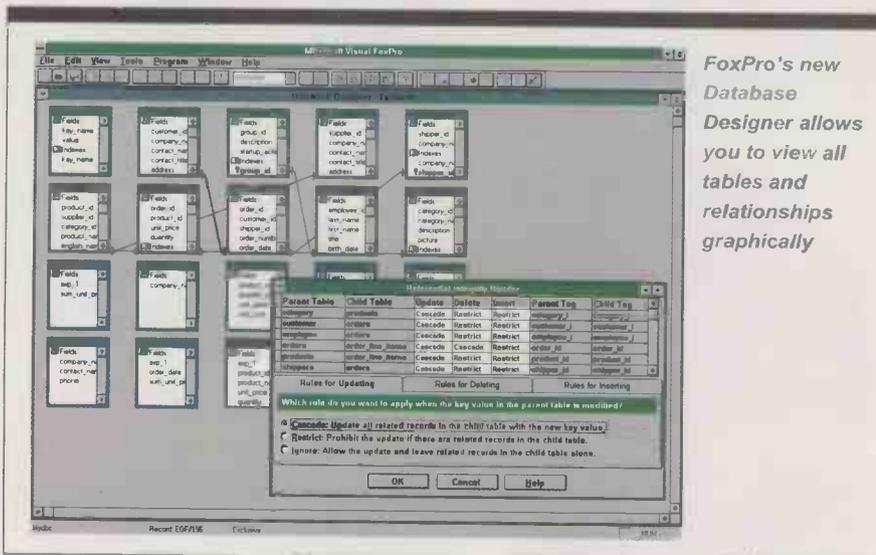
The other thing you'll notice about the

opening screen is that the familiar "Run" button is missing. This is because of radical changes which have been made to the interface. The concept of a database in version 3.0 is as a container of tables, whereas in previous versions individual tables were referred to as databases. Functions on the old-style Database menu no longer make sense in the new version, and the Run menu has had to be eliminated and its functions moved to other menus.

The most impressive of the new visual design tools is the Database Designer which displays all tables, views and relationships contained in an application. Within the Designer you can create database schemes graphically very much like the relationships window in Access. Tables can be joined interactively by dragging and dropping related fields, and in this way you get an overview sketch of your application design.

Referential integrity rules can be defined interactively in the Database Designer with various parent-child options. The details of all table relationships are stored in a central data dictionary or container so that all links are persistent throughout the application. When you're creating a form or report the relationships between tables are created automatically, based on relationships defined in the Database Designer.

Visual FoxPro 3.0 uses a full range of OLE objects and controls, and makes it easy to create your own class libraries with inheritance and encapsulation. The new object extensions allow developers to create reusable objects, classes, and sub-classes and the new Visual Class Designer allows classes to be created visually. With its powerful developer's tools, this is an RDBMS capable of fully exploiting the Windows GUI.



FoxPro's new Database Designer allows you to view all tables and relationships graphically

PCW Details

Price £160 (upgrade £99). Professional version £399 (upgrade £239)

Contact Microsoft 01345 002000.
Fax 0181 977 5465

Good Points Great improvements in all aspects of Windows application building.

Bad Points Microsoft's commitment to Mac and DOS cross-platform compatibility now seems doubtful.

Conclusion Excellent RDBMS for developers, with sophisticated object-based programming tools now added to the procedural language, and tools which take advantage of the Windows 95 interface and 32-bit processing.

DATA EASE

DataEase 5.0

People who use databases on PCs fall into all sorts of overlapping and indeterminate categories depending on their profession, their purpose, the operating system they use and their level of technical knowledge. This creates an intangible marketing problem for database manufacturers: do you create a product which tries to serve everyone, or do you create several products, each serving a slightly different market?

DataEase International has agonised over this question more than any other database manufacturer. About six months ago it was decided that in addition to the full developer's version of DataEase there should be an intermediate product for power users, providing limited functionality. The idea was eventually dropped because it made the product line too complicated and confusing. Now there are two basic products: the fully-fledged programmable database and the "Exec" version, which allows developers to distribute applications as independent executables. These two products now exist for three operating systems: OS/2, DOS, and Windows.

All three versions of DataEase use the same database engine, providing unusual flexibility in a mixed workstation office. Machines using different platforms can happily cohabit, running the same network application. This flexibility allows you to develop applications in one operating system and run them on another, so DataEase is worth looking at if you need to use all three platforms.

The DataEase opening screen is clear and simple, and for anyone who's ever

used Access the format will be familiar. On the left-hand side of the desktop window, acting as a kind of holding file for all the associated parts of a database, is a catalogue box listing all the forms, tables and reports in the current application.

Two buttons in the top left-hand corner of the screen allow you to toggle between the form designer and the user view. In the form designer fields can be created from scratch or from a previously defined table. A floating tool palette provides a range of functions including command buttons, radio buttons and OLE objects. As new fields are created, so a new table is automatically defined. Various pre-prepared form layouts are available to choose from if you don't want to build your own customised design.

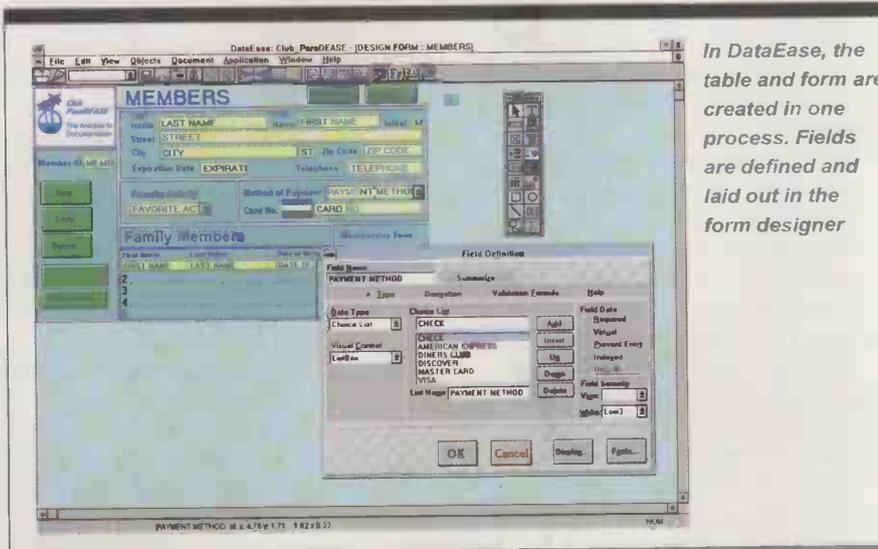
Despite some nice touches in the form designer, DataEase is let down by several annoyances like not being able to create a table without creating a form. Although every change made to the form is reflected in the table, to keep everything absolutely in sync there are times when it is necessary to create a field for lookup purposes which is not displayed on the form. In DataEase the only way of doing this is by creating a view of the form which selects the chosen fields for display.

Linking files is a fairly simple process achieved via the relationships option in the "Application" menu. List boxes, on the relationships utility, display all the existing tables in the current application and once chosen, two list boxes show all the possible fields which can be linked together. Unlike Access, however, there is no way

of viewing all the current relationships in terms of a graphical diagram or report. This generally standard facility is reserved for the "Exec" or developer's version, planned to be available by the time PCW is published.

DataEase 5 for Windows still uses DQL (DataEase Query Language), thus maintaining backward compatibility for the DataEase faithfuls. But as in many other areas of software development, the effort to retain consistency with the past has some negative consequences. The most obvious is that the language does not exploit the Windows GUI to the full. Although the manuals use "object" terminology and the form designer allows commands to be placed behind graphical objects, the language is limited when compared to full-blown visual programming languages like Access Basic. For building powerful Windows applications, DQL is not a serious contender.

A few years ago DataEase's big selling point was its friendly DOS user interface which made application building far more intuitive than it was in dBase (which still had the older-style command-line prompt). At that time DataEase was regarded as an innovative product and a massive user base was built up, particularly in the UK. The advent of Windows changed this comfortable position but DataEase was slow to react to the changing market. In short, the full DataEase for Windows product arrived two years too late. Its success will be largely dependent on the existing base of DOS users who want to convert their custom applications to Windows and on developers who want to write applications for multi-platform environments. For first-time buyers, however, there are much better offerings on the market.



In DataEase, the table and form are created in one process. Fields are defined and laid out in the form designer

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Good Points Great backward and cross-platform compatibility.

Bad Points Limited programming language. Some design annoyances.

Conclusion DataEase has concentrated on its existing user base with this product. If you're about to go out and buy your first database product, there are better products with languages more dedicated to the Windows environment.

What is client/server?

Client/server is one of those trendy computer-industry terms which means slightly different things to different people. Strictly speaking, client/server is an architecture in which processes running independently send each other requests and provide each other with services. The client and the server are defined by the type of process they perform: a process that sends a request is a "client", and a process that fulfils the request with the required service is the "server". A single process can be both client and server — in other words, it may be both a service provider and requester.

If you don't agree with this definition, it's because the original meaning of the term has shifted over the past couple of years to something slightly different. The definition provided above is a logical definition in which "client" and "server" are understood in terms of their relative functions. These days, most people understand "client" to mean any machine which sits in front of the

user, and "server" as any machine *not* in front of the user. In other words, client/server is understood in hardware terms rather than as a model of related processes.

In general, the hardware conception of client/server makes some sense. The user's client machine provides the appropriate user-interface logic to make server requests and the server responds accordingly. But in practice, the hardware conception does not fit all cases because there are so many different client/server architectures. It is possible, for example, for the server process to sit on the same machine as the client. Client/server software usually prevents the user from knowing the physical location of the server by re-directing service calls appropriately, and an individual program can be a client, a server, or both.

The basic idea of client/server is to distribute the processing power and storage space required to run a given application. This is not a new idea. In fact, Local Area Networks

have been used over the past ten years to provide many kinds of software solutions. The most basic form of client/server system is where a client (typically a PC) passes requests to the server for file records over a network. In this scenario the file server is being used to perform a very simple service and the requested data is generally found using many message exchanges.

A database server is more sophisticated. The client's request for data is made in the form of SQL commands and the results of these requests are returned over the network. Code residing on the file server processes the SQL commands and the requested data is filtered out and passed to the client. This provides a much more efficient system than the basic file server model described above: this is because the code which processes the SQL command sits in the same place as the data and filters out the appropriate data in response to *ad hoc* queries.



Tables



(Untitled)
(Untitled)
(Untitled)



(Untitled)
(Untitled)
(Untitled)

Object-orientated programming

There has been a lot of confusion recently about the meaning of the term "object-orientated" — largely because it has been bandied about by all and sundry to mean a multitude of different things. Put simply, object-orientated programming is a collection of design principles for writing code. It is only supported by some languages and aims to break programs down into manageable units called "objects". The core idea behind this is to make components which are sufficiently general purpose that they can be reused in other programs.

This method of designing code yields many advantages. Firstly, a program which is divided into independent chunks is easier to understand, easier to debug and generally easier to maintain. Secondly, if many of those chunks are reusable, time will be saved in future projects. Thirdly, an application made out of many independent parts can be more easily created by teams, thus increasing productivity.

The first object-orientated programming languages (Simula and Smalltalk) were conceived more than 20 years ago but it's only recently that people have started taking its principles seriously. C++ is now the most popular object-orientated language. Objects within C++ can correspond to real-world entities like bank accounts, employees or customers but they can also

correspond to computer hardware and software components such as communications ports, or video display windows, or data structures such as stacks or lists.

Many of the objects a program uses have the same structure. A program which simulates the operations of a bank, for example, will need many account objects and many customer objects. Once the structure of an object has been set up it is possible to produce many copies of it by using "classes". Each class contains a complete description of one kind of object.

Truly object-orientated code must have the three essential characteristics of inheritance, encapsulation and polymorphism. This sounds frighteningly technical but in fact the whole thing rests on three fairly simple concepts.

Firstly, classes can be defined from scratch, or they can be created by modifying an existing class. Derived classes take on all the characteristics of the existing class plus any modifications. This is called inheritance and can save you an incredible amount of time and effort in code writing.

Secondly, objects are available to the programmer via an interface which responds to a limited number of different kinds of message. The internal structure of individual objects is hidden from the programmer and this data hiding or encapsulation simplifies

the use of objects.

Thirdly, the major attribute of an object-orientated language is that all the objects of derived classes of a parent class are type compatible. This means that a derived class can be used anywhere the parent class is expected. This is called inheritance polymorphism and it enables clients of a family to see a simple uniform interface.

Programming languages which claim to be object orientated generally possess at least one of these characteristics but very few have the full power of C++. Packages such as Visual Basic and Paradox allow programmers to use whole sets of predefined classes or types of object which correspond to elements in the Windows environment. These are generally graphical features such as dialogue boxes, pushbuttons and combo boxes. This does not represent full-blown object-orientated programming in the C++ sense because the availability of "off-the-shelf" objects only accounts for one of the object-orientated characteristics: that of encapsulation. dBase for Windows is more truly object-orientated as it provides the tools for programmers to create their own classes and to create new classes based on existing ones. Compared with C++ it is limited, but more glaringly dBase still supports the use of procedural code which makes it only half committed to object-orientated principles.

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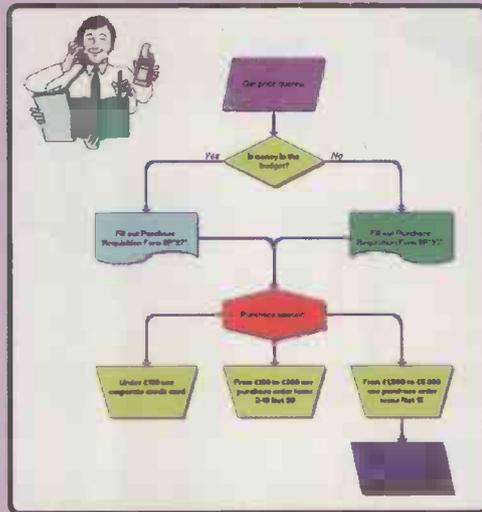
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	Access 2.0	Alpha Five 1.0	Approach 3.0	DataEase 5.0	Paradox 5.0	Visual dBase	Visual FoxPro
Manufacturer	Microsoft	Alpha Software	Lotus	DataEase International	Borland	Borland	Microsoft
Tel	0345 002000	01752 897100	01784 445808	0181 554 0582	01734 320022	01734 320022	0345 002000
Fax	0181 977 5465	01752 894833	01784 469342	0181 518 4150	01734 320017	01734 320017	0181 977 5465
Technical support	01734 271000	01752 897100	01784 445835	0181 518 3388	01256 373478	01256 373477	01734 271000
Warranty support	3 months	Unlimited	2 months	1 month	1 month	1 month	3 months
General Features							
Min RAM	8Mb	8Mb	4Mb	4Mb	6Mb	6Mb	8Mb
Min and (Max)							
Install space	6Mb (23Mb)	5Mb (11Mb)	6Mb (20Mb)	10MB (25Mb)	7Mb (29Mb)	10Mb (30Mb)	15Mb (50Mb)
Min processor	386/20	386/DX	386	286	386	386	386/SX
OLE 2.0 support	Yes	No	Yes	No	Yes	No	Yes
Prog language	AccessBasic	xBasic (limited)	None	DQL	ObjectPAL	dBase	FoxPro
Compiler	Yes	No	No	No	Yes	Yes	Yes
Graphs	Yes	No	Yes	Yes	Yes	No	N
Address labels	Yes	Yes	Yes	Yes	Yes	Yes	Y
SQL drivers	Yes	No	Yes	Yes	Yes	Yes	Y
OS Details							
32-bit version	No	No	No	No	N	N	Y
Win95 version pending	Yes	No	Yes	No	Y	Y	N/A
Supported platforms	Win3.1	Win3.1	Win3.1	Win3.1, Mac, DOS, OS/2	Win3.1	Win3.1, Win95*, DOS	Win3.1, Win95, WinNT*
Query Facilities							
xBase compatible	No	Yes	No	No	No	Yes	Yes
CL* interface	No	No	No	No	No	Yes	Yes
QBE interface†	Yes	Yes	No	Yes	Yes	Yes	Yes
Query by Form	No	No	Yes	Yes	No	No	No

- CL = Command Line ● QBE = Query By Example ● All packages included here are built for the Windows platform and all are ODBC compliant
- *Win NT - Visual FoxPro has been designed as a full 32-bit program.
- *Win95 - Visual dBase is not yet designed as a full 32-bit version but does conform to the Windows 95 GUI.

Editor's Choice



RDBMS packages have moved firmly into the Windows environment, providing all kinds of GUI utilities for the novice user. This makes database packages more accessible to more people, but also gives RDBMS packages a rather schizophrenic personality. They provide powerful programming tools which allow experienced developers to create complex custom applications, while offering context-sensitive help facilities and intuitive GUI reporting facilities.

Here, each database system has been assessed according to several criteria. Each one has been benchmarked using the VNU European Labs tests (see panel, page 217). This gauges system performance measured according to common tasks such as importing, indexing and filtering. Other important characteristics include adherence to the principles of data integrity, the degree of functionality offered in the programming language, and the degree of standardisation to the Windows interface.

For the novice user, ease of use is obviously the most important factor and Approach has always dedicated itself to this end with an intuitive interface, helpful Wizards, and automatic indexing. But the application ultimately falls down on its lack of relational integrity and lack of control language. DataEase, despite reasonable performance results, falls down on its inability to fully exploit the Windows environment and for that reason can only be recommended to existing users. As a user tool Alpha Five is the best choice when it comes to providing intuitive features for creating small, simple applications and its xBasic compatibility makes it possible to extend the complexity of applications should the need arise. This earns it the Highly Commended award in this round-up.

If you're looking for a powerful xBase-compatible system then the contest is between Visual dBase and Visual FoxPro. FoxPro is undoubtedly the best when it comes to power, and it's now looking like a serious contender among other Windows

programming tools. In many ways FoxPro has the edge over dBase with a more integrated language and a stricter adherence to object-orientated principles.

Paradox also offers a robust system producing reasonable results in our benchmark tests and offering a good set of powerful tools for building object-based Windows applications. But ObjectPAL has proved to be something of an acquired taste and is not the most accessible language for novice users or even semi-skilled programmers.

When looking for an RDBMS with a good balance of tools satisfying the widest possible spectrum of users, Microsoft Access is the clear winner and gets the Editor's Choice in this group test. When Access first appeared on the market Lotus Approach was seen as its natural rival, but it has now developed (and is still developing) into a tool equally suited to large corporate projects as it is to the home user, with the ideal combination of easy-to-use facilities and powerful development tools.

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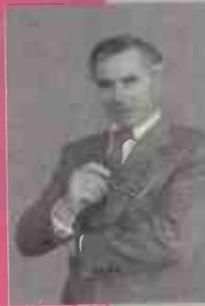
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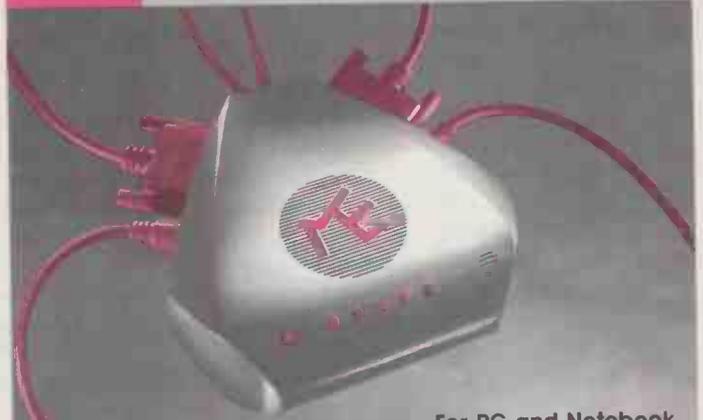


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Windows 95 databases

Why should database developers care about Windows 95?

Over the next few months, following the release of Windows 95, millions of copies of the new operating system will infiltrate the hard disks of PCs throughout the world. For those involved in the PC industry the introduction of a new mass-market operating system has all sorts of implications. If you're a database developer you'll have to consider the change-over more seriously than most, because it's down to you to ensure the successful operation of your applications in the new environment.

If you're a serious developer, you'll want to do more than just run your applications successfully; you'll want to fully exploit the new features of the operating system so that you can provide the best possible application solutions. Many developers are still unsure about how Windows 95 will affect the way they develop applications, so we'll give an outline here of the main advantages of the new OS. I'll also be previewing some of the features of the new version of MS Access due to be released in the next few months.

Stability and resource management

On the whole, the improvements incorporated into Windows 95 make it a more usable, more stable and fuller-featured OS. Two enhancements from which you will benefit straightaway are the improved stability of the system when multitasking, and better handling of system resources. One of the fundamental weaknesses of Windows 3.1 is that all applications, as well as operating system code, share a single address space called the system VM (Virtual Machine). The single address-space model is bad news when it comes to system integrity because applications are not protected from each other and key portions of the operating system are left exposed to buggy programs which can cause the entire OS to crash.

Ideally, each application should be run in its own independent session or VM where it is protected from other applications and does not jeopardise the OS itself. When an application fails, the effect of the failure should be limited to the session in which it is running. Effectively, what VMs do is protect the system against crashes by ensuring that applications do not write to each other's address spaces.

Windows 95 goes some way towards sorting this out by providing private address spaces for Win32 executables. Unfortunately, Win16 programs still execute as a single process within a shared address space

which means that one faulty 16-bit app can still bring down the whole system. Despite this, the new OS is generally a good deal more stable.

Pre-emptive multitasking?

If you want to search your database and simultaneously print out a document or download a file, then the operating system must be able to efficiently divide up processor time between different active Windows. We're all familiar with the way that Windows 3.1 handles this kind of thing — usually slowly and clumsily. That's because it uses a crude scheduling mechanism called co-operative multitasking. Under this system, applications are never forced by the OS to give up processor time to other applications. Instead, they yield voluntarily by continually retrieving and despatching messages. This can work reasonably well as long as all applications adhere to the rules: one rogue

application (by failing to check its messaging queue) can hog the processor for long periods of time.

Windows 95 solves this problem using a pre-emptive scheduler; the same mechanism employed in OS/2 and Windows NT. The distribution of CPU time is controlled by the operating system (not the application) which evaluates the status of each active thread or unit of execution and decides which thread gets priority. The fact that a single thread is not permitted to hog CPU time means that Windows applications can share CPU resources equally.

In Windows 95, true pre-emptive multitasking exists only for 32-bit apps. 16-bit apps are multitasked co-operatively, which means that a single rogue 16-bit task (such as a Windows 3.1 application) can still bring down the whole system.

The upshot of all this is that, as far as database developers are concerned, you

Preview of Microsoft Access for Windows 95

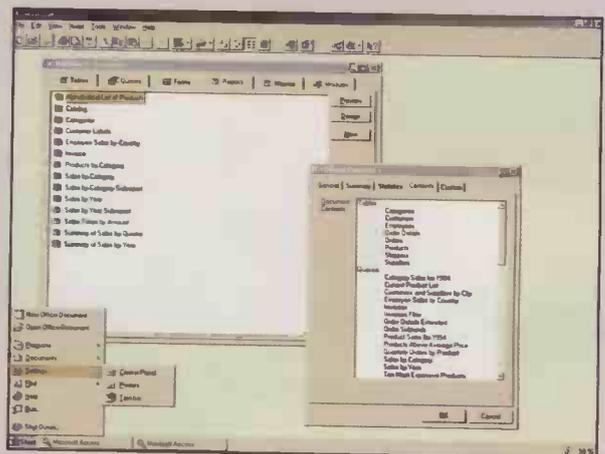
Microsoft Access 95 is being developed as a full 32-bit application and the beta code is currently being analysed by thousands of beta-testing sites around the world. The new version is designed to exploit the multi-threading capabilities of Windows 95 with the Jet engine, Access 95, and individual Access programs each running in their own threads.

As well as having taken advantage of the performance benefits in Win95, Access (like Visual dBase) has incorporated many of the Win95 GUI features into the application such as tab dialogues, option group buttons and the new-style check boxes. And some of the utilities have been designed so that their functions integrate with features in the operating system. For instance, there's a Database Properties dialogue box which displays the properties of individual databases, making files easier to locate via the Windows 95 Find File feature.

Access 95 supports the more obvious Win95 features like long filenames and the ability to create shortcuts to individual applications by dragging and dropping them onto the desktop. But some of the more familiar interface features have also changed to provide consistency with the operating system. The database container, for example,

is modelled on the Windows Explorer (Win95's File Manager) and allows you to view files either as large or small icons, or as a list, or with full details.

The ability to take advantage of the Win95 Briefcase is included, too. This allows users to work with replicated copies of databases and then synchronise changes with the master database and, by the same token, it allows developers to synchronise changes made to the master file with all



replica files.

One of the most impressive features of this new version of Access is the Table Analyser, designed to aid the process of converting flatfiles to relational databases. This has never been an entirely simple task even for experienced database developers and often involves a tortured sequence of creating appropriate file definitions, importing data, and analysing the best way to link files

won't get any performance benefits unless you make use of 32-bit processing.

RDBMSs for Windows 95

When it comes to preparing for the Windows 95 platform, database manufacturers are in various stages of development. Microsoft's Visual FoxPro was the first RDBMS to become available in its fully-fledged Win95 form. Although Borland's Visual dBase conforms to some of the Windows GUI features, it is still not a 32-bit application — the full version is planned for release early next year. Lotus plans a Win95 version of Approach which will be incorporated into Lotus SmartSuite (due for release next year) but DataEase International and Alpha Software, for example, have made no announcements as yet. The next big database upgrade will be for Microsoft Access, due to be released towards the end of November, which we have previewed here.

to avoid redundancy or duplication. The worst-case scenario is when you're presented with a huge spreadsheet which has built up over the years, and which has been added to and maintained by many different people. Generally a flatfile such as this is extremely difficult to break up into sensible parts because of the lack of syntax consistency. A geographical area for instance could be entered as "The North East" by one person, "Nrth East" by another, or simply spelled incorrectly by someone else. To make the spreadsheet into a relational database, each geographical area would be put into a lookup file and presented to the user as a drop-down list. But before this can be done, inconsistent syntax must be cleaned up.

The Table Analyser Wizard in Access 95 actually performs this process for you. It's able to look at a wide variety of flatfile formats, intelligently decipher inconsistencies in syntax and split the file into a set of related tables. The Wizard makes recommendations about your data (which you can either accept or reject), explains the consequences of duplicating data and gives complete guidance at each stage in the process. This makes the Analyser Wizard suitable both for novice users who want to create a working system quickly and easily, and developers who want to build a quick prototype of a system from an existing flat file.

Included with this version is another intelligent tool: the Performance Analyser Wizard. This examines your database and recommends different ways of improving application performance. In the past,

Microsoft's Open DataBase Connectivity (ODBC) is a standard set up to provide interoperability between ODBC compliant applications and ODBC compliant data sources. It is a C language specification for an Application Programmers Interface (API) that enables Windows client applications to speak to server software in the appropriate SQL (structured query language) dialect. The idea behind this is to provide a communications standard which can be used by database vendors and third party developers to link their software to any ODBC supporting server. Without this standard, vendors of client software would have to provide API's for every possible server database to which the client may want to talk.

The basic principle at work is the same as that used for the Microsoft print model where a generic printer interface in Windows acts as a communications channel between applications and printer drivers. DOS had no such

improving the performance of a database has always involved low-level tinkering and an intimate knowledge of the database package you're using. The Performance Wizard examines your database and recommends changes such as a new index or relationship, or a change of data type. Changes can be implemented either manually, or by the Wizard automatically.

The other major change in Access 95 is in the programming language which has now been modified to provide a consistent language for building solutions across the whole of Microsoft Office. Code written in Access can then be used in Excel or Visual Basic.

The changes which have been made in Access 95, with integration and consistency in mind, mark a definite step forward not just for Access but for the whole Office Suite. They make common tasks recognisable across different applications and extend the usability complex tasks which are automated in code by making them more universal across different apps. All these new features have been designed so that the software is working for the user, instead of the more familiar scenario where the user requires detailed knowledge of the system before it starts to become useful. Some of the more "intelligent" features have yet to be thoroughly tested and over the next few months thousands of bugs will be identified by beta testers throughout the world. Microsoft have not announced an official product release date, but it is expected to ship towards the end of November.

The development of ODBC

generic interface and therefore printer drivers had to be incorporated within each individual application.

ODBC works by routing function calls to a driver created for the destination database. When an application makes a call to ODBC for its database services, a "driver manager" establishes which driver to use for the data source involved. It then loads the correct driver and routes the call to it using the interface provided by the server. The driver can then translate the SQL call into syntax which the server can understand and send the query to. Report results are sent back to the user and the connection to the data source is terminated.

The services which ODBC provides are completely hidden from the developer. ODBC processes requests transparently so that developers don't have to understand the details of particular databases. When you print out a document from Windows, the same principles apply — there is no need for any knowledge of a printer's internal language.

This is a theoretical description of how ODBC works. In practice, the process is not quite as smooth as that described here. ODBC has been heavily criticised for not really being a standard, in addition to its poor performance. The truth is that ODBC is not just one standard but many. Applications using ODBC can be written to varying conformance levels which interpret the specification in slightly different ways. If things go wrong, ODBC interfaces are notoriously difficult to debug and developers complain constantly of poor performance and lack of functionality.



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Performance Results

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How we did the tests



In current software releases, most programmer effort is devoted to ease of use. Windows databases are no exception, but they remain as one of the few classes of program where performance remains even more important. We measured the performance of all the products using VNU Labs database tests; these stress the import, database engine, display and reporting capabilities of each product.

With all software testing, the most serious pitfalls concern machine configuration. We tested on an IBM Personal Computer model 350 — a Pentium 90 machine with 16 Mb of RAM and fast IDE hard disk. This ran MS DOS version 6.22 and Windows for Workgroups V3.11, configured as follows: 20Mb permanent swapfile, 32-bit file and disk access enabled, 128kb SmartDrive cache when running Windows, and 4096Kb of Windows disk cache. These set-

tings were inherited from the standard DOS and Windows installation routines. Each package was installed onto a "fresh" copy of Windows, to avoid earlier versions of DLLs and .INI file entries from affecting the results.

Although the tests time events like application startup time, the core of the testing is built on Indexed and non-indexed searching acting over a table thirteen columns wide and containing 10,000 rows. Four of the table's fields are indexed: these fields are searched using both single and multiple criteria. The second, more advanced Indexed search test combines multiple criteria across several fields. Despite the additional processing needed for complex queries, many databases take longer when building views to display the larger amount of data resulting from the less selective (simple) searches. Searching was tested using both the form-based query tools, and using

filtered views.

Reporting speed was tested using both a simple (column-based) layout derived from the test database, and also a grouped report based on a filtered view of the test database, with the Grouped information coming from a one-to-many relational join to a "sales" table. Times were recorded for three operations: building the report (including time spent processing the table join); previewing to the last page; and printing the report to a file using the Generic/Text Only Windows printer driver. The final test measures the time required to complete a block update of 1000 records.

Times for all the tests are weighted to reflect the commonest operations in typical database applications: the weightings are used to produce the overall figure — performance across all the tasks relative to DataEase for Windows.

Relational Integrity

The word "integrity" can apply to many different aspects of an RDBMS, but the two most important versions are *referential integrity* and *domain integrity*. The idea of integrity in a database refers to the consistency of all aspects of stored data. For a database to be truly relational, certain principles should be maintained. The definitive set of rules for this were laid down, in the seventies, at IBM's research laboratories by Dr. Tedd Codd.

Altogether there are twelve of these rules and, in theory, each must be fulfilled in order for an RDBMS to qualify as a fully relational system. In practice, none of the databases included in this round-up would qualify as "relational" in Codd's rigorous sense but there are certain basic integrity functions which should be provided in a database management system.

Domain integrity refers to the accuracy of data in individual fields. Most RDBMS systems should allow you to place conditions on the specific format of data entered in individual fields. Telephone numbers, postcodes, and National Insurance numbers, for example, each have their own formats and a database system which has domain integrity will allow you to enforce that the values

entered in these fields comply with the pre-defined format.

Referential integrity is to do with the co-ordination of data between two or more tables. The tables in a database are linked together by way of a key field which is specified in the file definition. When a large number of tables have been created and linked together the relationships between them can become complex, but there are generally two types of link which can be made: a one-to-one link, or one-to-many link. The term referential integrity refers to the way that data is synchronised in a one-to-many relationship.

In a typical company database, information on departments will be put into one table while information on employees will be put into another. There are many employees to one department. But suppose that, for some reason, a department becomes defunct. The obvious thing to do would be to delete the department from the database, but this would leave lots of redundant or "orphaned" employees floating around in the employee file — a database which supports referential integrity will ensure that links between groups of records in different files maintain consistency.

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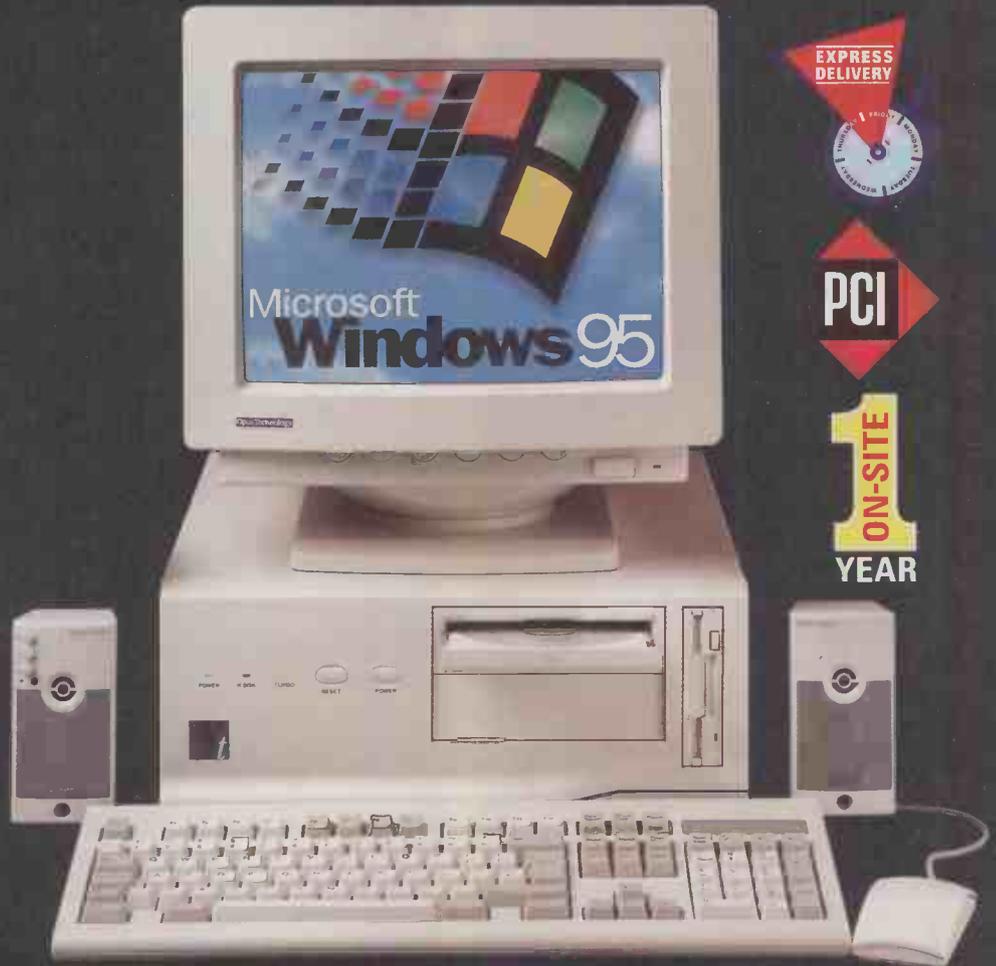
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- 2 2 6 **net.answers** — General points and problems about the Internet, cleared up by Nigel Whitfield.
- 2 3 0 **net.news** — A French hacker cracks the encryption in the European version of Netscape. This and other Net news, by Joanne Evans. Plus, our monthly netsurf round-up.
- 2 3 5 **net.newbies** — A shortened and simplified explanation of how to get online. A new, updated newbies column appears next month.

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PCW Futures

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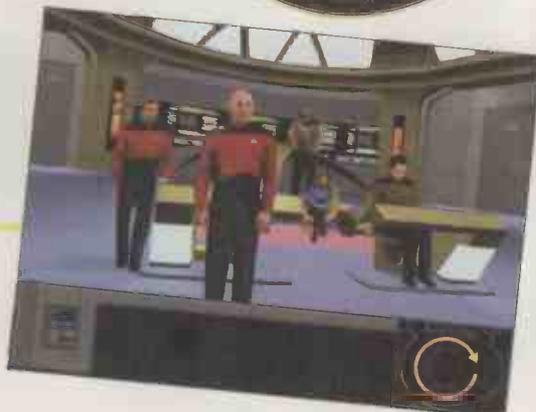


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How secure are you?



Who's watching you? And who's watching what you're watching? As far as security on the Internet is concerned, the basic issues facing home and business users are not very different. Geof Wheelwright reports.

While the whole issue of fraud and security may not have much impact on your day-to-day use of the Internet right now, rest assured it will in the future, especially where corporate access to the Internet is concerned.

US-based Internet Security Corporation president Rich Kosinski says, for example, that for corporations that want strong Internet security, it must first be completely "transparent" to the average user. In other words, there is no "host" computer that the user has to make an effort to log on to before getting access to Internet services. He suggests that Internet links to corporate networks should provide transparent access to all Internet services, including Internet mail and the World Wide Web.

Authentication and encryption

There are a couple of technologies used for accomplishing the all-important task of authentication. Both use a "onetime" password system for security (meaning that you have to know a password that is only used once in order to get onto the system). A complex combination of hardware and software is employed by some companies to produce this kind of authentication. It employs what is called a "time synchronous methodology" — the user is given some form of "hardware token" (such as a smart card) which has a clock on it that produces a onetime password every 30 seconds.

In order to gain entry to the system, a user would first have to be in physical possession of one of these smart-card tokens, and be able to access its ever-changing password generation system by entering the appropriate personal identification number (PIN). Having done so, the smart card would then display (on its built-in LCD screen) the password applying to that 30-second time period.

The advantages offered by this kind of corporate Internet security system are many and varied. Firstly, a user needs to

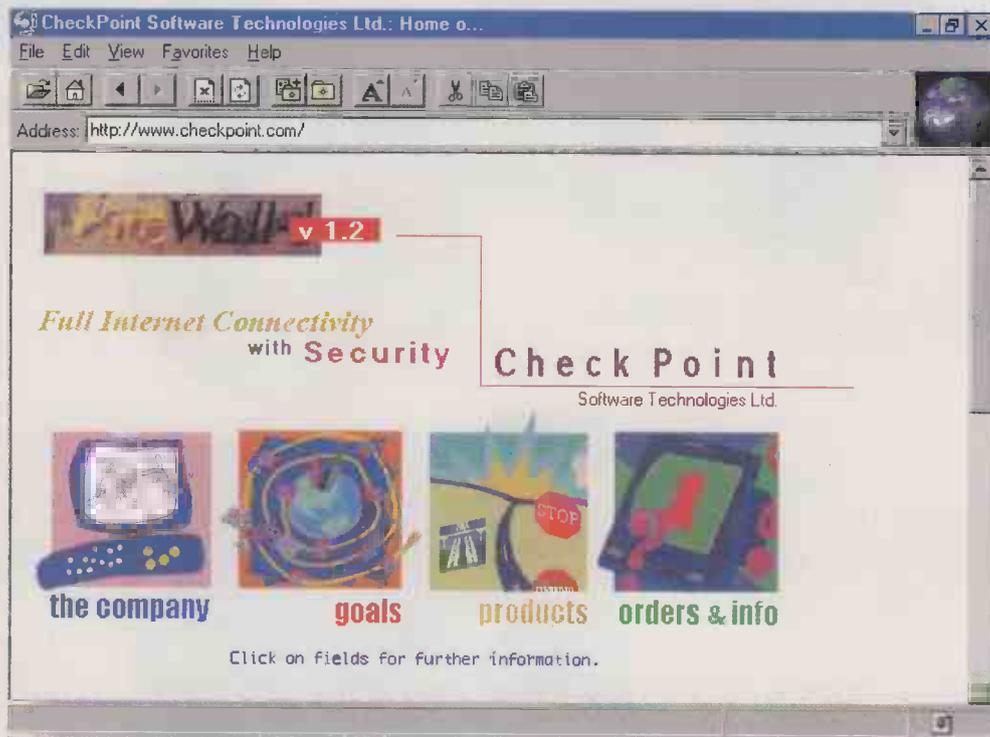
have a piece of individual hardware to get onto the system. Secondly, even if a hacker were able to "sniff" out the password generated for you by the hardware token, it would do them little good because it would only have an active "life" of 30 seconds.

Kosinski says that many corporations are now starting to use these technologies to provide them with Internet access security that goes beyond basic "firewalls". "Most people have to give access to specific groups of users via the Internet and the firewall provides access control but not authentication," says Kosinski. "It's an open hole through the firewall when they allow access

through the Internet."

He adds that in addition to the issues of authentication and "holes" in the firewall, there is also a need to "encrypt" sensitive data as it moves out across the Internet. Such encryption usually requires data to be "scrambled" when it is sent and "unscrambled" at the receiving end using a software "key". This is particularly attractive to financial companies who want to give their customers the ability to carry out transactions over the Internet. But Kosinski suggests that, so far, many of the firms developing systems for electronic commerce just haven't gone far enough. "Often they only want to encrypt

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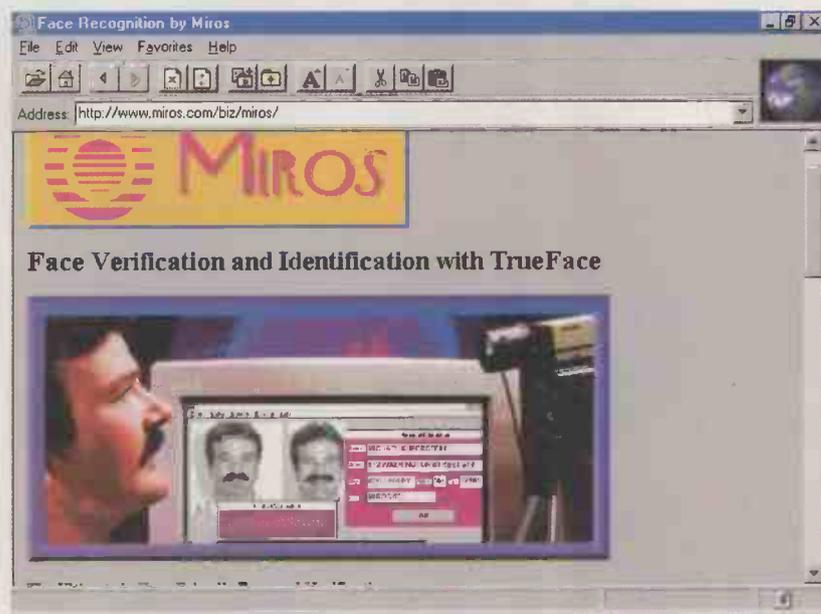


credit card numbers, and that is hardly useful. It leaves you with the same level of risk as giving your number over the telephone," he says.

The most important use, Kosinski argues, will be for organisations wanting to give customers secure access to specific applications. He suggests that encryption is the only way to do this. One example is onetime "pad encryption". For every message sent a new software key is generated with code the same length as the message itself. Someone who tries to break it can never know whether the key is broken. And even if, by chance, they were able to break it, on the next transaction there would be a new key of a different length. "And we are talking about keys of 10Kb or more in size: the larger the key, the higher the level of security," Kosinski adds.

An open forum

California-based Cylink Corporation vice-president David Morris suggests that the basic Internet security issues facing home and



The future today? Miros offers a system which compares your face captured by a video camera with one in a database. If it doesn't recognise you, you don't get in

business users are not very different. "If you look at the Internet and the problems that both parties, the individual user and the corporate user, experience, they are one and the same: the fact that information gets routed through all these fast, powerful computers along the way [when an Internet mail message is sent from one place to another]," he says. "It's kind of like me stand-

ing up at a town hall meeting and shouting across the room at someone and expecting that the other 200 people in the room aren't going to hear it. It's easy to forget that it's an open forum."

Cylink wants to build awareness of the security issue, and is developing products and technologies that Morris claims will change the way people use the Internet. Morris says the Cylink

solution uses what are known as "digital certificates" and signatures. This technology is used to authenticate a user's identity, and uses "public key cryptography" to encrypt the information sent by that user. The latter uses the Diffie-Hellman method of cryptography (named for the two Stanford University professors who developed it).

"This system does not involve

Security Tips

Tips on Internet security abound all over the Internet. If you have an interest in this area, spend a little time using your favourite Web searching tools to find material such as this little gem we came across from the San Francisco-based Computer Security Institute (CSI):

"Despite some notorious well-publicised non-events — like the Michelangelo virus scare predicted for this date in 1992 — computer viruses can be a significant but manageable threat to your systems. Your systems and your data will continue to be vulnerable until you establish proactive preventive and corrective processes for the overall security of your information. Computer Security Institute offers the

following tips:

Password security: In computing environments that allow reusable passwords, ensure that strong passwords are chosen. Insist that passwords contain an alphanumeric mix and are at least six to eight characters long. If appropriate, use third-party software to enforce password composition rules and forced password changes. Alternately, consider implementing onetime passwords or tokens for authentication and authorisation.

Anti-virus defense: Install anti-virus software at both the network server and workstation levels. Keep up with current versions and do not allow users to disable software.

Network communications: Use encryption to protect sen-

sitive data sent over networks.

Remote access: For secure dial-in access, implement unique user IDs and passwords; and limit access times and duration of connections. Consider token cards and dialback modems.

Internet access: Do not allow Internet access without ensuring that firewalls and other integral components of information security are in place.

Mobile computers: To secure mobile computers, install access control programs and physical security devices. Consider encryption and token cards.

Buying smart: Before purchase, evaluate products for security features. After purchase, disable default accounts and change default

passwords. Turn on all appropriate audit and security features.

Audit: Conduct regular and frequent reviews of security logs and audit trails. Institute an incident report procedure.

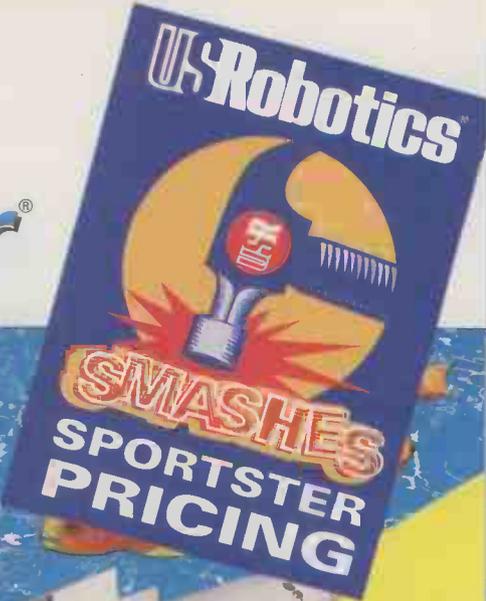
Identify risks: Conduct a thorough risk analysis of your computing environment. If you don't have the expertise in-house, look outside.

Enforce policies: Develop comprehensive policies and procedures for all aspects of information security and make sure they are enforced.

Educate your users: Raise the security awareness of your users with an enterprise-wide educational campaign. User-orientated computer security newsletters, videos and posters can be effective tools."

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any electronic key or physical keying technology," enthuses Morris. "It is buried under the covers — and can be buried in the applications. It can also be buried in a browser, in a communications package, in any one of a host's applications or as an application that works across other applications and called when needed." Similar systems are already being used for electronic banking and for people who want to make secure purchases electronically.

Face-to-face security

Another US company has come up with an even more inventive, if slightly offbeat, way of providing Internet security. Massachusetts-based Miros recently announced the development of what it calls the "TrueFace verifier and identifier". This device uses stored video images of users' faces and a video camera linked to the user's terminal, to provide secure access.

Miros calls it the "ultimate in user-friendly security" that is designed to prevent fraud for all kinds of businesses. "Using

standard video and computer hardware, TrueFace compares a live face image with a previously recorded face image to determine if they come from the same person."

Developed by Dr Michael Kuperstein and Dr James Kottas at Miros, the company claims that TrueFace can accommodate the wide variability of how a person's face can look at different times, yet can also easily detect impostors. "TrueFace delivers hands-free and non-intrusive access, making it more convenient and more socially acceptable than other biometric methods like fingerprint or hand-geometry readers," boasts Miros. "Enrolment takes about one second (not including time for entering ID information) and verification takes about one second, faster than any other biometric method. When searching a database of faces, the TrueFace Identifier can compare 200 faces per second on a Pentium PC."

The company explains that for the enrolment process, a person's picture and ID information are stored either onto a storage

medium on a plastic card, or on a computer chip in a smart card or a database. To reduce storage requirements, the person's face is automatically located, clipped out and compressed.

To use TrueFace a user could either enter a card into a card reader, key into a keyboard, step on a floor-pad switch, or step near a proximity sensor. Then a video camera would snap a picture of the person, verify it against their stored picture on the card or database, and allow or reject access.

For the matching process, the verifier computes the level of match or confidence and returns a number in the range 0 to 10. This level of confidence is compared against a preset threshold. If the confidence is above the threshold, access is allowed; otherwise, access is denied.

Changing looks

Miros explains on its Web pages that TrueFace "is based on neural network technology which mimics how our brain works" and adds that the technology "allows the product to accommodate the

following variations of a person's face image and still allow valid access: different head orientations, lighting conditions, makeup, suntan, clear glasses, earrings, hair styles, facial expressions, ageing and new facial hair".

TrueFace requirements

Miros says that TrueFace runs today on PCs with Windows 3.1x, 95, NT, and on Sun Solaris workstations, with Apple Macintosh, Silicon Graphics and other platforms coming soon. The software engine is in the form of a PC Dynamic Linked Library (DLL) or a Unix library. Since the library does not depend on any peripheral device, Miros says it can work with any off-the-shelf video camera, scanner and frame grabber as well as with any smart-card reader or database. It can also be run across computer networks, both local and remote. Custom applications and full solutions are built around the TrueFace engine. The recommended hardware is a Pentium PC or Sun Sparc with at least 12Mb of RAM.

Secure Sockets

Security is one of the key issues facing consumer use of the World Wide Web for making online purchases. Finding ways to address this issue is also vital for the future success of Netscape Communications' strategy for its World Wide Web tools.

Earlier this year, Netscape announced that a number of industry-leading companies and organisations are supporting the Secure Sockets Layer (SSL) protocol supported by Netscape for Internet security. According to a Netscape statement Apple Computer, Bank of America, ConnectSoft, Delphi Internet Services Corporation,

Digital Equipment Corporation, First Data Corporation, IBM, MarketNet, MasterCard International, MCI Communications Corp, Microsoft, Novell, Open Market, Prodigy, Silicon Graphics., StarNine, Sun Microsystems, Visa International, and Wells Fargo are all among companies backing SSL.

So what is SSL? Netscape calls it "an open protocol for securing data communications across computer networks" and claims that "the broad support for this protocol will promote interoperability between products from many organisations and will speed the growth of electronic commerce on the Internet and private TCP/IP networks. Today

more than three million people are already using SSL-enabled products, which have been available since December 1994".

Incorporating RSA Data Security technology, Netscape says SSL provides a straightforward method for adding strong security to existing applications and network infrastructures. The company further pledges that SSL is application protocol-independent and provides encryption. This creates a secured channel to prevent others from tapping into the network; authentication, which uses certificates and digital signatures to verify the identity of parties in information exchanges and transactions; and message integrity,

which ensures that messages cannot be altered en route.

"SSL provides the essential security mechanisms for commercial transactions on the Internet," says Taher Elgamal (in the Netscape announcement). Elgamal is author of the Elgamal digital signature algorithm, the basis for the Digital Signature Standard (DSS) for network security, and former director of engineering at RSA Data Security. "Applicable to the World Wide Web, existing TCP/IP protocols and future TCP/IP applications, SSL provides a robust, efficient and deployable solution to meet the security needs of individuals and organisations on the Internet today," he adds.



net.answers

Nigel Whitfield guides you through the Internet.

Q. My provider says that they have "virtual PoPs". What are these?

A. A PoP is a Point of Presence. For people using a dialup Internet connection, that's the telephone number you dial to access the service. Virtual PoPs are used by a number of providers. Unlike the traditional sort of PoP (where there's a computer that you connect to at the end of the phone number) a Virtual PoP is simply a telephone number. When you dial it, your calls will be automatically connected to a computer, possibly in a completely different part of the country, by the telephone.

Virtual PoPs are really a way of providing Internet access via a local telephone call. This means there's no need for computers dotted around the company, making it much easier for Internet providers to look after all their equipment.

Q. I'd like to connect my whole office to the Internet. How do I do it?

A. There are a number of different ways of connecting your office; it really depends on what sort of computer systems you have already, how they're networked and what you mean by "connected to the Internet."

The simplest sort of connection is an email-only one. If you already have an internal office email system you can buy a gateway – they're available for just about every popular email

system, including Microsoft Mail, QuickMail, cc:Mail and Novell's MHS. Depending on which system you use, you may need to dedicate a computer as an Internet gateway.

Your next step is to find a service provider who can manage the connection for you. Companies like CompuServe and ElectricMail can offer you a package connecting your network to the rest of the world, or you can pick an ordinary Internet service provider and do the configuration work yourself.

For complete access to the Internet, including the ability to access the World Wide Web from any machine or use programs like Telnet and FTP, you'll have to look at more complicated solutions, which almost all involve running

TCP/IP on your network in addition to the other networks you use.

If all your computers already run Windows for Workgroups or Windows 95, you can add TCP/IP to your network very easily (you'll need to download the WFWT32.EXE file from Microsoft's ftp server – ftp.microsoft.com – if you're using Workgroups. Look in the directory peropsys/windows/public/tcpip for more information). For a Macintosh you can install MacTCP, which comes included with System 7.5.

Once you have TCP/IP running on your network, you'll need to provide a gateway system that's connected to an Internet provider. You can use a free operating system like Linux (see *PCW, Hands On 32-Bit passim*) or a commercial system like SCO OpenServer 5, to route TCP/IP information to and

Q. I want to connect my computer to the Internet. What sort of modem do I need?

A. Just about any modem will do, but faster modems will mean that you'll spend less time on the phone. If you don't anticipate using the Internet for more than just sending and receiving mail, look for a modem that supports V.32bis; which means it can send about 1,400 characters (letters and numbers) down your phone line every second.

If you want to use the Internet a lot, a V.34 modem will work twice as fast, almost halving your phone bill, and is almost certainly worth the extra cash. Before you buy one, check with your chosen Internet provider to make sure that they have V.34 modems as well – you'll be wasting your money if they don't. You should also ask if they recommend any particular brands; V.34 is a very new standard for modems and sometimes different brands have difficulty talking to each other, so it's a good idea to check first. Often, the people providing your Internet connection will be able to sell you a modem as well.

from the rest of the network via a dedicated server PC, which can also act as a post office machine, holding the mail for the office.

You can also install a dedicated router, which is a device connecting your network to the Internet. Although they're usually used with a fixed link, you can use a router with a dialup Internet connection too. Remember, even if you do install a router, you'll probably need a machine to act as post office for all your PCs as well.

If the thought of installing and configuring an Internet gateway seems scary, it's now possible to buy dedicated boxes that sit on your network to provide an Internet connection. Sun Microsystems and Performance Technologies both supply this type of equipment, which is really an ordinary computer in a small box, with much of the necessary software pre-configured.

Ultimately, there are more ways of connecting your office to the Internet than you can shake a stick at. Some of the issues will be covered in next month's net.answers, but whichever type of solution you opt for, the rule is to consult a couple of Internet access providers first for advice. Making a mistake right at the beginning could cost you later on.

Q. My Internet provider says that I shouldn't use telephone programs such as iPhone, because they "hog bandwidth". What do they mean, and why is this a problem?

A. Although Internet telephone programs may seem like a great way of saving money on phone bills – especially if you have a free connection via a cable company – the current versions of many programs like this don't use the Internet in a very



responsible way.

The main protocol used on the Internet is called TCP/IP. TCP stands for Transmission Control Protocol, and it includes mechanisms designed to help prevent one connection from taking up all the capacity on a link, allowing you to do several things at a time via the TCP/IP connection from your computer to an Internet provider.

If a particular link on the Internet is used heavily, the performance for all the users passing data through it will suffer. You might already experience this if, for example, your Internet access is shared with a number of other people via a 64kbit link. Once more than a few users start transferring large files over the link it can become very slow, in spite of the regulation built in to TCP.

Many of the real-time chat programs like IPhone don't use TCP to transfer information, they use the User Datagram Protocol (UDP), which doesn't include a means for regulating the amount of traffic sent.

As a result, when you have a conversation with someone via a phone program – especially if they're on a fast link – it's possible for the connections between you and the other person to become "clogged up" with information sent via UDP.

The end result is that the performance of the connections for other users suffers when you use programs like these, so many Internet providers have

Internet Phone and programs like it may seem like a great way to save money, but they don't make efficient use of the Internet

banned their use.

If you're not sure whether or not you're allowed to use such programs, the answer is proba-

Q. I want to set up a TCP/IP network. Can I pick any address when I configure the computers?

A. No. Each computer on the Internet has to have a unique address so information can be routed correctly from anywhere in the world. If you just pick a random set of numbers, you wouldn't be able to connect to the site that has the right to use that number.

If you want unique numbers, you can get them by applying to your Internet service provider who will allocate you a range. You can even be allocated numbers if you don't intend to connect to the Internet at the time.

However, there are three ranges of numbers that have been set aside specifically for use on private networks and will never be allocated to people properly connected to the Internet. You can safely use these numbers without any problems, but if you connect to the Internet, you'll have to re-configure your computers with unique numbers or run firewall software to hide them from the rest of the world.

The ranges are: 10.0.0.0 to 10.255.255.255, 172.16.0.0 to 172.31.255.255, and 192.168.0.0 to 192.168.255.255.

You can find out more details about why they've been allocated and the reasons for using them by reading Request For Comments (RFC) 1597, available on the Internet as [ftp.demon.co.uk:/pub/doc/rfc/rfc1597.txt](ftp:demon.co.uk:/pub/doc/rfc/rfc1597.txt)

bly no. All the providers using the PIPEX network, for instance, ban live audio or video traffic. In the future, as the Internet becomes faster and newer versions of telephone programs are developed, it might be possible to use them without causing annoyance to other people; for now, if you're tempted to save money on long distance phone calls by using them, think how much it could cost you when your next large file transfer is slowed down by someone else using IPhone.

Q. How can I find the name and address of someone on the Internet?

A. The simple answer is that it's very hard, because there's no central directory of Internet users. There are books, like the Internet White Pages, which

have listings of addresses, which have been collected from postings made to newsgroups, but they're often out of date.

There are a few different ways of finding out if someone is using the Internet, but none of them are reliable and a lot rely on you knowing roughly where someone may have an account.

One of the most useful services is provided by the mail server at Massachusetts Institute of Technology which will give you a list of addresses based on the names of people who have posted to Usenet newsgroups. If someone posts to a small newsgroup restricted to their Internet provider, or to a group that doesn't reach MIT or never uses news at all, it won't help. But you have a good chance of tracking someone down this way.

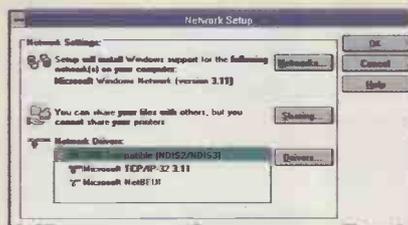
To use the server, send a message with no subject to mail-server@rtfm.mit.edu. To find all the addresses that I've used to post to a newsgroup, you'd include a line that says: `send usenet-addresses/whitfield`

Swap the "whitfield" for any other name (it must be a whole word, not just part of one – "whit" wouldn't get you my address) and you'll receive a message with a whole list of likely addresses and the date that they last posted to a Usenet newsgroup; this is part of the list that you'll receive if you search for my name:

```
nigelw@ibmpcug.co.uk (Nigel Whitfield) (Jun 1 95)
nigel@stonewall.demon.co.uk (Nigel Whitfield) (May 1 95)
Nigel Whitfield
<nigel@stonewall.demon.co.uk> (May 9 95)
```

Another useful tool is Netfind. Due to the growth in dial-up sites, it's not as useful as it used to be, as it uses the finger program, and can't find out information from computers that aren't connected when you make your search.

To use Netfind, telnet to



Microsoft's free TCP/IP add-on for Windows for Workgroups can be used with many other network protocols



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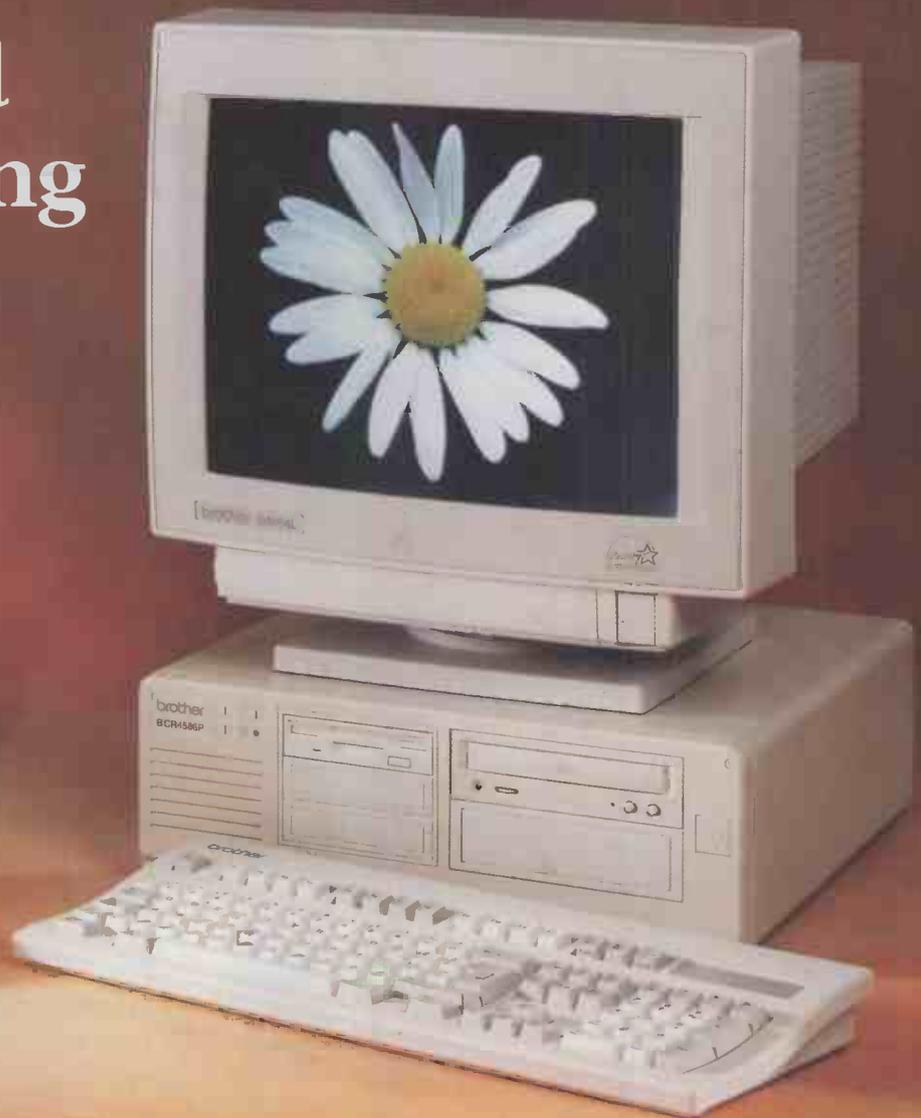
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12 MONTHS ON-SITE WARRANTY
EXTENDED WARRANTIES AVAILABLE

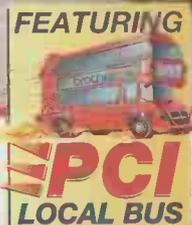
Including 6 Microsoft Titles - worth over **£400** (R.R.P.)



Model shown: Graduate MultiMedia.
Boxes shown for illustration purposes only.
Speakers supplied will be superior Deluxe Stereo Speakers

Enter a whole new dimension in creative computing with a MultiMedia PC. Integrate text, graphics, sound and live action on your PC to bring education, leisure and business software to life. With the new Microsoft Family CD Pack the Brother range

offers excellent value for the beginner through to the professional. And all hardware and software is installed, tested and ready to run straight from the box.



Tutor Multimedia

- 486DX2 50MHz CPU
- 128K Cache
- 340Mb Hard Disk
- 4Mb RAM exp. to 128Mb
- 14" SVGA Colour Monitor
- 1Mb VESA Graphics Accelerator
- Dual Speed CD-ROM
- SoundBlaster 16-bit Stereo Soundcard
- Stereo Speakers
- Microsoft Family CD Pack
- 2 x VL/5 x ISA expansion slots
- 3.5" 1.44Mb Floppy Disk
- 2 Serial, 1 Parallel, 1 Games Port
- 102 key enhanced Keyboard & Mouse
- Windows for Workgroups 3.11 and MS-DOS 6.2
- 12 months on-site warranty

Graduate Multimedia

- 486DX2 66MHz CPU
- 128K Cache
- 540Mb 11ms IDE Hard Drive with PCI Enhanced IDE Interface
- 4Mb RAM exp. to 128Mb
- 14" SVGA Low Radiation Non-Interlaced Colour Monitor (0.28)
- PCI 64-bit Graphics Accelerator
- Dual Speed CD-ROM
- SoundBlaster 16-bit Stereo Soundcard
- Deluxe Stereo Speakers
- Microsoft Family CD Pack
- 3 x PCI/4 x ISA expansion slots
- 3.5" 1.44Mb Floppy Disk
- 2 Serial, 1 Parallel, 1 Games Port
- 102 key enhanced Keyboard & Mouse
- Windows '95 or Windows for Workgroups 3.11 and MS-DOS 6.2
- 12 months on-site warranty



Professor Multimedia

- Intel Pentium 75MHz CPU
- 256K Cache
- 540Mb 11ms IDE Hard Drive with PCI Enhanced IDE Interface
- 8Mb RAM exp. to 128Mb
- 14" SVGA Low Radiation Non-Interlaced Colour Monitor (0.28)
- PCI 64-bit Graphics Accelerator
- Dual Speed CD-ROM
- SoundBlaster 16-bit Stereo Soundcard
- Deluxe Stereo Speakers
- Microsoft Family CD Pack
- 4 x PCI/4 x ISA expansion slots
- 3.5" 1.44Mb Floppy Disk
- 2 Serial, 1 Parallel, 1 Games Port
- 102 key enhanced Keyboard & Mouse
- Windows '95 or Windows for Workgroups 3.11 and MS-DOS 6.2
- 12 months on-site warranty



£839

PERSONAL CREDIT £35.64 inc. VAT per month APR 26.8%

£949

PERSONAL CREDIT £40.20 inc. VAT per month APR 26.8%

• DX2-80 £969 • DX4-100 £989

£1139

PERSONAL CREDIT £48.08 inc. VAT per month APR 26.8%

• P90 £1219 • P100 £1289
• P120 £1369 • P133 £1569

Worth over **£400** (RRP)

Microsoft Family CD Pack

FREE with these Brother MultiMedia Systems

- MS Encarta 1995 CD Encyclopaedia
- MS Works for Windows CD Integrated Package
- MS Dangerous Creatures CD Wildlife
- MS Money CD Home Finances
- MS MultiMedia Golf CD Entertainment
- MS Scenes (3.5" disks) Backgrounds

Documentation included on CD. Works and Money supplied on 1 CD

EnergyStar compliant with advanced Power Saving facilities

MULTIMEDIA OPTIONS & UPGRADES

Monitor Upgrades	
14" SVGA to 14" SVGA LR 0.28 (Tutor MultiMedia only)	£40
14" SVGA LR to 15" SVGA LR	£94
14" SVGA LR to 17" SVGA LR	£394
Joystick	£12
Fax Modem 14,400	£90
Fax Modem 28,800	£179
4Mb RAM to 8Mb	£109
Upgrade Case to 5000 Series Mini Tower Case	£20
Upgrade Case to 8000 Series Full Tower Case	£50

To the best of our knowledge the specifications and prices shown are correct at the time of press. Subject to change without notice. E. & O.E.

ALL PRICES EXCLUDE VAT

brother

The Brother Tutor Series

Tutor DX

- 486DX2 66MHz processor
- 340Mb hard disk
- 4Mb RAM exp. to 128Mb
- 14" SVGA colour monitor
- 1Mb VESA local bus graphics accel.
- 3.5" 1.44Mb floppy disk
- 200 Watt PSU
- 2 serial, 1 parallel ports
- 2 VESA local bus slots
- 6 x 16 bit, 1 x 8 bit expansion slots
- Keyboard and mouse
- Windows '95 or Windows for Workgroups 3.11 & MS-DOS 6.2
- Microsoft Works v3 for Windows
- 12 months on-site warranty

£679

PERSONAL CREDIT £29.00 inc VAT per month APR 26.8%



Lotus Tutor DX

- 486DX2 66MHz processor
- 340Mb hard disk
- 4Mb RAM exp. to 128Mb
- 14" SVGA colour monitor
- 1Mb VESA local bus graphics accel.
- 3.5" 1.44Mb floppy disk
- 200 Watt PSU
- 2 serial, 1 parallel ports
- 2 VESA local bus slots
- 6 x 16 bit, 1 x 8 bit expansion slots
- Keyboard and mouse
- Windows '95 or Windows for Workgroups 3.11 & MS-DOS 6.2
- Lotus Bundle 1
- 12 months on-site warranty

£689

PERSONAL CREDIT £29.41 inc VAT per month APR 26.8%

- Lotus Bundle 1 inc:
- Lotus 123 v5 Spreadsheet
 - Lotus Ami Pro 3.1 WP
 - Lotus Organizer 1.1
 - Lotus SmartCam
 - Lotus SmartPics 1.0 Clipart (disks & manuals available at extra cost)



Some recent Brother press quotes

"An Absolute Bargain"
PERSONAL COMPUTER WORLD

"Very good price for a system of this quality (Brother Pentium P60)"
COMPUTER SHOPPER

"For the best home bargain the Brother MultiMedia Master pipped the XXX on raw price performance"
WINDOWS USER

"This is a mother of a Brother especially at the price...Overall performance proved handsome"
COMPUTER BUYER

BROTHER PERSONAL CREDIT

Our monthly payment scheme is available to private purchasers only, subject to status. Example: PC Costing £899 + £20 (delivery) + 17.5% VAT = £1079.82 total cash price. 10% deposit of £107.98 followed by 36 equal monthly payments of £38.13 (APR 26.8%). Written quotation on request. Additional payment protection Insurance available.
Kyodai Electronics Ltd is a licensed credit broker.

BUSINESS LEASING Inc. 3 Year On-Site Warranty

3 Year Rental is offered to businesses trading 1 year or more (subject to status). Includes 3 Year On-site Warranty. Call for a competitive quotation on most products. Special leasing facilities also available for Education establishments.



CREDIT CARD HOTLINE

01279 416888

Fax: 01279 418130

2 Whitehall Estate, Flex Meadow, Harlow, Essex CM19 5TJ

Visit our Showroom Mon-Fri 9am-5pm Sat 9am-2.30pm

DELIVERY: Add £20+VAT per system for delivery in UK Mainland. Delivery will normally be effected within 5 working days. Please allow 5 days for cheque clearance. Carriage will be charged for items returned within the 30 day guarantee period.
ALL PRICES EXCLUDE VAT

Kyodai
A BROTHER COMPANY

The Brother Graduate Series

Graduate

- 486DX2 66MHz processor
- 540Mb 11ms IDE Hard Drive with PCI Enhanced IDE Interface
- 128K Cache
- 8Mb RAM exp. to 128Mb
- 14" SVGA low radiation MPRII non-interlaced colour monitor (0.28 dot pitch)
- PCI 64-bit graphics accelerator
- 3.5" 1.44Mb floppy disk
- 2 serial, 1 parallel ports
- 3 x PCI/4 x ISA expansion slots
- Keyboard and mouse
- Microsoft Works v3 for Windows
- Windows '95 or Windows for Workgroups 3.11 & MS-DOS 6.2
- 12 months on-site warranty

£899

PERSONAL CREDIT £38.13 inc VAT per month APR 26.8%

- DX2-80MHz £919
- DX4-100MHz £939

Brother Office Graduate



Microsoft Office v4.2 inc: MS Office Manager, MS Word v6 for Windows, MS Excel v5 for Windows, MS PowerPoint v4 for Windows, MS Mail Licence (Disks & Manuals included. Boxes shown for illustration only)

Office Graduate

- 486DX2 66MHz processor
- 540Mb 11ms IDE Hard Drive with PCI Enhanced IDE Interface
- 128K Cache
- 8Mb RAM exp. to 128Mb
- 14" SVGA low radiation MPRII non-interlaced colour monitor (0.28 dot pitch)
- PCI 64-bit graphics accelerator
- 3.5" 1.44Mb floppy disk
- 2 serial, 1 parallel ports
- 3 x PCI/4 x ISA expansion slots
- Keyboard and mouse
- Microsoft Office 4.2 for Windows
- Windows '95 or Windows for Workgroups 3.11 & MS-DOS 6.2
- 12 months on-site warranty

£1079

PERSONAL CREDIT £45.59 inc VAT per month APR 26.8%

- DX2-80MHz £1099
- DX4-100MHz £1119

The Brother Professor Series

Professor Series include:

- Intel Pentium processor for lightning fast 64-bit power
- PCI bus optimises data speed
- 540Mb 11ms IDE Hard Drive with PCI Enhanced IDE Interface
- 256K Cache exp. to 1Mb
- 8Mb RAM exp. to 128Mb
- 14" SVGA low radiation MPRII, non-interlaced colour monitor (0.28 dp), EPA EnergyStar
- PCI 64-bit graphics accelerator
- 3.5" 1.44Mb floppy disk
- 2 serial/1parallel/1games ports
- 4 x PCI, 4 x ISA (1shared) slots
- Windows '95 or Windows for Workgroups 3.11 and MS-DOS 6.2
- Microsoft compatible mouse
- Desktop case and keyboard
- 12 months on-site warranty



Pentium is a trademark of Intel Corporation



Shown here with 17" monitor, Mini Tower case and MultiMedia Upgrade Pack

Options & Upgrades

Monitor Upgrades	
14" LR NI to 15" LR NI	£94
14" LR NI to 17" LR NI	£394
Fax Modem 14,400	£90
Fax Modem 28,800	£179
8Mb RAM to 16Mb	£218
Quadspeed CD ROM	£119
MultiMedia Upgrade	
CD-ROM, Soundcard, Speakers, Microsoft Family CD's	£169
Upgrade Case to 5000 Series Mini Tower Case	£20
Upgrade Case to 8000 Series Full Tower Case	£50

P75 with 75MHz Pentium® Processor

3 Year Business Rental: £9.26 per week, inc. on-site warranty, ex. VAT & delivery

£999

P90 with 90MHz Pentium® Processor

3 Year Business Rental: £9.90 per week, inc. on-site warranty, ex. VAT & delivery

£1079

P100 with 100MHz Pentium® Processor

3 Year Business Rental: £10.46 per week, inc. on-site warranty, ex. VAT & delivery

£1149

P120 with 120MHz Pentium® Processor

3 Year Business Rental: £11.10 per week, inc. on-site warranty, ex. VAT & delivery

£1229

P133 with 133MHz Pentium® Processor

3 Year Business Rental: £12.91 per week, inc. on-site warranty, ex. VAT & delivery

£1429

New Brother Printers

brother



BROTHER HL-630 Laser Printer

- Superfast first page out
- Six pages per minute
- GDI mode for windows
- Built-in emulations for DOS printing
- Low cost per copy
- Network connectivity
- Microfine toner
- Straight paper path
- Auto emulation switching
- Economy print mode

only **£339**

BROTHER HL-631 Laser Printer

- All the features of the HL-630 with
- 1Mb RAM buffer memory

only **£359**

The NEW 600 Series Superfast Laser Printers

The amazing HL-600 series printers are completely different laser printers. The first superfast all-rounders on the market.

SUPERFAST FOR WINDOWS™

Offers outstanding performance within a Windows environment. GDI technology means first page out is virtually instant, and printing is continuous, with no pause between pages.

SUPER-VERSATILE TOO

But unlike the cheap and cheerful GDI-only printers currently available, the HL-600 printers are also at home outside Windows, because Brother has put the technology into these new printers that others have left out of theirs. They have PCL level 4 and multi-emulations, which mean they can print directly from DOS - and they're fully networkable too. So you get all the benefits of GDI without the limitations.

OUTSTANDINGLY HIGH QUALITY

Print quality is excellent, with possibly the lowest cost per copy on the market. And you only have to try one once to realise that they're built like every other Brother laser, with no compromise on quality.

OUTSTANDINGLY LOW PRICE

You'd expect a significant price premium for such a major advance in versatility and technology. But you'd be wrong - no laser printer has ever offered so much for so little.



BROTHER HL-660 Laser Printer

All the features of the HL-630 plus

- 600dpi resolution
- 2Mb RAM expandable to 8Mb
- HP LaserJet™ 4, Epson FX-850 and IBM Proprinter XL emulations

only **£479**

The new HL-1260 Ultimate Workgroup Laser Printer



- Genuine 600dpi with 1200dpi achieved with high resolution control & photoscale technology
- True 12ppm print speed
- 2Mb memory upgradeable to 26Mb
- BR-Script level 2 (PostScript®) and PCL5e emulations
- Duplex and Network options available
- 75 Scalable Fonts
- 500 sheet paper cassette plus 150 sheet multi tray
- Microfine Toner
- PCMCIA card slot and Font cartridge slot

only **£949**

Full Range of Printers from Brother, Canon, Epson and Hewlett-Packard available

To the best of our knowledge the specifications and prices shown are correct at the time of press. Subject to change without notice. E.&O.E.

ALL PRICES EXCLUDE VAT

brother

New Brother Pro'Book

SPECIAL OFFER
TFT Colour
 from £1499

Make Brother
 your *First Choice*

Express Delivery from
 Vast Stocks

Full 12 months
 on-site warranty

30 day no-quibble
 money back guarantee

MS-DOS, Windows and
 mouse pre-installed
 with original
 documentation

Buy with confidence
 from Kyodai - member
 of the \$1.3bn
 International Brother
 Group

BROTHER PERSONAL CREDIT

Our monthly payment scheme is available to private purchasers only, subject to status. Example: PC Costing £899 + £20 (delivery) + 17.5% VAT = £1079.82 total cash price. 10% deposit of £107.98 followed by 36 equal monthly payments of £38.13 (APR 26.8%). Written quotation on request. Additional payment protection insurance available.

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3 Year Rental is offered to businesses trading 1 year or more (subject to status). Includes 3 Year On-site Warranty. Call for a competitive quotation on most products. Special leasing facilities also available for Education establishments.



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DELIVERY: Add £20+VAT per system for delivery in UK Mainland. Delivery will normally be effected within 5 working days. Please allow 5 days for cheque clearance. Carriage will be charged for items returned within the 30 day guarantee period.

ALL PRICES EXCLUDE VAT



PCMCIA Card Slots
 Type II and Type III



Removable long-life battery
 with 5-level charge indicator



Removable Hard Disk for
 Infinite Storage & Security



LCD Status Panel



Sleek design and
 ergonomic palmrests

- Now with
- Built-in Sound
 - 420Mb Hard Disk
 - Free Carry Case



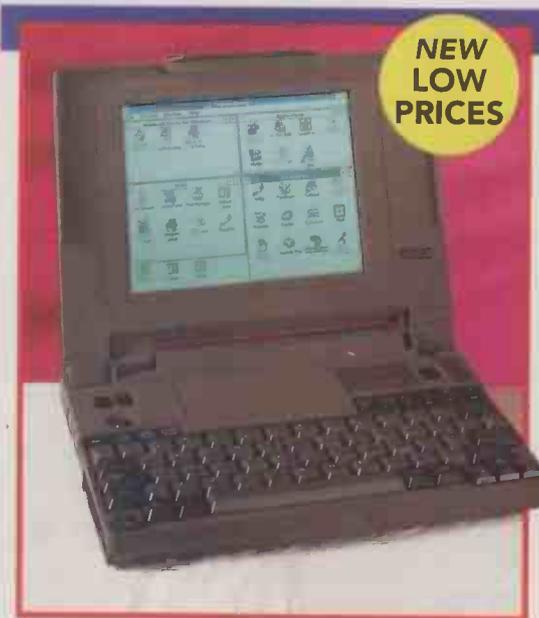
"A well designed portable, full of features that make it a pleasure to work with on the road... With its simple yet effective GlidePoint pointing device and its ergonomically positioned keyboard, the Brother ProBook is extremely comfortable in prolonged use... With its impressive battery life, extensive power management facilities, hot-swapping support and an attractive TFT screen, the ProBook is ideally suited for life on the road. It's also light and small enough to be carried around in comfort."



"A well designed portable... Of all the 256 Colour screens reviewed here, the Brother had the nicest TFT"



"The Brother performed well in our battery life tests - lasting an incredible four hours, which is, by far, the top score"



NEW LOW PRICES

The Brother Trekkers

The Brother Trekker is the perfect business travelling partner. It is one of the world's smallest and most lightweight portable computers yet packs the power of the Superfast 486SLC2 50MHz processor and is equipped with a formidable array of features you would expect to find on your desktop PC. Giving you the power to run your applications while visiting customers on-site, while on the move or to bring work home.

Trekker 486 Mono 250Mb

£749

PERSONAL CREDIT
 £33.98
 inc. VAT per month
 APR 26.8%

Trekker 486 Colour 250Mb

£899

PERSONAL CREDIT
 £41.44
 inc. VAT per month
 APR 26.8%

- 486SLC2 50MHz processor
- 4Mb RAM expandable to 8Mb
- 250Mb hard disk
- Built-in 3.5" 1.44Mb floppy disk drive
- Mono: 9.4" VGA LCD 64 greyscales
- Colour: 8.25" passive matrix colour LCD
- External colour (800 x 600) SVGA port
- Micro Trackball module with left/right buttons
- 80-key keyboard with embedded numeric keypad
- Suspend/Resume feature

- Ports: 1 serial, 1 parallel, 1 SVGA + external keyboard
- 2-4 hour fast charge NiCd battery
- Microsoft Works v3.0 integrated package includes Word Processing, Spreadsheet, Database, Communications
- Windows '95 or Windows for Workgroups 3.11 and MS-DOS 6.2
- 279mm x 210mm x 40mm
- Weight 2.3kg
- 12 Months on-site warranty

Kyodai
 A BROTHER COMPANY

The Professionals Choice

The New Brother Pro'Book 700 Series represents the next generation in portable computing. Now you can have more power in your notebook than you have on your desktop.

New to the 700 Series is built-in 16-bit stereo sound, the revolutionary GlidePoint™ trackpad that makes pointing and clicking a dream, plus a large 420Mb hard disk.

Convenient upgradability has arrived with the modular design of the Pro'Book. The hard disk is removable allowing infinite storage and security; the LCD displays are exchangeable, easy access to the motherboard allows simple upgrades of memory, even the processor chip is upgradable.

In addition, the 3.3V technology design enhances the efficiency of the removable battery, which features a 5-level remaining capacity display.



The revolutionary new GlidePoint® makes pointing and clicking simpler than ever

To enhance the Pro'Book, PCMCIA slots give access to versatile applications including Fax/Modem, networking, SCSI devices and hard disks.

Superb ergonomics, an extensive list of features, outstanding performance and superb pricing - the Pro'Book is the professionals choice.

PRO'BOOK SPECIFICATIONS

- **Choice of Display:**
Mono 9.4" VGA LCD 64 greyscales
Dual Scan Colour 9.4" and 10.4"
Colour Active Matrix TFT 9.4" and 10.4"
- **Choice of Processor:**
486DX2 66MHz, 486DX4 100MHz
- 4Mb RAM exp. to 8Mb, 16Mb or 32Mb
- Removable 420Mb hard disk (810Mb option)
- Built-in 16-bit SoundBlaster compatible stereo sound system
- Built-in 3.5" 1.44Mb floppy disk drive
- 1Mb VESA Local Bus graphics accelerator
- PCMCIA slots: 2 x Type II and 1 x Type III
- Docking Station Connector
- Ergonomic Palmrests
- Full feature power management with doze, sleep, suspend and suspend to disk mode
- LCD Status Indicator
- Removable battery pack with 5 level LED display of remaining capacity
- External colour (1024 x 768) SVGA port
- GlidePoint® trackpad with dual buttons
- 84-key keyboard with embedded keypad
- Ports: 1 serial, 1 enhanced bi-directional parallel, 1 SVGA + external keyboard
- 2 hour fast battery charge
- Microsoft Works v3.0 integrated package includes Word Processing, Spreadsheet, Database, Communications
- Windows '95 or Windows for Workgroups 3.11 and MS-DOS 6.2
- Weight 2.6kg, 286mm x 220mm x 45mm
- Free Carry Case
- 12 Months on-site warranty

PRO'BOOK OPTIONS

RAM Upgrades	Executive Carry Case	£49
4Mb to 8Mb RAM	Upgrade Hard Disk from	
8Mb to 16Mb RAM	420Mb to 810Mb	£260
16Mb to 32Mb RAM	PCMCIA Fax/Modems with	
Internal Battery Pack	Delrina WinFax Lite Software	£149
Docking Station	14,400bps	£199
NIHM Battery Pack	28,800bps	
Car Adaptor		

Pro'Book BCP700 Series

Model	Processor	9.4" Mono	9.4" Dual Scan	10.4" Dual Scan	9.4" TFT Colour	10.4" TFT Colour
BCP 741	486DX2-66	£1049	£1199	£1349	£1499	£1749
Business Rental Per Week		£9.82	£11.02	£12.46	£13.66	£16.11
BCP 761	486DX4-100	£1199	£1349	£1499	£1649	£1899
Business Rental Per Week		£11.02	£12.46	£13.66	£15.31	£17.31

All prices are for 420Mb Hard Disk.

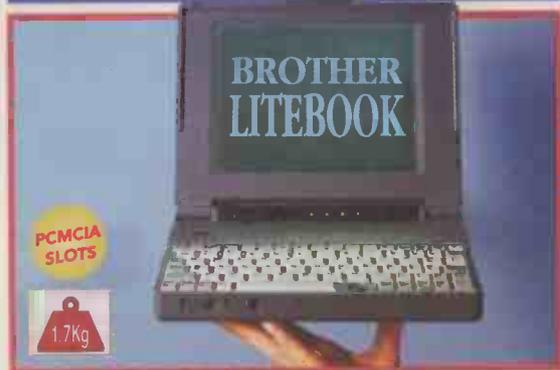
Brother Pro'Book 486DX2-66 Mono/420Mb & Lotus Bundle 1* inc:
 ● Lotus 123 v5 ● Lotus Ami Pro 3.1 ● Lotus SmartPics
 ● Lotus Organiser 1.0 ● Lotus ScreenCam **£1059**

Brother Pro'Book 486DX2-66 Mono/420Mb and Lotus Smartsuite 4.0* **£1119**

Brother Pro'Book 486DX2-66 Mono/420Mb and Microsoft Office 4.2 **£1229**

*Disks and manuals extra. Does not include Microsoft Works.

The Brother Litebook



No other Notebook is this lightweight, this powerful, this flexible or this affordable

£699

PERSONAL CREDIT £29.83 inc.VAT per month APR 26.8%

- 486SLC 25MHz processor
- Built-in co-processor
- 4Mb RAM exp. to 8Mb
- 80Mb Hard Disk
- PCMCIA slots: 2 x type II, 1 x type III
- External 3.5" 1.44Mb FDD
- 8.5" VGA LCD 64 Greyscales
- External colour (1024 x 768) port
- Ports: 1 serial, 1 parallel, 1 SVGA + External keyboard, 1 External Floppy Disk Drive
- Built-in Micro Trackball
- Microsoft Works 3.0 package includes Word Processing, Spreadsheet, Database and Communications
- Microsoft Windows 3.11, MS-DOS 6.2
- Removable Long-Life NiHi battery
- 252mm x 192mm x 39mm
- Weight 1.7kg with battery
- 12 months on-site warranty

Brother Litebook with GemFax PCMCIA Fax/Modem and Communications Software

£799

The Brother & Lotus Notebook



Brother brings you an exclusive notebook solution that represents truly amazing value. The powerful Brother BCP431V notebook with its fast 486DX 33MHz processor and large 250Mb hard disk, together with a complete suite of Lotus Windows software (now upgraded to include Lotus 123 v5) pre-installed and ready to run for your convenience. This solution provides the answer to all your needs - word processing, spreadsheet, personal organising plus clipart graphics - and all Lotus documentation is pre-loaded to provide on-line help as you need it.

Brother BCP431V Notebook

- 486DX 33MHz Processor
- Maths Co-processor
- Internal cache memory
- 250Mb Hard Disk
- 4Mb RAM exp. to 8Mb
- Power saving conservation feature on Hard Disk & LCD
- Easy to read back-lit 10" VGA Mono LCD with 64 greyscales
- 3.5" 1.44Mb fdd
- 2 x Serial, 1 x Parallel, SVGA monitor and keyboard ports
- 2-4 hours average charge time
- Password protection
- Microsoft compatible Mouse
- Lotus Software Bundle
- Windows '95 or Windows for Workgroups 3.11 and MS-DOS 6.2
- 292(w) x 217(d) x 46(h) mm
- Weighs only 3Kg
- 12 Month on-site warranty
- Wide range of options: carry case, car adaptor, trackball, extra battery, LAN Ethernet D link, keyboard adaptor.

£899

PERSONAL CREDIT £38.13 inc.VAT per month APR 26.8%

All this software Pre-installed and ready to run

- Lotus 123 v5
- Lotus Ami Pro 3.1
- Lotus SmartPics
- Lotus Organiser 1.0
- Lotus ScreenCam

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brother

The only Internet software package you'll ever need.

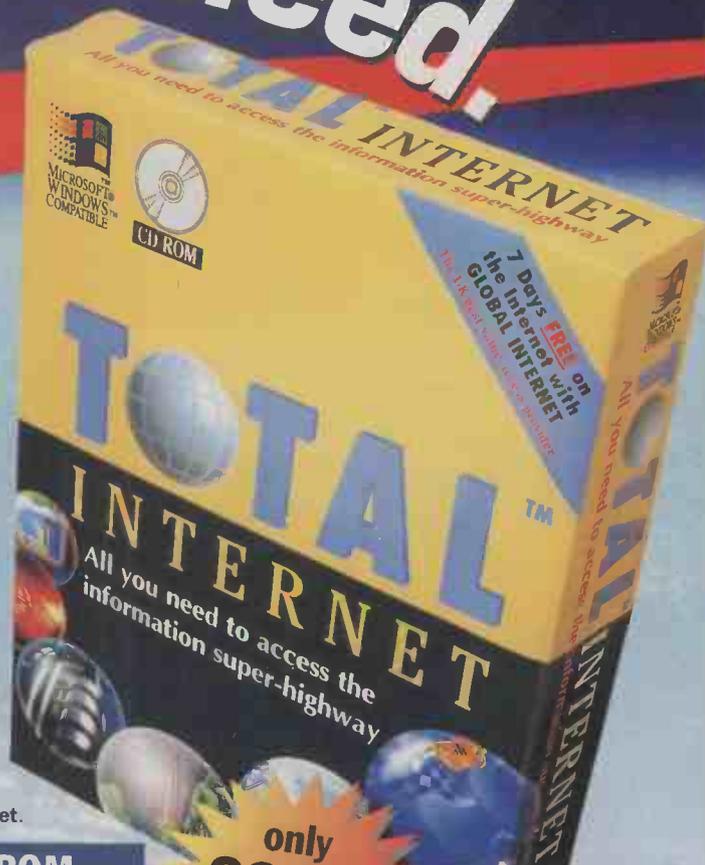
FASTER • EASIER • COMPLETE

At last it's possible to take advantage of the wealth of information and multimedia content on the Internet without having a Ph.D. in computer science. **Total Internet™** brings together the latest vehicles for cruising the information superhighway: these are the tools for sending e-mail, surfing the World Wide Web (WWW), viewing movie and video clips, participating in newsgroups, sampling audio sound files - and even making voice calls over the Internet.

And it's so simple to use. **Total Internet's** advanced setup program makes child's play of installing and configuring the software. Its interactive electronic registration form will help you connect instantly to Global Internet who offer the best value in nationwide local call access with unlimited usage from £7.50 plus VAT per month, and no extra hourly charges.

But we've saved the best until last. **Total Internet** is easily the best value package on the market. No other offering comes close to providing such a range of applications at such a low price. For £34.99 plus VAT you get 22 "best of breed" applications (including Internet Phone which normally sells for \$69.00). These are fully licensed and technically supported software products.

Check out what's included and you will realise why it's called **Total Internet**.



only
£34.99
+ VAT

**INCLUDES 24HR
INSTANT ACCOUNT
SETUP* AND 7 DAYS
FREE ACCESS**
(*for Credit Card Customers)

22 Internet applications on a single CD-ROM

-  **SUPER MOSAIC 2.1** - This brand new Netscape compatible browser will enable you to get the best out of the World Wide Web.
-  **EUDORA E-MAIL** - Perhaps the most popular E-mail software package for the Internet.
-  **NEWS XPRESS** - A powerful newsreader allowing you to access thousands of UseNet newsgroups. Join a favourite newsgroup to read, post articles or even send an e-mail message to the author of an article.
-  **REAL AUDIO** - Allows you to sample audio sound files.
-  **MPEG PLAYER** - Allows you to view animation/video in the popular MPEG format.
-  **VIDEO FOR WINDOWS** - View any .AVI format video clip.
-  **QUICKTIME for WINDOWS** - View Quicktime movies.

Plus: Adobe Acrobat reader, PPP/SLIP Connect, Internet Relay Chat (IRC), FTP, Gopher, Ping, Whols, Finger, Telnet, Archie and more...



Launch yourself from the Global Internet Home Page

CYBERPRESS SOFTWARE

Tel: 0181-213 2400 Fax: 0181-213 2450
121 Upper Richmond Road, London SW15 2TL

To run Total Internet you require: Microsoft® Windows® 3.1, Windows 95, Windows for Workgroups or Windows NT operating system. PC using 386 or higher (486 recommended). Minimum 4Mb RAM (8Mb recommended). 15Mb hard disk space required. CD-ROM drive. VGA or SVGA video. Mouse or compatible pointing device. 14.4, 28.8 or ISDN card. To use Internet phone requires 8 or 16-bit soundcard and microphone.

To order please fill in this coupon and post with your cheque or credit card details to: Cyberpress Software, 121 Upper Richmond Rd, London SW15 2TL

Please send me **Total Internet** for £46.99 including VAT @ 17.5% and delivery*.

Name _____

Address _____

PostCode _____

Tel No. _____

Card No. _____

Card Expiry Date _____

Card Holder Name (if different) _____

* Delivery £5 + VAT in UK Mainland. Delivery normally effected within 3 working days. Please allow 5 days for cheque clearance. Please allow 21 days for delivery.

monolith.cc.ic.ac.uk and log in as "netfind"; if the service is busy you'll be given a list of alternative places to try (bruno.cs.colorado.edu is one of the main ones). Select Search from the menu and type in a name and a rough description of where you think that person might be on the Internet.

For instance, if you typed whitfield ibmpcug co uk you'd be told one of my email addresses. Unfortunately, there are so many computers connected to the Internet that a request to search the whole of the UK can't be handled. Nevertheless, if you have an idea of where to start looking, Netfind can be helpful:

For tracking down users in the US, a shot in the dark might be as good as any other method. America On Line is one of the largest services in the US, especially popular with home users. If you think someone uses AOL, you can find out their address by sending a message to NameSearch@aol.com, giving as much information as you possibly can.

CompuServe's member directory isn't yet available from the Internet, but if you have an account yourself, GO DIRECTORY will let you look up the ID of other members. Access from the World Wide Web is planned, but first CompuServe wants to make sure that the information can't be used for junk-mailing its members.

Until a comprehensive directory of Internet users appears, your only other real alternatives include looking at the Web servers run by organisations where you know people work, or sending mail to "postmaster" on the computer they use, to find out their email address - assuming, of course, that you know that much about them.

Q. How can I speed up access to the World Wide Web?

A. Apart from using a faster modem or turning off images, a "caching proxy server" is one of the most effective ways of accessing the Web; when you use a proxy, instead of asking a remote site for a page directly, your Web browser will ask the proxy server for it. The proxy server will fetch the page, pass it on and keep a copy for itself. When someone else asks for the page, it will come directly from the proxy server without having to ask the site that the page lives on to transfer the information.

Many Web browsers have a built-in cache of their own which will store the pages you've used in a single session. In Netscape, you can select how much of your



You can speed up Web access for a single session by telling Netscape to use more of your hard disk as a cache

disk space is used for this cache from the Options.Preferences menu.

Even if you just have a single-user computer, a caching proxy server means that you won't have to keep fetching commonly-used pages. Internet service providers often provide a proxy Web server for their customers, since it helps to keep down the traffic on expensive external links. For instance, Demon Internet runs a proxy server, and the screenshot above shows how you configure Netscape to use it.

If you have a network of computers connected to the Internet, a caching server can help save time and is well worth installing on your network. If you have a Unix-based computer, you can install the CERN http daemon, which provides caching functions. There's also a commercial http daemon for Windows NT that provides caching (the freeware version, available in the /pub/https directory on emwac.ed.ac.uk, doesn't). You can find out more by looking at <http://emwac.ed.ac.uk/>

Networks using the CERN http daemon can even set up a second level of caching, using "inner" and "outer" proxy servers, so that a request for any Web page goes first to the server on your own network, then to the server provided by your Internet service provider, and finally to the home site where the page is stored.

PCW Contacts

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

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net.news

Around the Internet, with Joanne Evans

Into Netscape in eight days

A French hacker who cracked the encryption in the European version of Netscape has highlighted the problem of US restrictions on the export of encryption technology.

The hacker, a student at the engineering institute in Paris, decoded a message encrypted with a 40-bit key, the length of key used in the versions of Netscape Navigator distributed outside the US. The US version of Navigator uses 128-bit keys, but the American government currently restricts export of any encryption technology with keys longer than 40 bits.

The hacker was responding to a challenge thrown down by one Hal Finney in a cyberpunk newsgroup in July. He did it in just eight days with what he described as a "quick-and-dirty" program that scanned and searched through all the possible keys, but he had to use the combined processing power of about 120 workstations and two parallel processing machines based at three research institutes and searching on average 850,000 keys per second, to crack it.

Announcing his triumph on the Net, he wrote: "Many people have access to the amount of computing power that I used. The exportable SSL protocol is supposed to be weak enough to



be easily broken by governments, yet strong enough to resist the attempts of amateurs. It fails on the second count. Don't trust your credit card number to this protocol."

In response, Netscape fiercely defended the strength of the 40-bit key encryption, pointing out that the hacker cracked only a single message. Every message using Netscape is encrypted with a fresh key, so it would in theory take him another eight days to crack another message.

It added: "The standard way to judge the level of security of any encryption scheme is to compare the cost of breaking it with the value of the information that can be gained. In this case he had to use at least \$10,000 worth of computing power to break a single message. Assuming the message is protecting something of less value than \$10,000, then this information can be protected with only RC4 40-bit security."

Netscape also requested assistance from users to lobby the US government to raise

export restrictions on stronger keys. It may be in luck.

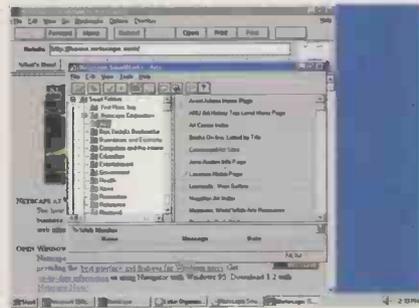
In the same week as the hacker cracked the 40-bit key, the US government announced that it may be prepared to raise the restriction to 64 bits as long as they were "in escrow". That is, when information about the key is held by a neutral third party, enabling law enforcement agencies with a warrant to obtain the key from them and break into encrypted messages. It is expected to make a decision this autumn after consulting the industry.

Netscape gets Smart

Netscape has released two applications to run alongside its Web browser which should make navigating the Net that bit easier.

Netscape SmartMarks is a bookmark application for updating and organising Web page addresses. It's a lot more sophisticated than the bookmark functions built into the browser, while Netscape Chat makes entering real-time chat forums using Netscape Community System software or industry-standard Internet Relay Chat (IRC), much more manageable. They are two of the first commercial applications built on Netscape's Client Application Programming Interface (NCAPI) in the browser.

SmartMarks, which was co-developed with a Silicon Valley company called First-Floor, automatically checks Web pages for updates and notifies you about page or link changes, sorts bookmarks into hierarchical folders, has point-and-click search capabilities for popular Internet directories including Yahoo and Webcrawler, and supports information bulletins from Web site authors telling you about new sites. It also enables you to import existing Netscape Navigator



Sort yourself out with SmartMarks bookmarks, and drag and drop bookmarks from folder to folder. Netscape Chat integrates with Netscape Navigator and works with any site running Netscape Community System or IRC Server to support one-to-one, many-to-many and one-to-many conferences.

Versions of both pieces of software can be downloaded from Netscape's home page at <http://home.netscape.com/>. They are free for use by students and staff of educational institutions and charitable non-profit organisations, and for 90-day evaluation for individual and corporate users. After that they are \$24.95 each.

Pipex in takeover talks

As PCW went to press Unipalm Pipex, the UK's largest Internet access provider, was in takeover talks with a suitor, believed to be US access provider Netcom.

Pipex issued a statement saying it has received an approach from an unnamed company "which may lead to a bid". Sources in other UK Internet companies said the suitor is Netcom.

Unipalm Pipex was the first Internet access company in the world to go public, floating on the stock market last March.

Pipex issued the statement about the takeover talks at the request of the stock exchange because its share price had already started to climb and the news further boosted its shares to value the company at more than £80 million. This despite combined group profits of just £442,000 last year and a loss of £1 million at the Pipex Internet division because it is investing heavily in growth (see last month's PCW).

Pipex currently has 33 points of presence (PoPs) and about 20,000 customers for its individual dial-up service which it launched

in the spring, as well as 700 corporate customers. Based in Cambridge, it employs 200 people.

Netcom, which is also a public company based in San Jose in Silicon Valley, has about 170,000 subscribers and 171 PoPs throughout the US. Unlike Pipex most of its subscribers are individual dial-up customers, but like Pipex it is in the red due to heavy investment in its infrastructure.

In the six months to 30 June 1995 Netcom lost \$2.9m on a turnover of \$10.5m. However, it claims to have assets worth \$83.4m, including \$47m in cash.

If the takeover goes ahead, Netcom will enter the UK Internet market just as it starts to get much tougher. After taking its time to catch on to the significance of the Internet and come up with a strategy for dealing with it, BT now poses an enormous competitive threat to every Internet provider. One commentator pointed out: "All BT has to do is to turn every one of its exchanges into an Internet PoP and there isn't anything anyone else can do about it."

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Scientology row continues as second poster is raided

The Church of Scientology's infamous campaign against critical postings on the alt.religion.scientology newsgroup has intensified with a second raid on a poster's home.

CoS lawyers raided the home of Arnaldo Lerma in Arlington, Virginia, and took his computer and over 100 disks using a writ of seizure which claimed he has violated their copyright by posting documents on alt.religion.scientology relating to a legal case in Los Angeles.

Lerma claims these documents are already available in printed form from the courts. The CoS is also suing Arnaldo Lerma's Internet access provider, Digital Gateways Systems of Virginia, with breach of copyright. On 22 August it filed a suit against the *Washington Post*, which wrote

a story about Lerma's case, accusing it of "conspiring with unlawful elements" on the Net to harm the CoS.

In common with Dennis Erlich, victim of the CoS's first raid on an alt.religion.scientology poster in February, Arnaldo Lerma is an ex-member of the cult. Indeed he was once engaged to marry Suzette Hubbard, a daughter of CoS founder L Ron Hubbard.

The CoS has a history of using copyright law in an attempt to silence critics, not only in electronic media but also books and newspapers, and is particularly quick to take legal action against ex-CoS members who have the most potentially damaging information.

Lerma was first threatened by the CoS

to stop posting on alt.religion.scientology last November, when two members visited his home, then sent a fax stating: "The CoS is willing to settle this matter out of court and withhold any further legal and investigative action if you will agree to cease and desist all your activity against the church and answer some of our questions to clarify this matter. What we want to know is: What is your motivation for these defamatory actions? Who have you colluded with? Who else is involved?"

Meanwhile, Dennis Erlich fights on with his case and the CoS continues to send out both messages to remove newsgroups to system operators and requests to have users' access stopped, with no end to the battle in sight.

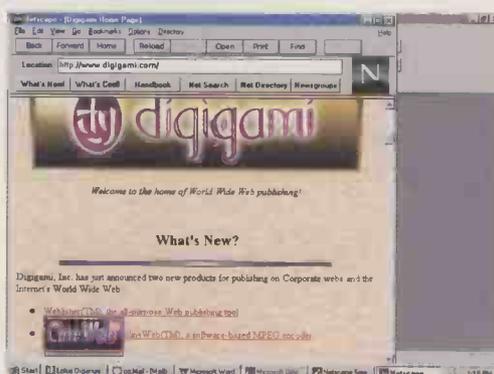
Shorts..

- According to a report in *USA Today*, benign vigilante group the Guardian Angels, who took up a brief guard on the London Underground, have spread their wings to the Internet. The CyberAngels, founded by leading angel Colin "Gabriel" Hatcher, have begun monitoring the Net for illegal activities which they intend to report to organisations such as Internet access operators and federal agencies. The report says each volunteer will monitor the Net for two hours a week. What, all of it? They should look out for online gambling, because according to a report in the *Wall Street Journal* the US Justice Department has decided online gambling is illegal.

- Industry analyst Ovum says the third wave of development of the information superhighway will be with us by the year 2000 when suppliers will be offering broadband capacity of 1.5M/bits/sec and faster, carrying broadcast-quality moving pictures. However, in its report "Applications for the Superhigh-

way: Market Drivers" Ovum also predicts that broadband capacity for businesses will be in both directions, while consumers will want broadband communications one-way only — coming into the home. The second wave, from now until 1997, will see the current capabilities of the Internet being broadened by increasing use of ISDN technology. Revenues from superhighway applications, Ovum estimates, will be \$185 billion by 2005.

- There's bad news for those hoping that a smidgen of the



original anti-commercial ethic of the Internet will survive. Advertising, not consumer subscription fees or Internet access providers, will become the main revenue source for content providers on the World Wide Web, according to Forrester Research. It estimates total US revenues from online advertising, which was \$37 million in 1995, will grow to \$2.6 billion by the year 2000. "The Web's growing upscale audience will make it a fixture in consumer products promotion," it says.

- On the other hand, if you are

into advertising, you can find a list of ad agencies and contacts at a new site at <http://www.shatz.co.uk/adagency/>

- Californian software developer Digigami has developed two tools for Web publishing. CineWeb (screenshot, left) converts Video for Windows AVI and Apple's Quicktime into platform-independent MPEG-1 format so movie files can be readable by most machines that are likely to be connected to the Web. Web-lisher converts documents from standard word processing format into html Web pages. For more information go to <http://www.digigami.com/>

- A Web site with comprehensive information about commercially supported Internet products has been compiled by the editor of a newsletter on electronic commerce on the Net and is being maintained by The London Parallel Applications Centre. You'll find it at <http://www.1pac.ac.uk/Trel/>



net.surf

● VNU, the publisher of PCW, now has a Web site with news, software charts and, in the near future, full text of *Personal Computer World* articles —

<http://www.mpn.com/vnu>. And check out PCW's Best of British Web sites page at <http://www.mpn.com/vnu/pcw/bob.htm>

● Peter Robins has set up a Walkers Web site. It includes info on some of the long-distance walks including the Coast to Coast walk from St Bees to Robin Hood's Bay, the SW Coast Path and the Pennine Way. The pages aren't exactly chock-full of stunning graphics but that does at least mean that modem users can have a quick look without clocking up a huge phone bill.

[Http://www.gorp.com/gorp/activity/europe/britain.htm](http://www.gorp.com/gorp/activity/europe/britain.htm)

● This is one Internet address that's worth a bookmark in anyone's copy of Netscape. It has pointers to all the leading IT companies plus user groups and the home pages of various standards bodies like the ATM forum and Network Management Forum. <http://www.compinfo.co.uk/index.htm>

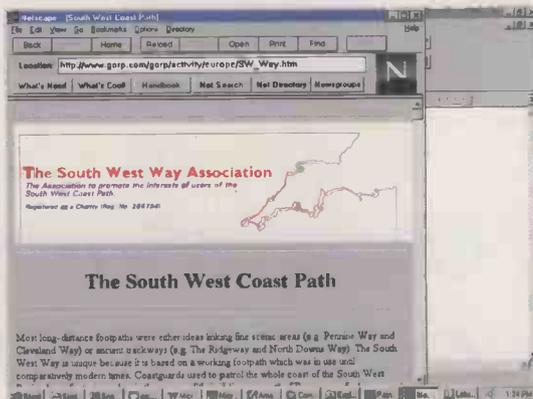
● Lawton Links is another site dedicated to providing links to other sites. There are sections for business, news, politics and technology. All the obvious links are included, like the sites of the national newspapers, plus plenty of less obvious ones like the Brent Council site and Private Eye. www.tcp.co.uk/~lawton

● Most serious football fans have probably hankered after a list of the premiership referees. Well, it's here in full together with just about every other bit of football trivia you care to think of, all neatly packaged behind a

Right, top The Penal Lexicon

Right Go football crazy!

Below Walkers Web site



CUTTING EDGE

PEOPLE



Michael Howard, Home Secretary



Derek Lewis, Director General of the Prison Service Agency



Sir Peter Woodhead, Prisons Ombudsman

football pitch interface.

<http://www.mcewans.co.uk/football>

● The Penal Lexicon is dedicated to prisoners, penal affairs and human rights. It's aimed at prisoners and their families, penal reform groups and charitable trusts, and those working in prisons. Dull but worthy <http://www.penlex.org.uk>

● Market research company CONTEXT has put up a home page with selections of CONTEXT European computer market research data. PC and printer sales by vendor is the kind of thing you can look up. <http://www.context.co.uk>

TRAVEL ABROAD WITH A FAX/MODEM?

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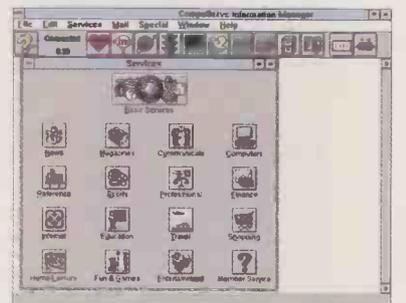
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net.newbies

Getting started on the Net

If you don't know what a "newbie" is, you probably are one. These pages are designed to be an easy-to-use reference guide to the Internet for the novice — or newbie, as hardened netters will call you.

If you don't understand what's written here or have any suggestions, please email me at derb@pcw.cityscape.co.uk, or write to me via "snailmail" (Internet-speak for paper mail) at PCW.

Meanwhile, here's an easy-reference guide to the tools which will help you make the most of the Internet.

What is the Internet?

The Internet consists of millions of computers inter-connected in a global network. The number of Internet users is difficult to measure for a variety of reasons, but those worldwide who can at least exchange electronic mail messages is estimated to be 30 million and this appears to be doubling each year.

What is the World Wide Web?

It is not the Internet. It is a service on the Internet which uses special software (usually available free) to give users access to pages of information with pictures and multimedia instead of just text. Around 15 million people have access to the World Wide Web.

What do I need to get on?

A PC of almost any age can be connected to the Internet as long as you can plug it into a modem. You don't even need to be able to view graphics on your

machine to look around (although it helps).

A modem allows your computer to dial in to another computer with a modem and communicate with it. They come in different speeds, from 2,400 baud to more than ten times that. When you are using the Internet, the speed at which things work is more likely to be limited by the speed of your modem than by that of your computer, so I would recommend buying the fastest you can afford. If you have an old 2,400 baud "V.22bis" model it would be fast enough to exchange electronic mail messages, but to send and receive files, or use the more exciting services on the Internet, a modem which runs at a speed of at least 14,400 baud "V32.bis" is vital. Fortunately, these have plummeted in price over the past few years and now cost as little as £100.

If you have the money, I would recommend spending even more on a 28,800 baud (V.34) modem.

Okay, I've got a modem. Now what?

For a modem to bring you information, it has to have a number to dial. This is where a "service provider" comes in — you have to subscribe to one if you want to get online. Whatever kind of connection you have set up, you will have to pay your phone costs on top of any subscription, unless you are lucky enough to get free local calls through a cable company. The bigger service providers will have "points of presence" (the numbers you dial) scattered across the coun-

try so you only have to dial a local number.

If there's no company, near to your home, which offers Internet access, you may have to pay long-distance phone rates. Once connected, though, it doesn't matter where the information you are accessing is physically located: you are always charged at the same rate. A list of providers and telephone numbers is available below; a much bigger list has been placed on our CD-ROM cover disk.

Typically, a subscription that only provides electronic mail costs around £5 a month and Delphi offers this. But "all you can eat" Internet access allows you to use email and Internet services for any amount of time, limited only by the size of your potential phone bill. This level of service costs £8.50 to £15 per month. There are dozens of companies offering this kind of Internet access; none of them big enough to dominate the market. The basic service being offered is largely the same, although some higher-priced providers may claim to offer more personal service or a better selection of access software.

Demon Internet is the best known and most popular operator. The BBC runs the BBC Networking Club (**BBCNC**) and **Frontier Communications** has launched an inexpensive Internet service that covers most of Britain at local call rates.

Major online services like **CompuServe** or **Delphi** offer Internet access, but also have a large number of services of their own to which only their subscribers have access. These

services include official technical support for hardware and software by electronic mail, online games, vast indexed software libraries and databases of business or consumer information. A monthly subscription tends to cost between £6 and £10 per month, plus an hourly charge if you are online for more than a set number of hours in that month. There can also be extra charges for accessing the more popular services.

UK Online is a special case, a cross between an Internet provider and an online service. For £8.50 to £12.75 per month it offers unlimited access to the Internet, partially "censored" to make it safer for children to browse, plus access to online magazines and other services.

Although programs like Windows Terminal can be used to access these kinds of services, it is normally easier to use specially-written online software. Any service provider should provide you with at least some of this software when you sign up, and if you want to choose something different, most of it can be acquired online, free of charge.

PCW Contacts

BBCNC 0181 576 7799 email: info@bbcnc.org.uk	☎
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Innovations

MPEG in multimedia

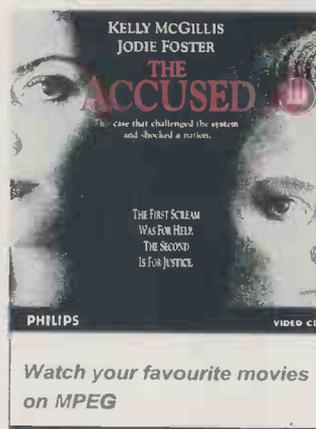
Windows 95 and new industry standards are changing the face of multimedia. Tim Frost tries to keep up.

One way of tracking the progress of PC hardware is to look at how the requirements for multimedia have changed over the years. From the original 8086 PCs with no graphics or sound capabilities, we have moved to a position where companies like Compaq are fudging the dividing line between computers and TVs and producing a machine that is effectively both.

The development of the new MPC3 standard and the announcement by Microsoft that future versions of Windows 95 will support playback of MPEG1 video and audio with a software codec to be included in the Windows package, is a double multimedia development created purely by the increase in power of CPUs and the reduction in cost of specialised video processing chips.

The MPC standards go back to when sound and graphics started becoming powerful enough to support games a little more complex than the blocks and squeaks of Space Invaders.

Because computer companies and games companies were producing hardware and software to various standards, the Software Publishers Association (SPA) in the US decided to set out a basic definition of what hardware a multimedia PC



should have. If games companies produced software that met the MPC specification, then customers would know that if they had an MPC computer, they would be able to play the games. The SPA realised that if people bought expensive computers and found they couldn't play the top-of-the-range games and multimedia programs, it would do the industry no good.

The first MPC specification — a 386SX, 16-colour VGA, 2Mb of memory, 8-bit audio, 30Mb hard disk and CD-ROM only as an option — seemed very demanding in 1991, a mere four years ago. But it's very modest by today's standards.

As multimedia developed into a realistic option, the software companies wanted to make the most of the increased power

buried in new PCs. In a preemptive strike, the standard was updated two years later to MPC2, whose demands went up to a 4Mb 486 with 64,000 colour VGA and a 160Mb hard disk. Now things are moving forward again and the SPA's multimedia working group, which includes AT&T, Creative Labs, Dell, Disney Interactive, IBM and Philips, has upgraded the standard.

As with MPC2, the new standard is being introduced before the more highly-powered PCs have become the norm. MPC3 looks for an 8Mb 75MHz Pentium, 540Mb hard drive and quad-speed CD-ROM drive; although still 16-bit, the sound card must now include a Wavetable synth chip. Lastly, and most significantly, MPC3 demands MPEG1 replay capability. And not just any MPEG1 replay: it must be capable of 25 (PAL) or 30 (NTSC) frame rate, full-screen MPEG1 with no frames dropped during replay.

This almost certainly means including a hardware MPEG1 card. These are already dropping to around £100, and due soon is the next generation of VGA cards that will include MPEG1 chips ready loaded. This will bring the cost down further, and also kill some of the compatibility problems that still

occasionally plague MPEG1 playback cards.

Software MPEG1 decoding is already available, but just as with running AVI files, playback speed and size is directly proportional to the power of the CPU and the amount of memory installed. With MPEG1 software decoding, unless you have a very powerful PC you can only expect playback at very low frame rates (5-15fps) and at small screen sizes.

With MPC3 in place, CD-ROM material will start migrating to MPEG files instead of AVI. An MPEG Encarta, for example, is already on Microsoft's release schedules, and Microsoft's move to include a software MPEG1 codec will at least give everyone the opportunity to see the video clips. The advantages of MPEG1 over AVI are clear. Using roughly the same file size as an AVI clip, MPEG1 can produce near-video quality full-screen images with near-CD quality stereo sound. You will need a hardware decoder to achieve this, as the Windows 95 codec will only get up to 11KHz audio, even on a Pentium.

Some people — including one or two members of the PCW editorial team — are still a little snuffy about MPEG1 quality. It's not perfect, but it is improving all the time, and new professional encoder systems have produced some huge improvements. Blocking is disappearing and the out-of-focus text problem has been cracked. Even so, many are looking forward to the high-definition MPEG2 standard.

For computer users MPEG1 has several advantages over MPEG2. It is cheap (or free, when you get the relevant Windows 95), you can use your existing CD-ROM drive and — most important of all — it exists.

MPEG2 multimedia PCs will, I think, have to wait for MPC4 in a year or 18 months' time. By then, I wonder, will MPC3 seem as antiquated as MPC2 is already starting to feel?

PCW



Horizons

Top of the PoPs

A new deal between Energis and Internet provider Demon allows customers to dial across the country at local rates. Simon Rockman argues that everyone stands to benefit from the Virtual Point of Presence.

The great advantage of the Internet is that it allows you to communicate around the world from a central point. You need only call one number to be connected anywhere. Unfortunately, this assumes that the one number is easily accessible. Surprising as it may seem to Londoners, not everyone has an 0171 or 0181 number. The solution adopted by Internet service providers is the PoP, or Point of Presence, a local number in an area outside the service provider's main location. An Edinburgh customer of a London provider can call a local number, and pay a local bill, to send data to a remote location such as Washington DC.

Perhaps the greatest user of this system is Demon Internet, the UK's biggest Internet service provider. Demon found that it was necessary to provide a local number to stimulate demand, requiring a PoP in every major conurbation. Fortunately, the rules on what constitutes a local call worked in its favour: when you make a telephone call you are charged not directly by the mile but by the zone, and the

zones are defined by the National Numbering Group (NNG). Customers in the 01923 (Watford) area can call other customers, or modems, in the 01923 area at a local rate. The rules laid down by Oftel state that it is still a local call if you are in an adjacent NNG. Otherwise, next-door neighbours who are on different phone codes would have to pay standard rates to chat. So if an NNG touches another NNG, calls between them are local.

As a result, service providers look for places where there are many potential customers and adjacent NNGs. Some areas have as many as six numbers bordering on them. If one of these is a major city, there will be a lot of potential customers. PoPs tend to be positioned just outside cities, not at their centre. Since every NNG will overlap several others in its spread of local numbers, careful planning is needed to ensure the best coverage with minimum PoPs.

PoPs are expensive. For each number you need a modem, and as the demand increases in a particular area you need to add more modems to service the

growing number of subscribers. The more subscribers, the harder the balancing act of providing capital equipment to cope with peak loads without making the whole thing too expensive to build and use.

The ideal is always to have one modem free at any time in every local call area, but this soon becomes economically unviable. If there are 1,000 places which need a PoP to provide local call access to a sensible majority of the population, there would be 1,000 modems not in use.

Demon has a clever solution to this problem. The VPoP, or Virtual Point of Presence, is the brainchild of Demon's Steve Kennedy. This has been pioneered in conjunction with Energis, the new electricity company which uses the national grid as the infrastructure for a national phone system.

Any new phone company needs traffic to get going, and people with modems are the ideal kind of traffic as they use a lot of telephone time. The deal Demon struck with Energis was to provide local call access

throughout the country – 84 per cent of the UK population is covered by the scheme. Demon customers could call their local Energis number and then be connected to the Network Operations Centre in North London.

The clever thing about the VPoP setup is that all 1,500 modems in this super-PoP are in one place. This will soon be upgraded to 4,500 lines.

The VPoP system works because all the connections between exchanges are digital. If you live in Skegness and call your mum in Stockport, your call to the local exchange down two bits of copper wire is analogue. As soon as it gets to the exchange it is digitised, chopped into packets, multiplexed with a zillion other calls to be sent down optical fibre, and fed into the exchange near your mum's house where all the bits are extracted and turned back into an analogue signal that sounds like you.

If your call is from your modem to the local exchange to a VPoP, the VPoP doesn't bother with the digital to analogue conversion but just sends the digital packets down the fibre to London. Calls to the VPoPs can only be routed to Demon, which makes a very efficient system.

Energis doesn't cover the whole of the UK and some NNGs have to be filled in with Traditional PoPs (TPoPs). However, in the areas where it works, everyone wins. Demon can offer local call access and so stimulate demand. Energis gets paid a slice of what BT charges the subscriber for handling the call (the interconnect fee) and BT handles a lot more calls. You could argue that BT loses out because people who would have made long-distance calls now only make local calls, and some of the revenue goes to Energis, but in practice BT gains from the phone bills from the 40,000 Demon subscribers. And the subscriber benefits because all the phone calls are local. **PCW**

Bluesky

Power and performance

Nick Beard looks at supercomputer applications and discovers new approaches to difficult simulations.

Last month we began a two-part series, taking a rapid tour of the realm of supercomputing. The boundary of practicable computability continues to be pushed forward, and new methods of programming emerge to populate the fertile terrain just inside this engineering boundary.

As we saw last month, computer power now comes ever more frequently from parallelism. The computational bottleneck of a single processor machine is no longer easily bypassed by making everything around it go faster. Instead, multiple machines are needed, wedged into one computational black box which shuffles bytes around at a high speed.

However, there is more to computer power than silicon and wire. This month we look at specific hardware and software architectures, and the applications emerging to tap all this power, including a novel approach to numerical solutions to partial differential equations.

The need for a continuous rise in computer power is recognised in almost all fields of science and technology. There are the "grand challenge problems" of aerodynamics, nuclear technology, materials science,

meteorology, and the modelling of economic systems, characterised by Kenneth Wilson (*Grand Challenges to Computational Science, Future Generation Computer Systems*; 1989, Vol 5, no 2-3, 171-189). These all require ever more MIPS. Since the hardware is never powerful enough, engineers strive to find ever more efficient ways of using the available MIPS to greater effect. One of these approaches is published in a recent edition of *Nature*.

Computers are often used to perform huge numbers of repetitive calculations, to fulfil inelegant functions that mathematicians cannot yet manage symbolically. A common problem is the solution of partial differential equations (PDEs), a nasty piece of maths with no neat symbol-shuffling solution. PDEs provide some predictive capability in settings where there is uncertainty over the precise relationships between the elements in the model being studied.

One popular way to solve PDEs is the finite element approach. This divides continuous surfaces or volumes – such as the inside of a box – into a grid. The infinite number of different places are divided into finite elements. Studying the

behaviour of points on the mesh requires a viewpoint – a computational point of view from which effects are seen. Traditional approaches suffered as a consequence of the different requirements for tracking the frame of reference – the viewpoint – from which the mesh is watched, depending on whether it represents a solid, liquids or gases.

When studying either liquids or gases, a fixed reference point is used (known as a Eulerian frame). The viewer in this frame sees the liquid passing like water under a bridge. However, this method makes it hard to keep track of many different reference points in the substance being studied – which is crucial for studying, say, stresses in a solid. To examine a moving solid, the frame of reference is attached to it in a so-called Lagrangian frame. This is widely used in engineering for the computational study of solids, but is impractical for the complex movements of fluids.

Braun & Sambridge report in *Nature* (24 August 1995) on a new approach, which is efficient and also provides a method for representing liquids and solids in the same model. As yet, the technique is incompletely worked out. For example, it will

"smear" sharp boundaries. Most importantly, it is still only a two-dimensional technique.

However, in time it should provide a valuable way of modelling liquids sloshing around in flexible containers, solidification processes, and the mechanics of cardiac pumping.

Techniques such as the new modelling methods described will eventually be added to the computational armoury. They will then be selected – combined with other techniques such as visualisation, emergent computational methods (neural nets, genetic algorithms, cellular automata) or programming methods not yet foreseen, to enable attacks on areas which are untouchable today.

PCW Resources

Nature Vol 376 (24 Aug 1995, p655-660)

Jean Braun and Malcolm Sambridge

A numerical method for solving partial differential equations on highly irregular evolving grids.

Parallel Processing in Cellular Arrays

Yakov Fet, Research Studies Press

Cellular arrays are important in the implementation of massively parallel computers.

Implemented via a model known as Distributed

Functional structures (DF-structures), cellular processing arrays are a potentially valuable in exploiting VLSI circuitry in supercomputing.

High Performance Computing Special edition of the Communications of the ACM, April 1994.

High-performance Computing in Engineering; Volume 2.

H Power and CA Brebbia (eds), Computational

Mechanics Publications

A series of advanced papers on the use of supercomputers in the numerical solution of complex engineering problems.

Retro

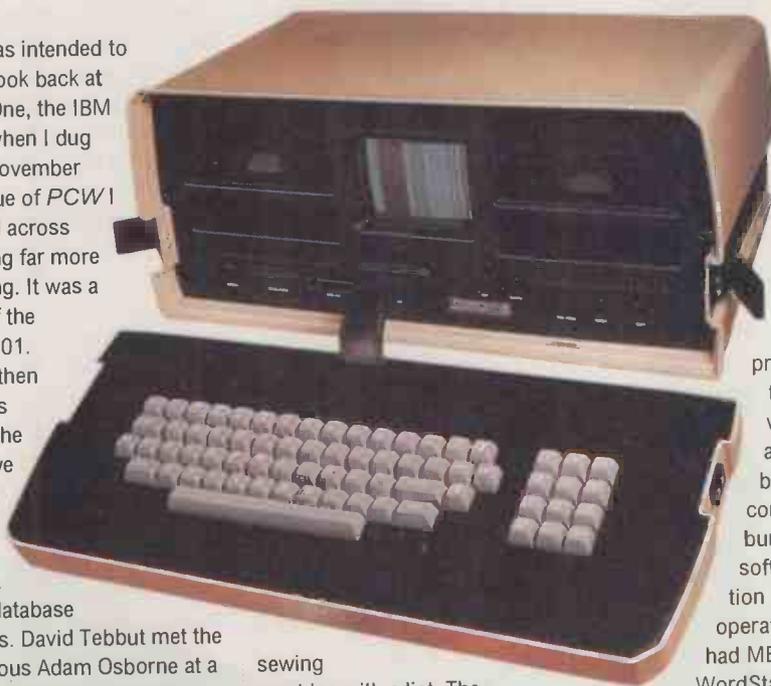
Heroic failure

The world's first portable had a five-inch screen and looked more like a sewing-machine than a computer. It's failure illustrates that cardinal rule of business – don't be first with a new invention. Simon Rockman laments the untimely death of the Osborne 01.

This was intended to be a look back at The Big One, the IBM PC, but when I dug out the November 1981 issue of *PCW* I stumbled across something far more interesting. It was a review of the Osborne 01.

Back then there was none of the testing we do in the labs today, no NSTL and no database of results. David Tebbut met the eponymous Adam Osborne at a party and took the computer home overnight. Not, I'll warrant, what most people expect to pick up at a party.

The Osborne 01 was significant because it was the first portable computer, although at 24lbs – about six times as much as a modern notebook – it was no lightweight and didn't run without mains power. The machine looked like a portable



sewing machine with a list. The drunken angle was due to the slope of the keyboard which clipped over the tiny 5in (diagonal) mono screen and two 100Kb 5.25 in disk drives. The size of the machine meant that there was no problem finding space for a full-sized keyboard. The design predated Alt and function keys, so there was plenty of space around the

standard QWERTY set, the only additions being cursor keys and a numeric keypad.

At \$1,795 (with an estimated UK price of £1,200) the machine was presented as a bargain because it had a comprehensive bundle of software. In addition to the CP/M operating system it had MBasic, CBasic, WordStar, Mailmerge,

and SuperCalc – which the review quaintly described thus: "SuperCalc is what the Americans would call an electronic spreadsheet." Since bundling was a new idea and the software had a list price of over \$1,500 the Osborne 01 could be presented as a computer for \$295, which of course it wasn't.

Actually the case was quite

stylish, with the grooves down the side described as being "rather like those along the side of some Rover cars". But as David Tebbut pointed out, unlike the car, this made the computer easy to pick up. Easy being a relative term: the machine was big and heavy, and all that space allowed the indulgence of a couple of pockets for storing floppy disks.

Along the front there were a battery socket, reset button, external video socket, contrast and brightness controls, a keyboard socket, parallel port, serial RS232 socket and a modem socket. These were at the front, which was great for plugging things in, but could produce a cat's cradle of cables on your desk. The machine came out before third-party keyboards, and the Osborne was connected to its keyboard by a thick ribbon cable.

But its wackiest feature was the screen. Five inches is small (okay, no lewd comments) and the Osborne solution to this was to have a window of 24 lines of 52 characters on a screen of 32 lines by 128 characters. Text could be highlighted or underlined, but there were no graphics, and of course, it was monochrome. For work the \$250 12-inch monitor was a sensible addition. The Osborne 01 may sound a bit crude today, but 14 years ago people were prepared to order a computer and wait for delivery. Osborne 01s took over three months to arrive and they were very successful.

A later model with a bigger screen superseded it, but Osborne was killed by announcing the Encore, a much more advanced machine. Sales of the Osborne 01 dried up in anticipation of the new machine and because the Encore was late, the lack of sales killed the company. A sad end for a pioneer. What is even sadder is that the IBM PC should totally overshadow the Osborne – a triumph of clout over technology.

PCW

BOOKS

The essential computer dictionary, a pocket guide for beginners, a much-needed guide to UK comms and an old-fashioned guide to Visual Basic programming.
Reviewed by Ben Tisdall and Tim Anderson.

Illustrated Dictionary of Computing (2nd Edition)

Author: **Jonar C Nadar**
Publisher: **Prentice Hall**
Price: **£20.95**
ISBN: **0-130205725-5**
Pages: **680**

Rating: ♦♦♦♦♦

A subject as riddled with jargon and acronyms as computing needs a decent dictionary. There are masses on the market, but most are either out of date or full of omissions. The latest edition of *Prentice Hall's Dictionary of Computing* is about the best I've seen.

ATM is always a good test of a dictionary. *The Penguin Dictionary of Computing* (1985 edition) is unable to offer a single definition. Our office copy of the *Oxford Reference*

(1991) comes up with automated (bank) teller machine, but Prentice Hall's latest edition romps home with all three, including Adobe Type Manager and Asynchronous Transfer Mode.

The publishers have also put care into the illustrations, a mixture of photographs and line drawings. There are pictures of Michael Dell, William R Hewlett and David Packard, and of Thomas J Watson who joined the Computing-Tabulating-Recording company in 1914 and was still at the helm when the company changed its name to International Business Machines (IBM) in 1924. There are also drawings showing the insides of typical desktop PCs and notebooks, and a number of intriguing

old photographs of computers and computer components, like the first integrated circuit, demonstrated in 1958 by its inventor, Jack St Clair Kilby of Texas Instruments.

Fun Facts panels are used to further enliven the text. For example: "If a person were employed to clap once every second for eight hours a day, from Monday to Friday (and if each clap were imagined to be one instruction), then a micro-processor rated at 27 MIPS can perform in one second what would take that employee four years to accomplish."

This dictionary manages to be an essential reference at the same time as being highly browsable. It's one of the few books we're likely to hang on to next time we clear out review copies.

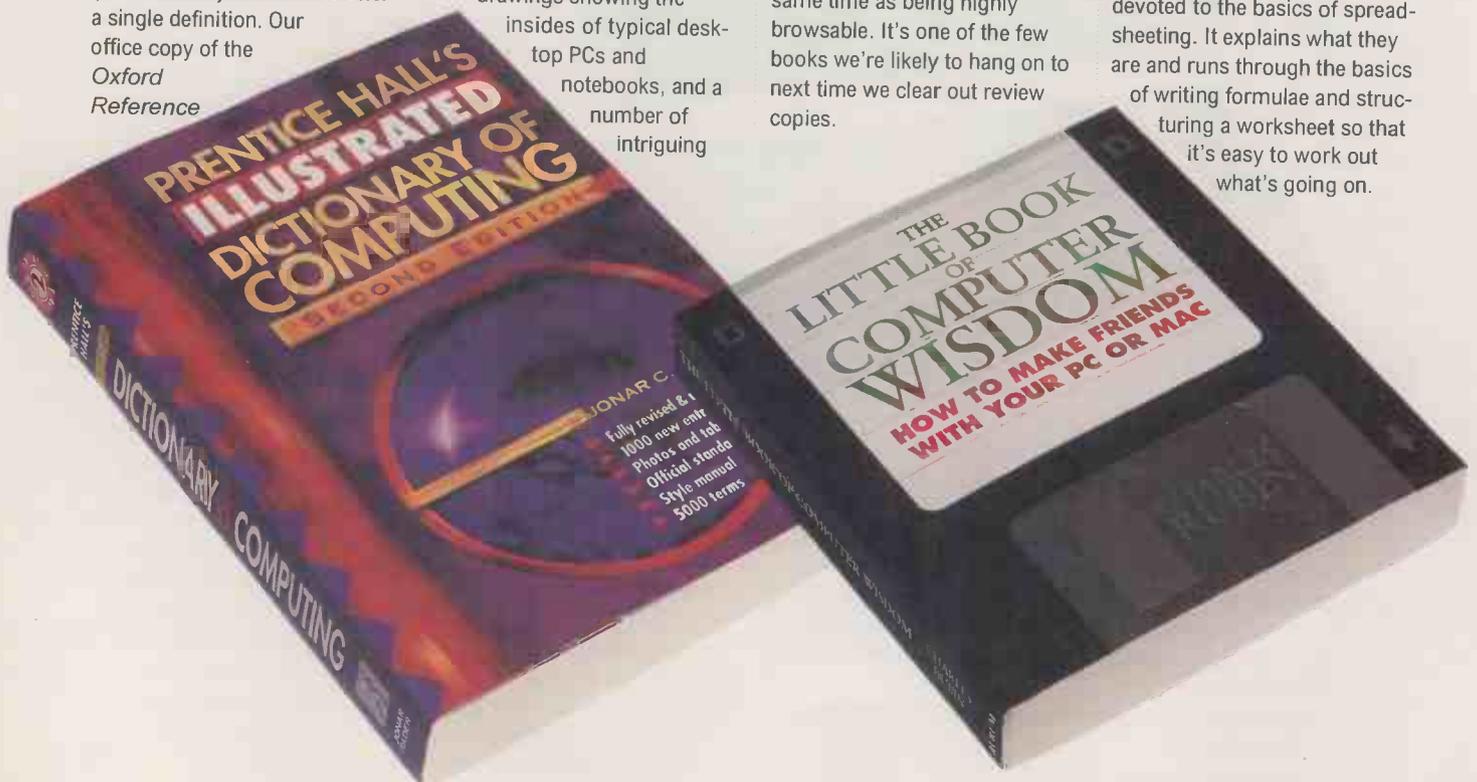
The Little Book of Computer Wisdom (How to make Friends with your PC or Mac)

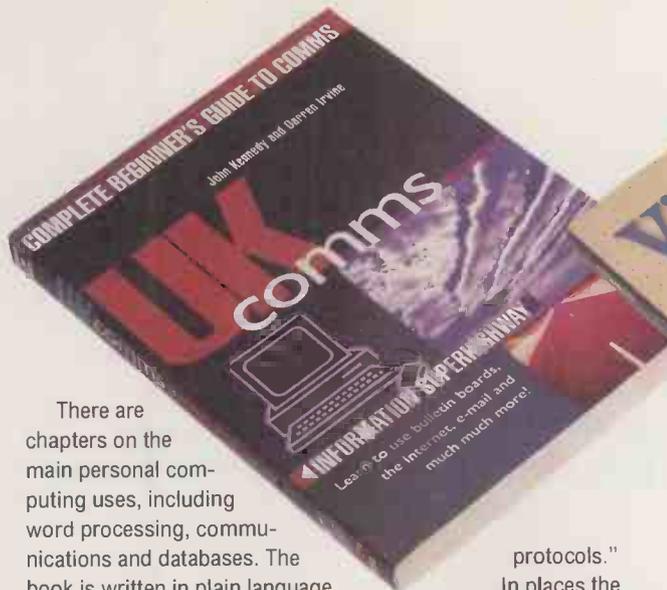
Author: **Charles Rubin**
Publisher: **Aurum Press**
Price: **£9.99**

ISBN: **1-85410-353-9**

Rating: ♦♦♦♦♦

Most computer books tend towards the tome, so a small volume is a welcome change. *The Little Book of Computer Wisdom* measures just 5.25in x 6in and runs to a mere 312 pages. It's aimed at beginners, and because it sticks to general principles rather than specifics, it is suitable for PC and Mac users. For example Chapter 8, entitled Spreadsheet Savvy, is devoted to the basics of spreadsheeting. It explains what they are and runs through the basics of writing formulae and structuring a worksheet so that it's easy to work out what's going on.





There are chapters on the main personal computing uses, including word processing, communications and databases. The book is written in plain language and generally talks sense, although sometimes the advice verges on the patronising. For example: "1. Unpack carefully. Take one box at a time and unpack it completely. Don't rush. Use a knife to cut the sealing tape, and try not to tear the flaps. Remove any styrofoam spacers without breaking them."

The book is in black and white so it lacks the visual appeal of, say, the Dorling Kindersley books with their colour photographs. But at the price, it's worth a look.

UK Comms

Authors: **John Kennedy and Darren Irvine**
 Publisher: **Bruce Smith Books**
 Price: **£19.95**
 ISBN: **1-873 308-40-X**
 Rating: ♦♦♦♦♦

Although there are hundreds of comms and Internet books, very few are written, designed and produced in the UK. *UK Comms* aims to give a UK perspective on the subject and does a pretty good job.

The first three chapters tackle the absolute basics: what is a modem; what moving data is all about; how to choose a modem. The style is humorous, slightly cynical and relatively free of jargon. For example: "It's a sad fact that computer communications can be the most jargon-riddled, anorak-wearing and propellor-headed subject in the world – even train-spotting can be more socially acceptable than a chat about baud rates and transfer

protocols." In places the humour is pretty off the wall. In Chapter 6, entitled Warnings, you are invited to remember the five simple rules of anti-static precautions. The first two are the usual kind of thing but number three is: "Don't rub balloons up and down your jumper picking up small pieces of newspaper and memory chips." Four is "Don't play with a Van der Graff static electricity generator immediately before opening your computer", and five is "Don't perform motherboard upgrades outdoors on mountain tops when the forecast is for heavy thunderstorms."

Often bald explanations are fleshed out with interesting pieces of background information, like the origin of Fidonet or how the World Wide Web was invented.

Appendices at the back list interesting Internet sites, Internet service providers (with a couple of paragraphs on each one), and the dial-up numbers for many UK bulletin boards. Altogether, it adds up to a very complete and up-to-date beginners guide to comms, as claimed on the front cover.

Visual Basic Made Easy

Author: **Edward Coburn**
 Publisher: **International Thomson Publishing**
 Price: **£39**
 ISBN: **0-534-22206-4**
 Rating: ♦♦♦♦♦

Just when thoughts are turning towards Visual Basic 4, here comes another version 3.0 tutorial. In this case it matters little,

for it is a programming tutorial of the old school. Twelve large-format pages devoted to the If...then...else statement demonstrate the author's concern for fundamentals, rather than the latest features of Windows. The book makes careful, thorough progress through topics like loops, arrays, buttons, menus, file-handling, graphics and DDE. It has the feel of a schoolbook, with questions and exercises at each chapter end. While it would be fine for home use, ponderous end-of-session advice to "turn off the computer (except in those labs where the computers are to be left on)" suggests the author has more formalised learning in mind.

Many Visual Basic enthusiasts will be impatient with a book that pays scant attention to key matters like VBX controls or OLE. Then again, some other titles show how to click-and-drag components on a form,

but omit basic techniques for sound programming. There is a particularly good chapter here covering indexed files, binary trees and sorting techniques, skills that every Visual Basic programmer should master and which offer an alternative to JET, Visual Basic's built-in database engine. JET is good but makes heavy demands on memory and resources, so that even simple database applications run like slugs on low-end PCs. Coding your own indexing and searching routines is more work, but creates slim, fast applications that will run on any Windows PC. This is valuable.

Unfortunately, the supplied low-density disk is little use, with a couple of sample applications but empty directories for most of the chapters. The DDE example omits the source code. Such a weak disk makes the product seem expensive, but for beginners wanting to pick up the basics of programming, it's still worth a look.

Top Ten Books: November 1995

1	Microsoft Windows 95 Resource Kit	Microsoft Press
2	Delphi Developer's Guide	Sams
3	Windows 95 For Dummies	IDG
4	Using Windows 95 Special Edition	Que
5	Complete Idiots Guide to Windows 95	Que
6	Linux Unleashed	Sams
7	Introducing Microsoft Windows 95	Microsoft Press
8	Delphi Unleashed	Sams
9	Teach Yourself Web Publishing with HTML in a Week	Sams
10	Visual FoxPro 3 Developer's Guide	Sams

List supplied by The PC BookShop of 11 & 12 Sicilian Avenue, London WC1A 2HQ. Tel: 0171 831 0022. Fax 0171 831 0443

CD-ROMs

Hang out with the flower children of the sixties, follow the music industry Grammy awards, meet the native American Indian and find out everything you ever wanted to know about cats and dogs. Paul Begg and Adele Dyer had a busy time with this month's selection of CD-ROMs.



Haight-Ashbury in the Sixties!

The neighbourhood of Haight and Ashbury in San Francisco was an inexpensive working class area. In the early sixties it attracted students from San Francisco State and from 1964 until 1968 they initiated a social and cultural movement that spread far beyond San Francisco and beyond California. The movement has been called many things, including Flower Power.

Perhaps best remembered for its Human Be-In and

slogans like "Tune In, Turn On, Drop Out", the Haight-Ashbury scene in the sixties represents a culture that spread through the world and has reached through the decades to influence us in the mid-nineties.

Haight-Ashbury is a two CD-ROM set that explores the history of the district and the movement it spawned. It includes music — Jefferson Airplane, Janis Joplin, the Grateful Dead — and video footage — Timothy Leary, Paul McCartney — and loads of stills; they alone probably make this a disc worth having.

It is all wrapped up in an idiosyncratic interface which caused me to feel that the whole thing might have been better as a video documentary. Nevertheless, it adds up to a fascinating opportunity for oldies to recall their youth and for young'uns to see just how cool and unbelievably naïve their parents — in

many cases that will probably even be grandparents — really were.

Contact Channel Marketmakers
01703 812755

Price £34.99 (inc. VAT)

Rating ●●○○○



The Grammys

I made a discovery this month that caused me no end of trouble; most early versions of

The best of the Grammys in your own front room



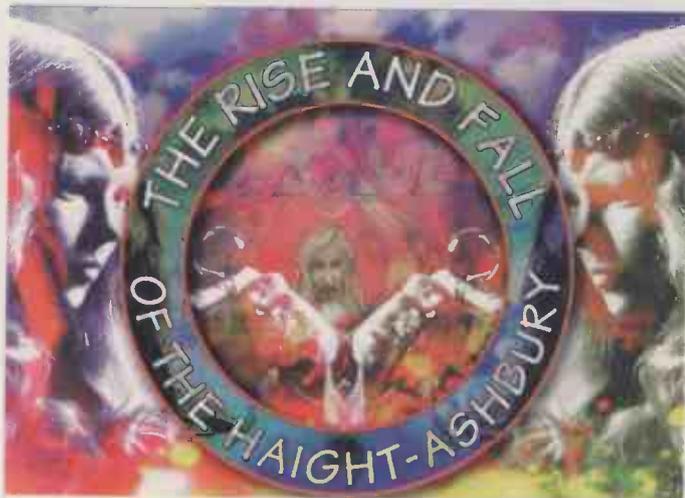
Tune in to the spirit of the sixties as you witness the birth of flower power

QuickTime, which you need to run most CD video, won't work with Windows 95. Thus you have to have QuickTime 2.0. Of course I didn't have it, so I had to download it from CompuServe. Then it wouldn't install. Then... well, I won't bore you with the details, but I eventually ended without any QuickTime installed on my computer. It was the weekend, of course, and this column was overdue. You get the idea. Anyway, just when I gave up, the CD I'd been trying to load and for which I'd been told I'd need QuickTime 2.0, began to work just fine. All I can say is that the age of miracles is not past.

The disc I finally got going was The Grammys. For 35 years the Grammys have been the music industry's most prestigious awards — the Oscars of the recording business. The award was conceived back in 1957 with the foundation of The

National Academy of Recording Arts and Sciences (NARAS). This CD-ROM takes you from the first award the following year (Best Album went to Henry Mancini for

Peter Gunn) through to 1993 (Best Album was won by Whitney Houston and others for



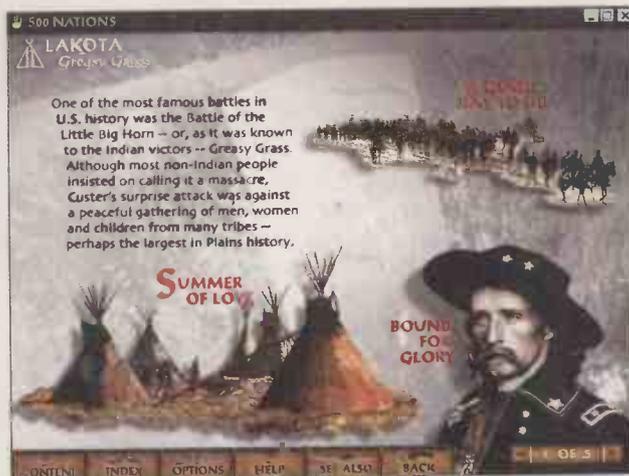


the soundtrack album for the film *The BodyGuard*).

The disc gives you video footage of some of the best performances at the Grammy awards and a small selection of winner interviews given backstage. Maybe best of all is the library where you can quickly find every winner and nomination in every Grammy category from 1958 to 1993. You can search by artists, awards, years, nominees, and winners. Finally, you can put together your own show and answer Grammy trivia questions until the cows come home.

Overall an interesting disc, but there is little solid meat here. Biographical information is sparse, and there is an almost complete concentration on pop music – very little jazz or country and western, no classical that I noted, and no spoken work or comedy recording.

Contact Mindscape
01444 246333
Price £39.99 (inc. VAT)
Rating ●●●●○



500 Nations picks up the trail of the native American Indian



hundred words.

Much the same can be said about the Jamestown colonists, John Smith and Pocahontas.

There's nothing said about Pocahontas' life in Britain, hardly any information about John Rolfe, whom she married, and little background on John Smith. The account of the Jamestown colony itself was dismal.

Little Big Horn was similarly short on information. Custer actually wrote a book, *My Life on the Plains*, which, though no doubt embellished, surely gave an interesting partial insight into relations with the Indians as he perceived them.

In short, *500 Nations* gives information in the nibble-sized amounts I'm accustomed to finding on the back of matchboxes, beer mats, crisp packets and the like.

You might get more value buying the videos (about eight of them, I think – if they are available outside the US) or the tie-in book. This said, if you want to go for the disc, it looks good, is packed with pretty

pictures and a lot of audio, including pronunciation. Last but not least, it has video featuring the dashing Mr Costner, which in some people's eyes would make it worth buying. You can search by following one of four main categories: Timeline, Homeland, Pathfinders and Storytellers.

Contact Microsoft
01734 270001
Price Recommended street price of under £40 inc. VAT
Rating ●●●●○



The Image of the World

This disc originates from an exhibition at the British Library and is meant as a way of taking home a little of that event. However, it stands up very well on its own and there is no need to have been to the exhibition to appreciate it.

Included on the CD are ten maps, dating from 1250 to 1994. These range from the famous Ludi Mappa Mundi to a series of satellite photographs of varying magnification.

The maps in between vary in their accuracy but all nicely demonstrate the prevailing attitudes to the world, travel and exploration. There is a

reference. And yes, I do have a machine meeting the required specifications.

My real complaint about *500 Nations* is that

it's thin on good, solid, detailed information. I am no expert on Indian history, but I do know quite a lot about the Roanoke colony (the first English speaking colony in North America), having researched a book on the subject. The relationship between these early colonists and the native Indians is astonishing, full of drama and high adventure, and the best thing about the story is that a man named Richard Hakluyt obtained first-hand accounts from the would-be settlers, preserving their authentic voice across the centuries. *500 Nations* does not contain a word from these first-hand accounts. The Roanoke colony is passed over in no more than a couple of



500 Nations

500 Nations was a television documentary series about the native American Indian. Hosted by Kevin Costner, it was first screened on CBS TV on 20 April 1995. This disc, also hosted by Costner, is based on the series.

The first made-for-Windows-95 disc, it's supposed to be self-loading but in fact threw up the Microsoft Home logo, then – nothing. When I did manage to get it going, it ran like glue. I wouldn't say it was unusably slow, but it certainly isn't a disc I'd want to consult for quick



concentration of maps dating from the late Middle Ages and the Renaissance and their development reflects the influence of the enlightenment. One map dating from 1886, the height of Britain's colonial stranglehold on the third world, is amply decorated round the edges by Britannia sitting on natives while every country in the world except the colonies is left beige.

Certain areas of the maps can be viewed in more detail and there are audio commentaries to describe these. Not every area can be enlarged, however, and the amount of time you have to view the detail is limited to the running time of the commentary.

To supplement the information about each particular map there is a general section on both the history and developing ethos of map making. Dull to look at, as it is simply text-based, this section is nonetheless fascinating, not only on how and why maps were compiled, but also their importance to the people of each age.

This interesting disk has the advantage of being in dual format form and very cheap.

Contact The British Library
0171 412 7000
Price £14.95
Rating ●●●●●

Guinness Encyclopaedia
You should not expect this CD to be yet another Guinness Book of Records. It is probably more useful though, being taken from the less well known Guinness Encyclopaedia, the latest hard-back edition of which is due to be released this autumn.

The encyclopaedia is on two CDs, which is more than justified by the amount of information packed into it, and the ease with which the encyclopaedia can be searched.

The main headings sound a little esoteric — The Nature of the Universe, the Restless Earth and The World Today. The sleeve notes break these down into more useful subcategories,

such as astronomy, geology and economics.

Each of the main categories covers a wide area and having clicked on one you are offered more choices and then yet more choices again. Once into a particular section you often have several pages worth of information on a particular subject, each complete with useful graphics.

To help you find your way round there is a useful little box which tells you exactly what your search path currently is. You can click on higher layers to go back up the tree and start again on another route. To navigate to other related sections there is another box, often packed with suggestions.

If you have a specific enquiry in mind, it is much simpler to use the text search. This is rather awkwardly located on the second disc, so you will end up swapping discs around if you want to see the graphics as well as the text, but it does enable you to search very quickly.

The list of contributors reads like a Who's Who of the British academic community and their calibre shows in the material. For example, the section on Literature and Language covers the development of modernism in the novel in the most comprehensive yet accessible description I have ever read. The Countries of the World section covers economy, history, government, population and much more, making it more informative than many geography CDs.

The only downside to this otherwise excellent package is the interface. Due to the many boxes it allows far too little room



**Multimedia Dogs
Multimedia Cats**

Two really nice discs we've seen this month are Multimedia Dogs and Multimedia Cats. They work in pretty much the same way, being a catalogue (or dogalogue in the case of Multimedia Dogs) of the animals in question. Cats covers the domestic breeds as well as wild cats, and both discs have loads of photographs, videos, text and audio. Both let you browse through different breeds or search for specifics. You can specify certain criteria and the program will list the animals best suited as a pet for you.

Both discs are guaranteed to provide any cat or dog lover with many hours of pleasure and useful reference tools to boot.

Contact Roderick Manhattan
0181 875 4400
Price £39 (excl. VAT)
Rating ●●●●○



for the text box, which is reduced to only five lines long. You can scroll up and down, but it is tiring on the eye. It is almost as if the authors do not expect the user to read the text, just to look at the pictures, but this does not do justice to the quality of the text.

At its worst the interface detracts from it; who can honestly say their favourite background colour is yellow? However, the text searches more than compensate for the

irritating interface, as does the quality of the material. Finally, it's all for a very reasonable price.

Contact J&S Software
01255 760743
Price £34.99 including VAT
Rating ●●●●○

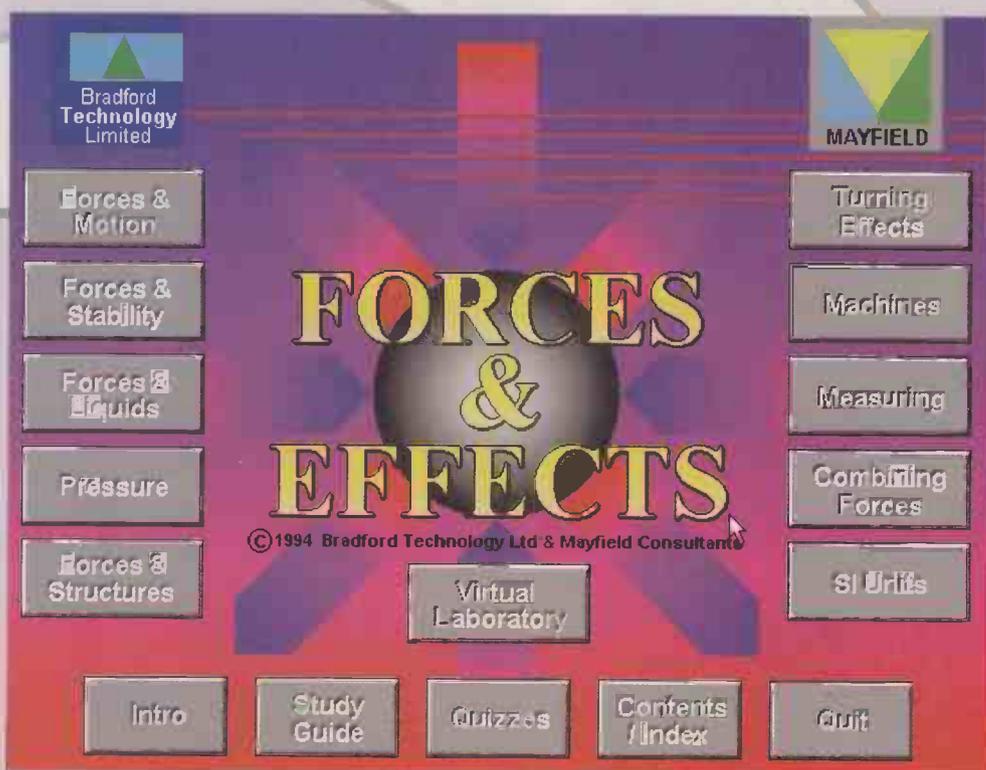
Packed with educational material, the Guinness Encyclopaedia is easy to navigate



Kids'

Stuff

As Christmas looms large, Paul Begg and his daughter Sioban have been looking at two cartoon makers and doing some pre-school reading. Paul has also been baffled by a heavyweight science disc.



With Christmas now clearly on the horizon, one piece of good news has been the announcement

from Microsoft of a software pricing restructure. You may have read of this elsewhere or already noted significant price reductions in the shops. Here's the low-down.

After considerable research, Microsoft has noted three price points: £29.99, £39.99 and £49.99, and has decided to sell much of its software at these price points. The good news for us is that most children's and reference software will be priced

When parents are dunces, help with the National Curriculum is at hand

at £29.99 (including VAT) and that includes Dangerous Creatures, Ancient Lands, Dinosaurs, Fine Artist and Creative Writer.

Such aggressive price structuring is both good and bad news. It's good news for us consumers because we like to save money, and it might force competing companies to cut the cost of their software. It's bad news because small companies with limited research and development budgets may be unable to cut costs and consequently get priced out of the market. The knock-on effect is that the big software players will

inevitably seek to satisfy the largest possible market and narrower interest won't be served.

Forces and Effects

This latter point sprang to mind as I looked at Forces and Effects from Bradford Technology. This disc covers everything you need to know to satisfy the demands of the National Curriculum and beyond: forces and motion; forces and stability; forces and liquids; pressure; forces and structures; turning effects; machines; measuring; combining forces; SI units.

Each of these sections takes you deep into the subject area. For example, forces and motion covers the basic ideas (scalars and vectors, displacement,

speed and velocity, acceleration), average speed, estimating speed, a lot about graphs and interpreting the information they contain, equations of motion (you know, $v = u + at$, $s = (\frac{u+v}{2})t$ and so on), estimating stopping distances and acceleration due to gravity, Galileo's experiment, hammer and feather, guinea and feather, measuring gravity and various calculations.

You get the idea of the depth! Frankly, I was soon left behind and grateful that I said goodbye to school umpteen years ago and wasn't required to learn this stuff anymore. However, my ignorance demonstrates the value of the discs to a dunce like me - when Sioban confidently



comes to her Dad for help with homework that might be written in Swahili for all he understands it, he can guide her to the computer and stick this disc in the CD-ROM drive.

You can browse through the disc, but as the manual observes, it is better to adopt a structured approach. The disc lets you search in one of several ways: you can go straight to a topic of specific interest or you can follow a "trail" (a recommended route through the material). The manual, which runs to just over 50 pages, suggests "trails" suitable for 11-14 year olds (Key Stage 3), 14-16 years olds (Key Stage 4, science double and for Key Stage 4, science single), and for people studying separate sciences (physics) or proceeding beyond age 16 study.

If the National Curriculum baffles you, don't worry. I think it baffles everyone except those so bright they look down on MENSA as a refuge for dolts. But for those who are interested, the disc provides comprehensive coverage of Key Stages 3 and 4 of the National Curriculum and some relevant coverage to Key Stages 1 and 2.

But back to the "trails". What they do is let you begin with the easy stuff and work up to the harder stuff, each step following the course and learning requirements as laid down by the National Curriculum.

You get images, animations and diagrams, relevant mathematics, text and audio explanations. There's also a virtual laboratory in which you can perform experiments, some impossible to conduct in a real laboratory. And at the end of

each section there is either a quiz or some relevant material on an accompanying worksheet. It is highly recommended that these be used to reinforce what has already been learned and highlight any weaknesses in one's knowledge.

Installation went without a problem – something of a relief after several temperamental discs had done nothing to soothe my irritability – and everything worked as it was supposed to. Overall, the disc had a few slight rough edges and a less than dynamic narration, but the extent to which the subject was investigated and the ease of presentation more than compensated for these drawbacks.

Spiderman Cartoon Maker

One of the problems I have with writing this column is that I have to spend lots of time researching some great software, a serious and arduous task. This month I found myself giving a lot of time to playing with, or, evaluating Spiderman Cartoon Maker.

As the name suggests, you can use this software to create your own animated

Spiderman cartoons. It sounds rather more complicated than it is, for this package is so simple you can virtually use it straight from the box. Even quite young children will have great fun.

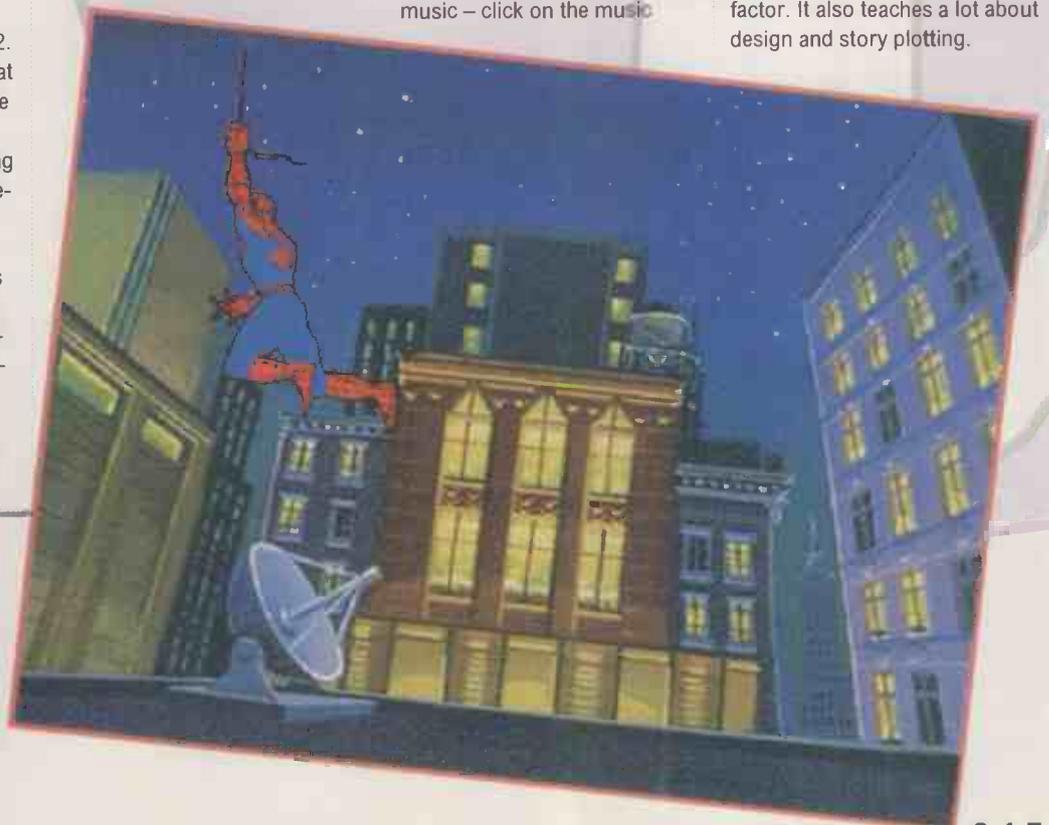
You choose a background from a collection of background scenery, then choose a foreground item or prop (a car, for example). Position it wherever you like. Then choose a moving object from the moving object library. Once you've chosen, drag the object to the required position and move it across the scene. Then click on the animation library and choose an animated character, such as old Spidey himself, or maybe one of the nasties such as Kingpin, Green Goblin, Venom or Shocker. Drag the character across the scene and have Spidey climbing down a wall, or whatever it is he does. When you play your cartoon, the picture you dragged will be animated and Spidey's arms and legs will move!

When you are happy with the animation, you need to add some sound. Maybe some music – click on the music

library button, to sample some of the available soundtracks and choose the one you want. If you have a microphone that plugs into your computer, you could add narration or sound effects.

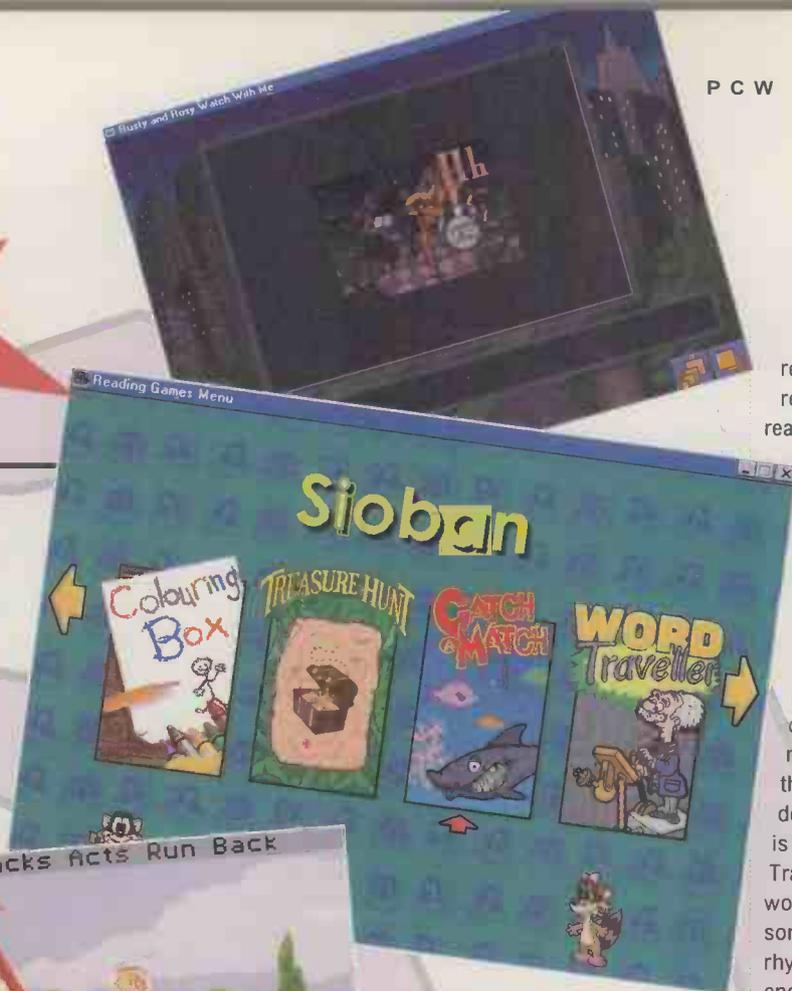
You now have scene one completed. Now comes the best part. Click on the Play button to watch your cartoon. This, of course, is Spiderman at its simplest. You can create your own backgrounds or enhance the ones provided with the various drawing tools. Several examples are provided.

I liked Spiderman Cartoon Maker a lot. Making cartoons isn't done in an eye-blink, so it's good for beating the boredom factor. It also teaches a lot about design and story plotting.



With Spiderman Cartoon Maker, you can choose a background, then make the hero or one of the baddies do your bidding

Above and right
Read With Me puts
fun and games into
pre-school learning
Below *Cartoonin'*
lets younger
children choose a
scene and a
character, then
add tracks to
move it around



Apparently, young children require something in the region of 3,000 hours of pre-reading instruction before they are ready to read. This disc is intended to add some variety and spice to some of those 3,000 hours by encouraging reading skills through various games and songs.

Catch-A-Match, for example, teaches the alphabet, colours, shapes, sizes and numbers in a simple game that involves matching the design on cards. Treasure Hunt is also a matching game. Word Traveller lets children create words. There are also alphabet songs and assorted nursery rhymes. And as if this weren't enough, those generous souls have chucked in a free video, ABC's Songs and Rhymes.

Along their respective tracks, have them jump, wait for a specified time (2 to 30 seconds), disappear and reappear, talk or think — you do this with a talk or think bubble as in a comic book.

If you have a sound card, you can record your child's voice and add it to a character. As with Spiderman, you get a good selection of drawing tools to add your own effects, such as squares, rectangles and circles, and you can fill objects with colour (useful for changing colour schemes).

Again, the program calls upon a child's initiative to plot a story, write dialogue, compose a meaningful scene and put the scenes together. It also encourages children to develop fairly advanced basic computer skills. My only real complaint is that it doesn't run under Windows.

Read With Me

Finally, every month I've been meaning to tell you about Read With Me, one of the Main Street titles from WordPerfect (Novell). Developed in conjunction with the Waterford Institute, a non-profit research centre, it's designed to teach pre-school children basic reading skills.

woodland glade — then add objects. There are several to choose from.

Then you add tracks. Now, this is one way that *Cartoonin'* is better than Spiderman. You choose a character, such as Little Red Riding Hood, then move the image around the scene. A line appears behind the character. When you want to change direction, simply click. A mark appears on the line to indicate a direction change. You can have up to 35 direction changes. What makes this so good is that you can introduce other characters, such as a squirrel or a bunny, and have them interact sensibly to the movements of the main character — for example, hiding behind a bush while the main character passes by.

You can change the speed at which your characters move

Cartoonin'

I also rather enjoyed *Cartoonin'*, one of the Create and Learn titles from VCI Software. It's a bit rough and ready around the edges by comparison to Spiderman, mainly because it runs under DOS and the graphics are fairly poor quality. On the other hand, it comes on three floppy disks (whereas Spiderman is on CD-ROM) and is relatively undemanding on resources.

Cartoonin' has a lot of charm about it, and it's better suited to young children who will find making gentle cartoons such as Little Red Riding Hood more appealing than the cut and thrust of Spidey and foes.

Cartoonin' works in much the same way as Spiderman: you choose a scene — say a kitchen interior, country cottage or

PCW Details

Forces and Effects

Price £39

(A schools version with site licence, worksheets and teacher's notes costs £116)

Contact Bradford Technology 01274 841320

Fax 01274 841322

Rating ★★★★★

Spiderman Cartoon Maker

Price £29.99 inc VAT

Contact Random House 0171 973 9000

Fax: 0171 233 6129

Rating ★★★★★

Cartoonin'

Price £24.99 excl. VAT

Contact VCI Software

01923 255558

Fax 01923 817968

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MS Windows 95

£67.00

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Quicken v4	£37.45
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Win an Oki

Up for grabs this month is some of the smartest equipment around — one 600dpi/8ppm LED printer and two brand new mobile phones.

The Oki OL810ex is one of the hottest printers around. With a 600dpi head, it has the highest resolution available for an LED printer. LED (light emitting diode) printers have a fixed head which extends across the whole width of the paper. The dpi resolution is in direct proportion to the number of elements on each inch of the head. The more elements you can cram into each inch on the head, the higher the resolution you can produce.

Up to now many LED printers have only been capable of 300dpi, but now the Oki is taking things one step further. Add to this Oki's superfine spherical toner and an outstanding page rate of eight pages per minute, and it all makes for an excellent little printer which will make your documents look professional and offers superb results for your photographic reproduction.

Oki has a reputation for producing very high-quality mobile phones and the OKIPHONES 1325E is no different. It can easily be programmed to store up to 60 names and numbers and the first 10 memory locations can be called by one-touch dialling. With a range of battery options from slim to extended life, it can provide over three hours of continuous talk time or 29 hours standby time. Oki is offering free installations for the mobile phones.

The winner of the competition will receive the LED printer, and two runners-up will receive a mobile phone apiece*. So, if

you fancy one of these, simply tell us what LED stands for:

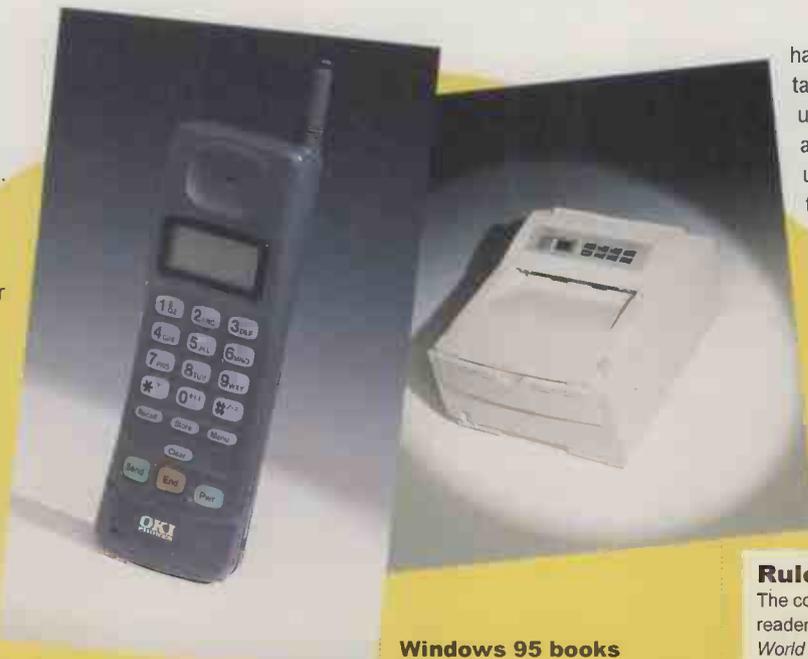
- (a) light emitting diadem
- (b) light emitting diode
- (c) laser emitting diode

Accent Professional

Accent Professional is the only word processor for serious polyglots. You can type in over 30 languages, including Hebrew, Arabic, Belorussian, Icelandic, Ukrainian and all other European languages. You can change the language of the menus and dialogue boxes, and to help you there are 50 keyboard maps as well as spell-checkers, thesauri and on-line help in many of the languages. It even includes integrated Winfax capability and Lotus Organizer. To win one of 20 copies, simply answer the following question:

X is 'A' in which of these languages:

- (a) Greek
- (b) Russian
- (c) Hebrew



has demo versions of contact managers, Internet utilities and multimedia accessories and yet more utilities. To win either of these books, answer the following easy question and, on the coupon, state which book you would like:

When was Windows 95 launched:

- (a) January 1995
- (b) August 1995
- (c) August 1994

Rules of entry

The competition is open to all readers of *Personal Computer World* except for employees, and their families, of VNU Business Publications, Oki, Accent Software and Transworld Books. All entries must be made by 17 November 1995. The Editor of *PCW* is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of prizes.

* Winners of mobile phones are subject to status and a standard Martin Dawes 12-month airtime contract: a choice of tariffs is available and all charges are subject to VAT.

Windows 95 books

To help you get your head around Windows 95, IDG Books is offering eight copies of *Windows 95 Secrets* and *Winning with Windows 95*. *Windows 95 Secrets* is aimed at intermediate users to experts and comes complete with a CD-ROM which includes Paintshop Pro, WinZip NT 5.5 and E-Mail Assistant. For the beginner there is *Winning with Windows 95* and its CD

PCW - Oki/Accent Competition

Name.....

Address.....

Postcode.....

Daytime Tel.....

Answers:

- | | | | |
|---------------------|----------------------------|----------------------------|----------------------------|
| Oki | a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> |
| Accent Professional | a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> |
| Windows 95 books | a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> |

Tick which book you would like to receive:

- Secrets of Windows 95 Winning with Windows 95

Send your completed coupon to: November Competition, *Personal Computer World* Editorial, VNU Business Publications, VNU House, 32-34 Broadwick Street, London W1A 2HG.



Screenplay

NEWS

Jungle fever '95



Remember the classic jungle adventure Pitfall on the Atari VCS2600? Well, now you can swing into that old-fashioned action on your PC with the latest title from Activision.

Developed specially for Windows 95, Pitfall: The Mayan Adventure brings all the excitement, speed and flare

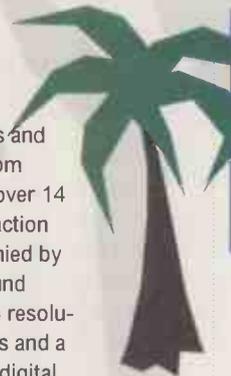
normally associated with top console games to your desktop.

You play the part of Harry Jr, son of original Pitfall Harry, on a quest to rescue his dad from an evil Mayan warrior. In true Indiana Jones style the path to pa's freedom will have you dodging crocodiles, bungee jumping,

using boomerangs and swinging from tree to tree over 14 levels. The action is accompanied by ambient sound effects, high resolution graphics and a spectacular digital video introduction.

Pitfall: The Mayan Adventure was designed by Hollywood animators and film musicians who worked on projects such as Cliffhanger, Home Alone 2 and True Lies. Priced at £44.99, it requires a 486/33 or better with 8Mb RAM, double-speed CD-ROM drive and Windows 95. Look out for a full review soon.

Activision 0181 742 9400



Make or break

Team 17, best known for action arcade games, is moving into the strategy arena with an online multi-player affair called Profits Warning.

This is a game of financial wizardry, with a direct link to the stockmarket that allows play to be updated on a regular basis. The game will be monitored by Team 17 which is running a three-month competition, at the end of which the player with the biggest bundle can win a BMW 325i SE or £25,000 cash.

Certainly something different, Profits Warning goes live on 1st October 1995.

Team 17, 01924 267776

It's out of this world

Pinball specialists at 21st Century Entertainment are set to release the largest pinball simulator ever to grace the PC. Pinball Worlds will be available on CD-ROM and features no less than 19 themed tables together with a series of unusual sub-games.

The table themes centre around different countries and places, such as China and Japan or

New York City. Along with the usual flippers and bells the tables are filled with items like pulleys, water currents and magnetic poles, each with its own effect on the ball. The sub-games involve using these to complete additional tasks so that you can move on to the next level.

Pinball Worlds will be priced at £44.99.

21st Century is on 01235 851852



Sega saga

Panzer Dragoon, Sega's fantasy 3D shoot-em-up for Saturn, has at last been officially launched in the UK. Reviewed in our comparison of the Sony Playstation and Sega Saturn on

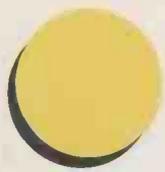
page 96 of our September 1995 issue, the game has gone straight in at number one in this month's all formats CD-ROM sales charts.

The game casts the player as

a lone crusader with a pet dragon, out to rid his world of evil alien invaders.

The plot stinks but the graphics and the gameplay are everything you have come to expect from Sega.

Panzer Dragoon costs £49.99 and is available from all good games stockists.



La Forge:
"Someone
has let all
the water
out of the
pool,
captain"



Star Trek: The Next Generation - A Final Unity

It's fun Jim, but not as we know it... Daniel Robinson brings good tidings to Trekkies everywhere.

“ Captain, I am unable to set course for Mutara sector. There is not enough memory to complete the operation.” “Very well, Mr Data, inform Starfleet that we need that Windows 95 upgrade NOW....”

If you're a fan of Star Trek, playing A Final Unity is probably the most fun you are likely to have next to dressing up as Mr Spock at Trekkie conventions. You get the chance to dash around the galaxy, boldly splitting infinitives that no man has split before, and even hear the actual voices of the Next Generation TV cast to accompany the action.

The scene is set for you at the start of the game in an impressive animated sequence using rendered simulations of the crew and the Enterprise itself. Sadly, the game graphics aren't quite up to this standard, but they are highly detailed and colourful and you can easily recognise all the usual crew members.

Without giving too much away, the main theme of the game is a kind of cosmic diplomacy mission, in which you attempt to prevent a disastrous civil war from breaking out among the Garidians. Relations with the Garidians are lukewarm to say the least, so a

successful outcome will get you lots of brownie points from Starfleet Command. After rescuing some Garidian political refugees at the start of the game, you discover that only a mysterious missing text written by the founder of Garidian society can save the day.

On board the Enterprise, you act as Captain Picard and can take direct control of the various functions or just leave them to the relevant crew member. This means that you can actually fly the Enterprise using keyboard controls, and take on the baddies with phasers and photon torpedoes. Alternatively, you may feel that such things are best left in the capable hands of

Lt. Worf. You can similarly take control of Engineering (you need to go down the Turbolift to reach it) and adjust power distribution and damage repair systems, but this is usually delegated to Geordi La Forge. The Enterprise main computer provides

extensive background information to help you on your quest, and you can always ask one of the crew for advice or confer with Starfleet Command if you feel it necessary.

Most of the action takes place on Away Team missions, with a



handful of crew members beaming down to carry out certain objectives. There are quite a few of these Away Team missions to carry out on the way to your final objective, each one of which is

- 1) *The Bridge. This is where it all starts from*
- 2) *The Away Team is ready. Stand by to engage Transporter...*
- 3) *Garidian Warbird on the starboard bow (funny, looks like a Ferengi Marauder to me)*



like a mini episode from the series. Each has a fairly extensive playing area with imaginatively illustrated backgrounds and a variety of alien life forms and artefacts to contend with. One such mini-adventure finds your Away Team trying to rescue a crippled satellite base whose power generator will shortly explode unless it can be brought back under control.

Unless you are playing in the lowest skill level (Ensign), you

get to choose the appropriate crew for each Away Team.

Some knowledge of the series comes in handy here – it is wise to pick Geordi La Forge in situations that need technical know-how, for instance, whereas other crew members have their own special skills.

This needs to be borne in mind when using equipment such as the Tricorder and Phaser, or when extracting information from other subjects.

Counsellor Troi is often best in these situations, thanks to her empathic abilities.

The entire game works very well. Each Away Team mission seems quite distinctive from all the others, and this makes it much more than just another adventure game. It's probably the nearest you will get to actually being in Star Trek, until someone comes up with a virtual reality simulation of the Enterprise.

System Requirements

33MHz 486DX, 8Mb RAM, double-speed CD, 20Mb hard-disk space free, sound card, SuperVGA graphics.
Price £45 - £50 (street prices vary)
Contact Microprose 01454 326532

Command and Conquer

Was Westwood's Dune spin-off worth the long wait? Daniel Robinson is gripped as he embarks on the ultimate battle of wills.

Westwood's Command and Conquer is one of the most eagerly-awaited games this year — not least because its release has been delayed several times. In fact, the version we have reviewed was still in beta, though it was stable enough to judge accurately. Was it worth the wait? Most gamers will think so — it's not without flaws, but it looks set to become a classic.

If you've seen Dune and Dune II, Command and Conquer will look familiar. It's based on the same basic engine, but it no longer refers to any of the rather daffy Dune myths, instead inventing an equally daffy battle between the UN-backed GDI and an army of ruthless terrorists called NOD. As with Dunes I and II you control men and vehicles using an easy-to-grasp, wholly mouse-driven interface. You click on individual soldiers and tanks or drag across several of them to control a group. Click on a place on the map to move

soldiers around or on an enemy to fire at him. In some scenarios you have a fixed number of troops, but in most you also construct a base with buildings, which allow you to build and repair units.

Command and Conquer isn't quite as easy as its designers think. There are a couple of places where you'll probably find yourself wondering how you deploy the NOD armour you have built, or how to start producing from the enemy's captured base instead of your own. The manual is just 60 pages long and only 20 of these are on how to play the game. You also need to discover your units' strengths and weaknesses by trial and error, as the information about them in the manual is sketchy.

You can't use your bases to churn out as many units as you like. They have to be paid for, either from existing reserves or more likely by mining Tiberium (the equivalent of Dune's spice).



The easy-to-grasp ground combat alone makes this a game worth playing, but it's the added strategic element of base building and protecting your Tiberium supplies that makes it irresistible.

Command and Conquer demands a more powerful computer to play it than its predecessors and requires a CD-ROM

drive, as it comes on two CDs. Westwood uses these new capabilities to add some significant improvements. The Command and Conquer map and units are beautifully detailed, even though the screen resolution is still only

320 x 200. Almost everything is animated — when an infantryman isn't moving around he will sit down or start cleaning his weapon, and when he comes under fire he drops to the ground and starts crawling.

The increased storage capacity of the CDs allows for larger battlefields in each mission, a greater variety of units, more music and some occasionally interesting video clips between missions. The missions are hard — in fact, too hard. There is no way to adjust the difficulty levels, and there are several scenarios where you just can't win the first time: you have to get licked, then fight again once you know what the other side has got. It

can take hours to advance through particularly tough missions, and you don't get to play with all of the interesting tanks and aircraft until you've played many hours with more primitive equipment. There are 18 levels for each side, but the game is so engrossing that you won't mind having to waste weekends on it.

Apart from the added gloss, there are some important added features. The AI for the computer player has been improved; it still occasionally makes foolish mistakes, but on the whole it's a worthy opponent. Probably the best improvement in Command and Conquer, though, is its support for fighting other people. Command and Conquer should allow you to fight up to four other people across an IPX network or one other person across a serial cable or modem line. It is not yet clear whether it will work with DOS utilities like Kali designed to allow Novell network games to work across the Internet. Using a single copy of the game, two people can play each other across the network using the two CDs in different machines

(though if this happens regularly, Virgin would prefer you to buy two copies).

This is a game well worth buying and if you are lucky enough to have a friend with a computer they can bring around, it's a must.

System Requirements

Minimum: 486/33 with 4Mb of RAM, 30Mb free disk space, double-speed CD. IPX network, modem or serial cable and 486/66 required for network play. 486/66 with 8Mb of RAM recommended.

Price £44.99 (inc VAT)

Contact Virgin 0171 368 2255

Charts



LEVEL ONE

1	Star Trek Final Unity (CD)	Microprose
2	Syndicate Plus (CD)	EA
3	Ecstatica (PC/CD)	Psygnosis
4	Dungeon Master 2 (CD)	Interplay
5	Privateer (CD)	EA
6	Full Throttle (CD)	Virgin
7	Terminal Velocity (CD)	US Gold
8	DiscWorld (CD)	Psygnosis
9	Ultimate Doom (PC)	US Gold
10	FX Fighter (CD)	Philips
11	Nascar (CD)	Virgin
12	Across the Rhine (CD)	Interplay
13	Dark Forces (PC/CD)	Lucas Arts
14	Day of the Tentacle (CD)	US Gold
15	Transport Tycoon (PC/CD)	Microprose
16	Colonization (PC/CD)	Microprose
17	Syndicate Plus (CD)	EA
18	X Wing (PC)	US Gold
19	Player Manager 2 (PC/CD)	Virgin
20	EA Sports Rugby (CD)	EA

Lelisure Lines

Brainteasers courtesy of JJ Clessa.

Quickie

What is the only word in the English language that ends in the letters SEDE?

This Month's Prize Puzzle

In the 8 x 8 grid below there is a hidden message. You can start with any square and moving only one square at a time, in any direction including

S	E	H	T	E	P	L	L
U	E	I	N	X	E	A	T
O	M	A	Y	T	A	H	F
O	T	T	L	C	H	C	G
N	W	D	S	W	O	I	H
M	O	T	I	S	Y	U	O
P	U	G	I	E	M	C	N
D	E	T	E	I	R	O	T

diagonally, you must traverse the entire grid landing on every square once only and noting the letter each square contains. If you move in the correct sequence, a message will be spelled out which should be easily understood — even if you don't choose the correct starting square. If a move takes you to the edge of the grid, the next move

may be to the other end of the row, column, or diagonal, which you are on. For example, numbering the squares from 1 to 64, from left to right, row by row — if a move takes you to square 24 (right edge, 3rd row down), your next move could be to squares 16, 15, 23, 31, 32, 17, 6 or 59, providing they have not been landed on earlier.

The message contains a problem which has a simple answer. All you have to do is write the answer to the question on a postcard or the back of a sealed envelope — no letters and no floppy disks, please. Then send your answer to: PCW Prize Puzzle - November 1995, P.O. Box 99, Harrogate, N. Yorks HG2 0XJ, to arrive not later than 20th November 1995. Good Luck!

Winner of August 1995 Prize Puzzle

The August problem, relating to the number rings, attracted about 120 entries. Most of you found the longest ring which, using a factor of 7, gave a ring comprising 10 numbers:

15 36 45 39 66 48 60 42 30 21

Naturally, the ring could be started from any of these.

The winning card drawn from the pile came from Mr Jason Ozin of London, Congratulations, Jason, your prize will be with you shortly.

Meanwhile, the usual message goes to all the nearly-wons: keep trying, it could be your turn next.

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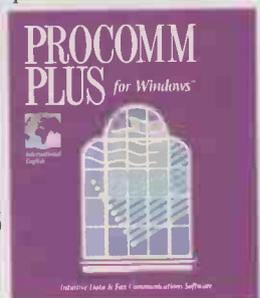
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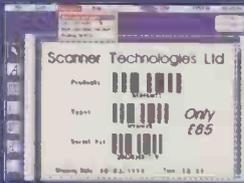
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Hands On is the place where readers can contribute to *PCW*, and as always we'll pay for anything we use. Macros, sections of code and hints and tips will be rewarded with a £20 book or record token (please say which you'd prefer) and we'll pay hard 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.ccmil.compuserve.com



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Split personality

The multiple-user feature of Win95 is a valuable asset for both networks and home PCs. Tim Nott shows you how to set it up and how it works.

One of the brand new features of Windows 95 is the ability to have multiple users on a single machine. This is tremendously convenient on a network, as it means someone can log in from anywhere on the system with their name and password, and have a desktop identical to the one on their usual machine. It's also useful on standalone machines used by more than one person, such as a home PC.

Setting this up is easy: go to Control Panel, click on the Passwords icon and select the User Profiles tab. There is a choice between all users sharing the same settings and users customising their own, so choose the latter and make sure the two boxes below are ticked. Next time you start Windows, a dialogue box will appear with a space for the user name and password. Fill this in, and Windows will "remember" any changes you make to the Desktop, Start Menu and (if applicable) Network Neighbourhood. You'll also get a personal Start Menu Documents list and your own Briefcase.

The way Windows does this is two-fold. If you look in the main Windows folder, you'll see a new folder called "Profiles". In this is a folder for each user and in each user folder are more folders for items on the Desktop, the Start Menu, Recent documents, and so on.

But this is only half the story — there is a whole load more stuff held in the Registry. Although Windows 95 reads CONFIG.SYS, AUTOEXEC.BAT, WIN.INI and SYSTEM.INI at startup (if they exist) it does this only to ensure backward compatibility. The registry is where all the settings, previously in these and other .INI files, are stored.

Windows 95 maintains two files: SYSTEM.DAT and USER.DAT, and backs these up with the .DA0 extension. If the .DAT files are found to be corrupt on startup, then the backups are used. With multiple users enabled, each one has a personal USER.DAT file. When a user logs on, these settings take over from the defaults. Most Control Panel settings such as colour and sound schemes, screen-savers, wallpaper, icon spacing, window font settings, mouse and keyboard options, are stored here. In addition, 32-bit Windows 95-aware applications can store the sort of information formerly held in private .INI files or a private WIN.INI section, so each user has not just a custom desktop but customised applications as well. All this is transparent to the user, who

changes things as normal from Control Panel or an application's Options menu. If you want to see how this works, open Edit Registry which will be nested somewhere in the Start menu. If you can't find it, type "regedit" in the Run... box. Click on HKEY_CURRENT_USER and the tree will expand. Click on Control Panel and you'll see a list of its various parts, and clicking on one of these shows the settings. You can edit these directly but it's a lot harder than the old-style .INI files and it's much easier to get things wrong, so meddle at your peril. Further down the tree you should see a section titled "Software" and it's here that personal settings for the other applications are stored.

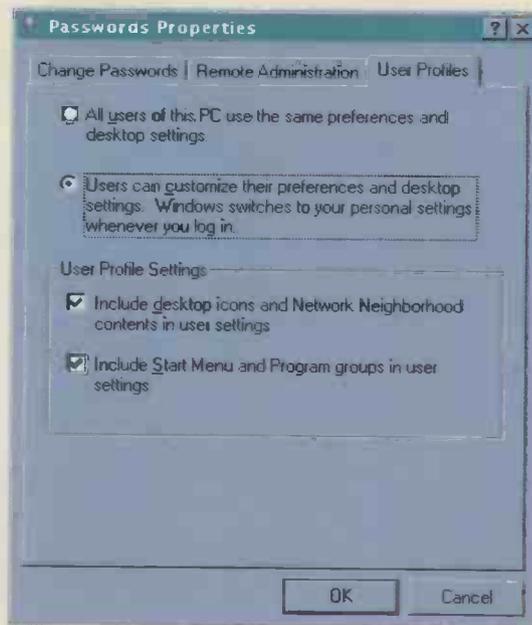
There is much more to the concept of multiple users than this, though. The System Policy editor, to which I'll return at a later date, offers a whole range of security features that go far beyond the Windows 3.1 Program Manager restrictions.

Scraps do the trick

One of the things I yearned for in Windows 3.1 was a multiple clipboard. Sure, you could save .CLP files and Windows 3.11 would let you see more than one at a time, but it was still awkward to use. So try this: open a document in Wordpad and highlight a piece of text. Drag it right out of the Wordpad window and drop it on the desktop. You'll end up with something called a Scrap, an OLE object containing the selected text. You can then open the scrap into a new copy of Wordpad, drag it back into the same or another Wordpad document, or drag it back into another application to insert it as an OLE object. Because you can repeat the process, you effectively

have a many-barrelled clipboard. The same trick works in the Office 95 versions of Excel and Word, but the latter has another trick as well. Right-drag the selection onto the desktop, and you'll get the choice of creating a shortcut instead of a scrap. Close Word, click on the Shortcut and Word will restart, reload your document, and go to the spot that you dragged text from.

With the test release version of Word there is only one snag to all this: the shortcut file size is often larger than the file to which it points, but this might not be as bad as it looks.



Enabling multiple configurations on the same PC

Where are they now?

Here are some old favourites in new guises:

- **Scroll bars**

It's not a new idea but these have changed. The longer the scroll bar, the greater the proportion of the document or folder content is currently visible.

- **Sort buttons**

One thing I really miss is the button bar in Windows 3.11 File Manager that lets you sort files by name, extension date or size. I was getting heartily sick of having to dig into the second level of the View menu of a folder, or Explorer, to do this. When I finally bothered to look at the online help, it said: "When you display files in Details view, you can sort them by clicking the column headings." A second click reverses the order.

- **Taskman**

Whatever happened to the Task Manager? It's still there — run Taskman from the start menu — but its function is superseded by the Task bar which provides a running count of all visible windows. Accessing this from the keyboard is rather awkward however: you have to press Ctrl + Esc which pops up the Start menu, then Esc to close the start menu, Tab to switch focus to the Task bar, then the arrow keys to switch between buttons. It's much quicker to use Alt + Tab to switch from the keyboard: this now shows the icons for every task simultaneously, rather than one at a time. If you really miss that old Task Manager though, try creating a shortcut to Taskman.exe on the desktop and assigning it the shortcut key of your choice. If you're curious about what's running behind the scenes, pressing Ctrl + Alt + Delete shows a list of all running programs.

- **File run...**

Now, on the start menu. Just as before, you can run programs or associated data files (myfile.txt for example) but there's now the added bonus of being able to "run" a folder. You don't always have to type the full path: for instance, "Fonts" will open C:\windows\fonts.



Hammer your personal touch onto the startup screen

- **Copying and pasting**

The keyboard shortcuts for copying, cutting and pasting remain unchanged as Ctrl + C, X and V, and the old Windows shortcuts still work too: Ctrl + Insert, Shift + Delete, and Shift + Insert. Southpaws don't even have to take their left hand off the mouse.

- **Screen play**

A really important question is "How do I change the startup screen?" The startup screen image is an ordinary 256-colour .BMP file, with a couple of peculiarities: it is stretched in use from its 320 x 400 pixel size, and it has been given a .SYS extension to deter meddlers. But don't let that stop you. Make a backup of LOGO.SYS, which you'll find in the root directory of your boot drive. Start Paint, and you'll find you can load LOGO.SYS just like an ordinary .BMP file. Dabble away and save the results (you'll lose the animation at the bottom). If you want to pull the same trick on the closing-down screens, the "Please wait..." screen is LOGOW.SYS and the "Now safe..." screen is LOGOS.SYS in the main Windows folder.

This leads to a word of warning about shortcuts in general: that little line in the property sheet that says "291 bytes" or whatever isn't telling the whole truth. Each file on your hard disk takes up one or more "clusters". The minimum size of a cluster varies with the size of the partition: 4Kb on a 200Mb disk, 8Kb on 500Mb and so on. Look at the properties for your hard disk(s), create a shortcut, and look again. If you get some totally illogical change, it's probably because Windows has decided to dynamically alter the swap file size, so

try the experiment when nothing else is running. This is one of the ways disk compression software scores, as each physical cluster on the hard disk can be packed with many small files.

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Foundation class

To run Windows efficiently, it is important to have your DOS set up correctly. Tim Nott describes how and why DOS works, and looks at the commands in the Config.sys file.

There are two aspects to consider when looking at Windows in relation to DOS: running Windows from DOS, and running DOS from Windows. With the former we have no choice under Windows 3.1 or 3.11, and even with the most perfectly tuned Control Panel settings and INI files Windows will run badly, or not at all, if the DOS preliminaries have not been set up correctly.

With apologies to the majority of readers who already know this, and in the hope of demystifying the subject for the minority who don't, let me explain: a PC has to go through a fairly lengthy process of preparation when you switch it on.

First, it loads the display-card BIOS (you might see a little message if your monitor warms up quickly enough). If everything squawks loudly and grinds to a halt here, then either something is truly broken or there is an address conflict.

Some S3 and ATI display cards use a memory address that is usually assigned to COM4, and if you try to install a modem or other device to this port, the card won't work.

Next, the motherboard BIOS (Basic Input/Output System) loads, ticks through a memory check — known in impolite circles as the "BIOS fart" — and retrieves settings for things such as the time, date and the types of disk drives on the machine, from a battery-backed chip known as the CMOS (Complementary Metal-Oxide Semiconductor).

Finally, it goes looking for a boot disk: first in the floppy drive and then the hard disk. Looking first in the floppy drive means that the user can use a floppy boot disk if they don't want the usual configuration (for a game, perhaps), or can rescue the situation if the hard disk boot files have become corrupted. It is easy, and

essential, to make a boot (or system) disk — you can do it from File Manager's Disk menu. If there is a disk in the floppy drive but it isn't a system disk, you'll get an error message and things will grind to a halt. This does no harm in itself — usually you just have to remove the disk and press any key — but it is the most common way of catching a virus, so you should try to avoid leaving floppies (especially those of dubious provenance) in the drive between sessions.

To be recognised as a system disk, and to start DOS, there must be three files present: under MSDOS these are IO.SYS, MSDOS.SYS and COMMAND.COM. The first two are system files and are usually hidden from directory listings, but you can use File Manager's View/By file type.../ Show Hidden/System Files option to see them. The third is a small program (the Command Interpreter) that processes your DOS keyboard input and has built-in commands for things such as changing directories and listing their contents. Once all this lot has loaded, DOS takes over from the BIOS and you see the familiar C:> prompt. This process is known as "booting" because in effect the system is pulling itself up by its own bootlaces — if you see what I mean.

However, the fun is only just starting: DOS doesn't know, as yet, what country it's in or where anything is. It won't have

```

Dos
MS-DOS Help: HIMEM.SYS
HIMEM.SYS

HIMEM is an extended-memory manager—a program that coordinates the use of
your computer's extended memory, including the high memory area (HMA), so
that no two applications or device drivers use the same memory at the same
time.

You install HIMEM by adding a <DEVICE> command for HIMEM.SYS to your
CONFIG.SYS file. The HIMEM.SYS command line must come before any commands
that start applications or device drivers that use extended memory; for
example, the HIMEM.SYS command line must come before the EMM386.EXE command
line.

Syntax
  DEVICE=[drive:][path]HIMEM.SYS [/A20CONTROL:ON|OFF] [/CPULOCK:ON|OFF]
  [/EISA] [/HMAHIN=n] [/INT15=xxxx] [/NUMHANDLES=n] [/MACHINE:xxxx]
  [/SHADOWRAM:ON|OFF] [/TESTMEM:ON|OFF] [/VERBOSE]
  
```

Online help is available for all that mysterious DOS stuff

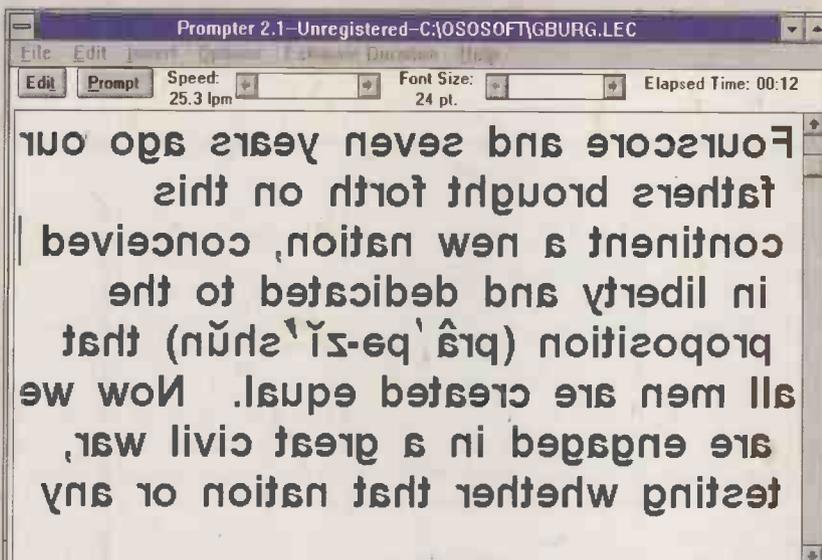
Prompter is right on cue

Following last month's critical acclaim for Bubba (a parody of Microsoft's Bob interface) I've been sent a floppy disk full of other products from Ososoft. Sad to report, they're all extremely sensible. There are small-ad, label and business card designers, clip-art and font management and a multimedia file manager.

The utility that caught my eye, however, was Prompter. This is a variant of the auto-cue machine — the thing that politicians use to make those "impromptu" speeches and Ronald Reagan used to order his breakfast. You import the text of your speech (or edit it in the program), set your notebook PC up on the lectern, set the font size and scroll speed, and spout away. There's a facility to show phonetic pronunciations of difficult words such as "proposition", and the whole display can be set in reversed text so you can view it via one of those semi-mirrored screens that gives the audience the impression that you're still looking at them.

Ideal for nervous presenters and wannabe demagogues alike, Prompter handles speeches of up to an hour's duration (but it doesn't guarantee that your audience will), and there are override controls should you need to pause while the assembly rolls about laughing at your jokes.

Prompter.zip is on this month's cover CD-ROM and needs VBRUN300.DLL to run. If you don't have a CD-ROM drive, but do have a modem and can stand the phone bill, you can dial the Ososoft BBS in the US on (805) 528 3753, 300-14400bps, 8N1, or nearer to home GO OSOSOFT on CompuServe.



You, too, can address the multitude with Ososoft's Prompter

any caching or drivers loaded and its default memory configuration won't let it run Windows. Just as the CMOS retains settings such as the type of hard disk so that the BIOS can find DOS, two text files (CONFIG.SYS and AUTOEXEC.BAT) store the more changeable aspects of a PC's setup.

Taking CONFIG.SYS first, because DOS does, the very first line (allowing for path variations) should be:

```
DEVICE = C:\DOS\HIMEM.SYS
```

Although your PC has four, eight or more megabytes of RAM, raw DOS only "sees" the first 640 kilobytes. The area between 640Kb and 1Mb is usually known as Upper Memory, the first 64Kb after that as High Memory, and the rest as Extended Memory. HIMEM.SYS is the Extended

Memory Manager that makes all this available to Windows and for loading DOS "high". If you want to find out more about HIMEM.SYS or about any other aspect of DOS, see tip number one in the Ten Top Tips box (page 262).

Next in line is the Expanded Memory Manager, which sounds depressingly similar but is actually quite different. Without going into too much gruesome detail, a program such as Windows sees extended memory as a vast open field, through which it can roam at will. Programs that use expanded memory can also access any part of the field, but not directly — it has to be dug up and placed in a bucket first. Windows doesn't need expanded memory even though some DOS applications do, but the Expanded

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Ten Top Tips for Windows

DOS To find out more about a DOS command or topic, open a DOS window and type "help topic".

File Manager The File/Search command has all sorts of uses, as Shane Devenshire, of Walnut Creek, California, points out. If you want to erase all .TMP files, or maybe back up all .DOC files scattered around your hard disk, enter *.TMP into the Search For box, the root directory in the Start From box and check the Search All Subdirectories option. You can then select all the files (Ctrl + I) and copy, move or delete the files in one go.

Notepad If you type ".LOG" as the first line of a Notepad file, then

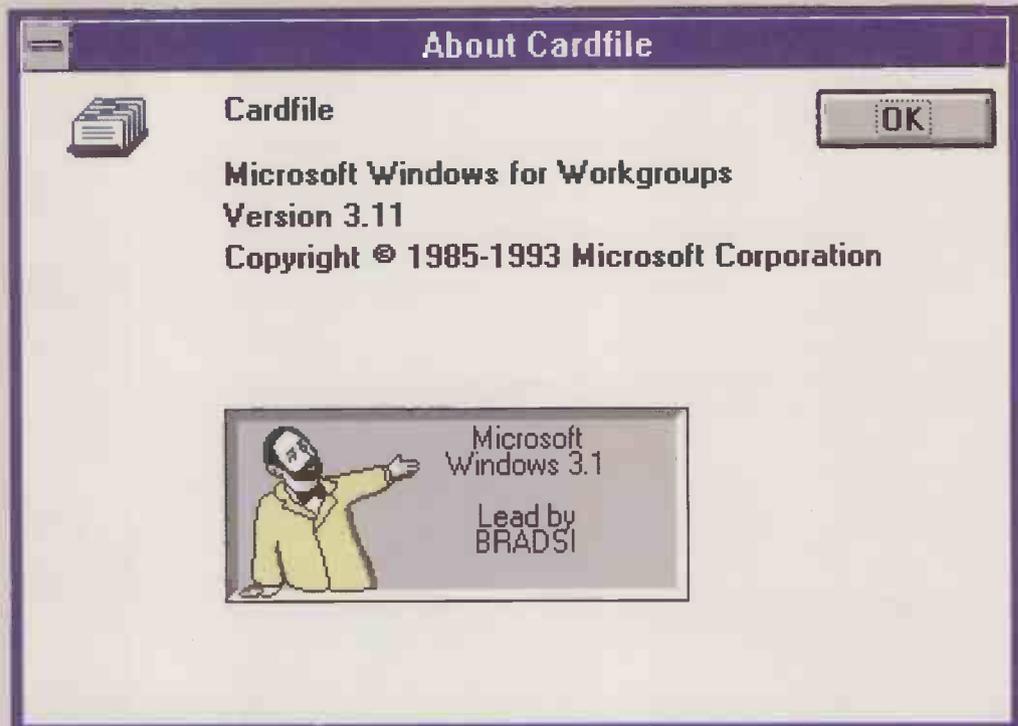
Notepad will add a time and date stamp every time you open the file.

Write Write will eat anything — you can load not just text files but program files too, if you're curious. Just be careful not to inadvertently save changes.

Windows Files If you're wondering what's what in your Windows and Windows\System directories, remember that original Windows 3.1 files have a creation date of 1/11/93 and a time of 03.11.00. Windows 3.1 files show 1/03/92 at 03.01.00. Thank you, Jonathan Sandys, for that one.

Help If the Help window has vanished, or its title bar has become unreachable sited off screen, delete the entire [Windows: Help] section from WIN.INI. Windows will revert to a sensible default position.

Minesweeper It's sad, but true. You can, if you want, cheat at Minesweeper. When you're stuck, type "xyzy", then hold down the Shift key and look at the top left pixel of your desktop. It will light up



● The Windows gang screen, with the bearded Brad Silverberg

when you're over a safe square. You might need to change to a dark background to see this.

Fonts You can drag font files from File Manager and drop them onto the Control Panel/Fonts dialogue. The fonts will be installed and copied to your Windows\System directory without having to touch the Add button.

Cardfile If you want to export the contents of a Cardfile as plain text, first install the Generic/Text Only printer driver on FILE:. Choose this printer from Cardfile's Print Setup dialogue, then Print All. You'll be prompted for a filename.

Gang screen From Program Manager (though this seems to work with other applets) go to Help/About... Hold down Shift + Ctrl and double click on the icon in the top left of the box. Let go of Shift + Ctrl and click OK. Repeat. You should see a fluttering flag and a dedication. Repeat again, and you'll see in turn: cartoon figures of Bill Gates, Steve Ballmer, Brad Silverberg and a bear, together with a scrolling list of credits.

Memory Manager has another use: it gives access to the Upper Memory area. Although some of this area may already be taken up with system and display ROM, there's usually a fair bit free.

By loading

```
DEVICE = C:\DOS\EMM386 NOEMS
```

this upper memory is made available for all the other bits and pieces that are subsequently loaded. (Note that there may be other settings in this line to include or exclude various areas of memory — see the DOS help file.)

The rationale for doing this is to keep as much conventional memory free as

possible. DOS games in particular often need a large amount and even if you've got a 32Mb machine, if only 500Kb of conventional memory is free, they won't run. Despite its seamless view of extended memory, Windows also needs conventional memory.

We covered this ground in September 1994, but to recap briefly, every application needs a small amount (often only 512 bytes) of conventional memory. Other parts of Windows take more, and some applications, such as WinFax version 3.0 and the MS Word Internet Assistant, use a lot more, so it's a good idea to keep as

much as possible free even if you don't run DOS applications or games.

Next in the CONFIG.SYS line-up should be:

```
DOS=UMB
```

This enables DOS to load device drivers and programs high — it won't work without HIMEM and EMM386 loaded.

```
DOS=HIGH
```

forces DOS to load as much of itself as possible in the High Memory area. You can combine these two commands as

```
DOS=HIGH,UMB.
```

If you're using Windows 3.11, then to take advantage of the 32-bit file access

you need

```
DEVICE=C:\DOS\IFSHP.LSYS
```

Again, the path may vary, but this is the real-mode "stub" for the Windows 32-bit file and cache systems.

```
DEVICE=C:\DOS\SETVER.EXE
```

is a kludge. It stops programs written for previous versions of DOS panicking when they detect a later version. If you type "SETVER" at the DOS prompt, you'll see a table of these programs and the versions they expect. Oddly, this includes Word for Windows and Excel, but it doesn't say what versions. You could try disabling this by putting REM at the beginning of the line and seeing if anything complains, but as it only takes a few hundred bytes it probably isn't worth the trouble.

```
BUFFERS=(number)
```

is another blast from the past, designed to provide a temporary holding area for data being read or written to disk. If you're using Smartdrv or Windows 3.11 Vcache you don't need this line at all — each buffer wastes about half a kilobyte of memory.

```
FILES=(number)
```

If you get error messages such as "insufficient file handles" in DOS sessions, try increasing this. The magic number, according to Microsoft, is 45.

```
STACKS=(number, number)
```

Windows 3.1 sets this to 9,256 on installation. It helps prevent Stack overflow which is actually as nasty as it sounds, so leave it alone. Conversely, if you have a different value, or no value, and everything works fine, don't worry.

```
COUNTRY=044,,c:\dos\country.sys
```

(for the UK). Windows doesn't need this, but if you want DOS to use UK date styles, leave it in. It doesn't use any memory.

```
SHELL=C:\DOS\COMMAND.COM C:\DOS\ /E:800 /p
```

(a typical value) has two purposes. First it points DOS at the command interpreter, COMMAND.COM, if this is not in the root directory. Secondly, the /E: switch can be used to increase the size of the Environment. This is a small part of memory that holds environmental variables assigned with the SET or PATH commands in Autoexec.bat. It defaults to 256, but if you have a long PATH statement or lots of SET commands you may need more.

```
LASTDRIVE=(letter)
```

You only really need this for networking or doing things such as cable-connecting two PCs via Interlink, for instance. If omitted, the value defaults to the letter after the last existing drive — more just wastes memory.

After that it's a free-for-all with specific hardware and disk compression drivers

Flannel panel

The flattery-will-get-you-almost-anywhere correspondent of the month award goes to Grahame Giddings, who has written a Visual Basic application called Cricket Statistics for Windows.

I declined his kind offer of a review copy, because, I explained: "My knowledge of cricket is minimal, and I would be talking out of my (*expletive deleted*) were I to feature it in the column. And I do quite enough of that already." Undaunted, Grahame replied: "Sounds like the ideal qualifications for an England selector", which I think deserves a plug. So, sight unseen, Cricket Statistics does all sorts of statistical crickety things ranging from batting averages to tea rotas; it's shareware and all the profits go to the Ottershaw Colts team. It's in the CIX Filepool as CRI-STAT.EXE (approximately 1.2Mb in size) and the author's email address is ggiddings@cix.compulink.co.uk.

loaded to suit your set-up. If you have a CD-ROM drive, for example, you might have

```
DEVICE= lines
```

to load its controller. Scanners, soundcards and other hardware might need drivers loaded, but read the manuals carefully and check that you're not loading these unnecessarily — the popular SoundBlaster Pro 16 comes with specific Windows drivers and doesn't need the real-mode *.SYS files loaded to work under Windows.

Windows doesn't need any mouse drivers loaded either, but there's a catch here: if you want to use a mouse in a DOS window, the driver must be loaded before Windows starts.

And that just about wraps up CONFIG.SYS for the moment. Next month we'll take a look at the other half of the celebrated comedy act, AUTOEXEC.BAT, and how you go about loading device drivers and programs into upper memory.

PCW contacts

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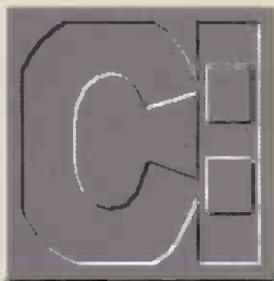
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The upper hand

Locating resident programs and drivers in Upper memory, speeding up indexing and sprucing up MSDOS 5, all calmly dealt with by Simon Collin.

Several issues ago you published an 'ideal' configuration for a standard PC with 4Mb of RAM. I followed this and have freed up some extra RAM, but I'm not too sure which of the resident programs and drivers are loaded where. To make the most of my setup, I would like to know if there is any way of telling where a program is located. Is it in upper memory, for example, since I don't think my configuration is making the best use of upper memory."

PCW Upper memory is not difficult to deal with and is a very useful area in which to store resident drivers out of conventional memory. The upper memory area lies between the 640Kb and the 1Mb mark and is supposedly reserved for use by hardware. A video card or network adaptor will have a fixed address in upper memory that transfers data to and from the processor. Since these devices use a fixed address, you need a special memory manager that spots if an address is in use and which range is unused.

A memory manager, such as DOS' EMM386, will associate these UMB (upper memory blocks) with real memory locations above 1Mb. Once this is done, you can store resident programs or data in the UMBs. The first step is to check that you have told your memory manager to look after the upper memory area and support UMBs. In the case of DOS' EMM386 you have to follow it with one of two parameters: the NOEMS switch will provide UMB but not EMS support, while the RAM switch will provide support for both UMBs and EMS memory.

I have covered how to set up UMBs and EMS in depth in previous columns, including the one to which you refer, so I'll skip this section and move on to your question: how do you see which program is using which area of memory. To do this, you can use the standard DOS MEM

command with the switch, MODULE. This will display a detailed listing showing where a particular program is stored in memory and how much memory it's using. For example, if you have loaded SETVER high (with the LH command) you could see where it is located using the line

```
MEM /MODULE:SETVER
```

MEM displays a report with details about the program; in this case it would look something like Fig 1.

To check if a program has been loaded into upper memory, look at the Region column: if there's a number in there, it means that the program has been loaded into upper memory. If there are several numbers under the Region column, don't worry, it just means that the program was too large to fit into one managed UMB and has been split over several.

Up against the BUFFERS

"I use my PC for indexing book manuscripts and would like to speed up the process. The DOS program looks through each chapter file and builds an index. For many of the large scientific works there can be hundreds of sections. The culprit is probably the hard disk since its activity light is on the whole time. I have tried to adjust the BUFFERS and the FILES commands in the CONFIG.SYS file but I'm not sure how high to set each."

PCW BUFFERS will always cause problems, for the reason that users are never quite sure what it does. If you just

increase its setting, you could easily cut performance rather than boost it. However, if you use it properly you can increase the read-write performance of your disk drives and regain a little RAM.

DOS reads data from a disk in 512-byte chunks, representing one disk sector; this data is temporarily stored in a buffer. If the data doesn't fill up the buffer, then data from the next file is also read in, which — with a caching algorithm — is used if you then request the next sequential file. In short, the buffers try and cut down the number of reads and writes to disk to speed up your programs.

A single buffer is 512 bytes long (although it actually has an extra 16 bytes tacked on for system use by DOS). Many users think that if they increase the number of buffers, so the performance will increase. This is true up to a point, but after you've passed the optimum setting you're just wasting memory. The setting depends a lot on the size of the hard disk, so start with these basic values:

less than 40Mb	20
40-79Mb	30
80-119Mb	40
>120Mb	50

If you don't have any cache software such as SMARTDRV installed, then there are more ways to improve performance using the BUFFERS command which are particularly useful when accessing sequential files. The BUFFERS command can (from MSDOS 4.0 or later) take a second parameter,

```
BUFFERS=30,4
```

The second parameter, in this case 4, defines the number of consecutive sectors that are read in each time DOS carries out a disk read. This is particularly useful when accessing lots of sequential files and can dramatically improve access times.

Since your indexing program reads a mass of sequential files, getting the BUFFERS statement set up correctly should produce good results.

Catching up with commands

"You have been concentrating on the newer features of DOS 6 and its contemporaries and are leaving me behind! I am still using an elderly version of MSDOS 5, and use batch files to spruce it up and give it a

Fig 1 MEM report

SETVER is using the following memory:				
Segment	Region	Total		Type
0E801	2	768	(1K)	Program installed:SETVER
Total Size:		768	(1K)	

Windows 95: how does it affect DOS users?

With the arrival of Windows 95, the number of letters I have received about its effects on DOS users has increased exponentially. I mentioned some of the more cosmetic changes that DOS users can expect, together with the use of the scalable TrueType font technology, in last month's column.

As far as readers of this column go, at the heart of Windows 95 beats a new version of MSDOS. Microsoft was initially going to remove all traces of DOS from Win95, but has bowed to pressure and added what would have been MSDOS 7 to the setup. There are also rumours that Microsoft will be releasing this as a separate, standalone product, although when is not clear.

When you start up Win95 there is little sign of MSDOS unless you are loading device drivers or TSRs from the CONFIG.SYS file, in which case Win95 switches mode to load these programs, then goes back to its native mode. The DOS commands under Windows are tucked away in the \WINDOWS\COMMAND directory and include all the standard MSDOS files that you would expect. The Windows tools, such as antivirus and backup, are integrated within Win95 so no longer appear in the COMMAND directory. There are only a few enhancements to the basic feature set, with a new switch for the DIR command and, of rather more interest, a new command called START.

The DIR command has gained a "/V" switch to display the files in verbose mode. This lists one filename per line together with date, size, version, and full attribute set. In addition, the listing ends with the total disk space and the percentage that is used up.

The new START command is far more exciting, since it lets you run any DOS or Windows application from the DOS command line. Not only can you start Windows programs from DOS, but you can also define how they run: the options include minimised on startup and full-screen.

For example, if you want to run the Windows calculator from the DOS command line, just enter "START CALC" and Win95 will load and run the file. There are four option switches to START: "/m" runs the programs as a background (minimised) job; "/max" runs it full-screen in the foreground; "/r" runs it in its default mode; and "/w" will wait until the program has finished before returning to the DOS prompt.

As you can imagine, this suddenly gives a whole new range of possibilities to the humble batch file since it can now run Windows programs and process their results. In short, batch-file programming can be used as a simple scripting language to control Win95 and DOS.

bit more zing. I would like to add that the overwrite copy protection that I have seen is part of MSDOS 6.2; is there any way of doing this with a batch file command that would work on my system?"

PCW There is a neat way of detecting an existing file that has the same name as the source file using the IF EXIST command in a batch file. The simplest way of using the EXIST command is to write it into a batch file called CHECK.BAT. If you enter this with a filename as an argument (for example, CHECK LETTER.DOC) it will report back if there is already a file with this name.

```
FOR %I IN (%1) DO IF EXIST %2/%I
ECHO %I already exists
```

The FOR loop uses a variable called "I" (it could be any single letter) and looks at the two command-line parameters that were used with the batch file. You would use CHECK.BAT as follows:

```
CHECK LETTER.DOC \FILES
```

The line of code would check through all the files in the directory named in the second parameter (%2) for the file that is to be named in the first parameter (%1).

This line does nothing more than check if the named file already exists in the target directory: if it does exist, the batch file will display a warning message. To turn this into a copy routine that prevents overwriting takes a slightly different line of code:

```
FOR %I IN (%1) DO IF NOT EXIST
%2/%I COPY %I %2
```

The complete batch file, now called COPY2.BAT, would have two lines and look like this:

```
@ECHO OFF
FOR %I IN (%1) DO IF NOT EXIST
%2/%I COPY %I %2
```

This technique is very useful, not only for updating old versions of DOS, but also to pass on processing to another program.

The only snag is that it cannot manage wildcard copies, but for most applications this is not a handicap.

PCW Contacts

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Fully booked

Where do you think Chris Bidmead gets all the Linux information he imparts each month? From a book, of course. Here he reveals some of his sources, and revels in more Partition Magic.

Partition Magic revisited

Last month I mentioned the miraculous partition moving and resizing software for OS/2 that One Stop Software of Bristol (tel 0117 985 3370) sent me for review. I said that Partition Magic seemed like a great idea, but I was chary of testing it out. Moving partitions around can be disastrous, particularly as the manual warns of "bugs in OS/2's Boot Manager" which mean you may not be able to find the moved partition when you come to reboot.

The authors of the manual are right to be cautious, but the Boot Manager problem turns out to be easily fixable. All you have to remember is to run FDISK again, and get it to re-save its information by changing the name tag on the partition you've just doctored.

Partition Magic seemed to be just what I needed when the time came to install Caldera. My Intel-built 486 box is fitted with a very handy 1Gb IDE drive from Micropolis that gets around the usual large-drive problems by fooling the BIOS into thinking it's a pair of drives. On Drive 0 I have a DOS partition, an HPFS partition, a partition that runs Windows NT, and the Boot manager. Drive 1 is divided into a pair of partitions, Linux FT root and Linux FT swap. So where do I put Caldera?

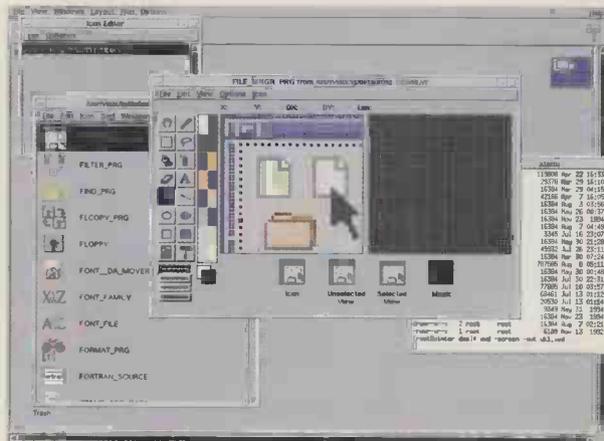
The Linux swap partition doesn't really need to take up nearly half a pseudo-drive, and OS/2 is only on this machine to manage the Boot Manager. So I thought I'd use Partition Magic to shrink the OS/2 partition from around 160Mb to 60Mb, put a new Linux swap partition in the space recovered (which the Boot Manager needn't know about), thus freeing up the

previous Linux swap partition on Drive 1 for Caldera. Caldera and Linux-FT could then both share the same swap partition on Drive 0.

Partition Magic was the key to getting all this moving, but a catch was immediately apparent. You can't use Partition Magic to resize or move partitions that its host operating system is running on. Happily, the authors have foreseen exactly the sort of dilemma I was in, and bundle in a version that will run under DOS. DOS can't see partitions beyond the 1024 cylinder limit, but that problem doesn't arise with the cunning Micropolis drive. So I copied Partition Magic to a network drive, rebooted under DOS, reconnected to the network and ran the program. It shrank my OS/2 partition in a couple of minutes. Fast, but not hasty, it proceeds cautiously through each stage, with a visual progress indicator showing it checking current integrity, clearing the truncated partition, adjusting the structures, and doing a post-integrity check.

This puts a new, empty partition between OS/2 and Windows NT. Linux sees hard-disk partitions as raw devices

A taste of Caldera. The icons are gorgeous and there's a very good icon editor to modify them or create your own



Reading matter

Last month I gave a brief plug to Mike Gancarz's book *The Unix Philosophy*, which I'd say is essential reading for anybody interested in the whys and wherefores of operating systems. It got me thinking that maybe I should tell you about the other books I'm relying on (you didn't think I just know this stuff, did you?). If you're just getting started with Linux you'll find a ton of documentation on the Net (Websurfers might start at

<http://sunsite.unc.edu/pub/Linux/Welcome.html>

but see box on Sunsite mirrors, page 268). But the problem for beginners is that there's just so much of it.

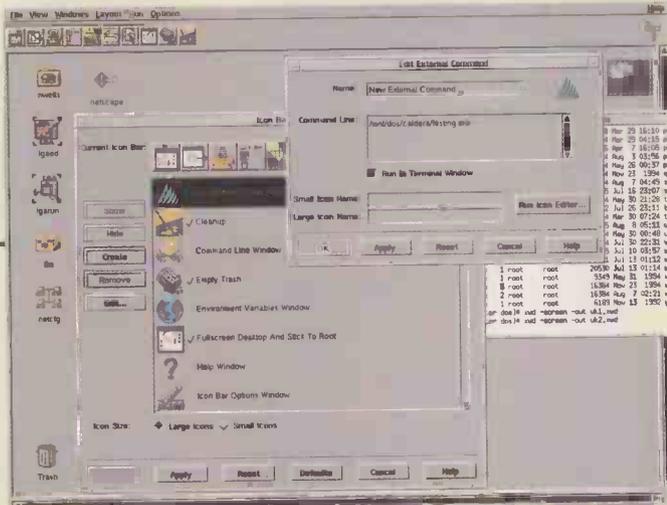
That's why I'm so keen on Mike's book, which you can get from Digital Press. All the other documentation tells you how — this book tells you why. Put it beside the O'Reilly *Unix in a NutShell*, a snappy catalogue of what you can do and how, and you have the makings of a complete general Unix library.

If you're running Linux you might want to make room for, well, *Running Linux*, again from O'Reilly. It's very thorough on subjects ranging from "What's so good about Linux anyway?" to "How do I configure my TCP/IP addresses?", and is written in an easy-going style that covers the technicalities without getting bogged down.

There's a complementary book from O'Reilly, *Linux: Network Administrator's Guide*, if you want to delve deeper into TCP/IP and set up email and news systems, and this includes a very good technical and historical background on networking in general. This book is also complimentary, with an "I", in the sense that it's part of the Linux Documentation Project and therefore downloadable from the Internet if you don't feel like lashing out for the O'Reilly hard copy.

Cashing in on the Linux boom comes another of those silverised, airport-novel style tomes from Que called *Special Edition: Using Linux*. This has a Slackware 2.0.1 CD-ROM

Caldera's Looking Glass desktop is full of neat tricks. Here's a command-line widget as an alternative to the plain xterm terminal



labelled

/dev/hda or
/dev/hdbx,

where a or b indicate the first or second drive, and the x is the number of the partition on that drive. According to my calculations the new partition would be /dev/hda3 to Linux, all ready and waiting to be turned into a swap device.

You have to be very careful when messing about with partitions from a number of different operating systems — it's all too easy to format the wrong one. Because of this I've got into the habit of creating partitions whose sizes differ by 25 or so megabytes, so their sizes give a clue to which partition you're dealing with. You need around 25Mb as the granularity because different operating systems measure size in different ways, and what looks to OS/2 like a 100Mb partition can look like 98Mb to Unix.

But when I powered up Linux and ran fdisk, the partition wasn't there! The newer disk utility, cfdisk, revealed what had happened. It's an iron rule of PC disk

management that you can only have four partitions on a disk. You can cheat around this: one of the partitions can be an "extended" partition under DOS, OS/2 and Windows NT, and then subdivided into "logical" partitions which become lettered drives. If you have only one drive on the system, these subdivisions will be D:, E:, F: and so on, complementing whichever of the primary partitions is currently drive C: (There's a complication here: primary partitions on a second drive get allocated drive letters preferentially, but we won't go into that right now.)

Logical partitions are really intended to store data, although some operating systems like OS/2 can be run from logical drives. The copy of OS/2 that I had so carefully shrunk with Partition Magic was on a primary partition; but the next partition

stuck inside the back cover, on the strength of which the publishers blurb it as "Your one-stop resource to this increasingly popular operating system." Like *Running Linux* it discusses what you might want to do with the software, as well as how to do it, so there are chapters on getting onto the Internet, and even on how to behave when you get there. It's about the size of the two O'Reilly *Running* and *Net Admin* books combined, and covers the whole ground.

If I had to pick just one book out of these three I think it would have to be *Running*. The *Special Edition* book with its bundled CD-ROM comes a close second, but, I'm sorry, I have a marked aversion for writers who, like the author of the Que book, call the X Window System "X Windows" passim.

While we're talking about Linux documentation, another "must have" if you're serious about tracking this fast-developing operating system is the *Linux Journal*. It's a slim monthly (a year's stack of them takes up the shelf

space of one PCW!) but it's packed with Linux-specific tips, news and reviews, and I think I'd be lost without it.

Where to get them

Linux Journal is published in Seattle. The subscription-meister Amy Simpson (subs@ssc.com) charges \$19 to US residents for an annual subscription and adds a not unreasonable \$10 to wing the thing beyond the North American continent. Alternatively, if you bought Linux on a CD, check with your dealer.

You can shop for the O'Reilly books on the Internet at

<http://www.ora.com>

or get them, and the other books, through the UK bookseller, Computer Manuals. Their phone number is 0102 706 6000 and they have a Web presence at

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along, set aside for Windows NT, was extended. The space I had created became a new logical partition in the extended partition.

The whole extended partition gets a Unix raw device name, but the subdivisions aren't recognised. The Linux fdisk just shows the raw device as an extended partition. Though the eyes of cfdisk Linux can see the subdivisions, there's no way it can make use of the new space as a swap partition.

Swapping with Linux

So, I temporarily abandoned the idea of a swap partition until I could get around to a total backup and rebuild of the hard disk. But now, neither of my Linux partitions had any swap space, and some of the X stuff was refusing to run. Happily, there are two ways of organising swapping under Linux — swap partitions or swap files. Swap partitions are preferred because they're out of the way and run no risk of being fragmented. But swap files can do a perfectly good job — that's the only way OS/2 and Windows NT can do it.

My Linux FT partition (/dev/hdb1) was larger than the new Caldera partition, so I decided that it should host the swap file. First I needed to be able to see the Linux FT file system from my Caldera partition (which would be convenient anyway for sharing data files and applications). Under Unix, you do this by creating a mount point (an empty directory) and connecting it to the raw device on which the other file system is sitting. So from within Caldera I ran the following commands:

```
# mkdir /linux_ft
# mount -t ext2 -o defaults /dev/hdb1
/linux_ft
```

The -t parameter defines the filesystem type I'm connecting to. The -o defaults option is shorthand for making it read/write and setting some other standard parameters. With these two commands, I've just connected the whole of my Linux FT file system seamlessly into my Caldera file system. Now to create the swap file.

First I need to create a file of the right

Sunsite mirrors

Sunsite is a very busy US server and they suggest that if you're calling from Europe, you use one of the many local mirrors. UK readers have a choice of at least four:

- **Coventry**
ftp.maths.warwick.ac.uk:/mirrors/linux/sunsite.unc-mirror/
- **Greenwich**
ftp.idiscover.co.uk:/pub/Linux/sunsite.unc-mirror/
- **London**
src.doc.ic.ac.uk:/packages/linux/sunsite.unc-mirror/
- **Mildenhall**
ftp.dungeon.com:/pub/linux/sunsite-mirror/

size. There are several ways of doing this, but the standard procedure is to use the dd command. This modestly-named utility is a real powerhouse low-level file converter, but all we're going to use it for here is to fetch a bunch of zeros out of the zero bucket and pour them straight into the new file. The Unix bucket you fetch zeros from is the pseudo raw device /dev/zero (there's a corresponding bucket to pour away junk you don't want, and that's called /dev/null). Here's what the completed command line looks like:

```
# dd if /dev/zero of /linux_ft/swap
bs=1024 count = 16284
```

This is the kind of Unix command line that's famous for frightening away tourists, but it's perfectly readable when you understand that if stands for "input file", of is "output file", bs is block size and count is the number of blocks. (Anyone a little more clued up than a tourist might wonder why the parameters are bereft of their usual introductory hyphens (-if). The answer is that they just are.)

Now we have the 16Mb file and we're going to format it to be a swap file. As this is a low-level operation, and some of the 16Mb of zeros may still be floating around loose in the the disk buffers, we run:

```
# sync
```

to make sure it's all written physically to disk. Now the formatting. We only need to

do this once, with the command

```
# mkswap -c /linux_ft/swap 16394
```

The -c parameter (there's that hyphen) tells mkswap to check for bad blocks. Why you need to tell mkswap that the file is 16394 blocks in size I'm not sure, and what happens if by mistake you make this number too big I dread to think and am not inclined to test. This is low-level stuff — tread carefully.

Another sync to flush the buffers, and we're ready to tell the system to go ahead and use the new file for swapping. The command is just

```
swapon /linux_ft/swap
```

You can now check that the swap is working by running the free command, which reports how much real and swap memory you have available. Everything's ready to run, and you can test the swapping by loading a lot of apps and seeing them all run properly. There's a nice little piece of X screen furniture called xsysinfo that lets me watch the swap file filling up as I work, and it quickly becomes clear that I'm probably going to need more than 16Mb of swap space.

Swapping to a file turns out to be rather slower than I'd like, so I'm going to have to find some way soon of creating that dedicated swap partition. That will be a process similar to the one we've just gone through, skipping the dd part and substituting the raw device name of the partition for the filename. And I don't have to have either a swap file or a swap partition — the design of Linux lets me mix and match a number of different swap devices.

We're not quite done yet with this temporary swap arrangement. Next time I power up Caldera I don't want to have to type the swapon command explicitly. Actually, a swapon command kicks in automatically at power-up time: by default it's already there in one of the session initialisation files. In the form "swapon -a" it will begin swapping on every swap device it knows about. It's very like the mount command, and like mount it "knows about" devices because it goes to look them up in a system file called fstab (file system table) which on Linux systems is found in the /etc directory.

Next month I'll talk about how to fix up /etc/fstab, and we'll have a proper crack at Caldera.

Raw device

"Raw device" is one of those obscure terms that Unix people take for granted. One of the key design goals of Unix is to make everything look and behave like a file, so a chunk of hard disk or a serial port is given a file-like name and stored in what looks like an ordinary directory (/dev/hda1 or /dev/tty0). The code necessary to join the "filename" to the function of the device is hardwired into the

kernel. (Newer Unixes are using dynamically loadable device drivers, and Linux is moving in this direction.) Unix comes with the /dev directory stuffed with device names. They are not arbitrary, and you can't just stick your own names in there, although you can create a new name like /dev/mouse and link it to an existing name like /dev/aux1.

PCW Contacts

Chris Bidmead is a consultant and commentator on advanced technology. He can be contacted at bidmead@cix.compulink.co.uk



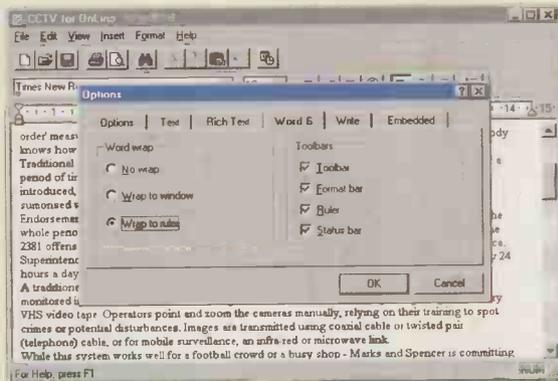
Dotty about DOS

Tim Phillips finds that loyal users of DOS word processors are being hard done by, tries the Win95 replacement for Write, fails to see the funny side of some Winword tips, and passes on some useful hints and macros.

Hello! Is anyone out there? I'm interested to discover whether my correspondents are all Microsoft employees under assumed names, because the mail I get is unbelievably Windows-centric these days. If you have a DOS-related subject you want to mull over, write to me or mail me today — or I'll cut off your bit of the column.

One steady complaint I receive goes something like this: "I've had version 1.0 for a decade, it does everything that I want it to and I don't see why anyone wants this new-fangled Word for Windows." David Ling of Hereford points out that there's not a huge difference between his 1987 Wordcraft 3 and the Wordcraft 6 that Eric Evans wanted to upgrade a couple of months ago, and to some extent, I agree. Increasingly it seems that DOS is the choice for users who are happy with what their software does and don't particularly want to change. But while there is cheap Windows software being sold by the cartload, suppliers don't seem to have twigged that the big bucks are no longer being committed to DOS software.

I think we should see the cost of DOS packages brought down to the £50 mark. After all, few suppliers have ongoing development work to fund. In view of this, the prices for DOS word processors are astonishing. A trawl through PCW gave me the opportunity to buy Multimate 4.0 for £271, IBM's awful DisplayWrite 5 for a staggering £252, and JustWrite 2.0 for £159. If anyone is buying this stuff, please write and tell me why.



WordPad, the Windows 95 word processor: not bad, but nothing new

Windows 95

Well, I'm sitting pretty with all the latest bits of software on my lap, but it took me so long to set up Windows 95 that I haven't had time to evaluate them all. I'm thoroughly enjoying WinWord 7.0 though, which has some neat touches — note the wiggly line under a misspelt or unrecognised word. What with Word Pro (aka Ami Pro 4.0) doing a similar thing, this looks like the spell-check method of choice for the discerning 32-bit Windows user.

Meanwhile, I'll take you on a quick tour of the Windows 95 replacement for Write, which latterly I grew to rather like. Instead we have WordPad. WordPad isn't bad, but I can't help thinking it's an opportunity lost.

Whereas Write's font support was almost non-existent, WordPad does better by letting you use the system fonts to set size and attributes. It also has a better set of filters, allowing you to open Word 6.0, rich text format, text and Write documents, although no non-Microsoft software filters are included.

That's hardly surprising, but I would have liked to have seen a few bells or whistles with WordPad. How about a few basic tools for letting users construct HTML? It's not that hard. (See page 271.)

Perhaps some sort of word-processing tutorial would have done the trick too, or a decent outliner to help users who don't write often

and need some help structuring a document. Well, they don't exist. For good commercial reasons (it wants to make you all buy Word for Windows 7.0) Microsoft

Sub MAIN

Begin Dialog UserDialog 446, 142, "Search For Text In All Files In Directory"

Text 99, 12, 247, 13, "What do you wish to search for?", .Text1

TextBox 134, 40, 160, 18, .TextBox1

OKButton 70, 70, 88, 21

CancelButton 250, 70, 88, 21

Text 66, 99, 285, 13, "Press CANCEL if you haven't already ",

.Text2

Text 66, 118, 229, 13, "selected the correct directory.",

.Text3

End Dialog

Dim SearchDlg As UserDialog

If Dialog(searchdlg) = 0 Then exit

FileNew

Print "Counting Files"

Redim temp\$

Redim count

Redim success

temp\$ = Files\$("*.*doc")

Fig 1 Chris McCarthy's search macro (see page 273)

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```

count = - 1
success = 0
While temp$ <> ""
    count = count + 1
    temp$ = Files$( )
Wend
Print "Opening files to do searches"
If count > - 1 Then
    Dim list$(count)
    list$(0) = Files$("*.*doc")
    For i = 1 To count
        list$(i) = Files$( )
    Next i
    For i = 0 To count
        Print "Opening file "; i + 1; " of "; count + 1
        FileOpen list$(i)
        EditFind .Find = SearchDlg.Textbox1, .Direction = 0,
        .WholeWord = 0, .MatchCase = 0, .Format = 0
        FileClose
        If EditFindFound() = - 1 Then
            Success = success + 1
            Insert list$(i)
            InsertPara
        End If
    Next i
End If
If success = 0 Then MsgBox "NO FILES FOUND CONTAINING SEARCH STRING"
ElseIf SUCCESS > 0 Then
    StartOfDocument
    Insert "Report: Search String Was " + SEARCHDLG.TEXTBOX1
    InsertPara
    InsertPara
    Insert "Search String Was Found In The Following Files"
    InsertPara
    InsertPara
End If
exit:
MsgBox "The macro has been aborted"
End Sub
    
```

obviously told its staff: make WordPad more or less exactly like Write, with long filenames and the ability to read WinWord 6.0 documents.

A note on humour

David Greenwood, inspired by our report of silly tips in WinWord, investigated the French and German versions. Presumably reluctant to take instruction from Americans on how to dress (plaid shirts and striped pants rarely make a positive fashion statement) the French humorous tips of the day concentrate on self-improvement:

C'est à Strasbourg que Gutenberg, vers 1440, a mis au point le procédé d'imprimerie à caractères mobiles qu'il développa ensuite à Mayence.

And if that didn't have you clutching your sides, try another WinWord tip:

Les deux auteurs du poème "La Chasse Spirituelle" attribué à Rimbaud,

ont été obligés de récrire un autre poème pour prouver aux critiques leur "bonne foi de faussaires". (Paris 1949).

If you're a German WinWord user, it's bad news about the funnies: there aren't any. Instead, Germans can relax and laugh loudly to themselves thinking about how the strong mark keeps the price of DOS word processors high.

Tim's macro club

A jolly good start and as yet, I'm not sorry I embarked on this. So here are the minutes of my first monthly meeting.

A prize to the excellently named Storm Dunlop, who has a solution to the problem of translating text with one language in each window. We wondered if a scrolling macro could be used. He gives a convincing reason not to bother: "I am also a translator, and at one time I toyed with this idea. In practice, however, it doesn't help. Only if you were translating something made of

Hints & Tips

● Having conducted an exhaustive survey of word processors for generating Web pages, including the HTML generators you can get with Word and WordPerfect, the shareware version for Ami Pro, and even a couple of dedicated editors like HotDog, I have found the best HTML writer around.

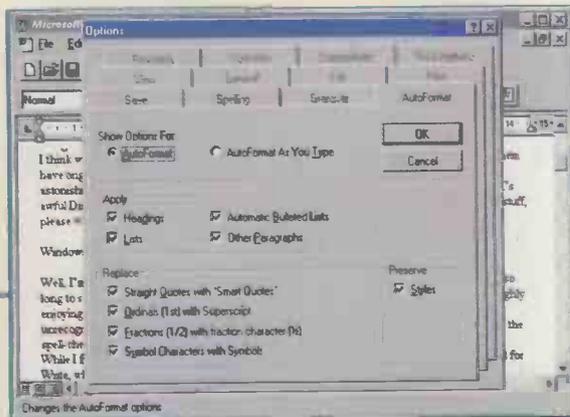
It's Windows Write and a cheap HTML reference on my lap. Or then again it could be Dos Edit, or Notepad (at a pinch) or any one of a million cheap text editors. I'm not a Luddite — quite the opposite — but the demands of HTML authoring are different to those of document formatting in the Word 6.0 sense. In HTML you have no control over fonts, or image size, or (unless you're a NetScape user) image position. There are about half a dozen style tags which will do for 90 percent of your pages, and in the end I found these easier to type direct rather than use some fancy tool which slowed me down.

By all means use one of these tools, but I reckon that good HTML style means keeping your page simple and precise, and the bells and whistles in HTML add-ons are a distraction. If anyone can come up with something I can do faster by using a word processor Web authoring add-on than by typing a tag manually, I'll send them a prize. ● Yet more on removing carriage returns. Definitely the last, I think. In Word 6.0, highlight the text you want to change, click on Tools, AutoFormat and Word does the whole job for you. It does add a bit of irritating extra formatting, but it will strip carriage returns from text where there isn't a blank line between paragraphs. My thanks to Robert Ramsay (rramsay@realres.demon.co.uk) and others for this tip. As he says: "Most people rightly ignore AutoFormat since, given complete freedom, it will almost always mess up your text in new and exciting ways. If however you preserve all your previous styles, clear all the 'Apply styles to' entries and set all the 'Adjust' boxes, your multiple lines will become one paragraph."

Use Tools, Customise to stick an AutoFormat button on your menu bar if you like.

● Our regular correspondent Shane Devenshire yet again trumps my knowledge of shortcut keys. His extras (the top two work in most Microsoft software) are:

AutoFormat in Word 7.0
(it's in version 6 too). A shortcut for stripping carriage returns



- Ctrl+Shift+F takes you to the font shortcut box;
- Ctrl+Shift+P to the font drop down box;
- Ctrl+Shift+F twice (or P twice) opens the font dialog box and selects the font tab;
- Ctrl+Shift+S takes you to the style drop-down list, and doing this twice puts you in the Format, Style dialogue box.

These are undocumented shortcuts and, I think you'll agree, top tips.

Storm Dunlop (see page 270) passes on his favourite macro (below) for WinWord 6.0. I'll let him explain:

"It is a function that was in WfW 2.0, but which was deleted (stupidly) in WfW 6.0. It enables you to key the name of a macro directly into your text and run it by hitting F3. It is not mine, I hasten to add, but comes from Herb Tyson via the WfW forum on CompuServe. It's called ExpandOrRun."

```
Sub MAIN
On Error Goto EndIt
If SelType() = 1 Then WordLeft 1, 1
A$ = Selection$( )
EditClear
B$ = GetAutoText$(A$)
If GetAutoText$(A$) <> "" Then
EditAutoText .Name = A$, .Insert
Else
ToolsMacro .Name = (A$), .Run
End If
EndIt:
Select Case Err
Case 0, 102
Case Else
EditUndo
CharRight
Error Err
End Select
End Sub
```

- Janet Gee of Hereford has an early copy of Professional Write and wanted to print a letterhead with it. "I have the image file of the

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Driving test

LESSON 4:

thinking outside the box.

Here's something to think about:

What does it take for a company to engineer hard drives so reliable they can operate for 34 years before failing? Or for a company to more than triple the capacity of its 3 1/2" drive in under two years?

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It takes the ability to anticipate the limitations of existing manufacturing processes and the determination to develop new methods. To do this, a manufacturer must be willing to step back and conceptualise bold, new solutions.

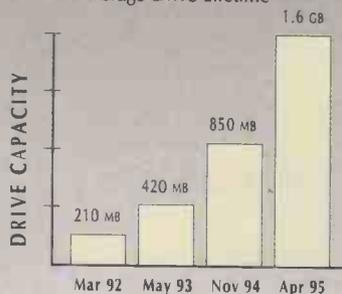
Western Digital already knows this. It's the kind of thinking that enables us to build so much quality, reliability and performance into our entire range of high-capacity drives and still keep them competitively priced.

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Osmosis Technologies Ltd
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Fax: 0181 758 2760

Ambyte
Windsor, Berks
Tel: 01753 655 477
Fax: 01753 655 864



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logo," she adds. "Is there an easy way to print it as part of the document?"

Yes and no, is the answer. I'm not familiar with Professional Write but a quick check assured me that your version doesn't support graphics. So, there are two solutions. The first is to upgrade your software, but you may not fancy that. The second is to use a package called Hijaak, which will be familiar to users of WordStar. This is an add-in program which will place graphics files on the page. You may find a character-based interface makes it tricky to place the graphic accurately, but Hijaak, despite its age, is pretty useful in these situations.

Can anyone track down this excellent utility for me? I have tried all the major dealers and they don't stock it any more.

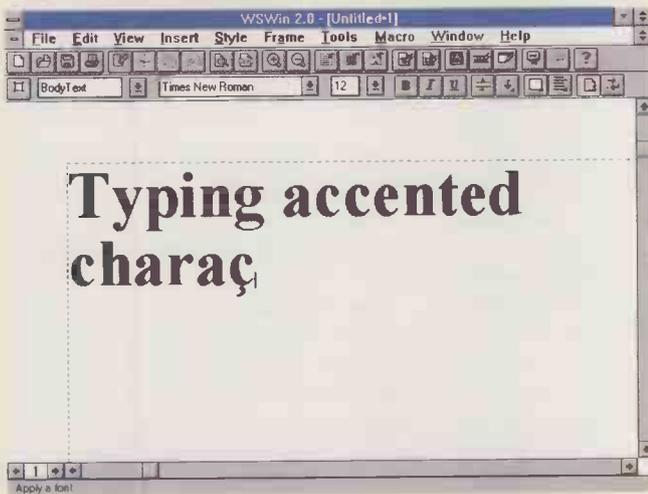
● Two WordStar queries to finish: Eric Roberts contacted me via email to ask how he can easily get accented characters into WordStar for Windows version 2.0. I initially thought this must just be a laborious process of assigning each character to a function key, but it turns out that WordStar has its own macro called EXTCHAR. It turns double characters into accented characters

— very neat. For example, run it and <c,> becomes ç. You type <ctrl+~> to access the macro, the status bar says "Please type two characters" and the table of characters is at the back of the manual.

While I was researching this one I found a neat way for DOS WordStar users to access the same file in two different places. The original tip is courtesy of Robert Sawyer, who uses it to work on his novels, which are a single file. To refer back to an earlier page he runs another copy of WordStar, opening the same file, and taking care not to save in that second copy.

The clever bit: he has two configuration files: wp.cfg for his standard copy, and wp.cfg for his auxiliary, which he has altered to make the backup extensions for the file — the temporary files created when the file is opened — into \$T\$, \$U\$ etc. In the standard configuration your temp files are \$A\$, \$B\$ etc.

You have to take care not to save the auxiliary copy of the file, and he sets the screen colours differently to make sure he always knows the difference. This sounds a neat kludge but don't use it unless you know what you're doing.



Accented characters the easy way in WordStar

very short lines (such as an index) might it work. Otherwise, the difference in length means that windows get out of synchronism with each other and you have to scroll up or down a line by hand. If you are trying to run a macro, you must have the option to do this without having to break out, scroll the line(s) and re-run the macro.

"I've found that the best solution is to use full-screen mode, and split that into equal halves with a view of source and target texts. I skip between them with CTRL-F6 and scroll down a page at a time. I also use colour to indicate which sections of the source I have already translated."

Also a prize to Chris McCarthy for his

excellent search macro (Fig 1) which, as he points out, can be used to strip carriage returns or do a host of other jobs to a whole directory of files. I'd like to see some adaptations of this one, and versions for Ami Pro and

WordPerfect. See what you can do.

"This Word 6 macro (OK in Word 2, I think) will open each file in a directory in turn and search for the specified text. Successful hits are noted in a new document. The user must be in the correct directory to start with," Chris says.

If you want to submit a macro, email it to me at the address below.

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

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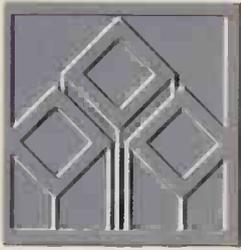
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 THIS POEM THREW IT I'M SHORE YOUR PLEASED



Par for the course

Stephen Wells tees off with a spreadsheet that will calculate your American-style golf handicap, continues a fair way with the financial analysis template for service companies, and drives home some pro tips for Excel.

Southern California has so many golf courses that you keep having to drive around them. More of your friends are likely to have a bag of clubs than a tennis racket, and in some jobs you'll never meet the boss unless you play golf. So it was inevitable that there would be a time of my life there when I tried to sink a few putts.

All those happy memories of fishing balls out of the water came bouncing back when I received a request for help from Doug Barton in Surrey. He and his pals would like to calculate handicaps for themselves using the United States Golf Association handicap system. This differs from the UK method in several ways, including the fact that it's based on the best ten of the last 20 games. Doug has a faded set of official tables but would like to do the calculations automatically on a spreadsheet.

I happen to have used Excel but the

principles are the same in any spreadsheet. *Fig 1* shows the layout. For the purposes of legibility, the screenshot only shows the outgoing nine holes, but it works just the same way when you apply the methodology to the full 18.

Row 5 gives the Par (the maximum number of strokes you're supposed to take to get the ball into the hole) for each hole on this player's usual golf course. Row 6 gives the Stroke Index. These numbers are printed on the scorecards for the course which list the difficulty of the hole.

In this case, the most difficult is on the homecoming 9. The next most difficult is Hole No. 4 (in column F). The easiest is No. 6 (in column H). Three of the player's games are shown. The dates on which the games were played are in column B. His previous handicap was 15 and this is entered in column M.

According to Doug, here's how this particular system works. The score for each hole is adjusted in three parts:

1. If the current

handicap is less than the Stroke Index (SI) for the hole, and the player's score is more than one over par, then one over par is recorded. Otherwise, the player's score is used.

2. If the handicap is more than the SI but less than 28 and the player's score is more than two over par, then two over par is recorded. Otherwise, the player's score is used.

3. If the handicap equals 28 and the player's score is more than 3 over par, then 3 over par is recorded. Otherwise, the player's score is used.

The first thing to do is create some Names. In our example C5 to K5 is Named Par, C6 to K6 is Named SI; and M9 to (arbitrarily) M28 is Named Handicap.

The results of the player's first three games are entered on rows 9, 11 and 13. Now we can do the main job with the IF and AND functions.

The way an IF and AND function works is that IF a=b AND c=d, then e, otherwise f. This is entered as

`IF(AND(a=b,c=d),e,f)`.

So referring back to Part 1 of the system:

`=IF(AND(Handicap<SI,C9>Par+1),Par+1,C9)`

You can also add another AND if you need it, so Part 2 of the system translates to:

`IF(AND(AND(Handicap>SI,Handicap<28,C9>Par+2)),Par+2,C9)`

Finally Part 3 is entered as:

`IF(AND(Handicap=28,C9>Par+3),Par+3,C9)`

How do you run all three parts together? Simple: just substitute one formula for the previous "otherwise" answer. That is, delete the last C9 in Part 1 and instead paste in Part 2. Then delete the last C9 in Part 2 and paste in Part 3.

That's how we arrive at our first formula. Cell 10 is:

`=IF(AND(Handicap<SI,C9>Par+1),Par+1,IF(AND(AND(Handicap>SI,Handicap<28,C9>Par+2)),Par+2,IF(AND(Handicap=28,C9>Par+3),Par+3,C9)))`

You can replicate this across the columns and down the alternate rows.

To produce the player's latest handicap we calculate the differential in column N. The total par for this course is 72: 36 out and 36 homecoming. All column N does is record the difference between the player's total adjusted scores for each game and 36. On 30/9/75 his adjusted score was 10 over par, so his differential is 10.

Where we need another spreadsheet function is to average his 10 best differentials out of his last 20 games. We only

HANDICAP.XLS													
A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	American Handicapping System												
2													
3													
4	Hole Nos.	1	2	3	4	5	6	7	8	9	Out		
5	Par	4	3	4	4	5	3	5	4	4	36		
6	SI	6	16	12	2	10	18	8	4	14			
7	Dates												
8	Scores	played									Total	H'cap	Diff.
9	Actual	30/9/95	6	4	5	5	8	6	5	5	5	49	15
10	Adjusted		6	4	5	5	7	4	5	5	5	46	15
11	Actual	1/10/95	6	3	4	5	9	3	5	5	5	45	15
12	Adjusted		6	3	4	5	7	3	5	5	5	43	15
13	Actual	5/10/95	4	3	5	5	7	3	6	4	7	44	15
14	Adjusted		4	3	5	5	7	3	6	4	6	43	15
15													
16													
17	Handicap	=M\$9:M\$28											
18	Par	=C\$5:\$K\$5											
19	SI	=C\$6:\$K\$6											
20													

Fig 1 Working out a new handicap based on the first nine holes of the player's regular course

EXCELlent shortcuts and longshots

- **CHECK IT** Choose File, Open, Library, audit.xla. Then Formula, Worksheet Auditor, Map Worksheet. This macro makes it easy to spot sequential peculiarities. Every cell is classified as Text, Formula, Number, Logical or Error.
- **CLICK IT** A double-click on a cell containing a formula highlights the cells to which the formula refers. Unless the cell contains a note, in which case you see the note.
- **DISPLAY IT** Want to see two parts of your worksheet at once? Choose Window, New Window, Arrange, Horizontal. To close that window press Ctrl+F4.
- **HELP IT** Because of the way Excel allocates memory, given a choice, design your worksheet going down the rows rather than across the columns. And link several efficient smaller worksheets in a workbook to avoid creating a lumbering monster.
- **HIDE IT** To hide an icon like a microphone on your worksheet (see SAY IT), press Ctrl+6 twice (once turns it into a square).
- **HOP IT** Highlight a block then press Ctrl+. (period) and you can jump around to the four corner cells of the block. This also freezes the highlight temporarily so you can extend it without having to start again.
- **LOSE IT** Tired of that opening graphic and seeing Sheet1? Select the Excel icon and Program Manager, File, Properties. Edit the Command Line to c:\excel\excel.exe /e. (Yes, there is a space before the e switch.)
- **SAVE IT** Want to save your work at automatic intervals just like in Word? Transfer the autosave.xla file into the XLSTART directory.
- **SAY IT** Choose Edit, Insert Object to display a list of objects registered in your system. If you have a sound card, you can add a voice annotation to your worksheet. Excel displays a microphone icon. Click on it to play back the message.
- **TRICK IT** Can't get Excel to respond to instructions for your printer? Make the settings you want in a document in another Windows application like MS Word or MS Works, then switch back to Excel.

have three games to work with in the example but imagine that he's played 20. Highlight the differentials for the 20 games in column N and Name it, say, Scores.

There are a number of formulae you could use here but this one works well:

=AVERAGE(SMALL(Scores,1),SMALL(Scores,2),SMALL(Scores,3),SMALL(Scores,4),SMALL(Scores,5),SMALL(Scores,6),SMALL(Scores,7),SMALL(Scores,8),SMALL(Scores,9),SMALL(Scores,10))

The SMALL function finds the lowest number in a data set, SMALL(Name,1); or the next to smallest, SMALL(Name,2); and so on. It allows correctly for ties. So we find the lowest 10 numbers and average them. That's the player's handicap.

Financial analysis

Moving on down the financial analysis template for service companies, we now come to the first Activity Ratios. The panel overleaf gives the listing for the two ratios which are traditionally recorded as Times ratios and the two which are usually quoted in Days. You may recall that a ratio may be quoted as 2 to 1, or 2:1, or 200% (percentage), or 2/1 (fraction), or 2 Times. They all mean the same thing. There just

happen to be conventions for expressing different ratios, sometimes varying according to the industry.

Rows 44, 48 and 52 are blank. Column A gives the definition. Column B gives the formulae. These can be replicated across columns C through F because we're using the Names created in the July edition of this column.

The average results for the company's industry which can be found for comparison are entered in column G.

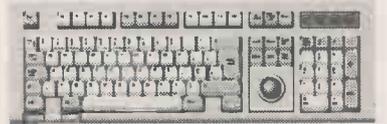
Fig 2 shows the outcome if you enter the sample financial results given in the July and August issues' columns. Fig 3 shows the resulting charts.

I would reiterate that the ratios produced by this template should be examined for trends and also compared with others in the industry, if available. Reference to a high ratio, here, means that it is higher than the median ratio for the industry, or a trend to a higher ratio over the five years of the company's results. Conversely, a low ratio means lower than the average for the industry, or trending down each year for the company.

As we're using an advertising agency's results for the example, total revenues are

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Berlitz Phrase	£30	SSD Wallet	£15
Games Packs	£24	Desk Stand	£14
Soundmaster	£20	Disk Drive	£195
Timebase Solo	£72	Books	
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F51		=Ave._Accounts_Receivable/Billings*365				
A	B	C	D	E	F	G
44						
45	ACTIVITY RATIOS (TIMES)					
46	Plant Turnover	14.98	13.71	12.58	14.43	11.62
47	Working Capital Turnover	7.75	6.19	4.57	5.74	5.52
48						
49	ACTIVITY RATIOS (DAYS)					
50	Payables Turnover	41	37	30	32	36
51	Collection Period	40	36	37	40	40
52						

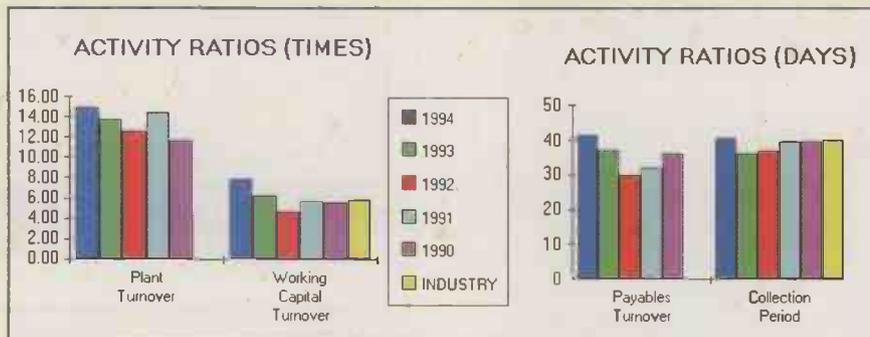


Fig 2 (top) Example results for the first Activity Ratios on the financial analysis template for service companies
 Fig 3 (above) Charts of the results shown in Fig 2, with a shared key box

not referred to as Sales but as Billings because they include all the client's media and production budgets. The gross income of the agency is usually called Commissions and Fees — that's why the Plant Turnover and Working Capital Turnover ratios for service companies are not based on total revenues as they are with companies which carry stock.

If the Plant Turnover ratio is increasing it can indicate that the company is using its investment in plant and equipment with increasing efficiency. But filing cabinets may be filling up and the PCs becoming dated so this category may also be reaching its capacity level. If this ratio has declined over a number of years it suggests that sales have not kept pace with increases in such capital investments.

To summarise: the higher the sales level with existing plant and equipment, the more profitable the company will be. But it is important to recognise the point when this is reaching its capacity level.

A high Working Capital Turnover can indicate that the company is over-trading for its industry. If sales increase dramatically,

more Working Capital is required. But if the higher turnover rate of Working Capital can be sustained comfortably, then a low Current Ratio may suffice.

The lower the Working Capital Turnover ratio, the less hassle you get from creditors. But a low ratio may indicate that the company is carrying more liquid assets than needed. A low Working Capital Turnover should be compensated by a higher Current Ratio.

To summarise: this ratio shows how many £s of sales the company is making for each £ of Working Capital. Working capital is needed even in service businesses to carry ensuing accounts receivables after work has been carried out for clients and until the money comes in. However, if this ratio is lower than customary for the particular industry, it indicates

an unprofitable use of Working Capital.

Payables Turnover shows the average number of days that the company is taking to pay for its purchases. If the number of days taken to satisfy creditors is trending up over the years, it is likely that the company's Working Capital is declining in relation to sales. If the ratio is low, it confirms that the company is prompt in paying.

To summarise: if a company prefers to deal with the best suppliers, it should pay vendors' bills as promptly as is expected in the particular industry.

Prompt payment may seem to be foregoing a cheap line of credit but in the long run it can pay when a company needs a supplier to come through with the best price or faster service. The Collection Period is the number of days taken to collect receivables. If debtors are increasingly taking advantage of the company from year to year it indicates that an increasing amount of Working Capital is being tied up in uncollected bills.

When compared with credit terms norms for its industry, the quality of the receivables can be determined: the longer a receivable is taking to collect, the less likely it is to be collected, because neglected receivables become bad debts.

The fewer days, the faster the company is collecting what is due from its clients. You have to consider selling terms. A company with a high proportion of cash sales will have a low average ratio. And too low an average collection period compared with the company's industry and company policy suggests that credit is being restricted too much. It could be excluding marginal customers whose purchases could bring in additional revenue.

To summarise: this ratio partly measures the internal collection efficiency of the company, indicates the chance of bad debt write-offs, and offers a comparison of the company's receivables position with others in its industry if the averages are available.

Next month, we'll consider the five Activity Ratios which are measured as percentages.

Financial analysis template listing	
A45	ACTIVITY RATIOS (TIMES)
A46	Plant Turnover
B46	=Commission__Fees/Net_Plant__Equipment
A47	Working Capital Turnover
B47	=Commission__Fees/Working_Capital
A48	
A49	ACTIVITY RATIOS (DAYS)
A50	Payables Turnover
B50	=Accounts_Payable/Billings*365
A51	Collection Period
B51	=Ave._Accounts_Receivable/Billings*365

PCW Contacts

Stephen Wells welcomes comments on spreadsheets and solutions to be shared. Send them to PCW Editorial at the usual address or to stephen_wells@pcw.ccmil. 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.

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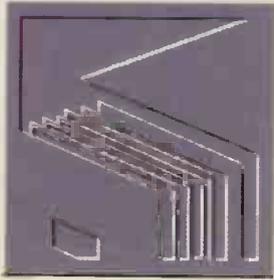
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Onto a winner

Mark Whitehorn considers information storage, data dictionaries and catalogues as part of his ongoing examination of Codd's rules, and the National Lottery provides an interesting problem.

Codding about

Continuing with the list of suggested rules for modern, PC-based RDBMSs, we have: 8. *An RDBMS must maintain a data dictionary for each database which stores information about the joins between the tables, referential integrity, etc. Access to the tables which circumvents this data dictionary should be forbidden.*

A "data dictionary", also known as a "catalogue", is a centralised store of information about the database. It contains information about the tables: their number, names, the fields they contain, data types, primary keys, indices and so on. However, it should also contain information about the joins which have been established between those tables: foreign keys, referential integrity, cascade update, cascade delete and so on.

Incidentally, this usage of the term "catalogue" should not be confused with its use in dBase, despite the fact that both usages are misspent in the same way. In dBase, a catalogue is simply a container for all components of the database: data files, queries, forms, programs and such like. There is no storage of information

about the joins between the tables.

One of the major functions of a true data dictionary is to enforce the constraints placed upon the database by the designer, such as referential integrity and cascade delete. In the early days of the PC, none of the "relational" DBMSs offered a true data dictionary, but this wasn't a major concern for two reasons. Firstly, the early PCs were very slow and incapable of manipulating large, complex, multi-table sets of data. Instead they tended to be used for fairly simple, single-table work (address lists, for example) so the deficiencies in the DBMS didn't show up as much as they might otherwise have done. Secondly, few PCs were running truly mission-critical systems, so if the data became a little "damaged", who really cared? (Well, the companies involved cared very much indeed, but the software world wasn't too concerned.)

So the early PC RDBMSs passed responsibility for this level of control to the programmer. This meant that writing a totally secure database was perfectly possible in, say, dBase. The snag was that you had to be a good programmer and it took a great deal of effort. In addition, there

was no centralised area where the relationships could be examined, so maintenance was difficult. If you suspected a join was being incorrectly supported, you had to hunt through, and understand all the relevant code, to find the area which was compromising the data.

As PC-based RDBMSs have grown up and come of age, there is now a strong need for a data dictionary. Sadly it has proved, shall we say, challenging to bolt a data dictionary onto those RDBMSs with a large installed base of users, code and data files. The result is that none of the classics (dBase, Paradox, FoxPro, etc) have acquired one, even with the major rewrites that these products underwent in moving to Windows. Many people (or is it just me?) feel that this was a major opportunity missed. The result for developers is that maintaining the integrity of the database remains their responsibility, and they probably have other things to worry about.

Some "modern" products, like Access, maintain a data dictionary and as a result do not inflict this extra workload on the developer. Less serious "modern" products, like Approach, which have chosen to use the dBase file format, have inherited the problems associated with that format. 9. *Rules controlling data entry to specific fields must be storable in the data dictionary and applied at the table level.*

For the same reasons given above, storing this kind of information centrally can protect data and reduce the developer's workload. Sadly, no RDBMS implements this as fully as it might. Most allow, say, input masks to be defined as part of the field definition so they are applied globally. However, as we have seen in this column over the last few months, input masks are often inadequate for controlling the input of real data such as telephone numbers and postcodes. Often, more sophisticated controls are needed. Most RDBMSs only allow these to be applied at the form level; it then remains the responsibility of the developer to make each form enforce the controls. The whole process leads to a waste of valuable (and hence expensive), human time and effort.

Tips & Tricks

Here are a couple of great tips from regular *Hands On* contributor Shane Devenshire, of Walnut Creek, California:

- "In Access, if you double-click the sizing handles on the right-hand side of a control, the control itself will 'best fit' its text. That is, it will change size to contain exactly the text in the control when you are in design view." *Nice one, Shane. At least in Access 2.0 it*

works with all of the resizing handles.

- "You can also use the keyboard to move and resize controls. Move a selected control with ALT and the arrow (cursor) keys; to size the control, use CTRL instead of ALT.

"Surprisingly, even if you have Snap-to-Grid activated, these keyboard methods work without activating the Snap-to facility, making them great for fine-tuning."

Questions & Answers

Signalling problems

"I am writing a multi-user database application and want to be able to signal between two workstations, so that when one finishes a process, the other can start its work. How do I do this?"

Workstations on a server-based network (which I presume this to be) don't usually signal to each other directly, either in a database or any other applications. Instead they communicate with the server, so the best way to solve your problem is to use the server as the channel for communication. Create a table on the server called (for want of a better name) SIGNAL. This should have a single Yes/No field called FINISHED, and a single record, default value "no".

Cause the first workstation to write the value "Yes" into the field when it has finished, and get the second workstation to poll the value UNTIL it changes to "Yes".

You can make this more complex. For example, you could adapt it to create a new record every time the process changes hands, and store in the same table the time/date at which hand-over occurs. This pre-supposes that you actually want to know when the processes swap over, but this sort of information can be extremely useful.

Looking for lotto

"I am using MS Access for Windows. I have a 20-record file, each record having six numerical fields. I wish to do a search across all fields for six numbers. I know that it is possible to find which fields these are in individually, but is it possible to search across all records for a set of six numbers and find out which records they are in and how many are in each? As I have just acquired Access as part of Office, I have no experience of its functions or how it works. (For the record — a pun, MW! — this is associated with National Lottery numbers.)"

Mark Broadbent

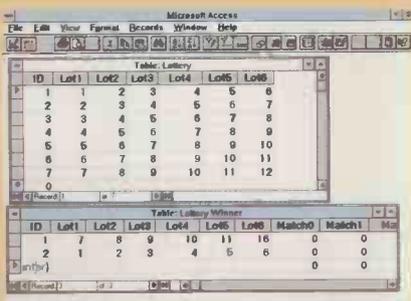


Fig 1 (top) The table LOTTERY stores your lottery guesses; in this case I have seven. Each week, into the table LOTTERY WINNER, you write the six winning numbers. Note that this table also stores the number of "Matches which are found between the winning number and your guesses"

Fig 2 (above) Given that this week's winning numbers are 1,2,3,4,5 and 6, I simply have to press the button labelled "Press Me!" and the number of matches appears

I regard the National Lottery as a pernicious influence on the nation. However, this is an interesting database problem applicable to more than the lottery alone, and hence worthy of study.

Traditionally, RDBMSs assume that information will appear in a "known" field. Thus, if you want to find a customer called Smith, you search in CUSTOMERS.LASTNAME. However, the results of the National Lottery (about

Lottery: the guesses

Lot1	Lot2	Lot3	Lot4	Lot5	Lot6
1	2	3	4	5	47
1	2	3	4	5	45
2	3	45	46	47	49

Lottery: the answer

Lot1	Lot2	Lot3	Lot4	Lot5	Lot6
1	9	30	37	45	48

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In the MD's office: What do you mean "we don't know how many fault calls relate to this" - it's on the computer isn't it?

In the library:
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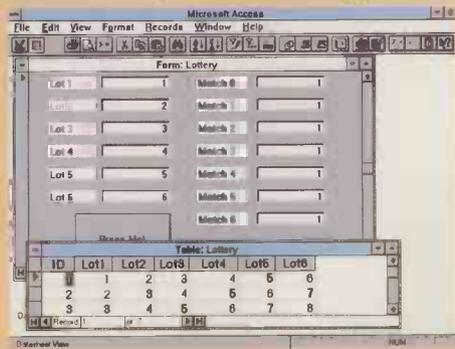


Fig 3 It appears that I have won the lottery, because one of my guesses matches all of this week's numbers. Whoopeee!

which I know very little) can, I believe, consist of six numbers. So, if you have three guesses, they might be as shown on page 279.

Now, given this week's answer (also page 279), I want to know how many matches each guess has attained. In the example given, two of my guesses contain the number one, as does the correct answer. This is easy to test for, since the number one always occurs in Lot1.

However, two of my guesses have the number 45, as does this week's answer. The trouble is that the number 45 is in Lot6 in one guess, Lot3 in

another, and Lot5 in the actual answer. To calculate the number of numbers that match the answer, I have to compare each number in a given guess with every number in the answer. (Given certain sets of numbers, every comparison isn't necessary, but it is easier to write code which checks all combinations. This is less efficient, but deciding whether a comparison needs to be done takes more time than simply doing all possible comparisons.)

As I said above, most RDBMSs assume that you know which field your data will be in — the problem here is that we don't. The only solution I could dream up involved code; can anyone find a solution using a query?

The complete application is on the cover disk as GAMB.MDB, including all of the code. You place your guesses into the table called LOTTERY and the winning answer into LOTTERY WINNER. Then you open the form LOTTERY, move to the record containing the correct winning number, and press the button. The number of matches appears on the right-hand side of the form (Figs 1 to 3).

Before you use it, a word of caution: I haven't tested this extensively, so if it tells you that you have won a fortune and then turns out to be lying,

don't sue me — check it manually first. If you do win vast sums of money, please remember that I helped you to discover that you were a winner (hint, hint).

Horses for courses

"Is it possible (using any mainstream database) to request the database to find the first record whose fields meet a particular set of criteria (say record X), search for the next occurrence of a record whose "name" field matches that of record X, then return to the first record following record X which again matches the required criteria?"

"I've got a database of several years' horse-racing results and I want to be able to search for horses who display particular characteristics; then search forward in the database to see firstly whether they ran again that season and if so, whether or not they won, etc."

Iain Simpson

I've never received a question about gambling; and then two within a week. It's a perfect demonstration of the Theory of the Clumping of Rare Events.

Use two queries. The first finds the horses that match your criteria. For example, the HORSES table contains some minimal data about horses and racing. I can use a query to find the names of all the horses which have, for argument's sake, come second at Ludlow (Fig 4).

The second query again looks at the HORSES table, and it uses the names returned by the first query as the criteria for its search. So, if the first query returns the name "Penguin", the second query returns all of the data in the HORSES table which relates to the horse of that name (Fig 5).

You can set up multiple query pairs like these which look for different criteria. Once set up, all you need to do is run the second query in the pair (in this case the one called "All Info for Horses Second at Ludlow"). These sample queries and table are also in the same database on the cover disk.

For non-Access users, the SQL (Fig 6, alongside) may be useful.

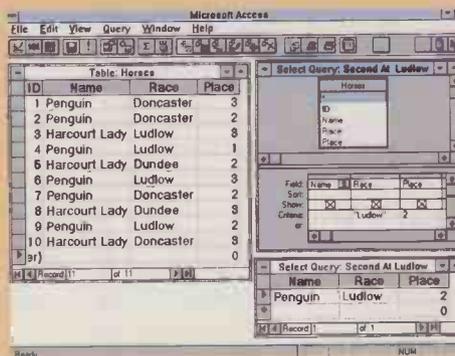


Fig 4 (left, top) The table contains data about the horses and the races they have run. The query, top right, finds all of the horses which have ever come second at Ludlow. At bottom right you can see the result of that query: only one horse matches the criteria. Fig 5 (left) At top left is the query that you can see in Fig 4. At bottom left, a second query is using the results from the first one as its criteria

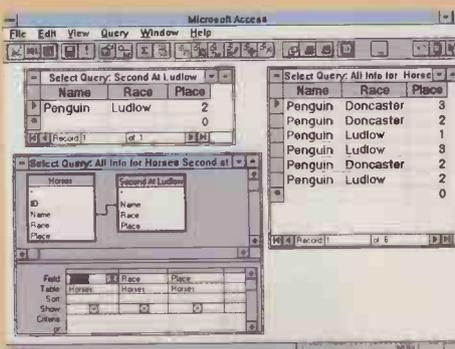


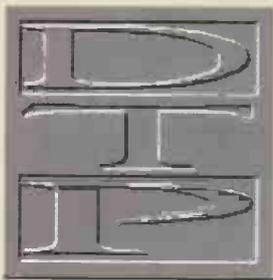
Fig 6

```
Query 1
SELECT DISTINCTROW Name, Race, Place
FROM Horses
WHERE ((Race="Ludlow") AND (Place=2));
```

```
Query 2
SELECT DISTINCTROW Horses.Name, Horses.Race, Horses.Place
FROM [Second At Ludlow] INNER JOIN Horses ON [Second At Ludlow].Name =
Horses.Name;
```

PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. He's on penguin@cix.compulink.co.uk



Drawing Net profits

Gordon Laing, a diehard disbeliever, has seen the light. He's found that the Internet opens up a whole new world of DTP and graphics possibilities.

I've resisted long enough. I'm sorry, but this month I'm doing graphics and DTP on the Internet. I used to feel as many people still do, and steered well clear of the services and information on offer over the World Wide Web. But recent experience has turned me into a new convert, an Internet evangelist fully embracing the global network.

My first brush with the Internet came while installing Windows 95 and finding it not wanting to run my bog-standard Diamond Stealth video card at anything other than VGA mode. My last desperate attempt for a solution was looking up the Windows 95 help pages on the Internet, where I found video drivers and a page devoted to Diamond's products. A rather obscure tip later and I was running at high resolution, in lots of colours, flicker free, as I had merrily been doing with Windows 3.1.

If this information was on offer, what other gems could be found? Always your humble servant I surfed away, and have returned with the best graphics and DTP pages I could find. While this month is predominantly concerned with pages offering tips, hints and frequently asked questions (FAQs), I'll write in the coming months about what makes a Web

page look good, what graphics work best, and display the finest examples of beautifully designed, but easy to view Web pages.

A brief mention to anyone interested in the Internet but not certain how to get online: check out our *Cutting Edge* section every month, before this *Hands On* section. There you'll find features, hints and tips about the Internet, along with regular CD-ROM and general entertainment reviews and features.

Photoshop update and PageMaker 6

Adobe has been busy with what are arguably its two major products: Photoshop and PageMaker. The former has a new update named version 3.0.4, with

enhancements on both PC and Macintosh platforms. Both platforms have the following new features: a scratch disk efficiency indicator showing the amount of time Photoshop hits your hard disk, support for TWAIN 36/48 bit scanners, and improved support for Illustrator files. I quizzed Adobe about the seemingly abandoned Illustrator for Windows and got the usual "Yes, we know, we'll try to get a new version out soon and get both Mac and Windows versions out simultaneously in the future." Adobe had better be quick in carrying this out, because Windows users currently have a wide choice of excellent drawing packages: MacroMedia FreeHand 5, CorelDraw 6, Xara Studio and Xres to name but a few. Many of these are already

Adobe PageMaker 6.
Notice the new multiple master pages,
Quark XPress style



enhanced for Windows 95.

Specific to Photoshop for Windows 3.0.4 is optimisation for Windows 95 such as support for long filenames, right mouse button configuration to the commands palette and registry of application and file icons. Photoshop 3.0 was a 32-bit application which can run under Windows 95, but the 3.0.4 update is said to be specifically designed to take fuller advantage of Windows 95.

Macintosh users of 3.0.4 can look forward to better support for the new PowerPC 604-based machines boasting many speed improvements, and new plug-ins including a superior PhotoCD import. Registered users of Photoshop 3.0 will have the 3.0.4 update dispatched free – it's available immediately.

Adobe is gearing up for the launch of PageMaker 6, just over ten years after the shipping of the original PageMaker 1; interestingly, PageMaker 6 has won Best of Show at the August MacWorld show in Boston. Adobe is citing more than 50 new enhancements, although perhaps of most interest to this month's column is version 6's ability to author HTML (HyperText Markup Language) documents for electronic publishing on the Internet. In line with Adobe Acrobat, PageMaker 6 will also be able to create publications in Acrobat PDF format.

Other highlights include colour correction and sharpening of PhotoCD images, Kodak Precision Colour Management System (KPCMS) and multiple master pages (like Quark XPress). Plus, PageMaker 6 can apply Photoshop plug-ins to images. Aldus Additions have changed format, and at the time Adobe briefed me, it was unknown whether PageMaker 5 Additions would be compatible with PageMaker 6. However, Adobe will upgrade all the standard Additions, so this shouldn't be a problem.

PageMaker 6 ships on floppies and a Deluxe CD-ROM, the latter including the Acrobat Distiller and Reader. The Macintosh and Power Macintosh version should ship in early autumn 1995 and the Windows 95 version shortly afterwards. Bad news is that all versions need at least 12 to 16Mb of RAM, but the good news is that you can upgrade from absolutely any version (not cross-platform, however) for the bargain price of £99.

DTP delights

Back to the information superhighway. The first thing I did to research this brief foretaste of the fruits on offer was to perform a NetScape Net Search on DTP —



graphics didn't get me very far. The most promising information was a page of DTP-related links provided by European imaging bureau Switch On. Primary links are to the Adobe and Corel home pages, but there are also good links to independents covering PageMaker, Quark XPress, and DTP packages in general.

Adobe's pages are very well designed with lots of nice — and quickly loading — iconic links to various subtopics. You can find out the latest news (at the time of writing, the aforementioned PageMaker 6 and Photoshop 3.0.4) and learn more about the company, its products, support and training.

Best of all are the tips and tricks pages consisting of many downloadable Acrobat files; if you don't have Acrobat, a suitable reader can be downloaded for free. Most of the PDF files range from 1Mb to 3Mb so you could be in for a lengthy download, but the results are worth it. The 3.5Mb Professional Studio Techniques is a 66-page PDF file covering 14 selected techniques from *Design Essentials*, *Imaging Essentials* and *Production Essentials*, books

Visit Adobe's Web pages and you will be able to download Acrobat PDF files of hints and tips

from Adobe Press.

As you would hope with Acrobat, the files look on screen as they do on the pages of the books, even if you don't have the correct fonts installed. If the idea of downloading large files puts you off, you should check out all three of these books at your local store — they are brilliant.

Corel's official pages are still under construction but the unofficial ones look good. Of note is Chris Dickman's CorelNET, with links to a huge range of information including bureaux, user groups and discussion areas. CorelDraw 6 for Windows 95 is to be launched soon.

Font fanatics should look no further than the address of frequently asked font questions listed at the end of this column. It may not look like much on the surface, but here you'll find links to a huge amount of information that should satisfy the most obscure enquiries.

Graphics and DTP on the Internet



[DRAW 3 to 5](#), [DRAW 6](#) and [VENTURA](#). The Corel Corporation area.



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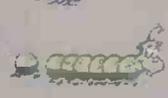
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Above Letraset's Ripper online utility allows you to sample any of its Fontek fonts using your own words

Right Alternatively, you can view a standard character listing. Here's La Bamba from the Fontek collection



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Left Everything you ever wanted to know about Corel is available on CorelNET

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SERIF SANS SERIF SCRIPT GRAPHIC BY NAME LATEST Ripper EXAMPLES



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esselte_new_media@esselte.com

Saving the best until last, here's my favourite find during this month's surfing. It is none other than the fabulous Esselte Letraset Online pages. Esselte is a Swedish company consisting of three major brands: Letraset (graphic supplies), Dymo (labelling products) and Pendaflex (suspension filing). Although Esselte's largest earner is office products, I'm more interested in Letraset.

As you'd hope from Letraset, all the pages are beautifully designed, not just the home page. They have lots of lovely icon links and great graphics overall without sacrificing access and download speeds. The home page at the time I was looking (Letraset updates its pages every month so they're well worth a regular visit) consisted of five main sections, including a springboard to related sites.

Ripper is an excellent idea making good use of the unique facilities of the Internet. It allows you to view any typeface from the Letraset Fontek collection, but using a line of text which you type in. Looking at alphabetic listings is no match for seeing your own words set in the desired face. It's obviously no good for printing or Letraset would rapidly go bust, but the anti



-aliasing techniques used really offer an effective view on-screen. You can also view conventional alphabetic listings of the Fontek collection.

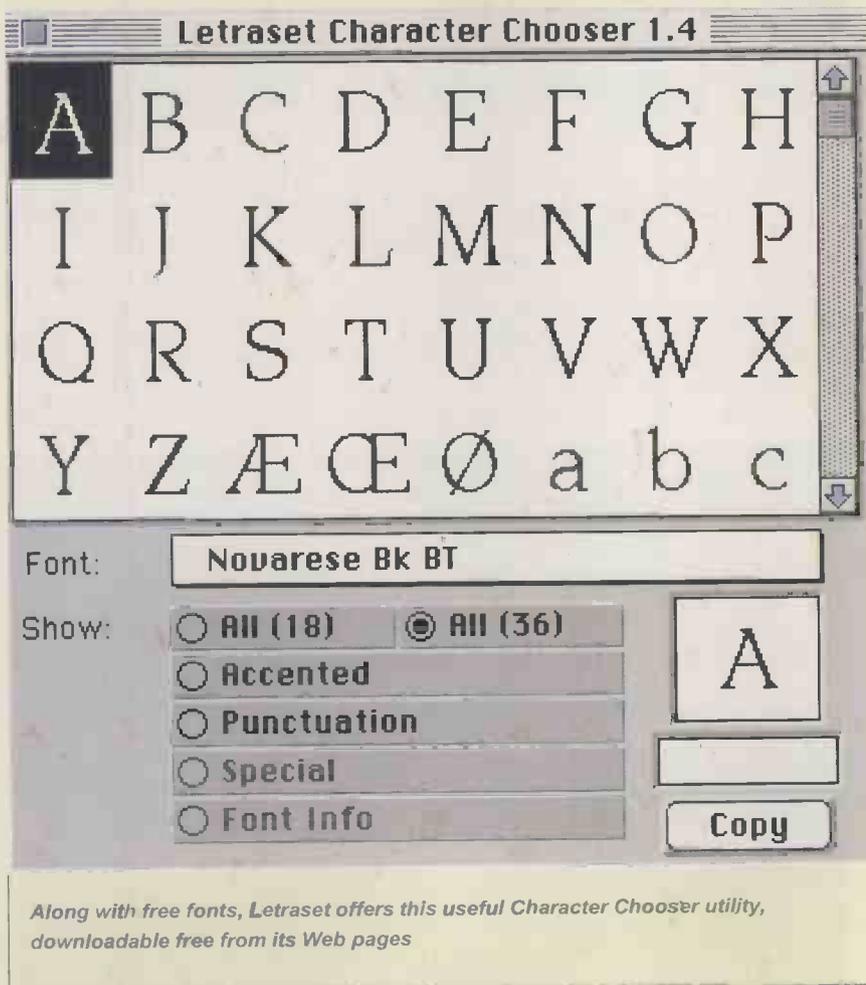
Catch Of The Month sounds most promising, and this is where you'll find lots of free products to download – yes, free, and remember these items change on a monthly basis. During August there was a demo of Letraset's Envelopes plug-ins for Macintosh Illustrator and FreeHand, and a free Character Chooser desk accessory for Macintosh. This displays a selected

font's entire character set including accented, alternative, ligature, special, or symbol varieties.

But best of all, every month there is a different Letraset font to download for free. I contacted Letraset who agreed to let me know what October's font would be. Consequently, if the timing is right, our Font of the Month is one you can have for free from the Fontek collection courtesy of Letraset.

Font of the month

Just my type this month is Van Dijk, which should be the featured font for October in Letraset's Internet Web pages. You can download it free of charge in TrueType or Type-1 formats for either PC or Mac. Designed by dutchman Jan Van Dijk, it's a friendly-looking typeface ideal for all those situations where traditional designs may come across as too conservative. Get on that modem now!



Along with free fonts, Letraset offers this useful Character Chooser utility, downloadable free from its Web pages

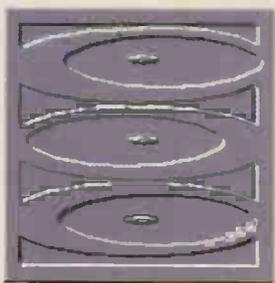
PCW Contacts

If you've found anything interesting on the Internet, or anywhere else for that matter, write to the usual PCW address or email me as
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Letraset
(<http://www.lettraset.com/lettraset>)



A standard for video

The guesswork is over — the spec for MPC Level 3 has been released. Panicos Georgiades and Gabriel Jacobs compare notes, try a video grabber board and mark language CD-ROMs.

Shortly after our attempt to guess the specifications of the MPC Level 3 standard (September issue), the figures were released by the MPC Council and the Software Publishers Association (from March of this year the SPA has been handling MPC specs).

MPC Level 3 is in some parts set slightly higher than we expected, but what is obvious is that its main target is to deliver decent video playback. MPEG video, either in software only or with hardware decompression, is now a requirement. This is no doubt one of the reasons why the minimum processor is now set at a Pentium 75.

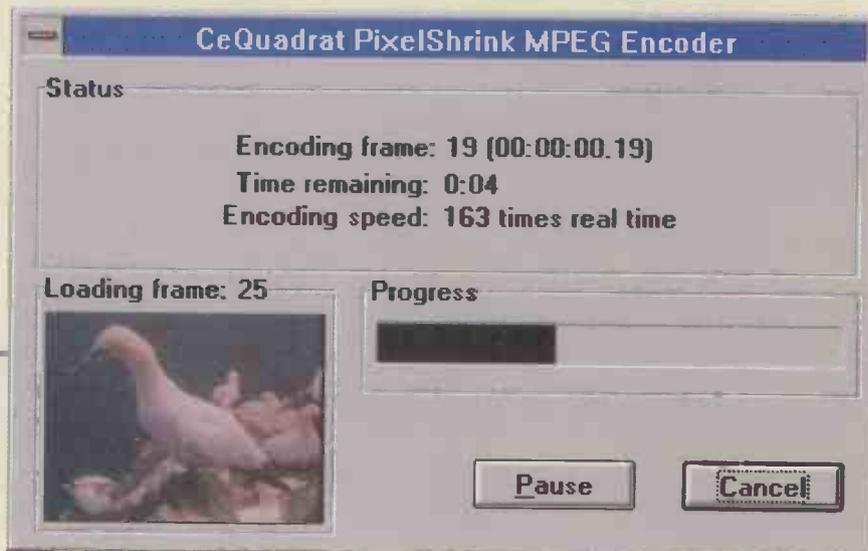
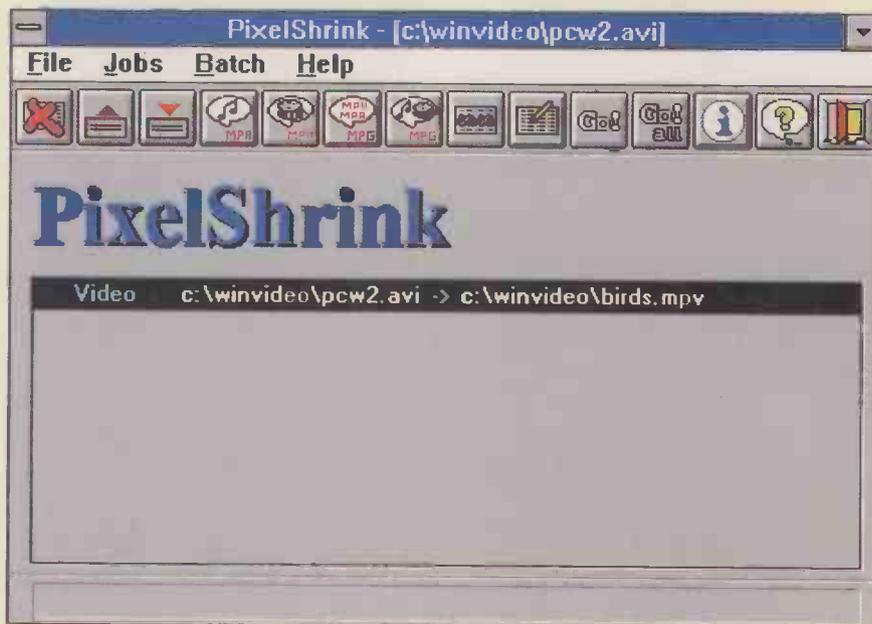
Level 3 also requires wavetable synthesis (pretty much standard now in sound cards) and a quad-speed CD-ROM drive, which is a slightly higher spec than what is presently sold on average.

Hard-disk size has been set at 540Mb (as we predicted) but the transfer rate is specified at 1.5Mb/sec, about double the transfer rate of the hard disks in most machines.

RAM is set to 8Mb, and although some will probably complain that this is too low, note that RAM is one of the few computer parts which have kept their price over the last few years. An additional £250 (to upgrade to 16Mb) is probably not what suppliers would have wanted.

PixelShrink, which is bundled with Crunch It, converts AVI (M-JPEG) files to MPEG-1 White Book standard

If you own a Pentium 60, do you now scrap it because it's not a 75? No. It's important to remember, before you part with any money, that most CD-ROM titles out at the moment are written at Level 2 standard, and a fair amount still require only Level 1. It will take two to three years before there are enough titles written at Level 3 to make your Level 2 machine obsolete. And by that time, the average machine on sale will have surpassed the Level 3 standard in any case.



The crunch for good video

To add to all the talk about video, here's news of a product for producing it which costs as little as products designed only to play it back. Graphics card manufacturer Spea has a new video grabber board called Crunch It. At £325 it not only delivers some of the best quality video capture, but as far as we know is the cheapest of its kind.

If you want very good digital video clips, you have to use very good compression algorithms that will pack as many bytes together in some clever way and still manage to keep the quality high. MPEG provides excellent compression resulting in each picture (frame) being only 5.6Kb.

No Video for Windows method will give you equivalent quality at such compression. So if you want to produce good-quality digital video you have, for practical purposes, two choices. You can either use an expensive bureau service, or you can buy expensive hardware (over £2,000) which provides you with MPEG-1 video compression in real time.

But forget for a moment about real time. If you can do without it (most of us can), compression can be done slowly. This involves digitising the video in your machine with no compression at all at the time of capture, then using some software to do the compression — an overnight job. The only problem is that capturing video with no compression in real time requires a hard-disk transfer rate of about 7.6Mb/sec (for an MPEG-1 frame size of 352 x 288 true colour, slightly larger than quarter-screen VGA), and you'll find it hard to get a hard disk to handle this. You can get disk arrays, but they're expensive. You can also connect a professional VCR to your computer and grab frame by frame, but again such VCRs are expensive and you won't want to wear out the heads.

The current difference between a Level 2 and a Level 3 machine can be several hundred pounds, which would probably be better spent buying 10 to 20 CD-ROM titles. This is especially good advice given that, discounting specific MPEG titles, there aren't that many CD-ROMs out there at the moment incorporating MPEG video.

Of course, the situation could change soon because many large companies are investing a great deal in MPEG technology, which probably means that the standard will be widely accepted. But that won't happen until the prices are right (and some would argue that if this takes too long, a new and better video standard will be out making use of high-density CDs).

Proof of the pudding? The first MPEG1

The answer lies in an in-between solution. You compress as you grab, but use a low-compression ratio — as low as you can get it, just to be able to grab onto a hard disk in real time without losing frames. There are hard disks that claim sustained rates of 3Mb-4Mb/sec (or even higher), but in real life expect to get anything between 1Mb-2Mb/sec. That means you can digitise, at 352 x 288, 25 frames per second at a compression ratio of between about 4:1 and 8:1 for an average hard disk. At up to 8:1 the quality is very good and the files are small enough to be manageable for further editing. Then you can re-convert your final material to MPEG-1 or Cinepak (both end up at over 50:1 compression).

The SPEA Crunch It board uses a Zoran chipset and captures at compression ratios ranging from 5:1 to 120:1. At 5:1 (and even up to 8:1) you'd find it hard to distinguish the original from the recorded signal. Parts of BBC news items are edited at 8:1.

In addition, the Crunch It captures the full PAL resolution of 736 x 576 pixels at 50 fields per second. You can also capture at 736 x 288, 384 x 576 and 384 x 288. It compresses using Motion-JPEG and you can edit the compressed files. With the pack you get a bundled software converter that converts Motion-JPEG files to White Book MPEG standards, and if you have Video for Windows, Premiere or some other editing program you can re-compress them using software-only playback methods.

The board has three video inputs (two composite, one S-Video), one composite output and one S-Video output for playing back video from the hard disk to a TV or VCR. It accepts PAL, Secam and NTSC standards.

VideoCD playback deck has just appeared from Pioneer, at £599. At that price, not many people are expected to be replacing their video recorders this Christmas.

CALL the shots

Whenever a new technology appears, the world of foreign-language teaching jumps out of its skin to take advantage of it. The invention of the printing press soon meant that books on language learning were being churned out by the hundred. Tape recorders and audio cassettes almost immediately generated language laboratories. Personal computers rapidly spawned language-learning software. No surprise, then, that multimedia has followed suit.

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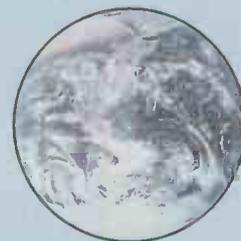
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PCW 11/95



But is it really possible, as language CD-ROM producers would have us believe, to learn a foreign language with only a computer, monitor and speakers? Can we do without a human teacher? On the face of it, the answer seems to be yes, since for the first time we have a technology which encompasses everything you need for learning a foreign language — sound, images, text, interactivity.

Dig a little deeper, however, and the picture isn't quite so rosy. When the language laboratory first appeared in the 1960s, language teachers feared for their jobs — unnecessarily, as things turned out. And their number has certainly not been reduced by the advent of computer-assisted language learning (CALL). The effect of multimedia CALL will be no different, and for a very good reason: lack of computer intelligence.

Multimedia may be able to deliver information better than previous technologies, but it's hampered by the fact that computers can't yet be made to respond intelligently to free-form user input, where the user can type in anything instead of being confined to a limited set of responses. In fact, computers can actually be worse than books and audio cassettes in this respect, since when they try to respond they risk looking foolish, and there's nothing worse than a teacher made to look a fool.

Language learning is especially susceptible to making computers look silly because language is so complex. Of course, voice input is out of the question because we're far from producing a computer powerful enough to understand human language at a level suitable for learning. But free-form typed input, too, poses insurmountable obstacles.

Accent on response

Take this simple but typical case. A user sees a picture of an object and hears the foreign word for it pronounced. He or she is asked to type in the word and misses out an accent over a character. The computer says the response is incorrect. But the response is less incorrect than typing in the word "chair" when the answer should have been "get an ambulance". No CALL package yet written has enough artificial intelligence to cope with that kind of basic distinction, let alone being able to recognise that the phrase "as white as ... goose down" (wrong) is more imaginative than "as white as ... snow" (correct).

Multimedia language-learning CD-ROMs tend to divide into those which offer free-form user input, those which avoid it entirely, and those which mostly avoid it.

Those which avoid it expect only a mouse click or a single key-press. This multiple-choice approach is fine for testing but not so good for teaching. Those which use free-form user input invariably fall into the trap of marking things wrong when they may well be right.

The intermediate approach may include exercises such as having a learner type in prepositions (under, over, on, off...) which are relatively few in number and which therefore give the programmer a chance of having the software recognise common errors. But if the package isn't limited to that kind of exercise, it must in the end opt for one or both of the two basic approaches, each with its inevitable pitfalls.

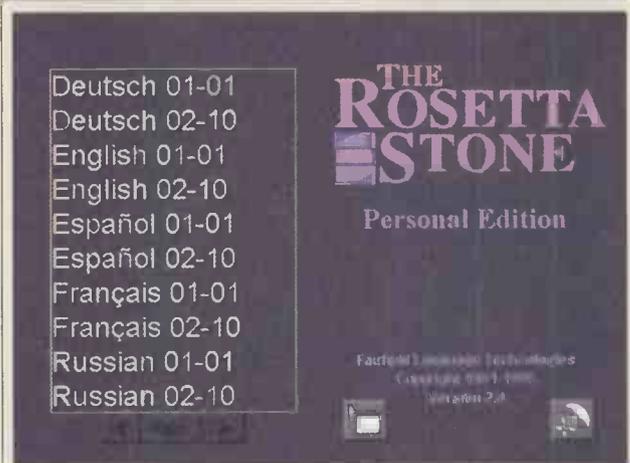
This doesn't mean that multimedia is no use for language learning. It's an excellent teaching aid, provided the user is aware of its limitations. Such is certainly the case with *The Rosetta Stone*, featured on this month's cover CD-ROM. This has generally received good reviews. The basic approach is that of listen and choose: you see four pictures and hear something which applies to only one of them. There are plenty of exercises of this kind, with some minor variations and options, ranging from simple beginner's stuff to fairly advanced material.

Parser pitfalls

As such, the approach works fine. But once the user is asked for input, the program falls down like all its equivalents. For instance, in Dictation Mode you hear a sentence and have to type it in. Make one small error (even of punctuation) and you're completely wrong. The parser simply isn't up to understanding your input: it needs a perfect match for an answer to be judged correct.

Nevertheless, the program is a good example of how multimedia can be used

Mind your language



The Rosetta Stone teaches German, English, Spanish, French and Russian. The Personal Edition is bundled on this month's front cover CD-ROM

for language learning: sound, text and images are integrated, and there's a reasonable level of interactivity. This is a big advance on those old DOS-based packages which had you doing drills, and the sound brings the whole thing to life.

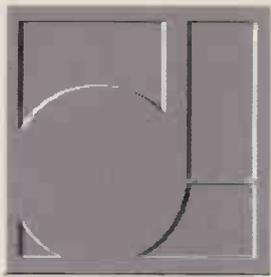
This is fine as long as you don't start to believe that multimedia CALL is a panacea, and that human language-teachers should fear for their future. Despite the fact that a good chess program can beat most human chess players, when it comes to artificial intelligence, you only have to consider language CD-ROMs to realise that we still have a very long way to go to create the equivalent of HAL in *2001: A Space Odyssey*.

PCW Contacts

Panicos Georghiadis and Gabriel Jacobs will be glad to answer your questions. Either write to PCW, or email g.c.jacobs@swan.ac.uk

Crunch It from Spea on 01844 261886





Rhythm methods

You'll never have a hit on your hands without a good drum track. Steven Helstrip has ways of making it sound live, and looks at Steinberg's latest release and at a new sampling CD.

Early betas of Cubasis Audio didn't look too promising, but I recently checked out the shipping version and was pleasantly surprised. In addition to its 60 MIDI tracks, Cubasis Audio will record and playback four mono, or stereo, audio files. You can lay down a vocal, guitar, or whatever on top of your sequenced parts. I ran the program on 486 and Pentium systems fitted with 8Mb and 16Mb RAM respectively and squeezed out four simultaneous audio tracks without hiccups.

The only real problem is the demand placed on your hard disk, but if it can sustain a data transfer rate of around 1.5Mb per second and has an access time of around 12ms you should be okay. The software works with any 16-bit Windows-compatible sound card, and that accounts for just about every card there is. However, if you want to play and record at the same time (a great help when it comes to recording vocals) you will need a card with duplex audio. Try cards from Turtle Beach, MediaTriX and Digital Audio Labs.

Without spending upwards of £1,000 you won't find any competitors to Cubasis Audio right now, even though it does lack MIDI features. Steinberg will be implementing the audio engine into the full version of Cubase however and it is likely to be available before the year is out. The new product, yet to be named, will have better audio editing facilities and may include digital effects, parametric EQ and automated fades.

Existing users of Cubasis can upgrade to the audio version for £120. Otherwise it will cost you £249.

Making waves

Just about every high-end keyboard manufacturer has now released a WaveTable expansion card enabling you to upgrade from FM. These include Kurtzweil, Roland,

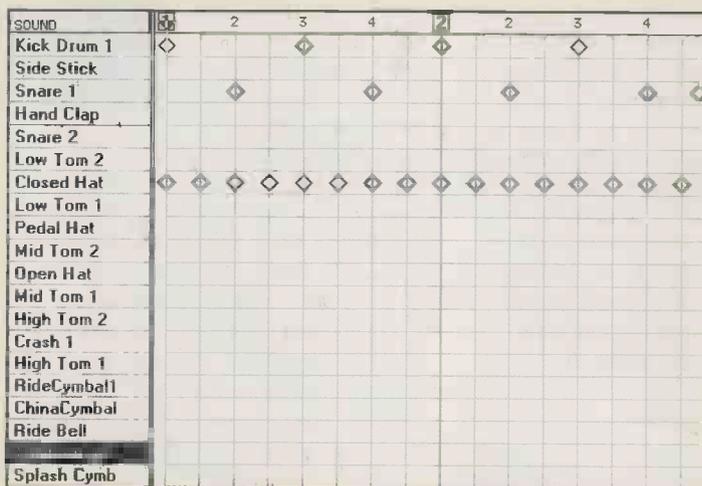
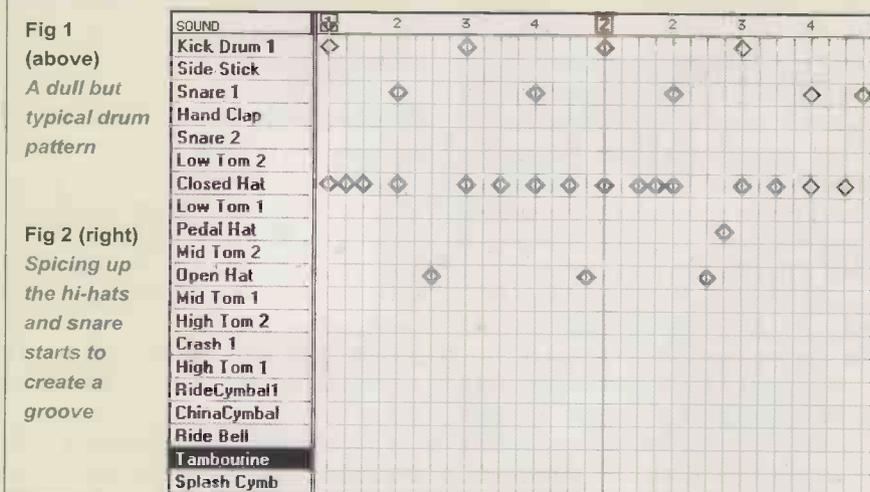


Fig 1
(above)
A dull but typical drum pattern

Fig 2 (right)
Spicing up the hi-hats and snare starts to create a groove



Korg and more recently Yamaha with its new XG synth. For those who don't have compatible sound cards, Et Cetera distribution has started work on a combined MIDI interface and host connector. It will have four independent MIDI ports to provide 64 MIDI channels. And because it isn't a sound card in the traditional sense, it will have a quieter output. The price has yet to be fixed but is expected to be under £250. It should be available by October.

Get into the groove...

Programming rhythm tracks is a subject I frequently receive letters about, so this month we'll be taking a close look at what makes a good drum track. We'll look at what you need, and how to go about putting grooves together.

The old maxim less is more applies to programming drum and percussion parts. There's little point in having 28 instruments playing at the same time if they are all fighting to be heard, cluttering up the song.

Depending on the style of music you are working on, you can usually get away with a basic kit consisting of kick, snare, hi-hats, cymbals and tom toms. If you're going for a more commercial, poppy

sound, it might be a good idea to add tambourine, finger snaps and hand claps to the list.

If you are using drum samples, as opposed to a drum kit from a synthesiser, it is worth sticking to the General MIDI keyboard lay-

out (see panel alongside). This will make life much easier when you come to playing back the piece on different equipment. You will also become familiar with the layout, saving you time when looking for the hand clap, for example.

When selecting sounds to use, take into consideration the style of the track. For example, use an electronic snare like the 909 (included on last month's CD) if it's a dance-orientated track. A live snare is better suited to more laid-back tracks. You might consider using two or sometimes three different snare samples, or sounds, to create a more convincing "live" feel.

If you break down a typical drum part with a 4/4 time signature, you will find the kick drum plays religiously on beats one and three, and the snare beats two and four. On top of this the hi-hats will play either quavers (eighths) or semi-quavers (sixteenths). Leave a drum track like this and you will not have a hit - it needs more. Whether this means making the snare drum pattern more exciting, adding the kick to beats two and four or introducing new elements, often depends on the track. Here are some guidelines for making your track a bit more interesting.

Instead of repeating a single bar over and over again, vary the pattern of a four-bar section slightly. The snare drum is probably the best place to start. Adding a short fill, or push, at the end of each second bar (Fig 1) can start to give the track a groove. Quantising to a heavy or slow shuffle can make the part more interesting.

Put aside a separate track for each element when recording the parts. Doing this makes it much easier to alter the level, feel and offsets if you should need to. It also means you can just copy the hi-hat pattern, if that's all you require in a link or middle-eight section.

When using hi-hats, make sure you work in the pedalled and open hats. These often work best on the off-beat. As with the snare pattern, quantising with a groove template can make them more interesting. Fig 2 shows simple yet effective variations for hi-hats.

The kick drum and bass guitar provide the foundation to a track, and it's vital that they work well together. When starting a track from scratch, it's worth putting in a simple "four on the floor" pattern and adding or removing notes once the bass line has been recorded.

Adding a clap, or finger snap, to beats two and four can lift a drum track. It's not usually a good idea though simply to copy what the snare drum is doing. As for tambourines, they can often do something similar to the hi-hats. Once you have a

General MIDI percussion map

MIDI Note No.	Octave	Instrument
35		Kick 1
36	C1	Kick 2
37		Side Stick
38		Snare 1
39		Clap
40		Snare 2
41		Low Tom 2
42		Closed Hat
43		Low Tom 1
44		Pedal Hat
45		Mid Tom 2
46		Open Hat
47		Mid Tom 1
48	C3	High Tom 2
49		Crash 1
50		High Tom 1
51		Ride 1
52		China Cymbal
53		Ride Bell
54		Tambourine
55		Splash Cym
56		Cowbell
57		Crash 2
58		Vibra-Slap
59		Ride Cymbal 2
60	C4	High Bongo
61		Low Bongo
62		Mute High Conga
63		Open High Conga
64		Low Conga
65		High Timbale
66		Low Timbale
67		High Agogo
68		Low Agogo
69		Cabassa
70		Maracas
71		Short Whistle
72	C5	Long Whistle
73		Short Guiru
74		Long Guiru
75		Claves
76		High Wood Block
77		Low Wood Block
78		Mute Cuica
79		Open Cuica
80		Mute Triangle
81		Open Triangle
82		Shaker
83		Jingle Bell
84C6		Bell Tree

General MIDI layout of percussion instruments found on MIDI channel 10.

basic pattern, play with the velocities of each note as this can add a lot of interest. If you set all the velocities to 64, for example, make the off-beat notes louder, or

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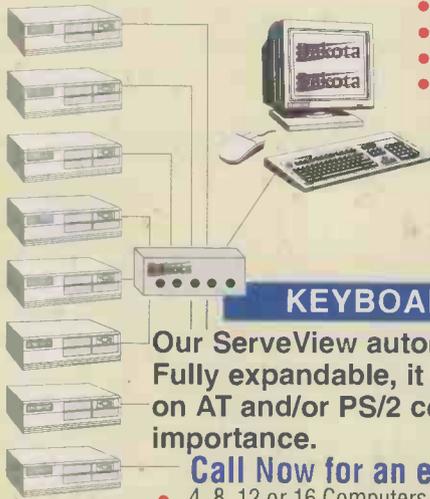
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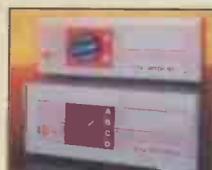
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Table manners

You would hardly know it from the manuals, but Delphi lets you create database tables entirely in code. Tim Anderson shows how, checks out a newcomer to Windows visual development, and offers ten handy Visual Basic tips.

Borland has been so keen to emphasise Delphi's ease of use that some of its best features are almost hidden. An example is the creation of new database tables. The documentation encourages you to wheel out the Database Desktop to do this interactively; but what if you want to

create a database in code? It is more complex but has many advantages, particularly for applications which will be distributed. Users do not want to define tables, nor should they have to struggle with the Borland Database Engine configuration utility. All these operations can be

done more tidily in Delphi code. Unfortunately, the documentation for creating tables on the fly is all but hidden. Here is a demonstration of two ways to do it.

The first and quickest method is to use a TTable component. The step-by-step method is as follows:

1. Start a new project

in Delphi and place TTable, Datasource and DBGrid components on the form. The grid is not strictly needed to create the table, but gives a way of viewing the results. Next, place a button on the form with a caption of "Create table". The code to do this will go in the button's Click procedure.

2. Double-click the button and enter the following code. Note that this procedure assumes the existence of a MYDBS directory on your C drive. (Fig 1.)

This code defines the fields for the new table. There are four parameters to the FieldDefs.Add method. The first names the field. The second defines the field type, and the possible values can be found in Delphi's online help under TFieldType Type. The types available will vary according to the database format used.

The third parameter is the size of the field, and is only meaningful where the size is not already determined by the field type. The last parameter states whether or not it is a required field. (Fig 2.)

Indexes are defined using the IndexDefs.Add method. The first two parameters define the index name and field respectively. The third parameter is a set of type TIndexOptions. Again, not all the options apply to all database formats. For example, in dBase the primary key is meaningless. (Fig 3.)

3. Now run the code. The BDE creates and fills the table. Performance is fine, as long as the hardware is sufficient to run the BDE in the first place — realistically you need an 8Mb 486 machine or better.

Another option is to use SQL. The latest versions of Borland's database engine can use SQL on local tables as well as on server databases. In Delphi (against intuition) you use a Query component to execute SQL instructions, even when there is no result set to return. Here is how it works.

1. Start a new project, and add Query, Datasource and DBGrid components. Again, the latter two are only needed to display the data. Finally, add a button and open its Click method.

2. Next write code as Fig 4.

The Clear, Add, ExecSql sequence is the fundamental technique for executing SQL instructions on a database. In this example the query.DatabaseName property is set to a directory name, which tells the BDE that it is working on a local, desktop database. The other problem is finding the correct syntax for the SQL commands. Not all SQL commands are supported for local databases, and the main restrictions are summarised in Appendix C of Delphi's

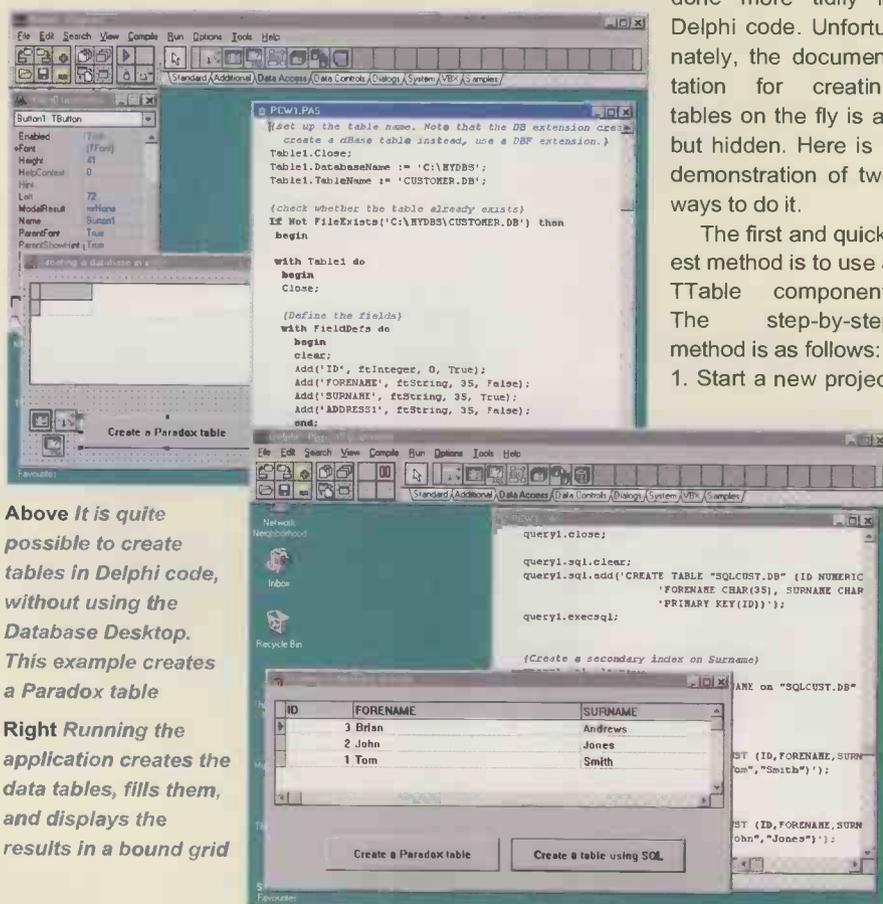


Fig 1

```
{set up the table name. Note that the DB extension creates a Paradox table.
To
  create a dBase table instead, use a DBF extension.}
Table1.Close;
Table1.DatabaseName := 'C:\MYDBS';
Table1.TableName := 'CUSTOMER.DB';

{check whether the table already exists}
If Not FileExists('C:\MYDBS\CUSTOMER.DB') then
begin

  with Table1 do
  begin

Close;
{Define the fields}
with FieldDefs do
  begin
  clear;
  Add('ID', ftInteger, 0, True);
  Add('FORENAME', ftString, 35, False);
  Add('SURNAME', ftString, 35, True);
  Add('ADDRESS1', ftString, 35, False);
  end;
end;
```

Fig 2

```
{now define indexes}
with IndexDefs do
  begin
  clear;
  Add('ID', 'ID', [ixPrimary, ixUnique]);
  Add('SURNAME', 'SURNAME', []);
  end;
```

Fig 3

```
{actually create the table and open it}
CreateTable;
Open;

{Append some records}
Table1.AppendRecord([1, 'Brian', 'Smith', '1 The Street']);
Table1.AppendRecord([2, 'Joe', 'Brown', '34 The Square']);
Table1.AppendRecord([3, 'Martin', 'Wilson', '43 The Close']);
Close;
end;

{Display a confirming message}
Application.MessageBox('Table created', 'Personal Computer World', mb_OK);
end;

{Display the table in the grid}
Table1.IndexName := 'SURNAME';
Table1.open;

datasource1.dataset := Table1;
dbGrid1.Datasource := datasource1;
dbGrid1.Refresh;
```

Database Application Developer's Guide. Note that double quotes are used within the SQL string, to avoid conflict with Delphi's single-quote string delimiter.

The SQL shown creates a Paradox table with a primary key. The primary key must be defined in this statement; you cannot add it afterwards. (Fig 5.)

So which is the best technique? There does seem to be some performance penalty for using local SQL, but the advantage is that the same code will run if you later convert your application to talk to a SQL backend server. Ideally you should try both the methods described to discover which gives the best performance in your particular system.

Into the Fourth Dimension?

Mac users have enjoyed an elegant graphical interface for years. Together with Apple's famous Human Interface Guidelines you might imagine this head start gives long-standing Mac developers an advantage over their Windows counterparts. In reality, the greater clout of the Windows marketplace more than compensates, and Mac development tools are poor in comparison.

The database area is particularly weak on the Mac, since companies almost always use PCs for serious database work. Although FileMaker Pro has won many hearts as a flexible end-user database, developers have been left to choose between 4th Dimension (4D), Omnis 7 or the Windows-like FoxPro; 4D is the biggest fish in this relatively small pond. ACI is now releasing a Windows version of 4D, which means that all the leading Mac databases are now cross-platform tools.

Taking the good points first, 4D joins Clarion, Visual Objects and Delphi in providing a compiler that creates native machine-code. You are still saddled with a large runtime database engine, but the speed improvements are impressive. The compiler can produce fat binaries that will run either as 68000 or Power PC applications on the Mac, or even (it is claimed) wrap Windows and Mac binaries into a single executable. Second, there is support for multiple processes, implemented by 4D itself on the Mac and on Windows 3.x, and by the operating system on Windows 95 and NT, which support multithreading. Third, 4D is usable on the desktop or as a database server, and it has built-in referential integrity, a visual relationship builder, and password-based security. The server product has a version control system for team development.

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Fig 4

```

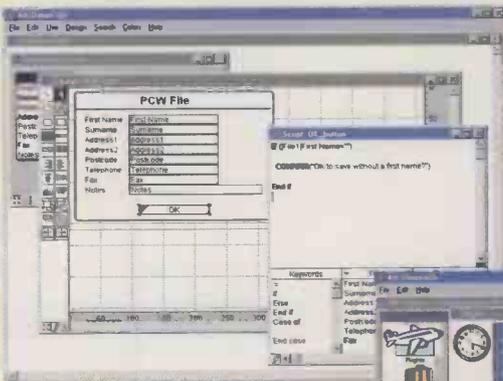
Query1.Close;
Query1.DatabaseName := 'C:\MYDBS';

{The extension determines the data format}
If Not FileExists('C:\MYDBS\SQLCUST.DB') then
begin
query1.close;

query1.sql.clear;
query1.sql.add('CREATE TABLE "SQLCUST.DB" (ID NUMERIC(10,2),'+
               'FORENAME CHAR(35), SURNAME CHAR(35),'+
               'PRIMARY KEY(ID))');

query1.execsql;

```



Above 4th Dimension has a Mac-like programming approach, where you can choose keywords from a scrolling list. The impatient can type directly. Right Multitasking comes naturally to 4th Dimension, and each window can have its own process even under plain Win3.1

Finally, the language itself is extensive and like Visual Basic can optionally be strongly typed; this last step is essential for compiled applications.

Evaluating a beta release uncovered a number of less attractive features. No surprise that 4D



looks Mac-like even under Windows, and does not approach either the polish or the flexibility of competing products like Access, Delphi or Visual Basic. For example, a 4D button can run a script when clicked and that is its limit. A VB button supports eleven events, including GotFocus, DragOver, MouseDown, MouseMove and MouseUp.

4D has a minimal range of screen objects. It does not support VBX or OCX controls, although it has its own native components called external objects, created in C or Pascal. The language has a crippling limitation: you cannot directly call functions in most DLLs or any Windows API functions, although you can compile special DLLs for use only by 4D. The language is fundamentally procedural, with no object orientation beyond the superficiality of a graphical interface builder. Finally, 4D has a complex and expensive range of add-ons which you have to buy to get full functionality. These include 4D Compiler, 4D Backup, 4D Server, 4D Chart, 4D Open for data access from other applications, and 4D remote for modem access.

As ever, the next version promises to be greatly improved. In the meantime, the main attractions of 4D are its compiled performance and its cross-platform features. If you have to support a mixed Mac and PC environment, 4D looks a reasonable but expensive option. Unfortunately, its numerous quirks and limitations make it unlikely to find favour outside that market.



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Fig 5

```

{Create a secondary index on Surname}
query1.sql.clear;
query1.sql.add('CREATE INDEX SURNAME on "SQLCUST.DB"
(SURNAME)');
query1.execsql;

{Add some data using SQL INSERT}
query1.sql.clear;
query1.sql.add('INSERT INTO SQLCUST
(ID,FORENAME,SURNAME) ' +
'VALUES(1,"Tom","Smith")');
query1.execsql;

query1.sql.clear;
query1.sql.add('INSERT INTO SQLCUST
(ID,FORENAME,SURNAME) ' +
'VALUES(2,"John","Jones")');
query1.execsql;

query1.sql.clear;

query1.sql.add('INSERT INTO SQLCUST
(ID,FORENAME,SURNAME) ' +
'VALUES(3,"Brian","Andrews")');
query1.execsql;

end;

query1.close;
query1.sql.clear;

{Define the query}
query1.sql.add('SELECT * from SQLCUST ORDER BY
SURNAME');
query1.open;

{Display the data}
datasource1.dataset := Query1;
dbGrid1.Datasource := datasource1;
dbGrid1.Refresh;

```

Ten Visual Basic Tips

We shall regularly publish tips for Visual Basic, Delphi, VBA, Visual dBase and Fox-Pro and other popular languages. If you have a tip others may find useful, please post or email it to Tim Anderson at the address below. You will also find David McCarter's Visual Basic Tips and Tricks help file on this month's cover CD, containing hundreds of tips and examples for VB developers.

1. To make a window appear Always on Top, use the SetWindowPos API call with the HWND_TOPMOST flag. To remove the setting, use the same call but with HWND_NOTOPMOST. For example:

```

'Declares (needed if you do not
include WIN31API.TXT)
Declare Sub SetWindowPos Lib "User"
(ByVal hWnd%, ByVal
hWndInsertAfter%, ByVal X%, ByVal
Y%, ByVal CX%, ByVal cy%, ByVal
wFlags%)

```

```

' SetWindowPos Flags
Global Const SWP_NOSIZE = &H1
Global Const SWP_NOMOVE = &H2

' SetWindowPos() hWndInsertAfter
values
Global Const HWND_TOPMOST = -1
Global Const HWND_NOTOPMOST = -2

```

' In your program include the following code to make Form1 always on top
Call SetWindowPos(Form1.hwnd,
HWND_TOPMOST, 0, 0, 0, 0, SWP_NOMOVE
+ SWP_NOSIZE)

2. Always save forms as text for reduced risk of corrupting your project, and compatibility with VB add-ons like the Setup Wizard. To do this by default, choose Options - Environment, select Default Save As Format, and choose the Text option.

3. When using VB to access external databases, attach them to an Access MDB for best performance. This ensures that JET holds the table structure in a memory cache.

4. Check your code for unused constants and declares, unused VBX controls, or even forms that are no longer used by your project. All these bloat to your application.

5. Don't use VBXs where native VB code will do. It is worth a little extra coding to get added performance.

6. Avoid hard-coding paths into your VB application. Sooner or later the path will be wrong and the code will break. Use App.Path to get the directory in which the application resides, and the API call GetWindowsDirectory to find where Windows is installed.

7. Check App.PrevInstance to find if your application is already running. For example:

```

Sub Main()
If App.PrevInstance then

```

```

Exit Sub
End If

```

8. You can make text boxes automatically select text when they get the focus. Use the following code:

```

Sub Text1_GotFocus ()
Text1.SelStart = 0
Text1.SelLength = 65000
End Sub

```

Since 65000 is near the maximum length for a text box value, VB will automatically select the whole text.

9. Use PICCLIP.VBX to store toolbar images or other graphics that need to be displayed quickly. It is very much faster than loading images from disk.

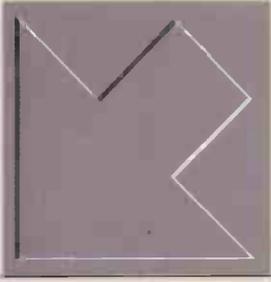
10. Never use a picture box where an image control will do. The image box is a lightweight control which uses far less system resources.

PCW Contacts

Tim Anderson welcomes your Visual Programming comments and tips. He can be contacted via PCW at the usual address, or at
freer@cix.compulink.co.uk

4th Dimension is from ACI UK
01625 536178. Prices not yet available.





Joining the dots

Mike Liardet introduces the handy technique of cubic splines for drawing accurate and smooth curves through a series of points.

We have all seen the well-known children's puzzle that involves joining up the dots in a picture in order to uncover an underlying drawing. There is a computer equivalent to this puzzle which requires a sequence of points, plotted in a display area, to be connected by a smooth line. Although this may sound a somewhat esoteric problem, it is surprising that there are several well-known software applications that require an efficient solution to it.

Look no further than Windows itself.

The handling of scalable fonts involves the manipulation of a sequence of points which define the shape of the character — a smooth curve is required through these points for all possible character sizes. Computer Aided Design needs the odd carefully crafted line as well. Most CAD applications allow the user to define areas or other arbitrary shapes by a sequence of plotted points, which must then be connected by an appropriate curve. Charting software also needs to offer the option of drawing a smooth line through some points in a graph, alongside the other options for pie charts, bar graphs and so on.

In this month's column we will introduce a powerful technique, called cubic splines, which is used for drawing extremely accurate and smooth curves through a sequence of points.

To get the flavour of the problem area, Fig 1 shows the output for the fairly simple task of drawing a curve through just

five points. In this case, the five points are neatly ordered so that the x coordinate of each is greater than its predecessor. The

points are also fairly evenly spaced, and this makes for a simpler problem than if the points are all over the place.

Points and polynomials

Readers with some basic maths training will know that, in theory, given a sequence of N points we can devise an equation involving an N-1 degree polynomial. When this is drawn as a graph, it passes through each of the points. (A polynomial is an expression in the form

$$a_1 + a_2x^1 \dots + a_Nx^{N-1}$$

For more information see last month's Low Level.)

For our five-point problem this would mean working with the equation $y = a_1 + a_2x^1 + a_3x^2 + a_4x^3 + a_5x^4$ and attempting to find values for

$$a_1, a_2, a_3, a_4 \text{ and } a_5$$

that enable it to go through each point. In this case it is not too difficult: we plug the values for the (x_1, y_1) coordinates for x and y in the equation and end up with one linear equation with the five "a" unknowns. The remaining four points provide four more linear equations, and, as we saw last month's Low Level, there is a simple method (Gaussian elimination) that can solve these equations directly.

Unfortunately, this technique does not work very well when applied to a large number of points. Firstly, the Gaussian elimination part of the method slows down markedly as it is asked to handle more than a handful of unknowns, and also the resulting polynomials can be difficult to compute. For example, a polynomial equation that can thread its way through 100 points will contain a sub-expression x^{99} . Even for small values of x an attempt to calculate this will cause an arithmetic overflow error in most programming languages.

The basic idea behind cubic splines is to dispense with the one large unwieldy polynomial that goes through all the points, and replace it with a number of simpler polynomials that are individually responsible for drawing a line only between an adjacent pair of points. Not surprisingly, given the name of the technique, we use cubic equations. The word "spline", by the way, is the name of a flexible draughting tool which is often used for solving the problem by hand.

To apply the cubic spline technique to the problem given in Fig 1 we need to devise four cubic equations to handle each of the four segments, as shown in Fig 2. In order to draw the spline it is first necessary to calculate the values of the a,

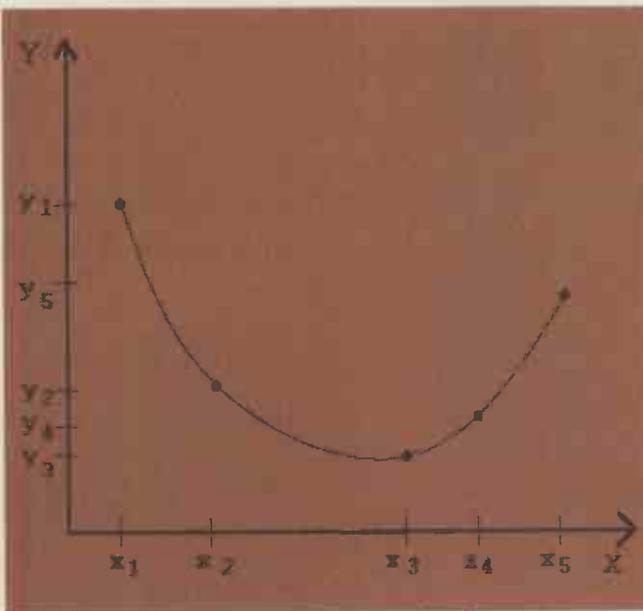


Fig 1 A smooth curve drawn through five points. Here the points are neatly ordered and evenly spaced

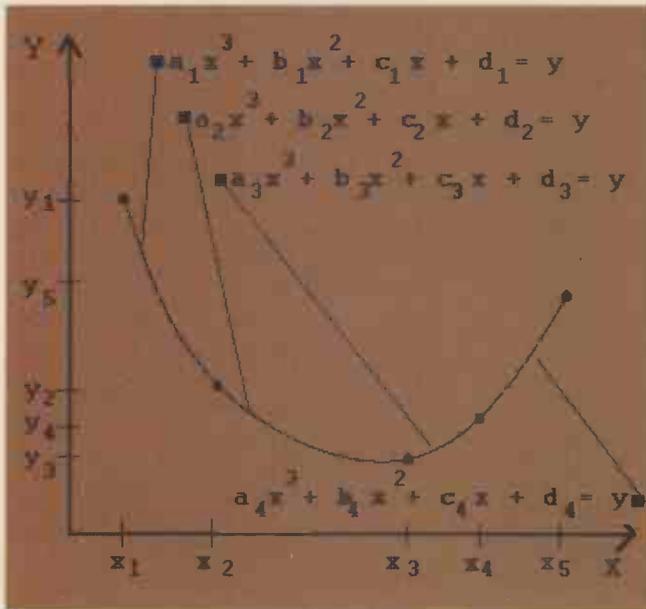
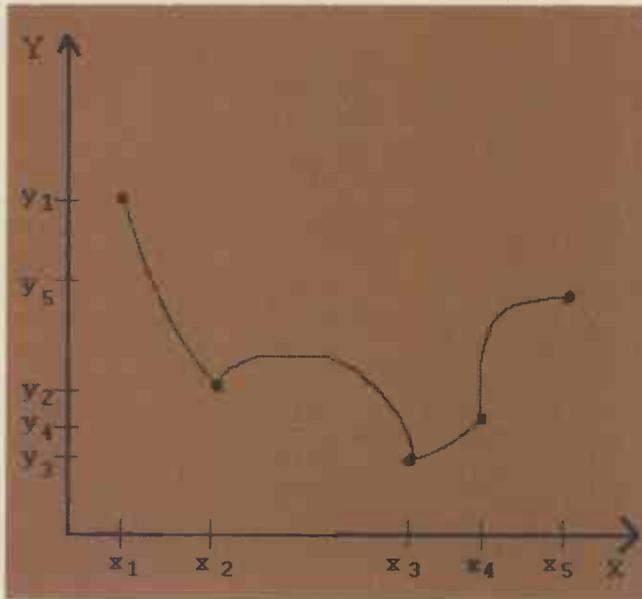


Fig 2 (left) The cubic spline method uses four cubic polynomial equations to draw the curve; each equation handles its own segment of the curve
Fig 3 (below) If the slope of adjacent lines are not equal at the meeting point, each segment is joined by a smooth line, but there are discontinuities where they meet



b, c and d coefficients in each equation — 16 unknowns in total. Looking at each cubic polynomial in turn, we can see that in each case it must pass through two points, its start point and end point. This gives us two equations for each polynomial and eight equations in all. But we need 16 equations to solve for the 16 unknown, so clearly this is not enough. The equations are under-constrained and we need to come up with some extra conditions in order to solve them.

It is not unreasonable to ask that the slope of the line at the end of a segment should be the same as the slope of the next line at the beginning. Without this requirement we could have two successive lines meeting at a point in such a way that the end result does not look smooth at all (Fig 3). With the five-point problem, setting slopes equal for adjacent polynomials gives us another three equations, and 11 equations in total, but this is still not enough.

See the join?

We can further constrain the problem by attempting to make the join between adjacent segments even smoother. We do this by demanding that the rate of change of

slopes (known as the second derivatives) are also equal. This provides another three equations — 14 in total, but still two short. We obtain the last two equations by adding the simple requirement that the second derivatives at the first and last points are zero.

Of course, we want to be able to apply the cubic spline technique to any number of points, and not just the five we have been looking at so far. Fig 4 shows how the equations can be set up for a problem involving N points. Readers unfamiliar with elementary calculus can take it on trust that the slope of a cubic polynomial equation

$$a x^3 + b x^2 + c x + d = y$$

is given by

$$3 a x^2 + 2 b x + c = y'$$

This is known as the first derivative.

The second derivative, which is also used in these equations, is given by

$$6 a x + 2 b = y''$$

The unknowns in these equations are the "a"s, "b"s, "c"s and "d"s. All the "x"s and "y"s are known, as these are given by the points which are to be joined by the spline. All the equations are linear and so in theory we could solve them by using the usual Gaussian elimination. Once the values of the unknowns are determined it is fairly easy to draw the curve as a sequence of line segments, with each line created by its own polynomial equation.

For a reasonable-size problem Gaussian elimination is too slow. For example, a cubic spline joining 26 points would require the solution of over 100 equations with over 100 unknowns, a task which would take a considerable time on most computers.

Fortunately, with the aid of a bit of

Fig 4

The complete set of equations used to find the cubic spline coefficients

The spline *i* passes through the points (x_i, y_i) and (x_{i+1}, y_{i+1}) ...

$$a_i x_i^3 + b_i x_i^2 + c_i x_i + d_i = y_i \quad (1) \text{ (for } i = 1..n-1)$$

$$a_i x_{i+1}^3 + b_i x_{i+1}^2 + c_i x_{i+1} + d_i = y_{i+1} \quad (2) \text{ (for } i = 1..n-1)$$

The second derivatives of the *i-1* and *i*th splines are equal at the point (x_i, y_i) . With the second derivative at (x_i, y_i) denoted as p_i we have...

$$6 a_i x_i + 2 b_i = p_i \quad (3) \text{ (for } i = 1..n-1)$$

$$6 a_i x_{i+1} + 2 b_i = p_{i+1} \quad (4) \text{ (for } i = 1..n-1)$$

The first derivatives of the *i-1* and *i*th splines are equal at the point (x_i, y_i) ...

$$3 a_{i-1} x_i^2 + 2 b_{i-1} x_i + c_{i-1} = 3 a_i x_i^2 + 2 b_i x_i + c_i \quad (5) \text{ (for } i = 2..n-1)$$

The unknowns are $a_1..a_{n-1}, b_1..b_{n-1}, c_1..c_{n-1}, d_1..d_{n-1}, p_1..p_n$ ie there are $5n-4$ in total. (1) to (5) give us $5n-6$ equations, so two more equations are needed to solve (1) to (5). For example we can specify that the second derivative at the first and last points is zero...

$$0 = p_1 \quad (6)$$

$$0 = p_n \quad (7)$$

Fig 5

Solving for the "p"s. The preparation work done here derives an equation where the only unknowns are "p"s. It is easy to program a fast and efficient solution to this equation

We will eliminate a_i , b_i , c_i and d_i from these equations. First eliminate d_i immediately by replacing (1) and (2) with (A) = (2) - (1)

$$a_i(x_{i+1}^3 - x_i^3) + b_i(x_{i+1}^2 - x_i^2) + c_i(x_{i+1} - x_i) = y_{i+1} - y_i \quad (A) \quad (\text{for } i = 1 \dots n-1)$$

Solve for a_i and b_i using (3) and (4). To solve for a_i we use (4) - (3) ...

$$6 a_i(x_{i+1} - x_i) = p_{i+1} - p_i \dots$$

$$a_i = (p_{i+1} - p_i) / 6 (x_{i+1} - x_i) \quad (\text{for } i = 1 \dots n-1)$$

To solve for b_i we use $x_{i+1}(3) - x_i(4)$...

$$2 b_i x_{i+1} - 2 b_i x_i = p_i x_{i+1} - p_{i+1} x_i \dots$$

$$b_i = (p_i x_{i+1} - p_{i+1} x_i) / 2 (x_{i+1} - x_i) \quad (\text{for } i = 1 \dots n-1)$$

We can now solve for c_i by substituting for a_i and b_i in (A) ...

$$(x_{i+1}^3 - x_i^3)(p_{i+1} - p_i) / 6 (x_{i+1} - x_i) +$$

$$(x_{i+1}^2 - x_i^2)(p_i x_{i+1} - p_{i+1} x_i) / 2 (x_{i+1} - x_i) +$$

$$(x_{i+1} - x_i) c_i = y_{i+1} - y_i$$

Using identities $r^3 - s^3 = (r - s)(r^2 + rs + s^2)$ and $r^2 - s^2 = (r - s)(r + s)$ we obtain...

$$(x_{i+1}^2 + x_{i+1} x_i + x_i^2)(p_{i+1} - p_i) / 6 +$$

$$(x_{i+1} + x_i)(p_i x_{i+1} - p_{i+1} x_i) / 2 +$$

$$(x_{i+1} - x_i) c_i = y_{i+1} - y_i$$

Simplifying and rearranging we eventually get...

$$c_i = (y_{i+1} - y_i) / (x_{i+1} - x_i) +$$

$$(-x_{i+1}^2 + 2x_{i+1}x_i + 2x_i^2) p_{i+1} / 6 (x_{i+1} - x_i) +$$

$$(-2x_{i+1}^2 - 2x_{i+1}x_i + x_i^2) p_i / 6 (x_{i+1} - x_i) \quad (\text{for } i = 1 \dots n-1)$$

We can now substitute for a_i , a_{i-1} , b_i , b_{i-1} , c_i and c_{i-1} in (5). Working with left and right hand sides of (5) separately...

$$\text{RHS (5)} = 3 a_i x_i^2 + 2 b_i x_i + c_i = (\text{after substitutions and much rearrangement}) =$$

$$(y_{i+1} - y_i) / (x_{i+1} - x_i) + (-x_{i+1} + x_i) p_{i+1} / 6 + (-x_{i+1} + x_i) p_i / 3$$

$$\text{LHS (5)} = 3 a_{i-1} x_i^2 + 2 b_{i-1} x_i + c_{i-1} = (\text{after substitutions and much rearrangement}) =$$

$$(y_i - y_{i-1}) / (x_i - x_{i-1}) + (x_i - x_{i-1}) p_i / 3 + (x_i - x_{i-1}) p_{i-1} / 6$$

Now LHS (5) = RHS (5) so...

$$(y_i - y_{i-1}) / (x_i - x_{i-1}) + (x_i - x_{i-1}) p_i / 3 + (x_i - x_{i-1}) p_{i-1} / 6 =$$

$$(y_{i+1} - y_i) / (x_{i+1} - x_i) + (-x_{i+1} + x_i) p_{i+1} / 6 + (-x_{i+1} + x_i) p_i / 3$$

After further rearrangement.....

$$p_{i-1} (x_i - x_{i-1}) (x_{i+1} - x_i) / 2 (x_{i+1} - x_{i-1}) + (x_{i+1} - x_i) p_i / 6 +$$

$$(x_{i+1} - x_i) p_{i+1} (x_{i+1} - x_i) / 12 (x_{i+1} - x_{i-1}) =$$

$$[(y_{i+1} - y_i) / (x_{i+1} - x_i) - (y_i - y_{i-1}) / (x_i - x_{i-1})] (x_{i+1} - x_i) / 2$$

$$(x_{i+1} - x_{i-1})$$

equation manipulation it is possible to make the equation solution process a lot quicker. Part of the technique involves the introduction of some new unknowns, p_1 to p_N , which represent the second derivatives at each point. Notice that, once these "p" values are known, all the other unknowns can be worked out almost immediately. We already know p_1 and p_N (they are both 0) and Fig 5 shows how we can derive a system of equations for the other "p"s. A close inspection of the last equation in Fig 5 reveals that we have a tri-diagonal system, and although these are

linear equations which could be solved by the Gauss technique, there is a much faster method for tri-diagonal equations, which was given in last month's Low Level.

Visual Basic in practice

Having got the theory out of the way, it is fairly easy to develop a Visual Basic program that can draw cubic splines (Fig 6). Interaction with the program is very simple. The points to be joined are given by clicking with the mouse in the large picture box. A small dot is plotted to show the

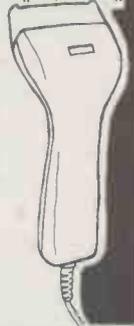
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position of each point. There are a couple of simple editing command buttons which can be used to clear the picture box or remove the last point entered, but the meat of the program lies in the spline-plotting commands — "Spline 1", "Spline 2" and "Spline - Gauss".

The routines that underly two of these buttons are shown in Fig 7. "Spline 1" solves the simpler problem, where the points are given in the correct X order (there is no validation in it so it crashes if you try to run it with unordered points). Given the coordinates of the points, it first calls the routine MakeSpline. In effect, this uses the tri-diagonal equation-solving technique on the equation derived in Fig 5 to calculate the the "p" values. These are returned to this routine in the array ys(). Once the "p"s are known, the routine plots the spline one segment at a time, working out the "a", "b", "c" and "d" values for each cubic polynomial by calling the CalcABCD routine. The service routines for working out the "p"s, "a"s, "b"s, "c" and "d"s are shown in Fig 8.

The "Spline 2" routine is similar to "Spline 1" but it can cope with points in any order (Fig 9). Instead of using one set of cubic polynomials that plot y values in terms of x, it uses two sets which plot y values in terms of "d" and x values in terms of "d". The "d" values are obtained by summing the overall distance to reach a particular point in the plot, summing the length of the straight lines between each successive point. The accumulated distances to each of the key points are calculated at the start of the routine, using the well-known Pythagoras formula to calculate the distance between two points. Of course, distance always gets greater as each point is passed, no matter what its direction, and so each individual spline works correctly. We also know that the plotted curve will go through each of the key points, since we



Fig 6 The Visual Basic program to plot cubic splines through an arbitrary number of points

Fig 7

The key subroutines that service the command buttons Spline 1 and Spline 2

```
Sub cmdSpline1_Click ()
'Calcs and draws a spline by solving on second derivs first
'Quick! - assumes X increasing - no error checks
Dim i As Integer
Dim AI As Single, BI As Single, CI As Single, DI As Single
Dim X As Single

    MakeSpline Val(labNumKnots), xk(), yk(), ys()
'For each segment between knots...
pic.DrawWidth = LINE_WIDTH
For i = 1 To Val(labNumKnots) - 1
    DoEvents
'Calc its cubic coeffs...
    CalcABCD i, xk(), yk(), ys(), AI, BI, CI, DI
'Plot for each half pixel
    For X = xk(i) To xk(i + 1) Step .5
        pic.PSet (X, AI * X ^ 3 + BI * X ^ 2 + CI * X + DI)
        DoEvents
    Next X
Next i
Exit SubEnd Sub

Sub cmdSpline2_Click ()
'Modification to Spline1 which can handle curves where x is not always
increasing
Dim A As Single, B As Single, C As Single
Dim i As Integer
Dim AX As Single, BX As Single, CX As Single, DX As Single
Dim AY As Single, BY As Single, CY As Single, DY As Single
Dim t As Single, tt As Single
Dim XX As Single, YY As Single

'Calculate accumulated distances between knots
ds(1) = 0
For i = 2 To labNumKnots
    ds(i) = ds(i - 1) + Sqr((xk(i) - xk(i - 1)) ^ 2 + (yk(i) - yk(i - 1))
^ 2)
Next i

'Make 2nd derivs for each knot, x coords and y coords separately
MakeSpline Val(labNumKnots), ds(), xk(), xs()
MakeSpline Val(labNumKnots), ds(), yk(), ys()

pic.DrawWidth = LINE_WIDTH
'For each segment between knots...
For i = 1 To labNumKnots - 1
'Calc its cubic coeffs...
    CalcABCD i, ds(), xk(), xs(), AX, BX, CX, DX
    CalcABCD i, ds(), yk(), ys(), AY, BY, CY, DY
'Plot for each half pixel
    For t = ds(i) To ds(i + 1) Step .5
        't = tt / (ds(i + 1) - ds(i)) 'makes t into range 0 to 1
        XX = DX + CX * t + BX * t ^ 2 + AX * t ^ 3
        YY = DY + CY * t + BY * t ^ 2 + AY * t ^ 3
        pic.PSet (XX, YY)
        DoEvents
    Next t
Next i
End Sub
```

Fig 8

Service routines for the two main command buttons

```

Sub MakeSpline (N As Integer, xp() As Single, yp() As Single, p() As Single)
'Given N knots (xp(1),yp(1))..(xp(N),yp(N)) calculate
'2nd derivs of cubic spline at each point, into P(1)..P(N)
Dim i As Integer
Static d(2 To MAX_KNOTS_M1) As Single
Static u(2 To MAX_KNOTS_M2) As Single
Static w(2 To MAX_KNOTS_M1) As Single

'Set up arrays to represent the tri-diagonal matrix
'd() contains values on the main diagonal...
For i = 2 To N - 1
    d(i) = (xp(i + 1) - xp(i - 1)) / 3
Next i
'u() contains values of diagonal immediately above/below it...
For i = 2 To N - 2
    u(i) = (xp(i + 1) - xp(i)) / 6
Next i

'Calc w(), the RHS values...
For i = 2 To N - 1
    w(i) = (yp(i + 1) - yp(i)) / (xp(i + 1) - xp(i)) - (yp(i) - yp(i - 1)) / (xp(i) - xp(i - 1))
Next i

'2nd deriv of first and last knot is zero
p(1) = 0
p(N) = 0

For i = 2 To N - 2
    w(i + 1) = w(i + 1) - w(i) * u(i) / d(i)
    d(i + 1) = d(i + 1) - u(i) * u(i) / d(i)
Next i

For i = N - 1 To 2 Step -1
    p(i) = (w(i) - u(i) * p(i + 1)) / d(i)
Next i

End Sub

Sub CalcABCD (i As Integer, xp() As Single, yp() As Single, p() As Single, A As Single, B As Single, C As Single, d As Single)
'Calculate A, B, C, D coeffs for cubic polynomial between knots at i to i+1,
'given (xp(),yp()) coords of knots and p() 2nd deriv at each knot
'There are 4 eqtns to solve..
'First two come from the fact that cubic passes through knots at i and i+1
'and next two from definition of p() as second deriv at these knots..
' A xp(i)^3 + B xp(i)^2 + C xp(i) + D = yp(i)
' A xp(i+1)^3 + B xp(i+1)^2 + C xp(i+1) + D = yp(i+1)
' 6 A xp(i) + 2 B = p(i)
' 6 A xp(i+1) + 2 B = p(i+1)
'Use last two eqtns to solve for A and B first...
LinEq2 6 * xp(i), 2, -p(i), 6 * xp(i + 1), 2, -p(i + 1), A, B
'Now feed A and B into first two and solve for C and D...
LinEq2 xp(i), 1, A * xp(i) ^ 3 + B * xp(i) ^ 2 - yp(i), xp(i + 1), 1, A * xp(i + 1) ^ 3 + B * xp(i + 1) ^ 2 - yp(i + 1), C, d

End Sub

```

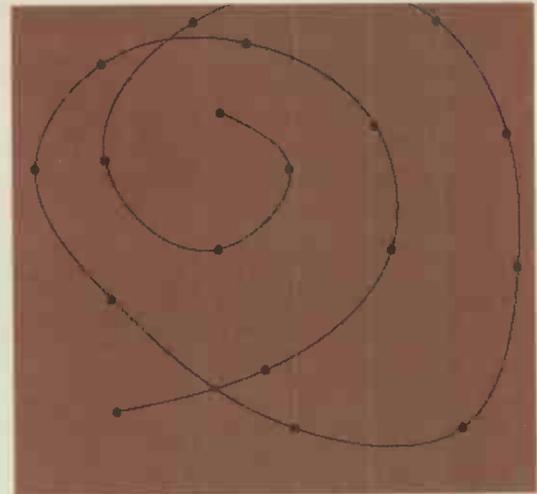


Fig 9 An adaptation of the basic spline technique enables a curve to be plotted where the points are given in any order

have the correct X values and Y values calculated at the ends of each segment.

Smoothly does it

The plotting part of this routine ties the two cubic splines together, producing a smooth curve on the display. With this little dodge the points can be in any order. It also copes well with the situation where some points are very close together and others are more distant. The "Spline 1" method can be fooled under these circumstances.

Lastly, the Visual Basic program contains a "Spline - Gauss" command. This solves the Fig 4 equations in the obvious fashion, using Gaussian elimination. This routine was developed without any need to understand the analysis we went through to derive equations for the "p" values in Fig 5.

The price that is paid for this simplicity is a slower solution process. The method also provides a useful check that the other Spline commands are working correctly, as the Gauss command should produce an identical curve to Spline 1 although it is calculated by a very different technique.

PCW Cover Disk

The full code for this month's Low Level is on the cover disk given with this issue of *Personal Computer World*.

PCW Contacts

Mike Liardet is a freelance programmer and writer. He can be contacted via the PCW Editorial office or on email as mliardet@cix.compulink.co.uk

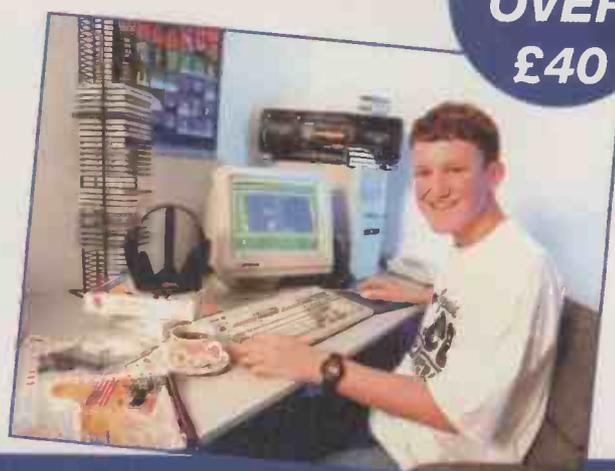
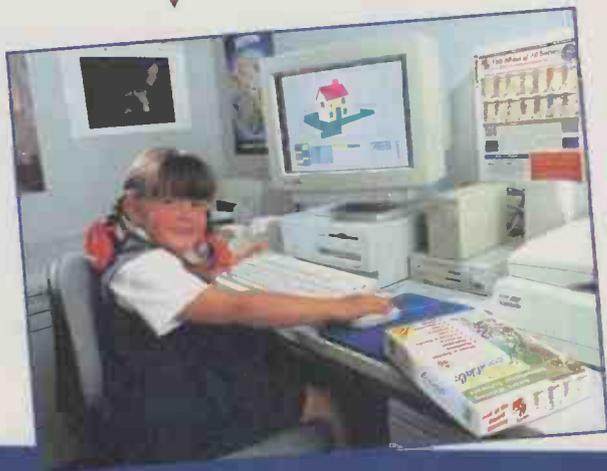
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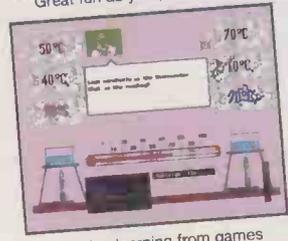
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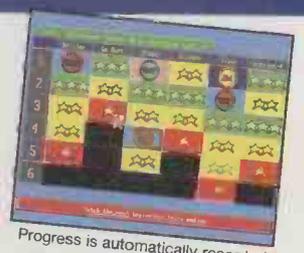
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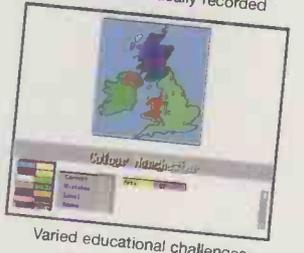
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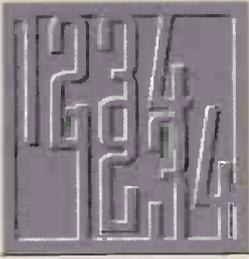
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Squambling, anyone?

The Squambling Function and related numerical pastimes, presented by Mike Mudge.

In David Wells' book, *The Penguin Dictionary of Curious and Interesting Numbers*, page 169, there appears the somewhat isolated entry: $175 = 1^1 + 7^2 + 5^3$. However, in the *Sunday Times* Brain Teaser 1712 published on 9 July 1995, the SQUAMBLING FUNCTION is defined, for positive integer argument, as the result of squaring the first (most significant) digit, cubing the second, raising the third to the fourth power etc, and summing the results. Thus

$$\text{SQM}(18) = 1^2 + 8^3 = 513$$

while

$$\text{SQM}(175) = 1^2 + 7^3 + 5^4 = 969.$$

The *Sunday Times* Problem required the value of the (unique?) number which, if squambled once, produced a three-digit answer, and if squambled twice, produced the original number increased by 1.

However, George Sassoon of Tytherington was prompted to ask the result of iterating the squambling function for a given initial argument — his investigation has produced the following loops:

Using the notation N/L where N denotes the largest number in the loop and L the total number of numbers (i.e. the length) in the loop;

$$1/1, 43/1, 63/1, 278/8, 43055027/105$$

PROBLEM SQAM. Investigate the behaviour of the squambling function defined as above, reproduce George Sassoon's loops, and address the questions: how many loops are there? Are there starting values for which the process diverges? **PROBLEM EXTENDED SQAM.** Reduce the powers to which each digit is raised by one, in line with the entry from Wells quoted above, and carry out the same investigation.

Note: While one might prefer to associate the powers with the integers in the reverse order, i.e. least significant raised to the

lowest power, this is not a different problem as the input to the squambling function is essentially a string of digits.

However, the pursuit of this argument leads to reducing the powers by one yet again, to bring them into coincidence with the associated powers of ten in decimal representation. Hence a function:

$$\text{MODSQUAM}(n_1 n_2 n_3 \dots n_k) = n^{0_k} + n^{1_{k-1}} + n^{2_{k-2}} + \dots + n^{k-2_2} + n^{k-1_k}$$

For example,

$$\text{MODSQUAM}(6789) = 6^3 + 7^2 + 8^1 + 9^0 = 274.$$

PROBLEM MODSQUAM. Investigate the general behaviour of this function for positive integer argument.

Food for abstract thought: if the integers are represented in some (as yet unknown manner) by points in a plane, do mappings by functions such as those defined above have an elegant geometrical representation? Is there a natural way to extend such functions to rational (and subsequently irrational!) argument? What about

$$\text{SQAM}(a/b) = \text{SQAM}(a) / \text{SQAM}(b)$$

yielding

$$\text{SQAM}(11/17) = 2/344 (=1/172).$$

Clearly arguments must be in their lowest terms...?

Complete or partial responses to the above problems may be sent to Mike Mudge, 22 Gors Fach, Pwll-Trap, St. Clears, Carmarthen, Dyfed SA33 4AQ, tel 01994 231121, to arrive by 1st February 1996. Any complete or partial solutions received will be judged using suitable subjective criteria, and a prize in the form of a £25 book token or equivalent overseas voucher will be awarded to the "best" solution arriving by the closing date.

Feedback from readers

Is there a new natural constant? Lars

Gullbransson of Malmo, Sweden, has been interested in the constant k defined by the transcendental equation $e^{-k} + 2k/3 + 1$ since early 1993. It first arose in his study of prices on the London Terminal Market for cocoa, sugar and coffee and later appeared in an analysis of the barometric pressure readings at 0800 hours each day! k is approximately 0.874217... Do any other readers have any knowledge of this constant?

The cake-slicing problem revisited... Kevin Yeo of Chatham is interested in the number of region defined by the chords connecting n points on the circumference of a circle... BUT in the degenerate case when the points are symmetrically distributed. Any thoughts?

The Smarandache Society in the form of Dr. Muller, c/o Ehrus University Press, 13333 Colossal Cave Road, Box 722, Vail, Arizona 85641, USA, would welcome correspondence. Numerous publications may be obtained on request to Dr. Muller.

Review of Numbers Count -144-PCW April 1995: 'In your prime'

Programs to generate primes proved to be as popular as always, but revealed nothing exciting. Most readers who attempted problems (A) and hence trivially (B) achieved success within the computing power available to them. Paraprimes were not appealing and readers are urged to re-read Charles Lindsay's ideas as this seems to me to be a field worthy of study. Henry Ibstedt generated some results here which could, with the writer's agreement, be made available to anyone who is interested.

Dr. J.H.E. Cohn, Reader in mathematics at Royal Holloway College, established that Brown's solution was not the smallest and corrects this with a solution in which neither A nor C (58 digits) is divisible by any of 37, 17 or 21 but B=D (58 digits) is divisible by all of them.

This month's prizewinner is David Price of 13 The Hall Close, Dunchurch, Rugby, Warwickshire CV22 6NP, who used Blitz Basic on an Amiga A1200 for such computation as was necessary. Details on request.

Contributions Welcome

Mike Mudge welcomes readers' correspondence on any subject within the areas of number theory and computational mathematics, together with suggested subject areas and/or specific problems for future Numbers Count articles.



Strange arrangement

Windows 95 is good, but not *that* good: Stephen Rodda attempts to solve a problem of Apple connectivity, installs a new keyboard, and answers questions from far-flung readers.

I have been running Windows 95 (build 490, about ten builds away from the release version) for some weeks now, and have found it extremely stable. One thing, however, has been niggling me: I have had NetWare file and print services turned on, to allow sharing of my hard disk under Novell NetWare instead of using the Windows Networking system. Whenever I restart my machine (after some tinkering or installation of a new program) the connection via Appletalk to my partner's machine gets lost.

I know that running Appletalk from NetWare concurrently with NetWare file and print sharing services is not the run-of-the-mill configuration. I can also understand that Microsoft has omitted to test this arrangement, but I am surprised that nobody else has found this problem. Perhaps it's to do with Windows 95's stability.

Windows NT 3.51 has been installed, de-installed and installed again here. Nothing to do with NT; it was because I decided that I was going to try to rearrange my hard-disk formatting. It's never a bad

thing to do the very occasional low-level format of a hard disk; the low-level formatting routine refreshes the side, track, and sector marks on the hard disk's surface, which, being magnetic, are liable to fade.

However, if your hard disk is IDE or EIDE, I'd recommend you not to follow this advice. You should never reformat an IDE or EIDE drive unless you have access to the manufacturer's formatting routine and unless you know what you're doing. When IDE drives first came out, people were reformatting them gratuitously and consequently losing the markings for the bad blocks, and changing the capacity (downwards, it has to be said) of their hard disks since the manufacturers had omitted to trap the format command in the drive's firmware. It's difficult to do this to an IDE-type drive now, as the formatting command is usually ignored. SCSI, however, is a different matter.

I recently got hold of a Hewlett-Packard SureStore Disk 2000LP 2Gb hard disk and I'm very pleased with it. But like my DEC DSP5200 2Gb disk, because it's

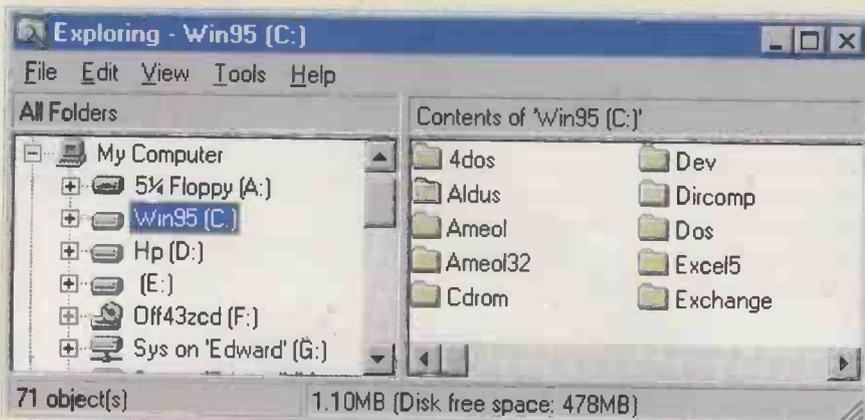
larger than 1Gb, the top half of it is ignored by DOS. I have heard that there is an NTFS driver for Linux and in an ideal world there should be an NTFS driver for Windows 95. I suspect that we are going to have to wait for this to be sourced through a third party rather than for Microsoft to compromise the security of an NTFS partition by writing (probably only issuing) its own driver for NTFS. I shouldn't be surprised if there were an in-house NTFS driver for Windows 95. Because I needed more disk space (I do have an inordinate number of programs installed on my hard disk) I decided to use Adaptec's on-BIOS utility to reassign the number of sectors, heads and cylinders so that DOS could see the whole of the 2Gb disks in each case.

I hadn't originally done this because NTAS 3.1 didn't like the custom reassignment, and I wasn't in that great a quandary with Windows 3.11 as it didn't take up as much space as Windows 95. So I decided to bite the bullet.

Juggling act

I backed up the whole data to tape, verifying that it could be read, and more importantly, verifying the data against what was already on the hard disk. I also did a test restore of a directory approximately in the middle of the tape to a new directory, running a comparison against the original files which were still on the system. Everything reported being correct. One more backup later, I decided that I might save time restoring if I juggled the files around the two 1Gb NTFS partitions and tried from there. I also made sure that I had a bootable floppy with a copy of FDISK, SYS and FORMAT on it. It would not have been the first time that someone's been caught out without a bootable system and no boot floppy from which to restore the original files.

Having copied all the files to the HP drive, I ran a low-level format of the DEC. About an hour later it had completed, and I rebooted from the floppy. Of course the HP drive was formatted ordinarily, so the Adaptec objected to the fact that I had turned on sector translation but had formatted only one large drive to use this. I repartitioned the drive into one 1Gb DOS partition and formatted it. Then I set about restoring the data from the HP disk. Half of the data was on an NTFS partition, so I



Explorer showing all three drives on my system, a feat which DOS couldn't achieve



Netherlands keyboard driver installed in my system [see page 309]

had to reinstall NT.

I was impressed with NT's clean installation. It detected all my hardware (quite a strange bunch of stuff), except for the ancient Mitsumi single-speed CD which I added manually, and continued.

Everything read happily from the HP drive and I had restored the system in about two hours. Now it was the turn of the HP drive. I reformatted this and about 30 minutes later it reported that formatting was complete. I ran Windows 95 and

Tips: Microsoft Network

Did you know that you can force a new line in the same paragraph of MSN Chat by holding down the control key and hitting the Enter key?

When attached to the Microsoft Network, you can check for new MSN email by holding down Control and pressing 1 or Control M to check for all new mail in Microsoft Exchange, whether connected to MSN or not.

repartitioned the drive into two FAT partitions which had been my intention. I did this rather than partitioning it into one 2Gb partition because I wanted to keep cluster sizes down — I felt 32Kb clusters were a bit over the top. So I now have 3Gb of file space which is accessible to Windows 95, and 4Gb for Windows NT.

But there is always a downside. In this case it is that NT won't allow Macintosh space to exist on a DOS FAT partition. I either have 2Gb available to DOS and (about) 2Gb available for sharing to Macintosh, or I have 3Gb available to DOS and 1Gb for the Macintosh.

I thought that Miramar Personal MacLAN Connect could solve my problems with Macintosh connectivity. Unfortunately it doesn't operate with Windows 95, or at least as far as I could see, without destroying complete 32-bit operation (meaning that we would be loading the LAN drivers into low memory, which I have so far managed to avoid). I therefore, reluctantly, did not test it. I have now removed all traces of Windows 3.11 from my machine. It's a pity that I couldn't manage to get it working, but I'm sure there'll be a 32-bit version along soon.

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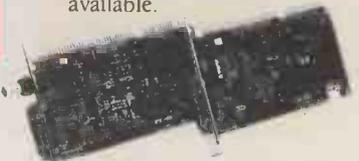
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Problem Solving

Letters are becoming rather prosaic, so there follows the edited text of a conversation I had in a chat forum on the Microsoft network with a Malaysian who signed himself SL.

SL: I hope you might be able to give me some pointers on a problem I'm having with Windows 95. I had Win95 installed on a standalone. I fitted the NIC and used WSWIN to set it up as a workstation. It then got stuck.

Don't use the old 16-bit Novell stuff. You really need to clear the whole thing out and start again, using Microsoft's own NetWare driver. Which version of Windows 95 are you using? Where's your NIC (Network Interface Card) located in memory? Make sure that it's not conflicting with anything. Also remember that funny things can cause problems, like CD-ROM adaptors with the port address and built-in bus mice which can conflict with the IRQ.

SL: 300 and IRQ of 10. Build 347.

Nothing else at 300?

SL: No

I suggest you delete all references to the Novell drivers and start again. Perhaps it might be worthwhile just formatting the hard disk and installing from scratch.

SL: I'd rather not do that since I've already got Windows 95 up and running. I reinstalled Win95 and now it gets stuck at "Cannot find C:\Windows\System\nwredir.vxd" and then hangs there.

Have you tried removing all references to networking, including the NIC and reinstalling it, remembering to do a cold boot in between?

SL: No. I'll do that now. How do I get it to boot without hanging, so that I can install it again?

Reboot, and when you get the message "Starting Windows 95" hit the F8 key quickly. Choose "Safe Boot" and then open the Control Panel and delete all its networking contents. You'll have to open the Networks icon to do it.

SL: [later] I've done that and now rebooting... Just reinstalling the ODI driver.

No. Not the ODI driver. It takes up valuable low memory. Just use the IP/SPX driver under the Microsoft heading in Add Protocol. It's 32-bit and therefore better.

SL: OK, it reboots and doesn't hang, but I still can't see the networking resources.

I'm afraid you'll have to reinstall from scratch. It's probably easier in the long run, especially with build 347.

SL mailed me a few hours later to say that he had done a complete reinstall, including a reformat of the hard disk. I'm pleased to report that he'd managed to get it working.

Barred from 32-bit

It was comforting to read your comments about Adaptec, SCSI and so on in August's PCW, having a non-blue chip PC with an Adaptec card and SCSI. I have a non-SCSI CD-ROM drive and I can't use 32-bit file access. This is a known bug. Is there a solution allowing full speed?

AF, Bristol

I'm afraid you'll have to wait for a 32-bit driver to be produced. There is the same problem with Windows 95 as far as IDE CDs and some EIDE controllers are concerned, and this is currently a bone of contention. You'll probably find that the Windows 95 driver will be released first, since this is the new hyped operating system. There is every likelihood that the Windows 95 driver will work with Windows 3.11. I found that the tools for the 32-bit Adaptec driver for Windows 3.11 also work with Windows 95, with the added feature that they also recognise my old proprietary Mitsumi.

I think Windows 95, like NT, pretends that it's a SCSI interface, and the Adaptec tools show it as installed. A strange situation.

The price is wrong

Why is it that Microsoft had the temerity to compare the pricing of the Microsoft Network with CompuServe's when most of their potential users (the ones outside the United States) will be paying approximately twice the price of CompuServe?

This was when the pricing strategy of the Microsoft Network was announced, offering US users 20 hours for \$19.95. The UK price of £5.99 for two hours and £3.25 for each subsequent hour is considerably steeper than CompuServe. The amount for 20 hours' use comes to £64.49 per month, roughly equal to \$100. Add to this the fact that many US users also get Internet connectivity and many get 28Kb access speeds, and CompuServe's £16 per month offer for 20 hours access seems very cheap in comparison.

After August 24th, MSN is going to be a very lonely place for us Europeans.

Going Dutch

I've recently installed a Dutch keyboard. It is a standard QWERTY one (these are the first few keys on the top left). Most other European keyboards are either AZERTY (French) or QWERTZ (German), which for the obstinate English would be very difficult to come to terms with.

The reason for the Dutch keyboard – apart from the fact that I live in the Netherlands – is that I've grown increasingly fed up with either looking up the accented character I want in a DOS manual, or stopping, running Charmap and copying and pasting the character from there. I know that Word for Windows has a special

Insert Symbol function, but life's too short. I can now access special characters directly from the keyboard without being *fatigué* of looking them up.

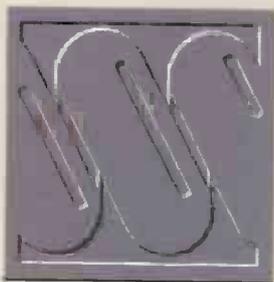
This happens much like the Macintosh keyboard, where the special accent keys are "dead" keys. Type one of them and nothing happens. Now type a letter which requires the accent you typed and hey presto, you have an accented character. I fail to understand why this can't be incorporated into all UK keyboards. The only problem with the arrangement is that things like brackets, parentheses and the asterisk have moved onto the keyboard, although the alphanumeric characters

remain where God intended them to be.

Can I put in a plea through this column for a multi-language version of the UK keyboard drive? I'm sure that there will be people who flock to this call. What with the coming of the European Union, why does anyone believe the British are not able to deal with accents?

PCW Contacts

Stephen Rodda is an independent computer consultant specialising in DTP and networking. He may be contacted as the_bear@cix.compulink.co.uk



It's good to talk

Live comms developments such as online chat and conferencing services are reviving the art of conversation. Stephen Cobb sits in on meetings, discussions and celebrity interviews.

Electronic mail has become deeply ingrained in the daily life of many business people, with good reason. Email offers many advantages over other forms of written communication. It is fast, reliable, and easy to organise. On a typical working day I don't do anything until I've checked my in-basket in WinCIM and replying to messages. My replies are automatically filed for me and I can easily move answered messages into a separate part of my electronic filing cabinet.

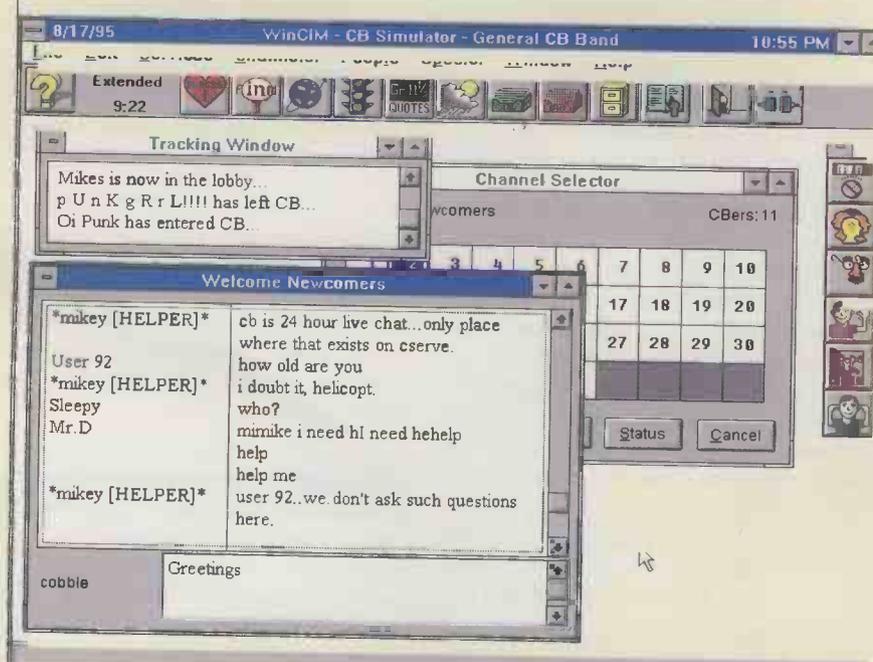
I find that email allows me to stay in

touch with far more people than fax or voice calls. It also cuts out a lot of unproductive telephone-tag. But email is no substitute for live conversation, the to-and-fro of question-and-answer exchanges. In this month's column we look at several different forms of live communication that are currently available to modem and Internet users — not high-tech videophones and teleconferencing, but online chat and online conferencing, where the input is still typed, but in real-time.

Ten four

Remember Citizen's Band radio? One of the first forms of live online communication was the CB Simulator on CompuServe.

Live and almost in person — CD Simulator on CompuServe can be an exciting way to spend online time (and money)



CB radio used a simple set of commands to enable many people to talk to each other at roughly the same time on the same channel. CompuServe's computerised version of this system is still operational, offering more than two dozen channels and three bands. If you use WinCIM to access CompuServe you will find CB Simulator on the Services menu.

The commands and protocols are quite easy to learn and there is one channel reserved for newcomers. Help is at hand from sysops who will respond to questions right away. This "chatting" aspect is particularly impressive. For the most part the people you encounter are helpful and polite to newcomers, although they may strike British users as overly familiar. Not everyone enjoys chatting to a wide and random range of people from all over the world, but if you do, then CB Simulator is worth checking out.

The same principle has been carried over into other areas of computer communications such as chatting on bulletin boards and the Internet facility known as IRC, for Internet Relay Chat. IRC, which has been around since 1988, was originally developed in Finland by Jarkko Oikarinen. It achieved extensive publicity during the Gulf war because it was used by correspondents in the region to file live reports. It was also used to provide up-to-the-minute news during the failed coup against Boris Yeltsin in 1993.

Unfortunately, IRC has recently developed a reputation for being rather racy. For example, when I joined a channel named Dog Lovers in order to shoot a screen for this article there was at least one person there who seemed to think the title referred to something other than canine companionship. In fact, finding a channel that deals with a topic that is of interest to you may take some effort, unless you know someone who is already using that channel, or unless spicy conversation is indeed what you are looking for. A warning to parents: exercise some control over access to IRC if you have children under 18 who are computer literate. There have been several cases in which adults have attempted to meet minors whom they have contacted via IRC.

Conferencing

More formal and public electronic get-togethers are possible with conferencing software built into CompuServe and Microsoft Network (MSN). They are usually presented in a "meet-the-celeb" or "talk-to-the-expert" format; in August Michael Jackson was on CompuServe

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to tell whether you have completed your contribution or have simply paused.

Fortunately, the message-and-response dialogue box provided for conferencing within WinCIM make these procedures fairly easy to follow. You can enter a question mark to signal that you are ready to ask a question, then type several sentences without sending them, so that you are ready to post the question as soon as you are called on. While it might seem to be rather formal this system works well, and as long as everyone abides by the rules you can get a good exchange going. But what happens if you want to make a comment to someone who is in the audience instead of just talking to the guest or moderator?

For this you can use the regular CompuServe Forum chat function. You use the special Who's Here? command in WinCIM to pop up a list of people who are "in" the conference room. Then you can click on any name and click the Talk button. This opens up a secondary message-and-response dialogue box for a two-way chat between you and that person, without interrupting the regular conference which continues to scroll by in the main message-and-response box. Since the main proceedings tend to be slower than voice conversations there is time to maintain several discussions at once. You soon

Many bulletin board systems have the capability to provide online chatting between board users. However, a major limitation for smaller boards is that they support fewer phone lines. If you have only half-a-dozen lines then you can only have six people talking at once, and in fact you may not want any of them chatting as it ties up the lines. Larger boards with dozens of lines are more likely to encourage chatting, particularly if there is a time-based charge for the use of the board or chat facility. You might be surprised how fast time flies when you are engrossed in a conversation that proceeds at 30 words per minute. You might be even more surprised when you get your phone bill and credit card statement.

One relatively recent development is changing the economics of BBS chatting: Telnet access to bulletin boards (see last month's column). Telnet connects with the BBS via the Internet. If you have free or low-cost access to an Internet connection

BBS chat



Today's BBS software provides online chat for callers, as in this WorldGroup for Windows board

you can spend longer online. Telnet also allows a board to support more concurrent connections without installing additional phone lines and modems — you can create as many as 256 TCP/IP channels on a T1 connection. In the screenshot above you can see a WorldGroup BBS accessed via Telnet. This particular BBS software comes with built-in conferencing and chat facilities.

Microsoft Network has an impressive schedule of experts in its online talk shows (grin)

A screenshot of the MSN Today website. The header features the MSN logo and the text "MSN TODAY". Below the header, there is a section titled "InSight: A Cyber Talk Show" with a small portrait of a man. The text describes a talk show with Open Computing Editor Rusty Weston at 4:00 PM (PDT) on June 29, featuring best-selling author Stephen Cobb. Below this, there is a section titled "Learn Online with MOLI" with a graphic of a book and a globe, and another section titled "Now online, the forums you've been waiting for!" with text about content providers on MSN.

learn to be succinct and quick.

The approach to conferencing on MSN is slightly different. The moderator and guest hold their conversation in a separate section, visible to

members of the audience but not accessible to them. The audience members chat among themselves and ask questions in a separate window. The moderator then takes questions from that window and poses them to the guest. The replies can be read by everyone, but there is no direct response capability. In fact, for a good conference with either system it is

almost essential that the moderator and guest be in voice contact as well. This can be done by participating from the same physical location or by holding open a voice line.

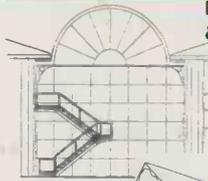
When I participated as a guest on MSN there were four of us on a conference voice call, with two people from Microsoft helping out the moderator and me by cutting and pasting questions from the audience and helping us decide which questions to handle. Usually, the service provider is not so involved but Microsoft was beta-testing MSN at the time. In fact, once you have some experience presenting a conference you can do it with just two people, the moderator and the guest, provided that the guest has a reasonable grounding in computer literacy.

The art of cyber-chat

You will find that good typing skills are helpful in all these live communication formats, but most people are forgiving of typos and the slightly terse writing style that tends to emerge. In fact, you may well enjoy the mental rush of answering questions quickly and succinctly. Some people even argue that cyber-chat is reviving the

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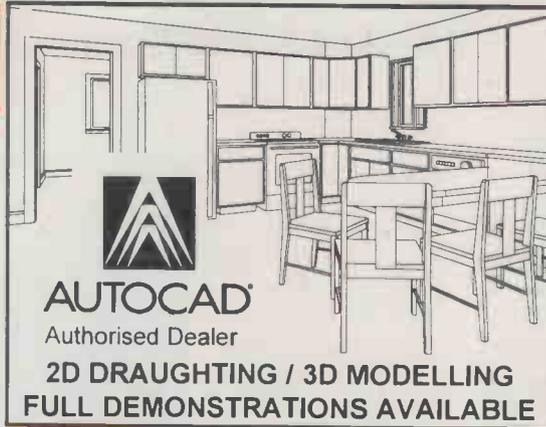
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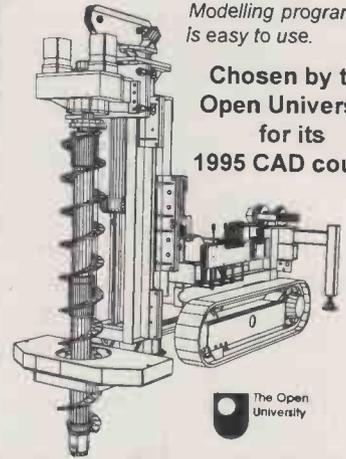
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Future developments

The Internet provides such far-reaching access to a relatively high-speed communications channel that further improvements in live contact are almost inevitable. We already have the ability to hold phone calls over the Internet and there have been some experiments in live video on the Web. However, phone companies are already providing video conferencing and video phones, so it is unclear what role the Internet will play in creating the sort of ubiquitous sound and video links that are so popular with science-fiction movie makers.

The next step for live Internet communications may be far less futuristic: some form of Web-based conferencing software. The ease-of-use that has made Web

browsers so popular could easily be extended into this area. Of course, you would still have to type what you want to say. But if conferencing becomes a standard part of Web server and client software, I predict we will see an explosion in conference events. Companies and organisations will be able to host conferences whenever they want. Instead of expensive conference calls on voice lines, meetings could be held at very low cost on the Internet. The need to type what you want to communicate, rather than speak it, may even result in more efficient meetings. We are all apt to choose our words with more care when we have to hunt and peck for them on the keyboard, especially if someone is logging them onto a text file on disk.

art of witty conversation, just as email has revived the art of written correspondence. Furthermore, an online conference can be captured on disk and transcripts made available almost immediately. These can make interesting reading for anyone who "missed the meeting". They also provide a more accurate account of what was said than one personal recollection.

Globalisation: an object lesson

In some countries, hunting animals for sport is mainstream activity. This is evident when you visit the CompuServe home page on the World Wide Web, which advertises a treasure-hunt-style competition with a sound clip of a hunting horn rallying the hounds. If you find hunting offensive, this will strike you as unfortunate, even downright gratuitous.

The people responsible for the content of the online world, and that includes all of us who post messages in public bulletin boards, need to realise that cyberspace is an international entity. People log on from anywhere, anytime, from many different cultural backgrounds.

We should all exercise a bit of tact and diplomacy when we put our words online. Imagine yourself speaking in a crowded bar in a foreign port when all of a sudden everything goes quiet and your voice can be heard by all present. How will you know whether the words you have chosen will strike anyone as insulting? And we should also bear in mind cultural differences and try not to take offence too easily. Give others some latitude before taking exception to their choice of phrase or .WAV file.

V for vacant?

If you liked last month's storm in a teacup over American legislation to ban obscenity

on the Internet (the Exon bill) you'll love the V-chip. The same mis-informed body politic, the US Senate, is pushing legislation that would require all television sets sold in America to be fitted with a special chip designed to allow parents to block out nasty programs. A ratings code would be assigned to each program and transmitted as part of the program signal, so if a program were rated V for violent and the parent had programmed the TV set to block all V programs, then the set would not display the program.

This is indicative of politicians cashing in on the current perceived moral crisis and bureaucrats turning to technology in order to solve problems that are human in origin. These problems can only be solved by humans behaving more responsibly than they do at the moment.

Questions to consider about the V-chip:

- Kids can program VCRs better than parents, so who is going to master the V-chip?
- Some parents won't block "unsuitable" shows so how do you stop kids watching at these parents' houses?
- Current TVs don't have the chip and will last for decades, so do we confiscate them?
- The link between TV content and childhood behaviour is unclear; why should the V-chip change kids' behaviour all of a sudden?
- If you can't raise your kids so that they turn off the TV when trashy programmes are on, then what difference will the V-chip make to the way those kids grow up?

PCW Contacts

Stephen Cobb can be reached on CompuServe as 72662,546 or the Net as cobb@iu.net

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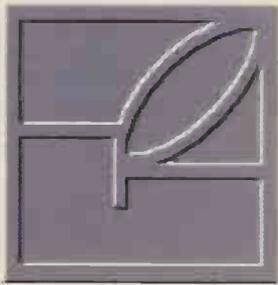
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New season's Apples

It's all go this month, from the launch of yet more PowerMacs to the MacWorld Expo in Boston. Chris Cain checks out the new machines, catches up with Speed Doubler from Connectix, and – most importantly – gets down to Doom II.

Following the successful introduction of the high-end 9500, Apple has released a further range of three new "next-generation" PowerMacs. The 7200, 7500 and 8500 boast high clock speeds, new internal and external designs, PCI bus and improved upgradability.

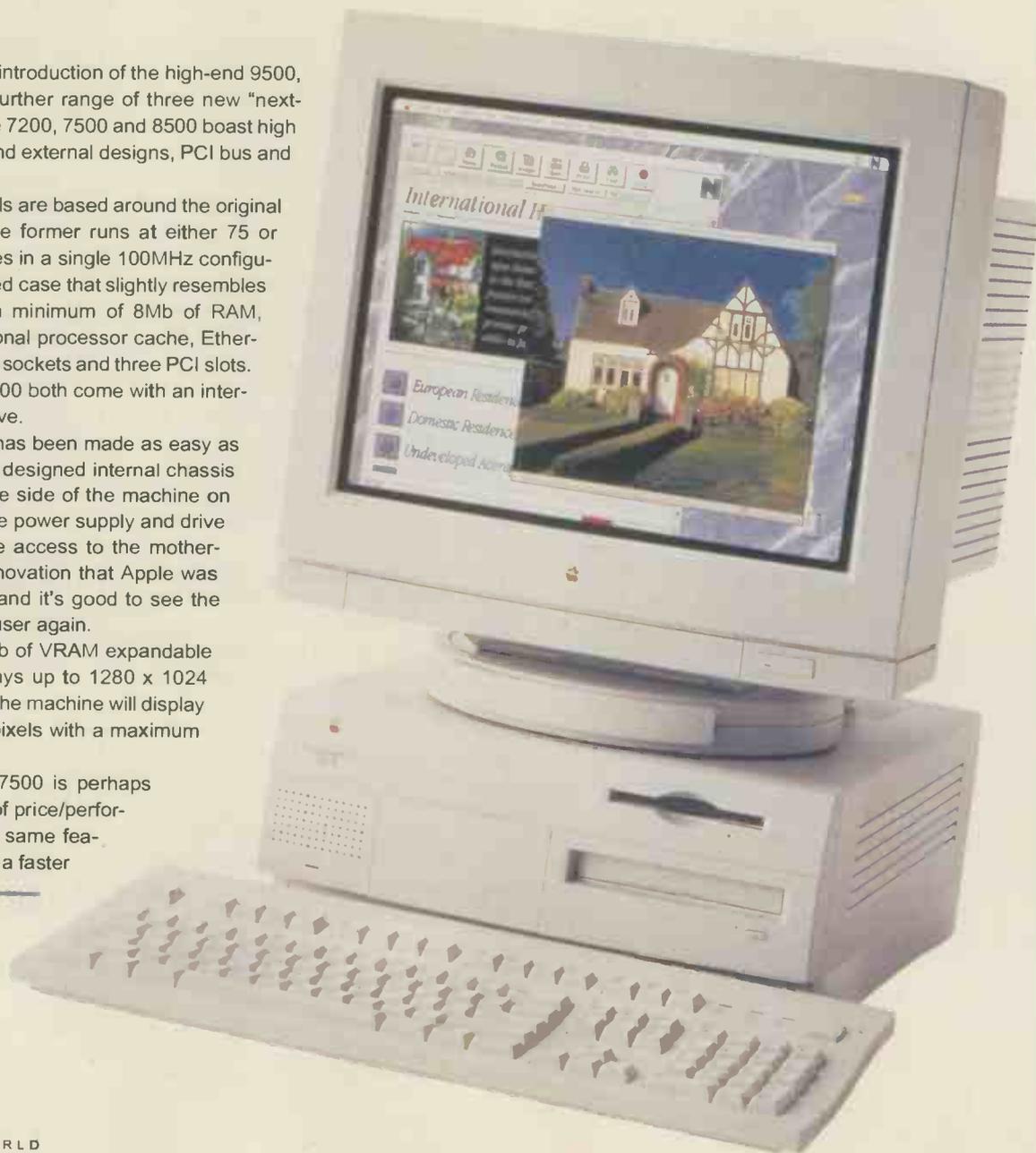
The 7200 and 7500 models are based around the original PowerPC601 processor. The former runs at either 75 or 90MHz, while the latter comes in a single 100MHz configuration. Both have a redesigned case that slightly resembles the 7100, and come with a minimum of 8Mb of RAM, 500Mb SCSI hard disk, optional processor cache, Ethernet, GeoPort compliant serial sockets and three PCI slots. The 90MHz 7200 and the 7500 both come with an internal quad-speed CD-ROM drive.

Upgrading these models has been made as easy as possible thanks to a cleverly designed internal chassis that swings up and out to the side of the machine on hinges. Once the lid is off, the power supply and drive bays lift up to give complete access to the motherboard. This is the kind of innovation that Apple was known for in its early days, and it's good to see the company thinking about the user again.

The 7200 comes with 1Mb of VRAM expandable to 4Mb, and supports displays up to 1280 x 1024 pixels. When fully upgraded, the machine will display 24-bit colour at 1024 x 768 pixels with a maximum refresh rate of 75Hz.

The middle-of-the-range 7500 is perhaps the most attractive in terms of price/performance, sharing many of the same features as the 7200. Apart from a faster

The 7500 offers a powerful 100MHz PowerPC601 and is upgradable to 604 to ensure a long life.



processor speed, the main differences include a higher maximum RAM capacity, internal Fast SCSI with a transfer rate of up to 10Mb/sec, a 24-bit video capture card supporting both PAL and NTSC formats, and a new internal digital audio/video (DAV) connector for video compression and decompression cards.

For improved sound quality there are RCA phono audio outputs as well as the standard 3.5in mini jacks found on other Mac models. You may not have thought the type of connector would make much of a difference, but Apple claims that using line-level phonos cuts down considerably on interference and noise during recording and playback. Older Macs with 8-bit audio certainly suffer from this. Graphics support on this model is 2Mb VRAM as standard, with 24-bit colour at 1152 x 870 pixels when fully expanded.

As well as being easy to upgrade thanks to the new chassis design, the processor in the 7500 is on a daughter-board and can be swapped out for a PowerPC604 at a later date. Once again, it's nice to see Apple thinking about the future and providing users with an upgrade path so that they don't feel left behind.

Finally, supplied in the company's cute mini-tower casing, the 8500 is PowerPC604 based and designed with multimedia in mind. It features a 256Kb second-level cache as standard, a maximum RAM capacity of 512Mb, 1Gb or 2Gb Fast SCSI drive, and three PCI slots. As with the 7500 there are RCA audio input and output jacks, a DAV slot and a video input, but there's also a multi-standard flicker-free video output complete with S-VHS connectors.

All the new models look promising, and for the full story and details, check out the reviews starting on page 112.

More from MacWorld

In other MacWorld news, Microsoft was showing enhanced 1995 versions of Encarta, Cinemania and a number of its other Home titles. The company announced an upgrade growth of 288 per cent for Office for Macintosh and Power Macintosh. Over 3.6 million copies of Microsoft Word for Macintosh have been shipped, making it the all-time best-selling word processor for the Mac. It's also just about the all-time slowest word processor for the PowerMac, but funnily enough they didn't mention that.

A number of PCI cards for the new Macs were on display, and Diamond Multimedia was offering an impressive graphics solution with the Javelin 3000 series.

Utility of the Month

Perhaps the most interesting product at the MacWorld Boston 95 show, and November's Utility of the Month, is Speed Doubler from Connectix, authors of RAM Doubler which was the first product to win this prestigious award. As its name implies, Speed Doubler can literally double the speed of your Mac, allowing you to work faster and be more productive. Speed Doubler has three main components: Speed Emulator, Speed Access and Speed Copy.

Speed Emulator is specifically for PowerMac users and is the most useful of the three components. It provides a new version of the Motorola 680LC40 emulator used to run non-PowerPC native software, which runs at twice the speed of Apple's original.

The new emulator works by using a technique known as Dynamic Recompile. This involves a system of translating and caching instructions. Whenever Apple's emulator sees a 68K command, it translates it into PowerPC code and executes it. The Speed Emulator does the same thing but then stores the translated command in memory, so that next time it's used it doesn't need to go through the translation bit. The result is 800Kb less memory available for programs but much faster emulated applications. Speed Emulator allows even the 6100/60 to emulate at Quadra speeds.

Interestingly, while Apple's new 68K emulator for the PowerPC604 chip uses cacheing techniques for improved performance, Connectix claims that its code is still 30 percent faster.

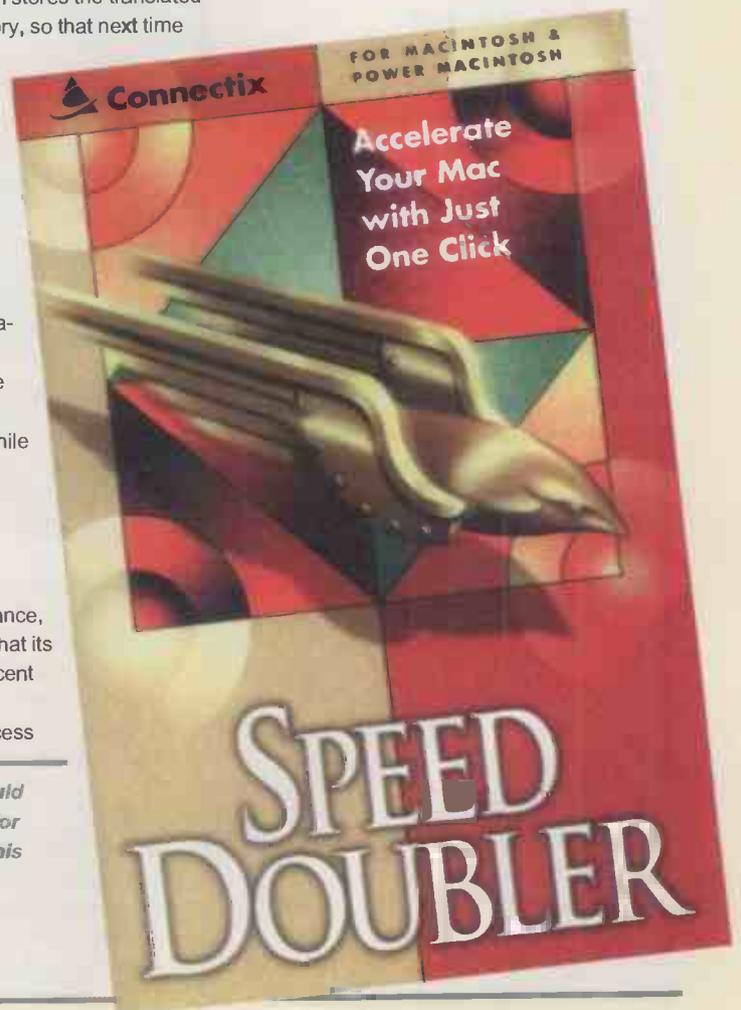
The Speed Access

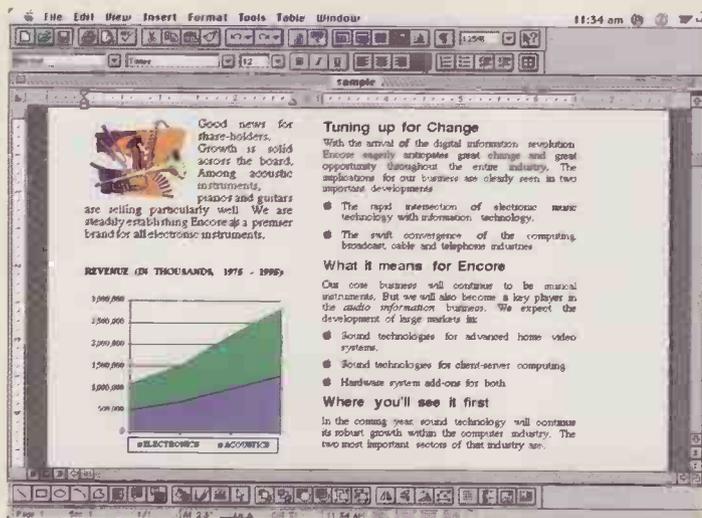
Speed Doubler could be the best utility for PowerMac users this year

part provides a much improved disk cacheing system, replacing Apple's own with more intelligent algorithms. Even under System 7.5 the current Mac disk cache performance peaks at around 256Kb, and assigning it more RAM can result in overall system slowdown in some cases. The Connectix version is not only more efficient, it improves as you give it more memory to play with – as a true cache should. The results are especially noticeable when loading, storing and sorting large files in programs such as ClarisWorks, Microsoft Excel, Adobe Photoshop and Doom II.

The final part of Speed Doubler, Speed Copy, is a general improvement to the Finder's file-copying functions. It speeds up data transfers between disks, allows copying in the background and up to three simultaneous file copies at once, to different destinations.

I've only been using Speed Doubler for a short time and I'm already convinced of its worth. With an RRP of £69, the same as RAM Doubler, it's going to fly off the shelves. Buy and install it today.





Left *Microsoft Word is now officially the biggest-selling word processor on the Mac*

Below *After much delay, the long-awaited Doom II finally appears in Mac form. The wait has been worth it*

been well worth the wait. Not only is the conversion as good as the PC version, it's even better in some places. On a PowerMac 7100/80 you can play at a good speed with 640 x 480 graphics, twice the resolution of the original, QuickTime GM MIDI music and stereo sound effects.

Doom II requires 8Mb of RAM and is a fat binary application so it will work with both 68K and PowerMacs. Network support is included for up to four players, and using MacIPX it should be possible to mix and match PC and Mac players.

Tests on different machine configurations revealed that Doom II works well on anything from a 33MHz 68040 upwards, although on a Performa 5200 it wasn't as

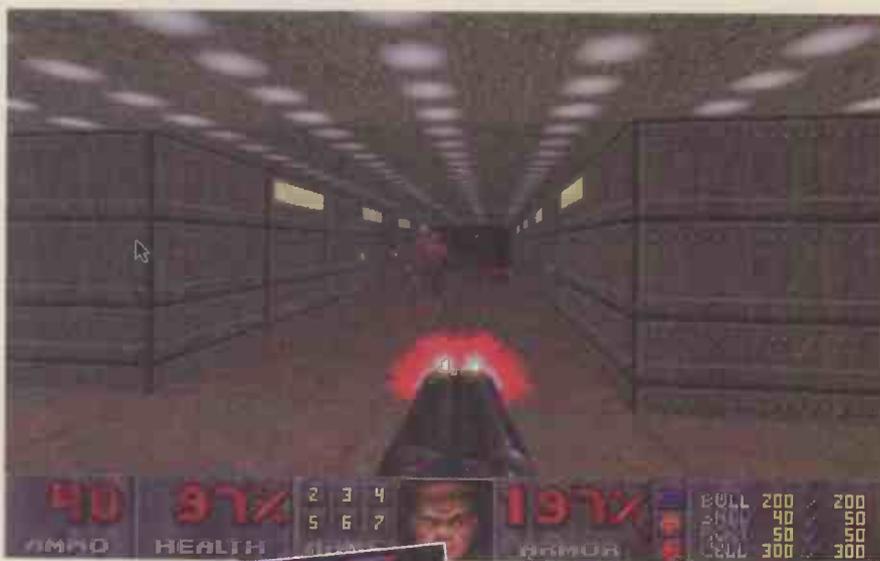
Based on the technology used in its Stealth series for PCs, these are 64-bit cards supporting screen resolutions up to 1600 x 1200 pixels at high refresh. Thanks to an S3 Vision968 processor, they also offer hardware video scaling and interpolation for improved QuickTime.

Prices are \$399 for the 2Mb VRAM Javelin Video 3240XL and \$569 for the 3400XL version with 4Mb VRAM.

Send in the clones

Mac clone vender Power Computing had a heavy presence at the show, with its machines starring on various third-party stands as well as its own. Chief among the clone users was Bungie, of Marathon fame, showing what the sequel to its best-seller looks like on a Power 100.

Comparable to an 8100/100, the Power machine has received generally favourable reviews from the US press and no compatibility problems have showed up so far. The machines are aggressively priced, with an 8/365 configuration coming in at \$1,699 complete with software including Claris Works and



good as I thought it would be due to the 603e processor and an internal IDE hard drive instead of SCSI. This is a pity; it would have been nice for retailers to have a couple of machines running the game in demo mode to prove that the Mac will do it.

That said, it has to be the best Mac game to date. It hadn't been released in the UK at time of writing, but will be available soon via Softline Distribution.

Did you know?

Early in its history, Apple had a legal run-in with the Beatles and their company Apple Records, which resulted in the computer giant agreeing that it would keep out of the music recording business. Later, when Apple started to explore the idea of voice recognition, it decided to bundle microphones with some Macs, technically breaking this agreement.

Knowing what they were doing, Apple engineers decided to add a new system sound to Macs with microphones. Its name? Sosumi.

Quicken, although this doesn't include Power Computing's High Performance Video (HPV) adaptor.

I did a little testing of my own and I was impressed. There's still no news of an official UK distributor at time of writing, but stay tuned and I'll let you know.

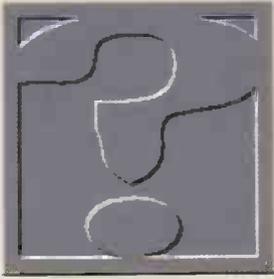
Doom Day

There's something about Doom that's so slick and addictive it knocks the competition into a cocked hat, then blows it away with a double-barrel shotgun. August finally saw the launch of GTE Interactive's conversion of Doom II for the Mac, and it's

PCW Contacts

Chris Cain welcomes all comments and suggestions from Mac users. He can be contacted via the usual PCW address or by email as chris_cain@pcw.ccmail.com, compuserve.com, chris@cix.compulink.co.uk or cain@eworld.com

- Apple 0181 569 1199
- Speed Doubler from Computers Unlimited on 0181 200 8282. Price: £99
- Microsoft Office for Mac and PowerMac from Microsoft on 01734 270001
- Diamond Multimedia 001 408 325 7346
- Power Computing 001 512 331 2783



Any questions?

If you've got a PC problem or think you could help other readers out, contact **Frank Leonhardt**.

Modems: in or out?

Very little attention seems to focus on internal modems nowadays: does that mean it is better to get an external one? I can see that I could use an external one on different computers, and it doesn't take up an internal slot. But on the other hand, an internal modem doesn't need to be plugged into the mains, doesn't eat up batteries, and I don't need to find space for it (and the accompanying serial cable) on a cluttered desk. Does the fact that internal modems have their own 16550 UART influence anything? Internal or external speeds (from the reviews I've read) seem to be very similar between different models. Is there any reason to pay a higher price than the cheapest (V.34) model I can find?

Chris Veness
chris.veness@eurocontrol.be

I don't like internal modems very much. Their main advantage, as you say yourself, is all-in-one-box neatness. High-speed internal modems often benefit from being integrated with a buffered UART (a 16550-compatible) which is useful if you have a standard serial port on your PC, though there is nothing to stop you adding a 16550 serial board to speed up an external unit.

What you lose is flexibility. I once tried to stop a friend from buying a cheap



An external modem can give a sense of security

internal modem. but he wouldn't be persuaded. Then his PC died, leaving him to fall back on his trusty Atari ST. He could use the PC's printer, but not the modem.

Of course, you may feel that you will be sticking with PC compatibles so this is not an issue. But what bus will your next PC have? PCI? How many ISA boards might you want to transfer to a new machine and which may you have to discard? Many PCI motherboards have just three usable ISA slots and you might have a modem, network card, sound board, scanner and exotic disk interface to choose from.

Then there are the pretty flashing lights on the front. These are rarely available as an external add-on for internal units. It is very useful to be able to look up and see if your connection is still active when your file transfer appears to have stopped. You can walk into a room and spot whether your modem is up to something: if your PC goes mad and starts dialling your mother-in-law instead of CompuServe, you can reach over and switch it off.

Give me a real modem, in a proper box with lots of lights, any day. If your desk is really crammed just screw the modem to the wall near your phone socket and use a long serial lead.

As for which modem to choose, price is no guide to reliability. Most modems of a given standard will perform at about the same rate on a clear line, but as the going gets rougher the speeds and connections can drop off quickly, as you'll see from some of the high-speed modem group tests in back issues of PCW. The same manufacturers tend to come out top every year and they are not necessarily the household names.

Out of bounds

Could tell me of any way in which the available drives can be limited in File Manager? At our school we have a large Novell network, with Windows and applications run from local drives. A user's personal directory is mapped as drive P. Because I have limited each user to 5Mb they will occasionally need to delete some files. But when they use File Manager it would be better if they were unable to access drive C and some of the search drives, and only "see" drive P. Is there a way of doing this in the win.ini file in the same way that you can set restrictions in progman.ini?

David Waller, The Sandon School
davidwaller@tcns.co.uk

I can't think of a way to do this simply by fiddling with the INI files. File Manager picks up the drives from MSDOS and it is possible to get DOS to pretend that some drives don't exist. But this wouldn't be of much use because Windows would lose access to itself.

However, File Manager does support extensions in the form of DLLs. They are not too difficult to write and it is possible to intercept every file selection made by the user if you wish. By checking to see if any naughty files have been selected you could cause the user to be locked out until a password was entered. Tempta-

Office installation tip

We have been using Windows 95 for a while. Trying to install MS Office (95 or 4.3) over a network from our CD server just wouldn't work. MS tech support couldn't fix the problem for us. "It's a known problem," they said.

But you can fix it: simply forget about Win95 disk mapping and Network Neighbourhood, and use the File Manager to "connect network drive...". Then it works like a dream.

Andrew Scott
<100607.3556@compuserve.com>

tion could also be removed by disabling the tool bar and drive bar, although as this is achieved using a simple menu option it does not really add to the security.

I'm not aware of any utility which does what I have suggested — I'll leave it with this column's clued-up readership to send in their nominations. An alternative would be to write your own restricted file delete program and not allow access to File Manager.

For real security though, take a look at Windows NT, designed with multiple users and file protection in mind. Users can set up their own Program Manager groups and you can restrict access to all files or directories based on individual users or groups — it's almost as much fun as Unix.

Retail corruption

I am using WfW 3.11 and a DOS accounts program (Micro Retailer Accounts) provided by a local company. They worked fine together for about nine months, but have recently begun to throw up an error message that the program has "Violated system integrity due to execution of an invalid instruction".

This happens at the same point every time: when switching to a sub-program of the Micro Retailer Program.

Mark Broadbent
 <100560.463@compuserve.com>

The message means that the CPU has just tried to run an instruction in your software which doesn't exist. Either the program has corrupted in some way, or the fault was always present, which is unlikely as your system has been working for nine months already.

Programs can be corrupted either in memory or on disk. If you have a faulty disk or RAM then the problem would be intermittent and random. A bug in the software could cause the sub-program to be corrupted after it has been loaded, and this bug may have manifested itself only now that you have entered a lot of data. Alternatively, the sub-program may not be loading and the main program may not have a built-in check to make sure it has, resulting in a crash as it executes the first instruction.

My prime suspect, however, is disk corruption caused by some other piece of software. Try running SCANDISK (or CHKDSK for older versions of DOS) and look out in particular for cross-linked clusters. If you find any, seek professional help as your accounts data

What does it all mean?

Referring to one of your recent articles in PCW, please could you tell me what SIMMS, BIOS and DRAM mean?

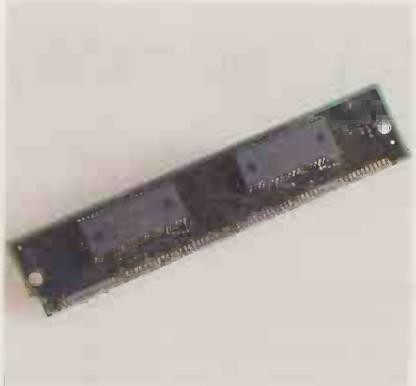
Asif Mughal
 <cb183@city.ac.uk>

DRAM is Dynamic Random Access Memory. This is the type of memory chip used by your computer to store the information and software on which it is currently working. Data not currently being worked on is stored on hard or floppy disks.

A SIMM is a Single-Inline-Memory-Module, a small circuit board containing several DRAM chips. It is more convenient to have your DRAM in the form of SIMMs because they are easier to fit than several individual chips.

The BIOS is a set of Basic Input/Output Sub-routines. The complex software running your computer gets the BIOS to do all the simple Input and Output operations involving the computer's hardware. As the BIOS software is stored on a chip which is built into the computer itself, it can protect the complex software which is using it from the

idiosyncrasies of your particular hardware. Accessing the hardware by using the BIOS has enabled PCs to be improved over the years while still allowing the complex software (such as operating systems like DOS/Windows, OS/2, or Unix) to run unchanged on the diverse new hardware.



These days you normally buy your DRAM in the form of SIMMs

may be in danger. Backing it up now may not help. Do not let SCANDISK "automatically" repair anything — it will remove your data along with the errors.

If you have no cross-linked clusters, let SCANDISK or CHKDSK fix any other errors and then re-install your software. This might overwrite a corrupted program file and fix the problem. If it doesn't, get a professional to look at your system.

Drives going cheap

I have been offered some secondhand SCSI drives (11ms access time) cheap, but I'm confused about what I need to connect them up to my PC. What is all this about SCSI kits? I want to connect four SCSI discs and one IDE to my PC which is VESA: what do I actually need?

Chris Milburn
 chris@liffe.com

You'll need a big case, for a start. It is possible to buy special SCSI device cases (with extra power supplies) to go alongside your existing box, but they are expensive.

If you are happy to boot from the IDE drive, then only a basic SCSI card will be needed. The Adaptec 1510A works well for me. You will also need driver software, which should be available with the card. For the 1510A card under DOS, these can be found in Adaptec's ASW-

1210 package (with instructions). OS/2, Windows NT and Windows 95 come with drivers which should support this SCSI board straightaway. Future Domain produces an equally well-supported alternative.

If you don't have a sound board, Creative Labs' SoundBlaster SCSI-II has the same Adaptec controller built in and comes with the DOS drivers that you will need.

You will also need a 50-way ribbon cable with five connectors, which should be available where you bought the SCSI board. If you are mounting the drives in an external box, you should really use an external SCSI cable assembly to make the connection.

PCW Contacts

Frank Leonhardt is an independent computer boffin who can sometimes be contacted on 0181 429 3047 or via email as frank@dircon.co.uk or leo2@cix.clink.co.uk. Letters may be sent to PCW at VNU House, 32-34 Broadwick Street, London W1A 2HG, but individual replies are not normally possible. Please do not ask about cover disks or CD-ROMs.

Adaptec 01252 811200
Creative Labs 01734 344322
Future Domain (001) 714 253 0400



Inside information

If your machine is being overtaken by faster, sleeker models, tinkering with the hardware to bring it up to date may be easier than you think.

Eleanor Turton-Hill leads you gently up the upgrade path.

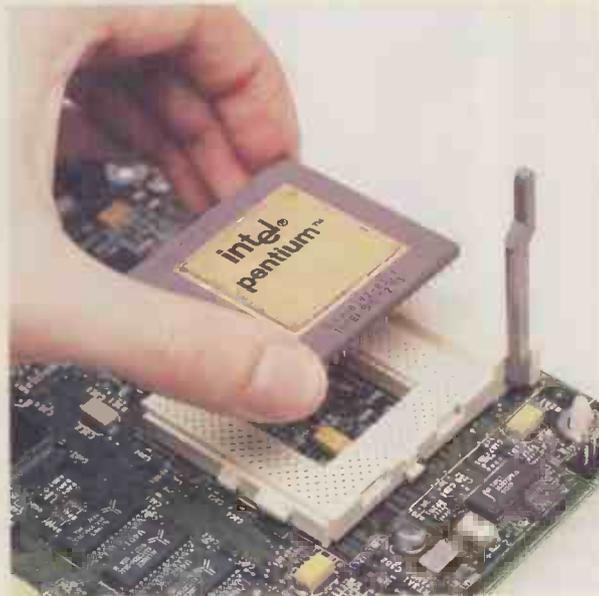
The majority of users still regard the inside of a PC as hostile territory. Otherwise intelligent lawyers, engineers, accountants or even programmers break into a cold sweat when faced with the innards of the familiar machine on their desk. What they don't realise is that today's PC is designed to be easy to take apart and put back together again, so there's no need to be intimidated.

If you own a PC you have to accept the fact that it will quickly become out of date. Your hard disk will gradually fill up, your favourite software will be superseded by a bigger version, and finally one day you'll discover that no-one even makes a computer like yours anymore. At one of these stages you'll want to reassess the value of your system.

You could, of course, decide to grit your teeth and ignore the flow of change. Sometimes (depending on what you want to do with your machine) this is a reasonable position to take. Alternatively, you could decide just to go out and buy a new machine. But before you start splashing your money about there is a third option, and that is to upgrade one or several parts of your system. This involves weighing up the cost of the upgraded parts against the cost of a new machine.

Which part to upgrade?

A PC, like a car, must have a healthy balance of parts which together make for



Processors: Intel's range will take your 486SX through to the more powerful 486, right the way up to the fastest Pentiums

optimum performance. There's no point in buying a Rolls Royce engine and putting it inside a Robin Reliant.

There are four basic components which can be upgraded depending on the current state of your machine: memory, hard disk, video card and processor. Adding a CD-ROM drive will also greatly improve your system. To keep a good balance, however, you'll have to decide which part of your system is most in need of a boost. For example, if you have a

200Mb hard disk, a 486 processor and 4Mb of RAM, then your first priority would be a memory upgrade. If your system has a 300Mb hard disk, 8Mb of RAM and a 486SX processor, then you'd be better off upgrading your processor. This month I'll look at upgrading your memory, video card and processor.

Memory

The most obvious and easiest way to improve your system is to add more RAM. RAM stands for Random Access Memory.

It's the working memory your computer uses to store instructions and data before they can be committed to the hard disk. Because RAM works much faster than the hard disk, it's used for handling all the data in constant use while programs are running, and for this reason it makes a big difference to performance.

In the old days of DOS-based applications, most spreadsheets, word processors, and simple databases could run quite happily on 1Mb or 2Mb. These days, most people run Windows programs which are graphical by definition (even simple spreadsheets and word processors) and are very memory-hungry. It's generally agreed that you'll need at least 8Mb to run the average system satisfactorily, and more if you use graphics or CAD (computer aided design) applications. A system with 4Mb of RAM will just about stand up, but it will soon drive you round the bend with its crunching noises and flashing lights as it struggles to shovel data from memory to disk.

The first thing to check about the RAM provided in your system is whether it uses standard or proprietary memory, and what the upgrade alternatives are. Some PC manufacturers force you to buy proprietary memory chips, usually insisting that their brand of memory is faster and more reliable. Generally this is just a way of getting you to spend extortionate amounts of money. These days 4Mb of

industry standard (72-pin) SIMMs costs about £120. You can still get hold of the older 30-pin type memory second-hand for as little as £15 for 1Mb. Proprietary RAM is generally priced at three to four times the price of industry-standard SIMMs, so weigh up the cost before you decide.

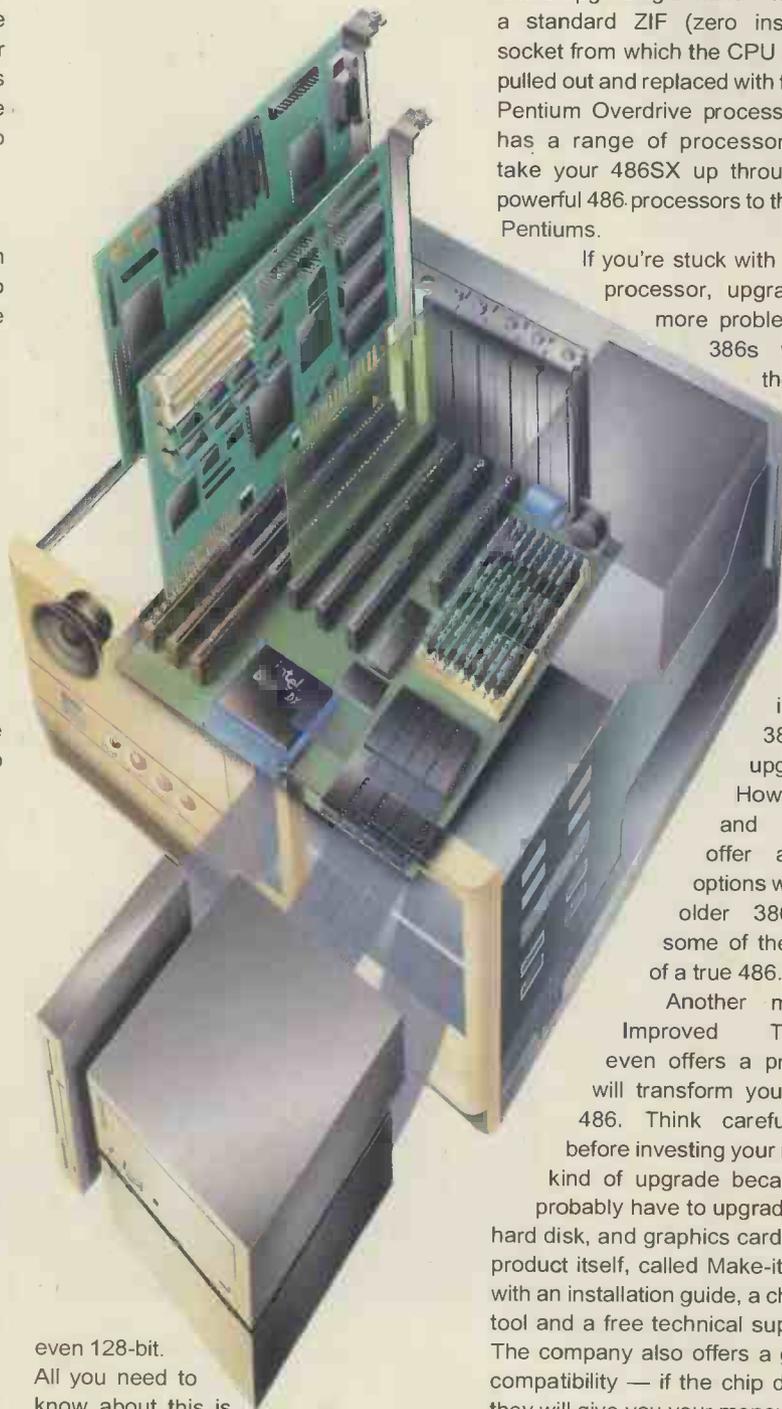
Video cards

Another way of giving your machine an extra power boost is to upgrade the video card. The video card sits in one of the expansion slots inside the PC and controls the features that the software can display on the monitor. Any kind of graphical manipulation is very demanding on system resources — and that includes normal Windows operations. Even the simplest of graphical procedures like drawing a circle on screen involves thousands of calculations.

One of the first things you'll need to know is whether your current video card is local bus or not. Local bus is a type of interface which connects your video card to the motherboard. It's a hardware standard which allows the memory in the card to be addressed directly by the CPU. This makes it a lot faster than the standard ISA (industry standard architecture) interface.

The most important aspect of your video card, and the most frequently quoted feature, relates to the resolution which the card supports in Windows. This is measured in terms of the number of pixels that the card displays on the screen. The absolute minimum these days is 1024 x 768 with a refresh rate of 70Hz. The refresh rate is an important figure as it relates to the flicker which you will perceive from your monitor. Be careful to check out the capabilities of your monitor before investing in an expensive graphics card. A powerful graphics card is useless if it cannot exploit the resolution capabilities of your monitor.

Modern graphics cards generally have a fair amount of processing power and memory built in. Check the amount of memory on the video card currently in your machine: 2Mb is about standard to run the current generation of software, 1Mb is skimpy and 512Kb is barely usable. Sometimes the memory on video cards can be upgraded, so check this out before buying a new card. Also, check out the performance capability of the card. Video cards come as 16-bit, 32-bit, 64-bit and



even 128-bit. All you need to know about this is that high numbers of bits mean faster performance and more colours. A reasonable graphics card costs about £70 but more powerful cards can cost anything up to about £500.

Processor speed

When it comes to performance, the single most important component in your machine is the processor or CPU. The upgrade options for your PC will depend on what type of processor you have. Modern 486-based PCs are designed with

future upgrading in mind. The CPU sits in a standard ZIF (zero insertion force) socket from which the CPU can be easily pulled out and replaced with the latest Intel Pentium Overdrive processor. Intel now has a range of processors which will take your 486SX up through the more powerful 486 processors to the even faster Pentiums.

If you're stuck with a 286 or 386 processor, upgrading will be more problematic. When 386s were made, there were no future-proofing standards to aid processor upgrading, and in fact Intel has completely ignored the 386 processor upgrade market. However, Cyrix and Evergreen offer a range of options which will give older 386 machines some of the capabilities of a true 486.

Another manufacturer, Improved Technologies, even offers a product which will transform your 286 into a 486. Think carefully, though, before investing your money in this kind of upgrade because you will probably have to upgrade your RAM, hard disk, and graphics card as well. The product itself, called Make-it 486, comes with an installation guide, a chip extraction tool and a free technical support hotline. The company also offers a guarantee of compatibility — if the chip doesn't work, they will give you your money back.

Next month I'll be looking at some of the issues involved when adding a CD-ROM drive to your system, and a second hard disk.

PCW Contacts

Evergreen upgrade chips available from
Total Memory Direct 01256 332460
Intel 01793 431155
Cyrix 01793 417759
Improved Technologies Make-It chip
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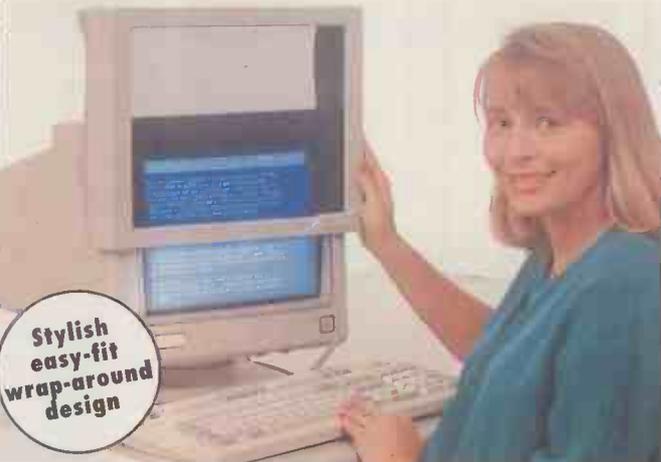
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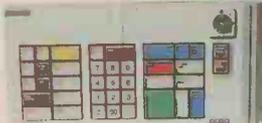
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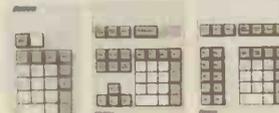
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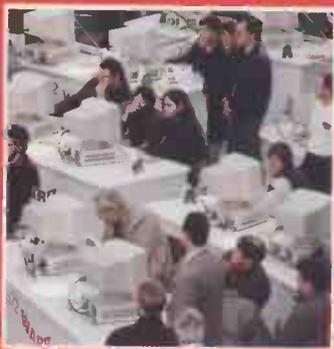
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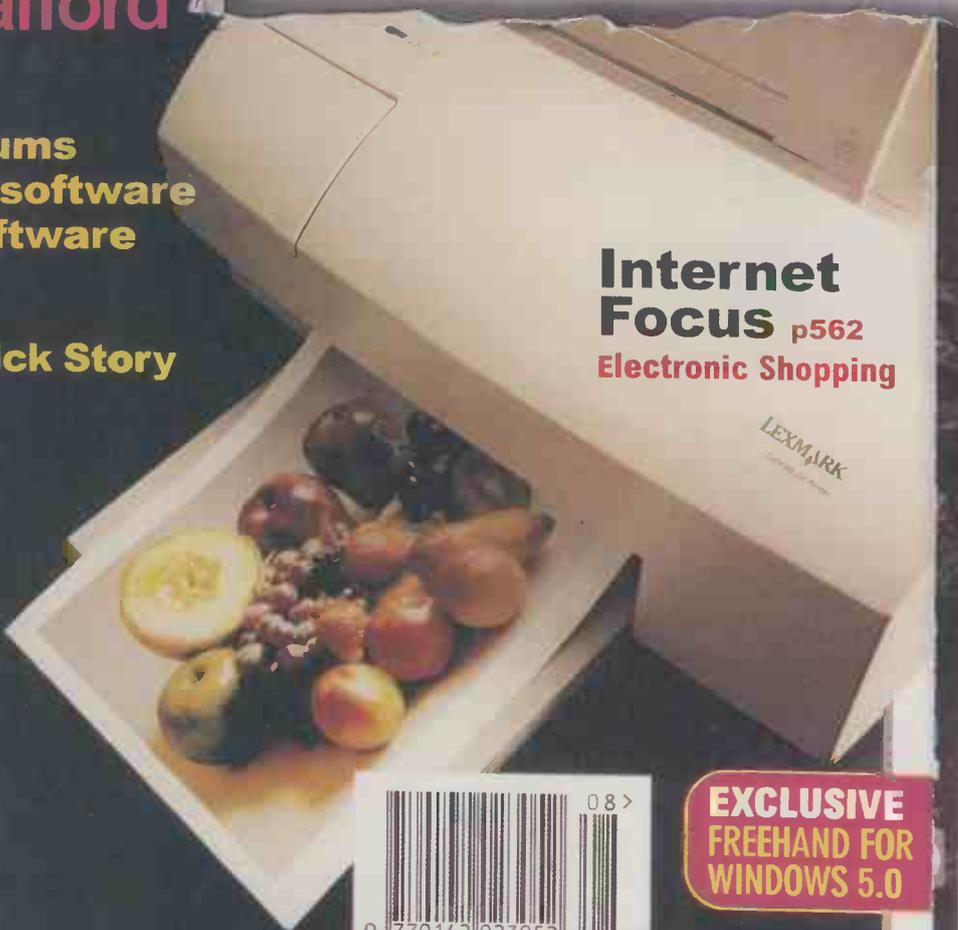
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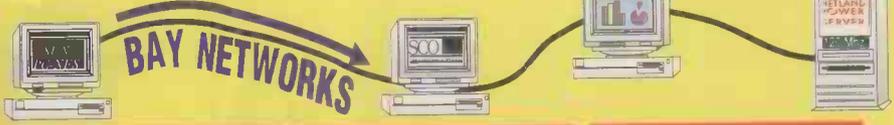
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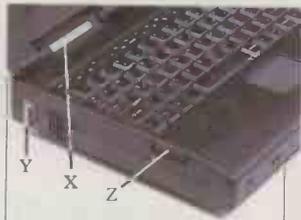
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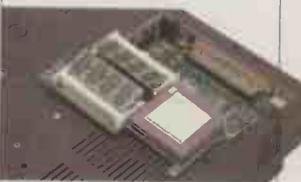
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- Upgrade HDD from 510 to 810 MB *£195.00

- Upgrade HDD from 510 to 1.3 GB *£395.00
- Additional 340 MB HDD£165.00
- Additional 510 MB HDD£275.00
- Additional 810 MB HDD£395.00
- Additional 1.3 GB HDD£595.00
- HDD housing kit (for all models).....£39.00
- PCMCIA ethernet adaptor£145.00

- PCMCIA fax/modem (14,400)£195.00
- PCMCIA fax/modem (28,800)£295.00
- PCMCIA CD-ROM drive (2x speed)£295.00
- Parallel port CD-ROM drive (4x speed)£295.00
- Docking station (7500/7600 series)£319.00
- Docking station (5400 series)£195.00

- NiMH battery (for all models)£95.00
 - NiMH heavy duty battery (5400 series only)£149.00
 - Additional external AC adaptor (for all models)£55.00
 - Car adaptor (7500/7600 series)£45.00
- *initial sale only

Government & educational orders welcome • 12 months RTB parts & labour warranty • Free lifetime technical support

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Showroom hours: Mon-Fri 9.00-5.30, Sat 9.00-2.00

AJP Business Computers Ltd

Units 6 & 7, The Edge Business Centre, Humber Road, London NW2 6EW
Tel: 0181-452 9090 Fax: 0181-450 6360



pentium

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THE Showman

THE ULTIMATE IN PRESENTATION & DEMONSTRATION THE POWER OF PROJECTION

The Portable MultiMedia Workstation that combines power portability and overhead projector presentation

Three easy steps to producing a perfect meeting, educational lecture or just entertaining your friends

It's as easy as...

- A ✓ Remove the tablet from the back of the TFT panel
- B ✓ Set the adjustable stand to the correct height, and attach the supplied fan
- C ✓ Place the TFT Screen over the Overhead Projector and switch on.

PRESENTING THE SHOWMAN:

- ◆ In-Built Overhead Projector Tablet
- ◆ In-Built CD ROM 5.25" Dual Speed
- ◆ 8 Mb Ram Expandable to 64 Mb
- ◆ 3.5" (1.44Mb) Floppy Disk Drive
- ◆ 32 Bit Vesa Local Bus 1Mb Graphics
- ◆ Trackpoint for easy use, no cleaning
- ◆ Built-In 16 Bit Sound Card ◆ Built-In Speakers, Microphone
- ◆ 1 x Type III PCMCIA 2 x Type II PCMCIA
- ◆ Portable 340Mb HDD Drive ◆ 16 cell RTG NIMH Battery
- ◆ 2 x Serial Ports & Parallel Port
- ◆ External Keyboard Port & SVGA Port
- ◆ Auto-Switching Mains Battery Charger
- ◆ Midi/Joystick Port ◆ Carry/Brief Case with accessory pockets
- ◆ Full Three Year Warranty Plan ◆ Fan & Stand

Showman



PROJECTOR TABLET & PORTABLE TFT COMPUTER

OPTIONS AVAILABLE

TV TUNER: £149.00
For Video Conferencing, Television, Video Capture

MPEG LIVE VIDEO: £299.00

Play your video CD's on the Overhead Projector screen

Includes 340Mb Hard Disk and 8Mb Ram	
486DX2-66	£2499.00
486DX4-75	£2549.00
486DX4-100	£2599.00
PENTIUM-75	£2849.00
PENTIUM-90	£2999.00

WHY CHOOSE XITEC ...

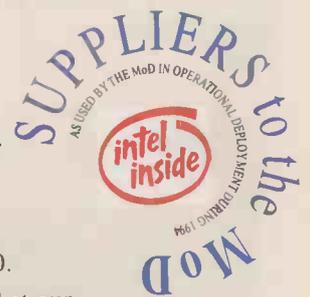
- ✓ Guaranteed delivery dates at point of order. Same day delivery available
- ✓ Lifetime technical support and Three Year Warranty plan
- ✓ The independent British company with one of the largest installed notebook bases in the UK
- ✓ We are told that we offer the highest level of support on notebook computers in the UK.
- ✓ A notebook solution for every requirement. We fulfill contracts from £800 to £2,000,000.
- ✓ Our UFS (unique friendly service) ensures that our Sales Team recommends the best notebook for your need.

SOME OF THE UPGRADE OPTIONS AVAILABLE

Upgrade per 4Mb RAM £160.00	Upgrade to 510Mb Hard Disk £99.00
14.400 IBM Fax Modem £199.00	Upgrade to 810Mb Hard Disk £199.00
PCMCIA Ethernet Card £129.00	Docking stations £299.00



Lotus SmartSuite v. 3 £349.00
Mini Docking Station £55.00
Range of PCMCIA products £CALL

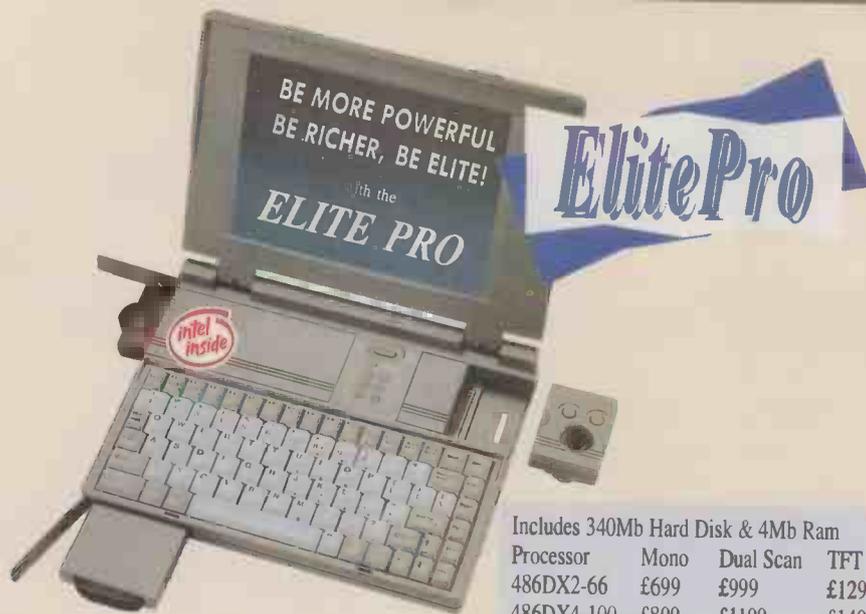


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FAX: 0181 287 4242

UNIT 7, PRINCESS MEWS, HORACE ROAD, KINGSTON, SURREY KT1 1SZ

Please note: all prices exclude VAT at 17.5% & Delivery prices & specifications are subject to change without notice.





Includes 340Mb Hard Disk & 4Mb Ram

Processor	Mono	Dual Scan	TFT
486DX2-66	£699	£999	£1299
486DX4-100	£899	£1199	£1499

BENEFITS OF THE ELITE PRO

- ◆ 486 Upgradeable Processor Socket
- ◆ V.2 PCMCIA Slot
- ◆ Removeable 340Mb Hard Disk Drive
- ◆ 3.5" (1.44Mb) Internal Floppy Disk Drive
- ◆ Award Winning Toshiba Display Mono/Dual Scan/TFT
- ◆ 4Mb Expandable to 16Mb RAM
- ◆ 2 Serial/1 Parallel/1 PS2 Mouse Port
- ◆ Built-In Trackball ◆ Carry Case with accessory pockets
- ◆ Autoswitching Mains Battery Charger
- ◆ AT Expansion slot for expansion box
- ◆ External SVGA Monitor & Keyboard Port
- ◆ Slimline Design 28cm x 21cm x 4cm ◆ Weight 5.7lbs
- ◆ Simultaneous Display (not dual scan models)
- ◆ Three Year Warranty Plan



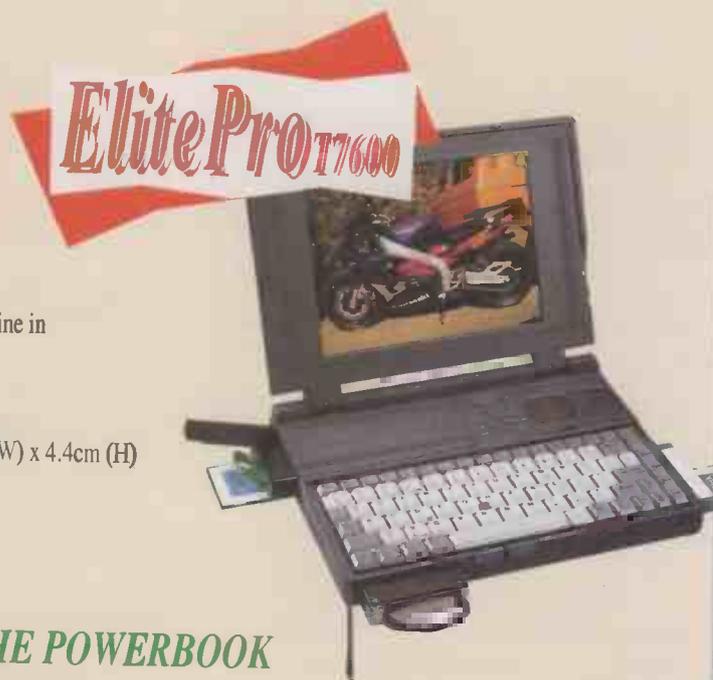
BENEFITS OF THE ELITE PRO T7600

- ◆ 486 Upgradeable Processor
- ◆ 2 x Type II PCMCIA Slots
- ◆ Removeable 2.5" 340Mb Hard Disk Drive
- ◆ 3.5" (1.44Mb) Floppy Disk Drive
- ◆ Mono/Dual Scan/TFT Screen Options
- ◆ 4Mb RAM upgradeable to 32 Mb
- ◆ 32 Bit Vesa Local Bus
- ◆ Removeable NIMH Battery Pack
- ◆ Auto-Switching mains battery charger
- ◆ Trackpoint situated between G & H Keys
- ◆ COM 1, Parallel Port, CRT Port

Includes 340Mb Hard Disk & 4Mb Ram

Processor	Mono	Dual Scan	TFT
486DX2-66	£799	£1049	£1399
486DX4-75	£849	£1099	£1449
486DX4-100	£899	£1149	£1499

- ◆ MIC, Midi Joystick Port, Speaker out, Line in
- ◆ 16 Bit Audio System
- ◆ 128Mb External Cache, Level 2
- ◆ Physical Dimensions 29cm (L) x 22cm (W) x 4.4cm (H)
- ◆ Weight 6.2 lbs ◆ Carry Case
- ◆ Three Year Warranty Plan



BENEFITS OF THE POWERBOOK

- ◆ PGA Motherboard takes 3.3V or 5V CPU's
- ◆ 128KB External Cache ◆ 32 bit Vesa Local Bus
- ◆ 4Mb Expandable to 36Mb Ram
- ◆ Removeable Upgradeable Hard Disk Drive
- ◆ 3.5" (1.44Mb) Floppy Disk Drive
- ◆ Mono, Dual Scan or TFT 10.4" Screen Options
- ◆ Microsoft Sound System
- ◆ 8 bit Sound Card, Sound blaster compatible
- ◆ Built-In speaker ◆ Built-In 25mm Trackball
- ◆ PCMCIA Type IV expansion slot
- ◆ External Microphone and Speaker Connections
- ◆ 1 Serial/1 Parallel Port
- ◆ Autoswitching Mains Battery Charger
- ◆ External SVGA Colour Monitor Port & External Keyboard Port ◆ Docking Station Port
- ◆ 28cm (W) x 22cm (D) x 5cm (H)
- ◆ 2 NiMH Batteries with hot swap facility
- ◆ Carry Case ◆ Three Year Warranty Plan

Includes 340Mb Hard Disk & 4Mb Ram

Processor	Mono	Dual Scan	TFT
486DX2-66MHz	£849	£1149	£1529
486DX4-75MHz	£869	£1169	£1549
486DX4-100MHz	£889	£1189	£1589

PENTIUM STANDARD WITH 4Mb Ram, 340 HARD DISK AND 16 BIT SOUND

PENTIUM 75	N/A	£1339	£1689
PENTIUM 90	N/A	£1399	£1749



A DIVISION OF ELITE CORPORATION
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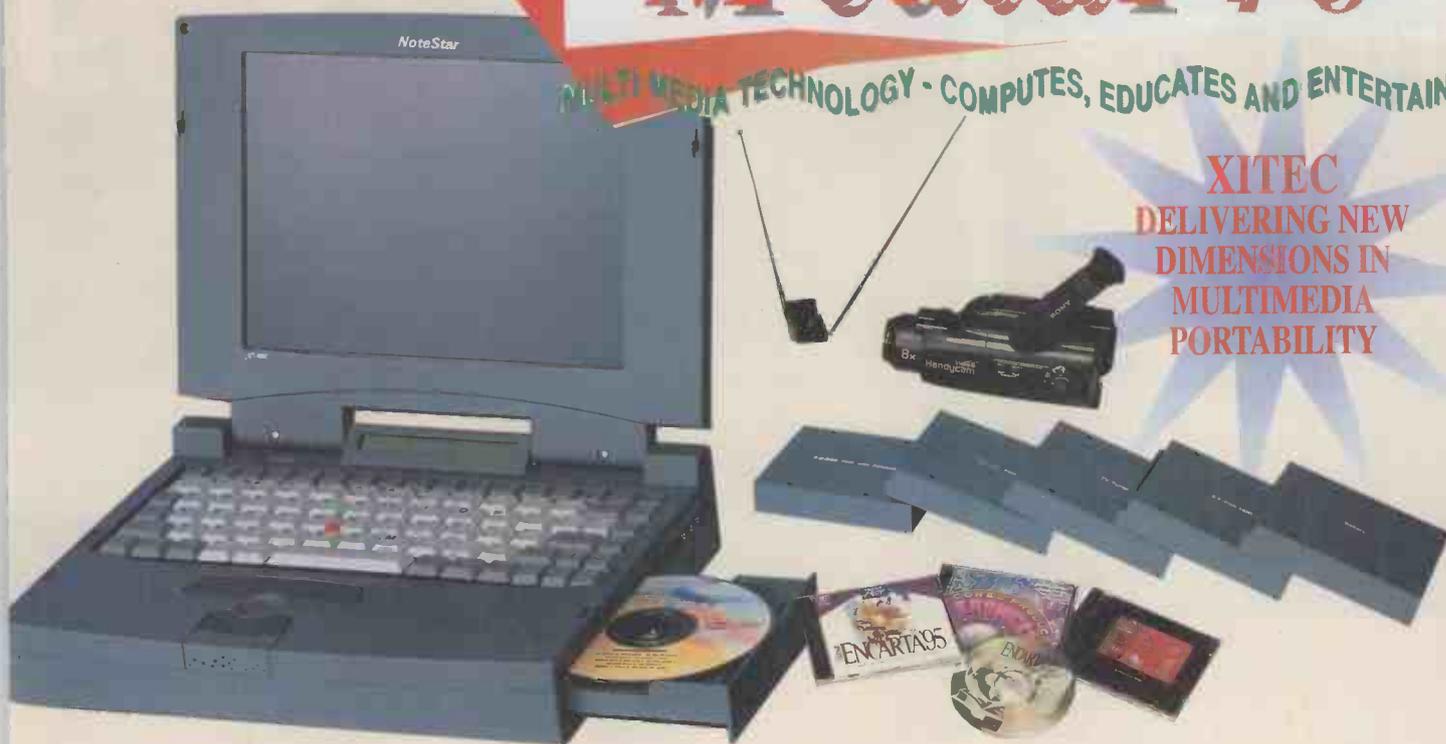
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THE MediaPro

MULTIMEDIA TECHNOLOGY - COMPUTES, EDUCATES AND ENTERTAINS

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DELIVERING NEW
DIMENSIONS IN
MULTIMEDIA
PORTABILITY



Make a professional move into the world of multimedia with options that are set to *amaze!*

BENEFITS OF THE MEDIAPRO

- ◆ Upgradeable 486 or Pentium processor socket & CPU Options
- ◆ 256K External Cache
- ◆ Upgradeable 5.25" Built-In Dual Speed CD ROM Drive
- ◆ Trackpoint (easier to use than trackball - no cleaning required)
- ◆ Two Built-In speakers, Built-In microphone
- ◆ 16 Bit Sound blaster compatible card
- ◆ VESA 32 Bit Local Bus, 1Mb graphics card
- ◆ Removeable, upgradeable and easily interchangeable Hard Disk
- ◆ 4Mb Expandable to 64Mb RAM
- ◆ 1xType III or 2xType II PCMCIA Slots

- ◆ 3.5" (1.44Mb) Floppy Disk Drive
- ◆ Upgradeable Dual Scan (10.4"), TFT (9.5"/10.4") Screen options
- ◆ External Keyboard Port and SVGA Monitor Port
- ◆ 2 Serial/1 Parallel Port/1 Midi/Joystick Port
- ◆ NiMH Battery 16 cell with special RTG feature for extra life
- ◆ Autoswitching Mains Battery Charger
- ◆ Carry Case with accessory pockets
- ◆ External microphone and speaker ports
- ◆ MPEG live video option
- ◆ Full Three Year Warranty plan

ACCESSORIES AND UPGRADES

Upgrade per 4Mb RAM	£160
Lotus SmartSuite V.3	£349
Upgrade to 510Mb HDD	£99
Upgrade to 810Mb HDD	£199
PCMCIA 14.400	
IBM Fax Modem	£199

Includes 340Mb Hard Disk, 4Mb Ram & CD ROM

Processor	Dual Scan	TFT
486DX4-75	£1399	£1749
486DX4-100	£1449	£1799
PENTIUM 75	£1539	£1889
PENTIUM 90	£1599	£1949

VIDEO MPEG OPTION

This option for live video film integrates the MPEG I decoder for video CD and CD-I, making it a perfect partner for education, entertainment and practical programs £299.00

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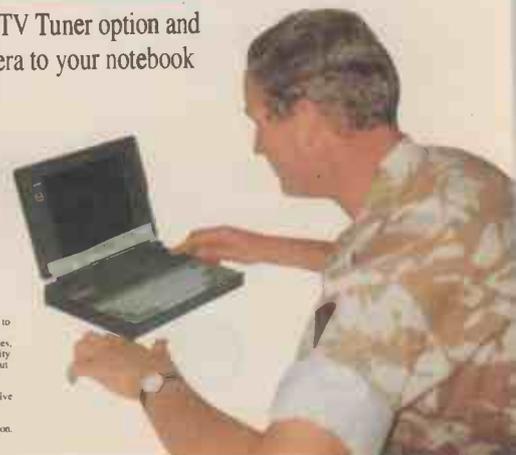
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TV TUNER OPTION

Keep up with current affairs with this TV Tuner option and capture still images from a video camera to your notebook with this module £149.00



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Mitac

486 DXII/66

Price Breaker

£599



This new PC from Mitac offers the very latest features at a price our competitors charge for entry level machines. Whatever your PC requirements, the Mitac offers more than enough power, thanks to its 486 DXII CPU running at a blinding 66MHz. Its built-in co-processor makes light of any maths work and an internal 8K cache gives fast data handling within the CPU.

Because the fastest chip is only as good as it's surrounding hardware we've included a 32 bit VESA local bus display card with 1MB of dedicated video memory. Add to this an MPR 1 14" digital colour monitor with on screen display and a maximum resolution of 1024 x 768 in non-interlaced mode and you've probably never seen Windows as fast or as clear as this before.

Pentium 75MHz Mode £999



- 486 DXII/66 MHz processor
- 4MB RAM expandable to 64MB
- 540 MB HDD
- 32 Bit VESA Local Bus card, 1MB RAM expandable to 2MB
- 3.5" 1.44MB floppy disk drive
- 14" SVGA Colour monitor with digital on screen adjustment, 28 dot pitch, MPR 1
- Expandable desk top case with 4 drive bays and extra 16 bit expansion slot
- MS DOS® 6.22, MS Windows™ 3.11 and a range of software
- 12 months Return To Base Warranty
- 4MB RAM upgrade £120
- Mini Tower version £599

MULTI MEDIA KIT

- Twin Speed CD Rom Drive • Sound Fx™ Card Sound blaster compatible 16 bit • Audio Software • Speakers • 5 CD ROM Titles
- The New Grollier Multimedia Encyclopedia – 33,000 articles, 3,000 photos and illustrations, 100's of detailed maps, sound tracks and animations.
- Space Adventure – A space voyage of exploration, 100's of pictures, sounds and a full motion video.
- Undersea Adventure – Ocean graphic tours, a biology lab, global perspectives, films, animations, a virtual 3-D aquarium.
- Quad Speed Option +£80
- Wave Table Sound Card +£80

Speed – Zoom through the history and science of speed from the fastest animals to simulations of the speed of light, includes speed reading courses, speed games, the award winning interactive motion picture "Speed".

Mega Race – Drive like a maniac. A futuristic TV show that gets higher ratings every time a car explodes, stunning graphics, awesome video footage.

£150

TRULY GREEN

The Mitac 486 DXII/66 is a PC with true green credentials, its power saving mode can significantly reduce its power consumption compared with an ordinary PC. Giving lower electricity bills and less pollution, in fact even the packaging is recycled and there are absolutely no CFC's used.



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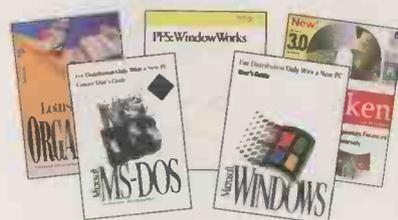
Order Line Open, 9am-5.30pm Monday-Friday, 9am-1.00pm Saturdays
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READY TO GO

Finally, just to get you started, we've pre-installed

- PFS Windows Works • MS Windows™ 3.11
- Intuit Quicken 3.0 • Lotus Organiser
- MS DOS® 6.22

The Mitac Popular is delivered ready to go!



Big Servers

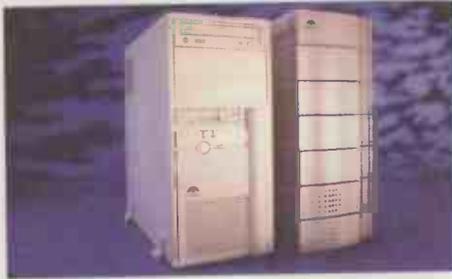
Amazingly, sophisticated large servers can be found at incredibly reasonable prices! Look no further. Adams have two basic types of large server system to offer. The Accura Modular offers flexibility and expandability whilst the Accura Integrated has many performance and redundancy enhancements engineered in. Both systems are based on R.A.I.D. technology and offer very high equipment quality levels, flexible warranty and service plans with a pricing structure that is truly amazing!

Modular Accura Modular, features a new "building block" style external disc array, providing the ability to upgrade your server as requirements dictate, from disc mirroring to full RAID level 5, even peripherals like DAT, can be added.

Integrated Accura Integrated gives a traditional server layout, with up to 6 removable drives integrated into the case. Features include a redundant power supply system with "quick change" spare, a high efficiency cooling system and the ability to integrate further peripherals like DAT, CD-ROM and optical drives. The Accura Integrated is one of the most cost effective high performance server systems available.

Call technical sales on 0161 877 8822 to find out more.

Accura Modular Server



Modular features

- Intel Pentium® 90/120mhz CPU
- Plug and play compatible with auto configuration (PCI and ISA bus)
- 512k external cache
- 32mb RAM (max 192mb)
- Modular expandable RAID enclosure with redundant PSU's
- 2.0gb addressable RAID level 5 array, with 3 x 1gb fast SCSI-II hard drives
- DPT 2124 PCI 32-bit bus mastering RAID controller with 4mb cache memory
- SCSI CD-ROM drive, 4.4 speed, multi session,
- 3.5" 1.44mb floppy drive
- Fast PCI graphics card with 1mb RAM
- 14" Accuscan energy saving, MPR-II monitor, NI, max res 1024 x 768
- 2 serial (16550), 1 parallel port (EPP/ECP)
- 32 bit 100mbps PCI bus mastering ethernet card
- Accura tower case with 250w PSU
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Operating systems: OS/2 Lan Server, Novell, SCO Unix, Windows NT (not supplied)

Powered by

Prices	Accura Modular RAID Server with Intel Pentium® 90 CPU, as specified	£4899
	Accura Modular RAID Server with Intel Pentium® 120 CPU, as specified	£5149

Modular	1gb → 2gb fast SCSI-II HDD (per drive)	£369
	1gb → 4gb fast SCSI-II HDD (per drive)	£699
	Main system memory upgrades per 1mb	£36
	RAID upgrade to 5 drives (4gb capacity)	£970
	2 extra 1gb drives and 2 mount modules	
	5 x 1gb RAID → 5 x 2gb RAID	£1995
	8gb total capacity	
	5 x 1gb RAID → 5 x 4gb RAID	£3495
	18gb total capacity	
	Motherboard and RAID controller ECC memory upgrade (per 1mb)	£CALL
Options	2-4gb DDS-1 DAT drive mounted in mount module (ready to stack)	£749
	4-16gb DDS-2 DAT drive mounted in mount module (ready to stack)	£899
	100mbps PCI bus mastering ethernet card	£199



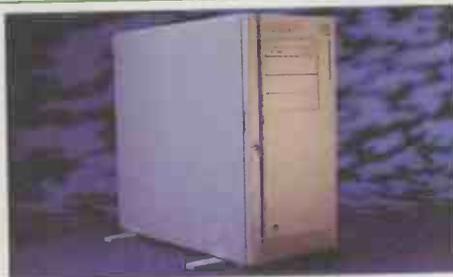
Extra peripherals (ie DAT) can be added to the Modular RAID unit. Extra mount modules just clip on, no cabling is required. Full redundancy and hot swapability of drive modules and PSU's.

Whoppers!

Accura Integrated Server

Powered by

Integrated	Accura Integrated RAID Server with single Intel Pentium® 90 CPU as specified	£7999
	Accura Integrated RAID Server with dual Intel Pentium® 90 CPU's as specified	£8249
Prices	Accura Integrated RAID Server with single Intel Pentium® 120 CPU as specified	£8249
	Accura Integrated RAID Server with dual Intel Pentium® 120 CPU's as specified	£8749



Integrated features

- Intel Pentium® 90/120mhz CPU
- Dual Pentium motherboard with Intel Neptune II 3.3v chipset, PCI and EISA slots.
- Plug and play compatible with auto configuration (PCI and EISA bus)
- 512k external cache
- 32mb RAM (max 512mb)
- 3 channel bus mastering, PCI RAID fast wide SCSI-II controller with 8mb cache. Max data transfer as configured 50-60mb/s
- 4.0gb addressable RAID level 5 array, with 3 x 2gb fast wide SCSI-II hard drives, mounted on alloy "hot plug-gable" mounts.
- SCSI CD-ROM drive, 4.4 speed, multi session
- 3.5" 1.44mb floppy drive
- Fast PCI graphics card with 1mb RAM
- 14" Accuscan energy saving, MPR-II monitor, NI, max res 1024 x 768
- 2 serial (16550), 1 parallel port (EPP/ECP)
- 32 bit 100mbps PCI bus mastering ethernet card
- Accura Integrated Server case with 2 x 400W redundant power supplies and 1 x 400w pluggable spare.
- Power supply failure alarm
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Operating systems: OS/2 Lan Server SMP, SCO Unix with SMP extns, Windows NT 3.5 (not supplied).

Integrated	2gb → 4gb fast SCSI-II HDD (per drive)	£299
	Main system memory upgrades per 1mb	£36
	RAID cache upgrades per 1mb	£36
	3 x 2gb RAID → 5 x 2gb RAID	£1699
Options	8gb total capacity	
	3 x 2gb RAID → 5 x 4gb RAID	£3050
	18gb total capacity	
	Motherboard and RAID controller ECC memory upgrade (per 1mb)	£CALL
	Secondary external RAID unit	£CALL



Case accommodates 6 removable RAID drives and 5 secondary units. HDD's mounted in alloy glitch free carriers, hot spare provision. 400w PSU's can be hot swapped, spare unit fitted in lower case.

Adams service

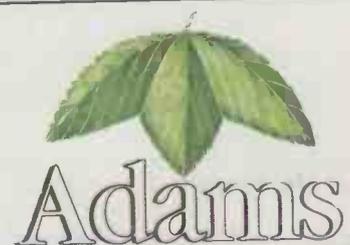
Warranty: For your peace of mind Adams offer a 3 year parts and labour warranty on your Accura Server. The first year of this warranty is on-site with BS5750 standard eight hour response provided by our partner ICL. All main system components are covered except monitors which are warranted by their own manufacturers. The on site service can be extended up to 3 years, and in certain areas, a four hour response time can be provided. Please call for specific quotations.

Ordering: We are pleased to accept enquiries between 9am and 6pm Monday to Friday. All Accura Servers are normally shipped within 2 weeks of order. We accept cheque with order, Visa, Mastercard or American Express. PO's are welcome from FTSE100 listed companies and government departments. Carriage charges at cost, normally around £25 per system. All prices quoted are subject to VAT.



Adams' are the official computer supplier to Williams Renault for 1995

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Advanced Computer Technology

ADAMS TECHNOLOGY LTD, CITY POINT, CHESTER RD, OLD TRAFFORD, MANCHESTER M32 0RW UK. FAX: 0161 877 8844

Nearly!

The perfect computer, now there's something. Imagine, just what you wanted, everything exactly right, perfectly trouble free with no hardware wobbles and software crashes. Sounds too good to be true? Well unfortunately computers tend to have a mind of their own and do the most unwanted things at the wrong time.

So, Mr. Adams are you going to tell me then that yours are perfect? No. Nearly perfect though, as close as we can possibly get them. We're constantly fine tuning and improving both our products and our company's service with the aim of making our whole customer relationship...perfect!

Adams have many, many corporate clients who value the effort and hard work we put in for them. We'll do the same for you when you become an Adams customer.

Talking about things perfect, here's a little barage of software:



Like it? We did so we thought that we would

Accura Premium

Premium
486

DX2-66	£899
DX4-100	£979

- 486DX2-66 or DX4-75/100 CPU
- 256k external cache
- 8mb RAM (max 128mb)
- 540mb sub 12ms IDE hard drive with built in IDE controller
- 3.5" 1.44mb floppy drive
- Accelerated local bus graphics engine with 1mb RAM (max 2mb)
- 14" Accuscan energy saving, MPR-II monitor, NI, max res 1024 x 768
- 2 serial, 1 parallel port
- Slim desktop case
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Win OS/2 V3.0 or Windows 95 preloaded

Premium
586

P75	£1149	P90	£1249
P100		£1349	

- Intel® Pentium® 75/90/100mhz CPU
- PCI local bus
- 256k external cache
- 8mb RAM (max 128mb)
- 540mb 11ms IDE hard drive with PCI 32-bit EIDE controller
- 3.5" 1.44mb floppy drive
- Ultra fast PCI graphics engine with 1mb RAM
- 15" Accuscan energy saving, MPR-II monitor, NI, max res 1280 x 1024
- 2 serial, 1 parallel port
- Desktop case with 200w PSU
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Win OS/2 Warp v3 with Lotus Smartsuite for OS/2 or Windows 95 with Novell PerfectOffice Standard

Perfect C

include Novell PerfectOffice with some of our PC's. If you choose an Adams PC, loaded with Microsoft Windows 95, we will offer either PerfectOffice standard with our Accura Premium range, or PerfectOffice Professional with the Accura Professional machines. Win OS/2 Warp V3 is available as an alternative to Windows 95, this time we load Lotus Smartsuite for OS/2. Decisions, decisions!

All this talking about software, we haven't mentioned the PC's themselves. Our Premium range is designed for the home user who would like a quality PC. The Professionals are of the highest quality and are the fastest that we can possibly make them; for the serious user. Our Professional 586 Workstation was Personal Computer World's Editors choice, by the way.

Our 3 year warranty remains unchanged, with on site support from our partner ICL. For those wishing to spread the financial burden, we can now offer you a "Buy now pay in Spring 1996" credit option. Of course at 0% APR*

Help us to make the perfect PC. Call Adams sales on 0161 877 8822 and say "Perfect PC!"

PS: Please write and tell what makes your perfect PC. We will arrange a trip with Williams to a touring car race for the most original letter.

Accura Professional

Professional
586 WS

P90	£2049	P100	£2149
P120	£2299	P133	£2449

- Intel Pentium® 90/100/120/133 mhz CPU
- Intel Triton® chipset
- Plug and play compatible with auto configuration
- 256k synchronous SRAM
- 16mb EDO RAM (max 128mb)
- 1.2gb sub 10ms IDE hard drive with PCI 32 bit mode 4 enhanced IDE controller
- Quad speed multi session ATAPI CD-ROM drive
- 3.5" 1.44mb floppy drive
- Soundblaster Pro 16 with speakers
- Matrox Millennium graphics card with 2mb WRAM (u/g to 8mb)
- 15" Accuscan energy saving, MPR-II monitor, NI, max res 1280 x 1024, 75hz refresh
- 2 serial (16550), 1 parallel port (EPP/ECP)
- Desktop Case with 200w PSU
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Win OS/2 Warp v3 with Lotus Smartsuite for OS/2 or Windows 95 with Novell PerfectOffice Professional

Professional
586 MM

P90	£2549	P100	£2649
P120	£2799	P133	£2949

- Intel Pentium® 90/100/120/133 mhz CPU
- Intel Triton® chipset
- Plug and play compatible with auto configuration
- 256k synchronous SRAM
- 16mb EDO RAM (max 128mb)
- 1.1gb sub 10ms IDE hard drive with PCI 32 bit mode 4 enhanced IDE controller
- Quad speed multi session ATAPI CD-ROM drive
- Soundblaster® AWE32 sound card and pro-dig spkrs
- 3.5" 1.44mb floppy drive
- Matrox Millennium 2mb WRAM graphics card (u/g to 8mb)
- 17" Idek MF8617 energy saving, MPR-II monitor, NI, max res 1600 x 1200, max refresh 100hz
- 2 serial (16550), 1 parallel port (EPP/ECP)
- Desktop Case with 200w PSU
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Win OS/2 Warp v3 with Lotus Smartsuite for OS/2 or Windows 95 with Novell PerfectOffice Professional

superb quality and value for money

Premium 586



Work Station

P90 £1499	P100 £1599
P120 £1749	P133 £1999

- Intel® Pentium® 90/100/120/133mhz CPU
- PCI local bus with 256k external cache
- 8mb EDO RAM (max 128mb)
- 1gb sub 10ms IDE hard drive with PCI 32-bit mode 4 enhanced EIDE controller
- Quad speed, multi session ATAPI CD-ROM drive
- 3.5" 1.44mb floppy drive
- #9 Fx Vision 330 64 bit PCI graphics card with 2mb DRAM
- 15" Accuscan energy saving, MPR-II monitor, NI, max res 1280 x 1024
- 2 serial, 1 parallel port
- Desktop case with 200w PSU
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Win OS/2 Warp v3 with Lotus Smartsuite for OS/2 or Windows 95 with Novell PerfectOffice Standard

Premium 586



Multi Media

P90 £1999	P100 £2099
P120 £2249	P133 £2399

- Intel® Pentium® 90/100/120/133mhz CPU
- PCI local bus with 256k external cache
- 16mb EDO RAM (max 128mb)
- 1.2gb sub 10ms IDE hard drive with PCI 32-bit IDE mode 4 controller
- Quad speed, multi session ATAPI CD-ROM drive
- Soundblaster® Pro 16 and speakers
- 3.5" 1.44mb floppy drive
- #9 FX Motion 771 64 bit PCI graphics card with 2mb VRAM (u/g to 4mb)
- 17" Accuscan MPR-II monitor, NI, max res 1280 x 1024
- 2 serial, 1 parallel port
- Desktop case with 200W PSU
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Win OS/2 Warp v3 with Lotus Smartsuite for OS/2 or Windows 95 with Novell PerfectOffice Standard

Accura options

Premium

540mb IDE → 1gb 10ms IDE HDD	£99
1gb IDE → 1.1gb 10ms IDE HDD	£35
Std memory upgrades per 1mb	£31
EDO memory upgrades per 1mb	£36
Ultra fast PCI graphics 2mb →	£59
#9 Fx Vision 330 with 2mb DRAM	
→ #9 FX Vision 330 with 2mb DRAM	£99
→ #9 FX Motion 771 2mb VRAM	
VRAM upgrades 2mb → 4mb	£150
14" → 15" Accuscan Monitor	£80
1280 x 1024, MPR-II	
15" → 17" Accuscan Monitor	£219
1280 x 1024, MPR-II	
Sound Blaster Pro 16 (includes Speakers)	£99
NE2000 compatible ethernet card	£39

Professional

1gb IDE → 1gb 8.5ms fast SCSI-II including 32 bit DPT 2024 PCI fast SCSI-II controller (cache and RAID upgradeable)	£299
1gb fast SCSI-II → 2gb 9ms fast SCSI-II	£349
DPT CM4000 cache module (0 mb) for DPT 2024	£349
Memory for CM4000 (per 1mb)	£36
DPT DM4000 RAID module for DPT2024	£349
Matrox Millennium 2mb → Matrox Millennium with 4mb WRAM	£150
Matrox Millennium 4mb → 8mb WRAM u/g	£270
2mb → 4mb VRAM upgrade	£185
17" Idek → 21" Idek MF-9121 Diatron Pro 1600 x 1200, MPR-II	£899

PLEASE CALL FOR MANY MORE OPTIONS

computers?

no compromises for power users

Professional



586 Server

P90 £2499
P120 £2749

- Intel Pentium® 90/100mhz CPU
- Plug and play compatible with auto configuration (PCI and ISA bus)
- 512k external cache
- 16mb RAM (max 192mb)
- 2.0gb 8.0ms fast SCSI-II hard drive with DPT PCI 32-bit bus mastering SCSI controller (caching and RAID upgradeable)
- 4.4 speed multi session SCSI CD-ROM drive
- 3.5" 1.44mb floppy drive
- Fast PCI graphics card with 1mb RAM
- 14" Accuscan energy saving, MPR-II monitor, NI, max res 1024 x 768
- 2 serial (16550), 1 parallel port (EPP/ECP)
- 32 bit PCI bus mastering ethernet card
- Tower case with 250w PSU
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Operating systems: OS/2 Lan Server, Novell, SCO Unix, Windows NT (not supplied).

Professional



586 Dual Server

P90 £3099
P100 £3599

- Two Pentium® 90/100mhz CPU's
- Plug and play compatible with auto configuration (PCI and EISA bus)
- 512k external cache
- 16mb RAM (max 192mb)
- 2.0gb 8.0ms fast SCSI-II hard drive with DPT PCI 32-bit bus mastering SCSI controller (caching and RAID u/g)
- 4.4 speed multi session SCSI CD-ROM drive
- 3.5" 1.44mb floppy drive
- Fast PCI graphics card with 1mb RAM
- 14" Accuscan energy saving, MPR-II monitor, NI, max res 1024 x 768
- 2 serial (16550), 1 parallel port (EPP/ECP)
- 32 bit PCI bus mastering ethernet card
- Server case with 300 W PSU
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Operating systems: OS/2 Lan Server SMP, SCO Unix with SMP extns, Windows NT 3.5 (not supplied).

ordering

Adams Technology sales lines are open from 9am till 6pm from Monday to Friday. Technical sales staff are available to answer questions on any of our products to help you with any differing requirements that you might have. Please add VAT to all prices quoted. We welcome payment by Visa, Mastercard and American Express, or on a cheque with order basis. We charge £20 for carriage on all systems and servers and £12 for portables. A 14 day money back guarantee* is offered on all purchases.

All sales are subject to Adams Technology Ltd's terms and conditions of sale. These are available on request. Please call for any further information you may require.



Adams' are the official computer supplier to Williams Renault for 1995



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Adams
Advanced Computer Technology

ADAMS TECHNOLOGY LTD, CITY POINT, CHESTER RD, OLD TRAFFORD, MANCHESTER M32 0RW UK. FAX: 0161 877 8684

*Warranty and money back guarantee subject to Adams Technology's terms and conditions



Hot Stuff!

Autumn has finally arrived, with fond memories or our last good summer for many years to come, we launch into computer silly season. Windows 95 has had a lot of press, but we still find we getting asked a lot for Win OS/2 Warp and good old Windows 3.11. Any of our machines can be supplied with either one of these operating systems.

At Adams we've been busy enlarging our range of notebooks to give you more choice, we've also been hammering away at the negotiating table to try and offer an even better price structure, to bring you the best ever value for money.

Portable+ Our latest product is the Accura Portable Plus, with many features of the original Accura Portable, but now with the largest LCD available: an 11.8" SVGA TFT. Other screens include an 11.3" DSTN or 10.4" TFT LCD's which all display 800 x 600 SVGA resolution. This machine is available in either Pentium or 486 versions, both are full multimedia portables and have CD-ROM, secondary battery and MPEG options.

75 The Accura 750 we launched in August as a quality entry level machine. It's near sub notebook size belies it's power and performance. Above all it represents outstanding value.

0% Adams has a new Personal Finance package to offer on certain portables. Buy now and pay in Spring 1996. APR 0%. Written details available.

Call Adams sales on 0161 877 8822 to find out more about the right notebook to suit you and your budget.

Accura 75

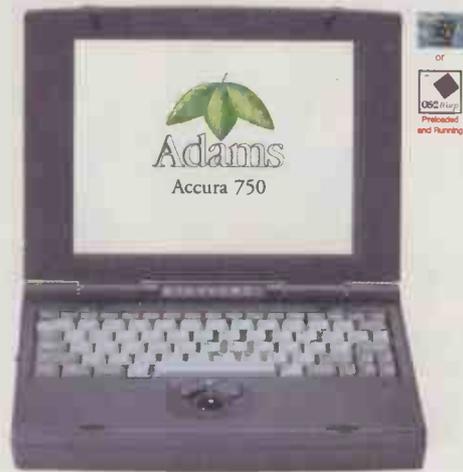
The Accura 750 represents a true compact, near sub notebook sized, entry level solution that is both rugged and extremely portable. Weighing only 2.2kgs the Accura 750 features a 9.5" LCD either mono or dual scan, with memory upgradeability to 20mb and CPU choices of 486DX2-66 or DX4-100. A large front mounted trackball and type III PC card slot completes the value for money feature list.

Accura 75

features

- 486DX2-66 CPU upgradeable to 486DX4-100
- 4mb standard memory upgradeable to 20mb
- 340mb 2.5" fast IDE hard drive upgradeable to 1.2gb.
- 9.5" Mono LCD with 64 grey levels, Dual Scan passive colour displaying 256 colours.
- Local bus graphics accelerator giving simultaneous LCD/CRT display and CRT resolutions up to 1024 x 768
- 1.44mb floppy disk drive built in
- BIOS controlled dual level power management facility
- Built in LED status indicator
- 19mm trackball built in
- 1 PC Card type III slot (takes type I and II also)
- Ni CD battery standard
- 1 serial port, 1 parallel port, external CRT port, external keyboard port
- Full function 84 key UK keyboard
- Multi voltage 90-240v charger power supply (2 hour charge time)
- Light weight 2.2kgs with hard drive and battery
- Compact size - near sub-notebook dimensions
- 1 year parts and labour warranty
- 14 day money back guarantee of satisfaction

Our new value for money entry level notebook



Accura 750

prices

Model	Mono	Dual Scan SVGA
486DX2-66	£849	£1199
486DX4-100	£929	£1279

Latest &

Accura Portable+

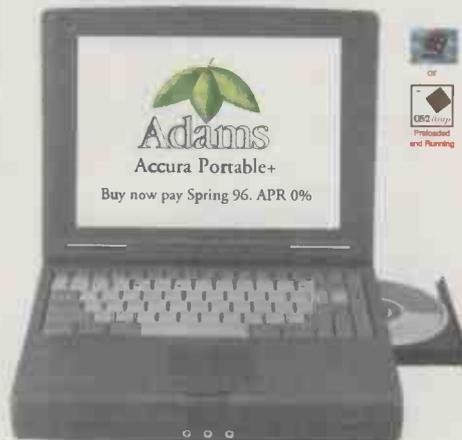
Our new SVGA, CD-ROM, 486 or Pentium® multimedia notebook

The new Accura Portable+ offers a state of the art high resolution graphics LCD combined with full multimedia features with an in built CD-ROM option. With either 486 or Pentium CPUs, the Portable+'s removable floppy drive, can be replaced by an additional battery to give up to 4 hours use, or alternatively fitted with a CD-ROM. An 11.3" SVGA (800x600) DSTN, 10.4" SVGA (800x600) and 11.8" SVGA TFT are the screen options. Software MPEG-1 is standard on Pentium machines.

Accura Portable+

features

- 486DX2-66 or 486DX4-100 CPU's
- Pentium® 75 or 90 mhz CPU's, including 256k cache
- 4mb (486) or 8mb (Pentium) standard memory upgradeable to 32mb
- Quick removable 340mb 2.5" enhanced IDE hard drive upgradeable to 1.2gb
- 11.3" SVGA DSTN LCD with 800 x 600 resolution, 10.4" and 11.8" TFT VGA LCD with 800 x 600 resolution
- Local bus graphics display giving notebook resolution of 800 x 600 and external CRT up to 1024 x 768
- 1.44mb removable FDD built in
- 16 bit stereo sound card built in with speakers
- Optional CD-ROM or secondary battery can be inserted in FDD slot
- BIOS controlled dual level power management facility
- Built in LED status indicators
- Intuitive front mounted trackpad pointing device
- Type IV PC Card slot (Takes type 1 x III and 1 x II also)
- Ni MH battery standard
- Up to 4.5 hours battery life with optional secondary battery
- 1 enhanced serial port, 1 EPP parallel port, external CRT port, external keyboard port, audio connectors
- Full function 84 key UK keyboard
- Multi voltage 110-240v charger power supply
- Weight 3.2kgs with hard drive and battery
- 1 year parts and labour warranty
- Windows 95 or Win OS/2 v3 preloaded and running
- 14 day money back guarantee of satisfaction



Accura Portable+

prices

Model	Dual Scan SVGA 11.3"	TFT Active SVGA 10.4"	TFT Active SVGA 11.8"
486DX2-66	£1399	£1849	N/A
486DX4-100	£1479	£1929	N/A
Pentium® 75	£1799	N/A	£2399
Pentium® 90	£1899	N/A	£2499

Accura Notebook

some options

750	
Memory upgrade to 8mb	£159
Memory upgrade to 12mb	£299
Memory upgrade to 20mb	£649
Upgrade HDD from 340mb - 520mb	£99
Upgrade HDD from 340mb - 810mb	£279
Upgrade HDD from 340mb - 1gb	£439
Additional main battery	£89
Car power adaptor	£55
Docking station	£399

Portable+ Hard drive upgrades as Accura 750

Memory upgrade to 8mb	£159
Memory upgrade to 16mb	£420
Memory upgrade to 32mb	£980
Internal x2 speed CD-ROM	£199
Internal MPEG-1 card	£229
Additional primary battery or secondary battery	£79
Docking Station (available soon)	£349
Port replicator	£55

General

Deluxe carry case	£39
PC Card 9600/2400 modem	£139
PC Card V32bis fax modem from	£199
PC Card ethernet card from	£139
PC Card external CD-ROM (x2 spd)	£219
PC Card SCSI adaptor	£199

Terms and conditions: *14 day money back guarantee does not apply to special orders. *Desktop 3 year warranty subject to warranty terms and conditions. Charge charge: Notebooks £12, Systems £20. All prices quoted are subject to change without notice, availability and VAT. Payment by credit cards: VISA or Mastercard, P.O. is welcome from FTSE 100 companies, universities, government departments and local authorities. Adams Technology was established in 1989 and is a corporate, university and MOD supplier. Interest free credit offers subject to status, full written details available. E & O E.

Accura Portable Top selling modular notebook



- 486DX2-66 CPU upgradeable to 486DX4-100
- 4mb standard memory upgradeable to 20mb
- Quick removable 340mb 2.5" fast IDE hard drive upgradeable to 1.2gb.
- Yamaha audio chip providing Sound Blaster® compatibility with built in speaker and microphone
- 9.5" Mono LCD with 64 grey levels. Dual Scan Passive Colour or TFT active colour displaying 256 colours, quickly interchangeable
- Local bus graphics accelerator with 1mb RAM giving simultaneous LCD/CRT display and CRT resolutions up to 1024 x 768
- Removable 1.44mb floppy disk drive
- BIOS controlled power management with SMM stop clock with suspend to disk function and built in battery meter
- 19mm Logitech trackerball built in
- 2 PCMCIA type II and/or 1 type III slot
- Ni MH battery standard (quickly interchangeable)
- 1 serial port, 1 enhanced parallel port (EPP/EPS), external CRT port, external keyboard/mouse port, d/station port
- Full function 86 key UK keyboard
- Multi voltage 90-240v charger power supply (1.5 hour charge time)
- Weight 2.4kgs mono, 2.7kgs colour, carry slip and utility disk included
- 1 year parts and labour warranty and 14 day money back guarantee

Model	Mono	Dual Scan Colour	TFT Active Colour
486DX2-66	£949	£1319	£1739
486DX4-100	£1029	£1399	£1819

Accura 7600 Value 586



- Intel Pentium® P75 or P90 CPU with 256k level 2 cache
- 8mb standard memory upgradeable to 40mb
- VESA local bus IDE HDD interface with 340mb 2.5" fast IDE hard drive upgradeable to 1.2gb
- Sound Blaster® 16 bit stereo compatibility with built in speakers
- 10.2" DSTN passive colour or 9.5" TFT active colour display
- VESA local bus graphics accelerator giving simultaneous LCD/CRT display and CRT resolutions up to 1024 x 768
- Built in 1.44mb floppy disk drive
- BIOS controlled power management
- 2 PCMCIA type 2 and/or 1 type 3 slot
- Ni MH battery standard (quickly interchangeable)
- 1 serial port, 1 enhanced parallel port (EPP/EPS), external CRT port, external keyboard/mouse port, d/station port
- Full function 86 key UK keyboard and 19mm trackerball built in
- Multi voltage 90-240v charger power supply (2.0 hour charge time)
- Dimensions(mm) 283w x 232d x 53h Weight 2.9kgs
- Utility disk set included
- 1 year parts and labour warranty and 14 day money back guarantee

Model	Dual Scan Colour	TFT Active Colour
P75	£1699	£1949
P100	£1799	£2049

Accura 6000 Premier 586 notebook



- Intel Pentium® P75 or P90 CPU with 256k level 2 cache
- 8mb standard memory upgradeable to 40mb
- 32 bit PCI local bus mode 3 hard drive controller with 340mb 2.5" fast IDE hard drive upgradeable to 720mb.
- Sound Blaster® 16 bit stereo compatibility with built in speakers
- 10.3" STN double refresh (Quad Scan) Passive Colour or 10.4" TFT active colour displaying 256 colours
- PCI 32 bit local bus graphics accelerator with 1mb RAM giving simultaneous LCD/CRT display and CRT resolutions up to 1024 x 768
- Built in 1.44mb floppy disk drive
- BIOS controlled power management with suspend to disk function
- 2 PCMCIA type 2 and/or 1 type 3 slot and infrared comms port
- Ni MH battery standard (quickly interchangeable)
- 1 serial port, 1 enhanced parallel port (EPP/EPS), external CRT port, external keyboard/mouse port, d/station port
- Full function 86 key UK keyboard and 16mm trackerball built in
- Multi voltage 90-265v charger power supply (2.0 hour charge time)
- Dimensions(mm) 279w x 218d x 51.5h Weight 3.09kgs
- Carry slip and utility disks included
- 1 year parts and labour warranty and 14 day money back guarantee

Model	Dual Scan Colour	TFT Active Colour
P75	£1899	£2749
P90	£1999	£2849

Greatest!

Accura 6000 Power users dream



The Accura 6000 is now available with 100 or 133 mhz CPU's and with a 10.4" SVGA 800 x 600 TFT LCD display. With built 16 bit stereo sound and a ruggedised magnesium alloy case, super fast SCSI-II hard drive, the Accura 6000 is the notebook of the future.

- Intel Pentium® 100/133mhz CPU
- 16k level 1 and 256k level 2 cache
- 8 mb standard memory upgradeable to 128mb (64 bit)
- 32 bit PCI local bus controller with 340mb 2.5" fast SCSI-II hard drive upgradeable to 1.2gb.
- Sound Blaster® 16 bit stereo compatibility with built in speakers and microphone
- 10.4" TFT active colour displaying 65,536 colours, max res 800 x 600
- PCI 32 bit local bus graphics accelerator (WD90C24A2) with 1mb RAM giving simultaneous LCD/CRT display and CRT resolutions up to 1024 x 768
- External 1.44mb ultra-low profile floppy disk drive
- BIOS controlled power management with sleep, suspend & resume functions
- Trackpoint, pointing device integrated into keyboard
- 2 PC card type 1/2 or 1 type 3 slot
- Ni MH battery standard (quickly interchangeable)
- 1 serial port, 1 enhanced parallel port (EPP/EPS), external CRT port, external keyboard/mouse port, d/station port
- Full function 82 key Lexmark UK keyboard
- Multi voltage 110-240v charger power supply (2.0 hour charge time)
- Dimensions(mm) 300w x 216d x 51h Weight 3.4kgs
- Leather carrying case included
- 1 year parts and labour international warranty

Model	TFT Active SVGA Colour
P100	£4480
P133	£4810

Accura Notebooks some options

Portable	Memory and HDD upgrades as Accura 750	
Additional main battery		£89
Docking station		£375
Car Power Adaptor		£49
Deluxe Carry Case		£39

7600	HDD upgrades as Accura 750	
Memory upgrade to 16mb		£309
Memory upgrade to 24mb		£679
Memory upgrade to 32mb		£988
Memory upgrade to 40mb		£1358
Additional main battery		£95
Docking station		£CALL
Car Power Adaptor		£CALL

6000	HDD upgrades as Accura 750	
Memory upgrade to 16mb		£309
Memory upgrade to 24mb		£679
Memory upgrade to 32mb		£988
Memory upgrade to 40mb		£1358
Additional main battery		£95
Docking station (with speakers and floppy drive)		£399

6000		
Memory upgrade to 16mb		£320
Memory upgrade to 32mb		£960
Memory upgrade to 64mb and 128mb		£CALL
Upgrade SCSI HDD from 340mb - 540mb		£149
Upgrade SCSI HDD from 340mb - 810mb		£349
Additional main battery		£115

Our pledge

Adams Technology pride ourselves on our products and service. We offer a 14 day money back guarantee* on all Accura Portables and most systems. A direct technical support line and technical information line are available during business hours. We do our best to ship notebooks within 2-3 days and desktops within 7-10 days. Please don't forget to add VAT to all prices quoted. See previous page for ordering details.

We will keep you up to date with the latest technological advances and where possible offer advantageous upgrades to your Accura Computer

Try something different, try Adams Technology for quality, value for money products and a service second-to-none.

OFFICIAL SUPPLIER
WILLIAMS TOURING CAR ENGINEERING

Adams' are the official computer supplier to Williams Renault for 1995

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OPTImisation, the key to your success !

OPTI portable computing, Pentium or DX4 portables, from RAYCOM COMPUTERS.

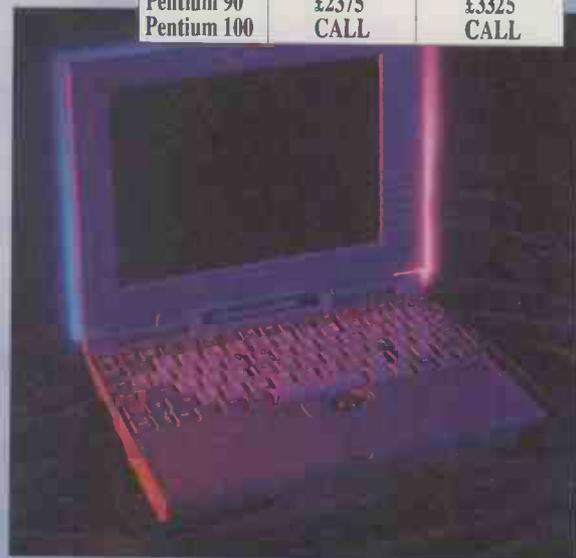
We can quote Personal Computer World as saying "the performance of a Ferrari or a Porche"



OPTI PANTERA™

- * PCI Multi I/O * 10.3" Dual Scan or 10.4" TFT Colour LCD Screen * 16 Bit Sound Card
- * 1024 x 768 Colour for external display * Wireless Infra Red port * 8 MB RAM
- * 360 MB fast HDD * 3.5" Floppy Drive * PCMCIA - 2 x Type 2 or 1 x Type 3
- * 1MB PCI Graphics Card * 1 NH-MH battery
- * Additional Mouse, Keyboard & VGA Ports.
- * 1 serial & 1 parallel port

	10.3 Dual scan	10.3 TFT
Pentium 75	£2249	£3199
Pentium 90	£2375	£3325
Pentium 100	CALL	CALL



OPTI PLATINUM™

The all NEW Opti Platinum with sound card.

1Mb VESA 32 BIT graphics, Dual scan system, Soundcard built in 340Mb HDD, 4Mb RAM, 3.5 FDD, 2 type 2 PCMCIA slots or 1 type 3, Trackball, Carry bag, 2 year Opti warranty.

	Mono	DL STN	TFT
486S2/50	£999	£1395	£1999
486DX2/66	£1099	£1495	£2099
486DX4/75	£1175	£1575	£2179
486DX4/100	£1225	£1625	£2229



MONITORS

RY14	165
RY15	245
RY17	409
RY20	729
RY21	999
IDEK15	259
IDEK17	536
PHIL20T	1229
IDEK21	1247

HARD DRIVES

EIDE 3.5"	
540 Mb 12ms	
635 Mb 12ms	109
850 Mb 12ms	129
1.3 Gb 11ms	165
	245
SCSI 3.5"	
352 Mb 12ms	115
532 Mb 12ms	125
1.0 GB 09ms	333

MOTHERBOARDS

VESA Local Bus		
DX2/66	256K	149
DX4/75	256K	174
DX4/100	256K	224
PCI Bus		
Pentium 75	256K	318
Pentium 90	256K	408
Pentium 100	256K	478
Pentium 120	256K	658

SCANNERS

EPSON	
GTX6500	465
GTX8500*	495
GTX9000	675
*add £80 for SCSI	
# Call for GTI prices	
HP3C Col	625
Trust 1200 Dpi	295
Trust 2400 Dpi	395
Nikkon LE	915

PRINTERS

Canon BJ20e	170
Canon BJC4000	231
Canon BJ600e	334
Epson Stylus 1000	329
Epson Stylus Col	339
HP Laserjet 4L	352
HP Laserjet 5P	578
HP Deskjet 540	209
HP Deskjet 660c	292
HP Deskjet 850c	390

SOUNDCARDS & SPEAKERS

Soundblaster	
SB 16 Valve	63
SB 16 Pro	84
SB 16 Pro Adsp	105
SB AWE32 Ve	122
SB AWE32 Fe	165
Creative 20W	69
Screenbeat 5	10
Screenbeat 3	12
Screenbeat Pro50	29

GRAPHICS CARDS

VL Bus Diamond Stealth	
1 Mb SE	79
2 Mb SE	119
1 Mb 64 DRAM	89
2 Mb 64 DRAM	139
PCI Bus	
1 Mb SE	78
2 Mb SE	119
1 Mb 64 DRAM	95
2 Mb 64 DRAM	135

FAX MODEMS

SM 28,800 Int	179
SM 28,800 Ext	199
SM 14,400 Int	69
SM 14,400 Ext	99
Hayes Accura 2.8	189
Hayes Accura 1.4	139
Pace from...	129
Roadrunner from...	119
Motorola from...	175
Pision Dacom from...	215

CD ROM DRIVES

AT Interface	
Panasonic 562 Dual	65
Panasonic 563 Dual	69
IDE Interface	
Orchard or Goldstar	69
Toshiba 5302 Quad	115
Pioneer Quad	145
SCSI Interface	
Toshiba 3601b	219
Pioneer Dr-u124x	199

KEYBOARDS & MICE

Microsoft Bus	48
Microsoft Home	21
Microsoft Natural	64
Cherry Click 3000	36
Cherry Soft feel	23
Genius Mouse 3	15
Logitek Pilot	25
Mitsumi Click K/b	11
Mitsumi K/board & Mouse Combo...	25

RAYCOM TOP 10 Business

1. W.Perfect 6.1	169
2. Ms Office 4.2	285
3. Novel Per off	355
4. Ms Office 4.3	314
5. Winfax Pro	59
6. Lotus Smartsuite	165
7. Simply 3D	44
8. Autocad/2 LT	366
9. Lotus Organiser/2	79
10. Ms Dos 6.22 U/g	44

RAYCOM TOP 10 Entertainment

1. Ms Flight Sim5	42
2. Ultimate DOOM	26
3. Discworld	32
4. X-Wing	32
5. Star Trek2	34
6. Ms Ent't pack	23
7. Doom2	24
8. Hokum Ka-50	24
9. Kings Quest 5	19
10. Super Carts	28

RAYCOM TOP 10 CD ROM

1. Star Trek TNG	39
2. Comand & Conq	36
3. Full Throttle	36
4. Syndicate+	18
5. Frontier Fe	32
6. Ult Soccer Man'r	27
7. Dark Forces	39
8. X-Wing Coll'n	34
9. Discworld	39
10. Bioforge	37

RAYCOM TOP 10 Upgrades & Ad-ons

1. 1 Mb/30pin Simms	25
2. 4 Mb/30Pin Simms	95
3. 264 Mb Hd	89
4. DX4/100 CPU	130
5. DX4/75 CPU	90
6. Pentii 63Mhz U/G	249
7. MPEG Card	149
8. Win/Tc Prima	149
9. TV Tuner	99
10. Logi Hand/Soc	78





RAYCOM



RAYCOM COMPUTERS RELOCATION

COME ON DOWN and join Raycom as we celebrate moving into our new showrooms in Dod Street, E14

RAYCOM PENTIUM SYSTEMS

All systems include the following:-

- * PCI Triton Motherboard
- * ZIFF Socket
- * Latest Bios
- * 8 M/b RAM (72 Pin)
- * 420 M/b IDE Hard Drive (Standard)
- * PCI Local Bus EIDE Controller
- * 2 Serial Ports & 1 Parallel Port
- * 1 M/b PCI Local Bus Accelerator Card
- * 14" SVGA Colour Monitor L/R
- * 3.5" Floppy Drive
- * Mouse
- * 102 Key UK Keyboard
- * Choice of Desktop or Mini Tower
- * Ms-Dos 6.22 & Ms-Windows 3.11

PENTIUM SYSTEMS

	P75S	P100S	P120S
420 MB	799	999	1,399
520 MB	825	1,026	1,427
1.0 GB	899	1,096	1,499

P133Mhz "in stock, call for prices"



RAYCOM 486 SYSTEMS

All systems include the following:-

- * VESA Local Bus Motherboard
- * ZIFF Socket
- * Latest AMI Bios
- * 256K External Cache Memory
- * 4 M/b RAM (72 Pin)
- * 420 M/b IDE Hard Drive (Standard)
- * VESA Local Bus IDE Controller
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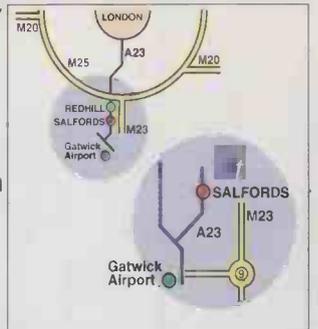
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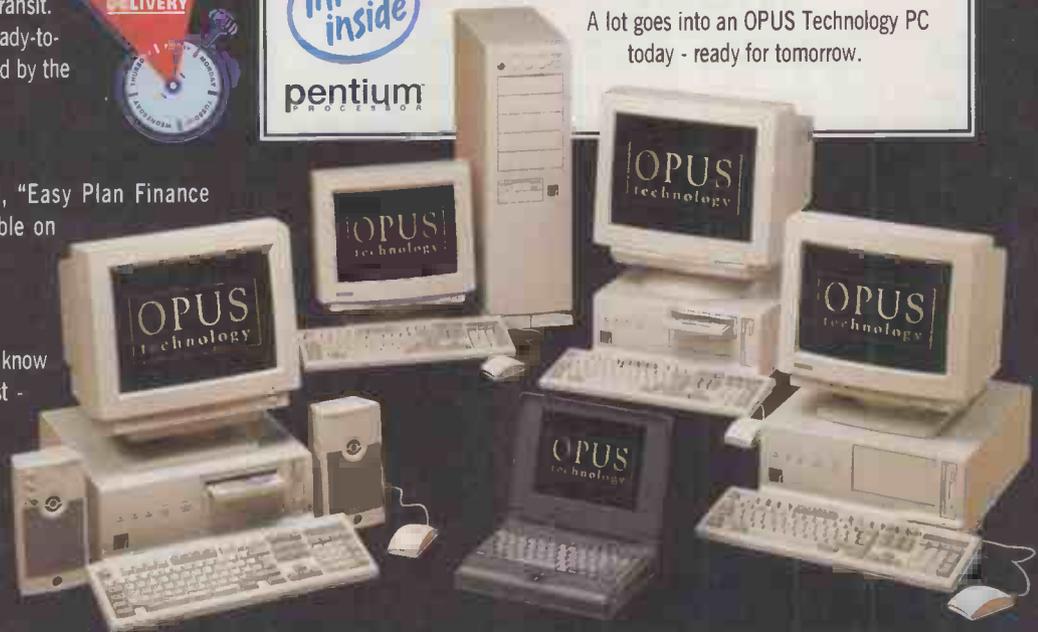
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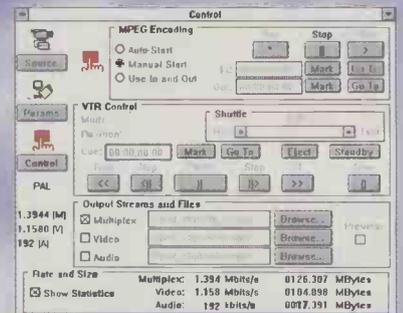
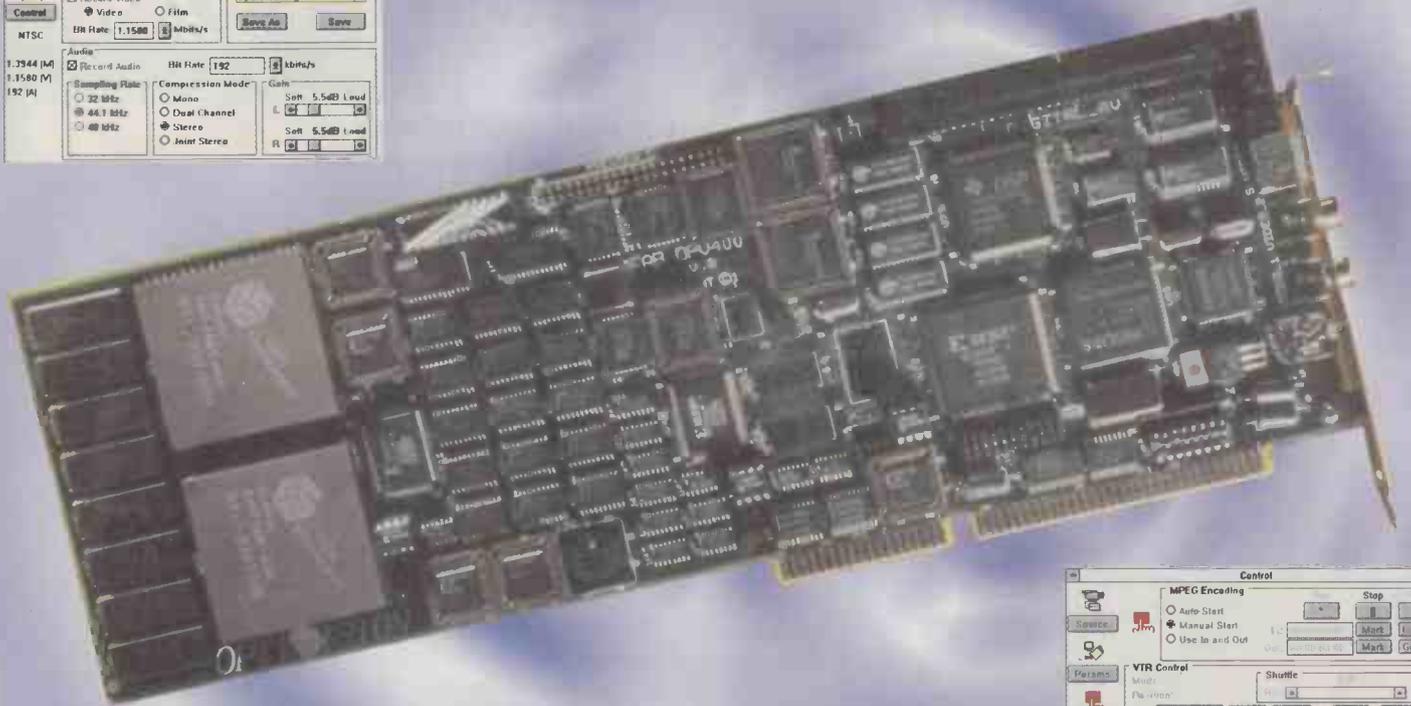
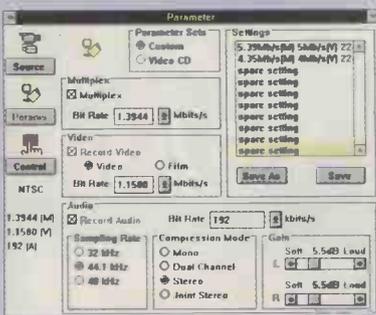


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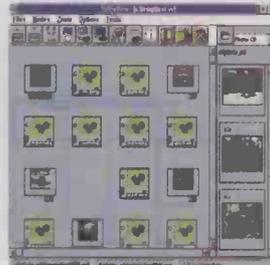
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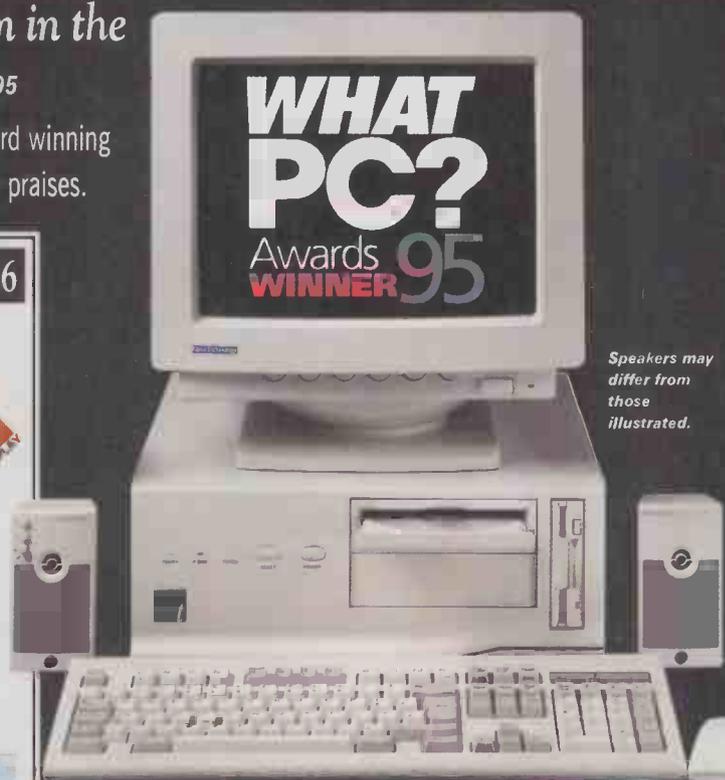
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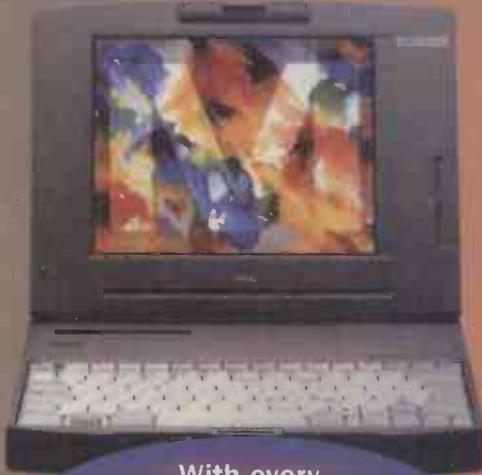
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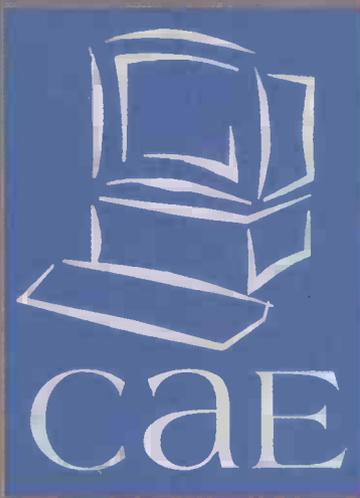


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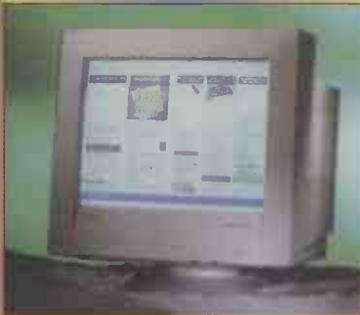
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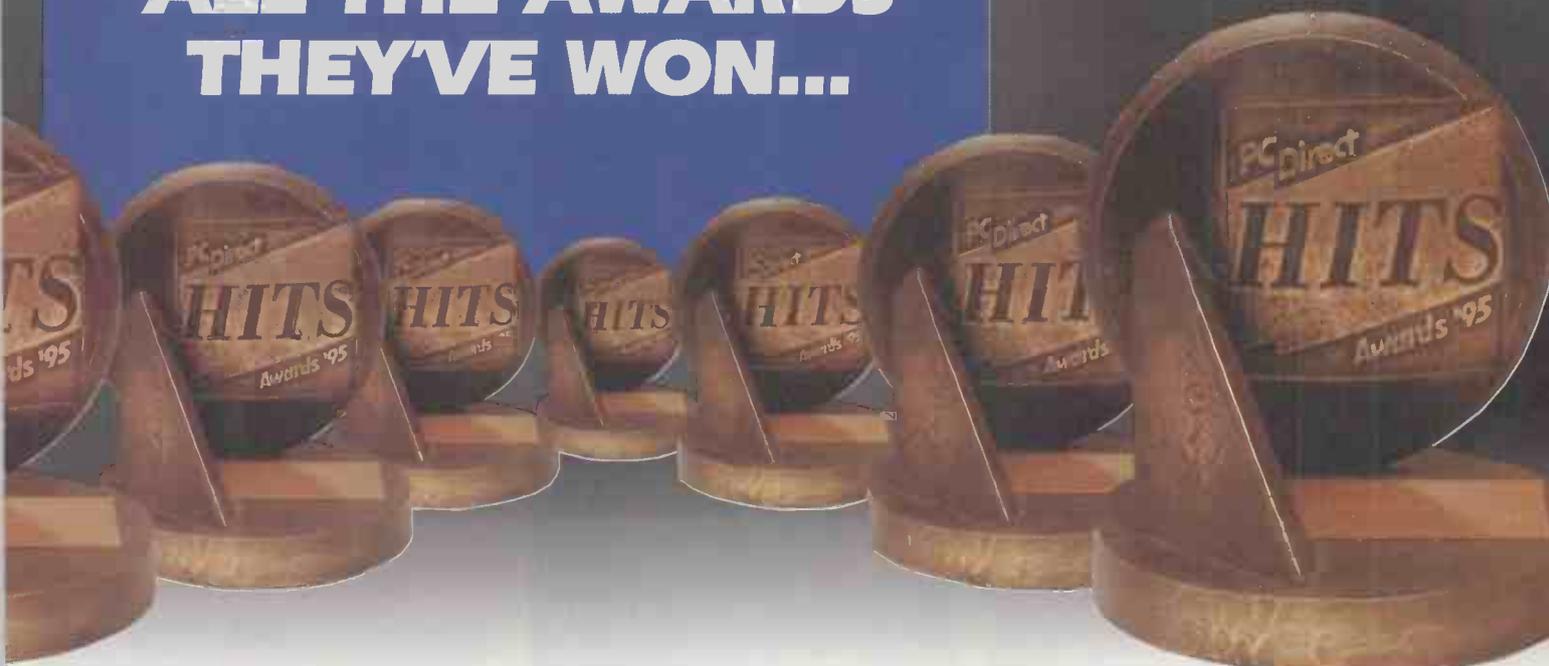
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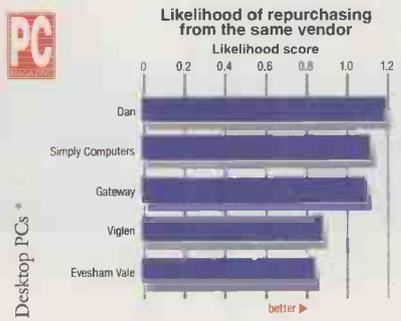
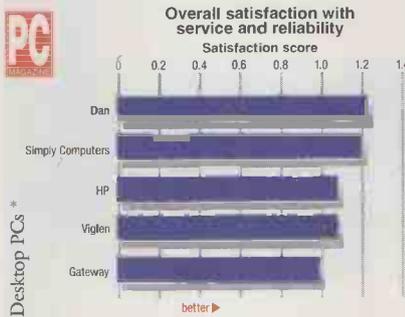
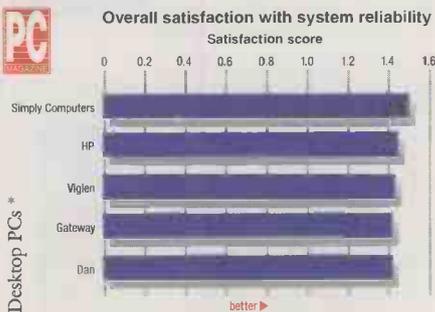
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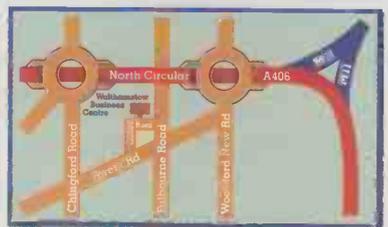


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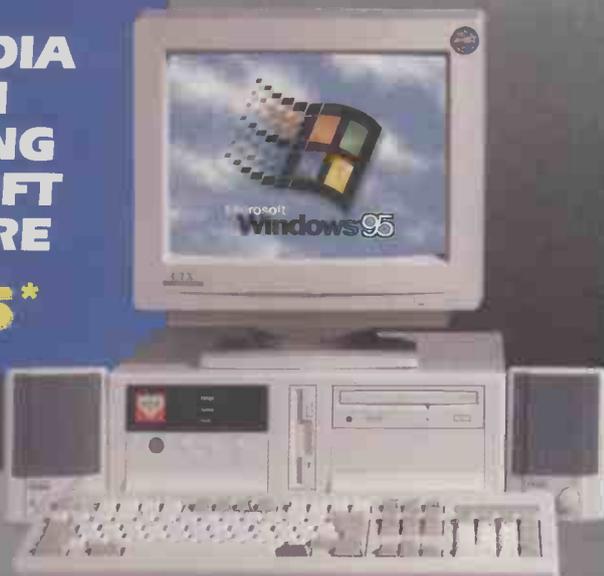
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850Mb	£1110	£1114	£1220	£1284	£1334	£1504	£1604
1Gb	£1165	£1199	£1275	£1339	£1389	£1559	£1659

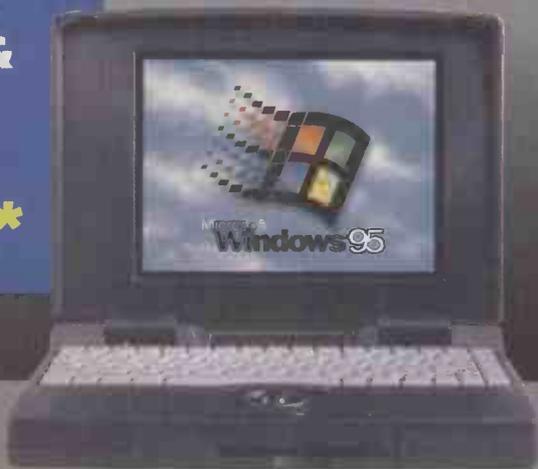
Software boxes shown for illustrative purposes only. Bundled software does not come with full retail packaging.

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Toshiba MK1926FC 810Mb 12ms.....	£425

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Seagate

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Creative 563CD Dual Speed CD with 2 CD's.....	£49
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Goldstar GCD-R540B Quad Speed CD ROM.....	£105

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Teac CD-56E Six Speed IDE.....	£209
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NEC 6Xe External Six Speed.....	£359
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Plextor 4PLex External Quad Speed CD ROM Drive PC45CH (1Mb Cache, includes power cable, SCSI cable & caddy).....	£359
Plextor 6PLex 6 Speed CD-ROM Drive Internal.....	£349
Plextor 6PLex 6 Speed CD-ROM Drive External.....	£429

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Sony CDU - 76S 4x SCSI 250ms.....	£145
Toshiba XM-3601B SCSI Quad Speed Bare Internal 4.4x.....	£209
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Backpack CD ROM/4S Quad Speed Parallel.....	£255

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Pioneer DRM-624X Quad Speed 6 Disk Jukebox.....	£489
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- MS Encarta 1995 CD
- Quad Speed CD
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AMD 80486DX4-100Mhz 256K VESA Local Bus.....£144

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IBM 80486DX2-66Mhz 256K PCI Motherboard.....£140

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AMD 80486DX4-100Mhz 256K VESA Local Bus.....£164

Pentium® 75Mhz PCI Motherboard 256K Cache.....£270

Pentium® 90Mhz PCI Motherboard 256K Cache.....£350

Pentium® 100Mhz PCI Motherboard 256K Cache.....£424

Pentium® 120Mhz PCI Motherboard 256K Cache.....£560

Pentium® 133Mhz PCI Motherboard 256K Cache.....£660

Pentium® Triton Chipset 75Mhz

PCI Motherboard 256K Cache.....£274

Pentium® Triton Chipset 90Mhz

PCI Motherboard 256K Cache.....£354

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PCI Motherboard 256K Cache.....£428

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PCI Motherboard 256K Cache.....£564

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Intel Zappa Pentium® 75Mhz 256K Cache.....£329

Intel Zappa Pentium® 90Mhz 256K Cache.....£399

Intel Zappa Pentium® 100Mhz 256K Cache.....£479

Intel Zappa Pentium® 120Mhz 256K Cache.....£599

Intel Zappa Pentium® 133Mhz 256K Cache.....£695

Intel Endeavour Pentium® 90Mhz 256K Cache.....£449

Intel Endeavour Pentium® 100Mhz 256K Cache.....£549

Intel Endeavour Pentium® 120Mhz 256K Cache.....£699

Intel Endeavour Pentium® 133Mhz 256K Cache.....£869

All the Above motherboards have TRITON chipset, on board Enhanced IDE, I/O & are Intel Manufactured

MOTHERBOARD WITH NO CPU

TRITON MOTHERBOARD

75-133MHz

- Pentium® 90/100/120/133MHz
- 256K ASYNC Cache
- Intel TRITON Chipset
- Integrated EIDE & Floppy Controller
- Flash BIOS
- Plug & Play (PNP) Support
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£139

486 VESA Local Bus M/B 256K Cache ZIF NCPU.....£75

(3 VESA, 4 ISA 4 x 72Pin Simms)

486 VESA Local Bus M/B 256K Cache ZIF NCPU.....£75

(3 VESA, 4 ISA 4 x 30Pin Simms & 2 x 72 Pin Simms)

486 PCI Motherboard NCPU.....£89

486 PCI,Multi I/O Motherboard NCPU.....£95

80486DX EISA M/B 256K Cache NCPU.....£219

Pentium® 75/90/100Mhz Motherboard with

EIDE & Multi I/O 256K Cache.....£135

Pentium® TRITON 90/100/120/133MHz M/B

EIDE PCI/ISA Super I/O 256K ASYNC Cache.....£139

EIDE PCI/ISA Super I/O 256K

Pipeline Burst Mode Cache.....£239

Dual Pentium® 90/100Mhz 256K Cache Motherboard

EIDE & Multi I/O.....£245

CPU's

SGS 80486DX2-66 (5V).....£39

IBM 80486DX2-66 (3.6v).....£45

Intel 80486DX2-66Mhz CPU.....£75

Intel 80486DX4-100Mhz CPU.....£105

AMD 80486DX4-100Mhz CPU.....£69

Pentium® 75Mhz CPU.....£135

Pentium® 90Mhz CPU.....£215

Pentium® 100Mhz CPU.....£289

Pentium® 120Mhz CPU.....£425

Pentium® 133Mhz CPU.....£525

OVERDRIVE CHIPS

Overdrive Chip 486SX2-50.....£79

Overdrive Chip 486DX2-50.....£79

Overdrive Chip 486DX2-66.....£99



MOTHERBOARDS

Overdrive Chip 486DX4-75.....£119

Overdrive Chip 486DX4-100.....£175

Pentium® Overdrive 63Mhz.....£179

(Overdrive Chip for 25Mhz Motherboards)

Pentium® Overdrive 83Mhz.....£189

(Overdrive Chip for 33Mhz Motherboards)

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Upgrade 386DX 20 to 486DX 40.....£142

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Upgrade 386DX 33 to 486DX 66.....£189

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486 Heat Sink with Fan.....£9

Pentium® Heat Sink with Fan.....£12



CO-PROCESSORS

80287-20Mhz Co-Processor.....£45

387SX-25Mhz/SX-20Mhz/SX-16Mhz CO-P.....£38

80387SX-33Mhz Co-Processor.....£39

80387SX-40Mhz Co-Processor.....£39

80387DX-33Mhz Co-Processor.....£39

80387DX-40Mhz Co-Processor.....£40



CASES

Deluxe Cases



Deluxe Desktop Case with LED.....£35

Deluxe Mini Tower Case with LED.....£35

Deluxe Slim-Line Case.....£49

Deluxe Large Mini Tower Case with LED.....£59

Deluxe Midi Tower Case.....£59

Deluxe Desktop Multi Media Case.....£75

All the Above cases come with Screws & Cables & 200 Watt PSU

Deluxe Full Tower Case with LED.....£75

Full Tower case comes with Screws & Cables & 230 Watt PSU.

REPLACEMENT PSU's

200W PSU for Desktop/Minitower.....£25

230W PSU for any case.....£29

300 Watt PSU for any case.....£39



SOFTWARE AND BOOKS

MS Windows to Win 95 Upgrade on CD.....£59

MS Windows to Win 95 Upgrade on 3.5".....£59

MS-DOS to Win 95 Upgrade on 3.5".....£119

MS-DOS 6.22 Upgrade.....£38

MS Win for Workgroups 3.11 Upgrade.....£44

MS-Windows for Workgroups 3.11.....£89

D.I.Y. Book.....£5

All the information you need to build or update a PC



KEYBOARDS AND RODENTS

KEYBOARDS

102 Key UK Keyboard.....£12

Cherry G81-3000 Keyboard Soft.....£22

Cherry G80-3000 Keyboard Click.....£36

Cherry G84-4100 Notebook Keyboard.....£65

Cherry G84-4400 Trackball Notebook Keyboard.....£199

MOUSE & KEYBOARD OFFER

Cherry G81-3000 Keyboard Soft & MS Mouse Version 2 **SAVE £32**
£39

Fujitsu FKB 4720 UK Keyboard.....£27

Keytronics Windows '95 Keyboard.....£29

Microsoft Natural Keyboard for Windows 95.....£59

Windows 95 Keyboard.....£19

ACCESSORIES

PS/2 Keyboard Adaptor (AT to PS/2).....£5

PS/2 Keyboard Adaptor (PS/2 to AT).....£5

Keyboard Extension Cable.....£8

Natex Plastic Keyboard Cover.....£19

RODENTS

2 Button Mouse MS Compatible.....£8

Creative Aeroduct (complete with 3D software).....£95

Genius Easy Mouse.....£9

Genius Mouse 3.....£15

Logitech Pilot Mousen Serial.....£17

Logitech Pilot Mouse PS/2.....£18

Logitech Trackman Pilot.....£25

Logitech Mouseman Sensa Mouse.....£38

(available in four flavours)

Logitech Mouseman Bus.....£38

Logitech Cyberman 3D Mouse.....£59

Logitech Trackman Portable.....£32

Logitech Trackman II PC.....£42

Logitech Trackman Voyager.....£48

Logitech Trackman Vista.....£43

Logitech Mouseman Cordless.....£48

Logitech Trackman Marble.....£59

Microsoft Home Mouse.....£21

Microsoft Bus Mouse for Windows 95.....£48

Microsoft Mouse V2.0 Combo with "Intellipoint".....£49

Genius 'Easy Painter' Digitizer.....£65



LEISURE

JOYSTICKS

Warrior 5 Joystick.....£9

Warrior 5 Plus Joystick.....£12

Mach 1 Joystick.....£12

Mach 1 Plus Joystick.....£16

Mach 2 Joystick.....£21

CH Flightstick.....£27

CH Flightstick Pro.....£48

CH Jetstick Joystick.....£23

CH Virtual Pilot Flight Yoke.....£59

CH Virtual Pilot Pro Flight Yoke.....£65

CH Pro Pedal for Flight Sims.....£65

Gravis Analog Joystick.....£24

Gravis Professional Analog Joystick.....£32

Gravis PC Game Pad & FIFA International Soccer (CD).....£35

Gravis Firebird Flight & Weapon Control System.....£59

Gravis Phoenix Flight & Weapon Control System.....£95

Logitech Wingman.....£23

LOGITECH WINGMAN EXTREME

USE IT OR DIE!

£29

LOGITECH

Dual Joystick Splitter Cable.....£9

Quickshot Skymaster.....£19

GAME CARDS

Gravis Game Card (50Mhz Max).....£25

CH Gamecard III Auto up to 80Mhz.....£28

CH Gamecard III MCA 50Mhz.....£32

JCD Gamecard 11 PCMCIA Dual Joystick Interface.....£45

IBM Game Card & Joystick 50Mhz.....£19

FREE Mousemat

WITH EVERY ORDER



GENERIC MEMORY

30 Pin Memory	
256K Simms 70ns.....	£10
1Mb x 9 Sips 70ns 9 or 3 Chip.....	£39
1Mb x 9 Simms 70ns 3 Chip.....	£26
1Mb x 9 Simms 70ns 9 Chip.....	£32
4Mb x 9 Simms 70ns 3 Chip.....	£99
4Mb x 9 Simms 70ns 9 Chip.....	£109
72 Pin Memory	
1Mb x 32 Simms (4Mb) 70ns.....	£95
2Mb x 32 Simms (8Mb) 70ns.....	£185
4Mb x 32 Simms (16Mb) 70ns.....	£339
1Mb x 36 Simms (4Mb) 70ns.....	£115
2Mb x 36 Simms (8Mb) 70ns.....	£219
4Mb x 36 Simms (16Mb) 70ns.....	£379
EDO RAM	
4Mb EDO Simms 70ns.....	£129
8Mb EDO Simms 70ns.....	£249
16Mb EDO Simms 70ns.....	£495



DESKTOP MEMORY

	2Mb	4Mb	8Mb	16Mb	32Mb
AST					
Premmia LXP/60, Bravo					
LC486, NewBravo 486			£244	£454	
Bravo 386SX/20, Bravo					
286/16 & Advantage Plus.			£249		
COMPAQ					
386/20e/25E/S					
Expansion Board		£205			
Module		£158			
Deskpro286/386N, S20/20N, M & I Series		£145	£285		
Proliant 1000 5/60, 2000 & 4000 Deskpro XE, Systempro XL				£556	£1,150
Prolinea 3/25S &			£259		
Prolinea 4 Series		£143	£277		
DELL					
316SX, 320SX, 325SX	£63				
P&D		£137		£539	
L, M, T		£119		£529	
TE, DE, DE/2, SE, DSA		£165	£279		
Latitude		£135			
ELONEX					
PC386SXM, SXB, 386/16, B/33.(KITS)	£64	£129	£249		
PC386 V/E, 486 V/E (KITS)		£139	£279	£464	
WS Range (KITS)		£139	£269	£489	
PC433M,450m,466M (KITS)		£122	£279	£469	
LT386SX/P (KITS)	£64	£135			
PC500 Series			£279	£469	
Elonex 560F EISA (KITS)			£329	£499	
HEWLETT PACKARD					
Vectra 386/25PC, 486PC, 486S/20 (KITS)		£159	£299		
HP ValueLine 486 Netserver Series			£289		
Module				£599	
IBM					
50,660,50Z, 55SX, 65, 56SX, SL					
Expansion Board			£249		
Module			£149		
Model 70, 80 Expansion Board			£259		
Module			£149		
Ambra, Hurdla, Sprinter & Enterprise	£65	£145			
PSI Pro, Willow Series, Valuepoint			£138		
GATEWAY					
PC 4SX-33 Module		£129		£475	
PC 4DX-33V, PC 4DX-66V					£950
Module		£129		£475	£950
PC 4D-66, PC 4D-100 (KITS)			£299		£1199
GATEWAY PC P5-60, PC P5-66 64Mb (KITS) £2695					
PACKARD BELL					
Legend 200/316SX (KITS)	£69	£144			
Legend 600 ,900 (KITS)		£129	£279		
486 Local Bus					
Module	£85	£149			
Force Range XL410/416/48616Mb (KIT)					£459

SIMM SAVERS



Instruction Manual
Lifetime Warranty
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Guaranteed Compatibility
Suitable for most PCs

Allows 8 x 30 Pin SIMMS to be utilised in 1 72 Pin Socket.....£55
Allows 4 x 30 Pin SIMMS to be utilised in 1 72 Pin Socket.....£39



MEMORY KITS

For most of the following manufacturers PC's:

AMSTRAD, COMMODORE, DAN TECHNOLOGY, DEC, ICL, KAMCO, MITAC, MBC, MJN, OLIVETTI, OLYMPIC, TANDON, TIKO, TIME, VALE, VIGLEN, WATFORD.

2Mb Kit.....£62
4Mb Kit.....£120
8Mb Kit.....£239

Please telephone to see whether your machine is compatible.



NOTEBOOK MEMORY

	2Mb	4Mb	8Mb
AMSTRAD			
ANB 386SX		£169	
AST			
Power Exec EL, 4/33SL, SLC		£159	£319
COMPAQ			
Contura 3/20, 3/25, 4/25, 4/25C, 4/25CX		£159	£295
LTE Lite 4/33C,4/25C, 4/25, 4/25E, 386/20, 2525C, 25E		£163	£326
IBM			
Ambra Trekka	£89		
L40SX,N33SX	£82	£159	
Thinkpad 300/350/355/500/700/710/720/750/755C		£159	£339
NEC			
Ultralite 111	£155		£299
Ultralite Versa 20, 20C, 25, 25P, 25C		£189	£345
TOSHIBA			
T2000/SX/SXC/2200SX, 2200SX, 1800, 1850		£155	£289
T1950, CS, CT, 4600, 4600C		£179	£319
T4400C & SX, SXC 64, SXC, DXC		£165	£329



PRINTER MEMORY

	2Mb	4Mb	8Mb
CANON			
LBP4 Expansion board		£78	
Module		£135	
LBP-811		£109	£179
Notebook		£139	£179
HEWLETT PACKARD			
Laserjet 4, M, Si, SiMX, Deskjet 1200C, 12000C/PSDesignerjet 600		£149	£259
Laserjet 11P, Laserjet 111, Laserjet 111P			
Laserjet 111D, Laserjet11D, Laserjet 11		£175	

If you do not see your computer, laptop, notebook or printer please call for details. All prices subject to market fluctuations.



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FULL TECHNICAL SUPPORT AVAILABLE

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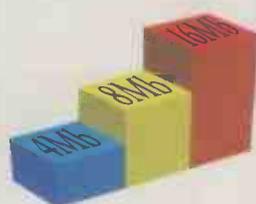
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PERFORMANCE



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SOUND CARDS

CREATIVE

Sound Blaster	
Sound Blaster V2.0 Value.....	£24
(Includes 2 free Games)	
Sound Blaster 16 Value.....	£60
(With IDE or PAN CD Interface)	
Sound Blaster 16 Pro.....	£84
(Now with IDE and Panasonic CD Interface)	
Sound Blaster 16 Pro AdSP.....	£105
Sound Blaster AWE 32 Value Edition.....	£120
Sound Blaster AWE 32 Full Edition.....	£159
3DO Blaster.....	£285
Wave Blaster II.....	£94
Midi Blaster.....	£94
Creative BlasterKeys.....	£115
Creative BlasterKeysKit.....	£299
(Sound Blaster AWE 32, 49 Key (full size) keyboard, Software - Midi Orchestrator Plus, Melody Maestrofr & E-mu Soundfont Libraries)	

Orchid

Orchid SoundDrive 16 EZ.....	£58
Orchid SoundDrive 16 EZ + SCSI.....	£79
Orchid Gamewave 32 Plus.....	£95
Orchid Soundwave 32 Pro.....	£135
Orchid Soundwave 32 Pro SCSI.....	£149
(Free NASCAR Racing CD while stocks last)	
Orchid Wavebooster 2Mb + CueBase Lite.....	£89
Orchid Wavebooster 4Mb + CueBase Lite.....	£119
Orchid Wavebooster 4Mb + FX + Midisoft.....	£139
Orchid NuSound PnP.....	£115

Gravis

Gravis Ultrasound Max Card.....	£134
Gravis Ultrasound Midi Kit.....	£29
Gravis Ultrasound ACE Wavetable Add-in Card.....	£75

Miro

MiroSOUND FM10.....	£62
MiroSOUND PCM10.....	£81
MiroSOUND PCM1 PRO.....	£128
MiroSOUND PCM12.....	£138
MiroSOUND PCM20 Radio.....	£190

Microsoft

Microsoft Windows Software & Microphone.....	£39
Microsoft Windows Sound Card.....	£105

Aztech

Sound Galaxy Nova 16 Extra.....	£75
Sound Galaxy Pro 16 - 2.....	£59
Sound Waverider 32+.....	£95
Sound Waverider 32+ Kit.....	£299

Others

Portable Sound Plus.....	£129
(Sound Blaster compatible connects to Parallel Port)	

SPEAKERS

Small Speakers.....	£5
Screen Beat 4 Speakers.....	£9
Screen Beat 5 Speakers.....	£10
Screen Beat 3 Speakers.....	£12
Screen Beat Pro 50.....	£29

CREATIVE

Creative 300 10W Speakers.....	£69
Creative 20W Speakers.....	£75

Labtec CS-600 Speakers.....	£19
Small Mains Powered Amp Speakers.....	£19

LARGE
80w Mains
Powered
£49
AMP SPEAKERS



Pro Digital Speakers.....	£29
Sounddisk SD-100 Speakers for 5.25".....	£15
Sony Multimedia PC Speakers SRS-PC30.....	£45
Sony Multimedia PC Speakers SRS-PC50.....	£65
Yamaha Sub Woofer.....	£75
Yamaha Multimedia Speakers YST-M5.....	£36
Yamaha Multimedia Speakers YST-M10.....	£43
ZIFI 2 Speakers.....	£25
ZIFI Pro 2 Speakers.....	£39

ACCESSORIES

Headphones.....	£5
Microphone.....	£9
Creative Microphone.....	£17



MULTI-MEDIA CARDS

VIDEOVIDEOVIDEO

Mirovideo 2Mb 20TD Live PCI or VLB.....	£319
Mirovideo Mouse.....	£285
Mirovideo DC1 (With Video Studio).....	£339
Mirovideo DC1 (With Adobe Premiere).....	£439
1Mb MiroVIDEO PCI or VLB12PD.....	£89
2Mb MiroVIDEO PCI or VLB12PD.....	£129
MiroMPEG Maker.....	£185

CREATIVE

Creative MP400 (MPEG Player).....	£174
Creative TV-Coder External.....	£119
Creative Video Blaster RT300.....	£255
Creative Video Spigot.....	£75

Aztech

Video Galaxy Gamma.....	£155
Video Galaxy Gamma MPEG Upgrade.....	£119
Video Galaxy Teletext Upgrade Module.....	£38
Video Galaxy Oscar (MPEG Playback board).....	£189

Fast Electronic

Fast Aviator MN502010.....	£185
Fast Movie Machine Pro.....	£289
Fast Movie Machine 2.....	£489
Fast Movie Machine 2 MJPEG Upgrade.....	£289
Fast Movie Machine 2 MPEG Upgrade.....	£239
Fast FPS 60 Card with MPEG.....	£489
Screen Machine 11.....	£659

Hauptpage

WIN/TV CELEBRITY

£259

■ Frame Grabbing on the fly ■ Teletext ■ NTSC/PAL Compatible
■ Scalable viewing window from icon to full screen



Hauptpage Win/TV Cinema.....	£189
Hauptpage Win/TV Prisma.....	£149

Orchid

Orchid 1Mb Kelvin MPEG.....	£249
Orchid 2Mb Kelvin MPEG.....	£295
Orchid Vidiola.....	£249
Orchid Vidiola Premium.....	£569
Orchid Vidiola Pro.....	£439

Sigma Design

Reelmagic Full Version.....	£325
Reelmagic Lite.....	£199

Rombo

Rombo Media Pro HI-RES.....	£209
Rombo Media Pro Plus.....	£189
Rombo PC Tuner.....	£65
Rombo TV Buster External.....	£45
Rombo TV Buster Internal.....	£45
Rombo TV Tuner with Teletext.....	£99

Videologic

Videologic 1Mb 928 Movie ISA.....	£139
Videologic 1Mb 928 Movie ISA Sound.....	£169
Videologic 1Mb 928 Movie VLB.....	£139
Videologic 1Mb 928 Movie VLB Sound.....	£169
Videologic 1Mb 928 Movie with MPEG Player ISA.....	£379
Videologic 1Mb 928 Movie with MPEG Player VLB.....	£379
Videologic 1Mb 928 VRAM Upgrade Kit.....	£69
Videologic 2Mb PCI Movie.....	£259
Videologic Captivator Pro.....	£169
Videologic Captivator Pro & TV.....	£219
Videologic MPEG Player for VMC.....	£219
Videologic Mediator XLC PC to TV Converter.....	£165

Videolabs

Flexcam Desk Top TV Camera.....	£499
Flexcam is a high resolution, integrated colour camera and microphone.	

Others

Compro LaserWave Movie Studio - MPEG Video Board.....	£239
Intel Smart Recorder Pro.....	£295
Spea Showtime (MPEG Player).....	£299

VIDEO CONFERENCING

CREATIVE LABS

SHAREVISION PC 3000

£995

Intel

Intel ProShare Premiere Edition SFW.....	£199
Intel ProShare Video System 200.....	£1,849



MODEMS

US Robotics

SPORTSTER



US Robotics Sportster 14.4 Fax EXT.....	£105
US Robotics Sportster 14.4 INT.....	£105
US Robotics Sportster 28.8 V34 Fax EXT.....	£157
US Robotics Sportster 28.8 V34 Fax INT.....	£157
(Now With Free Internet Access Software)	
US Robotics Courier V34 Int.....	£238
US Robotics Courier V34 Ext.....	£238
US Robotics Worldport Dual Standard Cellular.....	£125
US Robotics Worldport - Dual Standard Cellular V34 PCMCIA.....	£159

Hayes

Hayes Optima 28.8 V.FC & Fax.....	£385
Hayes Optima 28.8 V.FC & Fax Value Pack.....	£689
2 Hayes Optima 28.8 +2 Enhanced serial Ports (FREE UPGRADE TO V34)	
Hayes Optima 14.4 + Fax144.....	£269
Hayes Optima 14.4 + Fax144 PCMCIA.....	£215
Hayes Accura 28.8 + Fax VFC V32bis V34.....	£189
Hayes Accura 14.4 + Fax V32bis.....	£139

Motorola

3400 Online Internet Solution with Data/Fax Modem.....	£189
(V34, 28,800 bps 1 month free access to compuserve)	
3400 Pro 28.8 Data/Fax Modem.....	£175

Pace

Pace Netlink V32.....	£129
Complete internet Access Pack containing Pace MobiFax144, FREE 21 Days direct connection time Plus all Software needed.	
Pace Netlink Gold V34.....	£215
Complete internet Access Pack containing Pace MobiFax144, FREE 21 Days direct connection time Plus all Software needed.	

Pace Microlin fx34 PC Internal V34 Fax Modem.....	£179
Pace Linnet 34 Plus fx Desktop V34 Fax Modem.....	£179
Pace Microlin fx34 V34 Pocket Fax Modem.....	£179
Pace Microlin NB34 PCMCIA V34 Fax Modem.....	£329
Pace Microlin fx32 Plus V32 Internal Fax Mode.....	£134
Pace Microlin fx32 Plus V32 Pocket Fax Modem.....	£169
Pace Microlin fx NB 32 Plus PCMCIA Fax Modem.....	£189
Pace MobiFAX 14.400.....	£119
Pace Linnel Message Desk V32 Fax Modem.....	£195
(Voice functionality integrated with Data and Fax. Fax Back & Fax forward with enhanced audio standard. Internal Microphone)	

Pision Dacom

Gold Card V34 + Fax PCMCIA Modem.....	£315
Gold Card V32 bis + Fax PCMCIA Modem.....	£215

SiMPLY Modems

Simply 14400 PCMCIA Fax Modem.....	£219
Simply V34 External Fax Modem.....	£149
Simply V34 Internal Fax Modem.....	£149
Simply 14400 Internal Fax Modem.....	£69
Simply 14400 External Fax Modem.....	£99
Simply Modems are EABT approved and come with Windows software.	

Andest

RoadRunner Rocket Bundles

Silver Pack.....	£119
(Includes V32bis Modem, Serial Cable, BT Lead, PSU, no Software)	
Gold Pack.....	£135
(As above plus BT T' Piece, 9-25 way adaptor and TRAns-Send WinDOS Lite Software)	
Gold RocketBoard Bundle.....	£149
(As Gold Pack plus Rocketboard dual 16C550 High Speed Serial Card)	
Platinum Pack.....	£169
(As Gold Pack but with 19,200bps V32Terbo RoadRunner Rocket)	
Andest VPA V22 BIS.....	£349
Andest VPA V32 BIS + RocketBoard.....	£449
Andest RocketBoard - High Speed 16C550 Serial Card.....	£59

Cables

9 to 25 Pin Modem Cable.....	£9
25 to 25 Pin Modem Cable.....	£9

AUTOMATIC FAX MACHINES

Avro Pacific

Fax Friend **£45**
Automatic Fax & Data Switch

Andest

Andest MSL Manager 1100 Fax/Phone.....	£89
Andest MSL Manager 3300.....	£105
Andest MSL Manager 3300M.....	£125
Andest MSL Manager 7700.....	£145
(The above Modems are APPROVED for connection to telecommunications systems specified in the instructions subject to the conditions set out in them.)	
External V34 28.8 Fax Modem.....	£149
Internal V34 28.8 Fax Modem.....	£149
External V34 14400 Fax/Modem.....	£110
Internal V34 14400 Fax/Modem.....	£69
Internal 9624 Fax/Modem.....	£35
(The above modems are prohibited from direct or indirect connection to public telecommunications systems. Action may be taken against anyone so	



VGA CARDS

Generic	ISA	VLB	PCI
256K VGA 800 x 600 16C		£19	
512K VGA 1024 x 768 16C		£25	
1Mb Trident 8900D 1024 x 768 256C		£39	
1Mb Cirrus Logic 16.7 Win Accelerator		£44	
1Mb Tseng ET4000 16.7m Colours		£65	
1Mb Cirrus Logic 5429 Win ACC			£55
1Mb Cirrus Logic 5434			£69
1Mb Tseng ET4000/W32		£79	£79
1Mb Cardex 90C33		£79	
2Mb Tseng ET4000/W32P		£109	£109
1Mb Advanced Logic AL2301			£79
2Mb Cirrus Logic 5434			£109



DIAMOND

	VLB	PCI
1Mb Diamond Stealth SE	£69	£69
2Mb Diamond Stealth SE	£115	£115
1Mb Diamond Stealth 64 Dram	£85	£85
2Mb Diamond Stealth 64 Dram	£119	£119
2Mb Diamond Stealth 64 Video Vram	£199	£199
4Mb Diamond Stealth 64 Video Vram	£319	£319

Hercules	ISA	VLB	PCI
1Mb Hercules Dynamite Pro	£139	£139	
2Mb Hercules Dynamite Power		£195	£195
2Mb Hercules Graphite Terminator 64		£265	£265
4Mb Hercules Graphite Terminator 64		£379	£379
1Mb Hercules Stingray			£100
1Mb Hercules Stingray Pro Video			£109
1Mb Hercules Stingray 64 Video			£129
2Mb Hercules Stingray 64 Video			£149

Matrox	ISA	VLB	PCI
2Mb Matrox Millennium WRAM			£215
4Mb Matrox Millennium WRAM			£320

(Windows '95 compatible Plug & Play)

Orchid	ISA	VLB	PCI
1Mb Orchid Kelvin 64	£89		
1Mb Orchid Kelvin EZ		£69	£69
1Mb Orchid Kelvin 64		£89	£89
1Mb Orchid Fahrenheit 64		£99	£99
2Mb Orchid Kelvin 64	£119	£119	£119
2Mb Orchid Fahrenheit 64		£139	£139
2Mb Orchid Fahrenheit Pro 64		£225	£225
4Mb Orchid Fahrenheit Pro 64		£295	£295

Taxan	ISA	VLB	PCI
1Mb Taxan GTS WinBoost		£114	£119
2Mb Taxan GTS WinBoost		£145	£145
2Mb Taxan WinTurbo 64		£245	£245
4Mb Taxan WinTurbo 64		£395	£395

Number 9	VLB	PCI
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9 NUMBER 9

	VLB	PCI
1Mb 9FX Vision 330	£95	£95
2Mb 9FX Vision 330	£139	£139
1Mb 9FX Motion 531	£135	£135
2Mb 9FX Motion 531	£179	£179
2Mb 9FX Motion 771	£225	£225
4Mb 9FX Motion 771	£339	£339
2Mb Imagine 128 1280		£375
4Mb Imagine 128 1280		£475
4Mb Imagine 128 1600		£610
8Mb Imagine 128	£1,039	£1,039

Spea	VLB	PCI
Mb Spea V7 Mercury P64 VLB	£239	

STB	VLB	PCI
2Mb STB Powergraph 64	£149	£149
2Mb STB Nitro 64		£145
1Mb STB Powergraph 24		£139
2Mb STB Velocity 64V MPEG	£219	£245
4Mb STB Velocity 64V MPEG	£319	£395

VideoLogic GraftixStar Range

	VLB	PCI
1Mb GraftixStar 300	£99	£99
2Mb GraftixStar 300	£139	£139
1Mb GraftixStar 500 inc AVI scaling	£135	£135
2Mb GraftixStar 500 inc AVI scaling	£189	£189
2Mb GraftixStar 700 inc AVI scaling	£269	£269
4Mb GraftixStar 700 inc AVI scaling	£389	£389



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14" Mono VGA Monitor.....	£69
14" Crystal Colour SVGA Interlaced.....	£159
15" Crystal Colour Monitor N-I MPRII.....	£245
17" Crystal 17HQ 1280 x 1024 N-I.....	£509

CTX	
14" CTX 1451CD N-I MPRII.....	£169
15" CTX CPS-1565CD SVGA MPRII.....	£235
17" CTX 1765GM SVGA MPRII 28 1024 x 768.....	£449
17" CTX 1785GM SVGA MPRII 26 1280 x 1024.....	£495
LMT 1000 16 Grey Scale LCD VGA Screen 9.4".....	£499
LMT 5020 4096 Colour LCD VGA Screen 9.4".....	£1,999

All the above monitors come with one year on-site Warranty

Iiyama (IDEK)	
15" Iiyama Vision Master FST MF-8115.....	£279

17" IIYAMA VISION MASTER FST MF-8617E
£520

17" Iiyama Vision Master FST MT9017E.....	£585
21" Iiyama Vision Master FST MF8221E.....	£1,165
21" Iiyama Vision Master FST MT9021E.....	£1,250

(All 21" Monitors Bundled with Colorific Kodak SFW)

NEC	
NEC Multisync XV14 14" 1024 x 768 N-I.....	£219
NEC Multisync XV15 15" 1024 x 768 80Hz.....	£275
NEC Multisync XV17 17" 1024 x 768 80Hz.....	£569
NEC Multisync XE15 15" 1024 x 768 80Hz.....	£405
NEC Multisync XE17 17" 1024 x 768 80Hz.....	£719
NEC Multisync XE21 21" 1152 x 1070 75Hz.....	£1,335
NEC Multisync XP17 17" 1280 x 1024 76Hz.....	£935
NEC Multisync XP21 21" 1600 x 1200 70Hz.....	£1,759

Nokia	
Valuegraph 449E09P 15" SVGA FST.....	£299
Multigraph 449M09P 15" FST TCO Trinitron.....	£355
Valuegraph 447V090 17" SVGA FST.....	£469
Multigraph 447M090 17" FST Trinitron.....	£629
Multigraph 447X092P 17" FST Trinitron.....	£769
Multigraph 447M092P 17" FST Trinitron.....	£685
Multigraph 447X090 17" FST Trinitron.....	£829
Multigraph 445M090 21" FST.....	£1,299
Multigraph 445M092P 21" FST TC.....	£1,449
Multigraph 445X092P 21" FST.....	£1,799

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15" Panasync (TX-T1562) 1024 x 768 NI.....	£279
17" Panasync (TX-D1733) 1280 x 1024 NI.....	£489
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2 year On-Site Warranty on Panasonic Monitors

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14" Philips Enhanced VGA Color Monitor 14C.....	£179
15" Philips Brilliance Autoscans Colour Monitor 15B.....	£254
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(Built in Stereo for Multimedia Applications)

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(Built in Stereo for Multimedia Applications)

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17" Philips Trinitron Monitor 17T.....	£599
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20" Philips Autoscans Colour Monitor 20T.....	£1,299
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21" Philips Brilliance Autoscans Colour Monitor with CyberScreen Technology 21A.....	£1,749

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21" SuperMatch 21 - TXL 1600 x 1200 (RAD086).....	£1,599

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15" Syncmaster 15GLE 1024x768.....	£259
15" Syncmaster 15GLI 1280x1024 Plug & Play.....	£299
17" Syncmaster 17GLI NI 1280x1024.....	£499
17" Syncmaster 17GLSI NI 1280x1024 76Hz.....	£599

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Sony 15" CPDSF1 1024 x 768 NI 25.....	£309
Sony 17" GDM-17SEI SVGA N-I.....	£809
Sony 20" GDM20 SEV 1280 x 1024 N-I.....	£1,315
Sony 20" GDM20 SE1 1280 x 1024 N-I.....	£1,395
Sony CSS-B100 Computer Speaker System.....	£75

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14" Taxan Ergovision 420LR N-I.....	£235
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17" Taxan Ergovision 895 LR 1600x1200 N-I.....	£819



MONITORS Cont.

20" Taxan Ergovision 1080 LR 1600 x 1200 N-I.....	£910
21" Taxan Ergovision 2100 LR 1600 x 1200 N-I.....	£1,530

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14" Viewsonic 6E 1024 x 768 N-I.....	£165
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20" Viewsonic 20G 1600 x 1200 N-I.....	£985
21" Viewsonic 21 1600 x 1200 N-I.....	£1,329

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Universal Monitor Drawing Dust Cover.....	£11
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Scanafax & Delrina Lite (makes you fax machine into a scanner).....	£39
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Epson LapCAT GT300.....	£309
Epson GTX6500 SCSI.....	£465
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Epson GTX8500 Parallel.....	£495
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(Photoshop LE, OmniPage Direct)	
Epson GTX9000 SCSI.....	£675
(Photoshop LE, OmniPage Direct)	
Epson GT18500 SCSI (Adobe Photoshop V3).....	£769
Epson GT19000 SCSI (Adobe Photoshop V3).....	£869
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(Photoshop LE, OmniPage Direct)	
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Scanmate/256.....	£69
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HP 4C Colour Scanner.....	£POA

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Logitech Easy Touch Scanner.....	£98
Logitech Scanman Colour.....	£165
Logitech PageScan.....	£299
Logitech Scan Pad.....	£12

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Nikon Scantouch LE.....	£915
Nikon Coolscan.....	£985

Sicos	
Sicos Colour Page Scanner.....	£229

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Page Office.....	£280
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APC BackUPS Pro 280.....	£99
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All the Above Cards are Novell Approved

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SMC EtherEZ ISA BNC.....	£63
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INTEL Etherexpress ISA 16 BNC 5 Pack.....	£385
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Chase Research IOPRINT jr RG45 Parallel.....	£195
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BNC In-Line Coupler.....	£2
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3C625 FMS II Link Cable.....	£29

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D Link DE-809TC 8 Port Hub with BNC.....	£129
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SMC

SMC Tiger Hub TP6 Port.....	£165
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Lantastic Single User.....	£59
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Canon BJ30 Mono Portable Printer.....	£139
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Canon BJC70 Colour Portable Printer.....	£219
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Canon BJ330 136 Column Bubblejet.....	£389
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Ecosys FS-1600 10ppm.....	£1099
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- Thermal Wax Transfer Printer
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Mitsubishi Colour Thermal Transfer Printer G6710-10.....	£4,099
Mitsubishi Colour Sublimation Printer S3600-30.....	£4,699
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NEC Superscript 660 6PPM Laser.....	£395
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OKI OKIJET300C 300dpi Inkjet Printer.....	£239

Olivetti

Olivetti JP360C Inkjet (Upgradeable to Colour).....	£199
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Panasonic KX-P-1150 9 Pin Dot Matrix.....	£89
Panasonic KX-P-2023 24 Pin Mono Dot Matrix.....	£108
Panasonic KX-P-2124 24 Pin Mono Dot Matrix.....	£198
Panasonic KX-P-2135 24 Pin Colour Printer.....	£129
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Panasonic KX-P-6100 6ppm GDI Laser Printer.....	£235
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Panasonic KX-P-4440 10PPM Laser Printer.....	£719

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PENTAX

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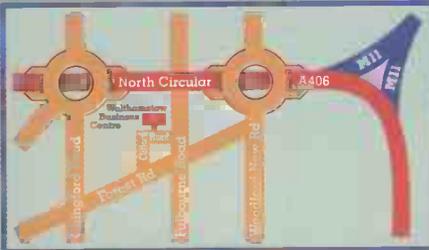
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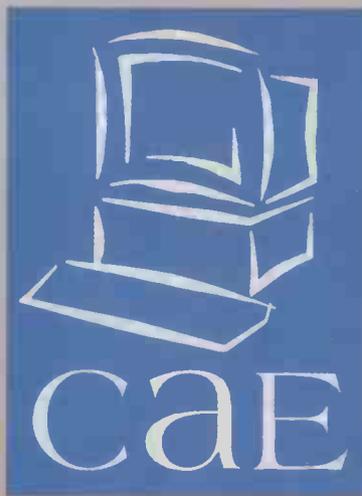
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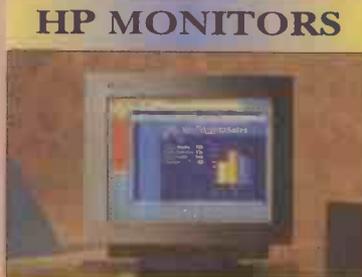
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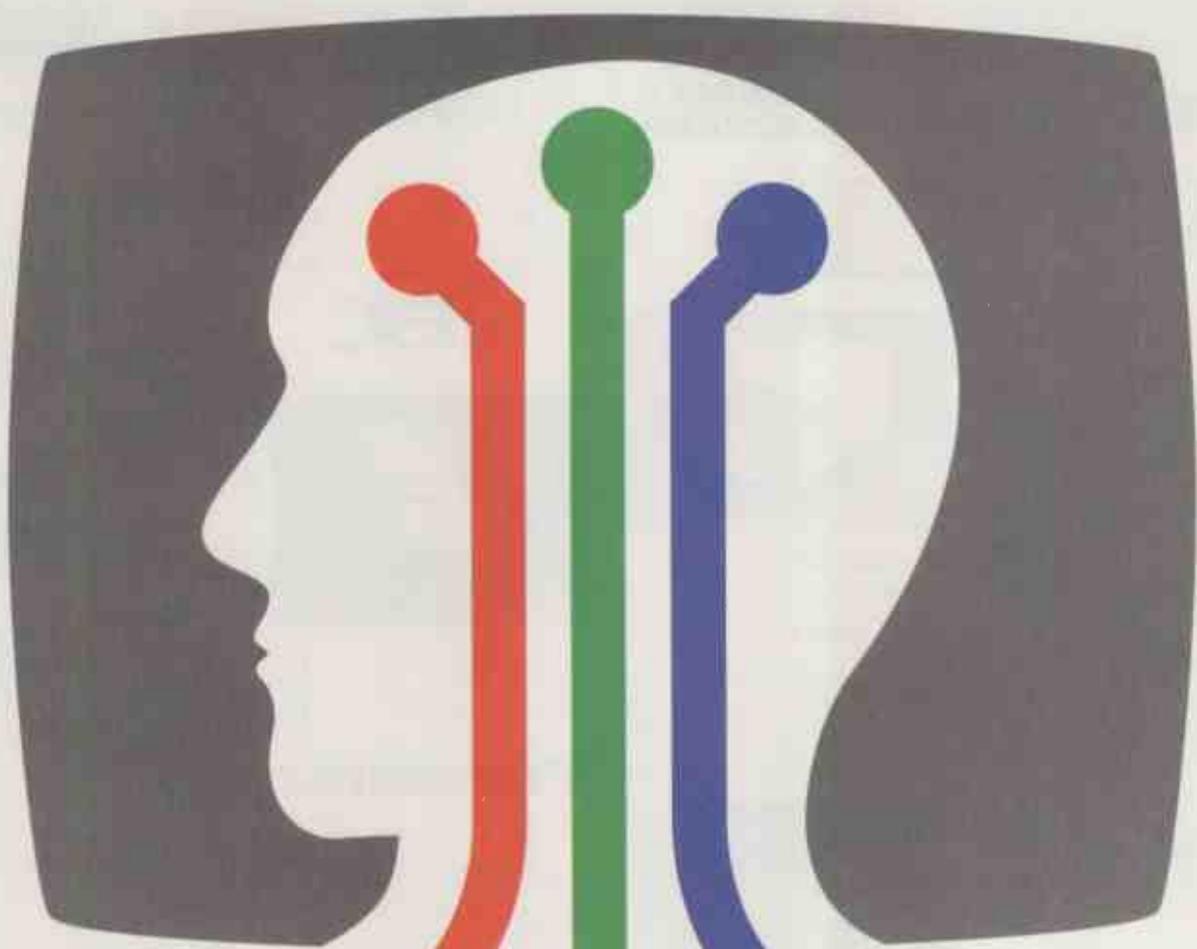


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P575, 90, 100, 120, 133 EDO

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100, P75, P90, P100

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NOVELL

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- S3 868 PCI local bus graphics card (1Mb RAM upgradable to 2Mb)
- 14" colour SVGA monitor
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- 2 serial ports, 1 parallel port
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- Desktop or mini-tower case
- 102-key soft tactile keyboard
- Serial 2/3-button mouse

£1,465 (plus VAT)

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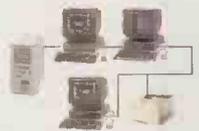
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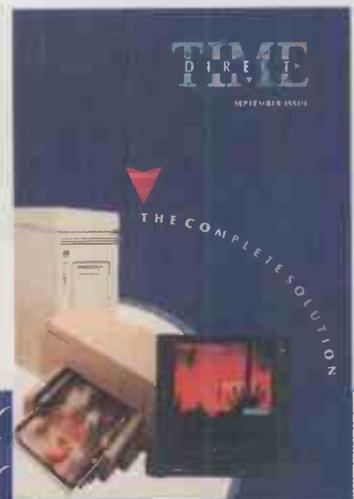
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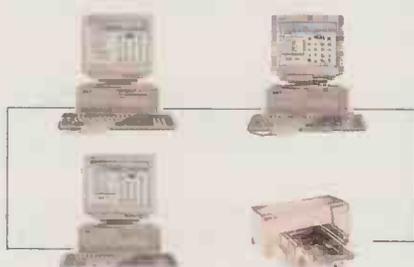


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- 486DX2-66 processor
- 4Mb or 8Mb RAM expandable to 64Mb
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- 120Mb, 170Mb or 540Mb IDE hard disk
- 3.5" 1.44Mb floppy drive
- 1Mb local bus graphics with Windows accelerator
- 14" SVGA colour screen
- IDE hard and floppy controller
- Parallel, 2 serial & keyboard ports
- Expandable desktopcase
- 4 drive bays and 7 expansion slots (2 VESA)
- 102 enhanced keyboard
- Mouse optional (from £9)
- Select required operating system

Models

486DX2-66 170Mb drive 4Mb RAM.....	£499
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486DX2-66 540Mb drive 8Mb RAM.....	£629

See options for other configurations

£479

MITAC 486DX4-100



- 486DX4-100 processor
- 4Mb or 8Mb RAM expandable to 64Mb
- Pentium® technology upgradeable
- 540Mb IDE hard disk
- 3.5" 1.44Mb floppy drive
- 1Mb local bus graphics with Windows accelerator
- Parallel, 2 serial & keyboard ports
- 14" SVGA colour screen
- IDE hard and floppy controller
- Expandable desktop case
- 4 drive bays and 7 expansion slots (2 VESA)
- 102 enhanced keyboard
- Mouse optional (from £9)
- Select required operating system

Models

486DX4-100 540Mb drive 4Mb RAM.....	£549
486DX4-100 540Mb drive 8Mb RAM.....	£649

See options for other configurations

£549

MITAC 75MHz PENTIUM®



- Intel 75MHz Pentium® processor
- 8Mb or 16Mb RAM expandable to 128Mb
- 540Mb or 850Mb enhanced IDE (fast ATA) hard disk with 256K hard disk Cache
- 256K external SRAM Cache
- 3.5" 1.44Mb floppy drive
- PCI bus with 4 PCI slots
- Parallel, 2 fast serial & keyboard ports
- 14" SVGA colour screen
- PCI bus 64-bit s3 graphics with 1Mb video RAM
- Enhanced PCI IDE hard and floppy controller
- Expandable desktop case
- 4 drive bays and 7 expansion slots (4 PCI)
- 102 enhanced keyboard
- Mouse optional (from £9)

Models

75MHz Pentium® 850Mb drive 8Mb RAM.....	£779
16Mb RAM models.....	£200 extra

See options for other configurations

£749

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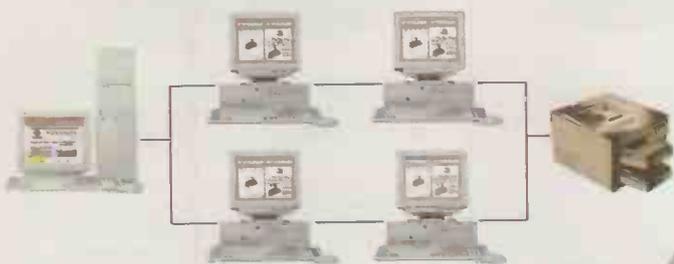
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COLOSSUS 486DX4-100



- 486DX4-100 processor
- 256K external Cache
- 4Mb or 8Mb RAM expandable to 64Mb
- Pentium® technology upgradeable
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- 3.5" 1.44Mb floppy drive
- 1Mb 64-bit PCI local bus graphics with Windows accelerator
- 14" SVGA colour screen
- PCI enhanced IDE hard and floppy controller
- Parallel, 2 serial & keyboard ports
- Expandable desktop case with 7 drive bays
- 102 enhanced keyboard
- Microsoft compatible mouse

Models	
540Mb drive 8Mb RAM	£759
850Mb drive 8Mb RAM	£789
Multimedia models	£99 extra

See options for other configurations

£659

COLOSSUS 75MHz PENTIUM®



- Intel 75MHz Pentium® processor
- 8Mb or 16Mb RAM expandable to 128Mb
- 540Mb, 850Mb or 1.08Gb enhanced IDE (fast ATA) hard disk with 256K hard disk Cache
- 256K external SRAM Cache
- 3.5" 1.44Mb floppy drive
- PCI Enhanced IDE hard and floppy controller
- 1Mb 64-bit PCI local bus graphics with Windows accelerator
- 14" SVGA colour screen
- Parallel, 2 serial & keyboard ports
- Expandable desktop case with 7 drive bays
- 102 enhanced keyboard
- Microsoft compatible mouse

Models	
90MHz Pentium 540Mb drive 8Mb RAM	£959
100MHz Pentium 540Mb drive 8Mb RAM	£1059
850Mb drives models	£30 extra
1.08Gb drive models	£80 extra

See options for other configurations

£859

DESKTOP/NETWORKING OPTIONS

RAM	
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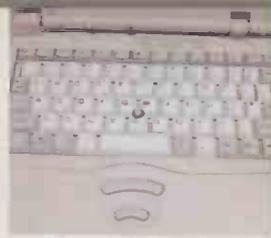
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The Satellite Pro 400 has a versatile conformable storage format via swappable CD-ROM and floppy disk drive



The easy to use Integral Mousepoint on all except T4850



All systems include PS/2 mouse, external PS/2 keyboard parallel printer, serial and external SVGA ports. (no PS/2 mouse on T21 series)



Port replicator (mini docking station) option is available for the T21 series, plus enhanced port replicator for Satellite Pro

COMMON TOSHIBA FEATURES

Toshiba notebooks are unbeatable in terms of quality, advanced features, performance and ease of use. Do not consider a low quality clone-buy the best. The following common features are standard with all models:-

SCREENS

Mono notebooks include a high quality sidelit Super Twist Nematic (STN) mono LCD capable of 64 grey scales and VGA resolution. STN colour portables utilise the latest advanced STN (Dual Scan) screens for enhanced contrast and faster response. Thin Film Transistor (TFT) or active matrix screens provide the best displays with up to 16.7 million bright colours, ultra fast response and the ability to use motion video.

KEYBOARD

Ergonomically designed 84 key full-size keys with 12 function keys and overlay numeric keypad. Dedicated cursor control keys.

INTERFACES

Standard ports include centronics parallel, RS-232C serial, PS/2 ext. keyboard, PS/2 mouse and VGA/SVGA for ext. monitor. Either Quickport port with bundled Ballpoint mouse or Integral MousePoint device included. Other ports and PCMCIA details see individual notebook. (NB. PS/2 mouse port on T21 series via port rep)

POWER

Autosensing AC adaptor (100 to 240V) suitable for world wide usage provides power for notebook and recharges batteries. Removable rechargeable batteries are standard (type of battery and life varies as shown).

SOFTWARE

Microsoft MS DOS 6.2 with Toshiba notebook enhancements, Windows 3.1 (Rel 3.11) or WFWG 3.11 are pre-loaded. CardWare PCMCIA support provides transparent use of PCMCIA cards without incompatibility problems and supports 'insertion'.

SPECIAL FEATURES

Intel 3.3v or 2.9v SL technology with low power consumption. Reset button for warm reboot. AutoResume puts your systems in standby mode for upto 7 days. AutoSave automatically saves your data if your battery power is running out. LIM EMS/XMS/Hard RAM support. MaxTime Power Management can be set to switch off your disk drive, screen, keyboard and CPU after a certain time. Advanced Power Management is also supported. Flash BIOS allows easy upgradeability in the future. Kensington Cable Lock Provision for physical security. Password/MultiSafe security with various levels of protection.

MONO 486DX2-50



T2110
New powerful 486DX4 notebook combines ultra-fast 75MHz with innovative ergonomics. An advanced high-resolution 9.5" mono STN screen enhances the level of performance yet further.

- Intel DX4-75 processor
- 4Mb RAM expandable to 28Mb
- 350Mb hard disk
- Internal 3.5" 1.44Mb floppy drive
- VGA/SVGA (640 x 480 pixel resolution) 9.5" diagonal display
- 84 key keyboard with mousepoint and overlay numeric keypad
- Standard ports
- 11.8" x 8.9" x 2.1" with 3.0Kg (6.6lb) weight
- Built-in autosensing AC adaptor
- NiH2 removable battery. Up to 4 hours usage

Options

4Mb RAM (PA2012U).....	£170
8Mb RAM (PA2013U).....	£230
16Mb RAM (PA2014U).....	£745
NiH2 Battery (PA2429UR).....	£94

£845

COLOUR 486DX2-50



T2100 CS
A superb large colour 10.4" dual scan screen. Local bus video makes this 486DX2-50 the ideal platform for high-quality graphics and mobile presentations.

- Intel DX2-50 processor
- 4Mb RAM expandable to 28Mb
- 350Mb hard disk
- Internal 3.5" 1.44Mb floppy drive
- VGA/SVGA (640 x 480 pixel resolution) STN 10.4" diagonal display
- 84 Key keyboard
- Standard ports and port replicator
- PCMCIA Rel 2.0 one type III or two type II)
- 11.8" x 8.9" x 2.1" with 3.1Kg (6.8lb) weight
- NiH2 removable battery (4 hours use)
- MS DOS 6.22, MS Windows 3.11

T1910CS (illustrated above)..... Call for details and availability

Options

4Mb RAM (PA2026U).....	£187
8Mb RAM (PA2027U).....	£340
16Mb RAM (PA2028U).....	£745
Port replicator (PA2708U).....	£128
Battery (PA2437U).....	£95
Battery charger (PA2436U).....	£149

£1269

COLOUR DX4-75 CD ROM



T2150CDT

The DX4-75 notebook offers spectacular performance using a 520Mib hard disk and top of the range TFT colour LCD 10.4" screen.

- Intel DX4-75 processor
- 8Mb RAM expandable to 32Mb
- 520Mib hard disk
- Dual Spin Internal 5.25" CD-ROM
- External 3.5" 1.44Mb floppy drive
- VGA/SVGA (640x480 pixel resolution) TFT 10.4" diagonal display
- 84 Key keyboard with mousepoint
- Standard ports, and port replicator
- Built in AC adaptor
- PCMCIA Rel 2.0 two Type II or one Type III
- 11.8" x 8.9" x 2.1" with 3.2kg (7 lb) weight
- Soundblaster Pro compatible sound system
- NiH2 removable battery (3 hours use)
- MS DOS 6.22 and MS Windows for workgroups 3.11

T2150CDS260.....	£1699
T2150CDS520.....	£1955
T2150CDS7520.....	£2715

Options

4Mb RAM (PA2026U).....	£187
8Mb RAM (PA2027U).....	£340
16Mb RAM (PA2028U).....	£745
Port Replicator (PA2708U).....	£128
Battery (PA2437U).....	£95
Battery charger (PA2436U).....	£149

£2715

TFT COLOUR PENTIUM NOTEBOOK



Satellite Pro 400CS

Toshiba's first modular notebook with Pentium processing power. Swappable CD-ROM and floppy disk drive modules and one touch docking.

- Intel 75MHz Pentium* processor
- 8Mb EDO RAM expandable to 40Mb
- 810Mb hard disk
- Swappable internal external 3.5" 1.44Mb floppy drive
- VGA/VGA (640 x 480 pixel resolution) colour STN 10.4" diagonal display
- 84 key keyboard and mousepoint device
- Parallel, serial port
- Serial infra-red port
- Enhanced port
- Replicator port
- SVGA port
- External FDD port
- Memory exp slot
- PCMCIA Rel2.0 slot, 2 x type II slot or 1 x type III
- Rechargeable, removable Lithium Ion battery (4 hrs use)
- Microphone, headphone and speaker sockets
- MS DOS 6.22 and Windows for workgroups 3.11

OPTION

8Mb EDO RAM (PA2001U).....	£420
16Mb EDO RAM (PA2002U).....	£904
32Mb EDO RAM (PA2004U).....	Call
Quad speed CD-ROM (PA2655U).....	£255
Li Ion battery 4hrs use (PA2487UR).....	£166
Battery charger (PA2486U).....	£166

£2425

TFT COLOUR PENTIUM NOTEBOOK



Satellite Pro 400CDT

Unbeatable high end performance A4 package with modular storage and Pentium* processing power coupled with flexible connectivity facilities.

- Intel Pentium* 75MHz processor
- 8Mb EDO RAM expandable to 40Mb
- 810Mb hard disk
- Swappable enhanced IDE quad speed CD-ROM
- Swappable internal external 3.5" 1.44Mb floppy drive
- VGA/VGA (640 x 480 pixel resolution) colour TFT 10.4" diagonal display
- 84 key keyboard and mousepoint device
- Parallel, serial port
- Serial infra-red port
- Enhanced port
- Replicator port
- SVGA port
- External FDD port
- Memory exp slot
- PCMCIA Rel.2.0 slot, 2 x type II slot or 1 x type III
- Rechargeable, removable Lithium Ion battery (4 hrs use)
- Microphone, headphone and speaker sockets
- MS DOS 6.22 and Windows for workgroups 3.11

8Mb EDO RAM (PA2001U).....	£420
16Mb EDO RAM (PA2002U).....	£904
32Mb EDO RAM (PA2004U).....	Call
Li Ion battery 4hrs use (PA2487UR).....	£166
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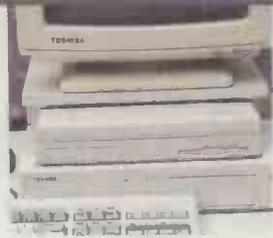
Two PCMCIA slots on all models provide ultimate expansion. Intel fax/data modem at an incredible £99 (except T3600)



Built-in Microsoft Sound System on T4850, and T4900



With Soundblaster Pro compatible sound system on T2150, Portégé and Satellite Pro



Deskstation IV turns your T4850 and T4900 notebooks into expandable desktop systems

TFT COLOUR DX4-75



T2110CS

Brilliant notebook, offers greater power than the T2100CS. Has top end 75MHz DX4 processor and a large 10.4" dual scan screen combine with a high capacity nickel hydride battery providing long lasting quality performance.

- Intel DX4-75 processor
- 4Mb RAM expandable to 28Mb
- 350Mi.b hard disk upgradeable
- Internal 3.5" 1.44Mb floppy drive
- VGA/VSGA (640 x 480 pixel resolution) STN 10.4" diagonal display
- 84 key keyboard and mousepoint device
- Parallel, serial port
- Replicator port
- SVGA port
- Memory exp slot
- PS2 keyboard port
- PCMCIA Rel.2.0 slot, 2 x type II slot or 1 x type III
- Rechargeable, removable nickel hydride battery (4 hrs use)
- MS DOS 6.22 and Windows 3.11

T2130CS5206

£1615

Options

- 4Mb RAM (PA2028U) £187
- 8Mb RAM (PA2027U) £340
- 16Mb RAM (PA2028U) £744
- 24Mb RAM (PA2029U) £1526
- Battery (PA2437U) £80
- Battery charger (PA2436U) £149

£1359

TFT COLOUR DX4-75



T2130CT

The T2130CT combines top-end DX4-75 processing with a TFT 10.4" colour screen and comes with 8Mb RAM, 520Mi.b hard disk.

- Intel DX4-75 processor
- 8Mb RAM expandable to 32Mb
- 520Mi.b hard disk upgradeable
- Internal 3.5" 1.44Mb floppy drive
- VGA/VSGA (640 x 480 pixel resolution) TFT 10.4" diagonal display
- 84 key keyboard and mousepoint device
- Parallel, serial port
- Replicator port
- SVGA port
- Memory exp slot
- PS2 keyboard port
- PCMCIA Rel.2.0 slot, 2 x type II slot or 1 x type III
- Rechargeable, removable nickel hydride battery (4 hrs use)
- MS DOS 6.22 and Windows 3.11

Options

- 4Mb RAM (PA2028U) £187
- 8Mb RAM (PA2027U) £340
- 16Mb RAM (PA2028U) £744
- 24Mb RAM (PA2029U) £1526
- Battery (PA2437U) £80
- Battery charger (PA2436U) £149

£2119

TFT COLOUR SUBNOTE



Portégé 610CT GE 610CT

The world's first Pentium 90 ultra notebook and the most powerful Toshiba portable. It offers very high performance in a lightweight ultra notebook package.

- Intel Pentium®75MHz processor
- 8Mb EDO RAM
- 720Mi.b hard disk
- External 3.5" 1.44Mb floppy drive
- VGA/VSGA (640 x 480 pixel resolution) TFT 9.5" diagonal display
- 84 key keyboard and mousepoint device
- Parallel, serial port
- Replicator port
- SVGA port
- External FDD port
- Memory exp slot
- PCMCIA Rel.2.0 slot, 2 x type II slot or 1 x type III
- Rechargeable, removable Lithium Ion battery (4 hrs use)
- Microphone, headphone and speaker sockets
- MS DOS 6.22 and Windows for workgroups 3.11

Options

- 8Mb EDO RAM (PA2031U) £420
- 16Mb EDO RAM (PA2032U) £804
- 32Mb EDO RAM (PA2034U) Call
- Li Ion battery (PA2489U) £166
- Battery charger (PA2482U) £166

£3019

TFT COLOUR DX4-75



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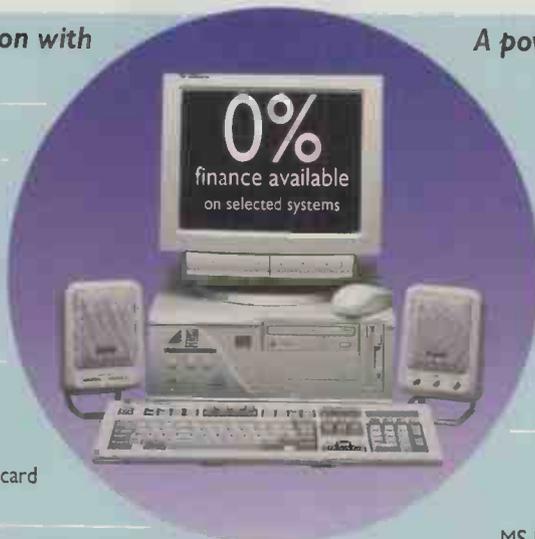
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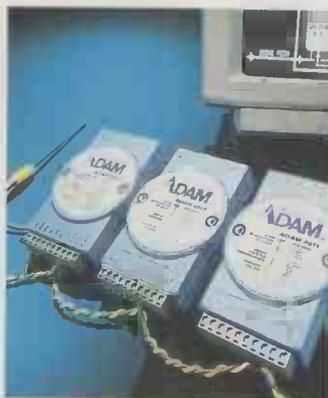
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- ▼ Output RS485 (2-wire)
- ▼ Baudrate 1.2K to 38.4K

£99

Analog Input module

ADAM modules can accommodate multiple types and ranges of analog input. You select type and range remotely by issuing ASCII commands from your host computer.

- ▼ Input for thermocouple, mV, V, or mA
- ▼ Input range 15mV to 2.5V, 20mA
- ▼ 10 samples per second
- ▼ 1 digital input / event counter
- ▼ 2 digital outputs
- ▼ Baudrate 1.2K to 19.2K

£165

ADAM Modules

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ADAM 8ch Thermocouple Module	£225
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ADAM Digital I/O Module	£119
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ADAM Counter/Frequency Module	£210
ADAM IP66 Industrial Enclosure	£85
ADAM Power Supply Unit 24V	£149

IEEE-488 Interface Card

Provides complete IEEE-488 functionality on a half size card.

- ▼ Powerful, easy to use software command set
- ▼ DMA & Interrupt
- ▼ On-board firmware driver
- ▼ 16 digital outputs
- ▼ Basic, Pascal & C drivers
- ▼ IEEE-488 cable 2m

£199

Digital I/O Card

The simple solution for providing digital I/O and timer functions.

- ▼ 32 digital inputs
- ▼ 32 digital outputs
- ▼ 3 channel programmable counter/timer
- ▼ Breadboard area

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High Density mixed digital I/O Card for industrial monitoring & control.

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- ▼ Interrupt handling
- ▼ Output status readback

£155

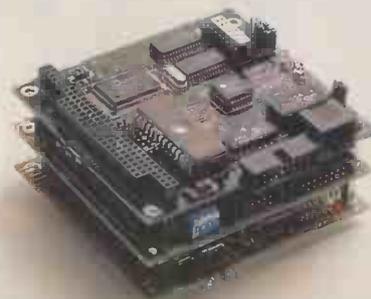
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Wiring Terminal Board	£35
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Analog & Digital I/O Card

Versatile fully integrated multifunction A/D, D/A and Digital I/O card.

- ▼ 12 bit 40KHz
- ▼ 16 single-ended or 8 differential A/D inputs
- ▼ 1 D/A output
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- ▼ 16 digital outputs
- ▼ Pacer Clock
- ▼ Timer/Counter
- ▼ DMA and Interrupt
- ▼ Wiring Terminal Board

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- ▼ 16 digital outputs
- ▼ Timer/counter
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Offering 8 programmable electro-mechanical relays for ON/OFF control or small power switching, and 8 opto-isolated inputs which can be used as digital input under noisy environment or floating potential.

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- ▼ Easy to use and program

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- ▼ 8 ISA slots

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- ▼ No software required

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CPU Card 486DX2/66 256K cache	£450
CPU Card 486DX4/100 256K cache	£550
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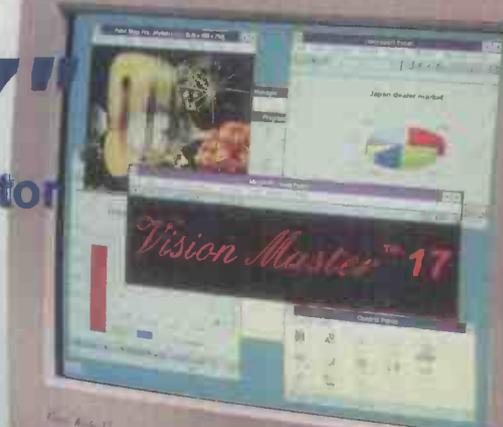


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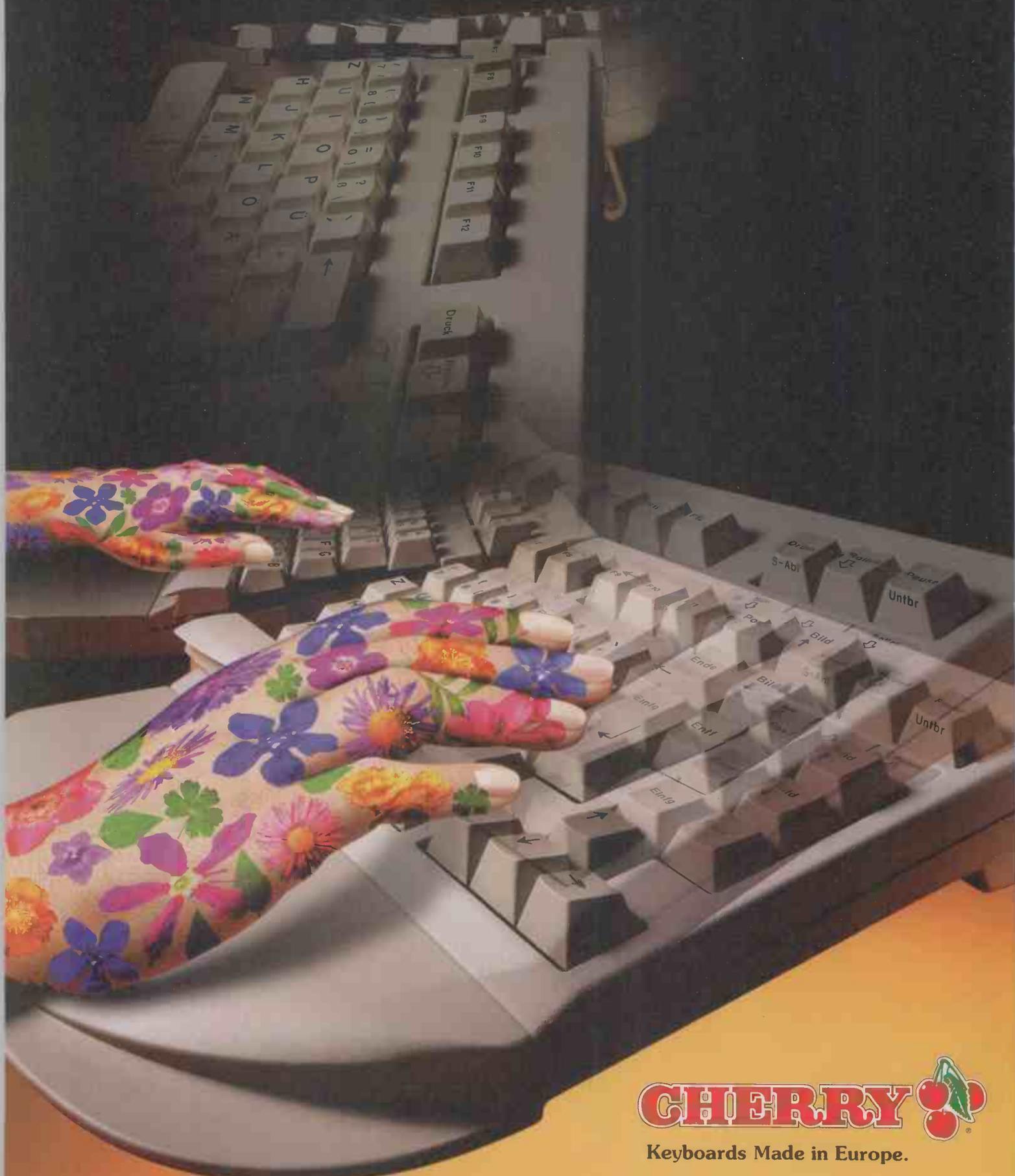
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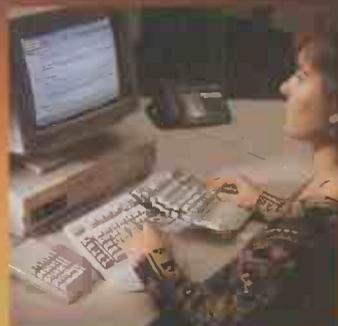
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CONNER 2107W	2.0GB	WIDE	6MB	9ms	£750
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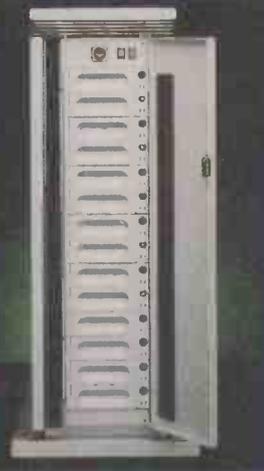
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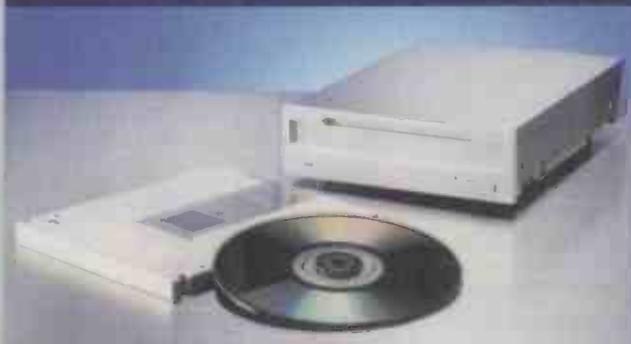
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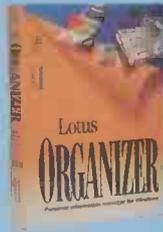
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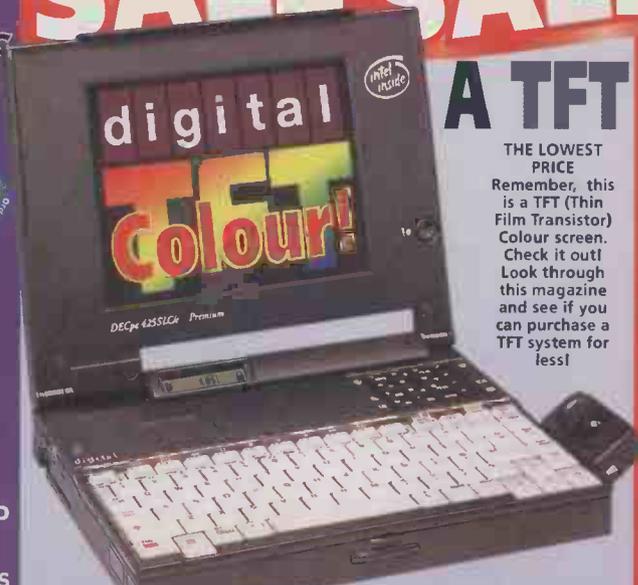
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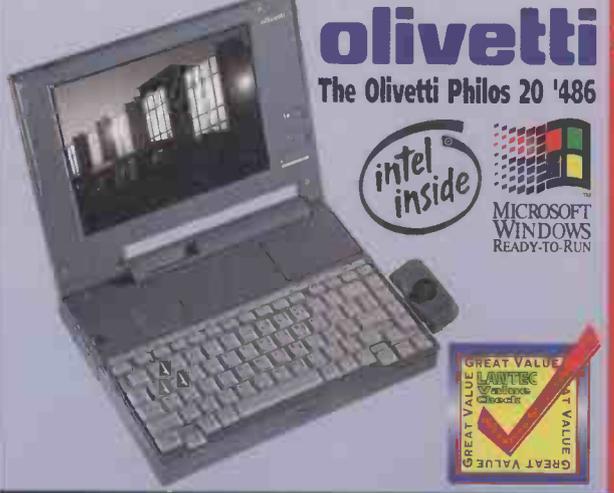
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As extensively advertised on television, this is a complete Multimedia system from one of the best known and most trusted names in microcomputer manufacturing. The Compaq Presario was designed from the outset to be everything you need in a home computer. It will perform all your "Home Office" tasks with ease, educate and entertain as well. Communications facilities are built-in, together with the software to get you "on-line" to CompuServe and the Internet. It comes with a large selection of the most important software including encyclopaedia and even some games. Highly recommended by LANTEC Direct, at this price, it's an unbeatable bargain.

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Manufactured in the UK by a VERY well known manufacturer to the highest quality • 80486 processor • 50 MHz clock speed • 240Mb Hard disk • Western Digital LocalBus Video Controller • Acer Low Emission SVGA Display • Display dot pitch .28mm • Windows version 3.1 • Quality keyboard • Quality mouse • MS DOS 6.2

THE "PC 2000" 486/50 Complete System
£599 Incredible value for money! Call for the details we can't print here!

Compaq Presario CDS 520 Multimedia System
£799 LANTEC Stock Clearance Price. RRP was £1,275!

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The Hewlett-Packard DeskJet 660C



Fast, professional-quality black printing for crisp, sharp characters • Enhanced, clear and vivid colours • Easy to use • Easy to set up • Built-in sheet feeder • Three years warranty

Hewlett-Packard DeskJet 660C
£283 ← HP Support Pack: £65

HP DeskJet 660C SupportPack £65
 HP DeskJet 660C spare black cartridge £19
 HP DeskJet 660C spare colour cartridge £21



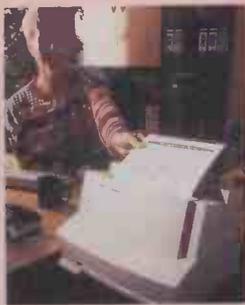
The Hewlett-Packard DeskJet 320 A great companion to any PC

• 3 pages per minute in black and white • Up to 7 minutes per page in colour (with optional colour kit) • 600 x 300 DPI with RET on plain paper (in monochrome), 300 x 300 DPI in colour • 500 pages monthly usage • Optional 60 sheet input tray • 6 typefaces and 13 scaleable Windows fonts

• 1 year warranty included
 • Warranty extendable with HP SupportPack.

Hewlett-Packard DeskJet 320
£169 ← Only £189 with Sheet Feeder

Colour Kit - £28
 Battery pack £25
 Spare black cartridge £15
 Spare colour cartridge £22



The Hewlett-Packard LaserJet 5L **NEW**

• 4 pages-per-minute • 600 DPI Resolution • 26 internal scalable typefaces • 26 TrueType fonts on floppy • 1Mb standard memory with MEt • memory expandable to 9Mb • 4,000 Pages/month capacity • parallel interface • PCL5e or HP PrintSmart language • 1 year return-to-base warranty

• Warranty extendable with HP SupportPack
 • Supports paper, envelopes, transparencies,

Hewlett-Packard LaserJet 5L
£357 ← HP Support Pack: £100

HP LaserJet 5L SupportPack £100
 HP LaserJet 5L Toner cartridge £POA
 HP LaserJet 5L 1Mb memory expansion kit £POA



The Hewlett-Packard DeskJet 600

Replacing the HP DeskJet 540, the HP DeskJet 600 is easy to set up and install. Designed to be "Family-friendly" the Dr.

DeskJet trouble-shooting software tools will help you if things go wrong. Basically a mono-chrome printer, (at up to 4 pages per minute,) the DeskJet 600 will print occasional colour (with the optional Colour Kit) at up to 1 minute per page.

Hewlett-Packard DeskJet 600
£215 ← HP Support Pack just £40

HP DeskJet 600 SupportPack £40
 HP DeskJet 600 Spare black cartridge £19
 HP DeskJet 600 Optional Colour Kit £POA

Enjoy total peace of mind by purchasing a Hewlett-Packard SupportPack. This will extend your warranty to 3 years and will provide you with on-site, next day response for each of the above printers. The costs are: HP DeskJet 320 and HP DeskJet 600 - £40, HP DeskJet 660C - £65, and HP LaserJet 5L - £100.

Windows '95 - What you Need to Know!

Microsoft Windows '95 represents a major step forward in PC ease of use and functionality. Microsoft say it will run on virtually any 386 or 486 system with 4Mb of RAM memory. However, LANTEC's opinion is that you really need a 486DX 33Mhz system and a minimum of 8Mb of RAM to use this new graphical environment. To really make it fly, we suggest 16Mb or more - especially if you plan to use the easy multi-tasking facilities in Windows '95. With memory upgrades being in short supply and quite expensive right now, we strongly advise you to buy your new PC with extra memory at the outset.

MS Windows '95 full copy £118.00
 MS Windows '95 (3.1 upgrade) £63.00
 MS Office '95 full copy £347.00
 MS Office Pro '95 full copy £449.00
 MS Plus for Windows '95 £27.00

Make the most of Windows '95 with a sound card, speakers and a CD ROM drive. We have easy-to-install complete packages at very reasonable prices. Call for details. We also sell all regular software packages.



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T2110CS



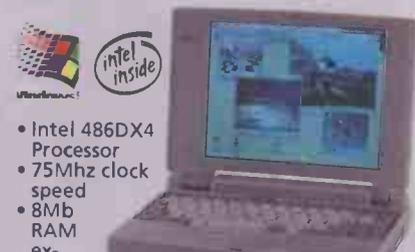
- Intel 486DX4 Processor
- 75Mhz clock speed
- 4Mb RAM expandable to 28Mb
- 350Mb hard disk
- 3.5" 1.44Mb floppy drive
- 10.4" STN colour display
- External SVGA monitor port
- 2 x PCMCIA type II or 1 x type III slot
- Mousepoint pointing device
- 4 hours battery life
- Built-in autosenesing AC adapter
- Optional Port Replicator
- DOS 6.2 and Windows 3.1
- 1 year world-wide warranty

LANTEC DIRECT PRICE

Toshiba T2110CS STN Colour

LANTEC Direct Price **£ 1369** With FREE InfoMover Ethernet Card

T2130CS



- Intel 486DX4 Processor
- 75Mhz clock speed
- 8Mb RAM expandable to 32Mb
- 520Mb hard disk
- 3.5" 1.44Mb floppy drive
- 10.4" STN colour display
- External SVGA monitor port
- 2 x PCMCIA type II or 1 x type III slot
- Mousepoint pointing device
- 4 hours battery life
- Built-in autosenesing AC adapter
- Optional Port Replicator
- DOS 6.2 and Windows 3.1
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T2130CT



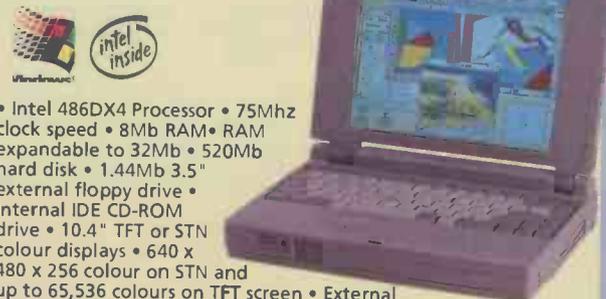
- Intel 486DX4 Processor
- 75Mhz clock speed
- 8Mb RAM expandable to 32Mb
- 520Mb hard disk
- 3.5" 1.44Mb floppy drive
- 10.4" TFT colour display
- External SVGA monitor port
- 2 x PCMCIA type II or 1 x type III slot
- Mousepoint pointing device
- 3.5 hours battery life
- Built-in autosenesing AC adapter
- Optional Port Replicator
- DOS 6.2 and Windows 3.1
- 1 year world-wide warranty

LANTEC DIRECT PRICE

Toshiba T2130CT TFT Colour

LANTEC Direct Price **£ 1969** With FREE InfoMover Ethernet Card

T2150CD



- Intel 486DX4 Processor • 75Mhz clock speed • 8Mb RAM • RAM expandable to 32Mb • 520Mb hard disk • 1.44Mb 3.5" external floppy drive • Internal IDE CD-ROM drive • 10.4" TFT or STN colour displays • 640 x 480 x 256 colour on STN and up to 65,536 colours on TFT screen • External SVGA monitor port with up to 65,536 colours • 2 x PCMCIA type II or 1 x type III slots • Mousepoint pointing device • Up to 3 hours battery life • Built-in autosenesing AC adapter • Built-in Sound system • Optional Port Replicator • 84 full-size keys and 12 function keys • DOS 6.2 and Windows for Workgroups 3.11 • 3 years world-wide warranty.

STN MODEL

Toshiba T2150CD STN Colour

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TFT MODEL

Toshiba T2150CD TFT Colour

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Portege 610CT



- Intel Pentium Processor • 90Mhz clock speed • 8Mb EDO RAM • RAM expandable to 40Mb • 720Mb hard disk • External 3.5" floppy drive • 9.5" TFT colour display • External SVGA monitor port • 2 x PCMCIA type II or 1 x type III slot • Mousepoint pointing device • 4.5 hours battery life • Built-in sound system • Optional Port Replicator • MS-DOS 6.2 • Windows for Workgroups 3.1 • 3 years world-wide warranty.

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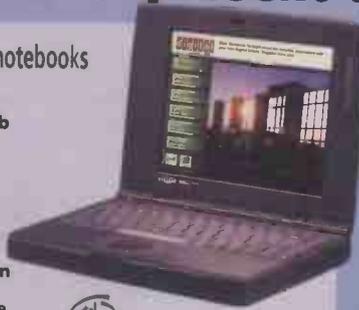
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LANTEC present the digital HiNote family

The Digital "HiNote" colour notebooks

- Choice of 486DX2 50Mhz with 340Mb hard drive or 486DX4 75Mhz with 510Mb hard drive
- 4Mb RAM expandable to 20Mb
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- Local Bus video providing 640 x 480 x 256 colours on internal screen or up to 1024 x 768 x 256 colours on external display
- Integrated trackball mouse and palm rest area
- 8Kb internal cache memory
- PCMCIA slots: 2 x Type II or 1 x Type III
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- Serial and parallel port
- MS DOS 6.22 and Windows for Workgroups 3.11 pre-Installed
- Windows '95 free Upgrade
- Free Lotus Organizer
- Weighs under 2.5kg



DEC 486DX2 50Mhz DSTN 340Mb

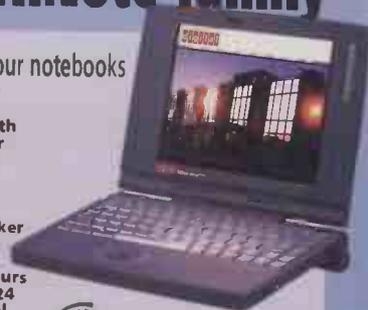
LANTEC Direct Price **£ 1299** WIN '95 FREE Upgrade

DEC 486DX4 75Mhz DSTN 510Mb

LANTEC Direct Price **£ 1549** WIN '95 FREE Upgrade

The Digital "HiNote Ultra" colour notebooks

- 486DX2 50Mhz Intel processor
- 340Mb hard drive
- Choice of 9.5" colour DSTN with 4Mb RAM (maximum 20Mb) or 9.5" colour TFT with 8Mb RAM (maximum 24Mb)
- Integrated trackball mouse
- Business Audio/MS Sound System, microphone and speaker (SoundBlaster compatible)
- Local Bus video & accelerator providing 640 x 480 x 256 colours on internal screen or up to 1024 x 768 x 256 colours on external display
- Wireless InfraRed connectivity
- 1 x PCMCIA 2.1 type III or 2 x type II slots
- Zero footprint, hot dockable snap-on 1.44Mb floppy drive
- Long life Lithium Ion (Lilon) flip-down battery
- Serial and parallel port
- MS DOS 6.22 and Windows for Workgroups 3.11 pre-Installed
- Windows '95 Free Upgrade!
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- Lightweight - just 2.1kg
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DEC 486DX2 50Mhz DSTN 340Mb

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Compaq Full-Spectrum Fault Management

Fault Prevention
Predicts and warns so can prevent and avoid failure

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Keeps server running in event of component failure

Rapid Recovery
Quickly and automatically recovers from critical failure

Example Configuration Price

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£ 2049

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The Compaq ProSignia 300 Server offers highly affordable performance. Indeed, you can enjoy server-specific features for the price of a desktop PC. In this model you will find:

- Choice of 75Mhz or 90Mhz Pentium processors
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- CD ROM built-in
- 1.05Gb & 2.1Gb hard disk drives, (or diskless model for you to customise).
- Integrated PCI, SCSI and Ethernet controllers
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- Compaq Uptime pre-failure Warranty and 3 years on-site repair service

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At £2,999* it's the new affordable CD Recordable Pentium® based PC

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CDR House, Gogmore Lane, Chertsey, Surrey KT16 9AP

Tel: 01932 562000 Fax: 01932 571999 E-mail: cdrevolution@dial.pipex.com

London Showroom - 29 Villiers Street, London, WC2N 6ND Tel: 0171 930 0010

also available from CD Revolution in Frankfurt, Germany - Tel: 06196 5605 0

Cape Town, South Africa - Tel: 021 880 1497/1710 & Sydney, Australia

Feature	CDR P-90/P-100 ISDN Video Conf.	CDR P-90/P-100 CD Record-2	CDR P-90/P-100 CD Record-4	CDR P-90/P-100 MPEG Encode
Choice of Intel 90 or 100 MHz Pentium® Processor with SIS chip-set	yes	yes	yes	yes
8MB RAM expandable to 128MB (72-pin) 256K cache 64-bit memory	yes	yes	yes	yes
1.2GB fast (10ms) IDE Hard Drive	yes	yes	yes	yes
Audio/Visual 2GB SCSI Hard Drive + Adaptec 2940 PCI SCSI Card	yes	yes		
3.5" 1.44MB Floppy Drive			yes	yes
Quad Speed CD ROM Drive - VideoCD compatible	yes	yes	yes	yes
16-bit Sound Blaster Sound Card with Yamaha Speakers	yes	yes	yes	yes
Jakarta 2MB RAM 24-bit PCI SVGA Graphics Accelerator + MPEG Decoder	yes	yes	yes	yes
Media Styler (Special Edition) multimedia authoring + VideoCLIP (Sampler) MPEG Editing	yes	yes	yes	yes
Intel ProShare ISDN Video Conferencing with concurrent data transfer & sharing facility	yes	yes	yes	yes
Choice of metal Mini or metal Midi-Tower case	yes	yes	yes	yes
2 Serial Ports, 1 Parallel Port, 1 Controller Port	yes	yes	yes	yes
15" High Resolution FST SVGA Colour Monitor	yes	yes	yes	yes
Professional Keyboard and MS Ergonomic Mouse	yes	yes	yes	yes
MS DOS 6.2/ Windows for Workgroups 3.11/ Windows 95	yes	yes	yes	yes
Lotus - Organiser/1-2-3/ Ami Pro/Approach/ScreenCam/Smartpics Sage Moneywise	yes	yes	yes	yes
CompuServe Software & 1 months subscription + 5 Popular Multimedia Titles	yes	yes	yes	yes
Internal Yamaha Quad Speed SCSI CD Recorder		yes	yes	yes
Internal Sony/ Philips/ JVC/ Pinnacle Dual Speed SCSI CD Recorder		yes	yes	yes
Adaptec 1505 SCSI card for CD Recorder		yes	yes	yes
Corel CD Creator or WinOnCD ToGo - CD recording software (loaded)		yes	yes	yes
OPTIVision real-time MPEG Encoder		yes	yes	yes
Affordable ready-to-go prices for CDR P-90 (Please add £100 for CDR P-100)	£3,499	£2,999	£4,099	£10,999

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 - Pentium® 90 8Mb £599
 - Pentium® 100 8Mb £679

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 - 540Mb £100
 - 850Mb £130
 - 1.08Gb £180
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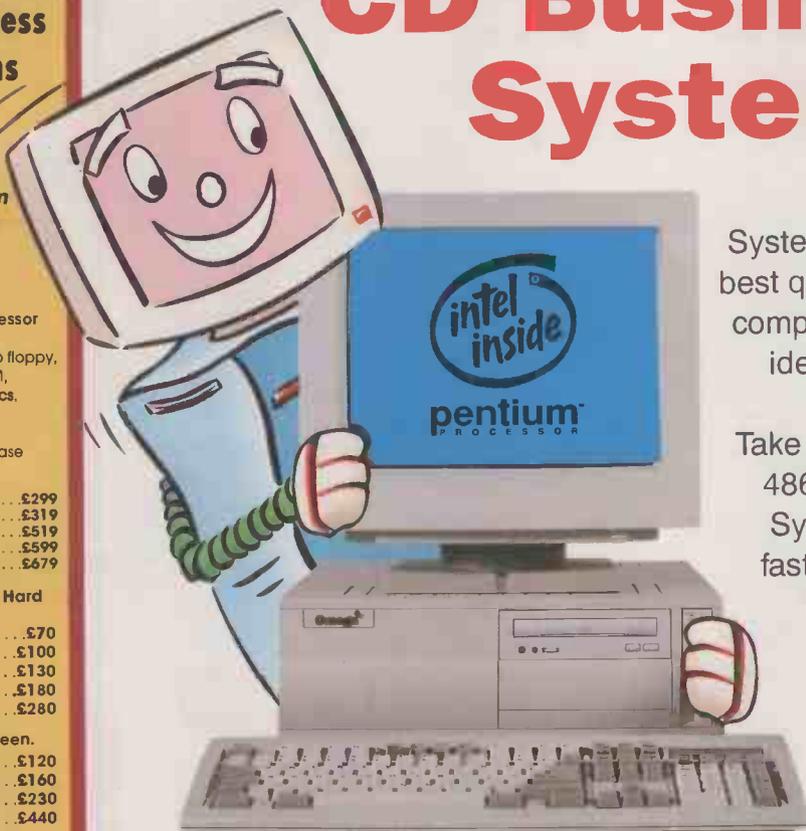
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 - 14" SVGA NI £160
 - 15" SVGA NI £230
 - 17" SVGA NI £440

- 4. Select the CD / Multimedia Options.**
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- 5. Additional Options.**
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- Parallel and 2 serial ports
- 102 keyboard
- 12 month warranty extendable to 3 years

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+ VAT

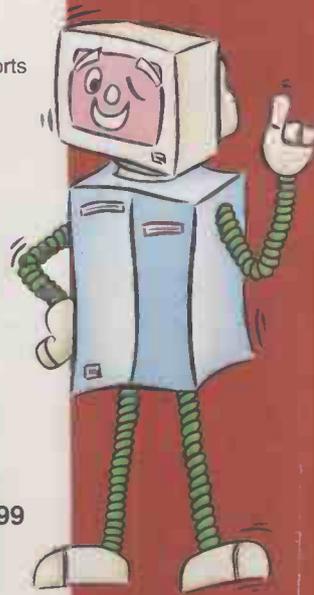
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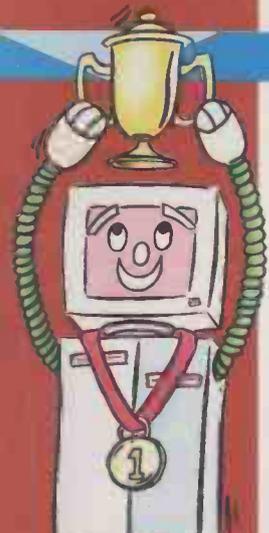
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Delivery charges: PC systems £19, Losers and large items £15, other items £10. Goods are normally delivered within a few days of cleared payment.
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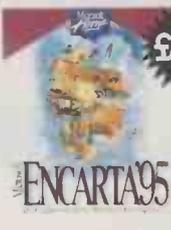
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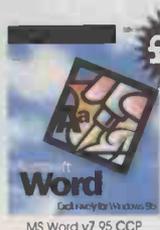
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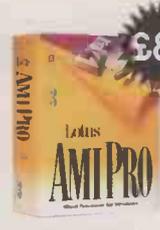
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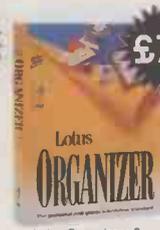
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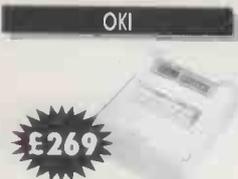
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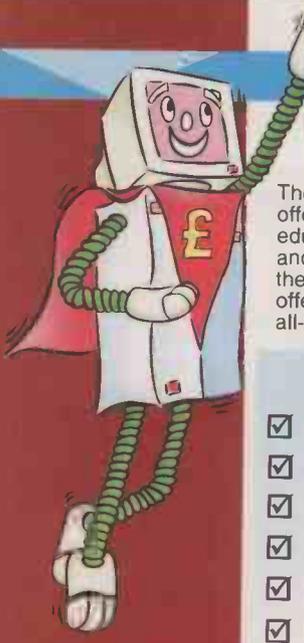
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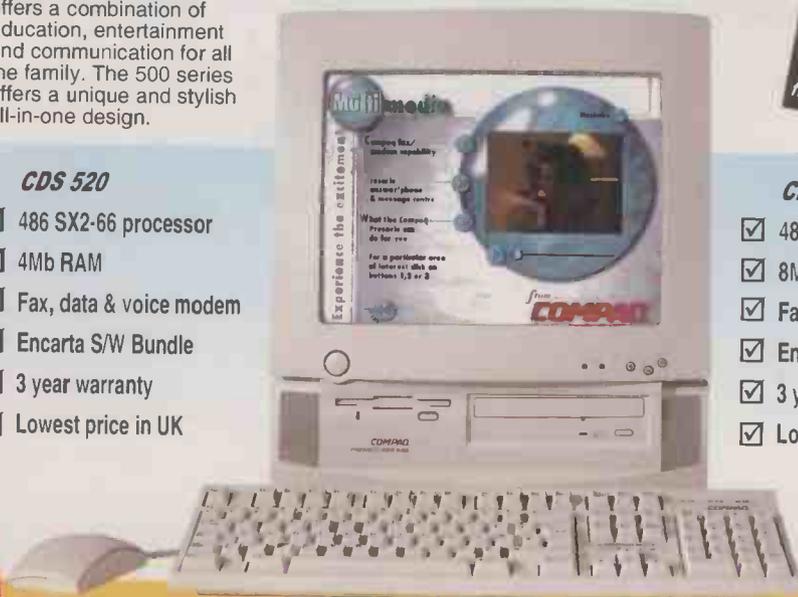
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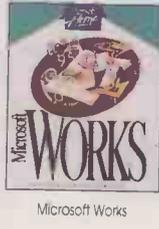
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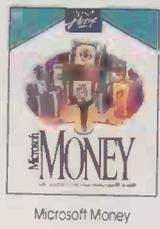
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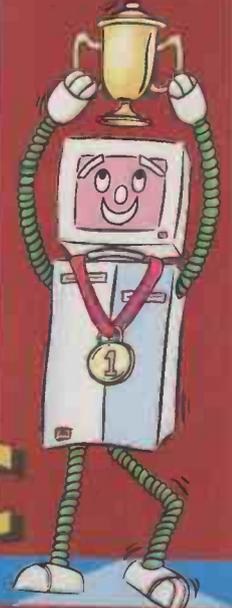
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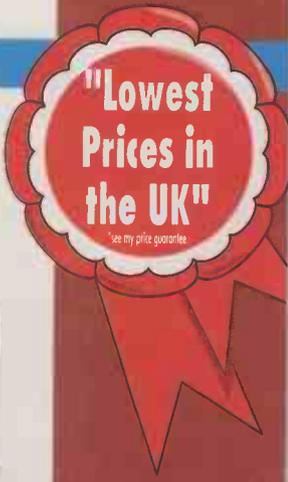
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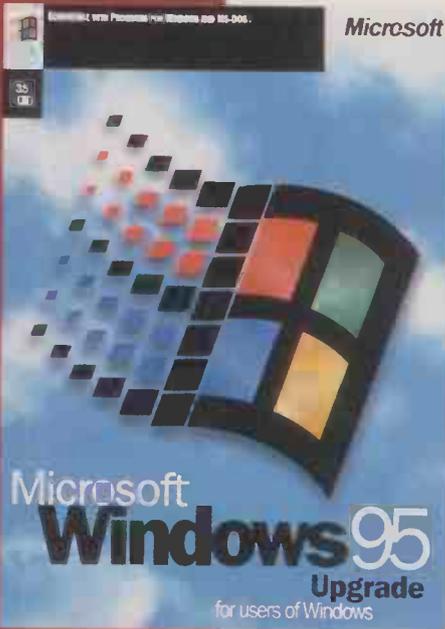
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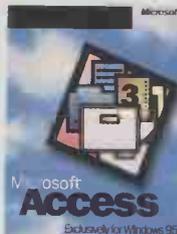
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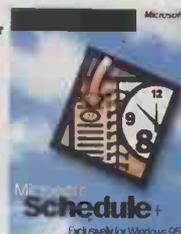


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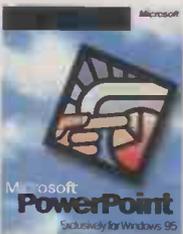
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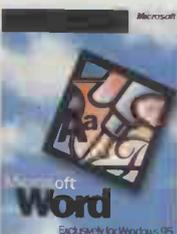


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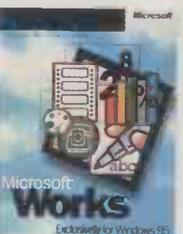


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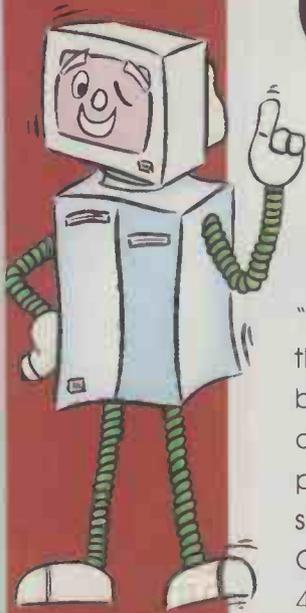
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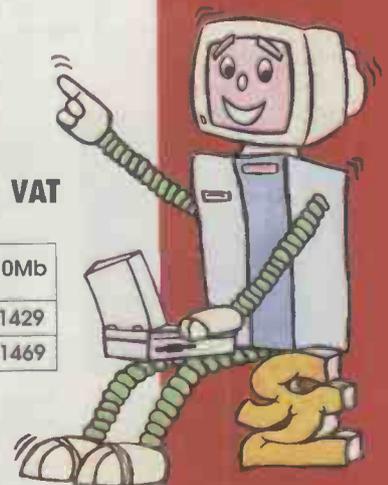
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 Composite 1

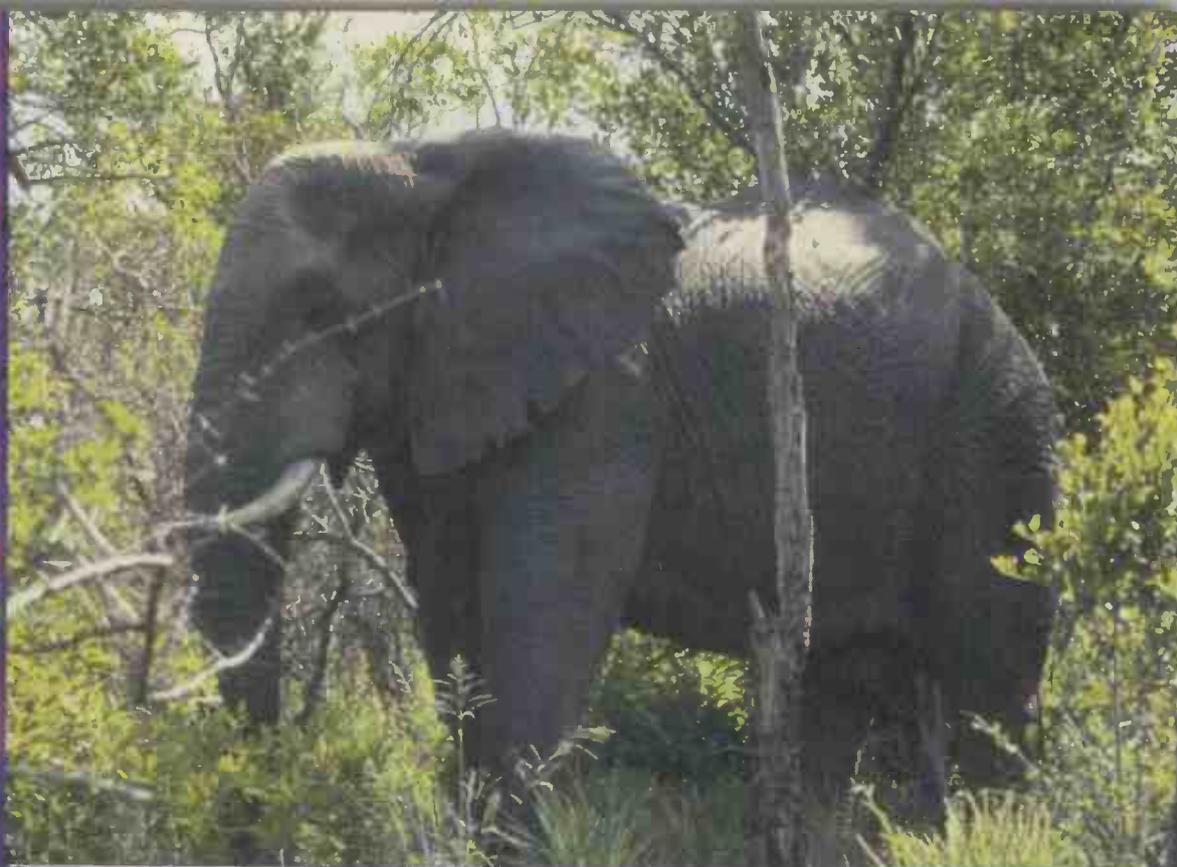
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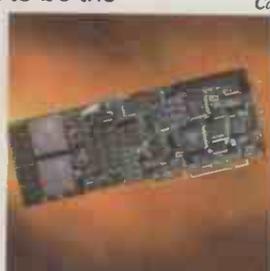
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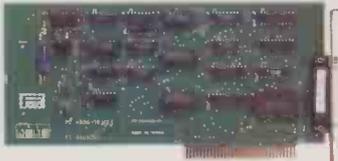


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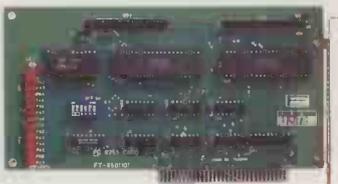
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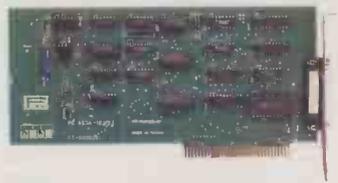
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Video Blaster MP400.....	£171
Digital Edge 3X.....	£228
Discovery 4X.....	£279
SoundBlaster Multimedia Home CD.....	£279



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ROLDEC'S YELLOW PAGES!

ROLDEC SYSTEMS



MEMORY

256K 256K 70ns SIMM.....	£10
SIM70 1MB 70ns SIMM.....	£26
SIM4M 4MB 70ns SIMM.....	£89
72 pin 4MB 70ns SIMM.....	£88
72 pin 8MB 70ns SIMM.....	£182
72 pin 16MB 70ns SIMM.....	£320

OUR MEMORY PRICES ARE CHANGING ALL THE TIME. CALL US FIRST ON 01902 45 64 64 FOR THE MOST UP-TO-DATE PRICES!



FUNCTION CARDS

ISA Multi I/O 1P/2S/1G IDE controller.....	£8
VESA Multi I/O + Mode 3 Enhanced IDE.....	£12
VESA Multi I/O + Mode 4 Enhanced IDE.....	£15
VESA High Perf. I/O, 16550 UART.....	£14

FUTURE DOMAIN FUNCTION CARDS

ISA Fast SCSI-II controller.....	£99
PCI Fast SCSI-II controller.....	£119

ADAPTEC FUNCTION CARDS

ISA 1542CF Fast SCSI controller.....	£135
ISA 1542CF Fast SCSI controller kit.....	£169
VESA SCSI - 2842A kit.....	£179
PCI SCSI - 2490 kit.....	£175
EISA SCSI Master kit - 2742.....	£279



FAX MODEMS (B.A.B.T. APPROVED)

Motorola Professional Sol'n 28.8 Ext.....	£187
Motorola Internet Solution 28.8 Ext.....	£199
PACE Microlin NB32+ PCMCIA.....	£169
PACE Linnet FX34+ External.....	£210
PACE Microlin NB34 PCMCIA.....	£217
PACE Microlin FX34 Pocket.....	£265
PACE Microlin FX34 Internal.....	£275
Roldec 14,400 V32 Internal.....	£66
Roldec 14,400 V32 External.....	£85
Roldec 14,400 V32 PCMCIA.....	£167
Roldec 28,800 V34 Internal.....	£159
Roldec 28,800 V34 External.....	£179
US Rob. Worldport 24/9.6 PCMCIA.....	£129
US Robotics Sportster V34 Internal.....	£158
US Robotics Sportster V34 External.....	£158
US Robotics Courier V34 Internal.....	£238
US Robotics Courier V34 External.....	£238

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NETWORK SOFTWARE

Novell Personnel Software.....	£46
Novell Personnel Software 5-user.....	£176
Novell Network 3.12 5-user.....	£422
Novell Network 3.12 10-user.....	£962
Novell Network 3.12 25-user.....	£1,430
Novell Network 3.12 100-user.....	£2,704
Novell Network 4.1 5-user.....	£481
Novell Network 4.1 10-user.....	£1,094
Novell Network 4.1 25-user.....	£1,625
Novell Network 4.1 100-user.....	£3,074



NETWORK CARDS

NE2000-Compatible BNC.....	£19
NE2000-Compatible RJ45.....	£21
NE2000-Compatible Combo.....	£26
Novell NE2000 16-Bit BNC or RJ45.....	£57
3COM 3C509 16 Bit BNC or RJ45.....	£78
SMC Elite Ultra 16 Bit BNC or RJ45.....	£63
Intel Etherpress 16 Bit BNC or RJ45.....	£73
D-Link PCI Ethernet 32 Bit combo.....	£89



486 MOTHERBOARDS

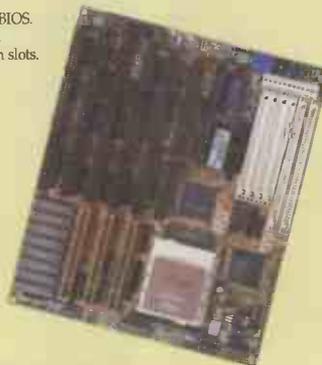
Intel CPUs	QDI	VLB-PW4T	PCI-P14	PCI 48AL
Bareboard	-	£62	£80	£92
486DX2-66	£75	£137	£155	£167
486DX4-75	£90	£152	£170	£182
486DX4-100	£103	£165	£183	£195
AMD CPUs				
486DX2-66	£50	£112	£130	£142
486DX2-80	£55	£117	£135	£147
486DX4-100	£69	£131	£149	£161

Q01 2/3 Baby AT size board with 256K cache, OPTI chipset, AMI Win BIOS Flash ROM. Memory 4 x 30 pin & 2 x 72 pin SIMM slots supports up to 64MB, 3 x VESA, 6 x ISA 16 Bit, 1 x 8 expansion slots. Supports DX4 Intel, AMD & Cyrix CPU, Green Functions.

PW4T 2/3 Baby AT size board with 256K cache, Winbond chipset, AMI BIOS. Memory 4 x 30 pin & 2 x 72 pin SIMM slots supports up to 64MB. 3 x VESA (2 x VESA LB Masters) 6 x ISA 16 Bit, 1 x 8 Bit expansion slots. Supports DX4 Intel, AMD & Cyrix CPU, Green Functions.

PCIPM4 2/3 Baby AT size board with 256K cache, AMI BIOS. Memory 4 x 72 pin SIMM slots supports up to 128MB. 4 x PCI 32 Bit, 3 x ISA 16 Bit expansion slots. Supports DX4 Intel, AMD & Cyrix CPU, Green Functions. 2 x on-board PCI Local-Bus Enhanced IDE controllers. 2 serial fast UART 16550 compt., 1 parallel ECP/EPP

PCI48AL 486SX, SX2, DX, DX2, DX4 Processors Intel, AMD, Cyrix 256K or 512K write-back cache. Up to 64MB RAM on-board, ALI Chipset, AMI BIOS, 3 PCI slots, 4 ISA slots. 2 PCI E-IDE channel (mode 3/4) and floppy controller 2.88. 2 serial fast UART 16550 compt., 1 parallel ECP/EPP, 1 PS/2 mouse ports. 1/2 baby AT size.



PENTIUM™ MOTHERBOARDS

CPU	PCI-54AL	PE-256	PCI-54IT	Intel™ PLATO	Intel™ ENDEAVOUR
Bareboard	-	£119	£115	£159	£142
Pentium™-75	£129	£248	£244	£288	£271
Pentium™-90	£210	£329	£325	£369	£352
Pentium™-100	£250	£369	£365	£409	£392
Pentium™-120	£400	-	-	£559	-
Pentium™-130	£515	-	-	£674	-

PCI54AL Intel P54C/CT 75/90/100/120/133MHz processors 256K or 512K write-back cache; Up to 128MB RAM ALI chipset; Plug and Play AMI BIOS 3 PCI slots; 4 ISA slots; 2 PCI E-IDE channels & floppy controller 2 serial, 1 parallel ports; 4/5 baby AT size

PE-256 Intel Pentium™ 75/90/100/120/133MHz processors 256K or 512K write-back cache; Up to 128MB RAM; SIS chipset 3 PCI slots, 4 ISA slots; 2 PCI E-IDE channels (mode 3/4); floppy controller 2.88 2 serial fast UART 16550 compt., 1 parallel ECP/EPP, 1 PS/2 mouse ports 4/5 baby AT size

PCI54IT Intel P54C/CT 75/90/100/120/133/150/166/180/200MHz processors 256K or 512K write-back cache; Up to 64MB RAM Pipelined Burst Synchronous module, Asynchronous module, or Discrete Asynchronous on board Up to 128MB RAM Fast Page and EDO support Intel Triton Chipset; Plug and Play AMI BIOS; 4 PCI slots, 3 ISA slots 2 PCI E-IDE channel (mode 3/4) & floppy controller 2.88; 2 serial fast UART 16550 compt., 1 parallel ECP/EPP, 1 PS/2 mouse ports; 1/2 baby AT size



SCANNERS

HP Scanjet IIIP AT Interface.....	£384
HP Scanjet IIICX AT Interface.....	£759
HP Scanjet IICX Document Feeder.....	£Call
Roldec 600/1200dpi Flatbed.....	£299
Roldec 1200/2400dpi Flatbed.....	£440
Mustek Hand-held 256-greyscale.....	£55
Mustek Hand-held 1200 Colour.....	£119

KEYBOARDS

CKB33 Soft Touch.....	£10
RKB65 102 Key Click.....	£13
KB61102 Key Click Metal.....	£20
Cherry High Quality Keyboard.....	£23

MICE & TRACKBALLS

EC-3N MS-Compatible Mouse.....	£5
TX-300A MS Compat Mouse & Mat.....	£9
MSM-2 Microsoft Mouse.....	£29
LTM Logitech Mouse.....	£25
TK-300 Desktop Trackball.....	£20

CASES

AW-4000 Workstation 90w PSU, TUV.....	£57
AS-4300 Slimline 200w PSU, TUV.....	£49
AD-4300 Desktop 200w PSU, TUV.....	£49
AM-4000 Mini Tower 200w PSU, TUV.....	£46
AM-4300 Midi Tower 200w PSU, TUV.....	£59
AB-4000 Big Tower 250w PSU, TUV.....	£81

Low Cost Cases with Speed Display	
WE-827 Mini Tower Case, 200w PSU.....	£34
WE-837 Desktop Case, 200w PSU.....	£34
WE-935 Midi Tower Case, 200w PSU.....	£47
WE-990 Full Tower Case, 250w PSU.....	£75

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30 & 72 PIN SIMM

30 PIN SIMM	60NS	70NS	80NS	100NS	30 PIN SIMM	60NS	70NS	80NS	100NS
256K X 8 BIT - 2 CHIP				3	1MB X 9 BIT - 3 CHIP	CALL	30	28	
256K X 9 BIT - 3 & 9 CHIP		10	10	8	1MB X 9 BIT - 9 CHIP	CALL	31	31	CALL
1MB X 8 BIT - 8 CHIP			28		4MB X 9 BIT - 9 CHIP		115	105	105
72 PIN SIMM	60NS	70NS	80NS	72 PIN SIMM	60NS	70NS	80NS		
1MB = 256K X 36 BIT		40	40	8MB = 2MB X 36 BIT		250	240		
2MB = 512K X 36 BIT			75	16MB = 4MB X 32 BIT		370	350		
4MB = 1MB X 32 BIT		115	110	16MB = 4MB X 32 BIT EDO			480		
4MB = 1MB X 32 BIT EDO			140	16MB = 4MB X 36 BIT		420	395		
4MB = 1MB X 36 BIT		130	125	32MB = 8MB X 32 BIT			660		
8MB = 2MB X 32 BIT		230	220	32MB = 8MB X 32 BIT EDO			950		
8MB = 2MB X 32 BIT EDO			260	32MB = 8MB X 36 BIT		740	720		

CACHE RAM CHIPS

8K X 8 BIT - 20 NS	4.50	32K X 8 BIT - 20 NS	5.00
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DRAM CHIPS - PLEASE CALL

CYRIX PROCESSOR UPGRADES

PROCESSOR UPGRADES		80386DX - 16/ 20 MHZ TO 486 - 40 MHZ	135
80386SX - 16/ 20 MHZ TO 486 - 40 MHZ	135	80386DX - 25 MHZ TO 486 - 50 MHZ	155
80386SX - 25 MHZ TO 486 - 50 MHZ	155	80386DX - 33 MHZ TO 486 - 66 MHZ	175
NUMERIC PROCESSORS	80387SX - 0 TO 33 MHZ	80387DX - 0 TO 40 MHZ	48

WORKSTATION MEMORY

HEWLETT PACKARD	4MB	8MB	16M	32M	64M
HP 3000 9x7 SERIES 937; 947; 957; 967; 977; 987; 9x7LX SERIES 917LX; 927LX; 937LX; 947LX; 957LX; 967LX; 9000 SERIES 807S; 817S; 827S; 837S; 847S; 857S; 867S; 877S; 887S; 897S			520	980	1800
HP APOLLO 9000 SERIES 375; 380; 400d; 400s; 400t; 425s; 425t; 433s	160	275	500	920	
HP APOLLO 9000 SERIES 382; 425e	160	275	500		
HP APOLLO 9000 SERIES 700/RX 16Ca; 16Ci; 19Ca; 19M	140	260			
HP APOLLO 9000 SERIES 705; 710		300	560	1000	
HP APOLLO 9000 SERIES 745i; 747i; 715/33; 715/50; 725/50		300	560	1000	1950
HP APOLLO 9000 SERIES 720; 730; 735; 750; 755			560	1000	1950
IBM	4MB	8MB	16M	32M	64M
XSTATION 120; 130	140				
RS/6000 POWERSTATION/ POWERSERVER 220 SERIES	140	260			
RS/6000 POWERSTATION/ POWERSERVER 320; 320E; 320H; 340; 340R; 350; 350R; 520; 520H; 530; 530E; 530H; 550; 550E; 550S; 560; 560F; 580; 730; 930; 950; 970; 980			780	1150	2100
SUN MICROSYSTEMS	4MB	8MB	16M	32M	64M
MODEL 3/60; 3/80; 4/110	140		440		
SPARCSTATION ELC (4/25); IPX (4/50)			420		
SPARCSERVER/ SPARCSTATION 330; 370; 390		260			
SPARCSTATION SLC (4/20)	140				
SPARCSTATION IPC (4/40); 1 (4/60); 1+ (4/65); 2 (4/75)	140		440		
SPARCSTATION CLASSIC LC (4/15); LX (4/30)		260		880	
SPARCSERVER/ STATION/ ENGINE 10 MODEL 30; MODEL 41; MODEL 52/ 54			500		1850
SPARCSERVER 630MP; 670MP; 690MP					1850

DESKTOP MEMORY

AST	2MB	4MB	8MB	16M	32M	64M
ADVANTAGE 386SX/20; 386SX/25; PRO 386SX/25; BRAVO 3/25s; 3/33s	56		220			
ADVANTAGE 486/25; 486/33; 486/33p; 486SX/20; BRAVO 4/33(original); 486/25 PREMIUM 386/33TE; 486/25; 486/25E; 486/25TE; 486/33; 486/33E; 486/33TE PREMIUM II 386/35; 386/33; 486/33; 486SX/20 POWER PREMIUM 3/33; 4/33; 4/33s; 4/50d; 4/66d; PREMIUM SERVER SE 4/33	60		300			
ADVANTAGE PRO 486DX/33; 486SX/25; BRAVO 4/25s; 4/33; 4/33s; 4/50d; 4/66d BRAVO LC 4/25s; 4/33; 4/33s; 4/50d; 4/50s; 4/66d; 4/100t; BRAVO LP 4/25s; 4/30s; 4/33; 4/33s; 4/66d; BRAVO MS 4/50s; 4/66d; 4/100t; P/60; P/90; P/100; BRAVO MT 4/33; 4/33s; 4/50s; 4/66d; P/60	80	115	220	380	720	
ADVANTAGE PLUS 486DX/33; 486DX/2/50; 486DX/2/66	115	220	400			

AST (CONT.)	2MB	4MB	8MB	16M	32M	64M	
BRAVO 286s; 386SX/16; 386SX/20; 386SX/25	70		210				
PREMIUM 386; 386C		120					
PREMIUM 386/25; 386/33; 386/33T; 386SX/16; PREMIUM II 386SX/20; 386SX/25 PREMIUM SERVER SE 4/50; 4/66; CUPID MEMORY BOARD	140						
PREMMIA 4/33; 4/33s; 4/50d; 4/66d; PREMMIA SE 4/66d; P/60; PREMMIA MTE 4/66d; P/60	150	270	500	920			
PREMMIA GX P/90; P/100; PREMMIA LX P/60; PREMMIA MX 4/66d; 4/100t; P/60			240	470	810	1590	
COMPAQ	2MB	4MB	8MB	16M	32M	64M	
DESKPRO 286N; 3/25; 3/33; 386/25M; 386/33M; 386N; 386s/20; 386s/20N; 4/25G; 4/33; 4/66; 486/33M; 486s/16M; 486s/25M; 486DX/2/50M; 486DX/2/66M; DESKPRO XE 4/33s; 4/50; 4/66; PROLIANT 1000 486DX/2/66; ENHANCED PROLINEA; PROLINEA 4/25s; 4/33; 4/33s; 4/50; 4/66; NET 1/25e; 1/25s; 1/25r; PROLINEA MT 4/33s; 4/50; 4/66; PROSARIO 400; 425; 433; 520; 520 CDTV; 600; 633; 660; 720 CDS; 724; 800; 833 CDS; 850; 866; 860 CDS; 920 CDS; 920 CDTV; 924; 924 CDS; PROSIGNIA PC SERVER 486/33; 486DX/2/66; PROSIGNIA VS. SYSTEMPRO/LT 386/25; 386/33; 486/33; 486DX/2/50; 486SX/25	75	130	240	400	790		
DESKPRO 386/33; 386/33L; 486/25; 486/33L; 486/50L; SYSTEMPRO 386/33; 486/33	90		280		1000		
DESKPRO 5/60M; 5/66M; XE 5/60; PROLIANT 1000 5/60; PROLIANT 2000 486/50; 5/66; PROLIANT 4000 486/50; 5/66; PROSIGNIA PC SERVER 5/60; 5/90			280	520	960	1800	
PROLINEA 3/25s; 3/25szs	58	220					
SYSTEMPRO XL 486/50; PENTIUM				520	980	1800	
	1MB	1-2MB	4-8MB	8MB	4MB MOD.	4MB BOARD	
DESKPRO 386/16	80	180	320	470	150	185	
					DESKPRO 386/20; 386/20e; 386/25; 386/25e	150	185
DELL	2MB	4MB	8MB	16M	32M	64M	
SYSTEM 316SX; 320SX (REV.1); 325SX	70						
SYSTEM 320SX (REV.2); 3250; 325P; 3330; 333P; 433P		130					
DIMENSION 386DX/33; 486SX/25; 486SX/33; 486DX/2/50; LOW PROFILE DESKTOP 486P/16; 486P/20; 486P/25; 486P/33; LOW PROFILE POWER DESKTOP 486P/50; 486P/66; NETPLEX P SERIES: POWER DESKTOP 486D/16; 486D/20; 486D/25; 486D/33; 486D/50; 486D/66; PRECISION 386DX/33; 486 SERIES	130	240	420	750			
DIMENSION XPS 450V; 466V; 4100; DIMENSION XPS midsize 466; DIMENSION XPS midsize 4100; OPTIPLEX 433e; 450e; 466e; 4100e; 425s/L(V); 433L(V); 433s/L(V); 450L(V); 466L(V); 425s/MX(V); 433MX(V); 433s/MX(V); 450MX(V); 466MX(V); PERFORMANCE 425s/L; 425s/M; 433L; 433M; 433s/L; 433s/M; 433T; 450L; 450M; 450T; 466L; 466M; 466T	180	240	420	750			
DIMENSION XPS P60; P60FS; P60MDT; P90; P90MDT; OMNIPLEX 433ME; 450ME; 466ME; 4100ME; OPTIPLEX XL590; XM590; POWEREDGE XE433; XE433s; XE450; XE466			240	470	810	1590	
OMNIPLEX 560ME; 566ME; 590ME POWEREDGE SP433; SP450; SP466; SP566; XE560; XE566; XE590; XE5100			260	520	925	1870	
OPTIPLEX 425LXe; 433LXe; 450LXe; 460LXe; 4100LXe OPTIPLEX 425Mxe; 433Mxe; 450Mxe; 466Mxe; 4100Mxe	130	250	460	910			
PERFORMANCE 425sME; 433ME; 433sME; 450ME; 466ME 4000XE SERIES 486/33; 486/50; 486/66			260		925		
SYSTEM 425TE; 433TE; POWERLINE WORKSTATIONS 420DE; 420SE; 425DE; 425SE; 433DE; 433SE; 450DE; 450DE/2; 450SE; 450SE/2; 466DE; 466SE	80	150	260	520			
HEWLETT PACKARD	2MB	4MB	8MB	16M	32M	64M	
NETSERVER LE SERIES 486DX/33; 486DX/2/66; 486SX/33; NETSERVER LM SERIES 4/33 LM; 4/66 LM; 5/60 LM; VECTRA 386/25 PC; 486/25M; 486/25M; 486/25N; 486/25NI; 486/25T; 486/25U PC; 486/33U PC; 486/25VL; 486/33M; 486/33MI; 486/33N; 486/33NI; 486/33ST; 486/33T PC; 486/33VL; 486/33XM; 486/50N; 486/50U PC; 486/50XM; 486/66XM; 486/66N; 486/66ST; 486/66U PC; 486/66VL; 486 PC; 486s/20; 486s/33M; 486s/33NI; 486s/33XM	130	260	460	910			
VECTRA 386/16N PC; 386/20N PC; 386/35N PC; 386/33N; 386/33NI	80		240				
VECTRA M2; N2; XM2; XP; XU; VECTRA VL2 4/25e; 4/33s; 4/33se; 4/50; 4/66; 4/100	130	260	460	910			
VECTRA QS/16S; QS/20; RS/20; RS/20C; RS/25; RS/25C	130						
IBM	1MB	2MB	4MB	8MB	16M	32M	
APTIVA 310; 330; 350; 510; 530; 710; 730; PC 300 (6571); (6573); (6575); (6581); (6583); (6585); PC 700 (6875); (6876); (6885); (6886)			120	230	400	790	
PS/1 286 (2011); PS/1 386SX (2121)	80	140					
PS/1 PRO 386SX (2123); (2133- 72PIN); (2155- 72PIN); (2168- 72PIN) PS/Valuepoint (6381); (6382); (6384- 72PIN); (6387); (6472); (6482); (6484); (6492); (6494)	75	130	240	400			
PS/1 (2133- 30PIN); (2155- 30PIN); PS/VALUEPOINT (6384- 30PIN)		120		440			
PS/2 25/286; 30/286	75						
PS/2 25SX; 35LS; 35SX; 40SX; 502; 55LS; 55SX; 56; 56SLC LS; 56SX; 56LS; 57; 57SLC; 57SX; 60; 65SX; 70; 76; 77; 80; 90 XP 486; 95 XP 486 (8595); E (9533); SERVER 85; PREMIER PS/2 56; 57; 76; 77; ULTIMEDIA-M57; M77	40	75	130	240			
PS/2 95 XP 486 (9595); SERVER 95 (9595); SERVER 95 ARRAY (9595)			140	280	460		
PS/2 SERIES; 1.632 BIT MCA MEMORY BOARD (6450609 & 34F3077)	190	250	360	600			

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PORTABLE MEMORY

AST	2MB	4MB	8MB	16MB
ADVANTAGE EXPLORER: ASCENTIA 700N; BRAVO NB		140	430	
ASCENTIA 800N; 810N		140	270	460
ASCENTIA 900N; 910N		140	280	450
PREMIUM EXECUTIVE 286/12; 386SX/20, 386SX/25, 386SX/25C		140		
POWER EXECUTIVE 3/25SL; 3/25SL-C, 4/25SL (SE); 4/33SL; COLOUR; COLOUR PLUS; EL	75	140	260	430
POWER EXECUTIVE 4/25SL; COLOUR; COLOUR PLUS		140		450
CANON	2MB	4MB	8MB	
NOTEJET 486/25 (BN-22)	75	130	250	
NOTEJET II 486C50 (BN-32P)	75	130	250	
NOTEJET 486C25 (BN-100C); 486C33 (BN-100C); 486M33 (BN-120); INNOVA 486NX		140	240	
COMMODORE	2MB	4MB		
C286-LT; C386SX-LT (16 MHZ)		85		
C386SX-LT (20 MHZ)			180	
COMPAQ	1MB	2MB	4MB	8MB
CONCERTO 4/25; 4/33-LTE ELITE			145	260
CONTURA 3/20; 3/25; 3/25C	75	130	240	
CONTURA 4/25; 4/25C; 4/25CX; 4/25EX		140	260	480
CONTURA 400, 410		145	260	480
CONTURA AERO		140	240	480
LT 286	45	80	130	
LTE 386s/20	60	90	160	
LTE LITE/20, LITE/25; LITE/25C; LITE/25E	90	160	290	480
LTE LITE 4/25; 4/25C; 4/25E; 4/33C		145	260	480
PORTABLE 486/66; 486C/66	40	75	120	240
SLT 286	60		120	
SLT 386s/20	55	95	160	
DELL	2MB	4MB	8MB	16MB
212N; 320N; 320N+	80			
316LT; 320LT; 320LX	70			
320SLI; 325SLI	80			
LATITUDE 433; 433C; 433CX; 450C; 450CX		140	430	
LATITUDE 433M; 433MC; 450NC; 450MCX		140	270	460
LATITUDE XP 450C; 450CX; 475C; 4100CX		130	245	435
NL20; NL25	80			
EVEREX	2MB	4MB	16MB	
TEMPO CARRIER	80			
TEMPO LX	80			
STEPNOTE 486SX/33; 486DX/250; 486DX/475		130	435	
IBM	1MB	2MB	4MB	8MB
AMBRA TREKA 386SL	75			
LEXMARK SE10		145		
PS/2 GL57SX; THINKPAD 700; 700C; 720; 720C		155	215	

IBM (CONT.)	1MB	2MB	4MB	8MB	16MB
PS/2 L40 SX; N33 SX; PS/NOTE 182		75	135	280	
PS/2 N51 SLC; N51 SX		75	135	265	
PS/2 P70 031; 061; 121; P75	40	75	130	240	
PS/NOTE 2618 C45; E35; M40; THINKPAD 350; 350C			120	235	410
PS/NOTE N45 SL		90			
THINKPAD 230C; 230Cs			130	260	
THINKPAD 300		75	255		
THINKPAD 330; 340; 355; 360; 730T			140	265	430
THINKPAD 360; 360C; 360CS; 360P; 750; 750C; 750C; 750Cs; 750P; 755C; 755Cs; 755Cd			140	265	430
THINKPAD 500; 510Cs			145	270	525
THINKPAD 710T		75	135	280	
THINKPAD TP701 SERIES			130	260	460
MITAC	4MB				
3026E	180				
PANASONIC	1MB	2MB	4MB	8MB	16MB
CF-170; 270; 370	40				
CF-380; 480C		90	170	240	
CF-580			140	480	
CF-1000			170		
CF-V21P (CD-NOTE); CF-41			150	270	480
PHILIPS	2MB	4MB			
PCL 300; 304	85	180			
SANYO	2MB				
17/NB; 18/NB; NB/6	80				
SHARP	1MB	2MB	4MB	8MB	16MB
PC 6200; 6220; 6240	55				
PC 6440		140			
PC 6600; 6621; 6641; 6661		90			
PC 6700; 6741; 6781; 6785; 6800; 6841; 6881; 6891		75	125		
PC 7700; 7750; 8150; 8650; 8650II; 8660			135	435	
PC 8501 COLOURSTAR		95			
PC 8700; 8900			140	245	460
TEXAS INSTRUMENTS	1MB	2MB	4MB	16MB	
TRAVELMATE 2000	80				
TRAVELMATE 3000; 3000 WinSX; WinSLO25		80			
TRAVELMATE SERIES 4000 Win; 4000E Win; 4000M			160	790	
TOSHIBA	2MB	3MB	4MB	8MB	16MB
DYNAPAD T100NX			145		
T1000LE; 1000SE; 1000XE; 1800; 1850; 1850C; 2000; 2000SX; 2000SXe; 2200SX	40		145	260	
T1600	40				
T1800; 1900C; 1910; 1950; 1950CS; 1950CT; 1960 T4500; 4500C; 4600; 4600C; 4700; 4700CS; 4700CT; 4800; 4850; 4900; DYNAPAD T200			145	280	540
T2100; 2105; 2150CT			150	280	520

TOSHIBA (CONT.)	2MB	3MB	4MB	8MB	16MB
T2400; 2450; 3400; 3600			140	260	480
T3100	60				
T3200		50			
T3800SL	80		145		
T4400C DX; 4400SX; 4400C SX; 4400SX; 6400DX; 6400DXC; 6400SX; 6400SX; 6600C; 6600C/CD; 6600C/CDV	80		150	260	480
TS200; 5200/100; 5200/200; 5200C; 8500	80			320	
TWINHEAD			4MB	8MB	16MB
SLIMNOTE 386SL; 386SX; 486SLC		145		440	
SLIMNOTE 330S; 550S; 550T; 575T; 5100T		145	260	470	
ZENITH	1MB	2MB	4MB	8MB	
SLIMSPORT 286; SUPERSPORT 286; 286e	50				
SUPERSPORT SX			100		
MASTERSPORT 386SL; 386SLe; II; ZDS- 600n; 620n; 625n; Z-STAR 433VL	80				
MASTERSPORT 386SX	80				
Z-SPORT 420S; 425S			160		
Z-STAR EX			140		
Z-NOTE 320L; 320Lb; 325L; 325Lc; 325Lp	75			260	
Z-NOTE 200; 425Ln; 425Lnc; 425Lnp; 425Ln+; 425Lnc+; 433Ln+; 433Lnc+; 433Lnp+			145	295	
Z-NOTEFLEX			140	260	

LASER MEMORY

BROTHER	1MB	2MB	4MB	8MB
HL-4; 4PS; 4V; 4Ve	70	100	165	
HL-8; 8D; 8e; 8V	75	105		
HL-6V		105	165	
HL-10DPS; 10DV; 10PS; 10V		100	165	
HL-10h; 660; 1260	40	130	240	
HL-630; 641; 645	65	85		
CANON	1MB	2MB	3MB	4MB
LBP-4; 4 LITE; 4 PLUS	90	125		
LBP-4SX	65	95		
LBP-430; 8IV; 4I; 4U	40		130	
LBP-8II; 8IIR; 8IIT	70	105	170	
LBP-8III; 8III PLUS	100	130	160	
LBP-8SX	75	100		
LBP-860; 1260	40	75	130	240
COMPAQ	2MB	4MB	8MB	16MB
PAGEMARQ 15; 20	80	150	240	440
EPSON	512	1MB	2MB	3MB
ACTIONLASER 1000; 1500; 5000; 5200	15	70		
ACTIONLASER 1100; 1400	40	70	115	
ACTIONLASER 1600; EPL5600	40	75	135	
ACTIONLASER II; EPL-4000; 4100; 4300; 8000; 8100	50	80	120	
ACTIONLASER PLUS & EPL-6000		95	155	
EPL-7000		60	95	125
EPL-7100; GQ-5000	24			

EPSON (CONT.)	512	1MB	2MB	3MB	4MB
EPL-7500			170		
HEWLETT PACKARD	256	1MB	2MB	4MB	8MB
DESKJET 500; 500C; 510; 520; 550C; 560C; PLUS	30				
DESIGNJET 200; 600; 650C; PLOTTER: DESKJET 1200; 1200C; 1200C/PS; LASERJET 4; 4 PLUS; 4M; 4MP; 4MV; 4M PLUS; 4P; 4Si; 4SIMX; 4V; COLOUR; 5		40	70	135	260
LASERJET II; IID		60	95	165	
LASERJET IIP; IIP PLUS; III; IIID; IIP; FAX		60	90	160	
LASERJET IIISi		40	70	115	240
LASERJET 4L		40			
PAINTJET XL300		95		185	300
IBM / LEXMARK	1MB	2MB	3.5	4MB	8MB
LASERPRINTER (4019-001); E(4019-E01); PENNIANT SYSTEM (4028)	65	95	140		
LASERPRINTER SE(4029- 010); 6(4029-020); 6A(4029- 021); 10(4029-030); 10A(4029- 041); 10L(4029-040); 4037- SE; VALUEWRITER 300; 600; WINWRITER 200; 400; 600	40	75		130	
LASERPRINTER 4039 10R; 10R DUPLEX; 12L; 12R; 16L COLOUR JET PRINTER PS 4079; OPTRA L; Lx; LxR; R; Rx				130	250
MANNESMAN TALLY	1MB	2MB	4MB	8MB	
MT-904; 904 PLUS	50				
MT-905		95	165		
MT-906		40	75		
MT-9008		40	75	130	240
OKI	1MB	2MB	4MB	8MB	
OL 400	65	95			
OL400e; 400ex; 410e; 410ex	65	95	165		
OL 410; 810	65	95	165		
OL 800; 820	65	95	165		
OL 830; 840; 850	85				
OL1200			165	280	
PANASONIC	32K	1MB	2MB	4MB	
IXCP-1124i	15				
IXCP-4410; 4430		65	95	165	
IXCP-4420; 4450; 4451		65	95	165	
IXCP-4400; 4401; 5400; SP100		55	85		
IXCP-4440; 5410		60	90	160	
IXCP-4450		70			
IXCP-4455			110		
STAR		1MB	2MB	4MB	
LASERPRINTER 4; STARSRIPT		65	95	170	
LASERPRINTER LS-5; 5EX; 5TT		65	110	190	
LASERPRINTER 8; 8II		70	95	175	
TEXAS INSTRUMENTS		1MB	2MB		
MICROLASER; PLUS; PLUS PS; PS; TURBO; XL; XL PS; XL TURBO			45		
MICROWRITER PS17; PS35			55	90	

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Tape Streamer 420Mb Int add	95
Tape Streamer 850Mb Int add	155
Microsoft Natural Keyboard add	50
250/280VA UPS (single PC) add	90
USR Sportster 14k4 Int modem add	107
USR Sportster 28k8 Int modem add	156

PENTIUM OPTIONS

16Mb EDO RAM instead of 8Mb add	235
32Mb EDO RAM instead of 8Mb add	706
256k synchronous RAM	60
Extra 1Mb DRAM on Video card	30
Midi Tower (3 x 5.25" bay) add	10

486 OPTIONS

8Mb instead of 4Mb add	99
16Mb instead of 4Mb add	299
Extra 1Mb DRAM on Video card	30
Midi Tower (3 x 5.25" bay) add	10
Adaptec 1542C and to change from IDE to SCSI HD	150

MONITOR UPGRADE OPTIONS

15" LR 1280x1024 NI, MPR-II add	80
17" LR 1280x1024 NI, MPR-II add	330
20" LR 1280x1024 NI, MPR-II add	900
21" LR 1280x1024 NI, MPR-II add	1000
Sony CPD-15SF add	150
17" Idek VisionMaster MF-8617A add	355

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HD	486DX4-100	Pent 75	Pent 90	Pent 100	Pent 120	Pent 133
	8mb	8mb	8mb	8mb	16mb	16mb
540Mb	845	1015	1085	1150	1500	1600
850Mb	865	1035	1105	1170	1520	1620
1.2Gb	895	1065	1135	1200	1550	1650
1.6Gb	1045	1215	1285	1350	1700	1800

DABS MULTIMEDIA SYSTEMS

All DABS Multimedia Systems include standard components mentioned above with the addition of: •PCI Accelerated 1Mb video card with MPEG software playback •Creative Labs 16 bit Sound Card •Quad speed CD drive •12w Mains Power Active Speakers •MS Works, MS Encarta •5 Year Warranty*

HD	486DX4-100	Pent 75	Pent 90	Pent 100	Pent 120	Pent 133
	8mb	8mb	8mb	8mb	16mb	16mb
540Mb	1035	1205	1275	1340	1690	1790
850Mb	1055	1225	1295	1360	1710	1810
1.2Gb	1085	1255	1325	1390	1740	1840
1.6Gb	1235	1405	1475	1540	1890	1990



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MF-8617E
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• Up to 1280x1024 @80Hz
• On-Screen Display Menu
• Colour Balance Control
• VESA & Energy Star Power Saving
• MPRII, TUV & CE Compliance

MT-9017E
• 17" 0.25mm Diamond/Tron colour
• Up to 1600x1200 @67Hz
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• Colour Balance Control
• VESA & Energy Star Power Saving
• MPRII, TUV & CE Compliance

MF-821E
• 21" 0.22mm Hzi FST colour
• Up to 1600x1200 @87Hz
• On-Screen Display Menu
• Colour Balance Control
• VESA & Energy Star Power Saving
• MPRII, TUV & CE Compliance

MT-9021E
• 21" 0.30mm Diamond/Tron colour
• Up to 1600x1200 @75Hz
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• Colour Balance Control
• VESA & Energy Star Power Saving
• MPRII, TUV & CE Compliance

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• 0.28mm Anti-Static Non-Glare Dark Tr
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• MPRII Low Radiation
• Front Controls

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• Refresh rate 1024x768@80Hz
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ProVista	14"	0.28	1024x768	155
Microscan 3v	14"	0.28	1024x768	185
Microscan 4v	15"	0.28	1280x1024	249
Microscan 4GP	15"	0.28	1280x1024	269
Microscan 5EP	17"	0.28	1280x1024	449
Microscan 5AP	17"	0.26	1280x1024	459

IYAMA

MF-8115 15"	245	MF-8617E 17"	485
MF-8221 21"	1247	MT-9121 21"	1209
MF-8621 21"	1645	MT-9017E 21"	582

GOLDSTAR

GS14620M 14"	169	GS1468	170
GS15050M 15"	194	GS15200M 15"	227
GS17250M 17"	440	GS20100M 20"	849

MICROVITEC

Autoscan 1450 14"	147	Autoscan 1439 14"	205
Proscan 1565 15"	231	Proscan 1782 17"	515

NEC

Multisync XV14 14"	172	Multisync XV15 15"	273
Multisync XE15 15"	318	Multisync XV17 17"	549
Multisync XE17 17"	680	Multisync XP17 17"	895
Multisync XE21 21"	1139	Multisync XP21 21"	1745

NOKIA

448S030P 14"	225	448E030P 15"	305
447B930 17"	519	448M032 15"	355
447M930 17"	629	447X932 17"	710
447M932 17"	685	445M930 21"	1299

PHILIPS

14C LR 14"	162	14A 14"	195
15B 15"	242	15A 15"	259
17C 17"	415	17T Trinitron 17"	446
17A 17"	625	20C 20"	775
20T Trinitron 20"	1085	21B 21"	1199

PANASONIC

TX1537 15"	335	TX1732 17"	470
TDX1751 17"	849	TX2032 20"	1196
TDX2123 21"	1388	TX2103 21"	1408

SAMSUNG

SyncMaster 3 LR 14"	153	SyncMaster 3 Ne 14"165	
15GLE 15"	225	15GL 15"	279
17GL 17"	465	17GLS 17"	579

SONY

CPD-16SF1 15"	239	CPD-17SF1 17"	569
GDM-17SE1T 17"	785	GDM-20V1 20"	1215
GDM-20SE1T 20"	1360		

TAXAN

400 LR 14"	188	410 LR 14"	189
420 LR 14"	238	580 LR 15"	275
880 LR 17"	515	885 LR 17"	589
895 LR 17"	799	1080 LR 20"	869
2100 LR 21"	1489		

VIEWSONIC

V56E 14"	154	V515E 15"	305
V517G 17"	515	V517-2 17"	650
V520G 20"	989		

WYSE

WY-1450 14"	185	WY-14+ 14"	185
WY-1570 15"	239	WY-15E 15"	249
WY-1791 17"	469		

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TERMINALS

WYSE

WY-35	275	WY-55	249
WY-60	315	WY-120	295
WY-160	340	WY-185	305
WY-285	269	WY-520	650
WY-325	469	WY-370	299

DEC

VT-510	239	VT-510 LE	249
VT-520	275	VT-520 LE	265

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Pentium 75-180 4PCV/ISA 256k EIDE TRITON	175

INTEL

Endeavour P 75-180iD+256K cache	207
Advanced ZP Pentium 75 & 8Mb EDO	515
Adv EV P50 + Sound 540 Adv EV P100+Sound623	
Endeavour P 75-180iD 207	

PROCESSORS

AMO

486DX2/80	81	486DX4/100	95
486DX4/75	80	486DX4/100	105
Pentium 75	128	Pentium 90	205
Pentium 100	279	Pentium 120	406
Pentium 133	499	486 Heatsink+Fan	5

INTEL OVERDRIVE

Any 486 -> DX4/75	153	Any 486 -> DX4/100	179
486 -> Pentium	259		

SIMM MEMORY

30pin x9	30pin x8	72pin x22	72pin x36	72pin x36	72pin x36
256k	10	10			
1Mb	26	29	38	38	
2Mb		79	65	69	
4Mb	89	94	90	102	120
8Mb		185	199	235	
16Mb	475		309	329	
32Mb			625	669	

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IOE DRIVE CONTROLLERS

2 HD+2 FD+2 serial+1 parallel+1 game ISA	10
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1505 kit ISA	42	1515 kit ISA	65
1542CF card ISA	125	1542CF kit ISA	165
1542CP PnP	Call	2825 kit with IDE+SCSI10	
2842C kit VLB	165	2940 kit PCI	189
2742 kit EISA	245	2940W kit PCI	259
7348 Parallel	84	7358 EPP Parallel	115
460 PCMCIA	155		

DISPLAY ADAPTERS

CIRRUS LOGIC

5422 1Mb ISA	45	5428 1Mb VLB	50
5434 1Mb PCI	64	5434 2Mb PCI	114

CREATIVE

300 Blaster	265	TV Coder External	100
VideoBlaster SE100	165	VideoBlaster SE200	220
VideoBlaster RT300	255	VideoBlaster MP400	174
VideoBlaster Dev Kit	55	Sharevision PC3000	910

DIAMOND

Stealth SE 1Mb	78	Stealth SE 2Mb	119
St 64 Video 2Mb VRAM	219	St 64 Video 4Mb VRAM	299
St 64 Video 1Mb DRAM	99	St 64 Video 2Mb DRAM	139
Motion Video player	205	Motion Video 2Mb	315
Viper SE 2Mb	199	Viper Pro Video 2Mb	269
Viper Pro Video 4Mb	369		

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Kelvin 64 2Mb	129	Viola Pro	265
Viola Pro	425	Viola Premium	560
Fahrenheit 64 1Mb VLB	90	Fahrenheit 64 1Mb PCI95	
Fahrenheit 64 2Mb VLB	130	Fahrenheit 64 2Mb PCI134	
Fht Pro 64 1Mb VLB	205	Fht Pro 64 1Mb PCI	210
Fht Pro 64 2Mb VLB	285	Fht Pro 64 2Mb PCI	295

VIDEOLICE

GraphixStar 300 1Mb	99	GraphixStar 300 2Mb	139
GraphixStar 500 1Mb	128	GraphixStar 500 2Mb	180
GraphixStar 700 2Mb	240	GraphixStar 700 4Mb	379
PCI Movie	725	MPEG Add-on	229
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HP

JetDirect MID	288	JetDirect External	229
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INTEL

Netport EL 2p	250	Netport XL 1S 2p	290
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STREAMERS

COLORADO

Jumbo 340Mb Int	73	Jumbo 680Mb Int	120
Jumbo 1.4Gb Int	180	T1000 Travan int	115
Trakker 350Mb Par	155	Trakker 680Mb Par	199
FC-20 Fast Controller	45	KE-10 External Kit	60

COLORADO POWERTAPE

1100 1Gb SCSI Int	370	2400 2.4Gb SCSI Int	629
2400 2.4Gb SCSI Ext	720	4000 4Gb SCSI Int	779
4000 4Gb SCSI Ext	949	SCSI Interface	96

CONNER

Tapestor 420Mb Int	90	Tstor 420Mb Par	179
Tapestor 850Mb Int	135	Tstor 850Mb Par	225
Tapestor 4000 Int	345	Tstor 4000 Ext	395
Tapestor 4Gb DAT Int	399	Tstor 4Gb DAT Ext	420
Tapestor 1700 Int	225		

HEWLETT PACKARD

Model	Int	Ext	Kit
SureStore 2000 2Gb	549	711	885
SureStore 5000 5-8Gb	639	749	1599
SureStore 6000 4-16Gb	759	869	1739

IOEMEGA

Tape 250 Insider	85	Tape 250 Parallel	165
Tape 700 Insider	135	Tape 700 Parallel	270
Ditto 3000 Int	120	Ditto 1700 Int	185
Ditto 3200 Int	169	Ditto 3200 Parallel	249

WANGTEK SCSI

5250ES 250Mb Int	295	5250ES 250Mb Ext	439
5525ES 525Mb Int	345	5525ES 525Mb Ext	539
51000HT 1Gb Int	495	51000HT 1Gb Ext	639
9500 10Gb Int	710		

WANGDAT SCSI

3100 2Gb Int	489	3100 2Gb Ext	559
3200 4-8Gb Int	595	3200 4-8Gb Ext	665
3400DX 8-16Gb Int	675	3400DX 8-16Gb Ext	745

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QuickInvoice	28		
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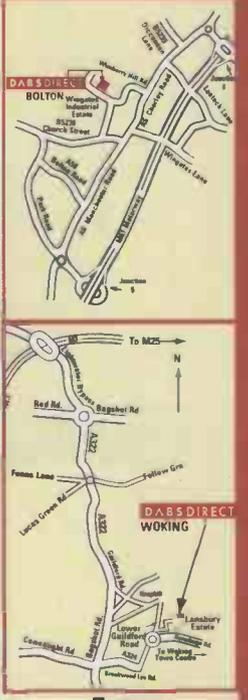
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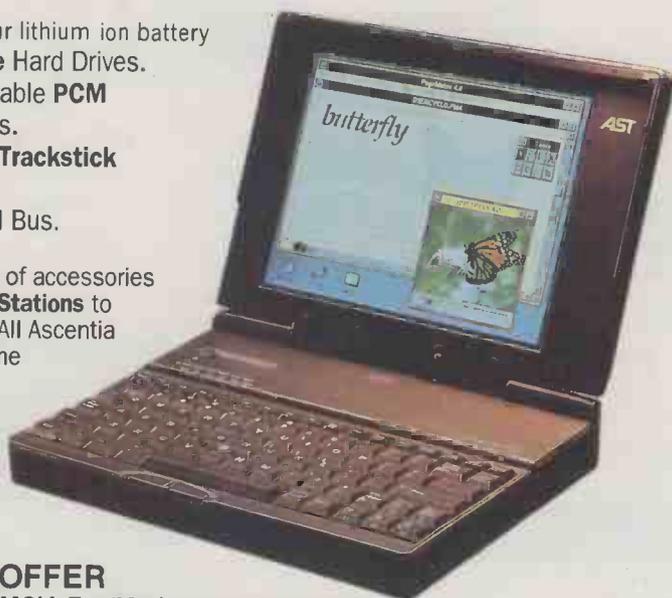


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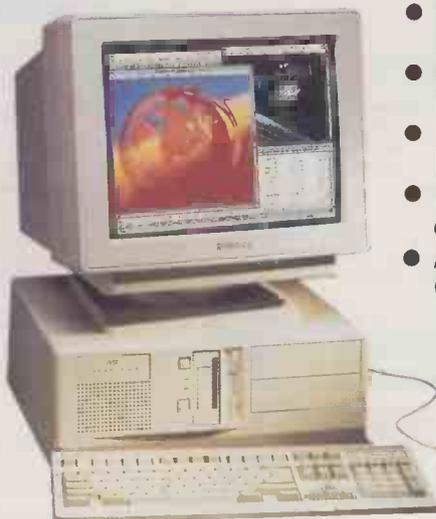
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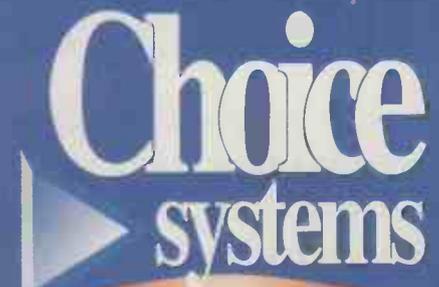
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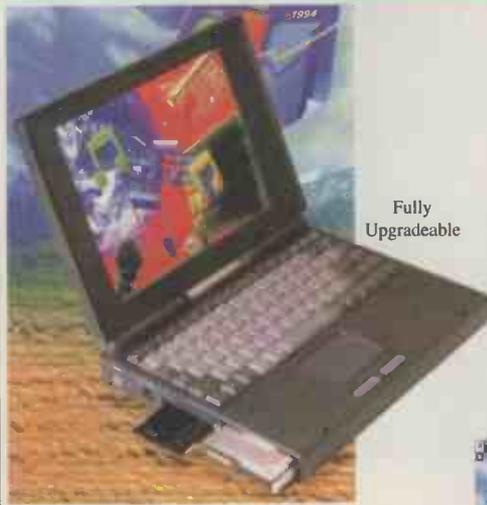
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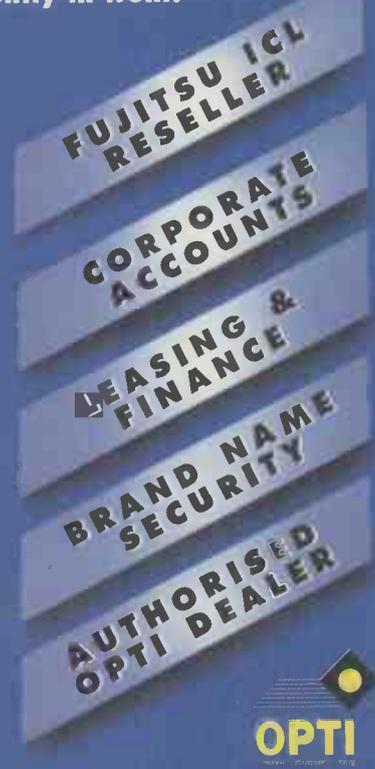


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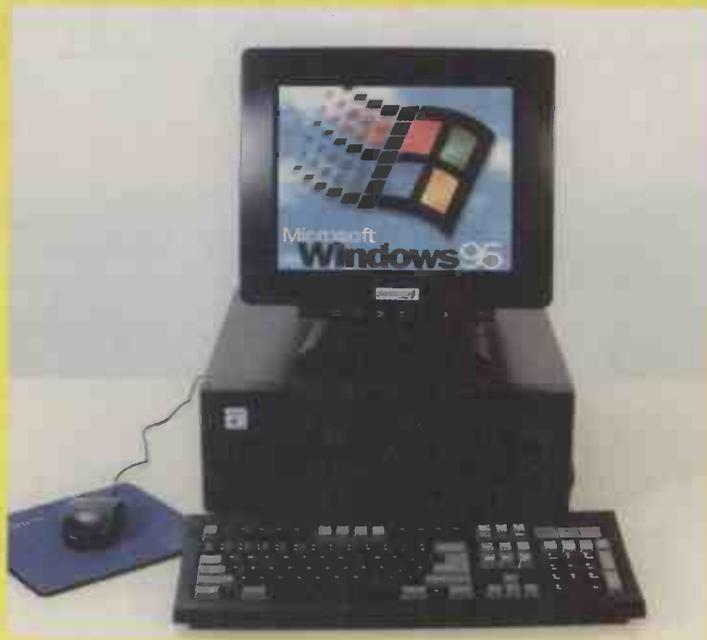
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Intel 80486DX2-50	£50
Intel 80486DX2-66	£78
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410MS	486DX2/50	4MB	250HD	9.5" Mono	£ 869
410CMS	486DX2/50	4MB	350HD	9.5" Dual Scan Col	£1369
410CX	486DX2/50	4MB	350HD	8.4" TFT Col	£1495
420C-350MS	486DX4/75	4MB	350HD	10.4" Dual Scan Col	£1525
420C-420	486DX4/75	8MB	420HD	10.4" Dual Scan Col	£1689
420CX	486DX4/75	8MB	420HD	10.4" TFT Colour	£2219
430C	486DX4/100	8MB	720HD	10.4" Dual Scan Col	£2119
430CX	486DX4/100	8MB	720HD	10.4" TFT Colour	£2559

3yr Int. Warr. MS=Microsoft Works for WIN. Mem upgr. - 4MB £145, 8MB £285, 16MB £529

COMPAQ LTE ELITE

	CPU	Ram	H Disk	Display	Price
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4/75 C510	486DX4/75	8MB	510HD	9.5" Dual Scan Col	£2099
4/50 CX	486DX2/50	8MB	340HD	9.5" TFT Col	£2245
4/75 CX340	486DX4/75	8MB	340HD	9.5" TFT Col	£2445
4/75 CX510	486DX4/75	8MB	510HD	9.5" TFT Col	£2615
4/75 CXL510	486DX4/75	8MB	510HD	10.4" TFT Col	£2915
4/75 CXL810	486DX4/75	8MB	810HD	10.4" TFT Col	£3165

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370 TC1	4386DX4/75	4MB	340HD	10.4" TFT Col	£2239
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701 DS2	486DX2/50	4MB	540HD	10.4" Dual Scan Col	£1995
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701 TF1	486DX2/50	4MB	360HD	10.4" TFT Col	£2159
701 TF2	486DX2/50	4MB	540HD	10.4" TFT Col	£2299
701 TF3	486DX4/75	8MB	360HD	10.4" TFT Col	£2829
701 TF4	486DX4/75	8MB	540HD	10.4" TFT Col	£2965
701 TF5	486DX4/75	8MB	720HD	10.4" TFT Col	£3099
755 CE2	486DX4/100	8MB	340HD	10.4" TFT Col	£3575
755 CD3	486DX4/100	8MB	540HD	10.4" TFT Col	£4119

755 CX1	5/75	8MB	540HD	10.4" TFT Col	£3869
755 CV1	486DX4/100	8MB	540HD	10.4" TFT Col	£4775

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T2150CDS	486DX4/75	4MB	520MB	10.4" Dual Scan Col	£2164
T2150CDT	486DX4/75	8MB	520MB	10.4" Dual Scan Col	£2495
T2450CT	486DX4/75	8MB	320MB	9.5" TFT Col	£2244
T3600CT	486DX4/75	8MB	250MB	8.4" TFT Col	£2114
T4850CT	486DX4/75	8MB	500MB	10.4" TFT Col	£2964
T4900CT	5/75	8MB	810MB	10.4" TFT Col	£3394
SAT 400CS	5/75	8MB	810MB	10.4" Dual Scan Col	£2419
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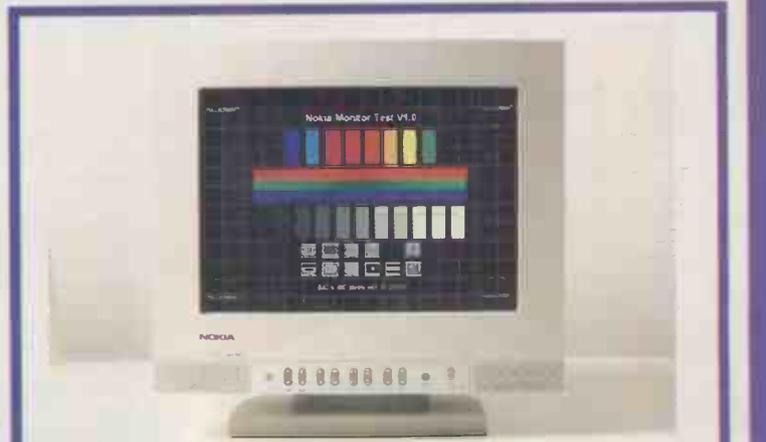
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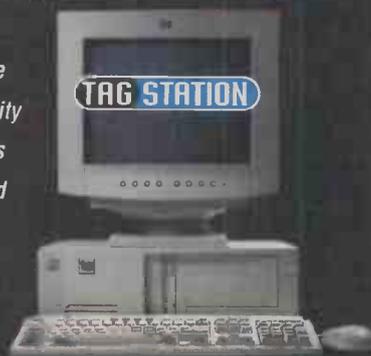
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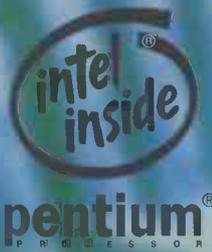
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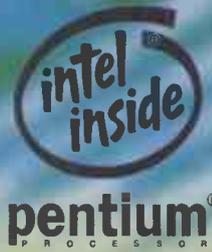
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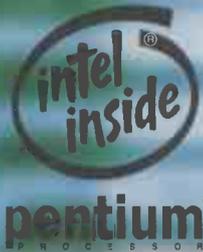
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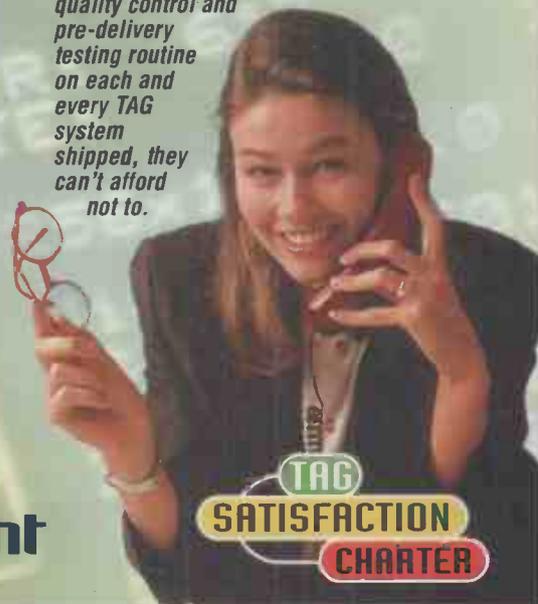
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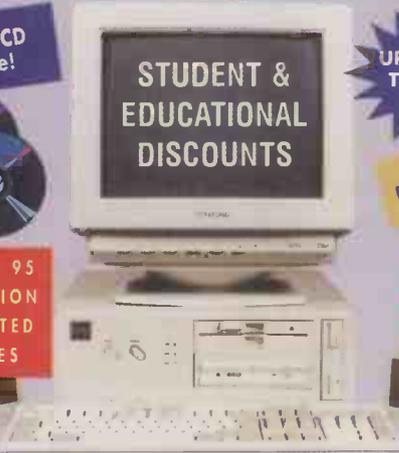
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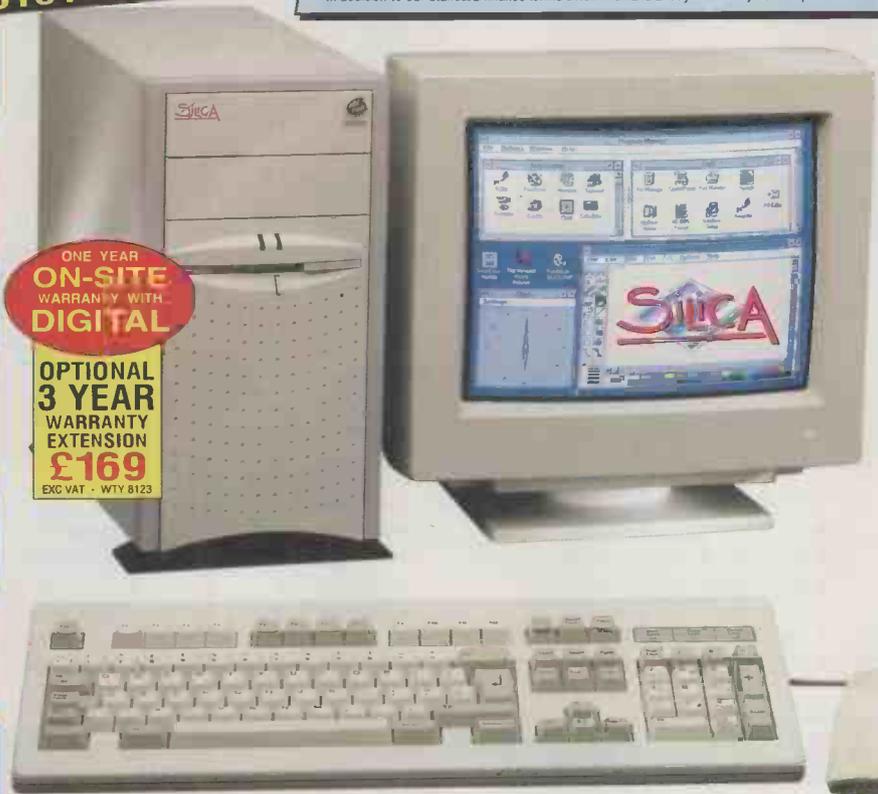
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- P24T upgradeable - DX4 100 model

MEMORY

- 4Mb and 8Mb RAM
- Accepts 72-pin SIMMS - single or double sided
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DRIVES

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- Customisable settings for 4 drives
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- EPA energy star compliant
- 15" monitor upgrade available (extra £69+VAT)
- 1Mb Trio 32 PCI card 2mb upgrade £50+VAT

ARCHITECTURE

- Mini-tower case
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- Plug and play PCI motherboard
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- Integrated motherboard with flash BIOS
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- Power saving mode
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SOFTWARE

- Windows 95
- PC Utility Software
- Tutorial Software
- All software includes disks and manuals where appropriate (not OPC 1424)
- Pre-configured, optimised and ready to run
- Multimedia Option

WARRANTY

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- 4Mb RAM Upgrade £118.30+VAT 1 x 4132
- 8Mb RAM Upgrade £235.60+VAT 2 x 4612

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	PROCESSOR 486DX4 100MHz OPC 1404 + MON 1514	PROCESSOR PENTIUM™ 75MHz OPC 1424 + MON 1514	PROCESSOR PENTIUM™ 75MHz OPC 1427 + MON 1514	PROCESSOR PENTIUM™ 90MHz OPC 1449 + MON 1514	PROCESSOR PENTIUM™ 120MHz OPC 1480 + MON 1514
MEMORY (RAM)	4Mb	8Mb	8Mb	8Mb	8Mb
MAX (RAM)	64Mb	128Mb	128Mb	128Mb	128Mb
HARD DISK DRIVE	540Mb	540Mb	850Mb	850Mb	850Mb
15" .28MM MONITOR	S-VGA COLOUR NON-INTERLACED				
15" MONITOR UPGRADE	Add £69+VAT				
PCI 1Mb VIDEO/ACCELERATOR	✓	✓	✓	✓	✓
3.5" 1.4Mb FLOPPY DRIVE	✓	✓	✓	✓	✓
ZIF SOCKET	-	Type 5	Type 5	Type 5	Type 5
PCI ENHANCED IDE	✓	✓	✓	✓	✓
WRITE BACK CACHE	256K	256K	256K	256K	256K
ENERGY STAR COMPLIANT	✓	✓	✓	✓	✓
DOS 6.22 & WINDOWS 3.11	PRE-INSTALLED	PRE-INSTALLED	PRE-INSTALLED	PRE-INSTALLED	PRE-INSTALLED
WINDOWS 95 PRE-INSTALLED	✓	✓	✓	✓	✓
WINDOWS 95 MANUALS	✓	✓	✓	✓	✓
1 Yr ON-SITE WARRANTY	WITH DEC (DIGITAL)				
MULTIMEDIA OPTION	SEE BELOW				
CASH PRICE	£799 +VAT = £938.83	£999 +VAT = £1173.83	£1099 +VAT = £1291.33	£1199 +VAT = £1408.83	£1499 +VAT = £1761.33
CREDIT TERMS 36 MONTHS TO PAY	£29 INC VAT PER MONTH SEE EXAMPLE BELOW	£39 INC VAT PER MONTH SEE EXAMPLE BELOW	£43 INC VAT PER MONTH SEE EXAMPLE BELOW	£49 INC VAT PER MONTH SEE EXAMPLE BELOW	£59 INC VAT PER MONTH SEE EXAMPLE BELOW

WITH MULTIMEDIA OPTION FITTED SEE LEFT

	OPC 1414 + MON 1514	OPC 1432 + MON 1514	OPC 1437 + MON 1514	OPC 1459 + MON 1514	OPC 1485 + MON 1514
CASH PRICE	£999 +VAT = £1173.83	£1099 +VAT = £1291.33	£1299 +VAT = £1526.33	£1399 +VAT = £1643.83	£1699 +VAT = £1996.33
CREDIT TERMS 36 MONTHS TO PAY	£36 INC VAT PER MONTH SEE EXAMPLE BELOW	£42 INC VAT PER MONTH SEE EXAMPLE BELOW	£49 INC VAT PER MONTH SEE EXAMPLE BELOW	£55 INC VAT PER MONTH SEE EXAMPLE BELOW	£65 INC VAT PER MONTH SEE EXAMPLE BELOW

Finance Example 12 MONTHS: CASH Purchase: £999+VAT = £1173.83 Inc VAT. CREDIT Purchase: £95.83 Deposit and 12 Monthly Payments of £99. CASH PRICE: £1173.83 Inc VAT. CREDIT PRICE: £1283.83 Inc VAT. *APR 19.9%

Finance Example 36 MONTHS: CASH Purchase: £999+VAT = £1173.83 Inc VAT. CREDIT Purchase: £99.97 Deposit and 36 Monthly Payments of £39. CASH PRICE: £1173.83 Inc VAT. CREDIT PRICE: £1503.97 Inc VAT. FINANCE IS SUBJECT TO STATUS. OTHER PAYMENT PERIODS AVAILABLE. WRITTEN DETAILS ARE AVAILABLE ON REQUEST.

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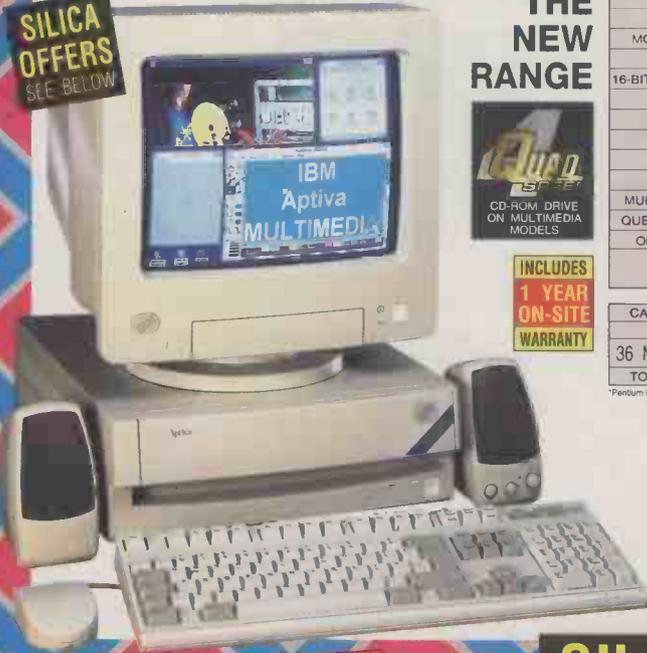
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THE NEW RANGE



INCLUDES 1 YEAR ON-SITE WARRANTY



APTIVA RANGE

	MULTIMEDIA				MULTIMEDIA			
	DESKTOP 910	DESKTOP 914	DESKTOP 921	DESKTOP 930	DESKTOP 941	TOWER 931	TOWER 932	TOWER 951
	486DX2 66MHz	486DX2 66MHz	486DX4 100MHz	PENTIUM 75	PENTIUM 100	PENTIUM 75	PENTIUM 75	PENTIUM 120
HARD DISK DRIVE	540Mb	540Mb	540Mb	540Mb	850Mb	540Mb	540Mb	1Gb
3 1/2" FLOPPY DRIVE	✓	✓	✓	✓	✓	✓	✓	✓
MEMORY (RAM)	4Mb	8Mb						
S-VGA MONITOR	14"	14"	14"	14"	15"	14" DIGITAL	15"	15"
MONITOR DOT PITCH	28MM	28MM	28MM	28MM	28MM	28MM	28MM	28MM
CD-ROM DRIVE	—	QUAD	QUAD	—	QUAD	QUAD	QUAD	QUAD
16-BIT WAVETABLE S'CARD	—	✓	✓	—	✓	✓	✓	✓
SPEAKERS	—	4 Watt	4 Watt	—	30 Watt	30 Watt	30 Watt	30 Watt
VIDEO RAM	512k	1Mb						
FAX/MODEM	—	—	—	—	—	—	28.8	—
OS/2 WARP	—	✓	✓	✓	—	✓	✓	✓
IBM HELPWARE	✓	✓	✓	✓	✓	✓	✓	✓
MULTIMEDIA FEATURES	—	✓	✓	—	✓	✓	✓	✓
QUEST/PRINTER OPTION	—	✓	✓	—	✓	✓	✓	✓
ON-SITE WARRANTY	1 YEAR	1 YEAR	1 YEAR	1 YEAR	1 YEAR	1 YEAR	1 YEAR	1 YEAR
SILICA EXC VAT	£850²¹	£1105⁵³	£1190⁶⁴	£1148⁹⁹	£1871⁴⁹	£1360⁸⁵	£1531⁰⁶	£2126⁸¹
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CREDIT TERMS - 36 MONTHLY REPAYMENTS - 19.9% APR								
CASH PRICE INC VAT	£999	£1299	£1399	£1349	£2199	£1599	£1799	£2499
DEPOSIT	£200.49	£225.14	£159.93	£275.14	£299.10	£249.80	£174.45	£323.75
36 M'THS - APR 19.9%	£29	£39	£45	£39	£69	£49	£59	£79
TOTAL CREDIT PRICE	£1244.49	£1629.14	£1779.93	£1679.14	£2783.10	£2013.80	£2298.45	£3167.75

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	524	528 TV TUNER	7106	7110	7150	7170
	INTEGRATED 486DX2 66MHz	INTEGRATED 486DX2 66MHz	DESKTOP 486DX4 100MHz	DESKTOP 486DX4 100MHz	DESKTOP PENTIUM 75MHz	DESKTOP PENTIUM 90MHz
HARD DISK DRIVE	420Mb	420Mb	420Mb	540Mb	540Mb	840Mb
3 1/2" FLOPPY DRIVE	✓	✓	✓	✓	✓	✓
MEMORY (RAM)	8Mb	8Mb	8Mb	8Mb	8Mb	8Mb
MAXIMUM RAM	64Mb	64Mb	128Mb	128Mb	128Mb	128Mb
MONITOR 28mm DP MPRII	14" INTEGRATED	14" VLB	14"	14"	14"	14"
GRAPHICS	32-BIT VLB	32-BIT VLB	32-BIT PCI	32-BIT PCI	32-BIT PCI	32-BIT PCI
TV Tuner Card	—	—	TV Tuner	—	—	—
BUS TYPE	VESA	VESA	PCI	PCI	PCI	PCI
EXP'N SLOTS	2	2	4	4	4	4
PCI SLOTS	—	—	2 (1 SHRD ISA)			
TOTAL DRIVE BAYS	3	3	4	4	4	4
PLUG & PLAY COMPLIANT	✓	✓	✓	✓	✓	✓
HOME COMMUNICATIONS FAX / MODEM	2,400 Modem 9,600 Fax	2,400 Modem 9,600 Fax	NO COMMS	14,400 Modem 9,600 Fax	14,400 Modem 9,600 Fax	14,400 Modem 9,600 Fax
SOFTWARE - SEE BELOW	✓	✓	✓	✓	✓	✓
CD-ROM DRIVE	Quad Speed					
SOUND CARD	16-bit	16-bit	16-bit	16-bit	16-bit	16-bit
SILICA EXC VAT	£1062⁹⁸	£1403⁴⁰	£1062⁹⁸	£1190⁸³	£1360⁸⁵	£1445⁹⁵
<small>CPO 7154 CPO 7528 CPO 7116 + MON 2782 CPO 7130 + MON 2782 CPO 7150 + MON 2782 CPO 7170 + MON 2782</small>						
CREDIT TERMS - 36 MONTHLY REPAYMENTS - 19.9% APR						
CASH PRICE INC VAT	£1249	£1649	£1249	£1399	£1599	£1699
DEPOSIT	£92.54	£162.12	£92.54	£159.93	£167.19	£184.59
36 M'THS - APR 19.9%	£42	£54	£42	£45	£52	£55
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- Works for Windows
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- MS Money
- Encarta '95
- Ultimate Human Body

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- Novell Perfect Works
- MS Money, Simcity
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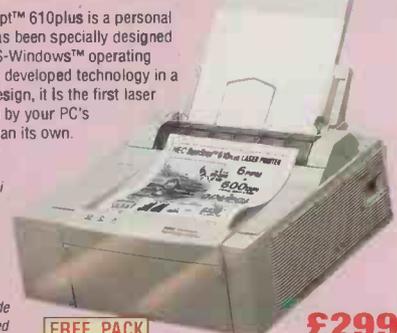
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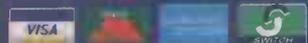


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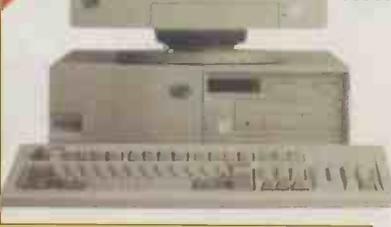
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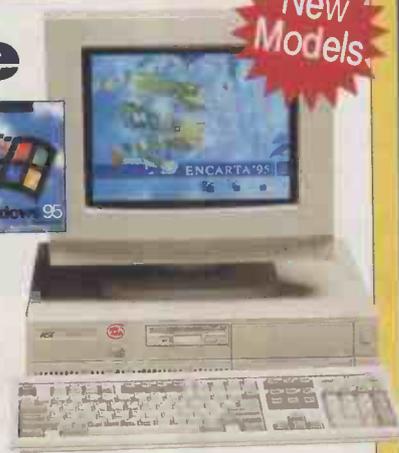
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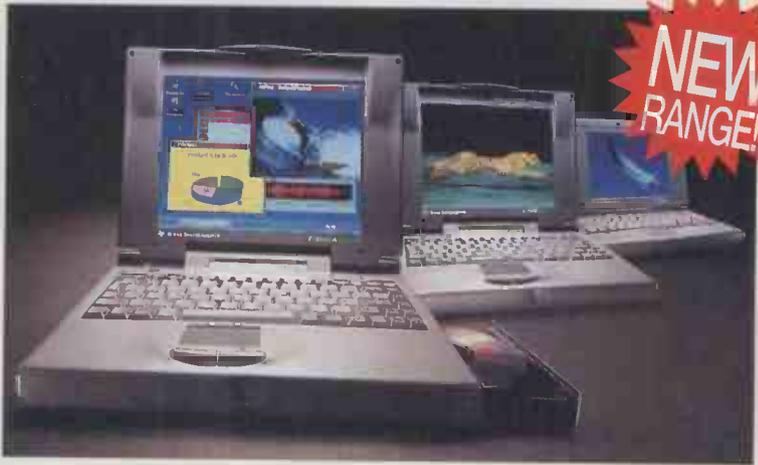
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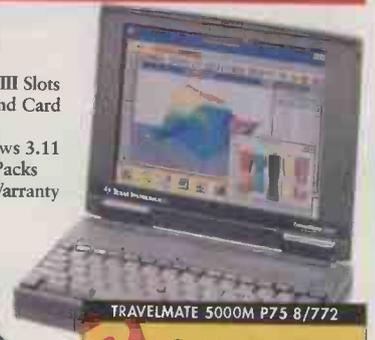
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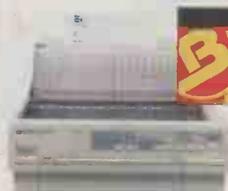
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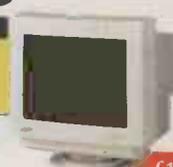
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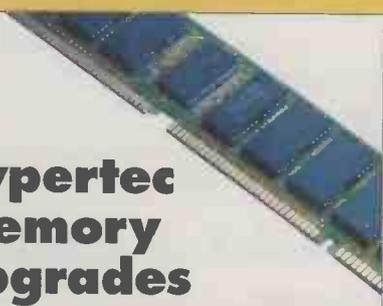
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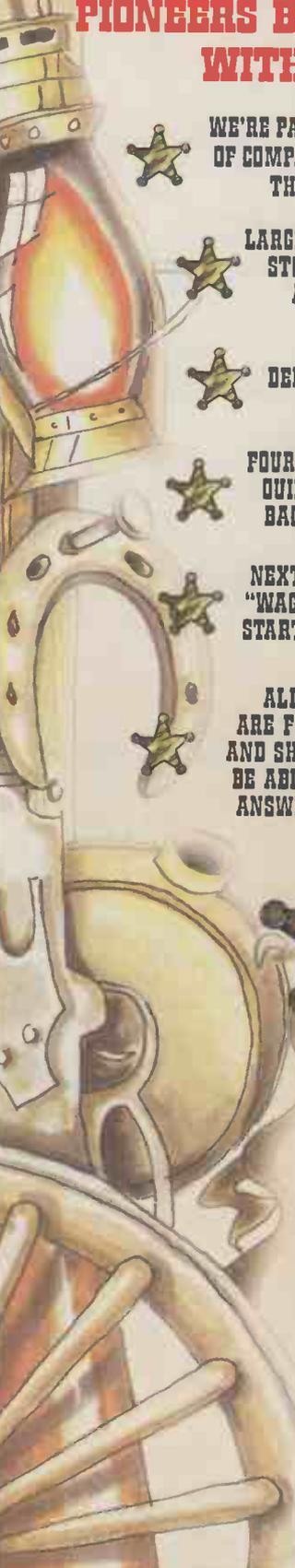
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- ✓ Processor: 1486DX4 (75MHz), 3.3v (includes numeric co-processor)
 - ✓ RAM: 2110CS - 4MB expandable to 28MB
2130CS/CT - 8MB expandable to 32MB
 - ✓ Hard Disk: 350MB or 520MB (upgradable)
 - ✓ Graphics: VGA/SVGA, VESA Local Bus Support
 - ✓ Display: 2110CS - dual scan STN mono, up to 256 colours, (640 x 480 pixels), 10.4" diagonal display
:2130CS - dual scan STN Colour, up to 256 colours, (640 x

- 480 pixel), 10.4" diagonal display;
- :2130CT - high res TFT Colour LCD (640 x 480 pixel), up to 65,536 simultaneous colours, 10.4" diagonal size
- ✓ Floppy Drive: Internal 3.5" 1.44MB
- ✓ PCMCIA Expansion: 1 x R2.0 III or 2 x R2.0 II
- ✓ Battery: Battery NiH₂ (T2110/T2130CS up to 4 hours and CT up to 3.5 hours battery life)
- ✓ Ops System: MS-DOS 6.22 with Toshiba enhancements, MS Windows 3.11, Cardware PCMCIA card support software, MaxTime Power Management and Plug & Play BIOS.
- ✓ Included: Mousepoint, Password Security and Kensington cable lock provision.
- ✓ Weight: 3.1Kg (6.8lbs)
- ✓ Warranty: 12 months international (return to Toshiba)



T2130CT/520MB PICTURED

T2110CS/350MB £1355 Item No. 78-39-0N	T2130CS/520MB £1779 Item No. 78-39-1N	T2130CT/520MB £1945 Item No. 78-39-2N
--	--	--

T2150 - The Ultimate Multimedia Notebook

- Features:**
- ✓ Processor: i486DX4 (75MHz), 3.3v (includes numeric coprocessor)
 - ✓ RAM: CDS-4MB expandable to 28MB
CDT-8MB expandable to 32MB
 - ✓ Hard Disk: 260MB or 520MB
 - ✓ Graphics: VGA/SVGA, VESA Local Bus Support
 - ✓ Display: CDS - STN colour LCD (640 x 480 pixel), up to 256 colours, 10.4" diagonal size
:CDT - TFT colour LCD (640 x 480 pixel), up to 65,536 colours, 10.4" diagonal size
 - ✓ Floppy Drive: CDS - External 3 1/2" 1.44MB (only available as option with 260MB version)

- :CDT - external 3.5" 1.44MB (incl.)
- ✓ PCMCIA expansion: 1 x R2.0 III or 2 x R2.0 II
- ✓ Battery: NiH₂ (up to 2 hours continuous use)
- ✓ Ops System: MS-DOS 6.2x with Toshiba enhancements, MS WFWG3.11, Cardware PCMCIA card support software, MaxTime Power Management and Plug & Play BIOS
- ✓ Included: Built-in microphone, Mousepoint, Password security and Kensington cable lock provision
- ✓ Weight: 3.35kg (7.3lbs)
- ✓ Warranty: 36 months international (return-to-base)



T2150CDS/260MB £2035 Item No. 77-28-5N	T2150CDS/520MB £2165 Item No. 77-28-6N	T2150CDS/520MB £2715 Item No. 77-28-7N
---	---	---

Toshiba Accessories for the 2100/2150 Series - ready to go!

MEMORY EXPANSION	TOSHIBA PART NO.	ITEM NO.	PRICE
T2100/T2150 4MB	PA2026U	77-41-5N	£215
T2100/T2150 8MB	PA2027U	77-41-6N	£395
T2100/T2150 16MB	PA2028U	77-41-7N	£849
T2100/T2150 24MB	PA2029U	77-41-8N	£1599

2YR WARRANTY TFT £129 Item No. 75-80-1N	2YR WARRANTY MONO/DSTN £80 Item No. 75-80-0N
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BATTERIES	TOSHIBA PART NO.	ITEM NO.	PRICE
T1910/T2400 Battery pack (NiH ₂)	PA2429U-R	75-60-7N	£99
Battery charger	PA2422U-E	73-44-4N	£125

Connectivity & Multimedia	TOSHIBA PART NO.	ITEM NO.	PRICE
Adv. PCMCIA V32 Fax Modem	TPCV32PF-UK	71-81-4N	£185
Adv. PCMCIA V34 Fax Modem	TPCV34PF-UK	70-85-4N	£225
Adv. PCMCIA Ethernet adaptor	PCE-10BC	75-61-1N	£213

DESCRIPTION	PROCESSOR	RAM	DISK	SCREEN	ITEM NO.	PRICE	DESCRIPTION	PROCESSOR	RAM	DISK	SCREEN	ITEM NO.	PRICE
T2100	486DX2/50	4MB	260MB	Mono	77-28-2N	£845	T2150CDT	486DX4/75	8MB	520MB	TFT COL	77-28-7N	£2715
T2110CS	486DX4/75	4MB	350MB	stn COL	78-39-0N	£1355	T4850CT	486DX4/75	8MB	810MB	TFT COL	76-56-9N	£2965
T2130CS	486DX4/75	4MB	520MB	stn COL	78-39-1N	£1779	T4900CT	Pentium/75	8MB	810MB	TFT COL	76-57-0N	£3395
T2130CT	486DX4/75	8MB	520MB	TFT COL	78-39-2N	£1945	Satellite Pro 400CS	Pentium/75	8MB	810MB	STN COL	78-40-3N	£2420
T2150CDS	486DX4/75	4MB	260MB	STN COL	77-28-5N	£1945	Satellite Pro 400CDT	Pentium/75	8MB	810MB	16.7 TFT	78-40-4N	£3139
T2150CDS	486DX4/75	4MB	520MB	STN COL	77-28-6N	£2165	Portégé	Pentium/90	8MB	720MB	16.7TFT	78-40-5N	£3015

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Cyberman CD Rom	PCMCIA
NEC Monitors	NEW
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Win 95 Product Companion	WIN 95
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Pro Vista14 - multi-frequency monitor

- 2 year On-Site Swap Out Warranty
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- MPR II low radiation
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- Max res. 1024x768 non-interlaced
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PRO VISTA 14
£159
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Model	Size	RGB	Temp Adj.	Item No.	Price
Pro Vista 14	14" 0.28	8		78-52-1N	£159
MicroScan 3V	14" 0.28	8		71-79-2N	£185
MicroScan 4V	15" 0.28 FST	8		72-00-9N	£249
MicroScan 4GP	15" 0.28 FST	8		72-01-4N	£269
MicroScan 5EP	17" 0.28 FST	4		72-01-5N	£449
MicroScan 5AP	17" 0.28 FST	4		72-01-7N	£459

Model	Size	Display	Item No.	Price
XV-17	17" LR	MultiSync	76-97-2N	£559
XE-17	17" LR	MultiSync	75-97-3N	£685
XP-17	17" LR	MultiSync	76-97-4N	£898
XE-21	21" LR	MultiSync	76-97-5N	£1149
XP-21	21" LR	MultiSync	76-97-6N	£1549

Model	Size	Display	Item No.	Price
XV-14	14" LR	MultiSync	77-62-2N	£215
XV-15	15" LR	MultiSync	76-97-0N	£278
XE-15	15" LR	MultiSync	76-97-1N	£389

NEC (See feature on this page)

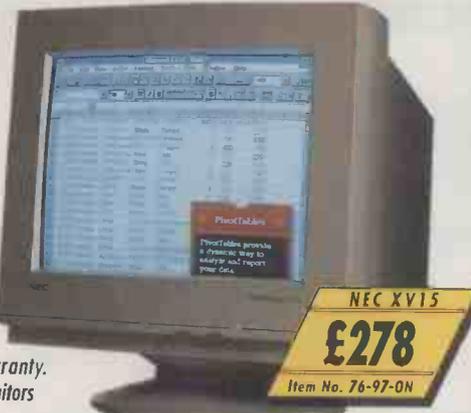
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Model	Size	Display	Item No.	Price
MICROSOFT				
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Natural Keyboard			73-68-0N	£65
Natural Keyboard Win95			78-55-4N	£49
Bus Mouse 2.0IP version			75-97-1N	£49
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AZTECH			
CDA 268-031, double Internal, IDE	72-23-4N	£69	
CDA 486-011, quad Internal IDE	76-02-7N	£119	

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- ✓ Type II compatible
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Cyberman CD, Dual, PCMCIA 2.1, sound CM2 SB	78-63-7N	£365
Cyberman CD, Quad, PCMCIA 2.1, no sound CM4 SX	78-63-9N	CALL
Cyberman CD, Quad, PCMCIA 2.1, sound CM4 SB	78-63-8N	CALL
CD-952, Dual, PCMCIA 2.1	78-10-1N	£259
NEC (SCSI 1 & 2 I/F)		
3Xp + Portable	76-19-4N	£242
4Xe External	76-19-6N	£263
4Xi Internal	76-19-5N	£255
NEC (SCSI 1 & 2 I/F KITS)		
AT ISA Bus	73-05-0N	£40
PANASONIC (without I/F kit)		
CR-504, Quad Internal SCSI-2	78-47-0N	£149
CR-562, 320ms, 306KB/Sec Internal, ISA	75-66-4N	£75
CR-562B, Dual, Parallel Port	77-86-8N	£159
Dual, PCMCIA2 or SCSI2	78-75-6N	£275
PIONEER		
DR-UA124X, Internal 4.4x IDE (with i/f)	78-39-6N	£135
DR-U124X, Internal 4.4x SCSI-2	78-39-7N	£212
DRM-624X, external Jukebox 4.4x SCSI-2	78-39-8N	£415
TOSHIBA		
XM-3601B, 150ms, min 660 KB/sec, Internal, SCSI-2 (w/out I/F)	77-27-8N	£210
XM-3601B, 150ms, min 660 KB/sec, External, SCSI-2 (w/out I/F)	77-27-9N	£279
KT-3601BA, 150ms, min 660 KB/sec, Internal, SCSI-2 (with AT I/F)	77-40-4N	£265

KT-3601SA, 150ms, min 660 KB/sec, Internal, SCSI-2 (with AT I/F)	77-40-5N	£309
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SoundBlaster 16 Value, 16-bit	75-37-4N	£69
SoundBlaster 16 Pro IDE with ADSP	78-47-4N	£110
SoundBlaster 16 Multi-CD Value, 16-bit with ADSP	75-92-8N	£112
SoundBlaster 16 SCSI-2 Value, 16-bit with ADSP	75-37-6N	£115
SoundBlaster 16 SCSI-2 Value, 16-bit with ADSP	75-92-9N	£133
SoundBlaster AWE32	91-92-6N	£175
SoundBlaster AWE32 IDE	78-47-5N	£165
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Waverider 32+(inc. mic., headphones & software)	76-54-0N	£89
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CREATIVE LABS		
SBS-300 Speakers	77-90-4N	£65
Pro Digital Speakers	75-78-0N	£28
Screenbeat speakers for Sound Blaster only	74-62-5N	£17
INNOVATIVE COMMUNICATIONS		
Portable Sound Plus, parallel output port	70-64-3N	£109
SONY SPEAKERS		
SRS-PC30	77-90-0N	£45
SRS-PC50	77-90-1N	£65

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Win/TV Celebrity	75-19-7N	£265
Win/TV Cinema	75-01-2N	£182
Win/TV Prisma	77-92-6N	£149

LCD PROJECTION PANELS

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Model	Colours	Max. Res	Item No.	Price
2080	16 Magenta	720 x 480	91-58-4N	£975
4100 B Colour	16 True	640 x 480	94-53-2N	£1365
4850 Colour	1.4m True	640 x 480	75-47-5N	£2045
6150 Colour	16.7m True	640 x 480	76-29-0N	£2885
6450 Colour	16.7m True	640 x 480	76-29-1N	£3315

UPS/ELECTRICAL PROTECTION

Model	Item No.	Price
APC SMART UPS (LINE INTERACTIVE)		
250VA Low Profile	73-13-2N	£159
400VA Low Profile	92-61-7N	£199
600VA Tower	92-47-7N	£210
1250VA Tower	92-69-1N	£495
APC BACK-UPS (OFF-LINE)		
250VA	92-68-6N	£76
400VA	92-68-7N	£104
600VA	92-68-8N	£145
900VA	92-68-9N	£255
24 MONTH WARRANTY WITH SWAP OUT SERVICE		
APC PowerChute Plus for Novell(NOM)	92-47-8N	£44

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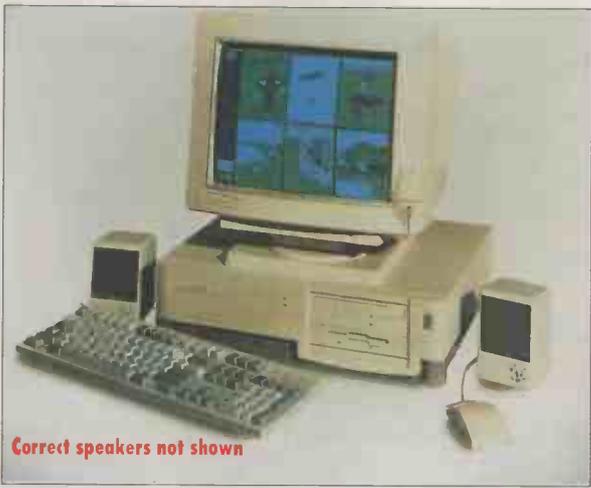


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Compaq Presario CDS 7100 - don't wait any longer for a multi-media PC



Correct speakers not shown

Compaq has just launched a new range of multi-media Presario PC's. The new 7100 series represents the new Presario entry level - if you've resisted buying a computer so far, this range will make the wait worthwhile. All models feature quad speed CD-ROM, 16-bit sound card with integral speakers and only the 7106 does not include a fax/data V.32 modem which provides answerphone, fax and e-mail facilities.

Features:

- ✓ Processor: up to Pentium 90 MHz
- ✓ RAM: 8MB expandable to 64MB
- ✓ Hard Disk: up to 840MB
- ✓ Graphics: SVGA, 32-bit PCI with 1MB of VRAM
- ✓ Display: 14" diagonal display size (separate from system unit)
- ✓ Floppy Drive: internal 3.5" 1.44MB
- ✓ CD ROM: quad, 5.25" format.
- ✓ Fax/Modem: 14,1400bps with software (except 7106 model)
- ✓ Expansion slots: 1 x ISA; 2 x ISA/PCI
- ✓ Sound drive bays: 2 x 5.25"; 1 x 3.5"
- ✓ Ops System: MS-DOS 6.2 with Presario enhancements, MS Windows v3.1
- ✓ Included: Novell Perfect Works for Windows, MS Money for Windows on 3 1/2" and Comptons Encyclopedia and King's Quest VII on CD
- ✓ Weight: 29Kg
- ✓ Warranty: 36 months (return to manufacturer)

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PRICES FROM
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Item No. 78-94-3N

DESCRIPTION	PROCESSOR TYPE	HARD DRIVE	ITEM NO.	PRICE
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CDS7110	DX4/100	8MB/540MB	78-94-4N	£1189
CDS7150	P/75	8MB/540MB	78-94-5N	£1359
CDS7170	P/90	8MB/840MB	78-94-6N	£1445

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LTE elite	RAM/HD	Item No.	Price
4/75C M340/W DX4/75	8MB/340MB	77-03-2N	£1975
4/75C M510/W DX4/75	8MB/510MB	77-03-3N	£2175
4/75CX M340/W DX4/75	8MB/340MB	75-02-0N	£2499
4/75CX M510/W DX4/75	8MB/510MB	75-02-1N	£2675
4/75CXL M510/W DX4/75	8MB/510MB	77-03-4N	£2975
4/75CXL M810/W DX4/75	8MB/810MB	77-03-5N	£3249
Centura 410			
410 DX2/509.5" mono STN	4MB/250MB	78-55-0N	*£845
410C DX2/509.5" COL STN	4MB/250MB	78-55-1N	*£1375
410CX DX2/508.4" COL TH	4MB/250MB	77-01-2N	£1695
* Now with MS Works			
Centura 420			
420C DX4/75COL 9.5" Col STN	4MB/350MB	78-31-7N	£1535
420DX4/75 9.5" COL STN	4MB/420MB	78-31-8N	£1695
420 CD DX4/75 9.5" COL STN	4MB/720MB	78-31-9N	£2375
Centura 430			
430C DX4/100 8.4" COL STN	4MB/420MB	78-32-0N	£1215
430CX DX/100 8.4" COL TFN	4MB/720MB	78-32-1N	£2725

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Optima 288 PCMCIA 2.0 FAX	Accura 144, V32bis, FAX
78-21-5N	78-55-2N
£195	£99
IBM - 1 Year Warranty	Accura 288, VFAST, FAX
14.4 PCMCIA 2.11, V32bis, Fax	78-55-3N
76-59-6N	£173
£139	Optima 144, V32bis FAX
28.8 PCMCIA 2.11, V34bis, Fax	74-77-4N
78-88-7N	£249
£179	Optima 288, VFAST FAX
LASAT-10 YEAR WARRANTY	74-77-5N
Credit 144 V32bis, PCMCIA 2.0 FAX	£335
75-16-3N	Optima 288 VALUE PACK
£165	76-27-0N
Credit 288 V34, PCMCIA 2.0 FAX	£645
78-41-6N	ESP Communication s Accelerator V2.0
£199	(16-bit Serial Board, ISA PC's & Windows)
PACE - 5 Year Warranty	LASAT-10 Year Warranty
Linnet Message Desk, 32bis, Internal, Voice/Fax	78-29-4N
78-43-8N	£120
£179	Unique 144 SAFIRE V32bis, Fax
Microlin FX 32+, PC 8-BIT ISA V32bis, FAX	72-83-8N
73-88-9N	£195
£129	Unique 288 SAFIRE V34bis, Fax
Microlin FX NB32 PCMCIA 2.11 V32bis, FAX	78-29-5N
74-70-3N	£195
£180	Unique 288 V34bis, Fax
Microlin FX NB34 PCMCIA, FAX	76-70-4N
77-91-0N	£295
PSION DACOM - 2 Year Warranty	MOTOROLA - 2 Year Warranty
Gold Card V32bis PCMCIA 2.11-V32bis, FAX	3400 Pro V34bis, Fax
74-52-6N	78-21-6N
£175	£165
Gold Card V34 PCMCIA V34, FAX	On-Line Internet solution (with 3400 Pro)
77-56-8N	78-19-3N
£195	£179
TOSHIBA - 1 Year warranty	MULTITECH - 2 Year Warranty
Advanced PCMCIA 2.11-V32 bis, FAX	MT14328LK V32bis, Fax
71-81-4N	91-01-1N
£185	£259
Advanced PCMCIA 2.11-V34 bis, FAX	MT1932 ZDXK V32bis, Fax
70-85-4N	74-94-1N
£215	£99
WORLDPORT - 5 Year Warranty	MT2834 ZDXK V34, Fax
2496 PCMCIA 2.11-V22bis, fax	77-80-6N
74-30-1N	£149
£129	MT2834BLK VFC - VFAST, Fax
PCMCIA 28.8 2.0 V34bis fax	76-23-4N
78-26-6N	£345
£165	PACE - 5 Year Warranty
US ROBOTICS - 5 Year Warranty	Linnet 32 PLUS V32bis, Fax
Sporster 14.4 WITH FAX V32bis, FAX	74-34-6N
91-88-5N	£148
£110	Linnet 32 Plus V32bis, Message Desk/Voice/Fax
Sporster 28.8 WITH FAX, v34 ISA	77-30-3N
76-71-4N	£165
£162	Linnet FX V34, Fax
ZOOM - 5 Year Warranty	UltraLink 32 Plus V32bis
Zoom 14.4 V32BIS, INTERNAL FAX	94-52-7N
74-18-6N	£225
£82	US ROBOTICS - 5 Year Warranty
Zoom 28.8 V34, INTERNAL FAX	Sporster 14.4 with Fax, V32bis, FAX
78-21-4N	91-01-7N
£159	£110
PORTABLE	Sporster 28.8 with Fax, V34 Fax
PACE - 5 Year Warranty	76-61-0N
Microlin FX 32 PLUS V32bis, FAX	£162
72-16-9N	
£148	
Mobi-Fax 144	
76-39-7N	
£94	
NetLink Internet Kit, V32bis	
78-32-8N	
£106	
NetLink Gold Internet Kit, V34bis	
78-69-5N	
£175	
WORLDPORT - 5 Year Warranty	
Dual Std. cellular, v32bis, fax	
75-65-2N	
£122	
ZOOM - 5 Year Warranty	
Zoom 14.4X - V32bis, FAX	
74-18-5N	
£94	
Zoom 28.8X V34bis, External fax	
78-21-3N	
£139	

NEC VERSA CALL FOR LATEST MODELS

VERSA	RAM/HD	Item No.	Price
Verso S/330i 33/33 0val Col.	4MB/210MB	75-35-9N	£995
Verso S/50i 50/50 0val Col.	4MB/260MB	76-63-0N	£1525
V/500i dx2/50 Dual Col.	4MB/250MB	75-19-3N	£1545
V/500i dx2/50 TFT Col.	4MB/340MB	75-36-1N	£1995
M/1000i dx4/100 TFT Col.	8MB/540MB	75-79-5N	£2999
M/1001i dx4/100 TFT Col.	8MB/540MB	75-79-6N	£3195
	(16.7M COLS)		
M/1005i dx4/100 SVGA Local	8MB/540MB	77-06-6N	£3275
P/75C Pentium/75 TFT Col.	8MB/810MB	77-01-3N	£3445
P/75S Pentium/75 SVGA Local	8MB/810MB	77-01-4N	£3725

MULTIMEDIA DESKTOP

AST

ADVANTAGE	HD	Form Factor	Item No.	Price
4066D DX2/66 14" SVGA	540MB	All-in-one	78-94-0N	£1099
6066D DX2/66 14" SVGA	540MB	Desktop	78-93-9N	£1235
6075P P/75 14" SVGA	540MB	Desktop	78-94-1N	£1489
8090P P/90 14" SVGA	540MB	Mini-Tower	78-94-2N	£1695

COMPAQ SEE FEATURE ABOVE

PRESARIO CDS (Multimedia)	RAM/HD	Item No.	Price
522 DX2/66 14" CD/V22bis FAX All-in-1	4/270MB	78-98-1N	£935
524DX2/66 14" CD/V22bis FAX All-in-1	8/420MB	78-98-1N	£1189
528 DX2/66 14" CD/V22bis FAXTV All-in-1	8/420MB	77-98-7N	£1399
7106 DX4/100 14" CD/No Fax Desktop	8/420MB	78-94-3N	£1049
7110 DX4/100 14" CD/V32bis FAX Desktop	8/540MB	78-94-4N	£1179
772 P/7514" CD/V32bis FAX Desktop	8/535MB	78-98-8N	£1531
962 P/6014" CD/V32bis FAX Desktop	8/535MB	77-99-1N	£1445
972 P/75 14" CD/V32bis FAX Desktop	8/725MB	77-99-2N	£1616
7150 P/75 14" CD/V32bis FAX Desktop	8/540MB	78-94-5N	£1349
7170 P/9014" CD/V32bis FAX Desktop	8/840MB	78-94-6N	£1429

SEE FEATURE OPPOSITE

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OTHER MEMBERS OF THE ECOSYS COST CUTTING, PLANET FRIENDLY PRINTER RANGE

FS-400
£359
Item No. 77-06-3N

FS-1550
£875
Item No. 76-25-8N

FS-1600
£1069
Item No. 76-25-9N

The Kyocera FS-400 The advanced personal page printer that saves on print costs



A compact 4ppm personal page printer that offers full system printer capabilities and savings on print costs due to its cartridge-free design. Kyocera are the company which introduced low-cost printing, the FS-400 is a low cost printer that offers unrivalled potential for small businesses or organisations needing a low-volume, centralised printing resource. The only consumable needed is toner, cartridge waste is eliminated by a long life drum for a considerable reduction in page printing costs.

STANDARD FEATURES:

- Output:** 4ppm
- Emulations:** HPLJIII, IBM X24E, Epson LQ-850
- RAM:** 1MB
- Resolution:** 300 x 300dpi/300 x virtual 1200 IRT
- Interfaces:** Centronics Parallel plus high speed option I/O port
- Fonts:** 79 bitmapped, 13 scalable
- Small footprint:**

Input Trays: 1 x 100 sheet Universal
Output Trays: 1 x 100 sheet face down



DRUM GUARANTEE
3 YEARS OR 100,000 PAGES
(WHICHEVER IS FIRST)

Dimensions: 353W x 350D x 173Hmm / **Warranty:** 12 months (return to base)



DOT MATRIX PRINTERS

EPSON	ITEM NO.	PRICE	ML395B 24 Pin	71-79-5N	£635
LX-300 9 pin	75-45-1N	£95	MLS20 9 Pin	71-48-2N	£355
LX-300 Colour Kit	75-45-2N	£29	MLS21 9 Pin	71-48-3N	£395
FX-870 9 Pin	71-03-6N	£245	MLS91 24 Pin	71-02-0N	£499
FX-1170 9 Pin	71-01-8N	£299	PANASONIC		
LQ300 24 Pin	76-65-1N	£147	KX-P1150 9 Pin	72-97-4N	£89
LQ-570+24 Pin	71-61-0N	£212	KX-P3696 9 Pin	76-64-8N	£266
LQ-870 24 Pin	94-01-9N	£377	KX-P2023 24 Pin	73-14-5N	£108
LQ-1070+24 Pin	73-86-0N	£298	KX-P 2124 24Pin	76-14-3N	£199
LQ-1170 24 Pin	94-02-0N	£435	KX-P2135C 24 Pin	76-14-4N	£125
DFX-5000 9-Pin	71-50-8N	£1179	KX-P3626 24 Pin	76-64-9N	£252
DFX-8000 9-Pin	73-46-3N	£2019	STAR		
DLQ-3000 24 Pin	75-95-9N	£789	LC-90 9 Pin	76-35-1N	£79
NEC					
PinWriter P2Q 24 Pin	72-78-2N	*£98	LC100 9 Pin Col	92-66-7N	£89
PinWriter P3Q 24 Pin	75-58-9N	*£178	LC15 9 Pin	71-79-7N	£177
PinWriter P72 24 Pin	71-49-9N	£372	LC24-15 Mk II	72-78-3N	£230
OKI					
ML321 9 Pin	71-31-7N	£365	LC-240 24 Pin Mono	76-35-4N	£90
			LC-240 24 Pin Colour	76-35-5N	£103

See Warranty Key

INKJET PRINTERS

CANON	ITEM NO.	PRICE	DeskJet 340 & CSF & Support <th>79-23-8N</th> <th>***ECALL</th>	79-23-8N	***ECALL
BJ-30 Black	77-67-3N	£139	DeskJet 600	79-02-7N	£209
BJ-30 White	77-29-5N	£139	DeskJet 600 & Support	79-24-3N	***ECALL
BJ-200EX	77-23-4N	£158	DeskJet 600 & Colour Kit	79-24-0N	***ECALL
BJ230	91-52-5N	£236	DeskJet 600 & Colour Kit & Support	79-24-2N	***ECALL
BJ300	71-39-3N	*£344	DeskJet 660C Col	77-07-3N	£275
BJ330	71-39-4N	*£388	DeskJet 660C Col & Support	77-08-2N	***£329
BJC-70 Black Colour	77-67-4N	£209	DeskJet 850C Col	77-07-5N	£333
BJC-70 White Colour	77-53-1N	£209	DeskJet 850C Col & Support	77-08-4N	***£394
BJC-4000 Colour	76-08-4N	£209	DeskJet 1200C Col	71-69-4N	£629
BJC600 E Colour	77-51-0N	£328	DeskJet 1200C & Support	76-09-3N	***£719
BJC800 Colour	94-80-5N	£1064	DeskJet 1200C/PS Col	71-75-0N	***£1012
EPSON <small>CALL FOR LATEST MODELS</small>					
Stylus 820 Mono	79-01-9N	£212	DeskJet 1600C Col	77-07-6N	£829
Stylus 820 Colour Kit	79-02-1N	£69	DeskJet 1600C & Support	77-08-5N	***£935
Stylus Colour IIS	79-02-2N	£265	DeskJet 1600CM Col	77-07-7N	£1219
Stylus Colour II	79-02-3N	£310	DeskJet 1600CM & Support	77-08-6N	***£1329
Stylus Colour	75-39-7N	£310	PointJet XL300 Col	71-56-9N	£1585
Stylus Pro XL A3 Col	78-33-0N	£1329	HP DeskJet XL300 Col & Support	76-13-3N	***£1675
HEWLETT PACKARD <small>CALL FOR LATEST MODELS</small>					
DeskJet 340	78-45-3N	£CALL	WinWriter 150C Col	79-07-0N	£258
DeskJet 340 & Support	79-23-4N	***ECALL	TEKTRONIX		
DeskJet 340 & CSF	79-23-5N	£CALL	Phaser 140 Colour	77-24-6N	£835

See Warranty Key

FAX

LOW PRICES

TAPE STREAMERS

Thermal	Item No.	Price	INTERNAL		
BT DF100, Alpine	93-66-8N	*£195	Colorado		
BT DF100, Dark grey	93-61-4N	*£195	Jumbo 350, 340MB	77-73-5N £79	
BT DF300, Alpine	76-11-5N	*£265	Jumbo 680, 680MB, 9.3MB/min, QIC-3010	76-33-3N £129	
BT DF300, Dark grey	76-11-6N	*£265	Conner		
Panasonic UF-V40	93-93-8N	*£258	TapeStar 420, 420MB, 9.5MB/min, QIC-80	74-44-8N £97	
Panasonic KX-F2700E, white	90-45-1N	*£279	TapeStar 850, 850MB, 9.5MB/min, QIC-3010MC	76-77-3N £165	
Panasonic KX-F2700E, charcoal	90-45-2N	*£279	PARALLEL PORT		
Samsung SF 500	92-01-6N	*£169	Colorado		
Samsung SF1505	76-26-8N	*£239	Jumbo Trakker 350, 340MB	Item No. Price	
Samsung SF2800	77-47-8N	*£275	Jumbo Trakker 700, 680MB, 9.3MB/min, QIC-3010	77-72-6N £149	
FAX/ANSWERING					
BT DF200 Alpine	93-61-8N	*£249	Jumbo Trakker 700, 680MB, 9.3MB/min, QIC-3010	76-29-5N £199	
BT DF200 Dark grey	93-66-9N	*£249	Conner		
BT DF400, Dark grey	76-11-8N	*£325	TapeStar 420, 420MB, 9.5MB/min, QIC-80	74-44-6N £199	
BT DF400, Alpine	76-11-7N	*£325	SCANNERS		
Panasonic KX-F2300E	93-68-5N	*£279	DELIRINA		
Panasonic KX-F2400E	93-68-2N	*£299	Winfax Scanner		
Panasonic UF-V60	93-93-9N	*£344	78-90-5N £245		
PLAIN PAPER FAX-INKJET					
BT BF800	93-78-2N	*£745	EPSON (Parallel I/F)		
Canon B320	76-34-2N	*£639	GT8500 PC, Parallel (inc. Photoshop LE)		
Canon B340	76-34-3N	*£745	77-61-2N £495		
HP FAX-900	93-76-1N	*£449	GT9000 PC, Parallel (inc. Photoshop LE)		
HP FAX-950	93-76-2N	*£625	77-99-3N £599		
PLAIN PAPER FAX-LASER					
BT 550	70-89-3N	*£589	GT9000 PC, SCSI-2 (inc. Photoshop LE)		
OKI Fax 1000	93-65-8N	*£689	75-96-7N £669		
Panofax UF-745	93-84-0N	*£1089	HEWLETT PACKARD		
Panofax UF-755E	76-58-2N	*£1349	ScanJet 3P AT Mono		
			75-99-9N £232		
			ScanJet 3C AT Colour Flatbed		
			77-68-4N £625		
			SICOS		
			Sicos Colour Page Scanner - ISA		
			75-16-5N £236		
			LOGITECH		
			ScanMan Easytouch		
			74-05-6N £98		
			ScanMan 32 WIN/Catchword		
			74-43-9N £56		
			ScanMan PC Colour Win		
			92-79-7N £138		
			ScanMan PowerPage Parallel A4 Scanner		
			75-08-4N £288		
			ScanMan 256 WIN		
			71-06-4N £69		

See Warranty Key

LASER/THERMAL PRINTERS

Make/Model	ITEM NO.	PRICE	HP LaserJet 4Si & Support <th>76-11-3N</th> <th>***£2555</th>	76-11-3N	***£2555
Brother HL-630 GDI, 6ppm	76-03-8N	£319	HP LaserJet 45i/MX, 16ppm	71-75-6N	*£2965
Brother HL-630i GDI, 6ppm	76-29-7N	£345	HP LaserJet 45i/MX & Support	76-46-2N	***£3395
Brother HL-660 GDI	76-59-5N	£458	HP Color LaserJet A3	76-69-8N	*£4195
Brother HL-1260 GDI	76-59-6N	£895	HP Color LaserJet A3 & Support	77-05-7N	*£5395
Epson EPL-5200+ 6ppm	77-66-1N	*£465	Kyocera FS-400	77-06-3N	£359
Epson EPL-9000 A3 8ppm	76-68-6N	£1195	Kyocera FS-1550	76-25-8N	£875
Epson EPL-9000PS A3 8ppm	76-68-7N	£1358	Kyocera FS-1600	76-25-9N	£1069
HP LaserJet 5L, 4ppm	78-45-4N	£355	NEC SuperScript Color 3000GDI Thermal	76-77-5N	£649
HP LaserJet 5P, 6ppm	77-07-8N	£575	NEC SuperScript 610+, 6ppm	76-55-8N	*£279
HP LaserJet 5L & Support	79-24-4N	***ECALL	NEC SuperScript 660, 6ppm	76-56-5N	*£385
HP LaserJet 5P & Support	77-08-7N	*£699	NEC SuperScript 660i, 6ppm	76-56-6N	*£545
HP LaserJet 5MP, 6ppm	77-07-9N	£725	OKI OL400ex 4ppm	71-49-5N	*£278
HP LaserJet 5MP & Support	77-08-8N	***£829	OKI OL410ex, 4ppm	74-83-3N	*£384
HP LaserJet 4 Plus, 12ppm	75-15-8N	£979	OKI OL810ex, 4ppm	77-69-1N	*£665
HP LaserJet 4 Plus & Support	75-15-9N	***£1335	Panasonic KX-P4430, 5ppm	94-78-0N	*£484
HP LaserJet 4M Plus, 12ppm	75-10-6N	£1295	Panasonic KX-P4400, 10ppm	74-08-4N	*£699
HP LaserJet 4M Plus & Support	76-46-3N	***£1439	Panasonic KX-P6100, 6ppm GDI	77-64-9N	*£265
HP LaserJet 4V 16ppm	76-02-9N	£1365	Panasonic KX-P6150, 6ppm GDI	78-24-1N	*£305
HP LaserJet 4V & Support	76-13-1N	***£1565	Star WinType 4000 GDI 4ppm	75-47-8N	£288
HP LaserJet 4MV 16ppm	76-03-0N	£1985	Star WinType 800C Thermal	75-70-0N	£595
HP LaserJet 4MV & Support	76-46-4N	***£2185			
HP LaserJet 4Si 16ppm	71-69-2N	*£2085			

See Warranty Key below

PRINTER MANUFACTURER'S WARRANTY DETAILS

† = Does not include On-Site Maintenance * = 1 Year On-Site Maintenance
** = 2 Year On-Site Maintenance *** = 3 Year On-Site Maintenance
Please note: Panasonic on-site warranty is limited to the UK Mainland

CBP Starter Kit

The CBP Printer Starter Kit provides you with everything you need to get up and running and contains:
• 1 x Parallel connecting cable • 1 x Replacement consumable • 1 x Ream A4 paper
We carry starter kits for all our top selling printers. For Example: Starter Kit for the HP LaserJet 4L is Item No. 76128-N at £49.95 (individual items would cost £56.30. Save £6.35 plus carriage costs)

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NEWS UPDATE

HP DeskJet 600

HP DeskJet 600
£209
Item No. 79-02-7N



The new DeskJet 600 replaces the DeskJet 540 and is designed to produce professional quality documents in the home, the small office at a very affordable price. An increased number of built-in fonts and a large receiver buffer memory offer enhanced usability together with speedier output using EconoFast mode.

Features:

- ✓ 80 column
- ✓ Monochrome with optional colour kit available
- ✓ Up to 4ppm in EconoFast mode, 1ppm (Best mode) for black text
- ✓ Up to 1 mpp in EconoFast mode, 4mpp (Best mode) for colour graphics
- ✓ Resolution: 600 x 600 dpi mono; 300 x 300 colour; 300 x600dpi on film or glossy.
- ✓ Emulates HP PCL3
- ✓ Fonts: 4 portrait & 4 landscape for DOS and 14 TrueType for Windows
- ✓ Built-in A4 100 sheet feeder (or 50 transparencies or 20 envelopes)
- ✓ 36 month return to HP Warranty (upgradable to 36 months home/office cover with HP SupportPack).

HP DeskJet 660C

HP DeskJet 660C
£275
Item No. 77-07-3N



The HP DeskJet 660C is the versatile inkjet printer for the office. Full 600dpi blacker, black and 300 clear colour printing is now possible thanks to new ink formulations and a host of other features.

Features:

- ✓ 80 column
- ✓ Integrated monochrome and colour
- ✓ Up to 4ppm in EconoFast mode, 1ppm (Best mode) for black text
- ✓ Up to 0.6mpp in EconoFast mode, 3mpp (Best mode) for colour graphics
- ✓ Resolution: 600x600dpi mono (300x300dpi colour)
- ✓ Emulates HP PCL3+
- ✓ Fonts: 8 for DOS and 14 TrueType fonts for Windows
- ✓ Built-in 100 sheet A4 feeder (or 50 transparencies or 20 envelopes)
- ✓ 36 month return to HP warranty (upgradable to 36 months home/office cover with HP SupportPack)

HP DeskJet 850C



HP DeskJet 850C
£333
Item No. 77-07-5N

The highly specified HP DeskJet 850C is fast and capable of excellent print quality in either black or colour. It is designed with the professional user in mind. It even comes with an AppleTalk Interface as standard.

Features:

- ✓ 80 column
- ✓ Integrated monochrome and colour
- ✓ Up to 6ppm in EconoFast mode, 4ppm (Best mode) for black text
- ✓ Up to 3ppm in EconoFast mode, 1ppm (Best mode) for colour graphics
- ✓ Resolution: 600x600dpi mono 300x300dpi with C-RET colour
- ✓ Emulates HP PCL3+
- ✓ Fonts: 26 scalable typefaces and 14 TrueType fonts for Windows
- ✓ 150 sheet multi purpose feeder
- ✓ 12 month return to HP warranty (upgradable to 36 months home/office cover with HP SupportPack)

HP OfficeJet LX - if you can't decide between a new printer, fax or copier get all three

The new **OfficeJet LX** from HP is a stylish yet compact printer/fax/copier that has been designed so that it can be connected directly to your PC via a bi-directional, centronics port. In addition it provides PC fax and scanning capabilities. It can even handle several functions at once.



Fax Features:

- ✓ Compatibility: ITU-T Group 3
- ✓ Fax/phone/answerphone switch included
- ✓ Answerphone: not built-in
- ✓ Number memory: 60 numbers plus 5 group numbers
- ✓ Mercury compatible with button
- ✓ 20 sheet document feeder
- ✓ 24 page memory (based on ITU-T No. 1 test chart)
- ✓ Handset is not included

Printer Features:

- ✓ 80 column
- ✓ Monochrome
- ✓ Up to 3ppm in EconoFast mode, 1ppm (Best mode) for black text
- ✓ Resolution: 600 x 300dpi
- ✓ Emulates HP PCL3
- ✓ Fonts: 6 for DOS and 16 TrueType for Windows

Other Features:

- ✓ Dimensions (W x D x H): 438 x 394 x 283mm
- ✓ Weight: 9.53Kg
- ✓ Warranty: 12 months return to HP with express unit exchange service

HP OfficeJet LX
£465
Item No. 78-61-7N

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Personal Computer Products

HP LaserJet 5P



HP LaserJet 5P
£575
Item No. 77-07-8N

The HP LaserJet 5P is designed for the office with a low to medium volume requirement. Text and graphics can be output at close to rated speed thanks to its 20MHz processor

Features:

- ✓ Up to 6 pages per minute
- ✓ 2MB RAM with memory enhancement (expandable to 50MB)
- ✓ 600dpi, with 300dpi compatibility mode; Economode
- ✓ Emulates enhanced HP PCL5 with optional Adobe PostScript™ Level 2 SIMM
- ✓ Fonts: 45 scalable typefaces (35 Intellifont and 10 TrueType)
- ✓ Universal 250 sheet A4 input cassette and one 100 sheet or 10 envelope multipurpose tray as standard (with flat paper path)
- ✓ HP JetDirect Option
- ✓ 12 months return to HP warranty (upgradable to 36 months home/office cover with HP SupportPack)

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COREL DRAW 6 for Windows® 95

CorelDRAW 6 is the world's premier 32-bit Windows 95 graphics application offering fully-featured applications for illustration, photo-editing and bitmap creation, business and multimedia presentations and 3D rendering.

Draw 6 £289
Item No. 34-58-2N

Upgrade CD from £148
Item No. 34-71-0N



COREL Draw 3, 4 & 5

CorelDRAW 3, the perfect entry-level graphics package – including CorelDRAW, CorelPHOTO-PAINT, CorelCHART, CorelSHOW, CorelTRACE and Corel MOSAIC. CorelDRAW 4, all the power and modules of CorelDRAW 3 and more – including CorelMOVE (for animation), OCR and multi-page layout. CorelDRAW 5 combines the graphics power of CorelDRAW and the advanced publishing capabilities of Corel VENTURA 5 within an integrated user interface. See line list for prices.

SEE LINE LISTING



COREL CD Office Companion

The best CD to complete your office suite.

Maximise your productivity with just one CD which contains: * CorelFLOW 2 for business graphics; * Corel Web Mosaic for Web browsing and CorelFAX for fax; * Corel PLANNER for personal management; * Corel GALLERY 2 for clipart and digital photos; * Corel FONT MASTER™ for 500 TrueType fonts; * Corel BOOKCASE™ for reference information and a collection of multimedia utilities.

Corel CD Office Companion

£67.50

Item No. 34-58-4N



COREL Gallery 2CD

Corel Gallery 2 is the world's best clipart and more. With 15,000 clipart images plus a state-of-the-art Visual Multimedia File Manager, 500 royalty free photos, 500 fonts, 75 sound clips, and 10 video clips, Corel Gallery 2 is the ideal partner for all your word processing, desktop publishing, and graphics applications.

£45

Item No. 30-60-0N



NEW

WINCheck/It

WinCheck/It from Touchstone, the all in one Windows problem solver, includes six main features. Fix Up, Clean Up, Tune Up, Uninstaller, Find Set-up and Check up.



£29.95

Item No. 34-31-5N

New FastMove!

New FastMove! from Touchstone, is a Windows based utility for every one who uses more than one PC. The fast, easy way to transfer files, FastMove! shows you which files need to be updated, scans each for viruses, synchronizes PCs with up to date files, simple interface for problem free transfers, selects just the files you want, includes Windows and DOS versions and also includes PC-to-PC transfer cable for the parallel port of any PC



£34.95

Item No. 34-91-5N

WIN'95 ADVISOR

Everything you need to get ready for Windows® '95. Get the answers you need quickly and easily! WIN'95 is designed to take all of the guesswork out of installing Microsoft Windows 95. Make the right decisions with WIN'95 Advisor and install Windows 95 right the first time



✓ Prepares your Windows 3.1 System for a fast, safe and easy upgrade

✓ Makes expert recommendations on hardware and software requirements

✓ Optimizes Windows 95 installation including Multimedia Benchmarks and Clean&Zip

£29.95

Item No. 34-91-4N

Touchstone

Hauppauge!

WIN/TV Celebrity Teletext, TV or video at home or in the office

This video card will install into a vacant expansion slot and after the software has been loaded and an aerial connected you'll have access to a maximum of 122 TV channels and Teletext on your Windows PC (Windows 95 compatible). 'Always in Front' mode allows TV viewing whilst working on Windows applications, the TV image will even sit on top of the screensaver. There's even a Video Out option! Features: ✓ from 640x480 to 1280x1024 ✓ 16.7m colours (4:2:2 supported) ✓ Video playback to full screen at 30fps ✓ No feature connector required ✓ 2 additional video inputs and audio line out requiring no extra sound card ✓ 12 months warranty



£29.95

Item No. 34-91-4N

ACCOUNTS – BUSINESS

Quickbooks V3.0	34-31-1N	£86
Quicken V4 Deluxe Business Pack WIN 3 1/2	34-27-5N	£45
Quicktax Returns 1995	34-27-7N	£28
Sage Instant Accounting V1.0 WIN	33-53-8N	£85
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As new versions of your current software are released it is highly probable that they will be Windows 95 versions and as such unusable by anyone NOT running Windows 95.

What type of PC do I need for Microsoft Office for Windows 95.

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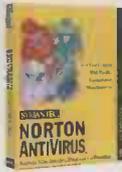
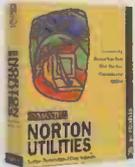
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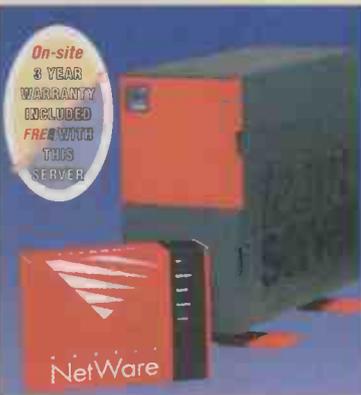
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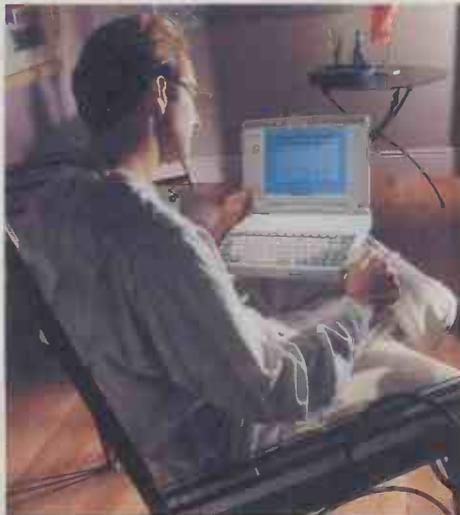
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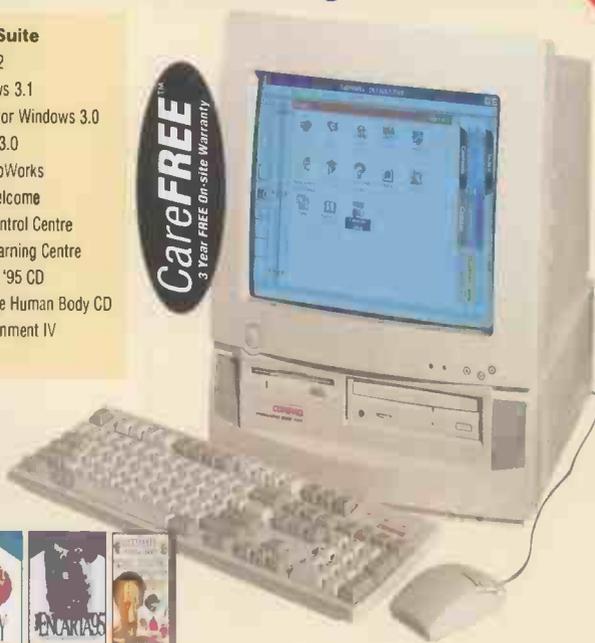
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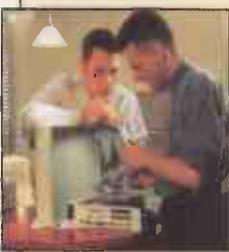


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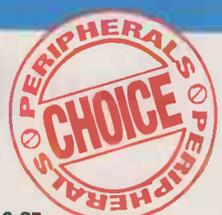


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- S105 MS Windows 3.x to Windows 95 Upgrade on 3.5"£59

- S110 MS DOS to Windows 95 Upgrade on CD£119
- S115 MS DOS to Windows 95 Upgrade on 3.5"£119
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- S125 MS Plus for Windows 95 on 3.5"£29
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The perfect tool for creating newsletters, brochures and flyers - quickly and easily. You don't need design experience. Publisher's award-winning power and ease of use allow even novices to create professional publications cost-effectively.



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- S160 MS Office for Windows 95 on CD£333
- S165 MS Office for Windows 95 on 3.5"£333
- S170 MS Office for Windows 95 Comp. Upgrade on CD£164

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MS Office 95 contains four full-featured Windows 95-ready applications. MS Word, MS Excel, MS Schedule and MS Powerpoint. It handles all your word processing, spreadsheets, presentation graphics and personal organisation.



- S175 MS Office for Windows 95 Comp. Upgrade on 3.5"£164
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- S185 MS Office for Windows 95 CCP Upgrade on 3.5"£139
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- S210 MS OfficePro for Windows 95 CCP Upgrade on 3.5"£205
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- S225 MS Schedule+ for Windows 95 on 3.5"£68

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Address: _____			Total	
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- 486DX2-66 Processor
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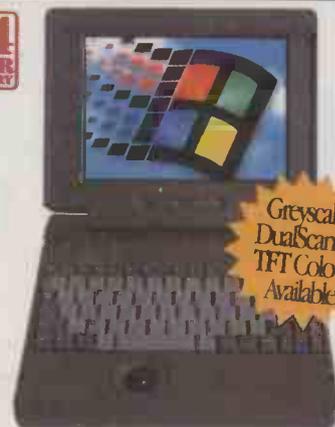


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- 3.5" Diskette Drive • Serial Mouse
- Microsoft Software: Encarta '95, Works, CD Sampler, Golf, Entertainment Pack & Dangerous Creatures
- Windows for Workgroups 3.11 & MS-DOS 6.22
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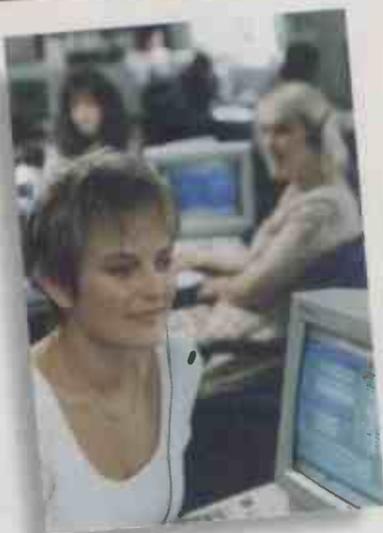
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A perfect balance



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ESTABLISHED 12 YEARS

Evesham Micros has been established for 12 years and now has four operating locations with a total annual turnover exceeding £45 million. It has risen to a position of strength in the computer market, with sustained growth and a secure financial status.

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We are a founder member of the Personal Computer Direct Marketers Association; a collaboration of manufacturers who adhere to a professional code of practice. This assures you of our pledge to provide a high standard of service. Additionally, the Payment Protection Plan provides peace of mind if you pay by cheque.



READY TO RUN

All systems are fully formatted and pre-installed with DOS and Windows or Windows '95. We also include the original installation disks and manuals, plus our own PC manual and easy-to-follow guide to Windows. A mouse is also included. Any peripherals and upgrades you buy with your PC will, wherever possible, be fully configured and tested.

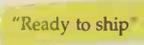
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READY TO SHIP

We endeavour to build and despatch all orders as quickly as possible. To this end, we try to maintain a buffer stock of popular configurations which can be either shipped immediately or purchased from one of our showrooms. These models are highlighted in the pricing information. Custom and other configurations are built to customer order and take a little longer, but we aim to despatch as quickly as possible. If you contact us we will give you a realistic estimate of the current delivery situation.



NO CHARGE UNTIL SHIPMENT

If you pay by credit card, payment is not processed until the goods are shipped. Beware of suppliers who charge your credit card weeks before they ship your order!

INSTALLATION/TRAINING

We can now offer a personal installation and training option for your new Vale PC. One of our local installers will deliver the PC to your premises or home, set it up for you and include a period of familiarisation training. This option costs £50.00.vat. More in-depth training can be negotiated directly with the installer.

ON-SITE MAINTENANCE

All PCs (except the *Voyager* notebooks) based on the UK mainland, plus the Isle of Wight, Northern Ireland and the Republic of Ireland have the benefit of on-site maintenance for the first year, covering both parts and labour. The length of cover can be extended to 2 or 3 years if desired (see the "Options" section of each page for price details).



30 DAY MONEY BACK GUARANTEE

We are so confident that you will be delighted with your Vale PC that should you, for any reason at all, be unhappy with your purchase, we will COLLECT it and refund your money in full. You will NOT pay any carriage or restocking charges (UK mainland only).

LIFETIME WARRANTY

We also offer a lifetime warranty on labour, so if a problem arises at anytime in the future you will only pay for the parts necessary to repair it.

LIFETIME TECHNICAL SUPPORT

As an owner, you will be privileged with access to our exclusive VALE HOTLINE telephone support number. Our award winning staff are both friendly and knowledgeable and have a full individual record of your system. Lines open 9am until 5-30pm Monday to Friday, and 10am until 4pm Saturday. To further improve our support service we have now installed a bulletin board for Vale customers offering latest drivers and technical information.



NO DEPOSIT PERSONAL FINANCE

Available with all purchases over £1000, subject to status.



WINDOWS 95

Windows 95 can be specified instead of Windows 3.11 at no extra cost.



NET ACCESS

With our special Internet access package, reaching a whole world of information from your Vale PC is very easy. Please see the *Platinum* page.



SOFTWARE PROTECTION

For your peace of mind all Vale PCs are thoroughly virus checked and have Iris Anti-virus software installed.



The proof of the pudding!



The readers of 'Personal Computer World' have just voted us "Best Hardware Supplier". We were also runner up for "Best After Sales Service" and "Best Telephone Support".



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In the 1993 'PC Direct HITS AWARDS' we won both "Customer Service Excellence" and "Service and Support Excellence" categories as voted by their readers. In 1994 we did it again winning the prestigious "Service Excellence" award. We are especially proud of all these accolades as they were nominated by readers who have actually dealt with our company. They also voted us their favourite supplier for several other products highlighted throughout our pages.

of the best ingredients

Every component of each Vale system is meticulously selected to provide a perfect balance of high specification and value for money.



'95 Reviews



The Vale PC

We offer a range of '486 desktop PCs from the modestly priced Popular models to the top of the range Premier.

PENTIUM MODELS
Cost effective Pentium computing is now available from the *Prestige* range. In the *Platinum* range we offer a computer optimised specifically to provide state of the art Pentium performance.

NOTEBOOKS
The *Voyager* offers a unique blend of style, performance and practicality, while the *Voyager 11* brings a new

dimension to mobile computing with its Pentium processor and built-in multimedia facilities.

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Evesham Micros has a proven track record of supplying some of the country's leading organisations. In addition to stand-alone PCs we specialise in the installation and support of a wide variety of network installations. Please our "Corporate and Network Sales" section on page 7 of the advert.



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Popular PCI



Windows 95 can be specified instead of Windows 3.11 at no extra cost.

The Vale Popular – a quality conscious computer at a budget conscious price.

Don't be fooled by the competitive price, this is NOT a cheap PC. It offers a fully implemented PCI solution with 8Mb RAM (essential for modern applications and Windows 95) and support for Plug and Play.

The motherboard is a bang up to date integrated design that incorporates a fast PCI hard disk controller, a ZIF socket for processor upgrades and 256kb cache RAM coupled with the latest energy saving technology.

The Vale Viewsonic 6E monitor is non-interlaced in all modes including 1024x768. More importantly it is able to display SVGA mode (800x600) at 72Hz refresh rate which is flicker free and does so while using the

full screen area (most budget monitors shipped with low cost systems have a huge border which uses up a large percentage of total screen area). It meets the stringent MPR II safety requirements as well as surpassing the EPA Energy Star power saving standard, so you can be assured of a relaxing flicker-free display that is kind to your eyes.

The 1Mb Diamond Stealth SE PCI video card bestows the Popular with astonishingly fast video performance for such a moderately priced computer (see the graph on the Platinum page).



- ◆ Integrated motherboard with Flash BIOS
- ◆ ZIF socket for processor upgrades, including Pentium OverDrive®
- ◆ On-board fast PCI IDE hard disk controller
- ◆ 8Mb RAM (expandable to 128Mb)
- ◆ 256kb external processor cache
- ◆ 2xPCI, 1xPCI/16-bit & 3x16-bit expansion slots
- ◆ 1 EPP parallel port and 2 serial ports with 16550 UART
- ◆ 1Mb Diamond Stealth SE PCI video card
- ◆ 14" fully non-interlaced MPR II monitor (0.28mm dot pitch)
- ◆ 3.5" 1.44Mb Floppy Disk Drive
- ◆ TÜV approved power supply with low noise fan
- ◆ EPA Energy Star compliant
- ◆ Choice of desktop or mini-tower case
- ◆ Full-tower case available at extra cost
- ◆ Mitsumi mouse and 102-key keyboard

- ◆ Includes MS-DOS 6.22, Iris Anti-virus software (3 month license), and your choice of either Windows for Workgroups 3.11 or Windows 95. Full manuals and disks supplied
- ◆ "Introduction to Windows" manual supplied
- ◆ 30 day moneyback guarantee
- ◆ 1 year On-Site Maintenance for parts and labour
- ◆ Lifetime technical support hotline
- ◆ Lifetime labour warranty

POPULAR MODELS			
486dx2•66	Standard	Media '95	Lotus Office
528Mb	£849+VAT	£999+VAT	£1039+VAT
1Gb	£909+VAT	£1059+VAT	£1099+VAT
486dx4•100	Standard	Media '95	Lotus Office
528Mb	£899+VAT	£1049+VAT	£1089+VAT
1Gb	£959+VAT	£1109+VAT	£1149+VAT

Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Multimedia models feature double speed CD-ROM drives (see below).

POPULAR OPTIONS

- 16Mb RAM instead of standard 8Mb£180.00 +VAT
 - Fully non-interlaced 15" monitor (as Vale Platinum) ..£79.00 +VAT
 - Internal High Density 5.25" 1.2Mb Drive.....£49.00 +VAT
 - Full-tower case£50.00 +VAT
 - Installation/training service£50.00 +VAT
 - Second year on-site maintenance.....£69.00 +VAT
 - Second and third year on-site maintenance.....£149.00 +VAT
- PLEASE SEE THE PLATINUM PAGE FOR VALE ACCESSORIES

Premier PCI

Upgrade any Popular model to a top specification 486 with class beating credentials for £150+VAT. These models feature the following enhancements:

- ◆ 15" FST microprocessor controlled non-interlaced 0.28mm dot pitch monitor (as Vale Platinum)
- ◆ 2Mb Diamond Stealth 64DRAM 64-bit PCI video card
- ◆ 102-key tactile keyboard ◆ Logitech Mouse

"ready to ship" models 486dx2•66/528Mb Microsoft Media '95 PC @ £1149+VAT
486dx2•66/528Mb Lotus Multimedia Office PC @ £1189+VAT



MEDIA '95

- ◆ MS Encarta
- ◆ MS Works
- ◆ MS Golf
- ◆ MS Scenes
- ◆ MS Money
- ◆ MS Dangerous Creatures
- ◆ PhotoCD software



With double speed CD-ROM drive

With quad speed CD-ROM drive

£150+VAT

£210+VAT

January 1995



In a group test with PCs from Compaq, Elonex & Hewlett Packard.

"Without hesitation we recommend the Vale Premier from this group." Vale Premier Media '95 PC

March 1995



"When you take into consideration the price and the one year on-site warranty, the Vale offers excellent value for money." Vale Premier

TWO GREAT MULTIMEDIA OFFERS AVAILABLE WITH ANY VALE PC:

Like the Vale PCs they are fitted to, our multimedia kits are quality conscious!! We definitely do NOT offer any old CD-ROM drive along with a so called "compatible" sound card, a pair of nasty cheap speakers and some end of line software.

- ◆ Choice of Panasonic double speed or Toshiba quad speed CD-ROM drive;
- ◆ Genuine Creative Labs SoundBlaster 16 sound card for great sound and total compatibility;
- ◆ ZyFi2 amplified stereo speaker system for crystal clear audio;
- ◆ Choice of Microsoft Media '95 software or Lotus Multimedia Office.





Prestige PCI



The Vale Prestige – affordable Pentium power

The Vale Prestige is a very close relation of our multi award winning Platinum range, so it has a strong pedigree. The monitor and video card are as used in our Popular model as are the keyboard and mouse, the end result is a perfect entry level Pentium processor system that can be expanded in tune with your needs.

- ◆ Integrated motherboard with Flash BIOS
- ◆ ZIF socket for processor upgrades
- ◆ On-board fast PCI IDE hard disk controller
- ◆ 8Mb RAM (expandable to 128Mb)
- ◆ 256kb external processor cache
- ◆ 2xPCI, 1xPCI/16-bit & 3x16-bit expansion slots
- ◆ 1 EPP parallel port and 2 serial ports with 16550 UART
- ◆ 1Mb *Diamond Stealth SE* PCI video card
- ◆ 14" MPR II fully non-interlaced monitor (0.28mm dot pitch)
- ◆ 3.5" 1.44Mb Floppy Disk Drive
- ◆ TÜV approved Power Supply with low noise fan
- ◆ EPA Energy Star compliant
- ◆ Choice of desktop or mini-tower case
- ◆ Full-tower case available at extra cost
- ◆ Mitsumi Mouse and 102-key Mitsumi keyboard
- ◆ Includes *MS-DOS 6.22*, *Iris Anti-virus software* (3 month license), and your choice of either *Windows for Workgroups 3.11* or *Windows95*. Full manuals and disks supplied
- ◆ "Introduction to Windows" manual supplied
- ◆ 30 day moneyback guarantee
- ◆ 1 year On-Site Maintenance for parts and labour
- ◆ Lifetime technical support hotline
- ◆ Lifetime labour warranty

Designed for



Windows 95 can be specified instead of Windows 3.11 at no extra cost.

Microsoft® Windows®95

PRESTIGE MODELS			
PENTIUM 75 528Mb 1Gb	Standard	Media '95	Lotus
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PENTIUM 90 528Mb 1Gb	Standard	Media '95	Lotus
	£1089+VAT	£1299+VAT	£1339+VAT
PENTIUM 120		Add £100+VAT to the price of P90 models	
Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Multimedia models feature quad speed CD-ROM drives (see below).			

BUSINESS FINANCE

Example: Lease the Prestige 486DX2•66/528Mb Lotus Multimedia Office PC for

£44.21+VAT per month.



FULL SCREEN DISPLAY IN ALL MODES



A Vale Prestige Media '95 PC

NO DEPOSIT PERSONAL FINANCE
 Example: Prestige 486DX2•66/528Mb Lotus Multimedia Office PC
 (Cash price £1467.58 inc VAT)
£52.45 inc VAT per month. No deposit.
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PRESTIGE OPTIONS

- 16Mb RAM instead of standard 8Mb£180.00 +VAT
- Fully non-interlaced 15" monitor (as Vale Platinum)£79.00 +VAT
- Internal High Density 5.25" 1.2Mb Drive£49.00 +VAT
- Full-tower case£50.00 +VAT
- Installation/training service£50.00 +VAT
- Second year on-site maintenance£69.00 +VAT
- Second and third year on-site maintenance£149.00 +VAT

PLEASE SEE THE PLATINUM PAGE FOR VALE ACCESSORIES

Pentium, Overdrive, the Intel Inside Logo and Pentium Processor Logo are registered trademarks of Intel Corporation.



We offer a full range of multimedia packs and products, any of which can be specified with your Vale PC, see page 9 of our advert for full details. Please note that bundled software does not feature full retail packaging. When ordering double speed CD-ROM installations in Vale computers the Panasonic CR-571 enhanced IDE drive may be used.



- ◆ Lotus applications: 1-2-3, AmiPro, Approach, Screencam, Smartpics
- ◆ Software Toolworks Grolier Encyclopaedia for 1995 - version 7
- ◆ Sage Moneywise
- ◆ FIFA International Football, Suprvoice, Dragon Lore, MegaRace, Theme Park
- ◆ Professor Windows, Professor Training Suite, Professor Multimedia, Typing Tutor
- ◆ Pilot Multimedia including 'Interlude' and 'Get Organized'

Lotus Office MULTIMEDIA



With double speed CD-ROM drive

£190+VAT

With quad speed CD-ROM drive

£250+VAT

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Platinum PC

Vale Platinum... the Editors' Choice - twice!

Four 1995 magazine accolades already - stunning success for a stunning performer.

A true giant killing act, the Vale Platinum has already received four magazine accolades this year including the highly prestigious PC Magazine "Editors' Choice" on two occasions!! This is no mean feat; both times computers from 30 different manufacturers, including the giants of the industry, were compared and examined in minute detail. The only computer to earn the title "Editors' Choice" was the Vale Platinum. At our attractive prices there is no need to compromise.

- ◆ Pentium® processor, upgradeable via Intel socket 5
- ◆ Integrated motherboard with 2x PCI, 1xPCI/16-bit & 3x16-bit expansion slots
- ◆ Fast PCI enhanced IDE mode 4 hard disk controller and drive
- ◆ 256kb external CPU write-back cache ◆ 8Mb RAM (expandable to 128Mb)
- ◆ Support for EDO RAM ◆ Flash BIOS ◆ EPP and ECP capable printer port
- ◆ Two 16550 compatible UART driven high speed serial ports
- ◆ Diamond Stealth 64DRAM 2Mb 64-bit video card
- ◆ 15" FST microprocessor controlled non-interlaced monitor
- ◆ Full Microsoft Windows 95 'plug and play' support
- ◆ CPU cooling fan ◆ EPA Energy Star compliant
- ◆ Latest Windows keyboard ◆ Microsoft mouse
- ◆ 3.5" 1.44Mb Floppy Disk Drive ◆ TÜV approved Power Supply with low noise fan
- ◆ Includes MS-DOS 6.22, Iris Anti-virus software (3 month license), and your choice of either Windows for Workgroups 3.11 or Windows95. Full disks and manuals supplied
- ◆ "Introduction to Windows" manual supplied
- ◆ Choice of desktop or mini-tower case ◆ Full-tower case available at extra cost
- ◆ 1 year On-Site Maintenance (next working day response) for parts and labour
- ◆ Lifetime technical support hotline ◆ Lifetime labour warrant
- ◆ 30 day moneyback guarantee



The finest ing

A high performance system that is a pleasure to use demands the finest components. We carefully select from the established leaders in their field.

Motherboards **intel®**

Processor

Hard disk

Video card **DIAMOND**

Microsoft® Mouse

CD-ROM drive **TOSHIBA**

PLATINUM MODELS

PENTIUM 75	Standard	NeoV 195	Lotus Office
528Mb	£1149 ^{+VAT}	£1359 ^{+VAT}	£1399 ^{+VAT}
1Gb	£1209 ^{+VAT}	£1419 ^{+VAT}	£1459 ^{+VAT}
2Gb	£1399 ^{+VAT}	£1609 ^{+VAT}	£1649 ^{+VAT}
PENTIUM 90	Standard	NeoV 195	Lotus Office
528Mb	£1239 ^{+VAT}	£1449 ^{+VAT}	£1489 ^{+VAT}
1Gb	£1299 ^{+VAT}	£1509 ^{+VAT}	£1549 ^{+VAT}
2Gb	£1489 ^{+VAT}	£1699 ^{+VAT}	£1739 ^{+VAT}

PENTIUM 120 Add £100^{+VAT} to the price of P90 models
PENTIUM 133 Add £230^{+VAT} to the price of P90 models
 Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Multimedia models feature quad speed CD-ROM drives (see pages 3&4).

PLATINUM OPTIONS

Upgrade to 16Mb RAM (Platinum)	£180.00 + VAT
Upgrade to 32Mb RAM (Platinum)	£600.00 + VAT
Upgrade to 32Mb EDO RAM (Triton)	£400.00 + VAT
Upgrade to 512kb Pipeline-Burst cache (Triton)	£90.00 + VAT
1Gb SCSI hard disk instead of 1Gb IDE	£269.00 + VAT
2Gb SCSI hard disk instead of 2Gb IDE	£430.00 + VAT
Upgrade to Diamond Stealth 64VideoRAM card (2Mb)	£65.00 + VAT
Stealth 64VideoRAM upgrade to 4Mb	£130.00 + VAT
Diamond Motion Video Player accessory for Stealth 64VideoRAM (gives MPEG decoding and includes upgrade to 4Mb)	£249.00 + VAT
Internal high density 5.25" 1.2Mb Drive	£49.00 + VAT
Full-Tower case	£50.00 + VAT
Installation/training service	£50.00 + VAT
Second year on-site maintenance	£69.00 + VAT
Second and third year on-site maintenance	£149.00 + VAT

Why Diamond Video Cards ?

The highly acclaimed Stealth range has won many press accolades including the coveted PC Magazine "Editors' Choice". Now a new range of stealth cards is available, giving a wide choice of graphics performance. They are all based around S3 chipsets for superb Windows acceleration as well as class leading DOS performance, and come with the renowned InControl Tools utility for setting up the Windows environment. Remember that Diamond are continually striving to optimise the performance and compatibility of their video cards; and you therefore have the assurance that driver support is ongoing.

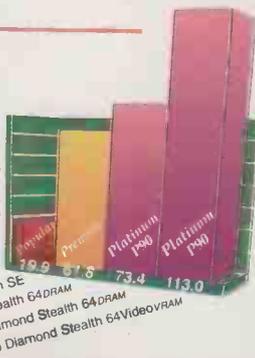
STEALTH SE (Vale Popular). The latest addition to the range continues the tradition of delivering the best price/performance available. It displays 24-bit True Colour at 640x480.

STEALTH 64DRAM (Vale Premier and Platinum). The Stealth 64DRAM is the world's fastest DRAM accelerator, its S3 Vision864 controller setting a new standard in affordable 64-bit graphics performance. Supplied with full AutoCAD drivers.

STEALTH 64VideoRAM (Vale Platinum Triton P120/133). The new Stealth 64VideoRAM is the ultimate graphics and video accelerator. It is supplied with full AutoCAD drivers and its 2Mb high speed VRAM can be expanded to 4Mb, giving 24-bit colour at 1280x1024! It has driver support for all popular video formats, including MPEG - you can scale video playback up to full screen, or view video clips in full-motion (up to 30 fps). The optional Motion Video Player accessory provides hardware MPEG decoding, allowing full-screen full-motion video, as well as accepting video input from camcorder, VCR, laserdisk etc.



Source: PC Labs Winmark 3.1. The figures represent megapixels per second over a variety of Windows related tasks. Last two figures produced on a Vale Pentium P90, all others on a Vale 486dx2-66. Figures vary with processor type.



Designed for Microsoft Windows 95

Keyboard KEY TRONIC®
 Our new Windows keyboard has three extra keys that are programmable for use with Windows 3.x but really come in to their own in Windows95 as Application keys.

Monitor
 The Vale EcoScan 15 that is supplied with the Premier and Platinum ranges is a superb quality micro-processor controlled 15" monitor. It's dark non-glare FST screen with 'Edge-to-Edge' display gives as much as 30% greater useable picture area than most 14" models. Complete control over all display adjustments is obtained via an ingeniously simple digital push button system, with on-screen representation of the settings. As it complies with the stringent Swedish MPR II safety standards and can display up to 1024x768 at a flicker-free 72Hz refresh rate it is especially kind to your eyes.

April 1995 Idek iiyama Vision Master 17 monitor

MONITOR UPGRADES

15" Idek iiyama SVGA colour (up to 65kHz scan, 1280x1024 max)	£50.00 + VAT
17" Vale EcoScan17 SVGA colour (up to 65kHz scan, 1280x1024 max)	£200.00 + VAT
17" Panasonic TX-D1732 SVGA colour	£299.00 + VAT
17" Idek iiyama Vision Master SVGA colour (illustrated)	£320.00 + VAT
20" Tatum SVGA	£699.00 + VAT
21" Idek iiyama SVGA colour (up to 92kHz scan, 1600x1200 max)	£1050.00 + VAT

Pentium is a registered trademark of Intel Corporation





Platinum Triton PCI

Vale Platinum Triton: The Hyperformance Pentium

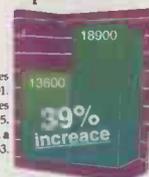
Intel's new Triton chipset unleashes the full potential of the Pentium processor family. Their engineers have been able to introduce several new technical advances that other manufacturers are currently unable to offer. In order to capitalise on these benefits and offer the ultimate quality we are using Intel's own Advanced Endeavour motherboard. The performance advantage achieved by fitting the latest high speed EDO-RAM and Pipeline-Burst Cache is very significant, as demonstrated in the accompanying graphs. As with every Vale computer we have paid great attention to detail in component selection, convincing us that Pound for Pound we doubt it is possible to build a better PC.

now
16Mb
EDO RAM

THE CASE FOR PIPELINE-BURST CACHE:

The most significant performance improvement since the Pentium!

Memory performance



Overall performance



"Memory performance" figures are taken with PC Bench 7.01.
"Overall performance" figures are taken with Winstone 95.
All tests conducted on a Vale Platinum Triton P133.

The Platinum Triton offers the following enhancements over the award winning standard model:

- ◆ Genuine Intel Advanced Endeavour motherboard manufactured in Europe
- ◆ Intel socket 7 for processor upgrades
- ◆ 3x PCI, 1xPCI/16-bit & 2x16-bit expansion slots
- ◆ 256k Pipeline-Burst cache
- ◆ 16Mb Extended-Data-Out (EDO) RAM
- ◆ Support for Native Signal Processing
- ◆ Enhanced IDE mode 4 hard disk controller and drive
- ◆ Integrated sound using the Creative Labs Vibra 16 chipset
- ◆ P120 & P133 models are fitted with Diamond Stealth 64VideoRAM 2Mb 64-bit video card

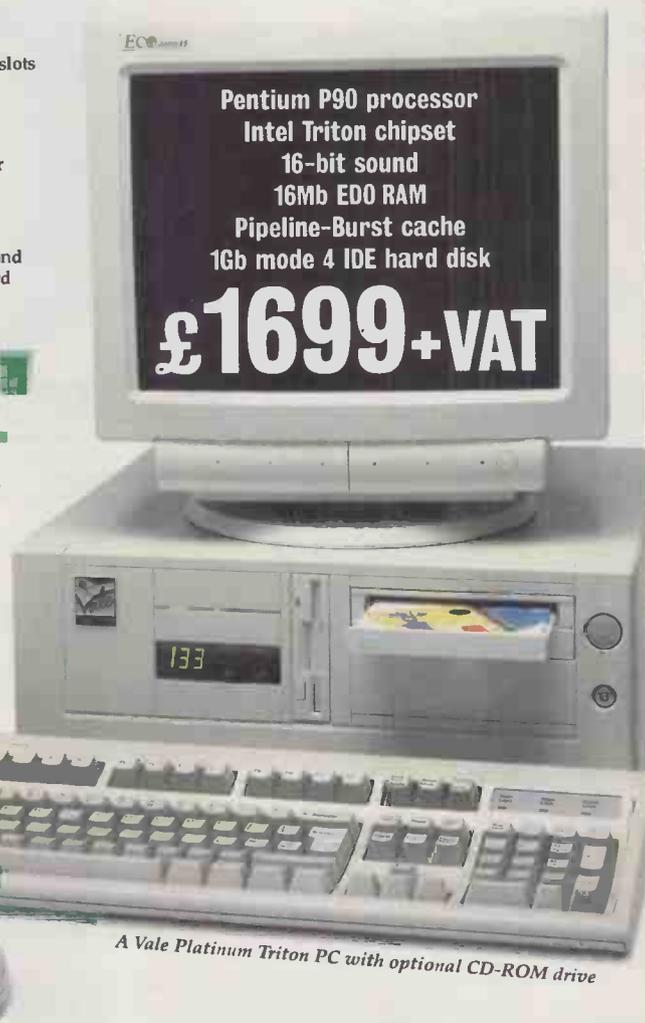
NO DEPOSIT PERSONAL FINANCE

Example: Buy the Platinum P90/1Gb Lotus Multimedia Office PC
(Cash price £1820.08 inc VAT).

£65.04 inc VAT
per month.

No deposit. 36 monthly payments.
APR 18.5%. Total payable £2341.44 inc VAT.

P120/133 models
DIAMOND
MULTIMEDIA
Stealth 64VIDEO
2Mb VRAM video card



Pentium P90 processor
Intel Triton chipset
16-bit sound
16Mb EDO RAM
Pipeline-Burst cache
1Gb mode 4 IDE hard disk

£1699+VAT

A Vale Platinum Triton PC with optional CD-ROM drive

Ingredients

And the proof of the pudding is...



"The Evesham Vale Platinum delivers excellent performance, a good feature set and an affordable price—a combination which is the hallmark of a PC Magazine Editors' Choice. In a market where compromise is all too common, the Evesham Vale Platinum is a winner."
January 1995 Vale Platinum P90



"The combination of an excellent multimedia platform and high all-round DOS and Windows performance, at a good price, makes the Vale Pentium an excellent multimedia PC, and a worthy Editors' Choice"

May 1995 Vale Platinum P90



"The Platinum took the top spot in our performance tests. The Diamond Stealth video system had a chance to show its true colours...Not only is the Platinum a top class machine, it's also good value for money."

February 1995

Vale Platinum P90



January 1995
Vale Platinum
P90 Media '95 PC

PLATINUM TRITON MODELS

PENTIUM 90	Standard	Neo '95	Lotus Office
1Gb	£1699+VAT	£1849+VAT	£1889+VAT
2Gb	£1889+VAT	£2039+VAT	£2079+VAT
PENTIUM 120	Standard	Neo '95	Lotus Office
1Gb	£1849+VAT	£1999+VAT	£2039+VAT
2Gb	£2039+VAT	£2189+VAT	£2229+VAT
PENTIUM 133 Add £130+VAT to the price of P120 models			

Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Multimedia models feature quad speed CD-ROM drives (see pages 3&4).

Vale PC Accessories

INTERNET ACCESS

This package is the affordable way to enhance your PC with communications ability. Send and receive faxes, and access online information services and the Internet. Apart from your PC and a phone socket, everything you need is included:

- Pace FAX/modem: either MobiFax 144 (V32bis: 14400bps) or Linnet 34fx (V34bis: 28800bps modem, 14400bps FAX)
- Software to access Internet facilities
- 21 days free subscription to an internet service provider
- "The Net" guide book
- FAX software

V32bis package **£90+VAT**
V34bis package **£195+VAT**



TAPE STREAMER BACKUP

Regular backups are essential to ensure the safety of your data; why not take the advantage of having a tape streamer fitted into your Vale? It is more economical than using multiple floppy disks, as well as being faster and far more convenient. Quoted capacities are with compression software (supplied). All units are supplied with full backup software.

IOmega 800Mb £139+VAT
IOmega 3.2Gb £225+VAT

Tapes for above.....£29 + VAT Tapes for above.....£29 + VAT



MICROSOFT OFFICE 95

- ◆ MS Word
- ◆ MS Excel
- ◆ MS Mail (workstation license)
- ◆ MS Powerpoint
- ◆ MS Access (Office professional only)



Special offer with any Vale PC:
Office 95 Standard **£159+VAT** Office 95 Professional **£229+VAT**
(Supplied via voucher redemption)

Evesham Micros • CALL US NOW ON (01386) 765500 • Evesham Micros



Voyager



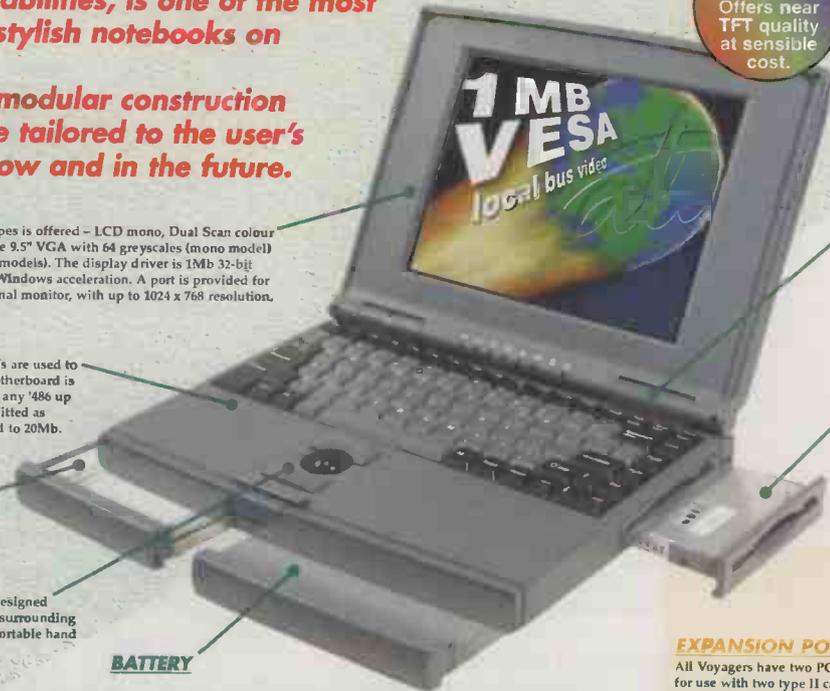
"It's toughness, excellent performance and good display make it a machine that we must honour with the PC Today best buy award."
Vale Voyager 486dx2+66
 Dual Scan Colour

The Vale Voyager, with its flexibility, Windows performance and sound capabilities, is one of the most powerful and stylish notebooks on the market.
Its completely modular construction enables it to be tailored to the user's exact needs, now and in the future.

Dual Scan Colour display
 Offers near TFT quality at sensible cost.



A Vale Voyager with the supplied carrying pouch



DISPLAY

A choice of display types is offered - LCD mono, Dual Scan colour and TFT colour. All are 9.5" VGA with 64 greyscales (mono model) or 256 colours (colour models). The display driver is 1Mb 32-bit VESA local bus with Windows acceleration. A port is provided for connection to an external monitor, with up to 1024 x 768 resolution.

CPU & RAM

Low power consumption CPUs are used to maximize battery life. The motherboard is CPU upgradeable, supporting any '486 up to the DX4-100. 4Mb RAM is fitted as standard, and can be upgraded to 20Mb.

HARD DISK

The hard disk is removable, offering the ultimate in upgradeability and data security.

TRACKBALL

A 19mm ergonomically designed trackball is built-in. The surrounding surface makes for a comfortable hand rest whilst typing.

BATTERY

BUILT-IN AUDIO

The Voyager has a built-in microphone and speaker, with digitized audio recording/playback capability. A Yamaha music chipset (SoundBlaster and Windows Sound System compatible) allows for sound generation. There are sockets for external speakers and microphone. With this audio performance, the addition of a CD-ROM drive makes the Voyager truly 'Multimedia ready'.

3.5" FLOPPY DRIVE

Designed for Windows 95 can be specified instead of Windows 3.11 at no extra cost.
 Microsoft Windows 95

VOYAGER

EXPANSION PORTS

All Voyagers have two PCMCIA ports for use with two type II cards or one type III card. Rear panel connectors include serial port; EPP parallel port; SVGA monitor; and PS/2 mouse, keyboard or keypad. A further port enables fast connection to a docking station.

QUALITY & STYLE

Voyager notebooks measure 286 x 226mm. The Voyager is just 34mm thick and weighs 2.4kg (mono model), while the Voyager II colour models are 49mm and 2.9kg. The quality of fit and finish is amongst the best we have ever seen.

WARRANTY

Voyagers feature 12 months 'return to base' warranty covering parts, with a lifetime warranty on labour.

Monochrome

	250MB	340MB	528MB
486dx2+66	£899 ^{+VAT}	£949 ^{+VAT}	£999 ^{+VAT}
486dx4+75	£949 ^{+VAT}	£999 ^{+VAT}	£1049 ^{+VAT}
486dx4+100	£979 ^{+VAT}	£1029 ^{+VAT}	£1079 ^{+VAT}

Dual Scan Colour

	250MB	340MB	528MB
486dx2+66	£1269 ^{+VAT}	£1319 ^{+VAT}	£1369 ^{+VAT}
486dx4+75	£1319 ^{+VAT}	£1369 ^{+VAT}	£1419 ^{+VAT}
486dx4+100	£1349 ^{+VAT}	£1399 ^{+VAT}	£1449 ^{+VAT}

TFT Colour

	250MB	340MB	528MB
486dx2+66	£1689 ^{+VAT}	£1739 ^{+VAT}	£1789 ^{+VAT}
486dx4+75	£1739 ^{+VAT}	£1789 ^{+VAT}	£1839 ^{+VAT}
486dx4+100	£1769 ^{+VAT}	£1819 ^{+VAT}	£1869 ^{+VAT}

VOYAGER OPTIONS

Additional primary NiMH battery.....	£89 ^{+VAT}
Upgrade from 4Mb to 8Mb RAM	£169 ^{+VAT}
Upgrade from 4Mb to 12Mb RAM	£299 ^{+VAT}
Upgrade from 4Mb to 20Mb RAM	£499 ^{+VAT}
Docking station	£349 ^{+VAT}
Cigar lighter adaptor	£49 ^{+VAT}
Additional PSU	£49 ^{+VAT}

DOCKING STATION



With a docking station on your desk the Voyager becomes a true "desktop replacement". The docking station has two drive bays (1x3.5" & 1x5.25"), three ISA expansion slots (2x full length & 1x 1/2 length), as well as permanent ports for monitor, keyboard, PS/2 mouse, serial, parallel, speaker, microphone and audio line-in.

RAM UPGRADES

Make the most of the power of your notebook by specifying extra RAM - up to 20Mb for the Voyager or up to 40Mb for the Voyager II.



PCMCIA MODEMS

A FAX/modem is the gateway to a world of communications, whether sending and receiving faxes or connecting to the internet information superhighway.



Corporate and Network Sales

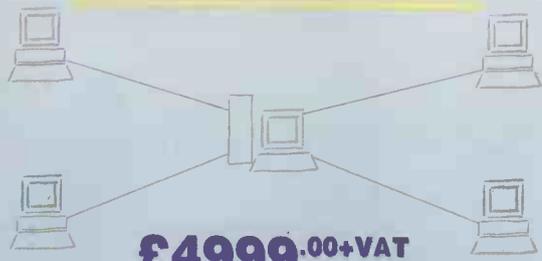
Established for over 12 years, Evesham Micros has gained consistent industry recognition for its quality of product and service and has a proven track record of supplying some of the country's leading organisations - a wide spectrum of businesses, government bodies and educational establishments. Each of our branches has dedicated account managers who can support your I.T. needs. Whether your needs are large or small, they are ready to discuss your requirements and advise on the ideal solution - we can offer PCs for Windows applications or CAD/CAM, right through to complete network solutions. We are able to react quickly to the market, therefore we can offer your company the latest technology at competitive prices.

Network Solutions

Whatever your networking requirement, we can provide the complete solution. From a simple two user peer to peer system to a Wide Area Network, we can install and support the entire installation - from initial concept to user training. All our installations are supervised by a Novell Certified Network Engineer, thus assuring our clients of the very best in networking expertise. Why not contact our Corporate Sales staff at your nearest Evesham Micros branch to discuss your requirements.



5 Station Solution



£4999.00+VAT
 Not including cabling and installation

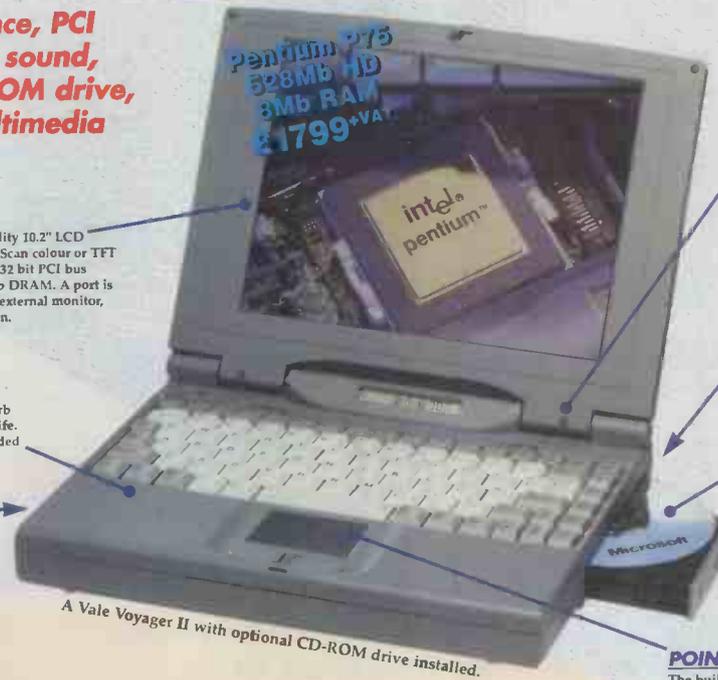
1 Fileserver:
 ♦ Vale Pentium P90 Fileserver (as right)

4 Workstations:
 ♦ 4x Vale Popular 486dx2+66
 ♦ 528Mb hard disk
 ♦ Ethernet card suitable for 10Base2 or 10BaseT

We fully appreciate that no two network requirements are exactly the same. While the above is an example of one of our solutions, we will be delighted to quote for your individual needs.

Voyager II PCI

With Pentium processor performance, PCI bus colour graphics, built-in 16-bit sound, and the option of an internal CD-ROM drive, the Voyager II notebook takes multimedia applications in it's stride.



Removable battery.



Upgradeable hard disk.

DISPLAY
The Voyager II has a high quality 10.2" LCD display, with a choice of Dual Scan colour or TFT colour. The display driver is a 32 bit PCI bus Windows accelerator with 1Mb DRAM. A port is provided for connection to an external monitor, with up to 1024 x 768 resolution.

CPU & RAM
Designed to use 3.3V Pentium processors, the Voyager II offers superb performance with maximum battery life. 8Mb RAM is fitted, and can be upgraded to a maximum of 40Mb.

HARD DISK
The enhanced IDE hard disk is driven by a PCI local bus controller, and can be removed for upgrading.

BUILT-IN AUDIO
The Voyager II really is multimedia ready. It has a 16 bit stereo sound card built in, together with stereo speakers. This can easily be expanded via the jacks for external speakers and microphones.

3.5" FLOPPY DRIVE
The built in floppy drive slides out to allow fitment of the optional CD-ROM drive.

CD-ROM DRIVE
The optional double speed CD-ROM drive replaces the floppy drive to make the Voyager II a self contained multimedia workstation. An external floppy drive is available for simultaneous use with the CD-ROM drive.

POINTPAD™
The built in Pointpad™, with palm rest, controls the cursor effortlessly and accurately.

FEATURES

- KEYBOARD**
Voyagers use full function 86-key keyboards. Unlike many notebooks, they have a good solid feel.
- BATTERY**
Voyagers use NiMH batteries for fast recharging and long life: up to 3-4 hours use with the Voyager 486dx2-66 mono model, and 2 hours with the Voyager II colour models. They can be easily

removed and replaced by a second unit. Extensive power management features include doze, sleep and 'suspend to disk' modes. The latter quickly saves your working environment to disk when the lid is closed, allowing you to re-load it later.

DOS & WINDOWS
Voyagers are supplied with MS-DOS 6.22 and your choice of either Windows 3.11 or Windows 95. Installed and ready to run.

ACCESSORIES

- PCMCIA V34 fax/Modem.....£199+VAT
- PCMCIA Ethernet card.....£139+VAT
- External keyboard.....£29+VAT
- Soundplus speakers/microphone/earphones system...£19+VAT
- ZyFi2 amplified speakers.....£29+VAT
- Total care warranty.....£see panel

Dual Scan Colour

	528MB	1GB
Pentium P75	£1799+VAT	£2119+VAT
Pentium P90	£1889+VAT	£2209+VAT

TFT Colour

	528MB	1GB
Pentium P75	£2219+VAT	£2539+VAT
Pentium P90	£2309+VAT	£2629+VAT

VOYAGER II OPTIONS

- Internal double speed CD-ROM drive.....£179+VAT
- External 3.5" floppy drive (parallel port)....£69+VAT
- Additional primary NiMH battery.....£59+VAT
- Upgrade from 8Mb to 16Mb RAM.....£299+VAT
- Upgrade from 8Mb to 24Mb RAM.....£499+VAT
- Cigar lighter adaptor.....£49+VAT
- Additional PSU.....£49+VAT

TOTAL CARE WARRANTY

Our optional "Total Care" package replaces the existing warranty with 2 year care. If your Voyager should need attention during this period we will collect it and return it to you when repaired. Typical turn-around is 3 working days. This cover is just 12.5% of the cost of the notebook (without accessories) - for example, £112.38** for the 486dx2-66/250Mb mono model.

CARRYING CASES

VALE CARRY CASE £30.00+VAT
A versatile, padded case with carrying handle and detachable shoulder strap. Ideal for protecting your Voyager "out in the field".



EXECUTIVE CASE £59.00+VAT

- Computer compartment (16.5" x 10.5" x 2.5")
- Cellular 'phone and power supply pockets
- Diskette and file pockets, pen and business card holders



Combining modern design with classic styling

TECHNOLOGY CASE £39.00+VAT

- Computer compartment (15.5" x 10.5" x 3.5")
- Printer/FAX compartment (12.75" x 9" x 2")
- Cellular 'phone and power supply pockets
- Diskette and file pockets, pen and business card holders



The Vale Fileserver

This is just an example of the type of fileserver we can supply. We will be happy to quote for your individual requirements.

- ◆ 90MHz Pentium® processor
- ◆ 1Gb SCSI hard disk with PCI controller
- ◆ 8Mb RAM
- ◆ 256kb cache
- ◆ 1Mb PCI video
- ◆ 14" SVGA monitor
- ◆ 32-bit PCI ethernet card

UPGRADES ARE AVAILABLE FOR, PROCESSOR, HARD DISK, RAM, DAT INSTALLATION, CD-ROM ETC. PLEASE CALL FOR DETAILS.

With the full-tower case (see first page):

£1649+VAT

With the purpose designed case (illustrated) featuring redundant PSU system:

£1949+VAT

A Vale Fileserver with the purpose designed case.



Vale Advanced NT Fileserver

Microsoft NT Advanced Server provides a highly secure environment for networks with workstations running Windows 3.x or Windows 95. The Vale Advanced NT Fileserver is designed to provide a complete solution for those moving to this operating system.

- ◆ Intel Advanced Endeavour motherboard with Triton chipset
- ◆ 133MHz Pentium® processor
- ◆ 2Gb SCSI hard disk with Adaptec 2940 PCI controller
- ◆ 32Mb EDO RAM
- ◆ 256kb Pipeline-Burst cache
- ◆ 1Mb PCI video
- ◆ 14" SVGA monitor
- ◆ 32-bit PCI ethernet card
- ◆ Quad speed CD-ROM drive
- ◆ Microsoft NT Advanced Server software

With the full-tower case:

£3999+VAT

With the dedicated fileserver case:

£4299+VAT

BUSINESS FINANCE

We offer very flexible leasing agreements to limited companies, government and educational establishments. For example: Lease the Vale Fileserver (standard case)

for **£58.37+VAT** per month.

3 year term, payable quarterly. Full written details are available on request.



TWO GREAT MULTIMEDIA BUNDLES



OFFERED WITH A VARIETY OF PACKS

Lotus Suite:

- Lotus 1-2-3
- Lotus AmiPro
- Lotus Approach
- Lotus Screencam
- Lotus Smartpics

Top Games Titles:

- Supervoice, Dragon Lore, MegaRace, Theme Park, FIEA International Soccer

Grolier Encyclopaedia:

Software Toolworks Grolier Encyclopaedia for 1995 - version 7

Plus: Sage Moneywise; Professor Windows, Professor Training Suite, Professor Multimedia; Typing Tutor; Pilot Multimedia including 'Interlude' and 'Get Organized'

Lotus Office



Microsoft Encarta '95

The complete multimedia encyclopaedia.

Microsoft Works The integrated productivity suite: Word Processor, Spreadsheet, Database, Graphics, Communications.

Microsoft Golf Experience the true-to-life challenges of the game of golf.

Microsoft Scenes Superb screen saver.

Microsoft Money All you need to take control of your finances.

Microsoft Dangerous Creatures See extraordinary creatures come to life.

PhotoCD software.



Upgrade speakers in any pack to ZyFi 2 PROs for a surcharge of £20+VAT.

See the CD-ROM drives (below and right) for details of the complete packs. When ordering please quote pack number. We recommend a minimum 486sx33 system for these packs. Please note that bundled versions of software and sound cards are not full retail packs, and the software features on-line documentation.

PANASONIC DOUBLE SPEED CD-ROM DRIVE



CR-562 Double Speed, multi-session drive
limited offer at only

£45.00+VAT

Includes cables and driver software

- Double speed 300kb/sec data transfer rate
- Multi-session mechanism - compatible with Kodak Photo CD Standard
- Motorised loading tray - no need for a caddy
- High speed 320ms access
- White book (CDi) compatible for video CDs
- MPC compatible ○ Mounts in 5.25" drive bay
- Output from audio CDs via headphone socket
- Requires SoundBlaster or compatible card with Panasonic CD interface

- 1E** £55.00+VAT CR-562 with AT-bus driver card
- 1F** £79.00+VAT CR-562 bundled with Soundplus 16 card
- 1B** £95.00+VAT CR-562 with genuine SoundBlaster 16 card
- 1C** £115.00+VAT CR-562 with genuine SoundBlaster 16 ASP card

- 7C** £136.00+VAT CR-562 with Media '95 pack, ZyFi2 speakers and Soundplus 16 card
- 7A** £150.00+VAT CR-562 with Media '95 pack, ZyFi2 speakers & genuine SoundBlaster 16
- 7B** £179.00+VAT CR-562 with Media '95 pack, ZyFi2 speakers & genuine SoundBlaster 16 ASP

- 9C** £169.00+VAT CR-562 with Lotus Multimedia Office, ZyFi2 speakers and Soundplus 16 card
- 9A** £190.00+VAT CR-562 + Lotus Multimedia, ZyFi2 speakers & genuine SoundBlaster 16
- 9B** £205.00+VAT CR-562 + Lotus Multimedia, ZyFi2 speakers & genuine SoundBlaster 16 ASP

TOSHIBA QUAD SPEED IDE CD-ROM DRIVE

TOSHIBA XM-5302B ENHANCED IDE DRIVE



WHY SETTLE FOR LESS!!
With 4x speed and the latest enhanced IDE interface this drive has the performance to cope with the most demanding multimedia applications.



"The Vale Pentium's Toshiba XM-5302B ATAPI CD-ROM drive is among the fastest and most modern you can buy". PC Magazine May 1995

- Enhanced IDE ATAPI interface
- Quad speed 600kb/sec sustained data transfer rate
- Super fast 190ms access
- Output from audio CDs via headphone socket
- Multi-session drive - compatible with Kodak Photo CD
- MPC and White Book (CDi) compatible

- 4A** £155.00+VAT XM-5302B with genuine SoundBlaster 16 card
- 4B** £220.00+VAT XM-5302B with genuine SoundBlaster AWE32 value
- 4C** £310.00+VAT XM-5302B with genuine SoundBlaster AWE32

- 5A** £210.00+VAT XM-5302B with Media '95 pack, ZyFi2 speakers and SoundBlaster 16 card
- 5B** £275.00+VAT XM-5302B with Media '95 pack, ZyFi2s and SoundBlaster AWE32 value
- 5C** £365.00+VAT XM-5302B with Media '95 pack, ZyFi2s and SoundBlaster AWE32

Lotus Office

- 6A** £250.00+VAT XM-5302B with Lotus Multimedia Office, ZyFi2s and SoundBlaster 16
- 6B** £315.00+VAT XM-5302B with Lotus Multimedia Office, ZyFi2s and SB AWE32 value
- 6C** £405.00+VAT XM-5302B with Lotus Multimedia Office, ZyFi2s and SB AWE32

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Suncom
FX2000 Joystick £19.00+VAT
 This recent addition to the highly acclaimed range of Suncom joysticks brings further advances in comfort and control. The pistol grip can be easily rotated to give perfect orientation for left or right handed use, while the unique "V" designed top fire button allows lightning fast response.
 Switchable autofire, throttle control and suction feet complete the package. Requires game port.

SPECIAL OFFER
 Includes F15 III on CD

MSC Multi-System £69.00+VAT
EVERYTHING YOU COULD WANT FROM A JOYSTICK.
 The Multi-System is three control systems in one. The sturdy base sits securely on your desktop with suction feet, and provides a nicely weighted steering wheel for driving games. The wheel un-clips to reveal bars which twist into position for either an aircraft yoke or bike handle bars. Whichever you use there are control buttons at your fingertips, and an aircraft throttle paddle. The four mounted pedal box gives you throttle and brake controls. Multi-System has a port for a second joystick. Requires game port.

It's a car!
It's a bike!
It's a plane!

Microsoft **Media '95**

- 11A** £304.00 +VAT CD-56E with Media '95 pack, ZyFi 2 speakers and genuine SB 16 card
- 11B** £369.00 +VAT CD-56E with Media '95 pack, ZyFi 2s and SoundBlaster AWE32 value
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Lotus Office

- 10A** £344.00 +VAT CD-56E with Lotus Multimedia Office, ZyFi 2s and genuine SB 16
- 10B** £409.00 +VAT CD-56E with Lotus Multimedia Office, ZyFi 2s and AWE32 value
- 10C** £499.00 +VAT CD-56E with Lotus Multimedia Office, ZyFi 2s and SB AWE32

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THE FLIGHTSTICK IS CONSISTENTLY REVIEWED AS THE BEST QUALITY JOYSTICK IN ITS CLASS
 Test fly a Flightstick with your favourite simulator and you will know the meaning of control. Whether you're a novice or experienced combat pilot, flying skills will be improved and enemy kill rate will increase. Excellent construction - looks and feels like the real thing! Includes throttle control and 7ft long connection cable. Requires game port.

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with IDE CD-ROM interface
- SoundBlaster 16 MCD card £99.00+VAT
with Panasonic/Sony/Mitsumi CD-ROM interfaces
- SoundBlaster AWE32 Value card £135.00+VAT
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SoundBlaster AWE32 card £179.00+VAT
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- 3H** £74.99 +VAT Soundplus 16 sound card with QS-123 joystick, ZyFi2 active speakers and Monkey Island 2
- 3F** £109.00 +VAT SoundBlaster 16 ASP with QS-123 joystick, ZyFi2 active speakers and Monkey Island 2



"Monkey Island 2 Le Chuck's Revenge" is a registered trademark of Lucasfilm Games

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THE ULTIMATE COMBAT STICK FOR COMPUTER PILOTS!
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VIRTUAL PILOT £68.00+VAT
THE MOST REALISTIC FLIGHT YOKE AVAILABLE FOR THE PC
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- Pentium P75.....£149.00^{+VAT}
- Pentium P90.....£239.00^{+VAT}
- Pentium P120.....£479.00^{+VAT}
- Pentium P133.....£569.00^{+VAT}
- Heatsink and fan recommended for all above processors.
- CPU Heatsink.....£3.00^{+VAT}
- 486 fan & heatsink£10.00^{+VAT}
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 - PC Magazine "Editor's Choice" April 1995

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Desktop Voice, Data and Fax Modem.
Integrates your PC and your telephone to provide complete communications facilities.



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"A superb combination of tape drive and software."
PC Today, December 1993
Iomega Tape250 Parallel Port Unit



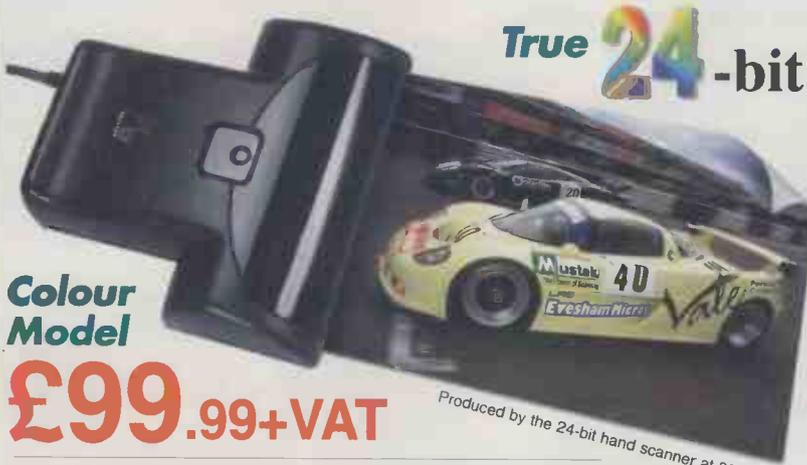
800Mb Internal unit.....£139 +VAT
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True 24-bit

Colour Model

£99.99+VAT

Produced by the 24-bit hand scanner at 300dpi.

or with 'parallel port' interface (see bottom right) £149.00+VAT

Requires '386 or higher, Windows 3.1 or higher, at least 4Mb RAM, Mouse, Hard Drive and 256 colour SVGA graphics or higher,

Providing powerful colour scanning tools, this package enables high quality colour images to be generated for use in professional graphics presentations.

COLOUR SCANNER FEATURES:

- Colour mode gives genuine 16 million colour, 400dpi hardware scanning (not software interpolated)
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PACKAGE INCLUDES:

- HAND-HELD COLOUR SCANNER & INTERFACE CARD
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Personal Computer World

"...I have found the quality of photographic and line-art scans to be good, and with Picture Publisher thrown in, this is extremely good value for money." Personal Computer World, September 1994



True 256 GREYSCALE HANDY SCANNER with all the right features, including O.C.R. and extensive graphics editing facilities.

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Scanners from **Mustek**



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"Superb quality results time after time. The ease of use is commendable and the bundled software offers brilliant value for money... We therefore recommend the Mustek without hesitation." What PC?, August 1993

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To help with your choice of scanner we have prepared a sample disk pack for each of the three units featured on this page.

Each sample pack contains several images (including the Car and Child) scanned in various modes to provide an exact representation of each unit's capabilities – before you buy.

A fact sheet is also included containing loading instructions, scanning info., and printed originals produced by the scanner of your choice for comparison.

Please state which scanner you are interested in (greyscale, colour or flatbed). Supplied on 3 1/2" disks.



Cost Per Pack £5.00+VAT including delivery – refundable on purchase of a scanner.

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- All models include image scanning and photograph re-touching software, and powerful OCR software

new fast single pass models



"Excellent value for money. The works for only £700." PERSONAL COMPUTER December 1993

"The Mustek MFS6000C is a quality piece of hardware... Superb results." Personal Computer World April 1993

"The Mustek MFS-1200CX provides a good set of features at the lowest price in the test group...if you need an inexpensive high-resolution scanner, then the Mustek MFS-1200CX should be on your shortlist." PC MAGAZINE October 1994

External SCANNER INTERFACE

Connect your scanner to your printer port!

This compact in-line interface box does away with the need to install an expansion card for your scanner, by simply plugging into the Parallel port. It is ideal for anyone who wants to transfer their scanner quickly between computers, as well as notebook owners and those who have simply run out of expansion ports. Compatible with the Mustek Black & White, Greyscale, & 24-bit Colour hand-held scanners.



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INTERPOLATED:	4800dpi	9600dpi	6400dpi	9600dpi
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	Transparency adaptor...£179+VAT		Automatic sheet feeder...£299+VAT	

Requirements: '386 or higher, Windows 3.1 or higher, Mouse, Hard Drive and 256 colour SVGA graphics or higher. 600dpi model needs at least 4Mb RAM, other models need at least 8Mb RAM.

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PRINTERS

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- March 1995 "GOLD"
- January 1995 "PRO"
- "Lexmark has paid attention to all the important basics, removed the frills and offers irresistible value-for-money". PC PRO (at an RRP of £479).
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- Fast GDI Windows printing
- Laser quality 300 dpi resolution
- 12 months on-site maintenance
- 2000 page per month duty cycle

- PCL4 printing from within Windows
- Windows & TrueType scalable fonts
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HP DeskJet 850C "It's output was superb, it has performance and terrific features on its side, and it's economical to run, its enhanced colour resolution of 800-by-800dpi out specifies any other printer... Few will be disappointed after buying this printer." October 1995

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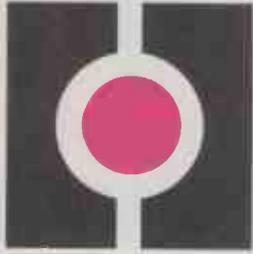
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- ... Pogo Sticks
- ... Buying loose sugar and butter

MEMORY



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Mark Simon
Chairman

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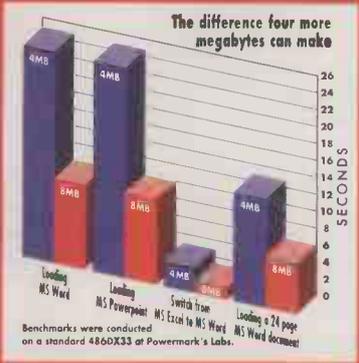
"Adding memory to your computer is undoubtedly the easiest, most cost effective way of increasing the performance of your system"

More and more applications demand large amounts of memory to work effectively. By increasing the standard memory in your PC you can:

- Radically increase the performance of your system
- Run multimedia applications at optimum speed
- Keep fonts and desktop accessories in RAM for instant access
- Run more than one application at a time, enabling true multi-tasking

DON'T JUST TAKE OUR WORD FOR IT...

"There's no question that you need more memory to run Windows or OS/2 than you ever did to run DOS."



The amount of memory made an even greater difference when we tried features like dragging and dropping between applications. The system was very slow with 4MB, significantly faster with 8MB, and faster still with 12MB.

On the basis of our tests, 8MB - not 4MB - is the minimum amount of memory you'll need to run Windows 3.1 satisfactorily. With 12MB, you'll get optimal performance in many cases."

PC Magazine, February 1995

"Possibly the greatest upgrade you can offer a flagging PC is an increase in memory."

The difference in speed between 4MB and 8MB is enormous, as is the jump from 8MB to 16MB. Anyone attempting to run Windows 3.1 in less than 4MB should upgrade now."

Personal Computer World, January 1995

HOW MUCH MEMORY DO YOU NEED?

Operating System	Minimum Requirement	Comfort Level	Optimum Performance
Windows 3.1	4MB	8MB	16MB
Windows 95	8MB	12MB	20MB
Windows NT	12MB	16MB	32MB
Windows AS	16MB	32MB	48MB
OS/2 Warp	4MB	12MB	20MB
Apple System 7.5	8MB	12MB	16MB

Source: manufacturers' figures

MATCHED MEMORY SIMM KITS

If you're unsure about upgrading then our Matched Memory SIMM Kits are for you. They're guaranteed to be totally memory matched. That means speed, voltage, refresh, parity and physical characteristics are all matched to give optimum performance to your system.

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- full installation instructions
- anti-static wrist strap
- dedicated support hotline
- our famous double guarantee - full lifetime warranty and the Powermark Promise - our 14 day 'no-quibble' money back guarantee

If your PC is not listed then call us. Our Memory Database has the upgrade path for almost every PC supplied in the UK over the last five years.

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- With most memory upgrades it's just a case of:
- switching off PC
 - removing lid
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 - installing SIMMs
 - closing lid
 - switching back on

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256K x 9	256K	80ns	£12
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1M x 9	1MB	80ns	£30
1M x 9	1MB	70ns	£29
1M x 9 (9cs)	1MB	70ns	£31
1M x 9	1MB	60ns	£30
4M x 8	4MB	80ns	£119
4M x 8	4MB	70ns	£114
4M x 9	4MB	80ns	£119
4M x 9 (9cs)	4MB	70ns	£114
4M x 9	4MB	70ns	£107
4M x 9	4MB	60ns	£116
16M x 9	16MB	70ns	£579
16M x 9	16MB	60ns	£599

GOLD EDGED SIMMS

• Specified by many PC manufacturers

- Longer MTBF

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1M x 9	1MB	60ns	£45

72 PIN SIMMS

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Type	Capacity	Speed	Price
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256K x 36	1MB	70ns	£59
512K x 32	2MB	70ns	£82
512K x 36	2MB	70ns	£82
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1M x 32	4MB	70ns	£105
1M x 36	4MB	80ns	£119
1M x 36	4MB	70ns	£119
1M x 36	4MB	60ns	£127
2M x 32	8MB	80ns	£213
2M x 32	8MB	70ns	£213
2M x 36	8MB	80ns	£245
2M x 36	8MB	70ns	£245
2M x 36	8MB	60ns	£259
4M x 32	16MB	70ns	£357
4M x 36	16MB	70ns	£399
4M x 36	16MB	60ns	£475
8M x 32	32MB	70ns	£839
8M x 36	32MB	70ns	£849
8M x 36	32MB	60ns	£949
16M x 36	64MB	60ns	£Call

72 PIN EDO SIMMS

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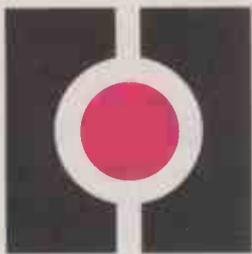
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(Call for notebook menu)

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Graphics or Video Card	£29
Multimedia Kit	£47

Save £££s with combo orders!

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MEMORY



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1MB Card	£129
NC200	
2MB Card	£149
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4MB	£129
PC7486 SLC	
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8MB Kit	£289
16MB Kit	£529



“ UPGRADING TIPS
You own a DX2/66MHz, 8MB of memory and 250MB hard disk.
Verdict: It's definitely well worth upgrading to Windows 95 and when you can afford it add more memory and a bigger hard disk for better performance.”

Personal Computer World
September 1995

LIFETIME WARRANTY ON ALL MATCHED MEMORY

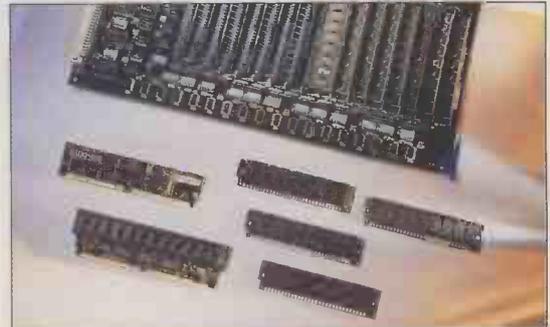
MATCHED MEMORY UPGRADES FOR HP

• Authorised HP dealer

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8MB Kit	£259
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8MB Module	£284
16MB Module	£499
HP95, HP100	
512K Card	£89
1MB Card	£149
HP OMNIBOOK 530, 630C SERIES	
4MB Module	£209
8MB Module	£399

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8MB Card	£289
T3300SL	
2MB	£66
T1200XE	
2MB Card	£93
T1600/T5100	
2MB Card	£75
T2100	
4MB Card	£149
8MB Card	£279
T2450 CT/2400 CT	
8MB Card	£359
T3100SX	
2MB Card	£85
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4MB Card	£149
8MB Card	£329
T1900, T1910, T1950CT, T1960, T3400CT, T4500, T4600, T4700CT, T4800CT,	
4MB Module	£149
8MB Module	£265
16MB Module	£499
T4850/4900	
8MB	£325
T5200/C & T8500/6400/6600	
4MB Module	£149
8MB Module	£329
T2400CS/ T3600	
4MB Module	£159
8MB Module	£319
DYNAPAD T100X	
6MB Card	£259
DYNAPAD T200, T200CS	
4MB Module	£139
PROTEGE 610CT, T2130CS	
8MB Module	£Call
16MB Module	£Call
SATELLITE PRO 400 SERIES	
8MB Module	£329



MATCHED MEMORY UPGRADES FOR OLIVETTI

PCS386SX	
1MB → 2MB	POWERCUT! £64
1MB → 4MB	POWERCUT! £129
1MB → 6MB	POWERCUT! £209
1MB → 8MB	£272
PCS40, 44	
4MB Kit	£145
8MB Kit	£279
M290	
2MB Kit	POWERCUT! £74
4MB Kit	POWERCUT! £149
M486/CP386	
2MB Kit	£99
4MB Kit	£168
PCS 11, 33	
2MB Kit	POWERCUT! £66
8MB Kit	£259
M300-30	
4MB Kit	£149
8MB Kit	£279
M400-10/40/60	
4MB Kit	£156
16MB Kit	£539
MODULO RANGE	
4MB Module	£149
8MB Module	£279
16MB Module	£489
SUPREMA M6-600, 700	
4MB Module	£149
8MB Module	£289
PCI/ISA PENTIUMS	
8MB Kit	£289
16MB Kit	£575

PRICE INSTABILITY!
CALL FOR LATEST OFFERS ON MEMORY BEFORE ORDERING

MATCHED MEMORY UPGRADES FOR ELONEX

PC386SXM, SXB, 386/16, B/33	
2MB Kit	£64
4MB Kit	£139
8MB Kit	£249
PC386 V/E, 486 V/E	
4MB Kit	POWERCUT! £139
8MB Kit	POWERCUT! £279
16MB Kit	POWERCUT! £469
WS RANGE	
4MB Kit	£139
8MB Kit	£269
16MB Kit	£499
PC433M, 450M, 466M	
4MB Kit	£129
8MB Kit	£279
16MB Kit	£469
LT386SX/P	
2MB Kit	£64
4MB Kit	£139
PC-500 SERIES, PC-560M	
8MB Module	POWERCUT! £279
16MB Module	POWERCUT! £479
ELONEX 560F EISA	
8MB Kit	POWERCUT! £279
16MB Kit	POWERCUT! £475
PC 575M/1, PC5120M/1,	
PC5133M/1	
8MB Kit	£279
16MB Kit	£549

SAVE £££s!

With the **Memory Bank Cheque Book**



Buy **Windows 95** and save £4 on any 4MB Memory Kit
See page 1

BEWARE
Beware of low grade 5 volt notebook memory that reduces battery life by up to 40%. Powermark plc only supplies 3.3 volt devices from market leaders with manufacturers' approvals.

DELIVERY CHARGES
See page 17

A great new way to buy...



See page 1

EARLY BIRD Order Bonus
See page 29



Everyone at Powermark passes through our training college

BANK

at Powermark



MATCHED MEMORY UPGRADES FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Powermark plc supply thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the United Kingdom.

MATCHED MEMORY UPGRADES FOR IBM

- Planar memory plugs directly onto system board
- Price instability - check latest offers on IBM matched memory before ordering

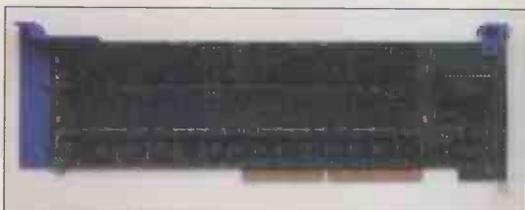


PS/2 35LS, 35SX, 40SX	
4MB	£139
8MB	£279
PS/2 55SX, 60, 65SX/57SX/M57	
4MB	£135
PS/2 70, Portable 70/75	
4MB	POWERCUT! £159
8MB	£289
PS/2 80	
4MB	£239
PS/2 140SX, N335SX, NSL	
4MB Card	POWERCUT! £149
8MB Card	£349
PS/2 90, 95, 95A	
4MB Kit	£139
8MB Kit	£279
PS/2 95 ARRAY PENTIUM	
16MB Kit	£599
VALUEPOINT 6381, 6382, 6384	
4MB	£129
8MB	POWERCUT! £279
PENTIUM VALUEPOINT PERFORMANCE SERIES	
4MB Kit	£139
8MB Kit	POWERCUT! £299
16MB Kit	£529
THINKPAD 300, 350, 355, 360, 500, 700, 701, 710, 720, 750, 755c	
4MB	£169
8MB	£329
16MB	£675
THINKPAD 730T	
4MB	£169
8MB	£349
PC466DX2, 100DX4	
8MB Module	£289
TREKKA	
2MB	£89
HURDLA, SPRINTA	
4MB Kit	£139
16MB Kit	£459
PS/1	
2MB	£85
PS/1 - 386	
4MB	£149
PS/1 - PRO 486	
4MB	POWERCUT! £139
8MB	£289
CONSULTANT, ESSENTIAL, WILLOW, EXPERT SERIES	
4MB	£129
8MB	£259
NEW! APTIVA SERIES	
4MB Module	£129
8MB Module	£259
16MB Module	£439
PC 300 SERIES	
4MB Module	£149
PC 700 SERIES	
8MB Module	£279

MATHS CO-PROCESSORS

Installation of a Co-Processor results in a significant speed increase in maths intensive applications eg: spreadsheets, databases, CAD and graphics packages.

	INTEL	IIT	CYRIX
80387 SX (16 MHz → 33MHz)	£53	£35	POWERCUT! £40
80387 SX (40 MHz)	£53	£35	£48
80387 SL (25 MHz)	£53	-	-
80387 DX (16 MHz → 33MHz)	£56	£32	POWERCUT! £41
80387 DX (40 MHz)	-	£35	£41
80386 RapidCAD	£189	-	-



MATCHED MEMORY UPGRADES FOR SIMM KITS

Include:

- full installation instructions
- anti-static wrist strap
- dedicated support hotline
- our famous double guarantee - full lifetime warranty and the Powermark Promise - our 14 day 'no-quibble' money back guarantee

MATCHED ADAPTER BOARDS FOR IBM PS/2

Completely user expandable
PS/2 50, 50Z, 60 & 65
 16MB Board with 4MB £295
 16MB Board with 8MB £425
PS/2 70, 80, 90 & 95
 64MB Board with 4MB £295
 64MB Board with 8MB £465

QUALITY! QUALITY! QUALITY!

Being the largest direct supplier means we buy memory direct from world class manufacturers.

Powermark plc only supply factory original memory.

MATCHED MEMORY UPGRADES FOR VIGLEN

Complete range for Executive, Professional and Tower

GENIE 386SX	
2MB Kit	£64
4MB Kit	£129
VIG II ELITE	
2MB Kit	£69
4MB Kit	£179
VIG III LS (Type 1)	
4MB Kit	£169
8MB Kit	£399
VIG III/25, III/33	
4MB Kit	£129
8MB Kit	£269
16MB Kit	£459
EX PENTIUM SERIES	
8MB Kit	£279
NEW! PCI PENTIUM SERIES	
8MB EDO Kit	£299
16MB EDO Kit	£549
EX 4DX33/50	
4MB	£139
8MB	£279
VIG 4SX25, 4DX33, 4DX50, 4DX2-50, 4DX2-66	
4MB Kit	£129
8MB Kit	£269
16MB Kit	POWERCUT! £469

CONTENDER RANGE

4MB	£139
8MB	£269

GENIE 486VLB RANGE

4MB Module	£139
8MB Module	£269
16MB Module	POWERCUT! £469
64MB Kit	£1999

GENIE PCI RANGE

4MB Module	£139
8MB Module	£279
16MB Module	£469

Certificate no. PS 26535
 BS5750 registered for the supply of computer, printer and workstation memory, processor and other upgrades.
 Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.

MATCHED MEMORY UPGRADES FOR APRICOT

XEN 486SX-25, 486DX2-50, 486 DX2-66, PCM	
4MB Module	£149
8MB Module	£269
16MB Module	£499
NEW! SHOGUN SERVER	
16MB Kit	£689
32MB Kit	£1199

MATCHED MEMORY UPGRADES FOR PACKARD BELL

LEGEND 200/316SX	
2MB Kit	POWERCUT! £72
4MB Kit	POWERCUT! £129
LEGEND 600, 900	
4MB Kit	POWERCUT! £129
8MB Kit	POWERCUT! £279
486 VLB, EXECUTIVE, ELITE RANGE	
4MB Module	£139
8MB Module	£269
16MB Module	£449
FORCE RANGE	
4MB Kit	£129
16MB Kit	£489
XL410/416/486	
16MB Kit	POWERCUT! £459

MATCHED MEMORY UPGRADES FOR APPLE

Complete range stocked
 Authorised Reseller



BEWARE

Beware of third party, low grade memory. Powermark plc only supply factory original memory.

Technical Sales Order Lines

0181-951 3355
 (50 lines)

MEMORY

It's time once again to Ponder Memory Moments



with Professor Paul

Dear Professor Paul,
 I currently have 4MB of RAM and I am in the process of upgrading my memory. I have heard that EDO is a new form of memory. Can I use this new form or am I tied to standard modules? Any upgrade that I make will mean the removal of the existing SIMMs.

Bemused in Belfast

Dear Bemused,
 Perfect timing as I am testing EDO in my laboratory. Technology is a great thing, speed, speed, speed. The answer to your question is "yes", change to the next generation of SIMM. Some Pentium computers come ready equipped with EDO, soon to be the new standard. Two 8MB modules will enhance the performance of your memory and did you know that if you combine EDO SIMMs with burst cache RAM, your PC will fly; the perfect fusion of two elements. I'm thinking EDO, burst cache RAM, maybe Pentium 120, 1GB SCSI hard drive, 16MB RAM, monitor upgrades; with all that power... just think!
 Yours, Professor Paul

Send your thoughts and queries to Professor Paul, c/o Powermark plc, Premier House, Station Road, Edgware, Middlesex, HA8 7AQ or fax them to 0181 905 6233. You can also Email Professor Paul on: profpaul@powermark.com

Professor Paul makes every effort to answer your memory problems, but he cannot guarantee to reply to everyone. Okay - So he's not a real professor but we think he should be!

Powermark plc
 Premier House, 112 Station Rd,
 Edgware, Middlesex HA8 7AQ

Tel: 0181-951 3355
 (50 lines)

Fax: 0181 905 6233
 Email: sales@powermark.com



Cards are not debited until despatch
 VAT at 17.5% will be added to all prices



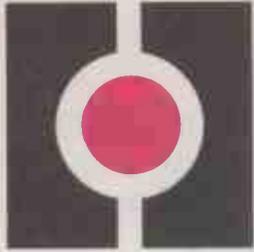
Public Sector customers can purchase through HMSO by calling 01603 694153.



Certificate no. PS 26535

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Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.



**Technical Sales
Order Lines
0181-
951 3355
(50 lines)**

... and here's what some of our customers have said ...

I would like to record how well and professionally I was dealt with by your Mr Tim Hunt when I called with a computer upgrade last week.

I just with other organisations were as helpful and professional.

R. Ollerton
Precision Research
International
Berkshire

... I pay particular compliments to a member of your Technical Sales staff: Ms Danielle Lester. She has been unfailingly helpful and courteous as well as obviously well informed.

... the correct product was identified within seconds together with all necessary details... you have a very competent member of staff - please pass on my appreciation.

R Rainsford Hannay
Cardoness Estate
Kirkcudbrightshire

**TURN THE PAGE
FOR MORE**

MEMORY



MATCHED MEMORY UPGRADE FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Powermark plc supply thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the United Kingdom.

HOW MUCH MEMORY DO YOU NEED?

Operating System	Minimum Requirement	Comfort Level	Optimum Performance
Windows 3.1	4MB	8MB	16MB
Windows 95	8MB	12MB	20MB
Windows NT	12MB	16MB	32MB
Windows AS	16MB	32MB	48MB
OS/2 Warp	4MB	12MB	20MB
Apple System 7.5	8MB	12MB	16MB

Source: manufacturers' figures

PCMCIA MEMORY

- All formats stocked: JEDEC, FLASH, OTPROM, DRAM, etc
 - Check compatibility before ordering
- | | |
|-----------|----------------------|
| 256K SRAM | £48 |
| 512K SRAM | £74 |
| 1MB SRAM | £122 |
| 2MB SRAM | POWERCUT! £99 |
| 2MB FRAM | £149 |
| 4MB FRAM | £439 |

DRAMS

- Call for devices not shown
 - Full range of PROMs, SRAMs & ZIPs available
 - 5 year warranty
- | | | |
|-----------|----------|--------|
| 64K x 1 | 120ns | £1.79 |
| 256K x 1 | 80ns | £2.80 |
| 256K x 4 | 80ns | £5.77 |
| 256K x 16 | 70ns SOJ | £25 |
| 1M x 1 | 80ns | £4.99 |
| 1M x 1 | 70ns | £5.20 |
| 1M x 4 | 80ns | £17.80 |

VRAMS

- | | | |
|----------|----------|-----|
| 256K x 8 | 70ns SOJ | £20 |
|----------|----------|-----|

SRAMS

- | | | |
|----------|-----------|-----|
| 32K x 8 | 10ns SRAM | £9 |
| 32K x 9 | 25ns SRAM | £10 |
| 128K x 8 | 20ns SRAM | £25 |
| 8K x 8 | 15ns SRAM | £6 |

**QUALITY!
QUALITY!
QUALITY!**

Being the largest direct supplier means we buy memory direct from world class manufacturers. Powermark only supply factory original memory.

MATCHED MEMORY UPGRADES FOR HP NOTEBOOKS AND PALMTOPS

- HP OMNIBOOK 300,425 SERIES**
- | | |
|-----|------|
| 4MB | £189 |
| 6MB | £289 |
- HP OMNIBOOK 530 SERIES**
- | | |
|------|------|
| 8MB | £389 |
| 12MB | £599 |
- HP 951X & 1001X**
- | | |
|------|------|
| 512K | £79 |
| 1MB | £129 |



MEMORY UPGRADES FOR TANDON

- POSITIVE 386SX25, 386DX40, 486SX25, 486DX33**
- | | |
|----------|------|
| 4MB Kit | £129 |
| 16MB Kit | £499 |

LIFETIME WARRANTY ON ALL MATCHED MEMORY

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

Personal Computer World
September 1995

MATCHED MEMORY UPGRADES FOR DAN

- DAN VANTAGE, WINDOWS NT SERIES**
- | | |
|----------|------|
| 4MB Kit | £129 |
| 16MB Kit | £489 |
- PREMIUM, DANTIUM, ULTIMATE**
- | | |
|----------|------|
| 8MB Kit | £269 |
| 16MB Kit | £489 |
| 32MB Kit | £899 |

**PRICE INSTABILITY!
CALL FOR LATEST OFFERS ON MEMORY BEFORE ORDERING**

MATCHED MEMORY UPGRADES FOR AST

- ACENTIA 900N, 910N**
- | | |
|------------|------|
| 4MB Module | £199 |
| 8MB Module | £349 |
- BRAVO LCII, III**
- | | |
|------------|------|
| 4MB Module | £149 |
| 8MB Module | £279 |
- PREMIUM, POWER PREMIUM**
- | | |
|------------|------|
| 8MB Module | £320 |
|------------|------|
- BRAVO NOTEBOOK SERIES**
- | | |
|----------|------|
| 4MB Kit | £175 |
| 16MB Kit | £549 |
- BRAVO MS P/75, PEMMIA GX P/90**
- | | |
|----------|------|
| 8MB Kit | £279 |
| 16MB Kit | £539 |



MATCHED MEMORY FOR NOTEBOOKS & PALMTOPS

- More memory can increase battery life by up to 18%
- COMMODORE LT286/386**
- | | |
|---------|------|
| 4MB Kit | £169 |
|---------|------|
- SANYO 17NB, 18NB**
- | | |
|-----|------|
| 2MB | £79 |
| 4MB | £165 |
- SHARP PC 3000, 3100**
- | | |
|-----|------|
| 1MB | £119 |
| 2MB | £139 |
- PANASONIC CF170, 270, 370**
- | | |
|-----|------|
| 2MB | £129 |
|-----|------|
- PANASONIC CF1000**
- | | |
|------------|------|
| 4MB Module | £198 |
|------------|------|
- PANASONIC CF580**
- | | |
|------------|------|
| 4MB Module | £185 |
|------------|------|
- LIBREX V386SX**
- | | |
|-----------|------|
| 1MB → 4MB | £199 |
|-----------|------|
- DEC HI-NOTE RANGE**
- | | |
|------------|------|
| 4MB Module | £197 |
| 8MB Module | £398 |
- HP OMNIBOOK RANGE**
Complete range stocked



BEWARE!
Beware of third party, low grade memory. Powermark plc only supply factory original memory.

DELIVERY CHARGES
See page 17

A great new way to buy...
See page 1



EARLY BIRD Order Bonus
See page 29



Everyone at Powermark passes through our training college

BANK

at
Powermark



MATCHED MEMORY UPGRADE FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Powermark plc supply thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the United Kingdom.

MATCHED MEMORY UPGRADES FOR COMPAQ

DESKPRO 386/20/25/e/s	
4MB Add-on Module	£169
4MB Expansion Board	£205
SYSTEMPRO, DESKPRO 486/33L, 50L & 486/25	
2MB Module	£109
8MB Module	£294
32MB Module	£1249

SYSTEMPRO XL 486/50, PENTIUM	
256MB Board with 16MB	£599
256MB Board with 32MB	£1099

DESKPRO 386N, 386S/20 & PROSIGNIA	
2MB Module	£79
4MB Module	£145

DESKPRO 386A/486, 486/25M, 486S/33M, 486DX2	
64MB Board with 4MB	£249
64MB Board with 8MB	£399

DESKPRO XE & XL FAMILY	
4MB	£129
8MB	£259

DESKPRO DESKPRO 5/90	
8MB Module	£269
16MB Kit	£539

PROLINEA 4/25S, 4/33, 4/50, 4/66, NET 1, MT	
4MB	£129
8MB	£259

PROLIANT 1000, 2000, 4000, PROLIANT PENTIUM	
4MB	£159
8MB	£295
16MB	£539

PORTABLE 486M/COLOUR 486/66	
2MB Kit	£87
8MB Kit	£299

SLT386	
2MB	£109
4MB	£169

LITE LITE 386, 386s/20	
2MB Board	£114
4MB Board	£179
8MB Board	£289

LITE LITE 4120/25/25C/25E	
4MB Card	£159
8MB Card	£289
16MB Card	£549

LITE ELITE SERIES	
4MB Card	£171
8MB Card	£321

CONTURA 400 C/CX, 4100, 4100C/CX	
4MB Module	£169
8MB Module	£339
16MB Module	£769

CONTURA 3/25/20/25C, 4/25	
4MB Card	£149
8MB Card	£287

CONCERTO 4/25, 4/33	
8MB	£335
16MB	£699

AERO 4/25/33	
4MB	£159

PRESARIO 425, 633, 833, 850, 866, 800 SERIES	
4MB	£149
8MB	£279

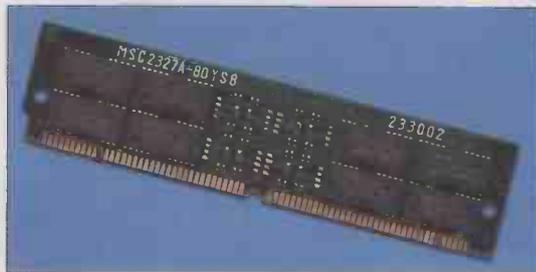
PRESARIO 700/900	
16MB Module	£499

PROSIGNIA 500	
8MB Kit	£289
16MB Kit	£499

MEMORY TOOLS

- Complete range of anti-static products available
 - Essential when handling electrostatic devices
- | | |
|-------------------------|------|
| ANTI-STATIC WRIST STRAP | |
| IC EXTRACTOR TOOL | £9 |
| SIMM TESTER | £779 |
| WRIST STRAP TESTER | £99 |

All our Matched Memory Kits come with our famous double guarantee - full lifetime warranty and 14 day money back guarantee



MATCHED MEMORY UPGRADES FOR ZENITH

SUPERSPORT SX	
2MB Module	£126
TURBOSPORT 386E	
4MB Kit	£159
MASTERSPORT SL/SLE, 620NL	
2MB Module	£109
Z-NOTE I SERIES, 320, 325	
2MB	£99
Z-NOTE 420/25/33	
4MB Module	£219
Z-SERVER/STATION/425/433/450	
8MB Module	£289
Z-SPORT 420/425	
4MB Kit	£179
Z-SELECT SERIES	
8MB Module	£269

MATCHED MEMORY UPGRADES FOR ICL

DRS 40, 45	
2MB Kit	£86
4MB Kit	£169
ERGOPRO C4, D4	
8MB Kit	£149
16MB Kit	£539
DRS M95	
4MB Kit	£180
32MB Kit	£1199
VALUEPLUS DL RANGE	
4MB	£168
ZENO SERIES	
4MB Kit	£149
16MB Kit	£539

MATCHED MEMORY SIMM KITS

- Include:
- full installation instructions
 - anti-static wrist strap
 - dedicated support hotline
 - our famous double guarantee - full lifetime warranty and the Powermark Promise - our 14 day 'no-quibble' money back guarantee

MEMORY EXPANSION BOARDS

KINGSTON ATA BOARD	
16MB Board with 4MB	£239
16MB Board with 8MB	£349
16MB Board with 16MB	£649



BEWARE

Beware of economy memory modules that use ASIC parity generation. Powermark plc only supply SIMMs with genuine parity DRAMs.

PRICE INSTABILITY!
CALL FOR LATEST OFFERS ON MEMORY BEFORE ORDERING

SAVE £££s!
With the Memory Bank Cheque Book



Buy Windows 95 and save £4 on any 4MB Memory Kit

See page 1

MATCHED MEMORY UPGRADES FOR GRAPHICS CARDS

Diamond Stealth 64	
1MB DRAM all versions	
1MB Upgrade Kit	£59
Diamond Stealth 64	
2MB VRAM PCI and VLB	
1MB Upgrade Kit	£59
Orchid Kelvin 1MB DRAM	
ISA and VLB versions	
1MB Upgrade Kit	£59
Taxan GTS Winboost	
1MB DRAM PCI, VLB, ISA versions	
1MB Upgrade Kit	£49

Call for upgrades on video cards not listed here

MATCHED MEMORY UPGRADES FOR MITAC

486SX/DXDV Series	
4MB Kit	£129
16MB Kit	£459
PENTIUM RANGE	
8MB Kit	£279
16MB Kit	£539

WE ALSO SUPPLY UPGRADES FOR...

Acorn, AIR, AST, Austin, Canon, Commodore, Dan, Goldstar, Hyundai, Loeland, MJN, Multiplex, NEC, NeXT, Opus, Philips, QMS, Sharp, Tandy, TI, Unisys, Wyse and all Pentium and multimedia systems.

Technical Sales Order Lines

0181-951 3355
(50 lines)

MEMORY

HUGE STOCKS
Guaranteed same day despatch on a virtually all stock items for orders placed even up to 4.00pm.

TECHNICAL SALES PEOPLE
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

FINANCIAL STABILITY
Powermark plc has been supplying upgrades for over 5 years and has an annual turnover exceeding £18 million with a healthy balance sheet.

LOW, LOW PRICES
We only supply products from leading manufacturers and at low, low prices too.

TECHNICAL SUPPORT
Dedicated after sales technical support teams on line to help with installation.

CORPORATE & PUBLIC SECTOR
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

FULL MANUFACTURERS' WARRANTIES
All products supplied by Powermark plc carry manufacturers' warranties and of course full Powermark plc guarantees.

TURN THE PAGE FOR MORE

UPGRADE DRIVE THRU
While-you-wait installation service available. See page 3 for details.

PERSONAL CALLERS
Save on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday. Saturdays: Sales from 9.30am to 4.00pm, Technical Support and Customer Service from 10.00am to 2.00pm.

Powermark plc
Premier House, 112 Station Rd, Edgware, Middlesex HA8 7AQ
Tel: 0181-951 3355
(50 lines)
Fax: 0181 905 6233
Email: sales@powermark.com



Cards are not debited until despatch
VAT at 17.5% will be added to all prices



Public Sector customers can purchase through HMSO by calling 01603 694153.



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Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.



**Technical Sales
Order Lines
0181-
951 3355
(50 lines)**

MATCHED MEMORY UPGRADES FOR IBM PRINTERS



IBM 4019 & 4019E	
3MB	£149
IBM 4029	
2MB	POWERCUT! £79
IBM 4039 & 4079	
4MB	POWERCUT! £149
8MB	POWERCUT! £339
LEXMARK OPTRA LX/1/R/RX	
4MB	£149
WINWRITER 200/400/600	
2MB	£79

... and here's what some of our customers have said ...
Please find the following order and my compliments to Nira, extremely polite, efficient and very friendly - a real asset to your company.
R. Smith
Kent

**TURN THE PAGE
FOR MORE**

MEMORY QUIZ

???????

"Your starter for 10MB"

1. What does PCMCIA mean?
2. What is a RAID?
3. What is SSA?

Answers on fax form page

MEMORY



MATCHED MEMORY UPGRADE FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Powermark plc supply thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the United Kingdom.

MATCHED LASERPRINTER MEMORY

• Price instability - check latest offers on laser printer memory before ordering

APPLE LASER WRITER SELECT 300/310	
4MB	£149
APPLE LASER WRITER PRO 810	
4MB	£179
APPLE LASER WRITER PRO 600/630	
4MB	£149
BROTHER HL-630, 660, 1260	
2MB	£85
4MB	£149
BROTHER HLS/E/V, HL10, DPS	
2MB	£109
CANON NOTEJET 486, BN22/BJC-880	
4MB Module	£149
CANON LBP4, 4+, LITE, SX	
2MB	POWERCUT! £125
CANON LBP8II	
2MB	£95
CANON LBP8IV	
4MB	POWERCUT! £119
CANON LBP 860	
16MB	£499
CANON LPB-1260	
4MB	£129
COMPAQ PAGEMARQ 15/20	
8MB	£269
16MB	£579
DEC LASER 2200/2100	
1MB	£79
EPSON EPL4000/4100/4300/8100	
2MB	£99
EPSON EPL7000	
3MB	£125
EPSON ACTION LASER 1600/1100	
4MB	£149
8MB	£279
FUJITSU VM4, VM8	
4MB Module	£149
KYOCERA F800	
2MB	£129
KYOCERA FS400, 410, 1500, 1550	
	&Call
NEC SILENT WRITER 95/95FX/97/97FX	
2MB	£85
OKI LASER 400, 410	
2MB	£95
OKI 800/820	
2MB	£99
OKI LASER 830/840/850	
2MB	POWERCUT! £99
PANASONIC 4420	
2MB	£109
PANASONIC 5410, 4440	
2MB	£105
PANASONIC 4450i	
2MB	POWERCUT! £99
TEXAS MICROLASER PS, MICROWRITER	
1MB	£69
TOSHIBA PAGELASER 6	
1MB	£119

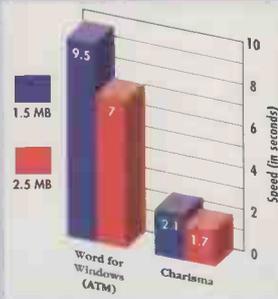
LASER PRINTER MEMORY - AN EXPLANATION

Increasing memory in your laser printer will enable it to print large, graphics intensive documents. Additional benefits include faster print spooling, faster printing speed and multiple font downloading.

This chart shows the improvement a single megabyte of printer memory can make. "Speed" represents the amount of time required to spool the document into the printer and get the full use of your PC back.

How much memory do you need?

Full page graphics	1MB - 2MB	4 - 5 PostScript fonts	2MB
Soft fonts	1MB	8 - 10 PostScript fonts	4MB
PostScript cartridge	1.5MB	Network printer sharing	4MB



MATCHED MEMORY UPGRADES FOR HP PRINTERS



AUTHORISED RESELLER

LASERJET II, IID

2MB **POWERCUT!** £89

4MB **POWERCUT!** £159

LASERJET IIP, III, IIID, IIIP

2MB **POWERCUT!** £82

4MB **POWERCUT!** £149

LASERJET 5P, 5MP

4MB **POWERCUT!** £139

8MB Module **POWERCUT!** £259

LASERJET IIIsi, 4, 4M, 4si, 4MV, 4MP, 4P, 4V

4MB **POWERCUT!** £139

LASERJET 4L

1MB £69

DESKJET 500, 500c, 550

256K £39

DESKJET 520, 540, 560C

4MB £139

DESKJET 660C/PS

4MB £139

8MB £259

DESKJET 1200 C/PS/1200, 1600C

4MB £139

8MB £259

JET DIRECT

EX PRINT SERVER &Call

NETSERVER SERIES

32MB Module £1399

DESIGNJET 600/650

4MB £139

PAINTJET XL300 &Call

HP COLOUR LASERJET

4MB Module £139

8MB Module £259

All our Matched Memory Kits come with our famous double guarantee - full lifetime warranty and 14 day money back guarantee

MATCHED MEMORY UPGRADES FOR DEC Workstations

• Call for models not listed here

MICROVAX 3100

MODEL 30 & 40

8MB Kit £430

DEC-SYSTEM 5100

8MB Kit £386

48MB Kit £1986

ALPHASTATION 200/400 SERIES

16MB Kit £575

32MB Kit £1099

MATCHED MEMORY UPGRADES FOR SUN Workstations

• SPARC tested and approved

• All Sun memory is individually tested

SPARC 1, 3/60, 3/80, 4/40, 4/60, 4/65, 4/75

4MB Kit **POWERCUT!** £162

16MB Kit £499

SPARC ELC

16MB Kit **POWERCUT!** £489

SPARC LX

32MB Kit £1199

SPARC 330, 370 & 390

16MB Kit £1294

32MB Kit £1802

SPARC SERVER 630, 670, 690

64MB Kit £2812

SPARC 630MP, 670 & 690

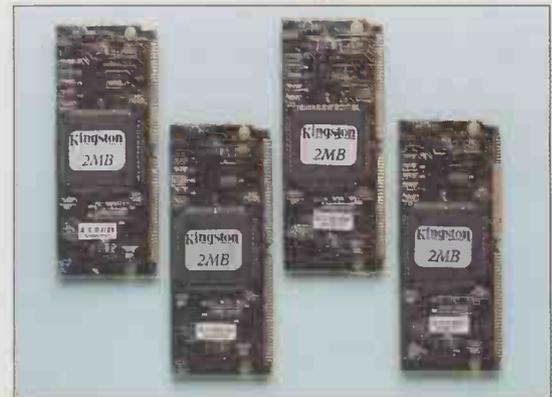
64MB £2812

128MB £5402

SPARCSTATION 10/20

16MB £599

**QUALITY!
QUALITY!
QUALITY!**
Being the largest direct supplier means we buy memory direct from world class manufacturers. Powermark plc only supply factory original memory.



MATCHED MEMORY UPGRADES FOR IBM RISC Workstations

• Call for models not listed here

RISC SYSTEM 6000

32MB Kit £1299

64MB Kit £2699

448MB Kit £17,384

POWERSTATION/ POWER SERVER 200

8MB Kit £298

X STATION

6MB Kit £228

MATCHED MEMORY UPGRADES FOR SILICON GRAPHICS Workstations

POWER SERIES IRIS

32MB Kit £2030

PROFESSIONAL IRIS

4MB £265

INDIGO, 4D/30, 4D/35533

64MB Kit **POWERCUT!** £1999

CHALLENGE M/ POWER CHALLENGE SERIES

&Call



DELIVERY CHARGES
See page 17

A great new way to buy...



See page 1

EARLY BIRD
Order Bonus
See page 29



Everyone at Powermark passes through our training college

BANK

at Powermark



MATCHED MEMORY UPGRADE FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Powermark plc supply thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the United Kingdom.

MATCHED MEMORY UPGRADES FOR DELL

200 / 300 SERIES	
2MB Kit	£64
4MB Kit	£129
325/D/P, 333/D/P	
2MB → 6MB	£129
2MB → 10MB	£289
POWERLINE	
WORKSTATION SERIES	
4MB Kit	£179
8MB Kit	£329
16MB Kit	POWERCUT! £495
POWER DESKTOP SERIES	
4MB Module	POWERCUT! £149
8MB Module	£299
LOW PROFILE POWER DESKTOP	
4MB	£139
16MB	POWERCUT! £479
POWEREDGE SP/XE SERIES	
8MB Kit	£279
16MB Kit	£579
NL20, NL25	
2MB Module	£109
320SLi	
1MB	£149
DIMENSION '1'	
4MB	£135
8MB	£249

MATCHED MEMORY UPGRADES FOR DELL

DIMENSION XPS, P100C, 133C	
NEW! 8MB EDO Kit	£299
NEW! 16MB EDO Kit	£599
NEW! 32MB EDO Kit	£898
OMNIPLEX SERIES	
8MB Module	£260
16MB Module	£439
OPTIPLEX SERIES	
16MB Module	£549
LATITUDE M SERIES	
4MB	£149
8MB	£309
LATITUDE XP SERIES	
4MB	£169
8MB	£289
16MB	£599
NETPLEX SERIES	
4MB Module	£145
8MB Module	£269
16MB Module	£439

MATCHED MEMORY UPGRADES FOR GATEWAY

PC 4SX-33	
4MB Module	£129
16MB Module	£475
PC 4DX-33V, PC 4DX-66V	
4MB Module	£129
16MB Module	£475
32MB Module	POWERCUT! £899
PC 4DX2-66P/V	
4MB Module	£129
8MB Module	£249
16MB Module	£475
32MB Module	£999
PC P5-60, P5-66, P90, P100	
8MB EDO Kit	£299
16MB EDO Kit	£499
32MB EDO Kit	£1099
64MB EDO Kit	£2299
PC 4D-66, PC 4DX-100	
8MB Kit	£249
32MB Kit	POWERCUT! £999
PS-120/133 ELITE, P90 PREMIUM SERIES	
NEW! 8MB EDO Kit	£299
NEW! 16MB EDO Kit	£575
LIBERTY NOTEBOOK	£Call

MATCHED MEMORY UPGRADES FOR DIGITAL

VENTURIS DESKTOP RANGE	
4MB Module	£159
8MB Module	£299
16MB Module	£549

MATCHED MEMORY UPGRADES FOR ESCOM

486 DESKTOP RANGE	
4MB Kit	£139
16MB Kit	£499
P90/100PCI	
8MB Kit	£269
16MB Kit	£529



BEWARE!

Beware of economy memory modules that use ASIC parity generation. Powermark plc only supply SIMMs with genuine parity DRAMs.

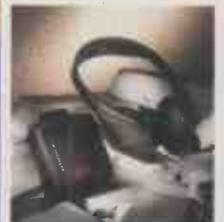
Technical Sales Order Lines

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(50 lines)

MEMORY & PROCESSOR UPGRADES

Email from America

I've just purchased an amazing product - NoiseBuster active noise reducing headphones and they really work! The NoiseBuster reduces rumbles and hums by between 50 and 95% whilst leaving desired sounds such as speech, ringing telephones and music clearly audible.



Microphones in the headphones listen for offensive noise and feed those sounds to the controller pack that produces 'anti' noise waves at 180° out of phase. These waves help cancel out annoying sounds like vacuum cleaners, air conditioners, aeroplane engine drone and vehicle engines.

Just clip the pager sized pack to your belt, switch on and relax. There is also a line out jack socket so you can plug the NoiseBuster in to your Walkman or aircraft entertainment system.

I've instructed my purchasing team to source them and now you can buy them from stock at a very low price of only £67.

Mark Simon

PS. Professor Paul will go bananas when he sees one! NoiseBuster includes battery and line-in cord with volume control
NOISEBUSTER £67

CYRIX FEATURE

CYRIX 386 TO 486 PROCESSOR UPGRADE



Plug in the Cyrix 386 to 486 Processor Upgrade. It's the fastest, most cost effective way to a 486 computer and it's totally compatible with the world's leading software: DOS, Windows and OS/2 operating systems.

It's easy to install. Just clip on the Cyrix processor and load the cache installation software. It's as simple as that. You're ready to run in minutes.



THE CYRIX MICROPROCESSOR UPGRADE FAMILY

The package consists of one Cx486DRx2 Microprocessor, a 386DX removal tool, (SX version is a clip-on chip), installation manual, upgrade cache installation software (on both 3.5" and 5.25" media) and a pin 1 locator arrow (for correctly aligning the upgrade processor in the socket). A Cyrix-green heatsink is also included with 20/40, 25/50 and 33/66 versions.



See page 3 for details

SAVE £££s!

on Cyrix Processors With the Memory Bank Cheque Book

Buy Windows 95 and save over £400 on leading peripherals and software!

See page 1

EVEN LOWER PRICES!

386DX	
DX 16MHz → 486 32MHz	£128 £129
DX 20MHz → 486 40MHz	£128 £129
DX 25MHz → 486 50MHz	£139 £155
DX 33MHz → 486 66MHz	£149 £159
386SX	
SX 16MHz → 486 32MHz	£128 £129
SX 20MHz → 486 40MHz	£128 £129
SX 25MHz → 486 50MHz	£139 £155

CYRIX DRx2/SRx2

- Single chip upgrade solution for 386 DX and SX personal computers
- Clock doubling technology for increased performance
- 1K on-chip cache
- Very easy to install
- Compatible with DOS, Windows and OS/2
- Free technical support
- Limited lifetime warranty



Public Sector customers can purchase through HMSO by calling 01603 694153.



Certificate no. FS 26535

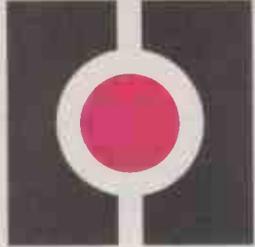
BS5750 registered for the supply of computer, printer and workstation memory, processor and other upgrades.

Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.



Cards are not debited until despatch
VAT at 17.5% will be added to all prices

Power



Mark

**Technical Sales
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**DATA
CARTRIDGES**

	Each 10 Pack	
DC6150	£13	£112
DC6250	£15	£139
DC6255	£19	£169
DC9100Magnus	£31	£295

All QIC tapes are preformatted

QIC	Capacity	Each	10 Pack
DC2120	120-250MB	£13	£119
DC2120XL	350MB	£17	£151
QIC3010	700MB	£17	£185
QIC3020	1.7GB	£23	£209

QIC-Wide	Capacity	Each	10 Pack
5500c	420MB	£19	£169
9000c	850MB	£21	£190

DAT	Length	Each	10 Pack
1.3GB	60m	£6	£58
2GB	90m	£6	£58
4GB	120m	£6	£58
Head Cleaner		£26	

**TURN THE PAGE
FOR MORE**

**VERBATIM
FEATURE**

DISKETTES

3.5" HD 10 Pack	£4
3.5" HD Preformatted 20 Pack + 2 free!	£8

**DATA AND DAT
CARTRIDGES**

	Unit 10 Pack	
DC2120 QIC 80	£13	£119
DC2120XL	£17	£150
MC 3000 XL	£17	£185
4mm 60m	£6	£58
4mm 90m	£6	£58
8mm 112m	£6	£58

BLANK CDS

CD-R 74 Min	£10
-------------	-----

OPTICAL DISKS

3.5" 128MB	£17
3.5" 230MB	£22
5.25" 600MB	£45
5.25" 1.3GB	£57

MEMORY

INTEL OVERDRIVE®



Intel OverDrive® processors enable you to take advantage of advanced technology on your existing upgradable Intel 486 CPU-based system. OverDrive® processors accelerate all applications running under MS-DOS, Windows, OS/2 and UNIX. Simply install the Intel OverDrive® processor into your existing system and watch your applications run at blazing speeds. Intel OverDrive® processors are available for all Intel 486 CPU-based systems with or without an OverDrive® socket.

**LOWER
PRICES**

Intel OverDrive Processor
CPU upgrade - speeds up all software on existing systems



**INTEL DX4
OVERDRIVE®**

- Give your PC 100MHz performance with the Intel DX4 OverDrive® processor
- For most 16, 20, 25, 33MHz Intel 486 SX or DX CPU-based systems
- Features Intel's "speed tripling" technology
- 16K on-chip cache memory
- On-chip maths co-processor
- The most powerful PC upgrade available
- Accelerates DOS, Windows, Windows 95, OS/2 and Unix application



INTEL DX4 16MHz → 48MHz	POWERCUT!	£105
INTEL DX4 20MHz → 60MHz	POWERCUT!	£105
INTEL DX4 25MHz → 75MHz		£105
INTEL DX4 33MHz → 100MHz	POWERCUT!	£139



**Can be
installed in seconds
by anyone**



OVERDRIVE®

watch your applications run at blazing speeds.

Intel OverDrive® processors are available for all Intel 486 CPU-based systems with or without an OverDrive® socket.

**INTEL DX2
OVERDRIVE®**

- Give your Intel 486 SX or DX PC 66MHz performance with the Intel DX2® OverDrive® processor
- For any 16, 20, 25 or 33MHz Intel 486 SX or DX CPU-based systems
 - Features Intel's "speed doubling" technology
 - 8K on-chip cache memory
 - On-chip Maths Co-processor
 - Opens and runs all your software applications faster on your system

INTEL DX2 25MHz → 50MHz	£78
INTEL DX2 POWERCUT! 33MHz → 66MHz	£99



**LIFETIME WARRANTY
ON ALL INTEL
OVERDRIVE®
PROCESSORS**

INTEL PENTIUM® OVERDRIVE®

The Pentium® OverDrive® processor is the newest and fastest member of the Intel OverDrive® processor family. It is the upgrade option for Intel SX2 and DX2® CPU-based systems and is the superior upgrade option for Intel 486SX and DX based systems. It is based on Intel's latest and most sophisticated Pentium® processor technology and features a superscalar architecture,

**Amazing
performance**

which allows the execution of more than one instruction per clock cycle, 32K on-chip cache (one 16K code cache and one 16K data cache) and a faster floating point unit. It operates at two and a half times the speed of the system bus. For example, when a Pentium OverDrive® processor is installed in a 33MHz Intel 486 DX based system, the integer unit, floating point unit and cache operate at 83MHz while the speed of the external bus remains at 33MHz, thus delivering Pentium® processor class performance.

INTEL P24T 63MHz £195



NEW! INTEL P24T 83MHz £205

9

**DELIVERY
CHARGES**
See page 17

A great new way to buy...
**MEMORYBANK
Gold Card**
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**EARLY BIRD
Order Bonus**
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**POWERMARK
ACADEMY**

Everyone at Powermark passes through our training college

BANK

at Powermark

SYQUEST STORAGE FEATURE



SyQuest®



SYQUEST SQ5200

SYQUEST REMOVABLE CARTRIDGE HARD DISK DRIVES

- Work like fixed drives yet provide unlimited capacity

SYQUEST 3.5" RANGE

- Choice of 105MB or 270MB formatted capacities on each cartridge

Unsurpassed warranties - 2 years on drives and 5 years on data cartridges

NEW! EZ135 DRIVES

135MB Removable Disk Drive

EZ135 IDE Internal	£159
EZ135 SCSI External	£189
EZ135 Parallel	£189
135MB Cartridge	£17

Free cartridge with all EZ135 disk drives

SYQUEST CARTRIDGES

Capacity	Form	Each	5 Pack
105MB	3.5"	£40	£195
270MB	3.5"	£41	£195
44MB	5.25"	£29	£140
88MB	5.25"	£36	£175
200MB	5.25"	£53	£259

SYQUEST REMOVABLE CARTRIDGE HARD DISK DRIVES

Type	Capacity	Internal	External
SyQuest 3.5" IDE	270MB	£259	£349
SyQuest 3.5" SCSI	270MB	£256	£348
SyQuest 3.5" PARALLEL	270MB	-	£429
SyQuest 5.25" SCSI	88MB	£179	£269
SyQuest 5.25" SCSI	200MB	£262	£352

HP COLORADO FEATURE



HP COLORADO T1000

TRAVAN

HP COLORADO TRAKKER

- Plug and play - no hardware installation
- A total backup solution - fully assembled systems available in up to 350MB and up to 680MB capacities

PARALLEL PORT TRAKKER 350	£154
PARALLEL PORT TRAKKER 700	£198
TRAKKER CARRY CASE	£37

HP COLORADO JUMBO

- Connects to your floppy controller
- Includes software and cables

JUMBO 350	£79
JUMBO 700	£124
JUMBO 1.36GB	£187
QIC 3020	£23
FAST CONTROLLER CARD	£53
EXTERNAL MOUNTING KIT	£64

POWERCUT!

COLORADO MEMORY SYSTEMS®

A division of
HEWLETT-PACKARD

HP SURESTORE TAPE SERIES

- Very fast DAT drive system
- Capacity from 2GB to typically 8GB
- PC Magazine Editors' Choice

	Int	ISA Kit*
HP SureStore Tape 2000	£651	£Call
HP SureStore Tape 5000	£739	£Call
HP SureStore Tape 6000	£844	£Call

* ISA Kit includes cable, cartridge, head cleaner & full software

Mass storage experts available for specialist advice

IOMEGA TAPE BACKUP FEATURE

IOMEGA Makers of Bernoulli

NEW! TRAVAN 3 3.2GB DRIVE

Fully backward compatible	
INTERNAL	£259
PARALLEL	£339

1.7GB INTERNAL	£209
QIC 3020 TAPES (for 1.7GB)	
INTERNAL	£23

QIC & WIDE 420MB	
INTERNAL	£89
TAPE700 INTERNAL	£115

TAPE700 PARALLEL PORT	£195
TAPE ACCELERATOR CARD	£49
700MB DATA CARTRIDGE	£17

DITTO 800

- New, advanced Travan technology
- 800MB capacity (with compression)
- Backward compatible with 250, 350 and 420MB tapes
- Direct drive - no belt
- Network compatible

DITTO 800 INTERNAL	£129
DITTO 800 PARALLEL	£209



DITTO 800

IOMEGA ZIP DRIVES

Awarded 5 mice by MacUser, 9th June 1995

- Increase your hard drive capacity inexpensively on 100MB removable disks
- Provides high capacity mobile storage - use it at the office, at home, on the road, anywhere
- Zip Tools Software helps you track, organise and find everything with ease
- Excellent and easy for transferring information between two computers
- Securely organise your data by putting work, home, school, and leisure files on separate disks and let Zip Tools keep track of it all



- Makes backup fast easy and worry free
- Use as many disks as you need for one or more people or applications

IOZIP Parallel	£159
IOZIP SCSI	£159
100MB Cartridge	Single £15
5 Pack	£60
10 Pack	£115

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MASS STORAGE & PROCESSOR UPGRADES

HUGE STOCKS
Guaranteed same day despatch on virtually all stock items for orders placed in up to 4.00pm.

TECHNICAL SALES PEOPLE
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

FINANCIAL STABILITY
Powermark plc has been supplying upgrades for over 5 years and has an annual turnover exceeding £18 million with a healthy balance sheet.

LOW, LOW PRICES
We only supply products from leading manufacturers and at low, low prices too.

TECHNICAL SUPPORT
Dedicated after sales technical support teams on line to help with installation.

CORPORATE & PUBLIC SECTOR
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

FULL MANUFACTURERS' WARRANTIES
All products supplied by Powermark plc carry manufacturers' warranties and of course full Powermark plc guarantees.

TURN THE PAGE FOR MORE

UPGRADE DRIVE THRU
While-you-wait installation service available. See page 3 for details.

PERSONAL CALLERS
Save on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday, Saturdays: Sales from 9.30am to 4.00pm, Technical Support and Customer Service from 10.00am to 2.00pm.

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Fax: 0181 905 6233
Email: sales@powermark.com

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VAT at 17.5% will be added to all prices

HMSO

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Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.

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(50 lines)**

ADAPTEC SCSI CONTROLLER CARDS



Industry standard SCSI
controllers from Adaptec

	Bare Card	Kit With Software
AHA1505	-	£39
AHA1510	-	£52
AHA1515	-	£65
AHA1522 ISA	-	£109
AHA1460	-	£142
AHA1542 ISA	£109	£169
AHA1640 MCA	£184	£217
AHA2742T EISA	£229	£267
AHA2940 PCI	£185	-
AHA2842VL/K VLB	-	£166
AHA3940 PCI	-	£299

**Save
£6 off
any
hard disk
drive over 500MB
when you buy Windows 95.
See page 1**

**TURN THE PAGE
FOR MORE**

REAL HARD DRIVES

Famous hard drives...
*Mastering the Citroen
2CV gearbox layout*

*A night journey with a
slipping fanbelt*

*Your first
pedal car*



MEMORY

CONNER FEATURE

CONNER

The Storage Answer

IDE DRIVES

CFS425A POWERCUT!	425MB	14ms	£97
CFS540A POWERCUT!	545MB	14ms	£112
CFS850A	850MB	14ms	£141
CFS1275A	1.275GB	14ms	£239

SCSI DRIVES

CPA540S	540MB	14ms	£149
CP1080	1.08GB	10ms	£299
CFP2107	2.1GB	9ms	£679
CFP2105	2.1GB	11ms	£639
CFP4207 Caymen	4.2GB	8ms	£999

1GB HARD DISKS AND ABOVE

FEATURE:

- 5 year warranty on all SCSI drives
- Embedded servo systems eliminate the need for thermal recalibration and provide consistent data transfer rates
- Hot pluggable for uninterrupted data access in RAID applications
- Low power consumption means less heat and component wear



**HARD DISK EXPERTS
AVAILABLE FOR
SPECIALIST ADVICE**

NEW!

CONNER TRAVAN 800MB

The Travan 800 is the latest in value data protection. Each kit includes

- Backup Exec software
- Interface cable
- User Guide
- 800MB Travan cartridge
- 9.5MB/minute backup rate
- Backward compatible with QIC80 and QIC40

TAPE-STOR 800MB INTERNAL	£125
TAPE-STOR 800MB EXTERNAL	£225

CONNER TAPE-STOR 850MB

- External parallel port tape backup or internal IDE system
- Compact, portable external system
- 9.5MB/minute backup rate
- QIC-wide and QIC-3010 compatibility

TAPE-STOR 850MB INTERNAL	£139
TAPE-STOR 850MB PARALLEL	£219

CONNER TAPE-STOR 420MB

Kit includes: Tape, Software, Manuals and cables

- Backward compatible with QIC80 and can read QIC40
- 9.5MB/minute backup rate

TAPE-STOR 420MB INTERNAL	£89
TAPE-STOR 420MB PARALLEL	£207

NEW! MAXTOR HARD DISK KIT FEATURE

Maxtor

- Available in the following EIDE capacities: 850MB, 1.0GB, 1.2GB and 1.6GB
- Ideally suited for upgrading to Windows 95 or Windows NT
- Exclusive, hotline technical support, BBS and faxback service available to onlt to Maxtor customers

- "No quibble" Maxtor service and warranty

MAXTOR IDE DRIVE KITS

K127540A	540MB Kit	12ms	£139
K127850A	850MB Kit	12ms	£169
K1271080A	1.0GB Kit	12ms	£205
K1271260A	1.2GB Kit	12ms	£219
K1271620A	1.6GB Kit	12ms	£389



ALL KITS INCLUDE:

- Easy step by step installation guide
- Dual IDE cable
- Formatting software that can format hard drives greater than 528MB
- 5.25" mounting brackets
- Rail supports
- Screws

Complete Hard Disk Kits!

11

**DELIVERY
CHARGES**
See page 17

A great
new way
to buy...



See page 1

**EARLY BIRD
Order Bonus**
See page 29



Everyone at
Powermark passes
through our
training college

BANK

at
Powermark

HARD DISK DRIVE FEATURE



Calluna
TECHNOLOGY
Maxtor

Seagate

Quantum

WESTERN DIGITAL



CONNER
The Storage Answer

TOSHIBA PARTNERS

IDE HARD DISK DRIVES

Quantum	LPS420AT	420MB	12ms	£107
Conner	CFS425A	425MB	14ms	£97
Seagate	ST3491A	428MB	14ms	£99
Maxtor	7540AV	540MB	12ms	£113
Quantum	LT540	540MB	11ms	£112
Western Digital	AC2540	540MB	13ms	POWERCUT! £117
Fujitsu	M1603T	544MB	10ms	£115
Conner	CFS540A	545MB	14ms	£112
Seagate	ST3660A	545MB	14ms	£108
IBM	Aladdin	548MB	12ms	POWERCUT! £115
Western Digital	AC2635	639MB	10ms	£125
Quantum	LT730	730MB	11ms	£145
Maxtor	7850AV	850MB	12ms	POWERCUT! £145
Conner	CFS850A	850MB	14ms	POWERCUT! £141
Western Digital	AC2850	853MB	10ms	£144
Seagate	ST5850A	855MB	11ms	POWERCUT! £142
Western Digital	AC31000	1.0GB	10ms	POWERCUT! £205
IBM	Pegasus	1.05GB	9ms	£329
Seagate	ST31220A	1.08GB	12ms	£178
Fujitsu	M1606T	1.09GB	10ms	£189
Maxtor	71260AT	1.26GB	12ms	POWERCUT! £192
Conner	CFS1275A	1.275GB	14ms	£239

Western Digital	AC31200	1.28GB	10ms	POWERCUT! £220
Western Digital	AC31600	1.62GB	10ms	POWERCUT! £285
Maxtor	71626AP	1.63GB	12ms	£342

SCSI CONTROLLER CARDS

FUTURE DOMAIN

8-bit SCSI	ISA	Bare Card	£39
16-bit SCSI	ISA	Bare Card	£55
16-bit SCSI	ISA	Power SCSI Software	£109
32-bit SCSI II	PCI	Bare Card	£135
16-bit SCSI	PCMCIA	SCSI Software	£169
16-bit SCSI	MCA	Bare	£129

DPT

DPT 2021	16-bit SCSI II	ISA	Bare	£165
DPT 2022	32-bit SCSI II	E-ISA	Bare	£259
DPT 2124	32-bit SCSI II	PCI	Bare	£359

See Adaptec feature - page 11

IDE CONTROLLER CARDS

FUTURE DOMAIN

E-IDE	IDE	Software and cables	£39
POWERMARK			
E-IDE	PCI	Bare	£29
E-IDE	VLB	Bare	£29
E-IDE (Cached)	VLB	Software and cables	£89

SCSI HARD DISK DRIVES

Conner	CFA540S	540MB	14ms	£149
Quantum	LT540S	540MB	12ms	£145
Fujitsu	M1603S	544MB	10ms	£136
Seagate	ST5660N	545MB	12ms	£205
IBM	Satsuma	548MB	12ms	£140
Quantum	LT730S	730MB	12ms	£167
Fujitsu	M1606SA	1.0GB	10ms	£259
IBM	Pegasus	1.05GB	9ms	£399
Seagate	ST31230N Hawk-2	1.05GB	9ms	£369
Conner	CP1080	1.08GB	10ms	£299
Quantum	Fireball	1.08GB	10ms	£295
Micropolis	4221	2.05GB	8.5ms	£819
Conner	CFP2107	2.1GB	9ms	£679
Conner	CFP2105	2.1GB	11ms	£639
IBM	UltraStar	2.1GB	8ms	£958
Seagate	ST32430N Hawk-2	2.1GB	9ms	£729
Seagate	ST32550N Barracuda Fast SCSI 2	2.1GB	8ms	£899
Micropolis	1936	3.02GB	12ms	£999

Conner	CFP4207 Caymen	4.2GB	8ms	£999
IBM	UltraStar	4.3GB	8ms	£1419
Micropolis	3243	4.3GB	8.5ms	£1059
Seagate	ST15230N Hawk-4	4.3GB	9ms	£1079
Seagate	ST15150N Barracuda Fast SCSI 2	4.3GB	8ms	£1379
Seagate	ST410800N Elite	9.09GB	8ms	£2399
Micropolis	1991	9.1GB	12ms	£1799

Audio Visual SCSI

Micropolis	4221AV	2.05GB	8.5ms	£819
Quantum	Atlas XP32150	2.1GB	8ms	£895
Micropolis	1936AV	3.02GB	12ms	£1029
Micropolis	3243AV	4.3GB	12ms	£1069
Quantum	Atlas XP34300	4.3GB	8ms	£1460
Micropolis	1991AV	9.1GB	8.5ms	£1995

PCMCIA HARD DISK DRIVES (Type III)

Calluna	Calluna170	170MB	16ms	£299
Calluna	Calluna260	260MB	16ms	£379
Kingston	DPPCM/260	260MB	11ms	£439

2.5" HARD DISK DRIVES

2.5" IDE

Hitachi	DK212A/34	340MB	12ms	£159
Hitachi	DK212A/51	510MB	12ms	£249
Hitachi	DK212A/81	810MB	12ms	£429
Hitachi	DK212A/10	1.0GB	12ms	£579
Seagate	ST9240AG	210MB	16ms	£149
Seagate	ST9550AG	455MB	16ms	£270
Seagate	ST9655AG	524MB	16ms	£311
Toshiba	MK1924FC	543MB	12ms	POWERCUT! £279
Toshiba	MK2628FC	810MB	12ms	£499
Toshiba	MK2720FC	1.35GB	13ms	£599

2.5" SCSI

Toshiba	MK2526FB	528MB	12ms	£359
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(50 lines)

HARD DISKS
AND BACKUP

It's time once
again to visit...



**Dr Jane's
Storage Surgery**

Dear Dr Jane,
Not knowing much about computers, I wanted to clarify a few points with you before I buy a new hard disk drive. Presently I have 120MB, but I need to increase this before installing Microsoft Office 98. The most important thing to mention is that the hard disk has to be future proof, as far as possible. I hope that this is not asking too much but I work from home and my computer is essential to my expanding business.

Lost in Lowestoft

Dear Lost,
Do not despair as these symptoms are very common. The treatment is very simple and painless. I advise a SCSI hard disk drive together with a controller card. This will give you speed, performance, capacity, and expandability. Furthermore, Powermark can offer internal or external hard drive remedies. This prescription is tailor made for your needs:

A Future Domain SCSI card together with a Conner 1.0GB SCSI hard disk drive. All software and cables are provided.

If you have other specific requirements phone the surgery today.

Yours, Dr Jane

Send your thoughts and queries to Dr Jane, c/o Powermark plc, Premier House, Station Road, Edgware, Middlesex, HA8 7AQ or fax her to 0181 905 6233. You can also Email Professor Paul on: drjane@powermark.com

Dr Jane makes every effort to answer your storage problems, but she cannot guarantee to reply to everyone.

We confess. Dr Jane has no doctorate - Yet!

Powermark plc
Premier House, 112 Station Rd,
Edgware, Middlesex HA8 7AQ
Tel: 0181-951 3355
(50 lines)

Fax: 0181 905 6233
Email: sales@powermark.com

Card payments
VISA MasterCard
Cards are not debited until despatch
VAT at 17.5% will be added to all prices

HMSO

Public Sector customers can purchase through HMSO by calling 01603 694153.

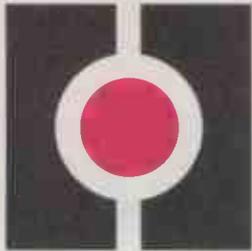


Certificate no. FS 26535

BS5750 registered for the supply of computer, printer and workstation memory, processor and other upgrades.

Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.

12



Technical Sales
Order Lines
**0181-
951 3355**
(50 lines)

... and here's what some of our customers have said ...
I recently required a tape streamer. Having looked through all the advertisements I had no hesitation in choosing Powermark. I could have purchased the unit £5 cheaper elsewhere, but your excellent combination of presentation style, humour, price and BSI accreditation won me over. I appreciated the little ditties scattered around and liked your approach with the fancy dress. It was nice to see some humour and originality in an otherwise stale collection of ads.

P.S: The salesperson didn't let me down either!

C. Jenkins
Leyfield Systems Ltd
West Glamorgan

MEMORY

PANASONIC OPTICAL & CD ROM DRIVE FEATURE



Panasonic QuadPro™ IDE 4xSpeed Upgrade Kit

- New quad speed CD ROM drive
- PowerIDE! software to eliminate conflict with hard disk drive
- Complies with MPC level 3
- 32-bit disk access
- Video-CD and CD-i movie
- Includes all accessory parts for quick, trouble free installation
- Optional IDE interface card available

QUADPRO KIT IDE £139
OPTIONAL INTERFACE CARD £11



Panasonic QuadPro™ SCSI 4xSpeed Upgrade Kit

- New quad speed CD ROM drive
- Corel SCSI! software supports most SCSI host adapters
- Complies with MPC level 3
- 256Kb cache memory
- Video-CD and CD-i movie
- Includes all accessory parts for quick, trouble free installation

QUADPRO SCSI KIT WITHOUT INTERFACE CARD £159
QUADPRO SCSI KIT WITH INTERFACE CARD £209



Panasonic PD System 2 in 1 CD ROM and Optical Disk drive

- New combined quad speed CD ROM drive and 650MB rewritable optical drive
- Removable 650MB optical media for archiving or re-distribution
- SCSI-2 interface for Mac or PC
- Corel SCSI! supports most SCSI host adapters
- CD ROM function supports Video-CD and CD-i movie
- Includes all accessory parts for quick, trouble free installation

PD SYSTEM KIT WITHOUT I/F CARD £499
PD SYSTEM KIT WITH I/F CARD £549
PD 650MB MEDIA £39

DIAMOND MULTIMEDIA FEATURE



Diamond have established themselves as the industry standard for high speed graphics accelerators, combining dependable quality with value and high performance.



SPEEDSTAR 64 PRO

- The best price/performance card for Windows games packages
- DRAM based
- ISA bus
- Includes Corel Draw 3 software

SPEEDSTAR 64 ISA 1MB £105
SPEEDSTAR PRO ISA 1MB **POWERCUT!** £79

STEALTH SE

- The best price/performance card for Windows/games packages
- DRAM based
- PCI or VLB bus

STEALTH SE PCI 1MB £69
STEALTH SE VLB 1MB £69

NEW! STEALTH 64 VIDEO DRAM

- The world's fastest DRAM graphics accelerator
- DRAM based
- PCI or VLB bus
- Now with software MPEG support

STEALTH 64 VIDEO DRAM PCI 1MB £89
STEALTH 64 VIDEO DRAM PCI 2MB £134
STEALTH 64 VIDEO DRAM VLB 1MB £89
STEALTH 64 VIDEO DRAM VLB 2MB £134



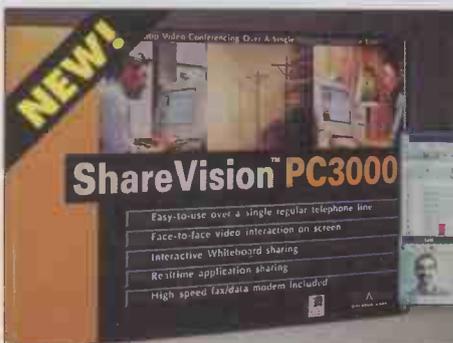
STEALTH 64 VIDEO VRAM

- The world's fastest 64-bit graphics accelerator
- Now with software MPEG support

STEALTH 64 VV PCI 2MB £219
STEALTH 64 VV PCI 4MB £319
STEALTH 64 VV VLB 2MB £219
STEALTH 64 VV VLB 4MB £319

CREATIVE LABS FEATURE

SHAREVISION



PC3000
Easy to use video conferencing over a single regular telephone line. Realtime application sharing

PC300
Easy to use audio conferencing over a single regular telephone line

Call for pricing

VIDEO BOARDS

- VIDEOBLASTER SE100** £169
- Live full motion video
- Capture single frames in BMP, TIFF, GIF, MMP, PCX, TGA or JPEG
- VIDEOBLASTER RT300** £255
- Intel i750PE chip inside
- VIDEOBLASTER MP400** £173
- Displays full motion MPEG video in a scalable window up to full screen
- 3DO BLASTER** £275
- Requires CR-563 CD ROM drive and SoundBlaster with CD audio connector
- TV CODER INTERNAL** £99
- TV CODER EXTERNAL** £119

TURN THE PAGE FOR MORE

MEDIA MOMENTS Famous media moments...

Operation Desert Storm

Any state occasion covered by the BBC

The Jarrow March



DELIVERY CHARGES
See page 17

A great new way to buy...
Gold Card
See page 1

EARLY BIRD Order Bonus
See page 29



Everyone at Powermark passes through our training college

CREATIVE LABS FEATURE

SOUNDBLASTER CARDS

SOUNDBLASTER

- 16 VALUE IDE** £63
- IDE interface
 - 16-bit stereo sampling and playback
 - 20 voice enhanced 4-operator stereo FM-synthesiser
 - Power amplifier (4 watts per channel) and volume, bass and treble control
 - Full software control of fade-in, fade-out, pan, volume, left/right steering and microphone mixing
 - Bundled software

SOUNDBLASTER

- 16 PRO IDE** £84
- With voice recognition software
 - With Panasonic interface

SOUNDBLASTER

- 16 PRO IDE ASP** £106

SOUNDBLASTER

- AWE 32 IDE VALUE** £121

- Includes upgrade socket

SOUNDBLASTER

- AWE VALUE** £122



SOUNDBLASTER MULTIMEDIA HOME CD QUAD SPEED KIT



MIDI keyboard for SoundBlaster cards £119

SOUNDBLASTER CARDS

MIDIBLASTER

- £94
- For amateur and professional music composition and presentation
 - 16 channels, 128 preset sounds, 33 preset effects, 55 preset drums
 - Bundled software included

MULTIMEDIA KITS

NEW! GAMEBLASTER VALUE KIT

- £175
- SoundBlaster AWE Value sound card
 - Dual speed IDE Panasonic CD ROM
 - SX2000 joystick
 - Speakers
 - Doom, Heretic, Theme Park software

NEW! HOMESTUDIO KIT

- £309
- MIDI compatible keyboard
 - AWE 32 IDE Lite sound card
 - Windows software included

NEW! DISCOVERY EZ 16 PACK

- £319
- Double speed external CD ROM drive
 - SoundBlaster 16
 - Speakers
 - Microphone
 - Bundled software

NEW! DISCOVERY QUAD SPEED KIT

- £269
- Quad speed internal drive
 - SoundBlaster 16 Pro
 - Top selling bundled software
 - Ideal for home and office use

MULTIMEDIA HOME CD QUAD SPEED KIT

- £275
- Quad speed IDE internal drive
 - 16-bit ASP sound card
 - Speakers
 - MS Publisher
 - MS Works 3
 - MS Encarta '95
 - MS Design Pack
 - MS Bookshelf '94
 - MS Cinemania '95
 - MS Ancient Lands
 - MS Dangerous Creatures
 - MS Musical Instruments
 - MS Golf and more

NEW FROM CREATIVE!

- Infrared pointing devices
- Aero Mouse £69
 - Aero Pen £69

POWERMARK MULTIMEDIA KITS

POWER PERFORMANCE PACK

- £499
- Toshiba 3601 4.4 SCSI CD ROM drive
 - 16-bit SCSI controller card
 - AWE 32 sound card
 - Quality 25 watt speakers
- SMART QUAD KIT** £225
- Mitsumi FX4 quad speed internal drive
 - SoundBlaster 16 Pack
 - 10 CD ROM bundle
 - Lotus SmartSuite
 - 15 watt speakers

CREATIVE DOUBLE KIT

- £239
- Double speed internal drive
 - SoundBlaster Pro Pack
 - MS Encarta, MS Dangerous Creatures, Doom I & II, MS Golf

TOSHIBA 4x4 KIT

- £375
- Toshiba 5302 quad speed internal IDE drive
 - SoundBlaster 32 AWE Value Pack
 - 25 watt speakers
 - 10 CD ROM bundle
 - MS Encarta
 - Enhanced IDE controller

Also available with SoundBlaster 32 AWE full version

JUNIOR KIT

- £189
- Double speed internal drive
 - SoundBlaster 16 Value Pack
 - Screenbeat speakers
 - 10 CD ROM bundle

GAMEBLASTER AWE 32 KIT

- £287
- Quad speed internal drive
 - SoundBlaster AWE32 IDE Lite
 - Stereo speakers
 - Joystick
 - Top selling bundled software titles
 - CSP Socket

NEW! AERODUET KIT

Only £99



- Aero Mouse
- Aero Pen



SOUNDBLASTER AWE32 IDE

Multimedia experts available for specialist advice



SOUNDBLASTER 16 VALUE IDE

SOUNDBLASTER CARDS

SOUNDBLASTER AWE 32 IDE

- £165
- IDE Interface
 - Next generation SoundBlaster card offering unbelievable sound quality
 - Full 16 channels, 128 instruments, 6 drum kits, 32 voice polyphony
 - Microphone included
 - Comprehensive software bundle including Creative VoiceAssist, Creative TextAssist, WaveStudio, Creative Sound Panel, Creative Mosaic, Creative Ensemble and more

WAVEBLASTER II

- £94
- Programmable Advanced WavEffects generator

External Kit

Amazing value!

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MULTIMEDIA & CD ROMS

SUPER SPECIAL CD ROM BUNDLES!

10 CD ROMs for £29!

- | | |
|--------------------|----------------|
| The Blues Brothers | Fire Forget II |
| The Blues | Battlestorm |
| Brothers Juke | Super Cauldron |
| Box Adventure | Titan |
| Titus Fox | Prehistorix |
| Crazy Cars 3 | Prehistorix II |

11 CD ROMs for £29!

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|---------------------|-----------------------|
| Return to Ringworld | Spectre VR |
| Microcosm | Compuserve Starter CD |
| Jutland | The Psychotron |
| The Cyberplasm | Jurassic Park |
| Formula | Shadowlands |
| Bodyworks | Sleepwalker |
| Voyager | |

CHILDREN'S CD BUNDLE £19

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| Lenny's Musictoons | Family Circus |
| Cinderella | Putt Putt's Fun Pack |
| Basic Spelling Tricks | Sing-along Kids |

16 TITLES ON 10 CDS for £29

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|-----------------|-----------------|
| Animals | Enchantia |
| World Atlas | James Pond 2 |
| Space | Outrun |
| Encyclopaedia | Print/Paint |
| World Cup USA | Power |
| Winter Olympics | Comedy Central |
| Links Golf | Madonna |
| Thunderhawk | Michael Jackson |
| Curse of | Phil Collins |
| | Abba |

10 CDs MEGAPACK Now only £19

- | | |
|-------------------|-------------------------------------|
| Links Golf | Freakin' Funky |
| Test Drive III | Fuzzballs |
| The Passion | Ultima: The Savage Empire |
| F14 Tomcat | The Magic Death |
| Mike Ditke | Virtual Murder II |
| Ultimate Football | Absolutely no shareware or dip-art! |
| Dinosaur Safari | |
| Audubon's Mammals | |

Powermark plc

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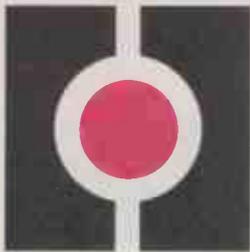
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MEMORY

KEY TRONIC KEYBOARD FEATURE

KEY TRONIC KT2000

The Key Tronic KT2000 Windows 95 keyboard features three additional keys designed to offer users an easier interface to Microsoft Windows 95. **KT2000** £32

PROTOUCH WINDOWS 95 KEYBOARD

The ProTouch keyboard represents a breakthrough in technology. ProTouch offers increased reliability - hinge

tested to 70 million cycles - in a spill resistant product. Plus, the soft landing of the flexible lever arm switch assembly makes



ProTouch a more comfortable keyboard to use. In an independent ergonomic study results showed that ProTouch improved keying performance and was preferred over standard keyboards in all useability factors.

PROTOUCH KEYBOARD £28

KEY TRONIC COLORKEYS COOL STUFF KIT

- ColorKeys keyboard
- Clikmate mouse
- Mouse pad
- Screen bezel for 14" monitor
- Microsoft Fine Artist software
- All cables and connectors

COLORKEYS COOL STUFF KIT £49



Save £7 off KT 2000 Keyboard and £7 off Protouch Keyboard when you buy Windows 95. See page 1



- Mouseman Combo** £34
- High performance mouse of superior design
 - Ergonomic design
 - Ready for Windows 95



Sensa each £38

- Ergonomic design
- Ready for Windows 95, available in: soft matt Blue Leopard or Silver Pearl, or Deep Wood and Black Chess with their brilliant lacquered surface

Cordless £49

Chroma £23

- 3 button mouse with co-ordinated mouse mat, available in: Apple green with orange mat, luminous orange with blue mat, bright blue with yellow mat and canary yellow with green mat

Trackman Vista £43

- Ergonomic design
- Ready for Windows 95

Trackman Live £105

- A unique radio-wireless solution for presentations can be used for controlling slideshows or as a handheld mouse works from up to 10 metres
- Ready for Windows 95

Trackman Voyager £50

- Sets new standards in comfort, flexibility and performance for travellers and those looking for the latest in design

Pilot Mouse £18

Scanman Colour £179

Scanman 256 £87

Fotoman Plus Digital Camera £439

Save £10 off Logitech Mouseman Combo when you buy Windows 95. See page 1

MULTIMEDIA ACCESSORIES FEATURE

INTERNAL MULTIMEDIA EA-PRO WITH STEREO SPEAKERS

Equalizer/amplifier and speaker combination that brings full stereo sound to your multimedia PC.



- 60 watt equalizer/amplifier
- 7-band graphic equalization
- Installs into a 3.5" drive bay
- 40 watt stereo speakers

INTERNAL MULTIMEDIA EA-PRO WITH STEREO SPEAKERS £69

External version for Macintosh & PC available (Call for prices)

MULTIMEDIA STEREO KEYBOARD

For use with any multimedia software. Perfect for entertainment, education, presentations and your favourite music CDs.

- Built-in 16 watt stereo speakers 4" magnetically shielded
- Enhanced bass response for great listening pleasure
- Omnidirectional microphone
- Softsliding volume control
- Built-in headphone and microphone jacks
- Teleconferencing ready

FREE PS/2 ADAPTER CABLE included with purchase

MULTIMEDIA STEREO KEYBOARD £81

MULTIMEDIA STEREO AMPLIFIED KEYBOARD

For use with any multimedia software. Perfect stereo sound quality for education, entertainment, presentations and your favourite music CDs.

- Built-in 13 watt stereo amplifier
- Built-in 16 watt stereo speakers 4" magnetically shielded
- Soft sliding volume, treble and bass controls

- Enhanced bass response for great listening pleasure
- Built in headphone and microphone jacks
- Teleconferencing ready
- LED volume readout

MULTIMEDIA STEREO AMPLIFIED KEYBOARD £109



MICROSOFT® HARDWARE FEATURE

MICROSOFT® MICE

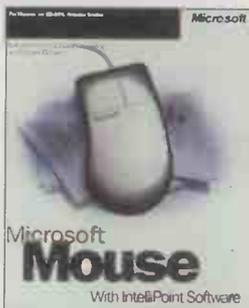
MICROSOFT MOUSE 2.0

- Plug and Play with Windows 95
- Ergonomically designed for comfort
- Optimum hand position
- Teflon 'gliders' - moves smoother and swifter over any surface

New improved IntelliPoint software gives you:

- Shortcuts - assigns common tasks to each button
- Single click - click just one for double click
- Sonar - helps you find a lost cursor
- SmartSpeed - slows the cursor for added control

MICROSOFT MOUSE 2.0 £36



MICROSOFT® HOME MOUSE

Microsoft® Home Mouse, featuring IntelliPoint software is ready for Windows 95, and includes Microsoft® Arcade and Microsoft® The Best of the Entertainment Pack - 18 free games!

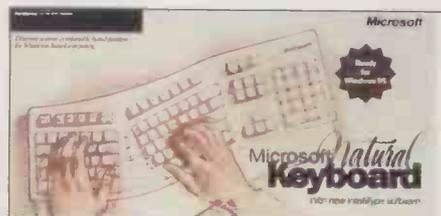
MICROSOFT® HOME MOUSE £28

Microsoft®

MICROSOFT® NATURAL KEYBOARD

- Ready for Windows 95
- Windows logo function keys
- Unique contoured design - encourages a balanced, more natural hand and wrist position
- 104 key design

- IntelliType software - customisable for improved Windows based performance
- MICROSOFT NATURAL KEYBOARD** £65



DELIVERY CHARGES See page 17

A great new way to buy...



See page 1

EARLY BIRD Order Bonus See page 29



Everyone at Powermark passes through our training college

HAUPPAUGE FEATURE

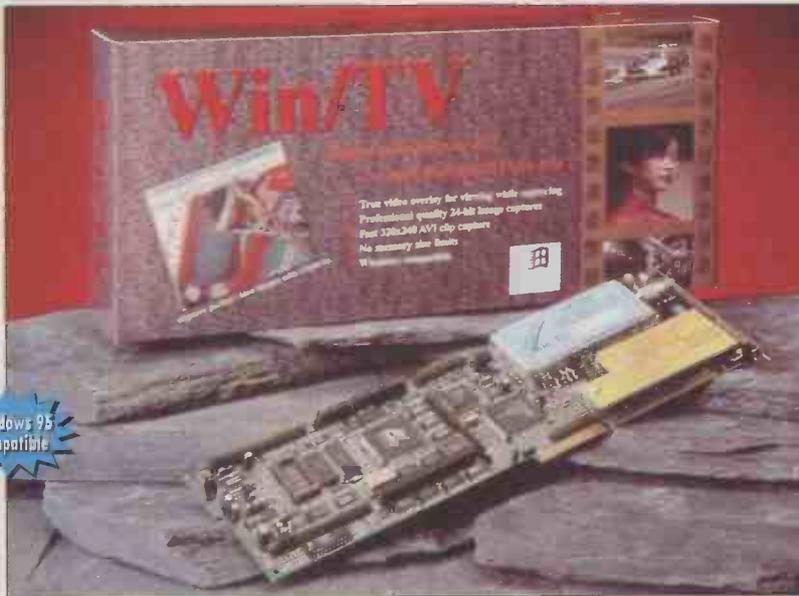
WIN/TV CELEBRITY

THE NEW GENERATION

...the best choice for Multimedia Video! Perfect colour digitising from Hauppauge.

Works with all VGA and SVGA cards up to 1280 x 1024 with up to 16.7 million colours, requiring no feature connector. No memory size limitations make this the easiest overlay/capture card to install.

- MAET technology support: on board motion artifacts elimination
- Fast 320 x 240 lossless AVI clip capture
- Integrated TV tuner/teletext
- Perfect colour: 4:2:2 YUV colour separations and S-Video support for high quality multimedia presentations
- Square Pixel (CCIR 601) support
- Teletext feature is Reuters 1000 ready, supporting dynamic data exchange (DDE) see page 876 on CNNtext, for updated news



WIN/TV CELEBRITY	£259
VIDEO OUT MODULE FOR WIN/TV CELEBRITY	£149
WIN/CINEMA	£169
WIN/TV PRISMA	£159

- SVGA compatible
- 640 x 480, up to 800 x 600 resolution
- Audio line-out so you don't need a sound card

Save £10 on Hauppauge WIN/TV
Celebrity when you buy Windows 95.
See page 1

Multimedia experts available for
specialist advice

VIDEOLOGIC FEATURE

GRAFIXSTAR

A new generation of leading price/performance 64-bit Windows accelerators...
expandable with low-cost multimedia options



GrafixStar 300/500	
1MB upgrade	£47
GrafixStar 300/500/700	
VMC Controller	£39
GrafixStar 700	
2MB upgrade	
& VMC Controller	£149

GrafixStar 700

- Fastest performance
- 64-bit - S3 Vision968
- 110+ million Winmarks
- Up to 1600 x 1200 resolution
- Expandable with VMC multimedia options
- Built-in AVI acceleration DCI drivers

FREE XING SOFTWARE
MPEG PLAYBACK

GRAFIXSTAR 700	
VLB/PCI 2MB	£229



928MOVIE

ISA 1MB	
928MOVIE	£129
928MOVIE	
with sound POWERCUT!	£159
VLB 1MB	
928MOVIE	£129
928MOVIE	
with sound POWERCUT!	£159
928MOVIE with MPEG	£359

MPEG PLAYER

The quality solution for
Video CD playback
MPEG
PLAYER **POWERCUT!** £199

CAPTIVATOR PRO TV

Sensational quality video
and TV for VML systems
CAPTIVATOR PRO TV £199
CAPTIVATOR PRO **POWERCUT!** £179

PCIMOVIE

Super fast graphics for
PCI machines
PCIMOVIE 2MB £239

GrafixStar 300

- Entry level graphics card
- 64-bit - S3 Trio64
- 85+ million Winmarks
- Up to 1280 x 1024 resolution
- Expandable with VMC multimedia options

GRAFIXSTAR 300	
VLB/PCI 1MB	£97

Save £13 on Videologic
MPEG player when you
buy Windows 95.
See page 1

GrafixStar 500

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Another Case For The Backroom Boys To Investigate



Dear Backroom Boys,
I have a puzzle that I just cannot unfold. I have seen near perfect video on a computer, but as yet I have been unable to reproduce such crisp images on my PC. Even now with a particularly high end Pentium system the picture is jumpy and of poor quality.

Mystified in Manchester

Dear Mystified,
We have snooped high and low and agree with you that video can be shown on a standard computer. Our roaming detectives have investigated and what you need is an MPEG card. This will enable you to play entire films or even pop tracks with video, as long as you have a sound card and CD ROM drive. There are many video cards on the market available to purchase through Powermark's Technical Sales department so call today for detailed advice.

Yours, The Backroom Boys

PS, We've just uncovered the new GrafixStar range from Videologic - they're more than just graphic cards!

Send your investigations to The Backroom Boys, c/o Powermark plc, Premier House, Station Road, Edgware, Middlesex, HA8 7AQ or fax them to 0181 905 6233.

You can also Email The Backroom Boys on: bboys@powermark.com

The Backroom Boys make every effort to investigate your problems, but they cannot guarantee to reply to everyone.

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DFI / SANYO	IDE	Q	600Kb/sec	190ms	Tray	256Kb	E-IDE	£99	-
Goldstar GCD-R520B	IDE	D	300Kb/sec	250ms	Tray	64Kb	E-IDE	£69	-
Goldstar GCD-R540B	IDE	Q	600Kb/sec	220ms	Tray	128Kb	E-IDE	£99	-
Mitsumi FX300	IDE	T	450Kb/sec	250ms	Tray	64Kb	E-IDE	£99	-
Mitsumi FX400	IDE	Q	600Kb/sec	230ms	Tray	128Kb	E-IDE	£105	-
Nakamichi (7 CD-ROM)	SCSI	D	330Kb/sec	380ms	Caddy	256Kb	16-bit SCSI	-	£249
NEC 3XP	SCSI	T	450Kb/sec	250ms	Caddy	128Kb	16-bit SCSI	-	£249
NEC 6Xi/e	SCSI	6	900Kb/sec	150ms	Caddy	256Kb	16-bit SCSI	£279	£359
Plextor 6x	SCSI	6	900Kb/sec	115ms	Caddy	512Kb	16-bit SCSI	£365	£439
Panasonic CR503	SCSI	D	300Kb/sec	320ms	Tray	256Kb	8-bit SCSI	£129	-
Panasonic 562B	SB	D	300Kb/sec	320ms	Tray	64Kb	SB16 card	£49	-
Panasonic LF1004PDDO	SCSI	Q	600Kb/sec	220ms	Caddy	512Kb	16-bit SCSI	£499	£549
Pioneer DRU124X	SCSI	Q	660Kb/sec	150ms	Tray	256Kb	16-bit SCSI	£189	-
Pioneer 124X	IDE	Q	600Kb/sec	220ms	Tray	256Kb	E-IDE	£105	-
Sony CDU4X	IDE	Q	600Kb/sec	190ms	Caddy	256Kb	E-IDE	£124	-
Sony CDU55E	IDE	D	300Kb/sec	250ms	Tray	256Kb	E-IDE	£89	-
Sony CD76S	SCSI	Q	600Kb/sec	150ms	Tray	256Kb	16-bit SCSI	£147	-
Toshiba XM3601	SCSI	Q	660Kb/sec	130ms	Tray	256Kb	16-bit SCSI	£219	£285
Toshiba XM5301B	SCSI	Q	600Kb/sec	190ms	Tray	256Kb	16-bit SCSI	£139	£219
Toshiba XM5302	E-IDE	Q	600Kb/sec	150ms	Tray	128Kb	E-IDE	£115	£219

Key to drive speeds: D=Double, Q=Quad, T=Triple, 6=Six speed

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GRAVIS ULTRASOUND MAX £144

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A great new way to buy...



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DFI®

DFI MULTIMEDIA KIT

All you need to start exploring the world of multimedia together with some of the best selling software from Microsoft. Full installation instructions included to get you up and running quickly and easily.

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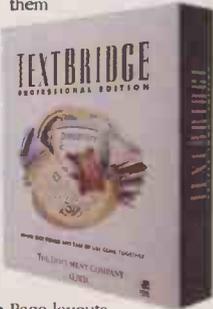
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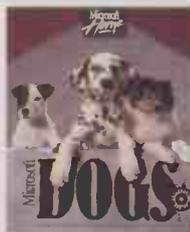
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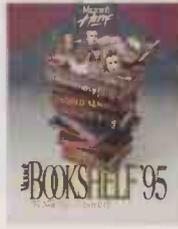
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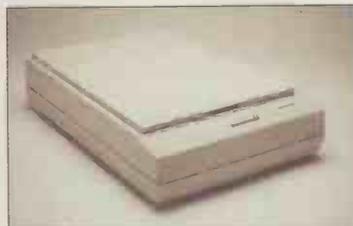


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 VAT at 17.5% will be added to all prices

20

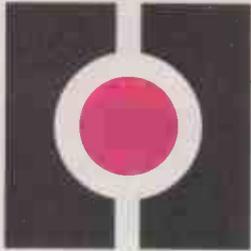


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**Technical Sales
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**COMFY
KEYBOARD**

An interactive educational experience for pre-schoolers. Take the ComfyKeyboard, attach it to any PC and run a ComfyLand movie.



- Self-guided learning in a nurturing and delightful play-world
 - Hundreds of animated stories
 - An ever-expanding list of interactive movies
- PC Magazine November '94 rating ★★★★★ (Excellent)
PC Kids rating ★★★★★
- COMFYKEYBOARD** £49
- INTERACTIVE MOVIES**
- The Great Concert in ComfyLand £25
 - Colourful Adventures: The Missing Bone £25
 - Christmas in ComfyLand £19

**TURN THE PAGE
FOR MORE**

**MOVIE
MEMORIES**

- Databasic Instinct*
- The Great Escape Key*
- Tech Support Your Local Gunfighter*



MEMORY

TAXAN FEATURE

MONITORS

- Taxan, market leader in display technology were the first manufacturer to introduce an energy efficient monitor compatible with the new EPA Energy Star programme - the adopted 'green' standard for the PC industry
- The Ergovision range not only help save the environment, they save you money too
- All monitors are Macintosh compatible - cable available at extra cost



TAXAN ERGOVISION 1080LR

TAXAN ERGOVISION 1080LR

A 20" analogue auto-scanning ultra high resolution colour monitor, compatible with IBM, Compaq, Apple and most other personal computers. It is an excellent solution for high resolution Windows applications.

**3 YEAR ON-SITE
WARRANTY
FROM ONLY £49**

	Size	Dot pitch	Resolution up to:	Frequency	Tube		
400LR	14"	0.28mm	800 x 600	60Hz	Conventional	POWERCUT!	£186
410LR	14"	0.28mm	1024 x 768	60Hz	Conventional	POWERCUT!	£197
420LR	14"	0.28mm	1280 x 1024	60Hz	Conventional	POWERCUT!	£239
NEW 580+LR	15"	0.28mm	1280 x 1024	60Hz	FST	POWERCUT!	£282
880LR	17"	0.28mm	1280 x 1024	60Hz	FST	POWERCUT!	£510
885LR	17"	0.26mm	1600 x 1200	65Hz	FST	POWERCUT!	£579
895LR	17"	0.25mm	1600 x 1200	67Hz	Trinitron	POWERCUT!	£795
1080LR	20"	0.28mm	1600 x 1200	65Hz	Conventional	POWERCUT!	£879
2100LR	21"	0.30mm	1600 x 1200	72Hz	DiamondTron		£1499
NEW K1CV100	9.4"	0.30mm	640 x 480	72Hz	TFT LCD Colour		£1999
NEW K10CV200	9.4"	0.30mm	640 x 480	72Hz	STN LCD Colour		£1249



TAXAN ERGOVISION 2100LR



TAXAN ERGOVISION 580+LR



TAXAN ERGOVISION 410LR

Save **££££s** on Taxan Monitors & Graphics Cards when you buy Windows 95. See page 1

**WINTURBO
ACCELERATORS**

- True 64-bit graphics and multimedia accelerator
- Powered by ATI 88800 Mach64 graphics engine
- 2MB (upgradable) or 4MB VRAM for higher resolution, more colours and greater performance
- ISA, VLB and PCI versions available
- Up to 16.7 million colours at all resolutions from 640 x 480 to 1280 x 1024 with full graphics acceleration

GTS WINTURBO

ISA	2MB VRAM	£205
ISA	4MB VRAM	£345
VLB	2MB VRAM	£205
VLB	4MB VRAM	£345
PCI	2MB VRAM	£205
PCI	4MB VRAM	£345

**WINBOOST
ACCELERATORS**

GTS WINBOOST

ISA	1MB DRAM	£101
ISA	2MB DRAM	£139
VLB	1MB DRAM	£101
VLB	2MB DRAM	£139
PCI	1MB DRAM	£101
PCI	2MB DRAM	£139

GOLDSTAR MONITOR FEATURE



GoldStar
Technology with the human touch

- Consistent quality and reliability from an ISO9001 approved company
- Over \$350m annual R&D spend
- Full range of monitors from 14" to 20"
- Full safety approvals
- Full ergonomic approvals

- All monitors non-interlaced except 1462
- Extended warranties available - call for full details

**Monitor experts
available for
specialist advice**



Model	Size	Dot Pitch	Resolution up to:	Frequency	Features (see key)	
1462	14"	0.28mm	1024 x 768	87Hz	NG, AS, DT	£169
1468	14"	0.28mm	1024 x 768	60Hz	NG, AS, DT	£189
1505	15"	0.28mm	1024 x 768	60Hz	NG, AS, DT, FS, IM	£229
1527	15"	0.28mm	1280 x 1024	60Hz	NG, AS, DT, FS, IM, OS	£269
1727	17"	0.28mm	1024 x 768	60Hz	NG, AS, DT, FS, IM, OS	£469
2010	20"	0.28mm	1600 x 1280	60Hz	DF, AR, AS, IM, OS	£889

Key

NG = Non-Glare, AS = Anti-Static, DT = Dark Tint, FS = Flatter Squarer Tube, IM = Invar Mask, OS = Digital On-Screen Controls

**DELIVERY
CHARGES**
See page 17

A great new way to buy...



See page 1

**EARLY BIRD
Order Bonus**
See page 29



Everyone at Powermark passes through our training college

BANK

at
Powermark

POWERMARK MONITOR FEATURE

Power



Mark

Monitors

New from Powermark - top quality monitors packed with leading edge features at very low prices.



MBMON15
15" Monitor

MBMON14

14" LOW RADIATION MONITOR (MPRII)

Top quality, low radiation, non-glare, non-interlaced monitor. We have tested this monitor with some of the best known names and it has exceeded all expectations and comes out as one of the best for picture quality, image sharpness and vivid colours. With a maximum non-interlaced resolution of 1024 x 768 at 0.28 dot pitch this monitor will give you true image likeness in all your applications.

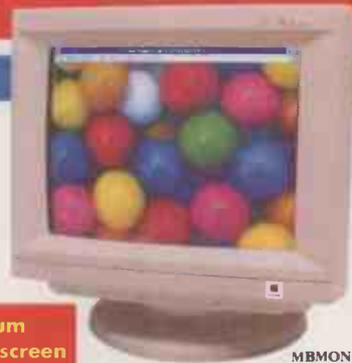
All Powermark monitors are MPRII compliant and feature EPA Energy Star power saving

15" minimum recommended screen size for Windows 95

MBMON15

15" FLATTER SQUARER TUBE MONITOR (MPRII)

Top quality, low radiation, non-glare, non-interlaced monitor with Energy Star power saving. Has the same picture quality as the 14" model but with a flatter squarer tube and Invar mask to give even crisper fuller screen images.



MBMON14
14" Monitor

MBMON17

17" FLATTER SQUARER TUBE MONITOR WITH OSD

To really get the most out of Windows 95, choose Powermark's high quality 17" monitor with OSD (On Screen Display). With a maximum non-interlaced resolution of 1280 x 1024 at 0.28 dot pitch you can be sure that Powermark's fully featured 17" monitor will meet all your demands and at an unbelievably low price too!

EXCLUSIVE MONITORS AT LOW, LOW PRICES!

	Size	Dot pitch	Resolution	Frequency	Features	
MBMON14	14"	0.28mm	1024 x 768	48MHz	NG, TSB	£147
MBMON15	15"	0.28mm	1024 x 768	65MHz	FS, NG, IM, TSB	£208
MBMON17	17"	0.28mm	1280 x 1024	64MHz	FS, NG, IM, OS, TSB	£377
MBMON20	20"	0.28mm	1600 x 1280	82MHz	DF, IM, AS, TSB, DIG	£839
MBMON21	21"	0.28mm	1600 x 1280	82MHz	FS, DF, IM, TSB, DIG	£1149

KEY NG = Non-glare, FS = Flatter Squarer Tube, IM = Invar Mask, OS = On Screen Display, TSB = Tilt and Swivel Base, DIG = Digital Control, AS = Anti-Static, DF = Double Focus

HITACHI MONITOR FEATURE

HITACHI

Hitachi is one of the largest manufacturers of high resolution computer monitors, and is able to offer a complete range of models which will meet the needs of both home or small-business users, as well as the more demanding needs of the professional designer, publisher or DTP user.

All monitors offer the latest in screen ergonomics including tilt and swivel bases, anti-glare screen treatment, MPR-II low radiation, energy save function and flicker free resolution capability.

All monitors are IBM PC, Apple Macintosh compatible, and can connect to most workstations.



HITACHI 15MVXValue



HITACHI 17MVXValue

17MVXValue

- 17" Flatter Squarer Tube
- Superfine .26mm dot pitch
- Dynamic focusing gun for sharp focus in all areas
- Optimum flicker-free resolution of 1024 x 768 @ 75Hz
- PC & Mac compatible
- VESA, DPMS power save
- Microprocessor control for optimising image size, position and geometry
- MPR-II low emission
- Colour adjust facility
- 12 months on-site replacement warranty

Monitor experts available for specialist advice

	Size	Dot pitch	Resolution	Refresh	Tube	
15MVXValue	15"	0.28mm	1280 x 1024	60Hz	FST, Energy Star	£249
17MVXValue	17"	0.26mm	1280 x 1024	60Hz	FST, VESA-DPMS	£489
CM1711	17"	0.26mm	1280 x 1024	77Hz	FST, VESA-DPMS	£599
CM2096	20"	0.31mm	1280 x 1024	75Hz	Standard, VESA-DPMS	£989
CM2098	20"	0.28mm	1600 x 1200	72Hz	Standard, VESA-DPMS	£1139
NEW CM2111	21"	0.28mm	1600 x 1200	75Hz	FST, VESA-DPMS	£1469
NEW CM2112	21"	0.26mm	1600 x 1280	107Hz	FST, VESA-DPMS	£Call
CM2199	21"	0.26mm	1600 x 1280	80Hz	FST, VESA-DPMS	£1979

15MVXValue

- PC and Mac compatible (when supplied with appropriate Mac adapter)
- Supports resolution standards - VGA / SVGA / ESVGA / XGA / 8514A / MacII, Mac Quadra
- High refresh rate in all modes
- Microprocessor control
- MPR-II compliant
- VESA-DPMS compliant

CM1711M

This new multi-scanning colour monitor with 0.26mm dot pitch tube offers sharp and clear images right up to the bezel. Images are flicker free to over 75Hz for resolutions from 640 x 480 to 1280 x 1024, and screen adjustments are made by a microprocessor-based on-screen display. In a recent PC Magazine 'First Looks' review, this monitor was rated 12% better than the previous Editor's Choice.

Technical Sales Order Lines

0181-951 3355
(50 lines)

MONITORS

HUGE STOCKS
Guaranteed same day despatch on virtually all stock items for orders placed even up to 4.00pm.

TECHNICAL SALES PEOPLE
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

FINANCIAL STABILITY
Powermark plc has been supplying upgrades for over 5 years and has an annual turnover exceeding £18 million with a healthy balance sheet.

LOW, LOW PRICES
We only supply products from leading manufacturers and at low, low prices too.

TECHNICAL SUPPORT
Dedicated after sales technical support teams on line to help with installation.

CORPORATE & PUBLIC SECTOR
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

FULL MANUFACTURERS' WARRANTIES
All products supplied by Powermark plc carry manufacturers' warranties and of course full Powermark plc guarantees.

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Fax: 0181 905 6233
Email: sales@powermark.com

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Cards are not debited until despatch
VAT at 17.5% will be added to all prices



Public Sector customers can purchase through HMSO by calling 01603 694153.

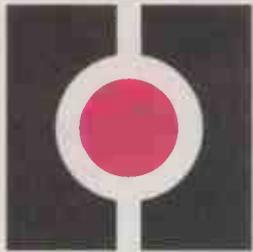


Certificate no. FS 26545

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Power



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(50 lines)**

NEW!

**PENTAX
POCKET JET
PRINTER**

- The smallest, lightest portable PC printer in the world: its dimensions are just 30mm x 255mm x 55mm and it weighs only 497g including battery!
- Fast, laser quality printing: 3ppm @ 300dpi
- Full HP Laserjet IIP (PCL4) emulation
- 30-35 pages per battery charge, only 70 minutes to re-charge
- Complete kit includes printer, battery, charger/adaptor, mains and parallel cable, carry case and 100 sheets of paper
- No need for ribbons, toner or ink cartridges

Call

**TURN THE PAGE
FOR MORE**

**MOVIE
MEMORIES II**

Another chance to read...

*A Hard Disk's
Night*

The Macintosh Man

*The Dells Of St.
Trinians*



MEMORY

FUJITSU PRINTER FEATURE

FUJITSU

Fujitsu, the world's second largest supplier of data processing systems, telecommunications equipment and electronic components, provides a wide range of printer products for home and business applications. The VM range of LED Page Printers offer all the inherent quality associated with all Fujitsu manufactured products, combined with exceptional value.

- LED print technology
- Small footprint
- Easy operation
- Low power consumption
- No waste toner
- Meets the EPA requirements for 'Green' printing
- Low cost per page
- 100 page sheet feeder



FUJITSU VM8

VM4

- 4 pages per min
- 300 dpi which is optimised to 300 x 900 dpi using Fujitsu Enhanced Imaging Technology
- PCL5
- 1MB RAM expandable to 9MB
- 10MHz Intel 80960 RISC processor
- Ethernet and Appletalk network interfaces available

FUJITSU VM4 £349

VM4-WIN

- 4 pages per min
- 300 dpi which is optimised to 300 x 900 dpi using Fujitsu Enhanced Imaging Technology
- High speed Bi-directional parallel interface (IEEE P1284 Nibble mode)
- Minimal memory (3 raster memory + work memory)

FUJITSU VM4-WIN £295

VM8

- 8 pages per min
- 300 dpi which is optimised to 300 x 900 dpi using Fujitsu Enhanced Imaging Technology
- PCL5
- 1MB RAM expandable to 9MB
- 20MHz Intel 80960 RISC processor
- Ethernet and Appletalk network interfaces available

FUJITSU VM8 £399

KYOCERA PRINTER FEATURE

**KYOCERA
FS-400**

In our opinion, the best compact printer available

A compact 4 pages per minute, low cost personal page printer that also offers full system printer capabilities and savings on print costs due to its cartridge-free design.

The FS-400 has a wealth of features, including 300 dpi resolution, enhanced to 300 x 1200 dpi by Kyocera resolution technology, 13 scalable in-built fonts, and for addition cost savings, Energy Star compliance and draft print mode.

Other features include industry standard LaserJet III and optional PostScript emulations and full compatibility with Windows applications.

- KYOCERA FS-400** **POWERCUT!** £380
- NETWORK-SPECIFIC ETHERNET**
- INTERFACE** £169
- TONER KIT** £16
- 3 YEAR ECOSHIELD**
- ON-SITE WARRANTY** £99



KYOCERA FS-400

**KYOCERA
FS-1550**

The FS-1550 10 pages per minute printer offers substantial savings on running costs compared with competitive printers - where the ongoing cost of consumables can amount to far more than the purchase price.

It is ideal for word processing, database and spreadsheet printing, and with resolution enhancement, graphics. As your requirements grow, ECOSYS paper handling options include extra paper trays, a duplex unit and a sorter/collator.

Other features include industry-standard LaserJet III and optional PostScript emulations, sophisticated networking and IBM connectivity options, and full compatibility with Windows applications.

- KYOCERA FS-1550** £915
- NETWORK-SPECIFIC ETHERNET**
- INTERFACE** £279
- TONER KIT** £51
- 3 YEAR ECOSHIELD**
- ON-SITE WARRANTY** £199
- Also available - **KYOCERA FS1600** £1089
- KYOCERA FS3600** £1799



KYOCERA FS-1550



KYOCERA FS-1550 WITH ACCESSORIES

ECOSYS

**Printing costs.
Stop paying the price.**

DELIVERY CHARGES
See page 17

A great new way to buy...

MEMORYBANK Gold Card
See page 1

EARLY BIRD Order Bonus
See page 29



POWERMARK ACADEMY

Everyone at Powermark passes through our training college

HP PRINTER FEATURE



Authorised Reseller
Personal Computer
Products

NEW!

HP OFFICEJET LX

The complete office solution

- High quality printer
- Integrated fax
- Photocopier
- Scanner

HP OFFICEJET LX £495



HP OFFICEJET LX

HP DESKJET 320

- 600 x 300 dpi in black
- Up to 3 pages per minute in black

HP DESKJET 320 £171

HP DESKJET 320 WITH

- CUT SHEET FEEDER £189
- COLOUR KIT UPGRADE £32
- 3 YEAR ON-SITE WARRANTY £39



HP DESKJET 1600C

HP DESKJET 850C

- 600 x 600 dpi in black
- Up to 6 pages per minute in black
- 45 TrueType fonts

HP DESKJET 850C £343

HP DESKJET 1200C

- 600 x 300 dpi
- Up to 6 pages per minute in black

HP DESKJET 1200C £651

HP DESKJET 1200C/PS £1035

HP DESKJET 660C

- 800 x 600 dpi in black
- 14 TrueType fonts

HP DESKJET 660C £285

HP DESKJET 1600C

- 600 x 600 dpi in black
- 4MB RAM

HP DESKJET 1600C £851

HP LASERJET 4V

- A3 paper handling
- 8 pages per minute in A3, 12 in A4

• Delivery: £27 on this printer

HP LASERJET 4V £1409

HP LASERJET 4MV £2039

HP LASERJET 4V 500 SHEET TRAY SYSTEM £279

3 YEAR ON-SITE WARRANTY £199

Matched Memory Kits for HP Printers on page 7



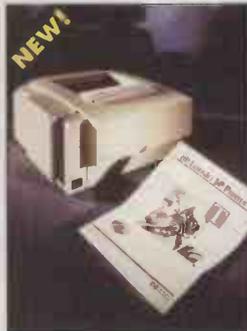
HP DESKJET 660C

HP LASERJET 5P

- 6 pages per minute
- 26 seconds first page out
- 600 dpi, RET, microfine toner
- 2MB RAM, up to 50MB

HP LASERJET 5P £597

HP LASERJET 5MP £729



HP LASERJET 5P

HP LASERJET 5L

- 4 pages per minute
- 600 x 600 dpi in black
- 1MB RAM

• New innovative style case

HP LASERJET 5L £Call

HP LASERJET 4 PLUS

- 12 pages per minute
- Up to 600 dpi
- 2MB RAM

HP LASERJET 4 PLUS £979

HP LASERJET 4M PLUS £1335

HP DUPLEX UNIT £499

3 YEAR ON-SITE WARRANTY £159

HP COLOR LASERJET

- Up to 10 pages per minute in black
- Up to 2 pages per minute in colour
- 300 dpi

• 1 year on-site warranty

• Delivery: £27 on this printer

HP COLOR LASERJET £4338

IEEE 1284 COMPLIANT PRINTER CABLE £19

HP COLOR LASERJET CABINET £345

250 SHEET REAR FEED UNIT £315



HP COLOUR LASERJET

HP LASERJET 4Si

- 16 pages per minute
- 600 dpi

• 1 year on-site warranty

• Delivery: £27 on this printer

HP LASERJET 4Si £2150

HP LASERJET 4SiMX £3041

3 YEAR ON-SITE WARRANTY £459

HP DJ600

- 600 x 600 dpi, RET
- Colour option
- High resolution in black

HP DJ600 £216

PRINTER ACCESSORIES

HP SupportPack

- Onsite warranty by HP engineers
- Recommended for all HP Laserjets & Deskjets



ORIGINAL TONER CARTRIDGES

HEWLETT-PACKARD

LaserJet II/III/III/III £47

LaserJet II IIP/IIIP/IIIP £46

LaserJet II III/4Si/4MX £77

LaserJet II 4/4+/4M/4M+ £67

LaserJet II 4L/4ML/4P/4MP £44

LaserJet II4V/4MV £115

LaserJet 5 Series £Call

DESKJET CARTRIDGES

HP DESKJET BLACK CARTRIDGE £18

HP DESKJET COLOUR CARTRIDGE £21

PRINTER CABLES

PARALLEL 1.5m £4 £8

25M - 25M £4 £9

25M - 36M £6 £8

PRINTER SHARERS

AUTO SWITCHES

2 PCs to 1 printer £18

4 PCs to 1 printer £18

AUTO SWITCHES

• 256K buffer

4 PCs to 2 printers £127

Printer experts available for specialist advice

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(50 lines)

PRINTERS

HUGE STOCKS
Guaranteed same day despatch on virtually all stock items for orders placed even up to 4.00pm.

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Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

FINANCIAL STABILITY
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LOW, LOW PRICES
We only supply products from leading manufacturers and at low, low prices too.

TECHNICAL SUPPORT
Dedicated after sales technical support teams on line to help with installation.

CORPORATE & PUBLIC SECTOR
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

FULL MANUFACTURERS' WARRANTIES
All products supplied by Powermark plc carry manufacturers' warranties and of course full Powermark plc guarantees.

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SPECIAL OFFER!

**Powermark
Dual High Speed
Serial Card**

- Dual 16550 UART serial connections providing data transfer rate three times faster than V.34 modems
- Prevents interrupt overruns and data loss
- Easily Installed even into heavily loaded systems
- Shorter communication times reduce costs
- Ideal for other high bandwidth communications including ISDN

HSSC10 £27

**Save £8 -
Only £19 when
purchased with any
modem**

CABLES

- 2 metre 9F to 25M £8
 - 2 metre 25F to 25F £8
- Call for modem/serial cables and adaptors not listed here.

**TURN THE PAGE
FOR MORE**

**FAMOUS
COMMUNICATORS**

- Marconi
- Watson Watt
- Alexander
- Graham
- Bell



MEMORY

HAYES MODEM FEATURE



ACCURA 288 V.34 + FAX

ACCURA+FAX

Low cost fax modems with all of the quality and ease-of-use that comes with the Hayes name.

OPTIMA+FAX

Offers outstanding performance with the ability to compress data twice as much as other fax modems.

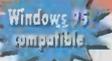


OPTIMA 288 V.34 + FAX



HAYES MODEMS

The industry standard



Model	V21	V22	V22bis	V32	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	Fax	Internal	External
ACCURA 144 + FAX144	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£98
ACCURA 288 + FAX	●	●	●	●	●	●	●	●	●	●	●	●		£172
OPTIMA 144 + FAX144	●	●	●	●	●	●	●	●	●	●	●	●		£249
OPTIMA 288 + FAX	●	●	●	●	●	●	●	●	●	●	●	●		£339
OPTIMA 288 + FAX bundle 2 pack with free accelerator cards and upgrade to V.34	●	●	●	●	●	●	●	●	●	●	●	●		£669
ULTRA 144	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£419
ULTRA ISDN 64K System Adapter														£599

ESP high speed serial card, 1 port £59, 2 port £89

PSION MODEM FEATURE



PSION DACOM MODEMS

Model	V21	V22	V22bis	V32	V32bis	V34	V.F.C.	MNP2-4	MNP10	V42	V42bis	MNP5	Fax	PC Card	
V.32bis Gold Card	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£157
V.34 Gold Card	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£189

**Comms experts
available for
specialist advice**

All modems supplied
by Powermark plc are
BAST APPROVED

**NEW!
GOLD DRIVE
PC CARD
DRIVER**



- Internal device reads any PC Card
 - Fits into any 3.5" drive bay
 - Front loading
 - Reads Type I, II and III cards
 - Easy to use
 - Easy to install
 - 5MB/sec data transfer rate
- GOLD DRIVE PC CARD DRIVER POWERCUT! £99**

ZOOM MODEM FEATURE



**Personal Computer
World:
Editor's Choice
Award Dec '93 and
June '93**

**Windows User:
Best On Test
February 94**

ZOOM MODEMS

Model	V21	V22	V22bis	V23	V32	V32bis	V34	MNP2-5	V42	V42bis	Fax	Internal	External
14.4X	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£95
14.4I	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£89
14.4X MacPak	●	●	●	●	●	●	●	●	●	●	●		£109
28.8X	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£169
28.8I	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£149
28.8X MacPak	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£179



**ZOOM 14.4
MODEMS**

- Remote configuration and callback security
- High speed 14,400 bps fax and data transmission with V.42bis and MNP 2-5

- Extended status reporting with 15 LED lights (14.4X only)
- 5 year warranty
- Buffered 16550 UART to prevent data overruns (14.4I only)

25

**DELIVERY
CHARGES**
See page 17

A great
new way
to buy...



See page 1

**EARLY BIRD
Order Bonus**
See page 29



Everyone at
Powermark passes
through our
training college

BANK

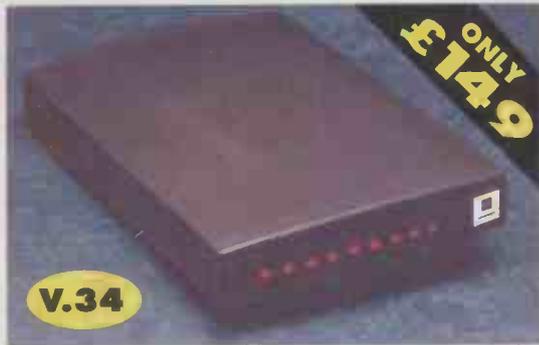
at
Powermark

POWERMARK MODEM FEATURE

Power
Mark.
Modems

Top quality, fully featured, Internet ready, BAPT approved modems brought to you at unbeatable prices from Memory Bank.

All modems feature Auto-Dial and Auto-Answer to ensure ease of use. Error correction and Data



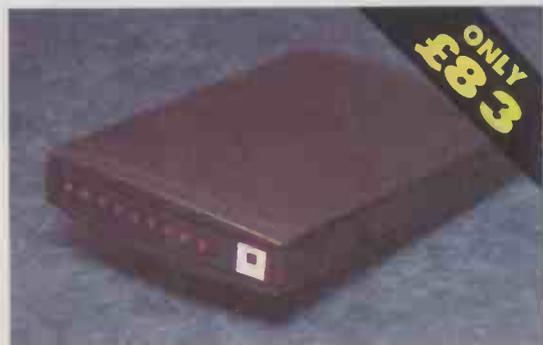
MBM288 External



MBM288 Internal

All Powermark modems come complete with:

- 10 year warranty
- Delrina Dosfax Lite
- Winfax Lite (upgradable to Winfax Pro for Windows 95)
- Comit Lite for Windows
- Free introductory subscription to Compuserve - your gateway to the Internet
- Comprehensive user manual
- Telephone cable
- Serial cable and AC adapter (with external models)



MBM144 External

POWERMARK MODEMS

Model	V21	V22	V22bis	V23	V32	V32bis	V34	MNP2-5	V42	V42bis	Fax	Internal	External
NEW! MBM144	●	●	●	●	●	●	●	●	●	●	●	£79	£83
NEW! MBM288	●	●	●	●	●	●	●	●	●	●	●	£148	£149

- HSSC10 - 2 Port High Speed Serial Card**
- Dual 16550 UART serial connection
 - Enables shorter communication times and therefore reduces costs
 - Save £8 when purchased with any modem

All Powermark modems are BAPT APPROVED

MULTITECH MODEM FEATURE

MultiTech
Systems

MULTITECH MODEMS

Model	V21	V22	V22bis	V32	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	Fax	Simultaneous voice & data	External
NEW! MT2834BLK	●	●	●	●	●	●	●	●	●	●	●	●	Windows 95 compatible	£379
MT1932ZDXK	●	●	●	●	●	●	●	●	●	●	●	●		POWERCUT! £108
MT1432LTI PCMCIA	●	●	●	●	●	●	●	●	●	●	●	●		£198
MT2834LTI PCMCIA	●	●	●	●	●	●	●	●	●	●	●	●		£219
MT1432MK Pocket	●	●	●	●	●	●	●	●	●	●	●	●		POWERCUT! £299
MT1432BLK	●	●	●	●	●	●	●	●	●	●	●	●		POWERCUT! £277
MT2834ZDXK	●	●	●	●	●	●	●	●	●	●	●	●		POWERCUT! £165
NEW! MT2834PCSI	●	●	●	●	●	●	●	●	●	●	●	●		POWERCUT! £439



MULTIMODEM II MT2834 PCSI



MULTIMODEM II MT2834 ZDX

MULTIMODEM II ZDX SERIES

- Desktop unit
- Group 3/Class 2 (TR29) fax
- V.17 fax compatible
- PSTN only
- V42 (lap-M) error correction
- V42bis data compression
- MNP to Level 5
- Asynchronous operation
- AT command set (Hayes compatible)
- Free Multiexpress fax and comms software for windows
- 10 year warranty
- Available in 28.8bps (V34) and 14.4bps (V32bis)

MULTIMODEM II SERIES

- Desktop unit/metal enclosure
- Group 3/Class 2 (TR29) fax
- PSTN and 2W/4W leased line
- Leased line dial-backup with auto-restoral
- Security call-back (30 no.)
- V42 (lap-M) error correction
- V42bis data compression
- MNP to Level 5
- V25bis async/sync
- Free Multiexpress fax and comms software
- 5 year warranty
- Available in 28.8bps (V34) and 14.4bps (V32bis)

Save £25 off Multitech MT2834 PCSI modem when you buy Windows 95. See page 1



Technical Sales Order Lines

0181-951 3355
(50 lines)

MODEMS

- HUGE STOCKS**
Guaranteed same day despatch on a virtually all stock items for orders placed even up to 4.00pm.
- TECHNICAL SALES PEOPLE**
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.
- FINANCIAL STABILITY**
Powermark plc has been supplying upgrades for over 5 years and has an annual turnover exceeding £18 million with a healthy balance sheet.
- LOW, LOW PRICES**
We only supply products from leading manufacturers and at low, low prices too.

- TECHNICAL SUPPORT**
Dedicated after sales technical support teams on line to help with installation.
- CORPORATE & PUBLIC SECTOR**
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.
- FULL MANUFACTURERS' WARRANTIES**
All products supplied by Powermark plc carry manufacturers' warranties and of course full Powermark plc guarantees.

TURN THE PAGE FOR MORE

- UPGRADE DRIVE THRU**
While you wait - installation service available. See page 3 for details.
- PERSONAL CALLERS**
Save on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday. Saturdays: Sales from 9.30am to 4.00pm, Technical Support and Customer Service from 10.00am to 2.00pm.

Powermark plc
Premier House, 112 Station Rd, Edgware, Middlesex HA8 7AQ

Tel: 0181-951 3355
(50 lines)

Fax: 0181 905 6233
Email: sales@powermark.com

Cards are not debited until despatch
VAT at 17.5% will be added to all prices



Public Sector customers can purchase through HMSO by calling 01603 694153.



BS5750 registered for the supply of computer, printer and workstation memory, processor and other upgrades.

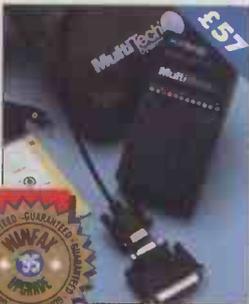
Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.

Power



Mark®

**Technical Sales
Order Lines
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(50 lines)**



FREE
WinFax
for
WINDOWS 95
Upgrade

**Save £10 off
WinFax Pro
when you buy Windows 95.
See page 1**

All modems supplied
by Powermark plc are
BABT APPROVED

**TURN THE PAGE
FOR MORE**

**WARTIME
Memories**

It is not the
end of the
beginning...
Winston Churchill
Air raid sirens
Barrage
Balloons

MEMORY

U.S. ROBOTICS MODEM FEATURE

USRobotics®

The Intelligent Choice in Data Communications

U.S. ROBOTICS MODEMS

Model	V21	V22	V22bis	V32	V32bis	V32terbo	V.34	MNP2-4	V42	V42bis	MNP5	FST Cellular	Fax	Internal	External
Sportster 14,400 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	●	£106	£106
Sportster 28,800 V.34 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT! £161	£159
Sportster 28,800 V.34 Mac + Fax	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£179
Courier Dual Standard V.34 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	●	£245	
Courier Dual Standard V.34 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT! -	£242
WorldPort Dual Standard Cellular + Fax	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT! -	£125
WorldPort PCMCIA V.34	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT! -	£165

PowerPort High Speed Dual Async Serial Card. Recommended for turbo and V34 modems to prevent bottleneck of data £49



SPORTSTER 28,800 + FAX

SPORTSTER 28,800 + FAX

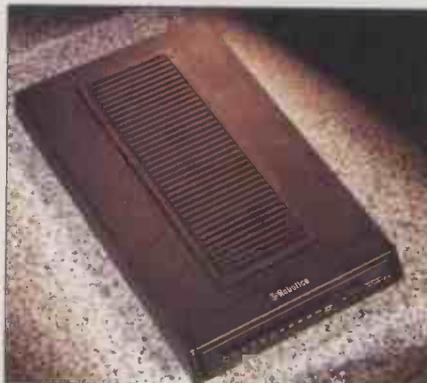
The world's best selling modem just got better. With speeds of up to 28,800bps, the Sportster 28,800 + Fax offers proven high performance technology, at an unbeatable price.

COURIER

Courier Dual Standard V.34 with V.32bis

V.34 for speeds of up to 28,800bps. With the use of data compression a throughput of up to 115,200bps can be achieved, enabling you to

communicate at speeds previously never possible on a dial-up line.



COURIER V.34



WORLDPORT DUAL STANDARD CELLULAR

WORLDPORT DUAL STANDARD CELLULAR

Small enough to fit in your pocket, whilst providing you with all your data communications needs both in and out of the office, the WorldPort Dual Standard Cellular Fax is the perfect choice for the mobile user.

WORLDPORT PCMCIA

WorldPort Dual Standard Cellular PCMCIA 2.0 Fax Modem

Compatible with any portable equipped with a PCMCIA type II slot and powered directly by the computer. The ideal solution for anyone who will regularly need to transfer data from their portable computer.



WORLDPORT PCMCIA



FREE with every Sportster 28.8

- 30 days free trial with PIPEX DIAL TRIAL
- After 30 days, subscribe to PIPEX DIAL - the



- full version of PIPEX Internet for only £50 which includes a further 2 months free access to the Internet (normally £30)
- One month's free trial with COMPUSERVE
- Free access to the ACC call service. Save up to 25% on BT basic rates for national and international calls
- QuickLink II fax and data software
- Modem 9-25 pin serial cable and 9-25 pin serial converter for external Sportster
- Telephone cable

All modems supplied by Powermark plc are BABT APPROVED

27

DELIVERY CHARGES
See page 17

A great new way to buy...
See page 1



EARLY BIRD
Order Bonus
See page 29



Everyone at Powermark passes through our training college

BANK

at Powermark

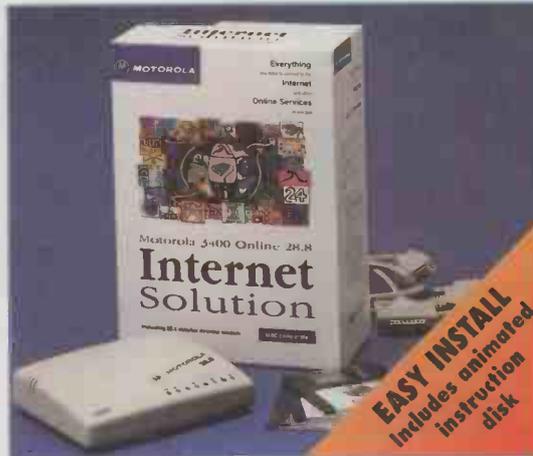
MOTOROLA MODEM FEATURE



MOTOROLA MODEMS

Model	V21	V22	V22bis	V23	V32	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	Fax	Voice	External	
NEW! 3400 Online	●	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£169
NEW! 3400 Pro Mac	●	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£175
NEW! 3400 Pro PC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£167

Windows 95 compatible



EASY INSTALL
Includes animated instruction disk

3400 ONLINE & PRO MODEMS

- Motorola RISC Technology
- Twice the speed of V.32bis 14.4bps technology
- Automatically selects the fastest possible line speed
- Robust performance over standard telephone lines
- Data error correction and data compression
- Fax error correction
- Phone number directory

- Speed 28,800 bps the fastest standard available
- True V.34 worldwide compatibility
- Complete with all necessary cabling
- Includes popular fax and communications software
- Comprehensive user manual included
- Telephone support helpline

Easy install - includes animated instruction disk

Motorola 3400 Online 28.8 Internet Solution comes complete with all hardware and software that you need to get your PC online to the Internet!

- Internet software
- Protocol software
- File transfer software
- WorldWide Web browser software

- Electronic mail software
- Newsgroup software
- Interactive online game
- Internet phone software licence

Comms experts available for specialist advice



EASY INSTALL
Includes animated instruction disk

DFI MODEM FEATURE

DFI®

F1114V

- Features**
- Data/Fax speed: 14,400 bps
 - V.32, V.32 BIS, V.42, V.42BIS
 - MNP level 2-4, 5
 - Fax Class 1, 2 & 3
 - Call back security
 - Full/half duplex and auto fallback

Accessories included

- Serial cable
- Telephone lead
- User's manual
- AC adapter

Software

- Delrina's 4 in 1 Win/DOS Fax Lite and Comit Lite DOS/Win software for data transmission

Access

- Introductory membership to CompuServe

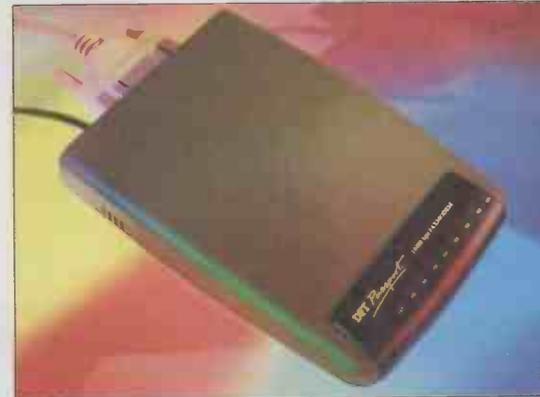
Warranty

- 5 years

DFI manufactures a comprehensive line of high quality PC components which are the strength behind its custom-built desktop and notebook PCs. To supplement this product line, DFI have now moved into the data communications arena, launching the passport range of BABT approved fax modems. This complete package offers you state of the art technology and incorporates everything you need to gain access to the information super highway at a highly competitive price.

DFI MODEMS

Model	V21	V22	V22bis	V32	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	HST Cellular	Fax	Internal	External	
Passport F1114V	●	●	●	●	●	●	●	●	●	●	●	●	●	£84	£84	
Passport F1128V+	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT!	£159	£159



F1128V+

- Features**
- Data/Fax speed: 28,800/14,400 BPS
 - V.32, V.32 BIS, V.42, V.42 BIS, V.34
 - MNP Level 2-4, 5
 - Fax Class 1, 2 & 3
 - Call back security

Accessories included

- Telephone lead
- User's manual

Software

- Delrina's 4 in 1 Win/DOS Fax Lite and Comit Lite DOS/Win software for data transmission

Access

- Introductory membership to CompuServe

Warranty

- 5 years



Technical Sales Order Lines

0181-951 3355
(50 lines)

MODEMS

HUGE STOCKS
Guaranteed same day despatch on a virtually all stock items for orders placed even up to 4.00pm.

TECHNICAL SALES PEOPLE
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

FINANCIAL STABILITY
Powermark plc has been supplying upgrades for over 5 years and has an annual turnover exceeding £18 million with a healthy balance sheet.

LOW, LOW PRICES
We only supply products from leading manufacturers and at low, low prices too.

TECHNICAL SUPPORT
Dedicated after sales technical support teams on line to help with installation.

CORPORATE & PUBLIC SECTOR
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

FULL MANUFACTURERS' WARRANTIES
All products supplied by Powermark plc carry manufacturers' warranties and of course full Powermark plc guarantees.

TURN THE PAGE FOR MORE

UPGRADE DRIVE THRU
Wait - you wait installation service available. See page 3 for details.

PERSONAL CALLERS
Save on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday. Saturdays: Sales from 9.30am to 4.00pm, Technical Support and Customer Service from 10.00am to 2.00pm.

Powermark plc
Premier House, 112 Station Rd, Edgware, Middlesex HA8 7AQ
Tel: 0181-951 3355
(50 lines)
Fax: 0181 905 6233
Email: sales@powermark.com



Public Sector customers can purchase through HMSO by calling 01603 694153.



BS5750 registered for the supply of computer, printer and workstation memory, processor and other upgrades. Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.



Cards are not debited until despatch
VAT at 17.5% will be added to all prices.

Power



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EARLY BIRD



**Catches the
ROM!**

**FREE
CD ROM**

**WITH EVERY
TELEPHONE
ORDER PLACED
BEFORE 1.00PM**
When ordering just
ask for your **FREE**
CD ROM as it is
not shipped
automatically

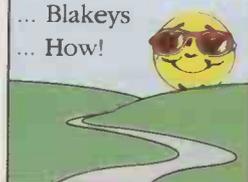
**HURRY!
STOCKS ARE VERY
LIMITED**

**TURN THE PAGE
FOR MORE**

**NEW! MEMORY
LANE AGAIN**

Do you remember this
Memory Lane from
December 1993...?

Do you remember...
... DEC Rainbow
... BMX
... Blakeys
... How!



MEMORY

DATAFLEX MODEM FEATURE



**14.4
portable
only £69**
Limited offer

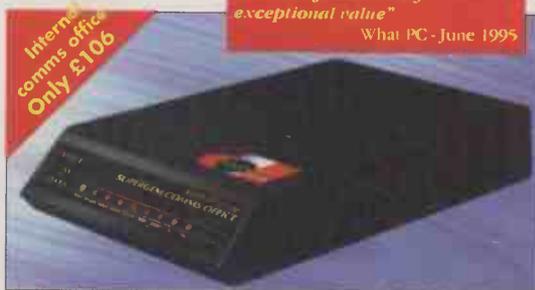
SuperGEM Comms Office

Combines voice recording, message taking, automatic touch tone response, fax, modem and comms management in one box. Easy to use Windows software enables your PC to become an answering machine with automatic voice, fax and data detection.

- Touch tone selection
- Voice mail
- Pager notification
- Call screening
- Sound card support
- Fax broadcasting
- Faxback/Faxforward
- Super Voice 2.0 software
- Windows fax and comms software

"Versatile modem combining answering machine with fax and data functionality - exceptional value"

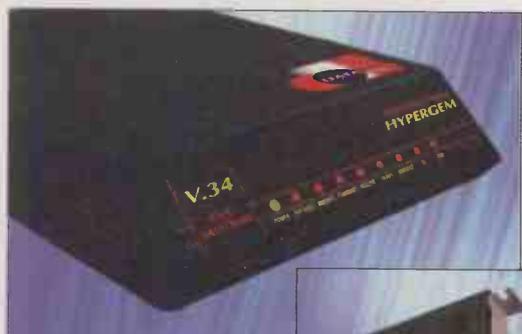
What PC - June 1995



Internal
comms office
Only £106

DATAFLEX MODEMS

Model	V21	V22	V22bis	V23	V32	V32bis	V34	MNP2-4	V42	V42bis	MNP10	Voice	VT/Fax	Internal	External
PC SuperGEM	●	●	●	●	●	●	●	●	●	●	●	●	●	●	£147
Portable SuperGEM	●	●	●	●	●	●	●	●	●	●	●	●	●	●	LIMITED OFFER! £69
Comms Office	●	●	●	●	●	●	●	●	●	●	●	●	●	●	£Call £173
PC HyperGEM	●	●	●	●	●	●	●	●	●	●	●	●	●	●	£162 POWERCUT!
Portable HyperGEM	●	●	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT! £169
Desktop HyperGEM	●	●	●	●	●	●	●	●	●	●	●	●	●	●	£242



HyperGEM

Available as portable, PC card or desktop

- V34 (28,800bps)
- Ideal for Internet
- Windows fax and comms software



LASAT MODEM FEATURE

LASAT MODEMS

Model	V21	V22	V22bis	V32	V32bis	V34	MNP2-4	MNP5	MNP10	Fax	External
Unique 144	●	●	●	●	●	●	●	●	●	●	POWERCUT! £149
Safire 144 (Mains only)	●	●	●	●	●	●	●	●	●	●	£116
Credit 144 PCMCIA	●	●	●	●	●	●	●	●	●	●	£159
NEW! Credit 288 PCMCIA	●	●	●	●	●	●	●	●	●	●	£191
Safire 288	●	●	●	●	●	●	●	●	●	●	£195
NEW! Unique 640i single channel ISDN/T/A	●	●	●	●	●	●	●	●	●	●	£399

Windows 95
compatible

LASAT

SAFIRE 288

The Safire 288 V34 modem has V.42 error correction; V.42bis

data compression, MNP 2-5, MNP10; industry standard AT commands; async/sync/autosync communications; V.29 and V.27 fax. With indicator lights on front panel, the Safire 288 comes with cable and fax software.

It can send and receive data at 115,200 bps and send and receive faxes at 14,400 bps.

CREDIT 288

The Credit 288 V.34 PCMCIA modem which has V.42 error correction; V.42bis data compression, MNP 2-5, MNP10; industry standard AT commands; async (8/9/10-bit), autosync; auto dialling/answering; built-in 16550 FIFO UART.

It can send and receive data at 115,200 bps and send and receive faxes at 14,400 bps. Includes telephone cable and fax software.



All modems supplied by Powermark plc are BABT APPROVED

"We were wrong to expect a good looking modem to perform badly. The Unique 144 displayed perfect data performance... and its throughput was excellent."
Computer Shopper, April 1994

DELIVERY CHARGES
See page 17

A great new way to buy...



See page 1

**EARLY BIRD
Order Bonus
See page 29**



Everyone at Powermark passes through our training college

SMC NETWORKING FEATURE

SMC®

SMC EtherEZ Adapters

Superior plug and play Ethernet adapter approved for Windows 95

SMC have been working very closely with Microsoft to ensure their adapter is completely compatible with Windows 95, and are therefore one of the first companies to have gained full approval by Microsoft. In non Plug and Play environments, these adapters install in just one easy step.

- Installs in less than 30 seconds
- Plug and Play capability means auto-configuration on power up
- SMC's fastest adapter to date
- All drivers are backward compatible with previous SMC adapters
- SNMP agent included at no extra charge
- Support for all popular network operating systems
- Lifetime Warranty
- 20 packs and 50 packs also available - call for pricing

	Single	5 Pack
EtherEZ Adapter BNC	POWERCUT! £60	£279
TP	POWERCUT! £60	£259
Combo	POWERCUT! £68	£299

24 AND 50 PACKS ALSO AVAILABLE



Windows 95 compatible

SMC Fast Ethernet Adapters

The SMC EtherPower 10/100 and Ether 10/100 adapters are 100Base-TX devices, designed for PCI or EISA bus computers. These dual-speed adapters allow for the easy integration of Fast Ethernet into 10Base-T legacy LANs.

- Performance boost for PCI and EISA machines
- Widest driver support, including NetWare, Windows for Workgroups, Windows NT, Banyan Vines, DEC Pathworks and IBM LAN Server
- Lifetime warranty
- ISO9002-certified manufacturing process
- SNMP agent included
- 20 packs + 50 packs also available - call for pricing

SMC ETHERCARD ELITE ULTRA

	Single	6 Pack
Elite 16 Ultra BNC	£59	£339
Elite 16 Ultra TP	£59	£339
Elite 16 Ultra Combo	£69	£386

SMC ETHERPOWER PCI

	Single	5 Pack
EtherPower PCI TP	POWERCUT! £89	£415
EtherPower PCI Combo	POWERCUT! £101	£499

SMC ELITECARD PCMCIA

	Single	5 Pack
EliteCard PCMCIA TP	£85	£399
EliteCard Combo	£114	£553

SMC ETHERCARD ELITE 32C ULTRA

	Single	6 Pack
Elite 32C Ultra Combo	£141	£769

TIGER HUBS

	Number of Ports				
	TP	BNC	AUI	FL	
CX3	0	3	1	0	£209
TP6	6	0	1	0	£124
TP6B	6	1	0	0	£125
TP12	12	1	1	0	£249
CX6	1	6	1	0	£435
FL6	0	1	1	6	£Call

Save £10 on SMC EtherEZ Ethernet cards and £40 on five-packs of SMC EtherEZ Ethernet cards when you buy Windows 95. See page 1

3COM FEATURE

3Com®

Compatible with commonly used operating systems, including Novell Netware, Microsoft LAN Manager, DECnet, DOS, PC-NFS, Banyan Vines and 3+Open.

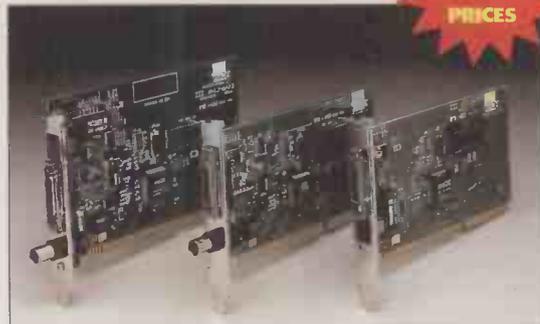
3C503 RANGE
Standard 8-bit or selectable 16-bit card. Shared memory architecture and 8K buffer.

3C529 RANGE
MCA Etherlink III Cards.

3C509 RANGE
16-bit high performance, low component cards.

3C579 RANGE
32-bit EISA Interface using Parallel Tasking Architecture. The adapter uses the same drivers as the EtherLink III and is SNMP manageable when used with Linkwatch.

CALL FOR 20 PACK PRICES



3C509 RANGE

	BNC	RJ45	AUI	Unit	5 Pack
3C509	●		●	£73	£329
3C509TP		●		£73	£329
3C509C	●	●	●	£80	£339

3C529 RANGE

• MCA Etherlink III cards

	BNC	RJ45	AUI	Unit	5 Pack
3C529	●		●	£152	£669
3C529TP		●	●	£156	£669
3C529C	●	●	●	£136	£679

3C579 RANGE

• 32-bit EISA interface using Parallel Tasking Architecture

	BNC	RJ45	AUI	Unit	5 Pack
3C579	●		●	£149	£679
3C579TP		●	●	£149	£679

3C589 RANGE

• PCMCIA cards

	BNC	RJ45	AUI	Unit	5 Pack
3C589T	POWERCUT!	●		£107	£490
3C589C	POWERCUT!	●	●	£137	£634

TOKEN RING PCMCIA

• AutoLink software
• LEDs for installation and trouble shooting

	Unit	5 Pack
3C689	TokenLink III 16/4	£299 £1399

3C590 RANGE

• PCI Bus Master adapters using parallel tasking architecture

	BNC	RJ45	AUI	Unit	5 Pack
3C590TP		●		£97	£419
3C590C	●	●		£106	£478

Technical Sales Order Lines

0181-951 3355
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MODEMS

HUGE STOCKS
Guaranteed same day despatch on virtually all stock items for orders placed even up to 4.00pm.

TECHNICAL SALES PEOPLE
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

FINANCIAL STABILITY
Powermark plc has been supplying upgrades for over 5 years and has an annual turnover exceeding £18 million with a healthy balance sheet.

LOW, LOW PRICES
We only supply products from leading manufacturers and at low, low prices too.

TECHNICAL SUPPORT
Dedicated after sales technical support teams on line to help with installation.

CORPORATE & PUBLIC SECTOR
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

FULL MANUFACTURERS' WARRANTIES
All products supplied by Powermark plc carry manufacturers' warranties and of course full Powermark plc guarantees.

TURN THE PAGE FOR MORE

UPGRADE DRIVE THRU
While-you-wait installation service available. See page 3 for details.

PERSONAL CALLERS
Save on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday. Saturdays: Sales from 9.30am to 4.00pm, Technical Support and Customer Service from 10.00am to 2.00pm.

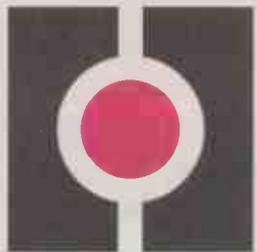
Powermark plc
Premier House, 112 Station Rd, Edgware, Middlesex HA8 7AQ
Tel: 0181-951 3355
(50 lines)
Fax: 0181 905 6233
Email: sales@powermark.com

MasterCard VISA SWITCH
Cards are not debited until despatch
VAT at 17.5% will be added to all prices.

HMSO
Public Sector customers can purchase through HMSO by calling 01603 694153.



BS5750 registered for the supply of computer, printer and workstation memory, processor and other upgrades.
Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.



**Technical Sales
Order Lines
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951 3355
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With the
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Cheque
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Buy Windows 95 and
save over £400 on leading
peripherals and software!

See page 1

**TURN THE PAGE
FOR MORE**

... and here's what
some of our customers
have said ...

*Many, many, thanks for
what I can only describe
as a brilliant service.*

*The memory arrived as
promised, and the new
32MBs are installed and
functioning properly
with no problems at all.
There is now no disk
thrashing, even with my
larger files and it is all so
much quicker.*

M Cunningham-Brown
West Midlands

**MEMORABLE
Ha Ha GAGS**

Punchlines
to old, old,
old favourites

Do you know how
to drive this?

The one on the tank

Mild green furry lip
squid

If you can't remember the
stories to these then contact
Quentin Quizzy and he'll be
happy to oblige.

MEMORY

ARTISOFT FEATURE



Ideal
as your
first network

LANTASTIC POWER SUITE NETWORK STARTER KIT

The easy-to-use LANtastic
network integrated with Lotus
cc:Mail e-mail, Lotus Organiser

group scheduling and personal
calendar, Cheyenne fax, data-
comms and modem sharing
software. Plus introductory
Compuserve membership.
LANtastic Power Suite is an
integrated package that
combines the LANtastic



network
operating
system with
a complete
networking
and communications solution
for small businesses.

LANtastic Power Suite give
users everything needed to set
up a network; start sharing
files, modems, printers and
other peripherals; efficiently
schedule meetings and
automatically notify attendees
and send and receive faxes and
e-mail messages.

**LANTASTIC POWERSUITE 2
NODE NETWORK STARTER
KIT** £219
**LANTASTIC ADD ON ONE
NODE KIT** £115

**Powerfully
simple
networking**

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ONLY	
1 USER	£89
5 USER	£375
LANTASTIC 2 NODE NETWORK STARTER KIT (without Powersuite)	£194
LANTASTIC ADD-ON	
1 NODE KIT	£99
LANTASTIC OPERATING SYSTEM	
1 USER	£66
5 USER	£289
LANTASTIC V6 FOR DOS AND WINDOWS	£56
5 USER PACK	£224
LANTASTIC UTILITY PACK	£249
ARTICOM	£69
ARTISAVE	£132

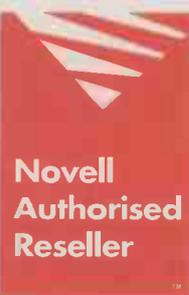
INTEL NETWORKING FEATURE



	BNC	RJ45	AUI	Unit	5 Pack
NETPORT XL BNC/TP				£299	£869
NETPORT XL TOKEN RING				£439	
ETHEREXPRESS FLASH					
EF16	•		•	£74	£352
EF16-TP		•	•	£74	£352
EF16C	•	•	•	£86	£415

	BNC	RJ45	AUI	Unit	5 Pack
ETHEREXPRESS 16					
EE16	•		•	£69	£325
EE16-TP		•	•	£71	£335
ETHEREXPRESS PRO 10 (PLUG & PLAY)					
EP16-TP		•	•	£59	£266
EP16C	•	•	•	£69	£329
ETHEREXPRESS FLASH PRO 10 (PLUG & PLAY)					
EFP16-TP		•	•	£68	£289
EPPI6C	•	•	•	£77	£353

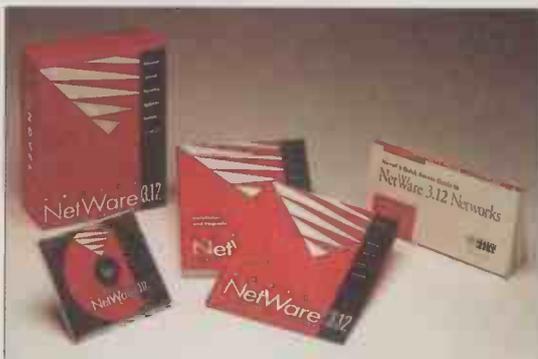
NOVELL FEATURE



INTRODUCING NOVELL NETWARE 4.1

NetWare 4.1 has all the
advantages of previous
versions of NetWare, plus gives
you new capabilities designed
to increase productivity, reduce
costs, and simplify installing
and maintaining your network.

- Additive licensing - 25 user + 10 user = 35 user licence
- NDS - NetWare Directory Services
- Single network log in for access to all resources
- Improved memory management and protection using both ring 3 and 0
- Enhanced security utilising RSA public/private key cryptography
- Remote management features



- Independent network auditing features
- Automatic file grooming and archiving
- All utilities in GUI format
- Support for over 250 printers per server
- New simplified installation
- Improved ITX WAN behaviour with enhanced routing of IPX, AppleTalk and IP
- Internationalisation via Multi-lingual language modules

UPGRADES

Upgrades from any version to Netware 4.1

Current	New	5	10	25	50	100	250	500
5	£185	£719	£1179	-	-	-	-	-
10	-	£355	£834	£1375	-	-	-	-
25	-	-	£567	£1064	£1886	-	-	-
50	-	-	-	£765	£1520	£Call	£Call	-
100	-	-	-	-	£1065	£Call	£Call	-
250	-	-	-	-	-	£Call	£Call	-

FREE WITH EVERY COPY OF NETWARE

Lan Workplace 5 buy-one-get-one-free offer. Time Out (1996) full version of Net Connect. Groupwise Quicklook CD (offer ends 22/10/95) Limited offer - please ask for NOV2 when ordering

NOVELL NETWORK 4.1 CD	
5 USER	£439
10 USER	£1029
25 USER	£1529
50 USER	£1997
100 USER	£3279
250 USER	£Call

NOVELL NETWORK 3.12	
5 USER	£425
10 USER	£1009
25 USER	£1479
50 USER	£1969
250 USER	£Call

Call for CD ROM pricing

PERSONAL NETWARE

- Share all your printers, drives (CD ROMs etc), directories and files



PERSONAL NETWARE 5 PACK	£44 £189
-------------------------	-------------

**DELIVERY
CHARGES**
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A great
new way
to buy...
**MEMORYBANK
Gold
Card**
See page 1

**EARLY BIRD
Order Bonus**
See page 29



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ACADEMY**

Everyone at
Power mark passes
through our
training college

BANK

at
Powermark

XIRCOM FEATURE



CREDIT CARD ETHERNET + MODEM II

- Simultaneous Ethernet/803.2 LAN plus 19,200 bps data and 14,400 bps send/receive fax modem operation in one slot
- Modem software configurable to support localised telephone requirements in US and 14 European countries
- Serial port/UART emulation provides increased compatibility with all popular terminal and fax software
- Includes terminal and fax software for Windows

- Performance modem communications via Xircom's Modem Application Programming Interface (XMAPI)
- Supports advanced PCMCIA features including HotSwap, Suspend/Resume and Integrated Power Management
- Support for remote node access applications
- Includes Windows terminal and fax software

- CEM2-10BT (TP)** **POWERCUT!** £299
- CEM2-10B2 (BNC)** **POWERCUT!** £309
- CEM2-10BC (COMBO)** **POWERCUT!** £319

Xircom

CREDIT CARD TOKEN RING ADAPTER IIps

- High-performance, memory-saving SmartRing software
- 16 or 4 Mbps software selectable ring speed
- Windows and DOS based installation program automatically configures PC and NOS setup
- Intuitive Windows based user utility for easy adapter management
- Allows 'hot' removal and reinsertion while preserving system status
- Supports both shielded & unshielded twisted pair Token-Ring cabling
- Compatible with the widest range of platforms

PS-CT2-16CTP (TP) £299



POCKET ETHERNET ADAPTER III



- Universal connection for all notebook, laptop and desktop PCs
- Enhanced Parallel Port (EPP) capable
- Requires no internal expansion slots
- No jumpers or configuration switches to set
- Ultra-compact, ergonomic design for maximum portability and one hand installation
- Phantom power cable
- Small, lightweight power supply included

PE3-10B2 (BNC) £185

PE3-10BT (TP) £186

PE3-10BC (COMBO) £209

ACCENT FEATURE



ACCENT SPECIAL EDITION

Includes all of the features of Accent Express plus advanced support in - English, French, German, Spanish and Italian. Each language offers a spell checker, thesaurus, hyphenation, word-forward translation with the Berlitz Interpreter and keyboard maps. Accent Special Edition contains advanced word processing features and can import from or

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ACCENT PROFESSIONAL

Accent Professional, the premier complete multilingual solution, as Accent Special Edition plus more. 17 spell checkers, 9 thesauruses, 12 language hyphenations, including Russian, Danish, Portuguese, Finnish and Dutch.

ACCENT PROFESSIONAL £189

ACCENT LANGUAGEWARE PRODUCT LINE

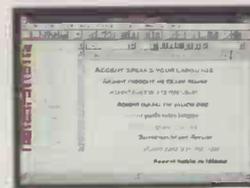
	Pro	Special Edition	Express
Typing Languages	Over 30	Over 30	Over 30
User Interface Languages	19	15	15
Interactive Keyboard Maps	Over 50	Over 50	Over 50
TrueType Fonts	Over 150	Over 80	30
On Line Help Languages	12	8	-
Spell Checker Languages	17	9	-
Thesaurus Languages	11	8	-
Hyphenation Languages	14	8	-
Berlitz Interpreter			
Word-for-Word Translation	5	5	-
Word Processing Features	Advanced	Advanced	Standard

ACCENT LANGUAGEWARE

Discover Accent LanguageWare and bridge the language barrier across international borders.

Accent offers you the ability to work effortlessly in over 30 languages simultaneously, with any PC and printer.

Accent speaks your customers' languages enabling you to write an entire letter or contract in their language or simply spell your customers' names and addresses correctly, from Russian letters to Turkish accent marks.



ACCENT EXPRESS

All the features of a traditional word processor plus the capability to create documents in over 30 languages. Accent Express can import and export text and graphics. Includes 50 keyboard maps for ease of use and authentic characters in any language.

ACCENT EXPRESS £38

Exclusive to Powermark
Buy Accent Express for only £24 with any other purchase

ACCENT HOT PRESS

"Accent is the best multilingual word processor we've seen."

PC Magazine, January 1995

"If you're looking for a world-class correspondence program, I've got it. ... for those who must do electronic correspondence in many languages, I'd think this would be a godsend."

Byte, January 1995

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NETWORKING & PRINTERS

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Guaranteed same day despatch on virtually all stock items for orders placed even up to 4.00pm.

TECHNICAL SALES PEOPLE
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

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We only supply products from leading manufacturers and at low, low prices too.

TECHNICAL SUPPORT
Dedicated after sales technical support teams on site to help with installation.

CORPORATE & PUBLIC SECTOR
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

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While-you-wait installation service available. See page 3 for details.

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Save on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday. Saturdays: Sales from 9.30am to 4.00pm, Technical Support and Customer Service from 10.00am to 2.00pm.

Powermark plc
Premier House, 112 Station Rd, Edgware, Middlesex HA8 7AQ

Tel: 0181-951 3355
(50 lines)

Fax: 0181 905 6233
Email: sales@powermark.com

Accepted by VISA, MasterCard, American Express, Switch
Cards are not debited until despatch
VAT at 17.5% will be added to all prices



Public Sector customers can purchase through HMSO by calling 01603 694153.

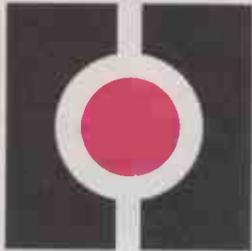


Certificate no. PS 26545

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peripherals and
software!

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Training Video
for Microsoft
Windows 95

£19

or £16 when purchased
with Microsoft Windows 95

... and here's what
some of our customers
have said ...
...the service and help I
received from you all over
the last few weeks has
been nothing short of
brilliant.
... Your company has been
brilliant and I will
certainly use you again
and recommend you whole
heartedly to my friends in
the future, THANK YOU.

Mr & Mrs N Luxford
St Albans

**TURN THE PAGE
FOR MORE**

MEMORY

WINDOWS® 95 FEATURE

Microsoft®

Unlock the potential of your PC with Microsoft® Windows® 95

Microsoft Windows 95 makes everything you
do with your computer faster and easier.

The Microsoft® Windows® 95 operating system
will transform everything you do with your PC.
Suddenly using a computer can be fast, easy
and fun - with limitless possibilities!

**Microsoft® Windows® 95:
Your open door to doing
more**

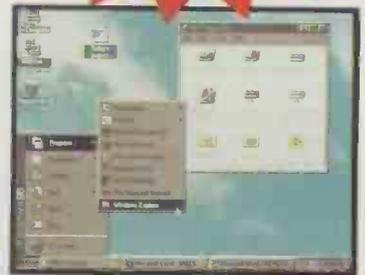
- Save time with an easier-to-use interface; long filenames; and one-click access to all of your programmes and documents with the **Start** button
- Plug and Play technology automatically connotes compatible disk drives, sound cards and more
- 32-bit, pre-emptive multitasking lets you run multiple programmes or perform multiple tasks simultaneously
- Gain built-in access to e-mail and faxes with Microsoft Exchange, and to the Internet with **The Microsoft Network**
- Full-motion video provides vividly realistic game play with big, fast, on-screen action

**Everything you do is
easier and faster**

- **Easier.** Navigate your system quickly with easy-to-use tools, including the **Start** button, **taskbar**, and **Windows Explorer**
- **Plug and Play.** Plug and Play frees you from manually setting up Plug and Play-compatible hardware devices such as CD-ROM drives and scanners
- **Long File Names.** More descriptive file names - up to 250 characters long
- **Faster.** Enjoy improved performance in all major areas, including faster file and disk access, and faster printing, thanks to the 32-bit architecture of Windows 95®
- **Compatible.** Works with your current software - 16-bit programmes and drivers for Windows, Windows for Workgroups, and MS-DOS are compatible with Windows 95®



**Buy
Windows 95 and
save over £400 on
leading peripherals
and software!
See page 1**



MICROSOFT® PLUS! FOR WINDOWS® 95

To give Windows® 95 even
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new Microsoft® Plus!

Introducing Microsoft® Plus! - the way to
fully exploit the power of 486 and
Pentium PCs.

A companion for the Windows® 95
operating system, Microsoft® Plus! adds
space and style to your PC. With
Microsoft Plus!, your computer is self-
maintaining and is customisable with
unique new desktop themes. Microsoft
Plus! gives you outstanding data
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you get fast, easy access to the Internet.

Microsoft® Plus! is packed with
features that complement Windows® 95

- An intelligent new System Agent makes your PC self-maintaining
- Microsoft® Plus! has an enhanced version of DriveSpace that allows up to 50% more compression than Windows® 95 and more free disk space without any performance penalty
- Themes - 11 colourful themes, each with new fonts, icons, backgrounds, sounds, screen savers and colours
- For Internet users Microsoft Plus! includes an enhanced Internet Browser
- Pinball - a 3-D game designed for Windows 95 that looks, sounds and plays like the real thing
- Turn your computer into a Dial-Up Networking server that lets your small office or workgroup share data or send and receive mail remotely
- Font smoothing makes fonts easier to read

MICROSOFT PLUS! 3.5" FLOPPY £29



MICROSOFT PLUS! CD ROM £29

**A world of new
possibilities**

- **Multitask.** Work on several tasks at once with fast, new 32-bit programmes that support pre-emptive multitasking and **multithreading**
- **The Microsoft Network.** Sign on to The Microsoft Network. It's an easy-to-use online service with e-mail, news, Internet access and more
- **One-Stop In-Box.** Microsoft Exchange is your one-stop in-box that makes it easy to view and work with such things as electronic mail from multiple sources, faxes, documents and bulletin boards
- **Network-Ready.** Windows 95 is network-ready, providing easy 32-bit access to network resources.
- **Mobile.** Get the most from your portable PC features such as Dial-up networking, Battery Monitor and Plug and Play support for PCMCIA cards and docking stations
- **Better Video.** Enjoy larger, smoother video than ever before for more fun multimedia experiences

MICROSOFT WINDOWS 95

UPGRADE 3.5" FLOPPY £59

MICROSOFT WINDOWS 95

UPGRADE CD ROM £59

33

**DELIVERY
CHARGES**
See
page 17

A great
new way
to buy...



See page 1

SOFTWARE WARRANTY
Do check compatibility before ordering.
Faulty software replaced through
Powermark Customer Service. Opened
software cannot be returned.



Everyone at
Powermark passes
through our
training college

WINDOWS® 95 FEATURE

Microsoft®

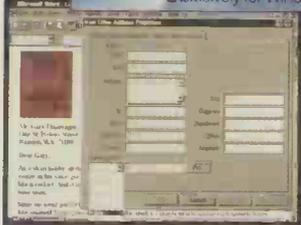
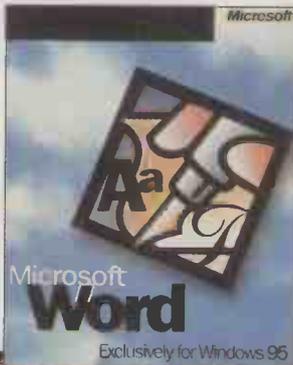
MICROSOFT® WORD FOR WINDOWS® 95

Microsoft® Word for Windows® 95 helps make everyday writing tasks more automatic and complex tasks simple. It also provides tools to create and distribute documents in an increasingly connected world.

Save time with Microsoft® Word for Windows® 95, with features like the integrated **Address Book** and grammatical **Find and Replace**.

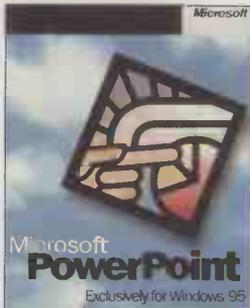
- Get your work done faster with Word's full 32-bit support and the new interface and user assistance of Windows® 95
- Readily access addresses for letters, memos and faxes

Word for Win 95	£229
Word for Win 95 1 SL	£195
Word for Win 95 UP CCP	£82
Word for Win 95 UP CCP 1 SL	£70
Word for Win 95 CUP	£107



MICROSOFT® POWERPOINT FOR WINDOWS® 95

- Type a help request in your own words, and the Answer Wizard finds the answer



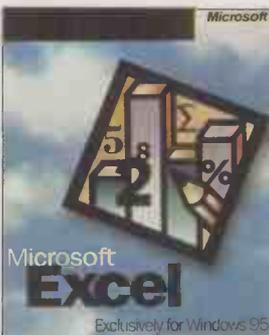
- Bring your presentation to life with extended animated builds, sounds and more!
- Take meeting notes and assign action items on the spot with the Meeting Minder
- Let a remote audience review your presentation over the network

PowerPoint for Windows 95

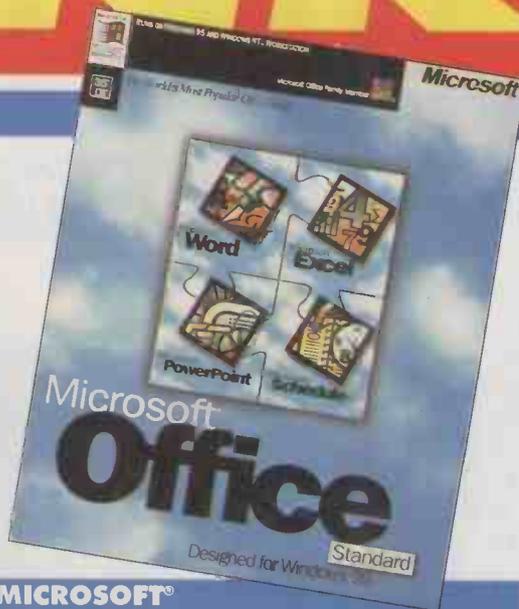
3.5" Disk	£229
1 Site Licence	£195
Upgrade CCP	£82
Upgrade CCP 1 Site Licence	£70
Competitive Upgrade	£119

MICROSOFT® EXCEL FOR WINDOWS® 95

- Enhanced IntelliSense® technology, more intuitive help, and integration with Windows® 95 make your everyday spreadsheet tasks easier
- Significant performance improvements help you get your work done faster
- Powerful new analysis tools simplify a variety of complex tasks



Excel for Win 95	£229
Excel for Win 95 1 SL	£195
Excel for Win 95 UP CCP	£82
Excel for Win 95 UP CCP 1 SL	£70
Excel for Win 95 CUP	£107



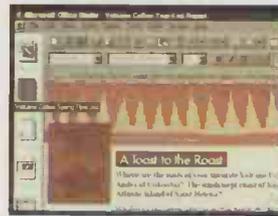
MICROSOFT® OFFICE FOR WINDOWS® 95

Microsoft® Office for Windows® 95. Easy access to powerful tools. For powerful accomplishments.

Microsoft® Office for Windows® 95 makes it easier than ever to focus on your job instead of your software.

In Microsoft® Office Standard for Windows® 95, you get: Excel, Word, PowerPoint® and the new Microsoft Schedule+. In Microsoft Office Professional, you get all these plus Microsoft Access.

- IntelliSense technology does routine tasks for you with enhanced AutoCorrect and much more
- Type a help request in your own words and the Answer Wizard gives you the answer you need



Office for Windows 95

3.5" Disk	£334
CD ROM	£334
1 Site Licence	£284
Upgrade CCP	£139
Upgrade CCP CD	£139
Upgrade CCP 1 Site Licence	£118
Competitive Upgrade	£164
Comp Upgrade CD	£164

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3.5" Disk	£431
CD ROM	£431
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Upgrade CCP	£205
Upgrade CCP CD	£205
Competitive Upgrade	£249
Comp Upgrade CD	£249

MICROSOFT® ACCESS FOR WINDOWS® 95

Access for Win 95	£229
Access for Win 95 1 SL	£195
Access for Win 95 UP CCP	£82
Access for Win 95 UP CCP 1 SL	£70
Access for Win 95 UP	£107

MICROSOFT® SCHEDULE+ FOR WINDOWS® 95

Put time on your side with Microsoft® Schedule+ for Windows® 95	
Schedule+ for Win 95	£75
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MICROSOFT® WORKS FOR WINDOWS® 95

Create professional documents easily and quickly with the essential tools in Microsoft Works. Provides the easy to use integrated tools you need - word processor, spreadsheet, database, drawing and communication tools to make everyday computing tasks easier and create professional documents for your business or home.

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Create distinctive newsletters, brochures and flyers without any experience with Microsoft Publisher. Publisher for Windows 95 £62

KEY			
CCP	Compliance Checking Product	MS	Microsoft Product
CD	CD ROM	SL	Site License
CUP	Competitive Upgrade	UP	Upgrade
DOS	DOS Version	Vxx	Version
		WIN	Windows Version

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(50 lines)

WINDOWS 95

- HUGE STOCKS**
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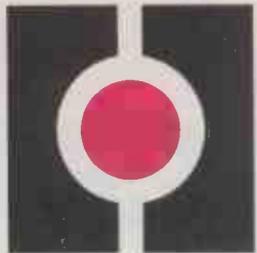
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WIN UP £95



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STUDIO**

Animator Studio is the complete 2D creative environment for Windows-based multimedia producers, providing animation with unlimited colour and synchronised sound.

Animator Studio £385

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MEMORY

Dr. SOLOMON'S FEATURE

DR SOLOMON'S



**NEW!
Version 7**

**Dr. SOLOMON'S
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Combat viruses in DOS, OS/2, Windows and Netware

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ANTI-VIRUS
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TOUCHSTONE FEATURE



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Get the answers you need quickly and easily! Win'95 Advisor is designed to take all of the guesswork out of installing Microsoft Windows 95. Make the right decisions with Win'95 Advisor and install Windows 95 right the first time.

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- Optimizes Windows 95 installation

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- Simple interface for problem-free transfers
- Selects just the files you want
- Includes Windows and DOS versions
- Includes PC to PC transfer cable

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Save £6 on Win'95 Advisor when you buy Windows 95.

See page 1



WINCHECK IT

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Includes Uninstall Utility! Six reasons why you need the new all-in-one Windows problem solver

- **Clean up** - Make room for more programs and data files
- **Fix up** - Recovery that works even when Windows won't
- **Tune up** - Get the most out of your Windows system
- **Set up** - Simplify hardware and software installation
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An easy to use package which gives you back control over who uses your computer

- Boot-up password
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Advanced Diagnostic Toolkit
TroubleShoot PC Problems!
• Diagnose hardware problems
• Find setup conflicts and assignments
• Compare system performance
• Document configuration details
• Create/recover system rescue disk
• Check for virus infections
• Install and test new equipment

CHECK IT PRO DELUXE £89
CHECK IT PRO £59

DELIVERY CHARGES
See page 17

A great new way to buy...
MEMORIAL Gold Card
See page 1

EARLY BIRD
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Everyone at Powermark passes through our training college

PRODUCTIVITY SOFTWARE FEATURE

Sidekick 95 for Windows 95

The Simplest Way to Stay Organised

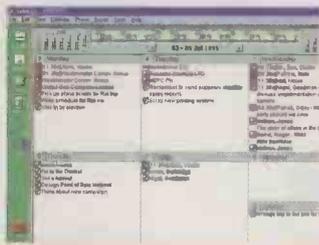
Simple to use, easy to learn and incredibly powerful - Sidekick is already the best-selling personal organiser ever. The new 32bit Sidekick 95 uses the power and flexibility of Windows 95 to get you organised quicker. It takes up a fraction of the memory other PIMs use, so you can keep it running all the time without affecting your system's performance.

Sidekick 95 helps you simplify your life - not complicate it. With the improved drag-and-drop interface, there's no need to enter information twice or complete complicated import / export procedures.

- Windows 95 Plug and Play compatibility
- Track your expenses and create complete summaries in seconds
- Now you can move your appointments, notes, and to-do items from one time to another with drag-and-drop simplicity
- Integrated, full function word processor
- Great new label, address book and envelope printing features gets you started with more than 70 templates
- Alarms with snooze feature

Over 10 million copies sold!

Sidekick 95 for Windows 95 £29



Who uses Sidekick 95?

- The business & home office professional
- The mobile professional
- The home PC and family PC

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SOFTWARE

NEW! First Aid 95 for Windows 95

Fixes Windows crashes, automatically fixes over 1,000 known problems in Windows 3.11 and Windows 95 and cleans your Windows system to remove clutter and improve performance.

It can take hours to track down even a simple problem in your Windows system. With Technical Support you hold for ages and when you get to speak to someone, it's difficult to explain the problem, let alone implement a solution.

Exclusive "AutoFix" technology automatically senses and actually fixes thousands of problems in your Windows system. Running in the background, First Aid pops up when it senses a problem and tells you what the problem is in plain English. Then, a click on "AutoFix" corrects the problem. No other product available can do this!

First Aid 95 for Windows 95 £39

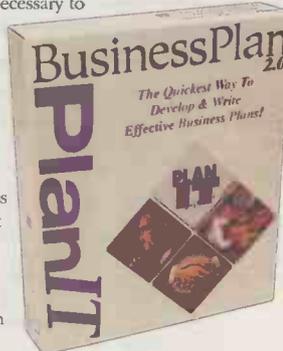


NEW! Plan/T Business Plan 2.0

Writing business plans is a tedious and time consuming job at the best of times. Business Plan 2.0 has been designed to take users through the process of developing and writing effective business plans by providing the structure, automating repetitive tasks and providing all the information necessary to write a winning business plan.

Business Plan 2.0 is an easy to use package that creates structured business plans for any size of company. It provides users with relevant questions and sample answers from which to create a business plan. It automatically formats it with headlines and subheads, even inserting your company details throughout. Simply answer the questions and fill in the blanks - Business Plan 2.0 does the rest!

Plan/T Business Plan 2.0 £89



Dashboard 95 for Windows 95

The Simplest Way to Organise Windows 95

Launch applications, check your system's memory usage, disk space and resources and at last - Windows printing made easy! Makes choosing and using a new printer simple, just click an icon of the new printer and Dashboard does the rest.

New for 95 are Dashboard's Virtual Screens. This innovative and useful feature allows you to open applications on up to 9 virtual screens and then switch between them with a simple mouse click. No more cluttered screens!

Dashboard 95 for Windows 95 £29



Launch Applications
No need to search for programs - just use Dashboard 95's Launcher!

Virtual Screens
Switch between up to 9 virtual screens on your PC!

Easy Printing
Just choose the printer you need by clicking an icon - easy!

Customise
Customise Dashboard 95 to do exactly what YOU want it to!

Save £10 off Sidekick 95 and Dashboard 95 combo when you buy Windows 95. See page 1



NEW for Windows 95

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4**

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**QUICKEN DELUXE
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WINDOWS** £84

MEMORY

SOFTWARE FEATURE

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CP Antivirus WIN	£69
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UTILITIES

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MS Office 4.2 1 SL	£294
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MS Office 4.2 CUP	£218
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Sage +2 Bookkeeper WIN	£84
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Sage Payroll II DOS V5	£135
Sage Payroll II LAN	£166
Sage +2 Payroll WIN	£135
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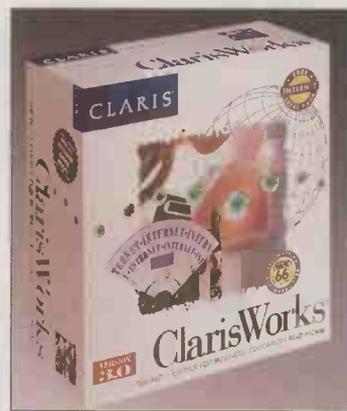
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ClarisWorks 3.0 software perfectly integrates all the functionality of five software applications into one easy-to-use programme: word processing, spreadsheet, database, graphics and painting. It is the perfect office alternative and it's compact, fast and friendly.

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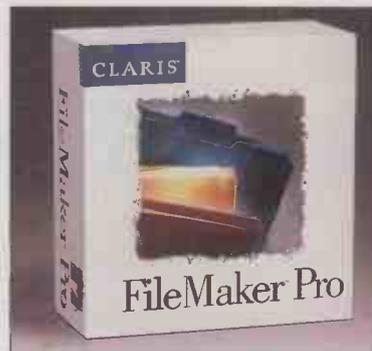


Save £50 off Clarisworks 3 when you buy Windows 95.

See page 1

CLARIS

Simply powerful software.™



CLARIS FILEMAKER PRO

Includes 6 ready-to-run applications:

- Contact Manager
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Do check compatibility before ordering. Faulty software replaced through Powermark Customer Service. Opened software cannot be returned.



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SOFTWARE FEATURE

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CUP Competitive Upgrade			WIN Windows Version

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SOFTWARE

Aaron's Answers



Dear Aaron,
Windows runs very fast on my friend's PC, even though we have identical models. All the configuration is the same, and nothing springs to mind. Why should this be, is it the machine that is at fault or is it just a quirk?

Bill Wildered

Dear Bill,
Just a thought - Have you set the virtual memory option under EMM386 in the control panel? If not, change the setting to either permanent or temporary. Don't forget the 32-bit disk access option as well. Since your friend has the same machine, have you thought of a processor upgrade, memory upgrade and even Microsoft Windows 95? Then your friend will be envious of you!

Yours, Aaron

Send your questions to Aaron's Answers, c/o Powermark plc, Premier House, Station Road, Edgware, Middlesex, HA8 7AQ or fax him to 0181 905 6233. You can also Email Aaron on: aaron@powermark.com

Aaron makes every effort to answer your problems, but he cannot guarantee to reply to everyone.

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EUROPRESS SOFTWARE

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 - Powerful yet easy to use
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MASTER QUIZZY

Famous quiz show sayings...

- Your next object is...
Twenty Questions
- Say what you see
Catchphrase
- The next object is
Animal with some Mineral
Twenty Questions

MEMORY

SOFTWARE FEATURE

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3.11 1 SL		£37
MS Windows For Workgroups V3.11		£89
MS Windows For Workgroups V3.11 1 SL		£87
MS Windows NT Winstation V3.5		£239
MS Windows NT Server V3.5 CD		£475
MS DOS V6.22 UP		£38
MS DOS V6.22 UP 1 SL		£36
Novell DOS 7		£49

DEVELOPMENT

Asymetrix Toolbook	WIN	£224
Asymetrix Multimedia Toolbook V3		£499
Borland Delphi		£155
Borland Delphi CUP		£109
Borland Turbo Assembler		£57
Borland Visual Solutions		£49
Borland C++ V2 OS/2 CD		£299
Borland Pascal With Objects V7		£189
Borland Turbo C++ V3 For DOS		£55
Visual Edition	WIN	£79
V4.5	WIN	£59
MS Visual C++ V2 CD		£245
MS Macro Assembler V6.11		£99
MS Visual Basic V3 Standard	WIN	£82
MS Visual Tools Suite	WIN	£179
MS Visual Control Pk	WIN	£69
Symantec C++ Standard		£66
Symantec C++ Professional		£228

New from Microsoft

MS Visual Basic V4	WIN	£62
MS Visual Basic V4	WIN UP	£39
MS Visual Basic Pro V4	WIN 3.5	£349
MS Visual Basic Pro V4	WIN CD	£325
MS Visual Basic Pro V4	WIN UG CD	£67
MS Visual Basic Pro V4	WIN UG 3.5	£111
MS Visual Basic Enterprise V4	CO	£664

GRAPHICS & DESIGN

Adobe Illustrator V4	WIN	£299
Adobe Photoshop V3	WIN	£395
Astound V2	WIN	£159
Corel Photo-Paint 5 Plus	CD	£56
Designworks	WIN CD	£75
Harvard Draw		£289
Micrografx Charisma	WIN	£181
Micrografx Designer V5	WIN	£270
Micrografx Draw	WIN	£66
Micrografx Picture Publisher	WIN	£277
MS Powerpoint		£225
Photofinish	WIN	£55
Photostyler V2	WIN	£370

NETWORKING

Intel LANdesk Manager 1 Server		£669
Intel LANdesk Virus Protect		£499
Netware Connect 2 Port		£279

See Novell feature on page 31 for full product listing

OCR

Omnipage Direct 2		£74
Omnipage	WIN	£379
Omnipage V5		£279
Omnipage Pro V5	UP	£129
Wordscan Plus	OCR	£390
Wordscan Plus V4	UP	£129

IBM OS/2 WARP FEATURE

Amazing application support

This operating system will run your current DOS and Windows applications reliably and often faster. Carry on working at full speed while printing a document, formatting a diskette or recalculating a spreadsheet.

Word processing

Word processing and faxing come free as part of the BonusPak in addition to a spreadsheet, report writer, database, charting and graphics tool, calculator, address book, to-do list and many other productive applications.

Great games

The best memory management to give a full 640Kb memory to run all your DOS and Windows games smoothly. It also picks up your games DOS settings automatically so no more editing or reboots.

Drag and drop

OS/2 Warp is intuitive, it just works the way you do.

Crash protection

Protects your applications and data should another DOS or Windows application crash.

Easy Interneting

Free as part of the OS/2 Warp BonusPak. With graphical interface and 3 hours free Net access also included.

IBM OS/2 WARP V3

3.5" FLOPPY	£65
CD ROM	£56
3.5" FLOPPY UPGRADE	£49
CD ROM UPGRADE	£54
CONNECT V3	£95
CONNECT V3 UPGRADE	£75

OS/2 WARP



IBM
Authorised Dealer
IBM Personal Computers

- BitMaps Unlimited, WipeOut, SystemSounds, Gammatech utilities for OS/2
- Shareware: Hobbes, Vogel, Roids, Chomp, Dungeon Chess for OS/2

IBM CD SHOWCASE

- Includes full version of Ami Pro for OS/2
- Galactic Civilisation, SimCity, Tensor, The Cosmos, Casino Game Pack, Microlearn game Pack
 - Lotus SmartSuite for OS/2, Describe word processor, Mesa Spreadsheet
- WIN FLOPPY** £127
WIN CD £111
WIN FLOPPY UPGRADE £79
WIN CD UPGRADE £69
*At full retail price

45 Ways to Get Warping with IBM CD Showcase

- Includes full version of Ami Pro for OS/2
- Galactic Civilisation, SimCity, Tensor, The Cosmos, Casino Game Pack, Microlearn game Pack
 - Lotus SmartSuite for OS/2, Describe word processor, Mesa Spreadsheet

Lotus SmartSuite Version 2.0 for OS/2 and OS/2 Warp Version 3

Consists of the Lotus SmartCenter, Ami Pro Bonus Pack Macros for OS/2 Lotus 1-2-3, 1-2-3 File Translator, Freelance Graphics File

Translator, Freelance Graphics SmartMaster sets and REXXLink for 1-2-3
3.5" FLOPPY £229
3.5" FLOPPY UPGRADE £139

DELIVERY CHARGES
See page 17

A great new way to buy...



See page 1

SOFTWARE WARRANTY
Do check compatibility before ordering. Faulty software replaced through Powermark Customer Service. Opened software cannot be returned.



Everyone at Powermark passes through our training college

Aries *The Sign of Quality*

The New Aries Perfecta PCI range is even by Watford's own high standards a breathtaking upgrade on the previous ranges. Designed without compromise for today's PC professional. Perfecta PCI Systems feature the hottest new local bus technology from Intel, PCI. Jointly developed by Intel and other industry leaders, PCI picks up where other bus architectures leave off,

providing greater system performance via a wider data path and increased expandability. Incorporating a host of advanced features for improved performance, future-proof upgradability, a peace-of-mind 6 year warranty and prices you've come to expect from Watford - you could say the new range is quite simply perfect!

ASK FOR THE NO COST OPTION

Microsoft WINDOWS 95
Installed on your Perfecta PC at no extra charge

INTERNET READY
with the Aries range of Modems

Perfecta[®] PCI

Genuine PCI performance at exceptional prices. These new Perfecta PCI systems incorporate a host of advanced features for improved performance including 9FX graphics cards to unleash the full power of Windows. Choose from the popular priced standard systems or include the industry-standard Microsoft Office software package. Whichever you choose you are assured of incredible value.

- ◆ 540Mb Fast IDE Hard Disk
- ◆ 4Mb RAM expandable to 128Mb
- ◆ 256K External Cache RAM expandable to 512K
- ◆ Write back & Write through Cache supported
- ◆ Advanced integrated upgradable motherboard
- ◆ Processor upgradable to Pentium Overdrive (Type 3 ZIF Socket on board)
- ◆ EPA Energy Star Compliant
- ◆ 9FX Vision 330 64 bit Graphics Card with 1Mb Video Memory
- ◆ 3.5" 1.44Mb Floppy Drive
- ◆ Enhanced Parallel Port (EPP/ECP)
- ◆ Two enhanced Serial Ports using 16550 UART
- ◆ Enhanced IDE Interface supporting four drives
- ◆ 3 x PCI & 4 x 16 bit expansion slots (1x PCI/16 bit shared slot)
- ◆ 102 key Enhanced keyboard
- ◆ 14" Super VGA Low Radiation MPRII Non-interlace Colour Monitor (0.28mm dot pitch)
- ◆ MS DOS v6.22 & MS Windows v3.11 OR MS Windows 95
- ◆ SIX Year Warranty consisting of: 12 months On-Site Parts & Labour Warranty Five Years (return to base) Labour Only Warranty
- ◆ Technical Support Hotline



6 YEAR WARRANTY

ENHANCED HIGH SPEED SERIAL PORTS 16550

Aries Perfecta PCI Systems

486DX2-66MHz	IN STOCK	£759
486DX2-66MHz with Microsoft Office pre-loaded		£Call
486DX4-100MHz		£799
486DX4-100MHz with Microsoft Office pre-loaded	IN STOCK	£Call

Perfecta PCI Upgrade Option

Part No.	Description	Price
PCI-01	4Mb to 8Mb RAM Upgrade	£115
PCI-02	4Mb to 16Mb RAM Upgrade	£345
PCI-05	Upgrade to 9FX Vision 330 2Mb Video Graphics Card	£59
PCI-10	1Gb IDE Hard Disk Drive instead of 540Mb IDE Drive	£68
PCI-20	Upgrade to 15" Aries 6000 Digital Control, Non-interlaced (1280x1024) Low Radiation MPRII Monitor	£65
P5-30	MS Office - Manuals & Disks	£49

Shown with optional MultiMedia Kit and Microsoft Office

DUAL SPEED MULTIMEDIA KIT
£149
See MultiMedia Panel

QUAD SPEED MULTIMEDIA KIT
£198
See MultiMedia Panel

In Stock models are normally kept in stock for immediate despatch

Perfecta[®] P5

Perfecta P5 systems make no compromises on quality or performance while continuing Aries reputation for superb value. With Pentium processors ensuring stunning speeds and a full range of options and low-cost multimedia kits you can personally customise your PC for your own needs.

- ◆ 540Mb Fast IDE Hard Disk
- ◆ 8Mb RAM expandable to 128Mb
- ◆ 256K External Cache RAM upg. to 512K
- ◆ Advanced integrated Pentium upgradable motherboard using Type 5 ZIF Socket
- ◆ EPA Energy Star Compliant
- ◆ 9FX Vision 330 64 bit Graphics Card with 1Mb Video Memory
- ◆ 3.5" 1.44Mb Floppy Drive
- ◆ Enhanced Parallel Port (EPP/ECP)
- ◆ Two enhanced Serial Ports using 16550 UART
- ◆ Enhanced IDE Interface supporting four drives
- ◆ 3 x PCI & 4 x 16 bit expansion slots (1x PCI/16 bit shared slot)
- ◆ 102 key Enhanced keyboard
- ◆ 14" Super VGA Low Radiation MPRII Non-interlace Colour Monitor (0.28mm)
- ◆ MS DOS v6.22 & MS Windows v3.11 OR MS Windows 95
- ◆ SIX year Warranty consisting of: 12 months On-Site Parts & Labour Warranty Five Years (return to base) Labour Only Warranty
- ◆ Technical Support Hotline

Perfecta P5 Upgrade Options

Part No.	Description	Price
P5-01	8Mb to 16Mb RAM Upgrade	£230
P5-02	8Mb to 32Mb RAM Upgrade	£690
P5-05	Upgrade to 512K External Cache RAM	£69
P5-06	Upgrade to 9FX Vision 330 2Mb DRAM Graphics Card	£59
P5-07	Upgrade to 9FX Motion 771 2Mb VRAM Graphics Card	£99
P5-10	1Gb IDE HDD instead of 540Mb IDE	£68
P5-11	2Gb IDE Hard Disk Drive instead of 540Mb IDE Drive	£258
P5-15	Upgrade to Full Tower Case	£45
P5-20	Upgrade to 15" Aries 6000 Digital Controlled Non-Interlaced (1280x1024) Low Radiation MPRII Monitor	£65
P5-21	Upgrade to 17" Panasonic PanaSync TX-D1733 Monitor (0.27mm DP)	£345
P5-22	Upgrade to 17" Panasonic PanaSync 17MM TX-D1733F with Built-in TopDome Sound & Microphone	£395
P5-30	MS Office - Manuals & Disks	£49

Aries Perfecta P5 Systems

Pentium P75	IN STOCK	£975
Pentium P75 with Microsoft Office pre-loaded		£Call
Pentium P90		£1099
Pentium P90 with Microsoft Office pre-loaded	IN STOCK	£Call

In Stock models are normally kept in stock for immediate despatch

DUAL SPEED MULTIMEDIA KIT
£149
See MultiMedia Panel

QUAD SPEED MULTIMEDIA KIT
£198
See MultiMedia Panel



LOW COST CREDIT
Available on all Perfecta PC's

Shown with MultiMedia Kit with Aries HiFi Plus 15 Watt Speakers and 15" Aries 6000 monitor (optional)

Case design may vary from that shown

Aries *The Sign of Quality*

Perfecta® P5 Triton

The Ultimate Performers

Looking for the fastest PC's around? The search is over. The Perfecta P5 Triton Ultimate Performers have arrived. Fast. Powerful. Built to run your toughest applications at staggering speeds and designed for the increasingly strenuous demands of today's business PC user. The P5 Triton systems feature the latest Intel Triton chipset designed to get the ultimate performance from the Pentium processor. Combine this with high speed EDO-RAM and a Pipeline Burst Cache upgrade and you have a system that is probably the finest example of Power Computing available anywhere.

- ◆ 8Mb EDO RAM expandable to 128Mb
- ◆ 1Gb Fast IDE Hard Disk
- ◆ 256K External Cache RAM expandable to 512K
- ◆ Pipelined Burst Cache Module supported
- ◆ 100MB/sec PCI Data Streaming
- ◆ Plug & Play (ISA) support for MS Windows 95
- ◆ Advanced Integrated upgradable motherboard with Intel Triton Chipset
- ◆ Processor upgradable to Pentium 200MHz using Type 7 ZIF Socket
- ◆ EPA Energy Star Compliant
- ◆ 9FX Vision 330 64 bit Graphics Card with 2Mb Video Memory
- ◆ 3.5" 1.44Mb Floppy Drive
- ◆ Enhanced Parallel Port (EPP/ECP)
- ◆ Two enhanced Serial Ports using 16550 UART
- ◆ Enhanced IDE interface supporting four drives
- ◆ 3 x PCI & 4 x 16 bit expansion slots (1x PCI/16 bit shared slot)
- ◆ 102 key Enhanced keyboard
- ◆ 15" Digital Controlled, Non-Interlaced (1280x1024) Low Radiation MPRII Colour Monitor (0.28mm dot pitch)
- ◆ MS DOS v6.22 & MS Windows v3.11 OR MS Windows 95
- ◆ SIX year Warranty consisting of: 12 months On-Site Parts & Labour Warranty Five Years (return to base) Labour Only Warranty
- ◆ Technical Support Hotline



6 YEAR WARRANTY

ENHANCED HIGH SPEED SERIAL PORTS 16550

2MB GRAPHICS CARD

Shown with optional MultiMedia Kit and Aries Digital Plus 80 Watt Speakers

Aries Perfecta P5 Triton Systems

Pentium P90	IN STOCK	£1299
Pentium P90 with Microsoft Office pre-loaded	IN STOCK	£Call
Pentium P120		£1499
Pentium P120 with Microsoft Office pre-loaded		£Call
Pentium P133		£1599
Pentium P133 with Microsoft Office pre-loaded		£Call

*In Stock models are normally kept in stock for immediate despatch

Perfecta P5 Triton Upgrade Options

Part No.	Description	Price
P5-Tr01	8Mb to 16Mb EDO RAM Upgrade	£256
P5-Tr02	8Mb to 32Mb EDO RAM Upgrade	£768
P5-Tr03	8Mb to 64Mb EDO RAM Upgrade	£POA
P5-Tr04	Upgrade to 256K Pipeline-Burst Cache Module	£50
P5-Tr05	Upgrade to 512K Pipeline-Burst Cache Module	£100
P5-Tr06	Upgrade to 9FX Motion 771 2Mb VRAM Graphics Card	£78
P5-Tr10	2Gb IDE Hard Disk Drive instead of 1Gb IDE Drive	£195
P5-Tr11	2Gb SCSI Hard Disk Drive instead of 1Gb IDE Drive	£448
P5-Tr15	Upgrade to Full Tower Case	£45
P5-Tr20	Upgrade to 17" Panasonic PanaSync TX-D1733 Monitor (0.27mm DP)	£275
P5-Tr21	Upgrade to 17" Panasonic PanaSync 17MM TX-D1733F with Built-in TopDome Sound & Microphone	£325
P5-Tr22	Upgrade to 20" Panasonic PanaSync TX-D2051 Monitor	£840
P5-Tr23	Upgrade to 21" Panasonic PanaSync TX-D2131 Monitor	£1180
P5-Tr30	MS Office - Manuals & Disks	£49

Case design may vary from that shown

LOW COST CREDIT
Available on all Perfecta PC's

DUAL SPEED MULTIMEDIA KIT
See MultiMedia Panel
£149

QUAD SPEED MULTIMEDIA KIT
See MultiMedia Panel
£198



UPGRADE ANY Perfecta PC TO A COMPLETE MULTIMEDIA SYSTEM

Perfecta MultiMedia Kits MM2 & MM4

- ◆ Dual Speed (MM2 Kit) or Quad Speed (MM4 kit) CD ROM Drive
 - ◆ Creative Sound Blaster 16 Sound Card
 - ◆ Aries HiFi Speaker Set (10W per channel)
 - ◆ Microsoft CD Bundle Pack (see panel)
- Dual Speed Kit MM2 **£149**
Quad Speed Kit MM4 **£198**



Complete Bundle Software Pack Included

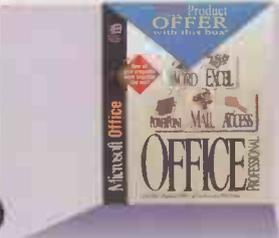
- MS Encarta 1995
- MS MultiMedia Works
- MS Dangerous Creatures
- MS Money
- MS Golf
- MS Scenes (3.5" disks)

Optional Speaker Upgrades

(only available with Multimedia MM2 & MM4 kits)

Part No.	Description	Price
P-Spk01	Aries HiFi Plus (15W per channel)	£9
P-Spk02	Aries Digital (25W per channel)	£18
P-Spk03	Aries Digital Plus (80W per channel)	£29
P-Spk04	Aries Ultra Power (80W per channel)	£39

MultiMedia Kit prices only applicable when purchased with a Perfecta PC



Microsoft Office 4.2 includes:

- ◆ MS Office Manager
 - ◆ MS Word for Windows v6
 - ◆ MS Excel for Windows v5
 - ◆ MS Powerpoint for Windows v4
 - ◆ MS Mail (Licence)
- Supplied when you purchase disks & manuals

Office Software supplied pre-loaded for your convenience with built-in tutorial. Disks & manuals available as an optional extra.

All prices, specifications and offers subject to change without notice. Please ensure suitability with manufacturer before ordering. All returns subject to handling charge. Goods not sold on a trial basis. Sales subject to our Terms & Conditions available on request. E & OE.

Watford Electronics Ltd
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Showroom only: 250 Lower High Street, Watford, WD1 2AN

SALES HOTLINE
01582 745555

All Prices exclude Carriage & VAT @ 17.5%

Credit Card/Sales Order Line: 01582 745555 • Technical Support: 01582 745500 • Switchboard: 01582 487777

The Aries *Perfecta*® 7000 Series

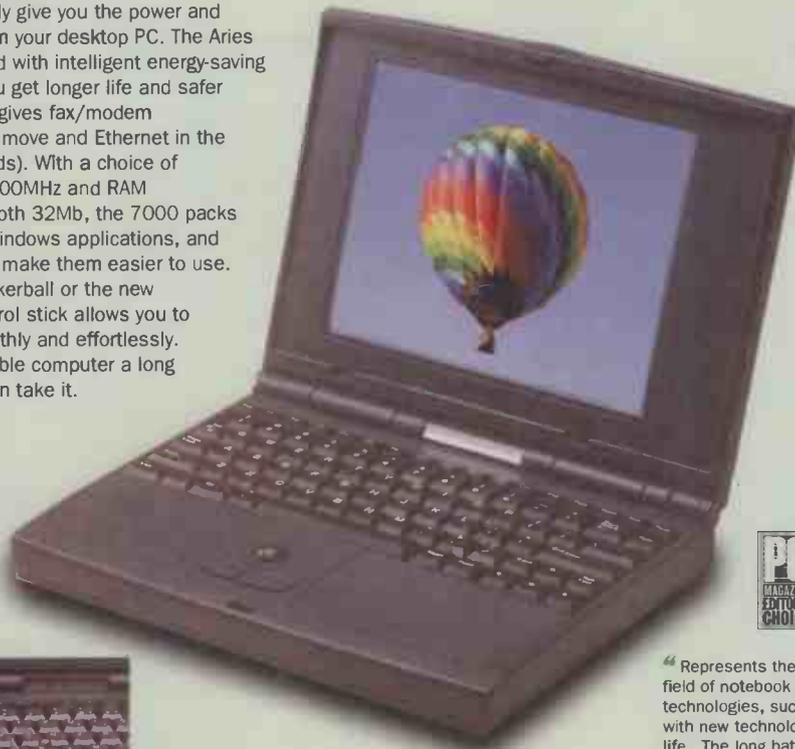
The Most Advanced Yet!

Introducing a new range of beautifully designed notebooks that genuinely give you the power and facilities you expect from your desktop PC. The Aries Perfecta 7000 is packed with intelligent energy-saving features that ensure you get longer life and safer data. PCMCIA flexibility gives fax/modem communications on the move and Ethernet in the office (with optional cards). With a choice of processors up to DX4 100MHz and RAM expandable to a mammoth 32Mb, the 7000 packs the power to run your Windows applications, and an ergonomic design to make them easier to use. While the standard trackball or the new optional trackpoint control stick allows you to control the cursor smoothly and effortlessly.

We've taken the portable computer a long way, think where you can take it.



SX/DX4 Models



Notebook shown here with 19mm Trackball with 2 buttons supplied as standard



Ergonomical designed sloping palm rest



Notebook shown here with Optional TrackPoint Control Stick

FREE
16 bit Soundcard (fitted) with any purchase of a Notebook this month
WORTH £49

i486sx™-33 Mono	£999
i486sx™-33 Dual Scan Colour	£1299
i486sx™-33 TFT Colour	£1799

"With plenty of processing power, (and) enough battery life to handle a transcontinental flight easily, ...a value winner." "...the lightest full-size notebook in the roundup; it also had excellent battery life..., optional audio and a good price..."

PC MAGAZINE, Cover Story: Notebooks

"...A great Windows PC, and an excellent value." "...the fact that you get the amount of performance we did from a battery charge speaks highly of the engineering."

LAPTOP BUYERS GUIDE & HANDBOOK, First Look



"Ranks above many famous-name notebooks. And in terms of pointing devices, it's definitely got them outnumbered." "...deserves a spot on your short list."

COMPUTER SHOPPER, PC Reviews

"Represents the best kind of innovation in the rapidly changing field of notebook computers. It keeps the best of proven technologies, such as a sharp display, and complements them with new technologies, such as those employed to stretch battery life. The long battery life makes it a good choice for anyone who needs a basic notebook that also delivers solid performance."

WINDOWS MAGAZINE, WinLab First Impressions
Reviews done on identical Notebook in the USA

LOW POWER 3.3V All the components in the notebook run at 3.3V, giving up to three times longer life.	SOUND PLUG-IN Mono/Stereo sound system with built-in speaker/microphone by adding a soundcard.	SUSPEND TO DISK Suspend to memory or suspend to disk ensures data is never lost when you leave the notebook.	SUPERB PERFORMANCE CPU Upgrade up to intel DX4-100 and 512KB of level 2 Cache! External connectivity enhanced by use of 16C550 Serial Port and Parallel Port with support for EPP/ECP	INTERNAL STATUS INDICATOR PANEL 12 distinct icons will display, flash or change appearance to give you a complete report on the state of the machine including a 5 step graduated remaining charge gauge.
ADVANCED POWER MANAGEMENT Complete with a comprehensive set of 16 features that will allow you to customise the operation of the machine to your benefit.	REPLACEABLE HARD DISK DRIVE Running out of space? Replace the Hard Disk Drive easily. The system BIOS will automatically detect the new HDD	EXTERNAL STATUS INDICATOR "At a glance" multi colour indicator on the top cover shows if machine is charging, charged, suspended with battery charging or charged.	FLEXIBLE PCMCIA Compartment for two type I/II or one type III PCMCIA slot with removable cover.	UP TO 32Mb RAM If your applications demand it, then we can supply it.

Aries *Perfecta* 7000 Series Notebooks

- ◆ Intel SL-Enhanced CPU
- ◆ 4Mb RAM expandable to 32Mb
- ◆ 340Mb Hard Disk Drive
- ◆ Advanced Power Management
- ◆ LCD Status Indicator
- ◆ Fully Modularised Design - Upgradable CPU, LCD, Removable Hard Disk & Keyboard
- ◆ VESA Bus Video with GUI accelerator
- ◆ Advance PMU Function
- ◆ Mono/Stereo 16 bit Sound System (Optional)
- ◆ Audio Line (In/Out) with volume control
- ◆ Built-in Speaker/Microphone (requires sound system)
- ◆ 1.44Mb 3.5" Floppy Drive
- ◆ 82 key QWERTY Keyboard
- ◆ 19mm Trackball (Optional Track-point device)
- ◆ PCMCIA slots (2 x Type II/1 x Type III)
- ◆ Hi-Speed 16C550 Serial Port
- ◆ Enhanced Parallel Port (EPP/ECP support)
- ◆ External Super VGA Monitor Port
- ◆ External Keyboard/PS/2 Mouse connector
- ◆ Optional Internal 14.4K Fax/Modem
- ◆ Rechargeable Ni-MH Battery Pack
- ◆ MS-DOS v6.22 & Windows v3.11
- ◆ Weight: 3Kg
- ◆ Carrying Case

PERFECTA 7000 OFFICE COMMUNICATIONS UPGRADE

Turn your Aries 7000 notebook into a complete voice mail system with the Aries Office Communications Workstation Kit. Suitable for home or business, supporting multiple mail boxes, Fax on Demand, and data communications. The Aries Office Communications Workstation Kit contains high speed V32bis (14400 baud) Voice/Fax Modem and software package, providing users with remote access to voice, fax and data messages. Record and play your own voice files through the Perfecta 7000 notebook's own internal mic and speaker, or play back voice files through either the 8- or 16-bit sound card modules available as an option.

SPECIAL OFFER £125

All prices are for standard 340Mb Hard Disk Supplied with **FREE** Carrying Case

Display	10" Mono 64 Grey Scale	10" Colour Dual Scan	10" Colour TFT Active Matrix
7000 Series	7100	7300	7400
SL i486SX™-33	£999	£1299	£1799
SL 486DX2™-66	£1069	£1369	£1949
SL i486DX4™-75	£1095	£1395	£1979
SL i486DX4™-100	£1145	£1445	£2029

ADDITIONAL OPTIONS

4 to 8Mb RAM Upgrade*	£159	PCMCIA Ethernet Card	£99
4 to 16Mb RAM Upgrade*	£525	Spare NiMH Battery Pack	£69
4 to 32Mb RAM Upgrade*	£1089	Spare AC Mains Adaptor	£49
Track-point device	£25	Car Lighter Adaptor	£29
8 bit Internal Sound Card	£25	Docking Station	£339
16 bit Internal Sound Card	£49	External Keyboard	£25
Aries HiFi Speakers	£29	Internal V32bis 14.4K Fax/Modem (non-approved) with software	£125
PCMCIA 9600 Fax/Modem	£59	PCMCIA 14400 Fax/Modem	£109

*Requires module exchange

7000 Notebook Hard Disk Upgrades

(Prices valid when purchasing Notebooks only)

UGA0530/A	340Mb to 540Mb HDD	£125
UGA0540/A	340Mb to 800Mb HDD	£249

BUSINESS LEASING Low Cost Leasing - Call for details

1 YEAR SUPPORT

All Perfecta Notebooks are covered by a FREE 12 Months Warranty in mainland UK.

2 YEAR GOLD CARE

For 12% of the cost, we will collect, repair and return your notebook within mainland UK for the first 24 months.

HOTLINE SUPPORT

All Perfecta Notebooks are covered by Hotline Support. We want you to get the best from your machine, so we offer a comprehensive support package over the phone.

All prices, specifications and offers subject to change without notice. Please ensure suitability with manufacturer before ordering. All returns subject to handling charge. Goods not sold on a trial basis. Sales subject to our Terms & Conditions available on request. E & OF.



Watford Electronics Ltd

Mail Order & Showroom: Jessa House, Finway, off Dallow Rd, Luton LU1 1TR



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All Prices exclude Carriage & VAT @ 17.5%

Credit Card/Sales Order Line: 01582 745555 • Technical Support: 01582 745500 • Switchboard: 01582 487777

Aries Award-Winning Scanners



Optional Automatic Sheet Feeder available with all Aries Relisys Scanners

Colour Transparency reader

The Relisys Scanner has been voted the 'BEST SCANNER OF THE YEAR' by the readers of PC Direct
 "better all round, and therefore a Best Buy, is Watford's Relisys...which combines value for money and good software support with quality output"

UNBEATABLE LOW PRICES

ISO 9001
 Manufactured to BS1 Quality Standard Certificate

With the Aries Relisys you'll open up a whole new world of possibilities. Imagine being able to scan pictures, diagrams, photographs in perfectly matched colour. To use unlimited zoom to create precisely the size you need. And then to combine them with other files to produce truly professional documents.

Aries Relisys Scanners are the perfect answer for Desk Top Publishing (DTP) and Optical Character Recognition (OCR) applications in both the PC and MAC environments. With Firmware Interpolated, they have outstanding Scanning Resolution in addition to stunning colours (16.7 million) and mono (256 greyscales) definition. Now industry standard TWAIN compliant, Aries Relisys Scanners can be used directly with Windows software.

With the new Hi-speed scanners you can scan an A4 Image in colour in just minutes. And in a breathtaking 15 seconds deliver an A4 mono. It's simplicity itself to set up and use, and the new comprehensive range offers a model for every need.

Aries Relisys Scanners

VM3420 SCSI II 256 Grey Scale **£199**

VM3520 SCSI II 16.7 million Colours 24 bit **£299**

- ◆ Up to 1200dpi resolution
- ◆ TWAIN standard
- ◆ Opt. Document Feeder
- ◆ Bundled Software
- ◆ Optional Transparency Adapter (Mono only)

Auto Document Feeders

- ◆ Capacity: 50 pages **ADF-30 £259**
- ◆ Paper size - Max: 8.5"x14" - Min: 5.0" x 7.2" **ADF-40 £295**
- ◆ Paper Thickness .05 to .15mm sheet **ADF-60 £345**

All Aries Relisys models will scan full A4 legal size

Aries Relisys Hi-Speed SCSI II COLOUR Flatbed Scanners

Aries	RELI 2412 2400dpi	RELI 4816 4800dpi	RELI 9624 9600dpi
Flat Bed Scanner type	Colour	Colour	Colour
Scanning Process	Single Pass	Single Pass	Single Pass
Image Data Colour - 24 bit	16.7 million	16.7 million	16.7 million
Image Data mono - 8 bit	256 Greyscale	256 Greyscale	256 Greyscale
Effective Scanning Area	216 x 356mm	216 x 356mm	216 x 356mm
Zoom Out Feature	Unlimited	Unlimited	Unlimited
Scanning Resolution - Max*	2400 x 2400	4800 x 4800	9600 x 9600
Brightness/Contrast Settings	256/256	256/256	256/256
Interface	SCSI II	SCSI II	SCSI II
Auto Document Option	ADF-30	ADF-40	ADF-60
Transparency Adaptor	VMT-68S optional £295	VMT-68S optional £295	Included - Worth £500
New Low Prices	£475	£599	£1225

* Resolution quoted is the maximum achievable using interpolation. 8Mb recommended on your PC.

FREE Software worth over £500
 The Relisys comes bundled with these FREE packages (requires Windows 3.1)
 ◆ Micrografix Picture Publisher v4 LE- Graphics Image Scanning/Editing
 ◆ Calera Wordscan OCR (optical character recognition)
Software Options
 Special upgrade pricing valid at time of purchase
 UGA 1800 Upg Picture Publisher LE to v4 **£75**
 UGA 1810 Upg Omnipage Direct v2 to Omnipage Professional v5 **£185**

HIGHSPEED FAX-MODEMS

Enter the realm of high speed communications with Aries's new XLink range of fax-modems. Available in both internal PC card and external pocket versions, the XLink range will open up a whole host of national and international possibilities. Error correction and data compression are standard on all models. Fax your friends in Florida, transmit TIFFs to Turkey, enter the Internet and discover the growing world of comms with an Aries XLink Fax-Modem.

ARIES XLink RANGE: Choose from V.32bis & V.34

All models feature:

- ◆ 28,800 (V.34) or 14,400 (V.32bis) bps top data transmission speed
 - ◆ V.32, V.32bis, V.23, V.22, V.22bis & V.21
 - ◆ Error Correction to MNP2-5 and V.42 standards
 - ◆ Data compression to MNP5 and V.42bis standards
 - ◆ Call back security
 - ◆ Sync & Async Operation
 - ◆ Group 3, Class I & II Fax at up to 14400bps V.17)
 - ◆ Group 1 and 2 fax compatible (V.27ter and V.29)
 - ◆ 16550 UART Buffer (Internal models only)
 - ◆ Fully Hayes compatible
 - ◆ 3 years warranty
 - ◆ BABT Approved plus additional Six European Approvals
 - ◆ Supplied complete with Delrina Winfax Lite, DOS Fax Lite plus COMit Lite for DOS and Windows
- Option: High Speed Serial Card (16550 UART) £29

Surf the Net
 with Aries XLink Modems you can connect globally using the InterNet via CompuServe or other Internet Providers like Demon. Includes **FREE** Introductory Subscription to **CompuServe**



14,400 BPS V.32 bis

External Modem XL-144E **£87**

Internal Modem XL-144i **£85**

28,800 BPS V.34 CLASS

External Modem XL-V34-288E **£159**

Internal Modem XL-V34-288i **£149**

All prices, specifications and offers subject to change without notice. Please ensure suitability with manufacturer before ordering. All returns subject to handling charge. Goods not sold on a trial basis. Sales subject to our Terms & Conditions available on request. E & OE.



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AMAZING Networking Offers

GENIUS ETHERNET PRODUCTS

GE2000 II Ethernet Adapter

The GE2000 II is a 16-bit Ethernet card which is 100% Novell NE2000 compatible. Installation is simple - just plug in and run the easy to use setup software.

- ◆ BNC and UTP connections (AUI optional)
- ◆ 35% faster than Novell NE2000 card
- ◆ Supports NetWare, WFWG & TCP/IP

Single: £27 5 pack: £129



Personal NetWare & GE2000 Card
Genius GE2000 II Ethernet card
and Novell Personal NetWare software*
SPECIAL OFFER PRICE £45



E3000 II Parallel Port Adapter

The E3000 II is a parallel port Ethernet adapter offering higher performance than any similar priced model available.

- ◆ BNC and UTP connections as standard
- ◆ Through connection for local printer
- ◆ Simultaneous printer & LAN connectivity
- ◆ PS/2 mouse port power lead or mains PSU

Single: £65 5 pack: £339



ME3000 II PCMCIA Ethernet Card
A high performance Ethernet adapter for use in notebooks with a PCMCIA slot. Has both BNC and UTP connections.

SPECIAL OFFER PRICE £81

GE2500 PCI Ethernet Adapter

The GE2500 is a new high performance Ethernet adapter for use in PCI based computers. Uses bus mastering for low CPU & Bus utilization, thus improving overall performance.

- ◆ BNC and UTP connections (AUI option)
- ◆ Software configurable & auto media detect
- ◆ Supports NetWare, WFWG, PCNFS & TCP/IP

Single: £89 5 pack: £439



GH4080/GH4160 Ethernet Hubs

The GH4080 and GH4160 are compact, stylish UTP Ethernet hubs, providing either 8 or 16 ports. The units are ideal for small to medium size workgroup applications.

- ◆ 8 or 16 UTP ports, 1x BNC connection
- ◆ Compact size and very lightweight
- ◆ Daisy chain port for stacking hubs together
- ◆ LED indicators display port status

GH4080: £89 GH4160: £90



GE2000 PnP Ethernet Adapter

The GE2000PnP is a 16-bit NE2000 compatible Ethernet adapter which support the new Plug & Play standard, and is ideal for use with MS Windows 95 operating system.

- ◆ Plug & Play NE2000 compatible card
- ◆ BNC and UTP connectors as standard
- ◆ Supports NetWare, WFWG, PCNFS & TCP/IP
- ◆ Full duplex transmission

Single: £35 5 pack: £169



Top quality products from Genius' No. 1 UK supplier

ETHERNET CABLING

Length	1m	3m	5m	10m	15m	20m	30m	50m	100m	300m
Thin Ethernet	£3	£5	£6	£8	£10	£15	£21	£29	£35	£115
UTP	£2	£4	£6	£9	£13	£16	£22	£30	-	£109

UPS SYSTEMS

American Power Conversion		
BK250i - 250VA Backup UPS	£83	
BK600i - 600VA Backup UPS	£159	
AP250i - 250VA Smart UPS	£175	
AP600i - 600VA Smart UPS	£219	
AP900i - 900VA Smart UPS	£389	
AP1200i - 1.2kVA Smart UPS	£510	
AP2000i - 2kVA Smart UPS	£979	
PowerChute Plus shutdown software	£49	
Upsonic		
Station 28 - 280VA Backup UPS	£84	
Station 40 - 400VA Backup UPS	£129	
System 60 - 600VA Smart UPS	£160	
System 100 - 1kVA Smart UPS	£499	
PowerMon shutdown software	£99	
Hewlett Packard		
PowerWare L600 - 600VA Backup UPS	£299	
PowerWare L900 - 900VA Backup UPS	£479	
PowerWare 1000VA Smart UPS	£769	
PowerWare 2100VA SmartUPS	£1199	
PowerWare Assistant software	£89	

TOOLS & CONNECTORS

Connectors	1-9	10+
50ohm BNC Male Crimp Plug	£0.95	£0.85
50ohm BNC T-connector	£1.70	£1.60
50ohm BNC In-line Coupler	£1.65	£1.60
50ohm BNC Terminator	£0.90	£0.80
50ohm BNC Terminator & Earth	£1.20	£1.10
RJ45 Male Crimp Plug	£0.35	£0.30
Thin Ethernet Socket Systems		
Safertap Outlet - surface or flush mount	£18	
Safertap 2.5m drop lead	£17	
Safertap Outlet & 2.5m drop lead	£33	
AMP Thinnet Tap Outlet	£17	
AMP Thinnet Tap 2.5m drop lead	£15	
UTP Cabling Accessories		
Dual RJ45 Outlet - flush mount	£14	
24way 19" RJ45 Patch Panel	£124	
Tools and Accessories		
Thin Ethernet BNC Crimp Tool	£12	
Thin Ethernet Cable Stripper	£7	
RJ45 Crimp Tool	£12	
Round Cable Stripper	£11	

NOVELL NETWORK

No of Users	5	10	25	50	100	250	Manuals
NetWare 3.12	£395	£965	£1445	£1942	£2540	£4560	£155
NetWare 4.1 CD	£415	£946	£1495	£2035	£2865	£5950	£135

Education and Upgrade Packs available - call **01582 745555** for details

ETHERNET ADAPTERS

16-bit ISA Ethernet Adapters	Connections	SingleCard Pack	Five Card Pack
3Com Etherlink III - 3C509B	BNC	CNA0610 £66	CNA1900 £319
3Com Etherlink III - 3C509B-Combo	BNC/UTP/AUI	CNA0630 £73	CNA1920 £355
Aries NE2000 II	BNC/UTP	CNA0040 £75	CNA1710 £119
D-Link DE-220CT	BNC/UTP	CNA1570 £65	CNA1730 £379
Genius GE2000 II	BNC/UTP	CNA1130 £27	CNA0940 £129
Genius GE2000 Plug & Play	BNC/UTP	CNA2130 £35	CNA2140 £169
Intel EtherExpress Pro 10	BNC/UTP	CNA1260 £62	CNA1270 £289
Intel EtherExpress Pro 10 Flash	BNC/UTP	CNA1280 £69	CNA1280 £319
Novell NE2000+	BNC	CNA1510 £48	CNA2070 £215
Novell NE2000T+	UTP	CNA1250 £48	CNA2080 £215
SMC Elite 16C Ultra	BNC/UTP/AUI	CNA0890 £62	CNA1210 £344
SMC EtherEZ	BNC/UTP	CNA2620 £66	CNA2660 £335
32-bit EISA Ethernet Adapters			
3Com Etherlink III - 3C579B	BNC/AUI	CNA0710 £139	CNA1950 £699
3Com Etherlink III - 3C579B-TP	UTP/AUI	CNA0720 £139	CNA1960 £699
Genius E1320	BNC/UTP/AUI	CNA1370 £169	CNA0980 £830
Intel EtherExpress 32C Flash	BNC/UTP	CNA1420 £155	
SMC Elite 32C Ultra	BNC/UTP	CNA1780 £143	CNA1740 £829
MCA (PS/2) Ethernet Adapters			
3Com Etherlink III - 3C529B	BNC/AUI	CNA0730 £139	CNA1930 £709
3Com Etherlink III - 3C529B-TP	UTP/AUI	CNA0740 £139	CNA1940 £709
Genius E1162M	BNC/UTP/AUI	CNA1360 £159	CNA0960 £779
32-bit PCI Ethernet Adapters			
3Com Etherlink III - 3C590B-Combo	BNC/UTP	CNA0430 £124	CNA0440 £475
D-Link DE-530CT	BNC/UTP	CNA2710 £95	
Genius GE2500	BNC/UTP	CNA2110 £89	CNA2120 £439
SMC EtherPower	BNC/UTP	CNA1240 £93	CNA2700 £579
Parallel Port Ethernet Adapters			
D-Link DE-620CT	BNC/UTP	CNA1660 £105	
Genius E3000 II	BNC/UTP	CNA1145 £65	CNA1230 £319
SMC EliteNote	BNC/UTP	CNA1630 £149	
PCMCIA Ethernet Adapters			
3Com Etherlink III - 3C589B-Combo	BNC/UTP	CNA1490 £130	
D-Link DE-650CT	BNC/UTP	CNA2720 £135	
Genius ME3000 II	BNC/UTP	CNA1620 £81	CNA1770 £395
SMC EliteCard	BNC/UTP	CNA2630 £144	

HUBS/REPEATERS

3Com	TP	BNC	AUI	SNMP	Price
LinkBuilder TP12	12	-	1	-	£229
LinkBuilder FMS II	12	opt	1	opt	£389
Aries					
EH-8	8	1	-	-	£119
EH-16	16	1	-	-	£279
EH-32	32	1	1	-	£459
Genius					
GH4080 Palmtop	8	1	-	-	£89
GH4160 Palmtop	16	1	-	-	£149
GH1000 19" rack	12	1	1	opt	£249
GR5050 Palmtop	-	3	1	-	£122
ER5020 19" rack	-	2	2	-	£122
ER5040 19" rack	-	4	4	-	£225
Hewlett Packard					
AdvanceStack 8U	8	opt	opt	opt	£135
AdvanceStack 12U 12	12	opt	opt	opt	£369
AdvanceStack 24U 24	-	-	1	-	£619
SMC					
Elite 3812TP	12	1	1	opt	£399
Tiger TP6	6	-	1	-	£145
Tiger TP12	12	-	1	-	£259
Tiger CX3	-	3	1	-	£219

PEER TO PEER NETWORKING

MS Windows 95 Networking Kits



Thinking of upgrading to the new Windows 95 and also networking your PCs? Why not take advantage of these special packs we have put together at very special prices.

Net95 Kit 1 - 2 User Upgrade Kit	£159
Net95 Kit 2 - 3 User Upgrade Kit	£239
Net95 Kit 3 - 5 User Upgrade Kit	£399
Net95 Kit 4 - Additional User Upgrade Kit	£85

All kits include Ethernet card, software, 5m cables and connectors

Personal NetWare Networking Kits

Link up to 30 PCs with Novell's low cost peer-to-peer software, and have shared access to hard disks, printers, CD ROM all at the click of a mouse button. With support for both DOS and MS Windows, it is the ideal solution for small scale installations.

NetWare Kit 1 - 2 User Kit	£89
NetWare Kit 2 - 5 User Kit	£210
NetWare Kit 3 - Additional User Kit	£49
NetWare Kit 4 - 1 User Notebook Kit	£109

All kits include Ethernet card, software*, 5m cables and connectors

ETHERNET TRANSCEIVERS

Excel		
10base2 BNC Transceiver	£25	
10baseT RJ45 Transceiver	£22	
Genius		
E6000 10baseT RJ45 Transceiver	£27	
E6001 10base5 "N" Transceiver	£26	
E6002 10base2 BNC Transceiver	£67	
E6003 10base5 Tap Transceiver	£38	

PRINTER SERVERS

Genius GPS300 Print Server

The GPS300 Pocket Print Server is the ideal solution to your NetWare printing requirements. It is a compact pocket sized unit which plugs directly into the Centronics port on your printer and connects directly to your network via BNC or RJ45 UTP connections.

Special Offer Introductory Price: **£115**

Hewlett Packard	
JetDirect - Internal for LJ4/4Si	£269
JetDirect - External	£229
D-Link	
DE950 External	£285
Intel	
NetPort Express EL	£249
NetPort Express XL	£299

Note: above are for use with Novell NetWare only

NETWORKING SOFTWARE

Lotus cc:Mail R2.0 Mobile WIN	£109
Lotus cc:Mail R2.0 Desktop WIN	£65
MS Windows for Workgroups v3.11	£89
MS Windows for Workgroups printing requirements	£89
MS Windows for Workgroups Add-On WIN	£41
MS Windows for Workgroups Add-On DOS	£43
MS Windows NT v3.5 Server	£595
MS Windows NT v3.5 Workstation	£225
MS Mail v3.2 PC Server	£299
Novell Personal NetWare - 1 User	£45
Sage MainLan v4 - 1 User	£49



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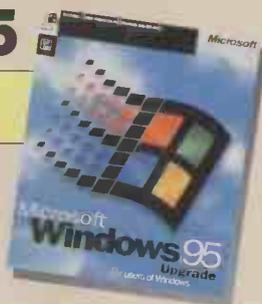
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GREAT REASONS TO BUY PERFECT OFFICE NOW!

1 Get **50% OFF** Windows 95

Offer extended until 31st October 1995

*This is what you do... Buy PerfectOffice (any version, any media) before 31st October and you will receive a voucher with the product. Then buy Windows '95 from Watford Electronics before 31st October 1995. Send both invoices for PerfectOffice and Windows '95 together with the completed PerfectOffice registration card and voucher to Novell, before 15th November 1995, and you will receive a cheque for 50% of the cost of Windows '95 up to a maximum of £44.50 inc VAT (per product) but excluding delivery.



2 Get a **FREE Upgrade** to PerfectOffice 7 for Windows 95

Anyone purchasing PerfectOffice (any version) from now until 30 days after PerfectOffice 7 for Windows 95 version is available, will receive a Free upgrade license to the Windows 95 version. Excludes media and documentation.

3 Pay the **Competitive Upgrade Price** for PerfectOffice if you have any version of Windows

PerfectOffice v3.0 for Windows The Perfect Place to Work

With PerfectOffice™, Novell have truly responded to your needs by integrating all of WordPerfect's leading business applications into one computing solution.

PerfectOffice is the first suite to give you all the features you've requested: software that's easy to use, open network integration and a convenient way to build custom solutions on top of your suite. All of which will revolutionise the way you perceive software suites today. As well as provide you with a truly effective solution to utilise all that your computer can do.

GREAT OFFER
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only £115
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PerfectOffice Standard

Consists of:

WordPerfect word processor

Quattro Pro spreadsheet

Presentations presentation graphics

Info Central personal information manager

GroupWise e-mail, calendaring and scheduling client

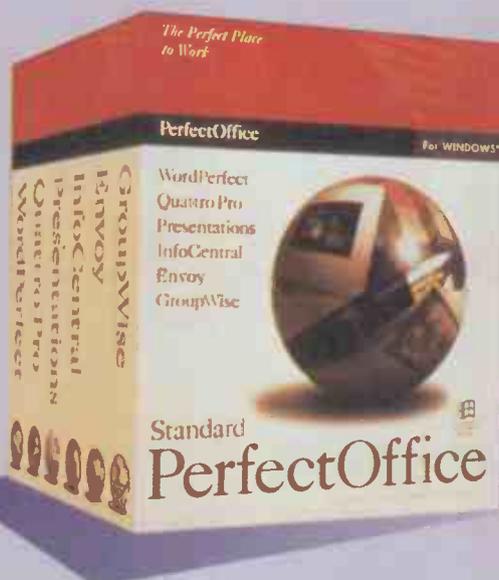
Envoy electronic publisher and viewer

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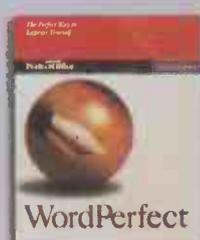
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Full CD Version **£348**

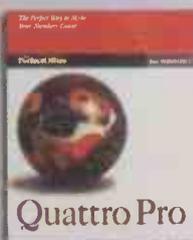
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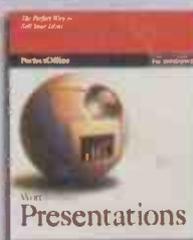
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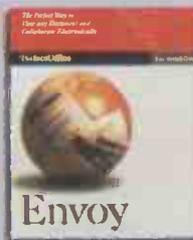
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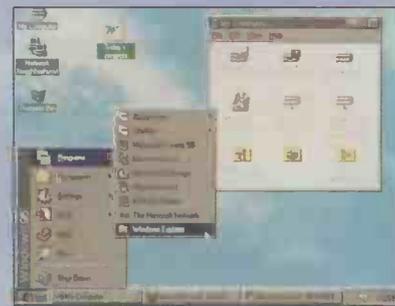
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Everything you do with your Computer will now be Faster, Easier and more Fun!



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- ◆ Plug and Play technology automatically connects compatible disk drives, sound cards, and more.
- ◆ 32-bit preemptive multitasking lets you run multiple programmes or perform multiple tasks simultaneously.
- ◆ Gain built-in access to e-mail and faxes with Microsoft Exchange, and to the Internet with The Microsoft Network.
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To give Windows® 95 even more space and style, add new Microsoft® Plus!

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Microsoft Plus
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In Microsoft Office for Windows 95 you get these full featured applications:

Microsoft Excel, Word, PowerPoint and a new addition - Microsoft Schedule+.

- ◆ IntelliSense™ technology does routine tasks for you with enhanced AutoCorrect and much more.
- ◆ Type a help request in your own words and the Answer Wizard gives you the answer you need.

Microsoft Office Standard
£139 CD or 3.5" Disk
Version Upgrade CCP
Comp. U/G £199. Full Pack £332



Microsoft® Works 4.0

for the Windows® 95 operating system

Microsoft Works for Windows 95 provides the easy-to-use, integrated tools you need - a word processor, spreadsheet, database, drawing and communication tools - to make everyday computing tasks easier and create professional documents for your business or home.

- ◆ Works has a brand new look. Besides the new 3D look, Works sports a new interface called the Task Launcher. The Task Launcher makes common tasks the primary entry point into the product.

Microsoft Works 4.0
£55



Microsoft® Office Professional

for the Windows® 95 operating system

In Microsoft® Office Professional for Windows® 95 you get these full featured applications:

Microsoft Excel, Word, PowerPoint Access, and Microsoft Schedule+

Available October

Microsoft Office Professional
£204 CD or 3.5" Disk
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Microsoft® Publisher

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The all-time best-selling desktop publishing programme for Windows®, Microsoft® Publisher is the natural choice for Windows 95.

- ◆ PageWizards™ are the fastest and easiest way to make customised, professional quality publications because they guide you through the design process.

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£62 CD or 3.5" Disk



Microsoft® Excel

for the Windows® 95 operating system

Microsoft Excel for Windows® 95 operating system was designed based on your needs and requests. Whether you're working on a simple summary, charting sales trends, or performing advanced analysis, Microsoft Excel helps you work the way you want to get your job done easily.

Microsoft Excel
£82
Version Upgrade CCP
Comp. U/G £122. Full Pack £225



Microsoft Natural Keyboard

for the Windows® 95 operating system

Responsibly designed for greater comfort, following extensive ergonomic and usability research, the Microsoft® Natural Keyboard™ lets you work more comfortably by helping you type with your hands, wrists, and forearms in a more relaxed posture.

Microsoft Keyboard
£59

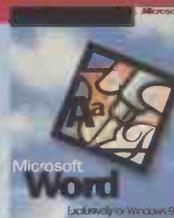


Microsoft® Word

for the Windows® 95 operating system

Microsoft® Word for Windows® 95 helps make everyday writing tasks more automatic and complex tasks simple. It also provides tools to create and distribute documents in an increasingly connected world.

Microsoft Word
£82
Version Upgrade CCP
Comp. U/G £122. Full Pack £225

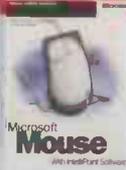


Microsoft® Mouse 2

for the Windows® 95 operating system

Extensive ergonomic research and new IntelliPoint software features make the Mouse 2 one of the most comfortable, accurate and versatile pointing devices you can use to enhance the Microsoft Operating system.

Microsoft Mouse 2
£35



Windows '95 Training Videos

This new Video Training Guide provides an easy to follow step-by-step introduction to the new Windows 95 operating system. Learn how to use the software faster, and learn the new concepts behind the software easier. Topics covered include:

- Installation and Setup
- New features
- Windows 95 Help System
- The Control Panel
- Examining the Task Bar
- The START button
- Using the Explorer
- Using plug and Play

Special Offer Price... £9.95

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Microsoft Works 4.0

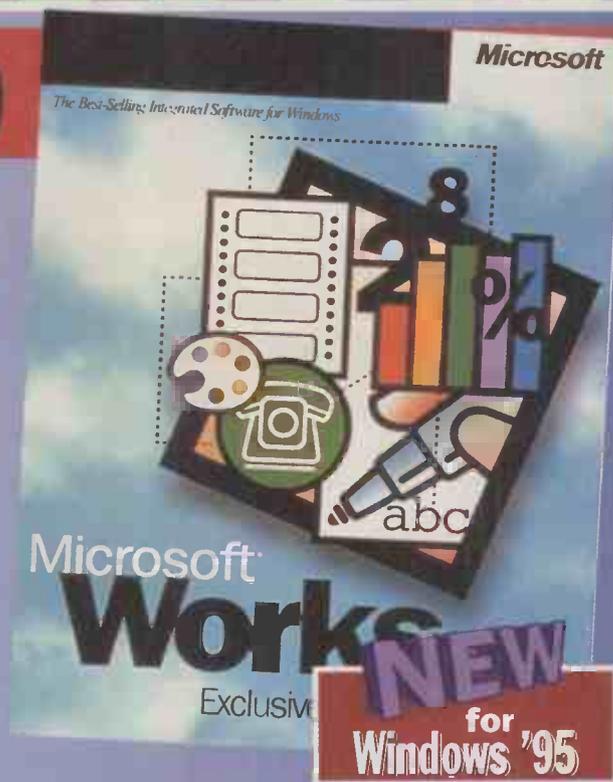
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- ◆ Ease of Use: new Task Interface makes it easier than ever to get the job done with 39 Task Wizards
- ◆ Great Value: new lower price of around £79.95 (with Bookshelf on CD-ROM for around £99.95)
- ◆ Professional Output: the Wizards help users create professionally designed letters, letterhead, bids, invoices and many other documents
- ◆ Windows 95 Support: mullet-tasking, long filenames, 3-D interface, Plug & Play
- ◆ MSN: talk to other Works users or small business in the Works Forum on the Microsoft Network - only a click on the toolbar away.



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A £20 cashback voucher is included in the box. This upgrade is available for existing Microsoft Works users, and also to users of other competitive integrated software products. This cashback voucher is valid if you receive your previous version of Works from an OEM with your PC machine.



Microsoft Works 4.0 for Windows 95

ONLY £55

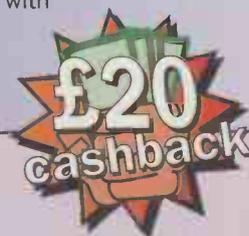
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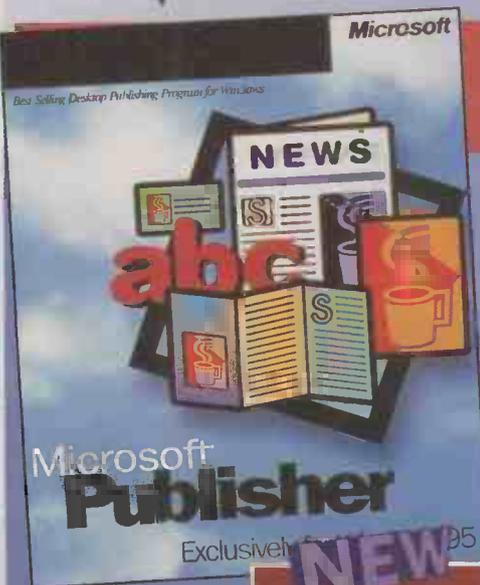
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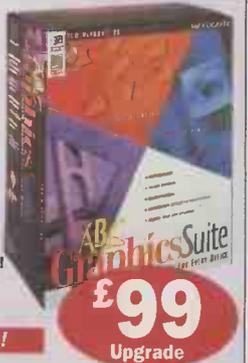
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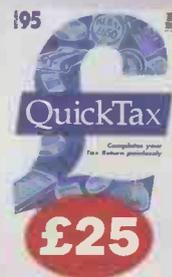
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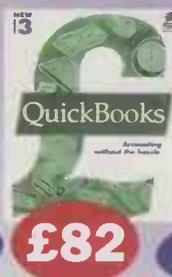
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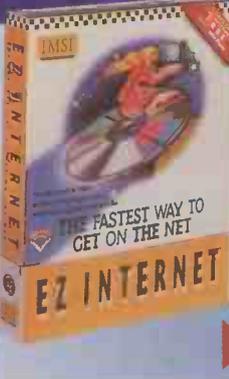
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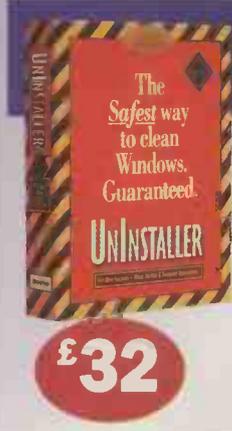
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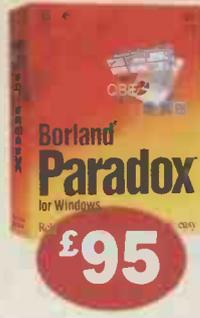
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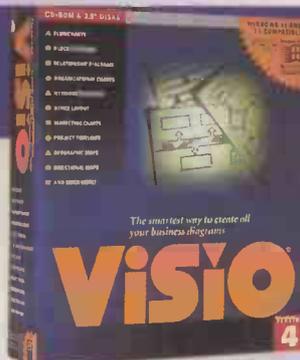
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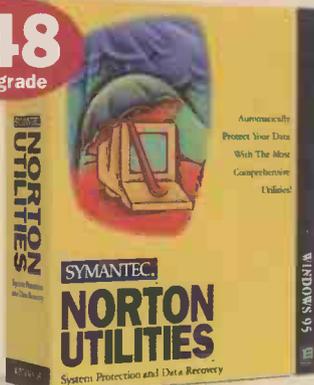
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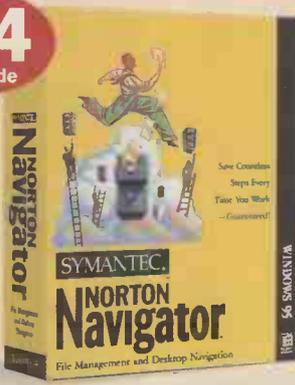
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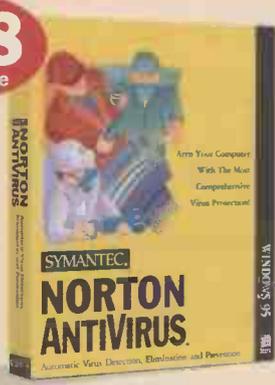
You can find, copy, move, zip or unzip any file, or launch any application, instantly. Access Norton Navigator's file management tools from the open/save dialogue box of any application, or from the Windows 95 Explorer. Keep frequently used items (files, folders, applications) right on the taskbar for one-click access. You can even access Internet FTP sites directly from the Norton File Manager.

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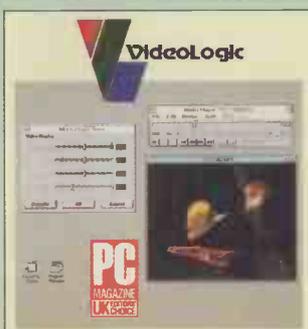
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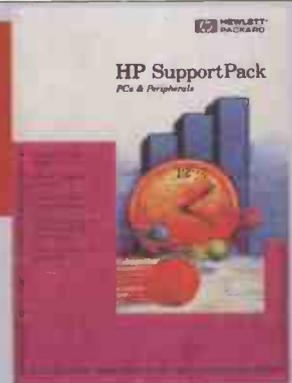
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NEC S60/60P/62P/90/95	£105	-	-
OKI OL400/800	£19	£189	-
OKI OL400e	£17	£129	-
KX-P4410/30	£28	£80	£90
KX-P4440	£32	£108	£115
KX-P4420	£24	£57	£55
KX-P4450/50i/51/55	£18	£75	£60
KX-P4400/5400	£14	£55	-
KX-P6100	£12	£98	-
Qume Crystalprint	£99	£189	-
Star LS-5	£83	-	-
Star Wintype	£68	-	-

LASER ACCESSORIES

JetPage Postscript Cartridge - IIP/IIIP	£169
Postscript Upgrade for LaserJet 4	£270
Postscript Upgrade for LaserJet 4P	£225
LaserJet 4 Lower Paper Cassette	£205
LaserJet 4 JetDirect Ethernet Card	£339
LaserJet IIP/Lowe Paper Cassette	£115
Ozone filter for KX-P4420	£9
Ozone filter for KX-P4450/4455	£20
LaserJet 4Si Duplex Unit	£475
Envelope Feeder for LaserJet 4	£199
LaserJet III FX/IBM Emulation Card	£79
Lower Paper Tray for Canon LBP-4	£98
A5 Paper Feeder for LaserJet 4P	£85

9PIN MATRIX PRINTERS

Citizen 1200+Parallel	80col	£90
Citizen 120D+Serial	80col	£105
Epson LX300	80col	£95
Epson LX1050	132col	£178
Epson FX870	80col	£242
Epson FX1170	132col	£297
Epson DFX5000+	132col	£1149
Panasonic KX-P1150	80col	£87
Panasonic KX-P3696	80col	£259
Star LC15	132col	£195
Star LC100C	80col	£97
Star LC90	80col	£78
Star ZA200	80col	£274
Star ZA250	132col	£341

24PIN MATRIX PRINTERS

Citizen ABC Mono	80col	£103
Citizen ABC Colour	80col	£125
Citizen Swift 200 Mono	80col	£138
Citizen Swift 200 Colour	80col	£146
Citizen Swift 330X	132col	£309
Epson LQ300	80col	£147
Epson LQ570+	80col	£209
Epson LQ870	80col	£370
Epson LQ1070+	132col	£291
Epson LQ1170	132col	£428
Epson DLQ3000	132col	£805
NEC P2Q	80col	£98
NEC P3Q	132col	£178
NEC P62	80col	£315
NEC P72	132col	£372
Panasonic KX-P2023	80col	£108
Panasonic KX-P2124	80col	£198
Panasonic KX-P2135 Colour	80col	£124
Panasonic KX-P3626	132col	£252
Star LC24-15 II	132col	£232
Star LC240 Mono	80col	£109
Star LC240 Colour	80col	£103
Star XB24-200 Colour	80col	£340
Star XB24-250 Colour	132col	£408

RIBBONS/INK CARTRIDGES

Manufacturers Original Ribbons Only

Type	Black	Colour
Canon BJ10ex/BJ10sx	£14	-
Canon BJ30	£10	-
Canon BJ200/BJ230	£16	-
Canon BJ300/BJ330	£11	-
Canon BJC70	£9	£14
Canon BJC600	£9	£6.50
Canon BJC800	£6	£22
Canon BJC4000 Ink Tank	£7	£13
Citizen 120D+	£4	-
Citizen Swift 200/240/ABC	£4	£13
Citizen Swift 24X	£8	£18
Epson LX100	£4	-
Epson LX400/LX850/FX870	£4	-
Epson LX1050/FX1170	£5	-
Epson LQ100	£4	-
Epson LQ150	£4	£12
Epson LQ570/870	£5	-
Epson LQ1070/1170	£8	-
Epson LQ2550	£8	£16
Epson SQ870/SQ1170	£23	-
Epson Stylus Colour	£12	£27
Epson Stylus Colour II/IIIs	£15	£19
Epson Stylus 800/1000	£10	-
Epson Stylus 820	£15	-
Fujitsu B100/B200	£18	-
HP DeskJet 500 Series	£19	£21
HP DeskJet 600/660	£20	£23
HP DeskJet 850	£22	£20
HP DeskJet 310/320	£13	£21
HP DeskJet 1200C	£19	£23
HP DeskJet 1600	£22	£23
HP PaintJet	£16	£18
HP PaintJet XL300	£16	£18
Kaga/Taxan KP810/815	£5	-
NEC P3Q/P32Q	£8	-
NEC P62/72/90	£8	£14
Panasonic 1150/1170/1180	£7	-
Panasonic 2180/23/24/35	£7	£14
Panasonic 1624/2624	£8	-
Panasonic KXP3626/3696	£11	-
Star LC10/LC20/LC100	£5	£9
Star LC100/200	£5	£11
Star LC24-20/24-100/24-200	£5	£12
Star LC24-30	£8	£12
Star XB24/ZA200/ZA250	£5	£12
Star SJ48	£15	-
Star SJ144 Thermal	£6	£8

INKJET PRINTERS

Canon BJ200ex	80col	£170
Canon BJ30	80col	£149
Canon BJ230	132col	£236
Canon BJ300	80col	£351
Canon BJ330	132col	£388
Canon BJC70	80col	£219
Canon BJC600e	80col	£330
Canon BJC800	32col	£1049
Canon BJC4000	80col	£227
Citizen ProjEtic IIC	80col	£205
Epson Stylus 820	80col	£215
Epson Stylus 1000	132col	£325
Epson Stylus Colour Pro A4	80col	£639
Epson Stylus Colour Pro XL	132col	£1539
Epson Stylus Colour IIs	80col	£260
Epson Stylus Colour II	80col	£307
Epson SQ870	80col	£445
Epson SQ1170	132col	£598
HP DeskJet 320	80col	£160
HP DeskJet 320 & CSF	80col	£184
HP DeskJet 600 Mono	80col	£207
HP DeskJet 660C	80col	£275
HP DeskJet 850C	80col	£333
HP DeskJet 1200C	80col	£630
HP DeskJet 1200C PS	80col	£992
HP DeskJet 1600C	80col	£822
HP OfficeJet LX	80col	£493
Lexmark ExecJet IIC	80col	£199
Lexmark WinWriter 100	80col	£269
OKI OJ300 Colour	80col	£225
Star SJ144	80col	£178
Star Wintype 800C Thermal	80col	£592

SHEET FEEDERS

Canon BJ10ex/BJ10sx	£40
Canon BJ300	£86
Canon BJ330	£96
Citizen Swift 24/200/240	£75
Epson LX400	£69
Epson LQ570/LQ870	£47
Epson LQ1070/LQ1170	£89
HP DeskJet 310/320	£48
NEC P20/P220	£59
NEC P3Q/P320	£85
Panasonic 1170/1180/1123	£59
Panasonic 1124i/1124/2124	£79
Panasonic 1824/2824	£128
Panasonic KX-P2135	£30
Star LC100	£69
Star LC24-20	£69
Star LC200/LC24-200	£69

INKJET REFILL PACKS FOR

◆ Canon BJ10ex/BJ10sx - 2 pack	£10
◆ Canon BJ10ex/BJ10sx - 5 pack	£24
◆ Canon BJ10ex/BJ10sx 1 Original Cart & 3 refills	£36
◆ Canon BJ200 2 refills	£34
◆ Epson SQ870/1170 - 2 refills	£9
◆ HP DeskJet Std capacity - 2 pack	£8
◆ HP DeskJet Std capacity - 5 pack	£20
◆ HP DeskJet Std capacity black Cart + 3 Std capacity refills	£30
◆ HP DeskJet Hi-capacity - 2 pack	£17
◆ HP DeskJet Hi-capacity - 5 pack	£35
◆ HP DeskJet Colour Cart & 1 each (3) colour refills	£39

ACCESSORIES

Citizen Swift 200/240/ABC Colour Kit	£32
Canon BJ10sx Battery Pack	£32
Epson OK Serial Interface	£29
Epson 8K Serial Interface	£75
Epson 32K Serial Interface	£95
Epson LQ100 Tractor Unit	£29
Epson LX300 Colour Kit	£29
Epson Stylus 820 Colour Kit	£75
HP DeskJet FX Emulation Cartridge	£49
HP DeskJet IBM Emulation Cartridge	£57
HP DeskJet 500 256K RAM Cartridge	£75
HP DeskJet 320 Battery Pack	£33
HP DeskJet 320 CarryCase	£49
HP DeskJet 320/540 Colour Kit	£28
HP DeskJet 320 Parallel Cable	£12
HP DeskJet 600 Colour Kit	£29
HP DeskJet Prestige Elite Fonts	£55
HP DeskJet Letter Gothic Fonts	£56
Panasonic Serial Interface	£49
Panasonic 32K Buffer	£16
Panasonic 2180/2123 Colour Kit	£30
Star 8K Serial Interface - LC Range	£52
Star 8K Serial Interface - XB Range	£39
Star 32K Buffer - LC24/XB24	£52
Dustcovers for 80col printers	£6
Dustcovers for 132col printers	£9

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Tel: 01923 237774

HP On-Site Warranty Packs

Model	1yr	3yr
Mono DeskJet/Deskwriter	£32	£40
Colour DeskJet/Deskwriter	£45	£65
LaserJet 4L/ML DJ1200/1600	£78	£90
LaserJet 4+4M+	£135	£160
LaserJet 4V/4MV	-	£200
LaserJet 5P/5MP	-	£130

PRINTER SHARER/BUFFER

Manual Printer Sharers

Type	Serial	Parallel
2in/1out	£12	£13
2in/2out	£28	£29
3in/1out	£15	£17
4in/1out	£24	£26

Auto Parallel Printer Sharer Buffers

Type	OK	256K	1Mb
2in/1out	£29	-	-
2in/2out	-	£105	£134
4in/1out	£45	-	-
4in/2out	£69	£124	£149
8in/1out	£79	-	-

Auto Serial Printer Sharer Buffers

Type	OK	256K	1Mb
2in/1out	£27	-	-
2in/2out	-	£124	-
4in/1out	£44	-	-
4in/2out	£69	£147	-
8in/1out	£62	-	-

RAM Expansion for above Auto Sharers

RAM Module	256K	1Mb	2Mb
	£59	£78	£124

Pocket Buffers

Parallel Flash Buffer	£65	£98	£119
Parallel Fast Flash Buffer	£85	£125	£158
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COMPACT CONVERTER

Serial to Parallel & Parallel to Serial	£49
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IEEE-488/Centronics Converter	£49
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MONITORS ▾ VIDEO CARDS ▾ MODEMS ▾ HARD DRIVES

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1785GM 17" **£495**

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NEC Multiscan Monitors
XV15 15" **£279**
XV17 17" **£559**
XE17 17" **£679**
XE21 21" **£1329**

Panasonic Monitors - 2yr On-site warranty
TX-D1562 15" **£260**
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TX-D1733F 17" **£499**
TX-D1751 17" **£625**
TX-D2051 20" **£939**
TX-D2151 21" **£1149**

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GDM-205E1VT 20" **£1295**
GDM-205E1 20" **£1395**

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EV 895LR 17" **£795**
EV 1080LR 20" **£879**
EV 2100LR 21" **£1489**

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17G 17" **£549**
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Aries X-Link Fax/Modems



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GOA0420 Microlin FX32+ Pocket **£147**
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GOA1030 Microlin NB34 PCMCIA **£275**
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Worldport Dual Cellular	£193	
Courier v34 Fax/Modem	£239	£239
Worldport PCMCIA 2496 Fx/Md		£129
Worldport Dual standard cellular PCMCIA		£165
Worldport v34 PCMCIA Connecting Cable 9/25		£8
Dataflex Fax/Modems		
Rapier Plus Desktop 3 year warranty. Complete with cables & software	£338	
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- ◆ Expandable desktop case
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- ◆ 102 Enhanced keyboard
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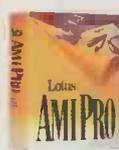
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- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 fast serial and keyboard ports
- ◆ Expandable desktop case
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- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers.
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- ◆ 3.5" 1.44Mb floppy drive
- ◆ PCI bus with 4 PCI slots
- ◆ PCI bus graphics with 1Mb video RAM (2Mb optional) and super-fast 64-bit s3 Windows accelerator
- ◆ 14" SVGA colour screen (15" optional)
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- ◆ 3.5" 1.44Mb floppy drive
- ◆ PCI bus with 4 PCI slots
- ◆ PCI bus graphics with 1Mb video RAM (2Mb optional) and super-fast 64-bit s3 Windows accelerator
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
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£889 +VAT

1.08Gb models£939
16Mb RAM models+£200
Multimedia models+£99

£989 +VAT

1.08Gb models£1039
16Mb RAM models+£200
Multimedia models+£99

Finance from under **£43*** Per Month
See example

Finance from under **£49*** Per Month
See example

Finance from under **£54*** Per Month
See example

Please Note: Mouse is not included with this range as a choice of different mice is available from as low as £9 + VAT

*APR

19.8%

Finance Example: Cash Purchase: £519 +VAT = £632.15 inc. delivery & VAT. Credit Purchase: 10% (£63.22) deposit and 24 equal monthly payments of £28.45. Total Price £746.02 Including delivery & VAT. Finance is available subject to status. Written details are available on request. Be sure you can afford the payments before entering into a credit agreement.



Pacioli 2000 Business Accounts is a full-featured package that outperforms many packages costing over £500



IBM OS/2 Warp v3 is the latest and most powerful 32-bit, multitasking operating system



PC DOS 7 (full version) is the latest version of DOS and gives you upto 40K more RAM than version 6.22



Fun School 4 covers the essential elements of the national curriculum



Fun School Maths educational package covering all the essentials



Doom virtual reality graphics game - the world's most popular game



Raptor Flight simulator / Warship shoot'em up action crazed guns blazing game



Blake Stone graphics adventure game set in a high tech space station



Epic Pinball professional arcade game with all the usual features

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**100 Hours
FREE
Internet
access worth
over £300**



486DX4-100

- ◆ 486DX4-100 processor
- ◆ 256K external cache
- ◆ 8Mb RAM expandable to 64Mb
- ◆ Pentium® technology upgradeable
- ◆ Enhanced 850Mb IDE hard disk with 256K cache
- ◆ 3.5" 1.44Mb floppy drive
- ◆ 1Mb 64-bit PCI local bus graphics with Windows accelerator
- ◆ 14" SVGA colour screen
- ◆ PCI enhanced IDE hard and floppy controller
- ◆ Parallel, 2 serial and keyboard ports
- ◆ Midi-tower case with 8 drive bays and 7 expansion slots (4 PCI)
- ◆ 102 Enhanced keyboard
- ◆ Microsoft compatible mouse
- ◆ Multimedia models include double (or quad speed option) CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Software bundle including Lotus SmartSuite (see below)
- ◆ 100 Hours FREE Internet access worth over £300 (modem required)



75MHz Pentium®

- ◆ Intel 75MHz Pentium® processor
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 850Mb, 1.08Gb or 1.6Gb enhanced IDE (Fast ATA) hard disk with 256 hard disk cache
- ◆ 256 external SRAM cache
- ◆ 3.5" 1.44Mb floppy drive, PCI bus with 4 PCI slots
- ◆ PCI bus graphics with 1Mb video RAM (2Mb optional) and super-fast 64-bit s3 Windows accelerator
- ◆ 14" SVGA colour screen (15" Optional)
- ◆ PCI enhanced IDE hard and floppy controller
- ◆ Parallel, 2 Fast serial and keyboard ports
- ◆ Midi-tower case with 8 drive bays and 7 expansion slots (4 PCI)
- ◆ 102 Enhanced keyboard and Microsoft compatible mouse
- ◆ Multimedia models include double or quad speed CD-ROM drive 16-bit sound card and twin stereo speakers
- ◆ Software bundle including Lotus SmartSuite (see below)
- ◆ 100 Hours FREE Internet access worth over £300 (modem required)



90MHz Pentium®

- ◆ Intel 90MHz Pentium® processor
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 850Mb, 1.08Gb or 1.6Gb enhanced IDE (Fast ATA) hard disk with 256 hard disk cache,
- ◆ 256 external SRAM cache
- ◆ 3.5" 1.44Mb floppy drive
- ◆ PCI bus with 4 PCI slots
- ◆ PCI bus graphics with 1Mb video RAM (2Mb optional) and super-fast 64-bit s3 Windows accelerator
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 Fast serial and keyboard ports
- ◆ Midi-tower case with 8 drive bays and 7 expansion slots (4 PCI)
- ◆ 102 enhanced keyboard and Microsoft® compatible mouse
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Software bundle including Lotus SmartSuite (see below)
- ◆ 100 Hours FREE Internet access worth over £300 (modem required)

£799 +VAT

Multimedia models +£99

£899 +VAT

1.08Gb 8Mb model £949
 1.6Gb 8Mb model £1049
 16Mb RAM models +£200
 Multimedia models +£99

£999 +VAT

1.08Gb 8Mb model £1049
 1.6Gb 8Mb model £1149
 16Mb RAM models +£200
 Multimedia models +£99

Finance from under **£44*** Per Month
 See example

Finance from under **£49*** Per Month
 See example

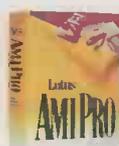
Finance from under **£54*** Per Month
 See example

Software Applications**

Claim your FREE software bundle with all above Colossus systems. This superb range of pre-loaded and ready to use software applications includes, the superb multi-tasking 32-bit version of Lotus SmartSuite for OS/2, IBM OS/2 Warp, Pacoli 2000 Business Accounts, Fun School, the best shareware games and other programs. Windows 95 options are also available.



Lotus 1-2-3 spreadsheet is the worlds best spreadsheet package



Lotus Ami Pro word processor with every advanced feature



Lotus Freelance Graphics presentation and drawing package



Lotus CC-Mail single user electronic mail licence



IBM Works is a superb easy to use collection of 5 great programs inc. WP, spreadsheet, charting, database & reporting



FaxWorks allows you to send and receive faxes easily (modem required)



IBM Person to Person (via telephone or network) allows collaborative working on your PC



Personal Information Manager allows you to manage your time more effectively



CompuServe Information Manager and Internet Connection provide graphical interfaces to these services (modem required)

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Ultimate Performance Incredible Value!

These state-of-the-art systems from Colossus provide the ultimate performance and expandability at prices that only Time could achieve with our buying power. Take a closer look at these incredible high specification products from the performance PC manufacturer.

minimum hard disk capacity of 850Mb or 1.08Gb The software bundle shown below (worth over £1000) includes Lotus SmartSuite and is normally £99 extra with these systems but is available FREE for a limited period.

All systems come with a truly expandable midi-tower case with 8 drive bays, and have a minimum of 8Mb or 16Mb RAM and

These systems are suitable for the power user who wants high specification and expandability. Windows 95 based software bundles are also available for a small extra charge.

100MHz Pentium®

- ◆ Intel 100MHz Pentium® processor
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 850Mb, 1.08Gb or 1.6Gb enhanced IDE (Fast ATA) hard disk with 256 hard disk cache,
- ◆ 256 external SRAM cache
- ◆ 3.5" 1.44Mb floppy drive
- ◆ PCI bus with 4 PCI slots
- ◆ PCI bus graphics with 1Mb video RAM (2Mb optional) and super-fast 64-bit s3 Windows accelerator
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 fast serial and keyboard ports
- ◆ Midi-tower case with 8 drive bays and 7 expansion slots (4 PCI)
- ◆ 102 enhanced keyboard and Microsoft compatible mouse
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Software bundle including Lotus SmartSuite (see below)
- ◆ 100 Hours FREE Internet access worth over £300 (modem required)

£1099 +VAT

1.08Gb 8Mb model	£1149
1.6Gb 8Mb model	£1249
16Mb RAM models	+£200
Multimedia models	+£99

120MHz Pentium®

- ◆ Intel 120MHz Pentium® processor
- ◆ Intel Trinton Chipset
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 1.08Gb or 1.6Gb enhanced IDE (Fast ATA) hard disk with 256 hard disk cache,
- ◆ 256 external SRAM cache
- ◆ 3.5" 1.44Mb floppy drive
- ◆ PCI bus with 4 PCI slots
- ◆ PCI bus graphics with 1Mb video RAM (2Mb optional) and super-fast 64-bit s3 Windows accelerator
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 Fast serial and keyboard ports
- ◆ Midi-tower case with 8 drive bays and 7 expansion slots (4 PCI)
- ◆ 102 enhanced keyboard and Microsoft compatible mouse
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Software bundle including Lotus SmartSuite
- ◆ 100 Hours FREE Internet access worth over £300 (modem required)

£1299 +VAT

1.6Gb 8Mb model	£1399
16Mb RAM models	+£200
Multimedia models	+£99

133MHz Pentium®

- ◆ Intel 133MHz Pentium® processor
- ◆ Intel Trinton Chipset
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 1.08Gb or 1.6Gb enhanced IDE (Fast ATA) hard disk with 256 hard disk cache,
- ◆ 256 external SRAM cache
- ◆ 3.5" 1.44Mb floppy drive
- ◆ PCI bus with 4 PCI slots
- ◆ PCI bus graphics with 1Mb video RAM (2Mb optional) and super-fast 64-bit s3 Windows accelerator
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 Fast serial and keyboard ports
- ◆ Midi-tower case with 8 drive bays and 7 expansion slots (4 PCI)
- ◆ 102 enhanced keyboard and Microsoft compatible mouse
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Software bundle including Lotus SmartSuite
- ◆ 100 Hours FREE Internet access worth over £300 (modem required)

£1399 +VAT

1.6Gb 8Mb model	£1499
16Mb RAM models	+£200
Multimedia models	+£99

Finance from under **£60*** Per Month
See example

Finance from under **£70*** Per Month
See example

Finance from under **£75*** Per Month
See example

***APR 19.8%**

Finance Example: Cash Purchase: £799 +VAT =£961.15 inc. delivery & VAT. Credit Purchase: 10% (£96.12) deposit and 24 equal monthly payments of £43.29. Total Price £1134.36 including delivery & VAT. Finance is available subject to status. Written details are available on request. Be sure you can afford the payments before entering into a credit agreement.



Pacifi 2000 Business Accounts is a full-feature package that outperforms many packages costing over £500



IBM OS/2 Warp v3 is the latest and most powerful 32-bit, multi-tasking operating system



PC DOS 7 (full version) is the latest version of DOS and gives you upto 40K more RAM than version 6.22



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Fun School Maths educational package covering all the essentials



Doom virtual reality graphics game - the world's most popular game



Raptor Flight simulator / Warship shoot'em up action crazed guns blazing game



Blake Stone graphics adventure game set in a high tech space station



Epic Pinball professional arcade game with all the usual features

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Multimedia Tower



System Specification

- ◆ 486DX2-66 or 486-DX4-100 processor
- ◆ 540Mb or 850Mb enhanced IDE hard disk
- ◆ 4Mb or 8Mb RAM (max 64Mb)
- ◆ 1.44Mb 3.5" floppy drive
- ◆ Pentium® technology upgradeable
- ◆ 14" SVGA colour screen with 16-bit SVGA graphics
- ◆ Expandable Omega mini-tower case with 5 bays and 7 slots
- ◆ 102 Keyboard and Microsoft compatible mouse
- ◆ 12 Months warranty expandable to 5 years

Multimedia Hardware

- ◆ Double speed or quad speed IDE CD-ROM drive
- ◆ 16-bit high quality sound card
- ◆ Twin stereo speaker system

Fax and Internet Access

- ◆ Models 3 and 4 also include the following for a limited period:- BABT approved fax and data modem
- ◆ 100 Hours FREE Internet access from IBM

Infoware Encyclopaedias

- ◆ Exploring Animals: covers 195 different animals and their behaviour with video footage and photographs
- ◆ Amazing Journeys: 1000 years of exploration, detailed animated journeys and discoveries

- ◆ World of Knowledge: Animated encyclopaedia covering 38 subjects
- ◆ World of Pharaohs: Interactive encyclopaedia of ancient Egypt with animation and maps



Software**

See software section for details

The superb 32-bit multitasking version of Lotus SmartSuite for OS/2 with the following programs:-

- ◆ Lotus 1-2-3 spreadsheet
- ◆ Lotus Ami Pro word processor
- ◆ Lotus Freelance presentation graphics
- ◆ Lotus CC:Mail licence
- ◆ Pacioli 2000 Business Accounts suite
- ◆ PC DOS 7 - the latest version
- ◆ IBM OS/2 Warp 32-bit operating system
- ◆ IBM Works easy to use pack
- ◆ IBM Personal information Manager
- ◆ IBM FaxWorks
- ◆ IBM Person-to-Person
- ◆ CompuServe information manager and Internet access (modem required)
- ◆ Doom arcade game
- ◆ Epic Pinball game
- ◆ Blake Stone game

Fun School suite covering all the essential elements of the National Curriculum

- ◆ Fun School 4 Educational Pack
- ◆ Fun School Maths pack
- ◆ Fun School 5 In Time
- ◆ Fun School Paint and Create



The multimedia tower systems from Time feature top quality advanced mini-tower PC systems from Omega, and come fitted with full-feature multimedia and pre-loaded with superb Lotus SmartSuite software and a range of other educational and leisure applications that includes 5 encyclopaedias and the full suite of educational software from Fun School.

Models 3 and 4 also include an integrated fax and data modem and also included is 100 hours of free access to the internet from IBM. At prices of just £599 for a full-feature multimedia PC, there simply is no better value!

Finance from under

£33* Per Month ^{*APR} 19.8%

Finance Example:
Cash Purchase: £599 +VAT = £726.15 inc. delivery & VAT. Credit Purchase: 10% (£72.62) deposit and 24 equal monthly payments of £32.68. Total Price £856.94 inc. delivery & VAT.

Multimedia Tower 1

486DX2-66
with 540Mb hard drive and 4Mb RAM

£599 +VAT

Finance from under £33* Per Month
See example

Multimedia Tower 2

486DX2-66
with 540Mb hard drive and 8Mb RAM

£699 +VAT

Finance from under £38* Per Month
See example

Multimedia Tower 3

486DX4-100
with 850Mb hard drive, 4Mb RAM and modem

£699 +VAT

Finance from under £38* Per Month
See example

Multimedia Tower 4

486DX4-100
with 850Mb hard drive, 8Mb RAM and modem

£799 +VAT

Finance from under £44* Per Month
See example

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Multimedia Time Machines 95



System Specification

- ◆ 486 Models: 486DX2-66 or 486DX4-100 processors
- ◆ Pentium® Models: Pentium® processor 75, 90, 100, 120 or 133MHz
- ◆ 8Mb or 16Mb RAM expandable to 64/128Mb
- ◆ 540Mb, 850Mb, 1.08Gb or 1.6Gb fast enhanced IDE hard disks with upto 256K cache
- ◆ 1.44Mb floppy drive
- ◆ Super fast local bus SVGA graphics controller with 1Mb or 2Mb video RAM
- ◆ 14", 15" or 17" SVGA low radiation colour screen
- ◆ Mitac desktop case with 4 drive bays and 7 slots. Models 1, 2 and 3 also available in Omega mini-tower case. Model 5 features Colossus Midi-Tower case with 8 drive bays
- ◆ 102 Keyboard and Microsoft compatible mouse
- ◆ Microsoft Windows® 95
- ◆ 12 Months warranty extendable to 5 years

Multimedia Hardware

- ◆ Double speed or quad speed IDE CD-ROM drive
- ◆ 16-bit high quality sound card
- ◆ Twin stereo speaker system
- ◆ PC joystick

Fax & Internet Pack

- ◆ BAPT approved 14.4 data and fax modem
- ◆ Easy to use fax software
- ◆ Communications software
- ◆ Introductory subscription to CompuServe with Internet mailbox



Optional: Advanced PC TV system with Teletext (£160) +VAT



Software**

See software section for details

Business Software

- ◆ Lotus software suite including Lotus 1-2-3, Ami Pro, Approach, Organizer 2, SmartPics and Lotus Training
- ◆ GSP Pressworks and Designworks
- ◆ TurboCAD for Windows
- ◆ Organize Your Way
- ◆ CV & Job Search Pro
- ◆ Pacioli 2000 Business Accounts
- ◆ Masterclips SE and Picture This!
- ◆ Quicken v4 personal finance pack

Educational Software

- ◆ Fun School 4, Spelling, In Time, Paint and Create and Maths
- ◆ Computerworks, Bodyworks and Autoworks
- ◆ EZ Language French, German and Spanish

Leisure Software

- ◆ PC Paintbrush
- ◆ Arts & Letters Draw, Doom, Blake Stone, Pinball and Raptor Games

CD Multimedia Software

- ◆ Microsoft Encarta® 95
- ◆ Encyclopaedia CD
- ◆ Time Almanac CD
- ◆ UFO for Windows CD
- ◆ Dinosaur Museum CD
- ◆ Bodyworks CD
- ◆ EZ Language CD
- ◆ World Atlas MPC CD
- ◆ WinTutor 95 CD
- ◆ Infopedia Encyclopaedia CD



The new Multimedia Time Machines are powerful, high specification 486 and Pentium systems that feature a minimum of 8Mb or 16Mb RAM and have been optimised for Microsoft Windows® 95. Excellent business software from Lotus and other leading manufacturers is included together with a range of educational and leisure software. All are fully multimedia ready with fitted CD-ROM drives, 16-bit sound cards and a superb range of CD multimedia titles.

Also included is the 14.4 Fax and Internet Pack allowing these systems to function as a powerful fax machine and allowing you to get on-line to services such as CompuServe and the Internet. (Models 1, 2 and 3 are also available in mini-tower options.)

APPROVED for use with telecommunication systems specified in the conditions for use subject to the conditions set out in them.

14.4 Modem Included

*APR

0%

INTEREST FREE CREDIT

Interest Free Credit is available subject to status. Written quotations are available on request. Be sure you can afford the payments before entering into a credit agreement. See page ii for Interest Free example.

Multimedia Time Machine 95/1 486DX2-66	Multimedia Time Machine 95/2 486DX4-100	Multimedia Time Machine 95/3 75MHz Pentium®	Multimedia Time Machine 95/4 75MHz Pentium®	Multimedia Time Machine 95/5 90MHz Pentium®
486DX2-66 with 8Mb RAM, 540Mb hard disk, and 14" Screen	486DX4-100 with 8Mb RAM, 850Mb hard disk and 14" screen	75MHz Pentium® with 8Mb RAM, 850Mb hard disk, 64-bit PCI graphics and 14" screen	75MHz Pentium® with 16Mb RAM, 1.08Gb hard disk, 64-bit PCI graphics with 2Mb video RAM and 15" screen	90MHz Pentium® Colossus Midi-Tower with Triton Chipset, 16Mb RAM, 1.6Gb hard disk, 64-bit PCI graphics with 2Mb video RAM and 15" screen
£39* Per Month	£49* Per Month	£59* Per Month	£69* Per Month	£79* Per Month
£156.65 deposit and 24 monthly payments of £58.00 OR £612.65 deposit and 24 monthly payments of £39.00 Total price £1299.00+VAT = £1548.65 inc delivery & VAT. *APR 0%	£178.15 deposit and 24 monthly payments of £62.00 OR £490.15 deposit and 24 monthly payments of £49.00 Total price £1399.00+VAT = £1666.15 inc delivery & VAT. *APR 0%	£186.40 deposit and 24 monthly payments of £69.00 OR £426.40 deposit and 24 monthly payments of £59.00 Total price £1549.00+VAT = £1842.40 inc delivery & VAT. *APR 0%	£245.90 deposit and 24 monthly payments of £91.00 OR £773.90 deposit and 24 monthly payments of £69.00 Total price £2049 +VAT = £2429.90 inc delivery & VAT. *APR 0%	£286.40 deposit and 24 monthly payments of £104.00 OR £886.40 deposit and 24 monthly payments of £79.00 Total price £2349 +VAT = £2782.40 inc delivery & VAT. *APR 0%
Mini-Tower model +£10	14" to 15" upgrade +£99 Mini-Tower model +£10	90MHz Pentium® upgrade +£79 100MHz Pentium® upgrade +£179 14" to 15" upgrade +£99 Mini-Tower model +£10	90MHz Pentium® upgrade +£79 100MHz Pentium® upgrade +£179 15" to 17" upgrade +£199	100MHz Pentium® upgrade +£100 120MHz Pentium® upgrade +£250 133MHz Pentium® upgrade +£350 15" to 17" upgrade +£199

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Multimedia PowerStation '95

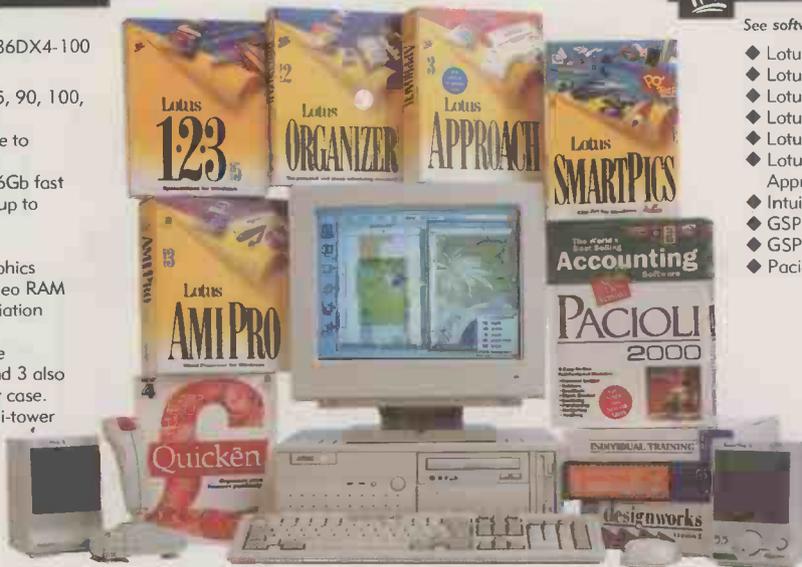


System Specification

- ◆ 486 Models: 486DX2-66 or 486DX4-100 processors
- ◆ Pentium® Models: Pentium® 75, 90, 100, 120 or 133MHz processor
- ◆ 8Mb or 16Mb RAM expandable to 64 / 128Mb
- ◆ 540Mb, 850Mb, 1.08Gb or 1.6Gb fast Enhanced IDE hard disks with up to 256K cache
- ◆ 1.44Mb floppy drive
- ◆ Super fast local bus SVGA graphics controller with 1Mb or 2Mb video RAM
- ◆ 14", 15" or 17" SVGA low radiation colour screen
- ◆ Mitac desktop case with 4 drive bays and 7 slots. Model 1,2 and 3 also available in Omega mini-tower case. Model 5 features Colossus mid-tower case with 8 drive bays
- ◆ 102 Keyboard and Microsoft compatible mouse
- ◆ Microsoft Windows® 95
- ◆ 12m Warranty extendable to 5 years

Multimedia Hardware

- ◆ Double Speed or quad speed IDE CD-ROM drive
- ◆ 16-bit high quality sound card
- ◆ Twin stereo speaker system
- ◆ PC Joystick



Optional: Advanced PC TV system with Teletext£160 Extra
Optional: Fax & Internet PacksSee section at the back



Software**

See software section for details.

- ◆ Lotus 1-2-3 v5 spread sheet
- ◆ Lotus Ami Pro v3.1 word processor
- ◆ Lotus Approach v3 database
- ◆ Lotus Organizer v2
- ◆ Lotus SmartPics graphics
- ◆ Lotus Training for 1-2-3, Ami Pro and Approach
- ◆ Intuit Quicken v4 personal finance pack
- ◆ GSP Pressworks desktop publishing pack
- ◆ GSP Designworks art and graphics pack
- ◆ Pacioli 2000 Business Accounts

Multimedia Software

- ◆ Microsoft Encarta '95 CD Encyclopaedia
- ◆ Time Almanac CD
- ◆ EZ Language Multimedia CD - Learn French, German, Spanish and more
- ◆ Play and Learn educational CD
- ◆ UFO for Windows CD
- ◆ Dinosaur Museum CD
- ◆ Bodyworks CD

Finance from under

£49*
Per Month

Finance Example
Cash Purchase: £898 +VAT = £1077.48 inc. delivery & VAT. Credit Purchase: 10% (£107.75) deposit and 24 equal monthly payments of £48.49. Total Price £1271.51 inc. delivery & VAT.

*APR
19.8%



If you are looking for a powerful complete multimedia solution, the Multimedia PowerStation '95 represents the best value. These 486 and Pentium® systems have a high specification which has been optimised for Windows 95 and includes a minimum of 8Mb or 16Mb RAM, large hard disks up to 1.6Gb, fast controllers and plenty of expansion potential.

All are fully multimedia ready with fitted CD-ROM drives, 16-bit sound cards, an excellent range of educational CD titles including Microsoft Encarta, Bodyworks and EZ

Language. Low cost Fax and Internet packs and PC TV with Teletext options are also available.

Also included is a range of excellent business software from Lotus, Intuit and GSP which will handle all your requirements for word processing, filing, number crunching, organising, graphics, accounts and desktop publishing. At these special introductory prices, with the finance option from under £49 these systems are a great buy.

Multimedia PowerStation '95/1 486DX2-66	Multimedia PowerStation '95/2 486DX4-100	Multimedia PowerStation '95/3 75MHz Pentium®	Multimedia PowerStation '95/4 75MHz Pentium®	Multimedia PowerStation '95/5 90MHz Pentium®
486DX2-66 with 8Mb RAM, 540Mb hard disk and 14" screen	486DX4-100 with 8Mb RAM, 850Mb hard disk and 14" screen	75MHz Pentium® processor with 8Mb RAM, 850Mb hard disk, 64-bit PCI graphics and 14" screen	75MHz Pentium® processor with 16Mb RAM, 1.08Gb hard disk, 64-bit PCI graphics with 2Mb video RAM and 15" screen	90MHz Pentium® processor Colossus Midi-Tower with 16Mb RAM, 1.6Gb hard disk, Triton chipset, 64-bit PCI graphics with 2Mb video RAM and 15" screen
£898	£998	£1098	£1498	£1698
+VAT	+VAT	+VAT	+VAT	+VAT
Mini-tower model+£10	14" to 15" upgrade+£99 Mini-tower model+£10	90MHz Pentium®+£79 100MHz Pentium®+£179 14" to 15" upgrade+£99 Mini-tower model+£10	90MHz Pentium®+£79 100MHz Pentium®+£179 15" to 17" upgrade+£199	100MHz Pentium®+£100 120MHz Pentium®+£250 133MHz Pentium®+£350 15" to 17" upgrade+£199

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Sat 9.00am-5.00pm

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Multimedia Perfect Office



System Specification

- ◆ 486 Models: 486DX2-66 or 486DX4-100 processors
- ◆ Pentium® Models: Intel Pentium® 75, 90, 100, 120 or 133MHz processor
- ◆ 8Mb or 16Mb RAM expandable to 64 / 128Mb
- ◆ 540Mb, 850Mb, 1.08Gb or 1.6Gb fast enhanced IDE hard disk with up to 256K cache
- ◆ 1.44Mb floppy drive
- ◆ Super fast local bus SVGA graphics controller with 1Mb or 2Mb video RAM
- ◆ 14", 15" or 17" SVGA low radiation colour screen
- ◆ Mitac desktop case with 4 drive bays and 7 slots. Model 5 features Colossus midi-tower case with 8 drive bays
- ◆ 102 Keyboard and Microsoft compatible mouse
- ◆ Microsoft Windows 95
- ◆ 12 Month warranty extendable to 5 years

Multimedia Hardware

- ◆ Double Speed or quad speed IDE CD-ROM drive
- ◆ 16-bit High quality sound card
- ◆ Twin stereo speaker system

PC Joystick

- ◆ Optional: Advanced PC TV system with Teletext (£160)

Optional: Fax & Internet Packs (see section at back)

Leisure Software

- ◆ PC Paintbrush
- ◆ Arts & Letters Draw
- ◆ Doom, Blake Stone, Pinball and Raptor shareware games



Software**

See software section for details

- Novell PerfectOffice Suite including:-
- ◆ WordPerfect 6.0 word processing package
 - ◆ Quattro Pro for Windows spread sheet
 - ◆ Presentations graphics package
 - ◆ InfoCentral organizer
 - ◆ GroupWise electronic mailing system

Other Business Software

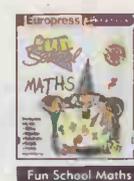
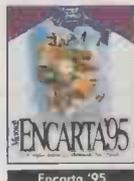
- ◆ GSP Pressworks and Designworks
- ◆ TurboCAD for Windows
- ◆ Organize Your Way
- ◆ CV & Job Search Pro
- ◆ Pacioli 2000 Business Accounts
- ◆ Masterclips SE and Picture This!

Educational Software

- ◆ Fun School 4, Spelling, In Time, Paint and Create and Maths
- ◆ Typing Tutor
- ◆ Computerworks
- ◆ Bodyworks
- ◆ Autoworks
- ◆ EZ Language French German and Spanish

CD Multimedia Software

- ◆ Microsoft Encarta® '95 Encyclopaedia CD
- ◆ Time Almanac CD
- ◆ Bodyworks multimedia CD
- ◆ UFO for Windows CD
- ◆ Dinosaur Museum CD



The new Perfect Office Systems from Time are powerful, high specification 486 and Pentium® systems that feature a minimum of 8Mb or 16Mb RAM and have been optimised for Microsoft Windows 95. Excellent business software from Novell and other leading manufacturers is included together with a range of educational and leisure software. All are fully multimedia ready

with fitted CD-ROM drives, 16-bit sound cards and a superb range of CD multimedia titles.

These systems are suited to the power user needing powerful software in the form of Novell PerfectOffice and are available on Interest Free Credit for a limited period only.

*APR

0%

INTEREST FREE CREDIT

Interest Free Credit is available subject to status. Written quotations are available on request. Be sure you can afford the payments before entering into a credit agreement. See page 11 for Interest Free example.

Multimedia Perfect Office 1 486DX2-66	Multimedia Perfect Office 2 486DX4-100	Multimedia Perfect Office 3 75MHz Pentium®	Multimedia Perfect Office 4 75MHz Pentium®	Multimedia Perfect Office 5 90MHz Pentium®
486DX2-66 with 8Mb RAM, 540Mb hard disk, and 14" screen	486DX4-100 with 8Mb RAM, 850Mb hard disk, and 14" screen	75MHz Pentium® processor with 8Mb RAM, 850Mb hard disk, 64-bit PCI graphics and 14" screen	75MHz Pentium® processor with 16Mb RAM, 1.08Gb hard disk, 64-bit PCI graphics, 2Mb video RAM and 15" screen	90MHz Pentium® Colossus Midi-Tower with Triton chipset, 16Mb RAM, 1.6Gb hard disk, 64-bit PCI graphics, 2Mb video RAM and 15" screen
£38* Per Month	£48* Per Month	£58* Per Month	£68* Per Month	£78* Per Month
£159.15 deposit and 24 monthly payments of £53 OR £519.15 deposit and 24 monthly payments of £38 Total price £1199+VAT = £1431.15 Inc delivery & VAT. *APR 0%	£156.65 deposit and 24 monthly payments of £58 OR £396.65 deposit and 24 monthly payments of £48 Total price £1299+VAT = £1548.65 Inc delivery & VAT. *APR 0%	£188.90 deposit and 24 monthly payments of £64 OR £332.90 deposit and 24 monthly payments of £58 Total price £1449+VAT = £1724.90 Inc delivery & VAT. *APR 0%	£248.40 deposit and 24 monthly payments of £86 OR £680.40 deposit and 24 monthly payments of £68 Total price £1949+VAT = £2312.40 Inc delivery & VAT. *APR 0%	£288.90 deposit and 24 monthly payments of £99 OR £792.90 deposit and 24 monthly payments of £68 Total price £2249+VAT = £2664.90 Inc delivery & VAT. *APR 0%
	14" to 15" Upgrade £99	90MHz Pentium® upgrade . . . £79 100MHz Pentium® upgrade .£179 14" to 15" upgrade £99	90MHz Pentium® upgrade . . . £79 100MHz Pentium® upgrade .£179 15" to 17" upgrade £199	100MHz Pentium® upgrade .£100 120MHz Pentium® upgrade .£250 133MHz Pentium® upgrade .£350 15" to 17" upgrade £199

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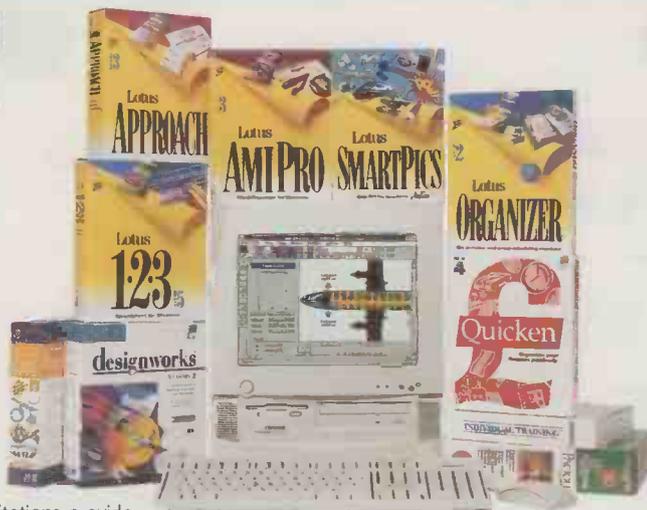


Compaq Presario Multimedia PowerStations



System Specification

- ◆ 486SX2-66 or 486DX4-100 processor
- ◆ 4Mb or 8Mb RAM expandable to 64Mb
- ◆ 420Mb hard disk
- ◆ 3.5" 1.44Mb floppy drive
- ◆ Local Bus SVGA graphics
- ◆ Compact 3 bay case with 2 slots
- ◆ Serial, parallel, joystick, MIDI and mouse ports
- ◆ 14" Low radiation NI SVGA colour screen
- ◆ 16-bit stereo sound card, microphone and speakers
- ◆ Double speed CD-ROM drive
- ◆ Integrated fax/data modem with telephone answering and CompuServe
- ◆ MS DOS 6.2, Windows® 3.1 (free upgrades to Windows 95 from Compaq), Tabworks, Welcome Centre, Control Centre and Learning Centre



Software**

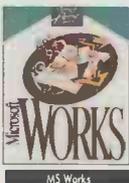
See software section for details

- ◆ Lotus 1-2-3 v5 spread sheet
- ◆ Lotus Ami Pro v3.1 word processor
- ◆ Lotus Approach v3 database
- ◆ Lotus Organizer v2
- ◆ Lotus SmartPics graphics
- ◆ Lotus Training for 1-2-3, Ami Pro and Approach
- ◆ New Intuit Quicken v4 personal finance pack
- ◆ GSP Pressworks 2 desktop publishing pack
- ◆ GSP Designworks 2 art & graphics pack
- ◆ Pacioli 2000 Business Accounts
- ◆ Microsoft Works v3 all-in-one package
 - ◆ MS Money finance pack
 - ◆ MS Entertainment pack
 - ◆ Microsoft Encarta® '95 Encyclopaedia
 - ◆ EZ Language French, German, Spanish & more
 - ◆ The Ultimate Human Body

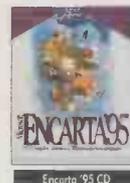
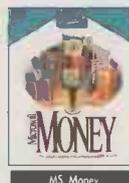
Compaq Presario Multimedia PowerStations provide you with famous brand, high quality solutions for home and business use. Only systems from Time come with additional software including the Lotus Business Suite, GSP graphics and DTP packages and New Quicken v4 personal finance pack. Also included are some excellent CD titles including Microsoft® Encarta, EZ Language and The Ultimate Human Body.

All systems feature high quality multimedia and also include fax & data modem with answerphone facilities.

Presario
PowerStation A £899
486SX2-66, 4Mb
and modem +VAT



Presario
PowerStation B £999
486SX2-66, 8Mb
and modem +VAT



Presario
PowerStation C £1099
486DX4-100, 8Mb
and modem +VAT



BUY NOW...

Pay only £137.65 deposit with nothing more to pay for 6 months

These new Time Machines for the business user feature a minimum of 8MB RAM and have been optimised for Microsoft Windows 95. They all come with excellent software and can be configured with Multimedia options, Advanced PC TV and Fax/Data modems if required. All systems are available on Interest Free Credit with a incredible buy now, pay later offer.



...PAY LATER

After 6 months pay just £49 per month for 24 months on Interest Free Credit. *APR 0%.



System Specification

- ◆ 486 Models: 486DX2-66 or 486DX4-100 Processors
- ◆ Pentium Models: Pentium® 75, 90, 100MHz processor
- ◆ 8Mb RAM expandable to 64/128Mb
- ◆ 540Mb or 850Mb fast Enhanced IDE hard disks with up to 256K cache
- ◆ 1.44Mb floppy drive.
- ◆ Super fast Local bus SVGA graphics controller with 1Mb Video RAM
- ◆ 14" or 15" SVGA low radiation colour screen
- ◆ Mitac desktop case with 4 drive bays and 7 slots.
- ◆ 102 Keyboard and Microsoft compatible mouse
- ◆ Microsoft Windows 95
- ◆ 12m Warranty extendable to 5 Years

Optional: Advanced PC TV system with Teletext£160
Optional: Multimedia Hardware
Optional: Fax & Internet Packs

Time Machine 95 /A
486DX2-66 with 8Mb RAM,
540Mb hard drive and 14" screen

£137.65 deposit,
nothing to pay for
6 months and
then 24 monthly
payments of £49.
Total price £1099
+VAT = £1313.65
inc delivery and
VAT. *APR 0%.

£49
Per Month

Time Machine 95 /B
486DX4-100 with 8Mb RAM,
850Mb hard drive and 14" screen

£159.15 deposit,
nothing to pay for
6 months and
then 24 monthly
payments of £53.
Total price £1199
+VAT = £1431.15
inc delivery and
VAT. APR *0%.

£53
Per Month

Time Machine 95 /C
75MHz Pentium® with 8Mb RAM,
850Mb hard drive, 64-bit PCI
graphics and 14" screen

£178.15 deposit,
nothing to pay for
6 months and
then 24 monthly
payments of £62.
Total price £1399
+VAT = £1666.15
inc delivery and
VAT. APR *0%.

£62
Per Month

90MHz Pentium® upgrade+£79
100MHz Pentium® upgrade +£179
14" to 15" Upgrade +£99



Software**

See software section for details

Business Software

- ◆ Lotus Software suite including Lotus 1-2-3, Ami Pro, Approach, Organizer 2, SmartPics and Lotus Training
- ◆ GSP Pressworks and Designworks
- ◆ TurboCAD for Windows
- ◆ Organize Your Way
- ◆ CV & Job Search Pro
- ◆ Pacioli 2000 Business Accounts
- ◆ Masterclips SE and Picture This!

Educational Software

- ◆ Fun School 4, Fun School Maths and Typing Tutor
- ◆ Computerworks, Bodyworks and Autoworks
- ◆ EZ Language French, German and Spanish

Leisure Software

- ◆ PC Paintbrush
- ◆ Arts & Letters Draw
- ◆ Doom, Blake Stone, Pinball and Raptor shareware games

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Multimedia Family PC



System Specification

- ◆ 486DX2-66, 486DX4-100 or Pentium 75 processor
- ◆ 540Mb Enhanced IDE hard disk
- ◆ 4Mb or 8Mb RAM (Max. 64Mb)
- ◆ 1.44Mb 3.5" floppy drive
- ◆ Pentium technology upgradeable
- ◆ Local Bus SVGA graphics with 1Mb
- ◆ 14" SVGA colour screen
- ◆ Expandable case with 4 bays and 7 slots
- ◆ 102 Keyboard and mouse
- ◆ 12 months warranty expandable to 5 years
- ◆ Manufactured by Mitac in the UK

Multimedia Hardware

- ◆ Double Speed or Quad Speed IDE CD-ROM drive
- ◆ 16-bit high quality sound card
- ◆ Twin stereo speaker system
- ◆ Free 100 hours Internet access worth over £300 (modem required)

Optional:

Fax & Internet Packs - Call for details

Optional:

PC TV with Teletext £160 +VAT



Software**

See software section for details

The superb 32-bit multitasking version of Lotus SmartSuite for OS/2 with the following programs:-

- ◆ Lotus 1-2-3 Spreadsheet
- ◆ Lotus Ami Pro WordProcessor
- ◆ Lotus Freelance Presentation Graphics
- ◆ Lotus CC:Mail Licence
- ◆ Padioli 2000 Accounts Suite
- ◆ PC DOS 7 -the latest version
- ◆ IBM OS/2 Warp 32-bit operating System
- ◆ IBM Works easy to use pack
- ◆ IBM Personal Information Manager
- ◆ IBM FaxWorks, Person-to-person
- ◆ CompuServe Information Manager & Internet Access (Modem required)
- ◆ DOOM, Epic Pinball, Raptor and Blake Stone shareware games

Fun school suite covering all the essential elements of the National Curriculum.

- ◆ Fun School 4 educational pack, Maths pack, Spelling, Fun School 5 in Time and Paint & Create

InfoWare Encyclopaedias

- ◆ Exploring Animals: Covers 195 different animals and their behaviour with video footage and photographs.
- ◆ Amazing Journeys: 1000 years of exploration, detailed animated journeys and discoveries
- ◆ World of Knowledge: Animated encyclopaedia covering 38 subjects
- ◆ World of Pharaohs: Interactive encyclopaedia of ancient Egypt with animation and maps
- ◆ History in Motion: Interactive encyclopaedia covering the history and development of transport



The new Family PC from TIME represents the best value Multimedia Educational PC system for the home. Models feature top quality advanced PC systems from Mitac, fitted with full-feature multimedia and pre-loaded with superb Lotus SmartSuite software and a range of other educational and leisure applications. At these special limited offer prices and with INTEREST FREE CREDIT for £29* per month these deals are simply unbeatable.

Multimedia Family PC /A 486DX2-66

With 540Mb drive and 4Mb RAM

£799 +VAT

Interest Free Credit

£29* Per Month

£265.15 deposit and 24 Monthly Payments of £29.
Total price £799 + VAT = £961.15 Inc. Delivery & VAT.
APR 0%

Multimedia Family PC /B 486DX2-66

With 540Mb drive and 8Mb RAM

+£139 +VAT

Multimedia Family PC /C 486DX4-100

With 540Mb drive and 8Mb RAM

£999 +VAT

Interest Free Credit

£39* Per Month

£260.15 deposit and 24 Monthly Payments of £39.
Total price £999 + VAT = £1196.15 Inc. Delivery & VAT.
APR 0%

Multimedia Family PC /D 75MHz Pentium*

With 540Mb drive and 8Mb RAM

+£100 +VAT

*APR

0% INTEREST FREE CREDIT

Interest Free Credit is available subject to status. Written quotations are available on request. Be sure you can afford the payments before entering into a credit agreement. See page 4 for Interest Free example.

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Mitac Notebooks

This superb new range of high performance notebooks from Mitac feature superb 486DX2-66 or 486DX4-100 processors with low power consuming 3.3V technology, superb crisp sharp mono or dual scan STN colour screens, latest PCMCIA type II/III slots, upto 20Mb standard RAM and high performance hard disks with up to 1.2Gb capacity. They feature a full notebook keyboard, integral

1.44Mb floppy drive, all standard ports a superb easy to use trackball and come complete with a range of excellent business software from Lotus, Quicken and AutoRoute.

Just compare the specifications with any other notebook in this price range and we are sure you will agree that these systems are unbeatable.

Finance from under

£49*
Per Month

*APR
19.8%

Finance Example: Cash Purchase: £899 + VAT = £1078.65 inc. delivery & VAT. Credit Purchase: 10% (£107.87) deposit and 24 equal monthly payments of £48.54 Total Price £1272.83 inc. delivery & VAT.



Notebook Specification

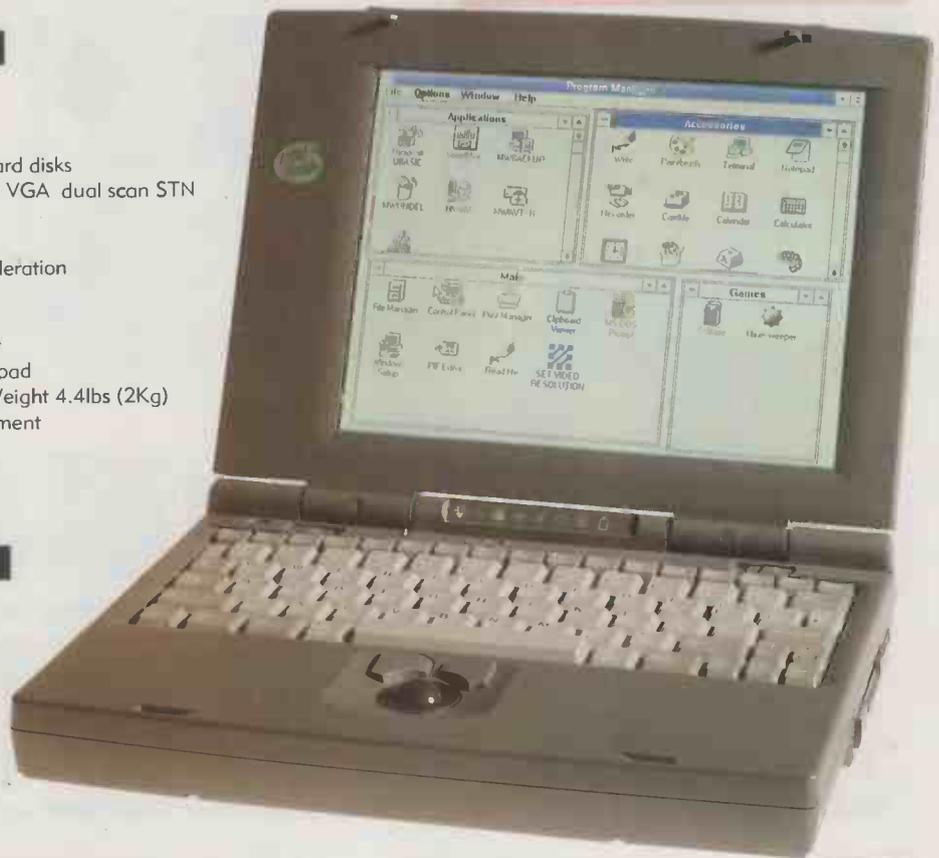
- ◆ 486DX2-66 or 486DX4-100 processor
- ◆ 4Mb, 8Mb, 12Mb or 20Mb RAM
- ◆ 340Mb, 540Mb, 810Mb or 1.2Gb fast IDE hard disks
- ◆ High contrast 9.5" LCD VGA mono or superb VGA dual scan STN colour displays
- ◆ 3.5" removable 1.44Mb floppy disk drive
- ◆ VESA Local bus graphics with Windows acceleration
- ◆ PCMCIA type II or I type III slot
- ◆ Built in 25mm trackball
- ◆ Parallel port, serial port, VGA port & PS2/port
- ◆ Integral 79-key keyboard with embedded keypad
- ◆ Size 26.8 x 20.4 x 4.5cm. (10.5 x 8 x 1.8" Weight 4.4lbs (2Kg)
- ◆ Up to 3 hour battery life with Power Management
- ◆ Battery & AC pack included
- ◆ DOS and Microsoft Windows 3.11
- ◆ 12 months warranty extendable to 3 years



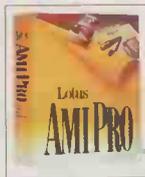
Software**

See software section for details

- ◆ Lotus 1-2-3 v5 Spread sheet
- ◆ Lotus Ami Pro v3.1 Word processor
- ◆ Lotus Approach v3 Database
- ◆ Lotus Organizer v2
- ◆ Lotus SmartPics Graphics
- ◆ AutoRoute Express UK Electronic Road Atlas
- ◆ Quicken v4 Personal Finance Pack



Lotus 1-2-3



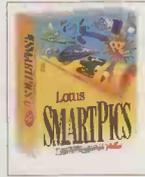
Lotus Ami Pro



Lotus Approach



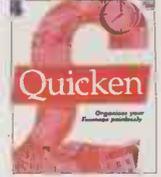
Lotus Organizer v2



Lotus SmartPics



AutoRoute Express



Quicken v4

Mitac Mobile Office 1
486DX2-66 Mono
With 340Mb hard drive

£899

+VAT

RAM Upgrade to 8Mb + £150

Mitac Mobile Office 2
486DX4-100 Mono
With 540Mb hard drive

£1029

+VAT

RAM Upgrade to 8Mb + £150

Mitac Mobile Office 3
486DX2-66 Colour
With 340Mb hard drive

£1269

+VAT

RAM Upgrade to 8Mb + £150

Mitac Mobile Office 4
486DX4-100 Colour
With 540Mb hard drive

£1399

+VAT

RAM Upgrade to 8Mb + £150
RAM Upgrade to 12Mb + £300

Mitac Mobile Office 5
486DX4-100 Colour
With 810Mb Hard Drive
(1.2Gb drive £220 extra)

£1569

+VAT

RAM Upgrade to 8Mb + £150
RAM Upgrade to 12Mb + £300
RAM Upgrade to 20Mb + £600

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Multimedia Office 95



System Specification

- ◆ 486 Models: 486DX2-66 or 486DX4-100 processors
- ◆ Intel 75, 90, 100, 120 or 133MHz Pentium® based processor
- ◆ 8Mb or 16Mb RAM expandable to 64/128Mb
- ◆ 540Mb, 850Mb, 1.08Gb or 1.6Gb fast Enhanced IDE hard disks with up to 256K cache
- ◆ 1.44Mb floppy drive
- ◆ Super fast local bus SVGA graphics controller with 1Mb or 2Mb Video RAM
- ◆ 14", 15" or 17" SVGA low radiation colour screen
- ◆ Mitac desktop case with 4 drive bays and 7 slots. Model 5 features Colossus Midi-Tower case with 8 drive bays
- ◆ 102 Keyboard and Microsoft compatible mouse
- ◆ Microsoft Windows 95
- ◆ 12 months warranty extendable to 5 years

Multimedia Hardware

- ◆ Double Speed or Quad Speed IDE CD-ROM drive
- ◆ 16-bit high quality sound card
- ◆ Twin stereo speaker system
- ◆ PC Joystick



Optional: Advanced PC TV system with Teletext + £160
 Optional: Fax & Internet Packssee section at the back



Software**

See software section for details

- ◆ Microsoft Works v3 integrated package featuring word processing, spread sheet, data base and business graphics.
- ◆ Microsoft Encarta '95 Multimedia Encyclopaedia CD
- ◆ Microsoft Dangerous Creatures CD
- ◆ Microsoft Multimedia Beethoven CD
- ◆ Microsoft Multimedia Golf CD
- ◆ Quicken v4 Personal Finance pack
- ◆ TurboCAD v2 for Windows CAD package
- ◆ IMSI EZ Language French, German & Spanish
- ◆ Masterclips SE Clipart
- ◆ Picture This! Graphics Management Pack
- ◆ Play & Learn Educational CD
- ◆ Doom, Raptor, Blake Stone and Pinball Games

Plus Models (£150 extra) also include the following additional software. Microsoft Office '95 Package which includes the following 4 programs (not pre-loaded)

- ◆ Microsoft Excel 95 spread sheet
- ◆ Microsoft Word 95 word processor
- ◆ Microsoft PowerPoint 95 presentation package
- ◆ Microsoft Organizer/Scheduler
- ◆ Time Almanac CD
- ◆ Dinosaur Museum CD
- ◆ UFO CD
- ◆ Bodyworks CD



Finance from under

£49*
Per Month

Finance Example
 Cash Purchase: £899 + VAT
 = £1078.65 inc. delivery & VAT.
 Credit Purchase: 10% (£107.87)
 deposit and 24 equal monthly
 payments of £48.54 Total Price
 £1272.83 inc. delivery & VAT.

*APR
19.8%

The Multimedia Office 95 Systems provide systems based around Microsoft's software solutions. These high specification systems have been optimised for Windows 95 and include a minimum of 8Mb or 16Mb RAM, large hard disk up to 1.6Gb, fast 486 and Pentium® processors and plenty of expansion potential. All are fully multimedia ready with fitted CD-ROM drives, 16-bit sound cards, an excellent range of CD titles from Microsoft and others. Low cost Fax and

Internet packs and PC TV with Teletext options are also available.

Multimedia Office 95 Plus models come with additional software which includes the new 32-bit version of Microsoft Office 95 and additional CD titles. With Finance options from under £49 these systems are going fast!

Multimedia Office 95/1 486DX2-66	Multimedia Office 95/2 486DX4-100	Multimedia Office 95/3 75MHz Pentium®	Multimedia Office 95/4 75MHz Pentium®	Multimedia Office 95/5 90MHz Pentium®
486DX2-66 with 8Mb RAM, 540Mb hard disk and 14" screen	486DX4-100 with 8Mb RAM, 850Mb hard disk and 14" screen	75MHz Pentium® processor with 8Mb RAM, 850Mb hard disk, 64-bit PCI graphics and 14" screen	75MHz Pentium® processor with 16Mb RAM, 1.08Gb hard disk, 64-bit PCI graphics with 2Mb video RAM and 15" screen	90MHz Pentium® processor Colossus Midi-Tower with 16Mb RAM, 1.6Gb hard disk, Triton chipset, 64-bit PCI graphics with 2Mb video RAM and 15" screen
£899 +VAT	£999 +VAT	£1099 +VAT	£1499 +VAT	£1699 +VAT
Plus models with Office 95 £1049	Plus models with Office 95 £1149	90MHz Pentium® +£79 100MHz Pentium® +£179 14" to 15" upgrade +£99 Plus models +£199 Plus models with Office 95 +£1249	90MHz Pentium® +£79 100MHz Pentium® +£179 15" to 17" upgrade +£199 Plus models +£199 Plus models with Office 95 +£1649	100MHz Pentium® +£100 120MHz Pentium® +£250 133MHz Pentium® +£350 15" to 17" upgrade +£199 Plus models +£199 Plus models with Office 95 +£1849

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Ultimate Time Machine

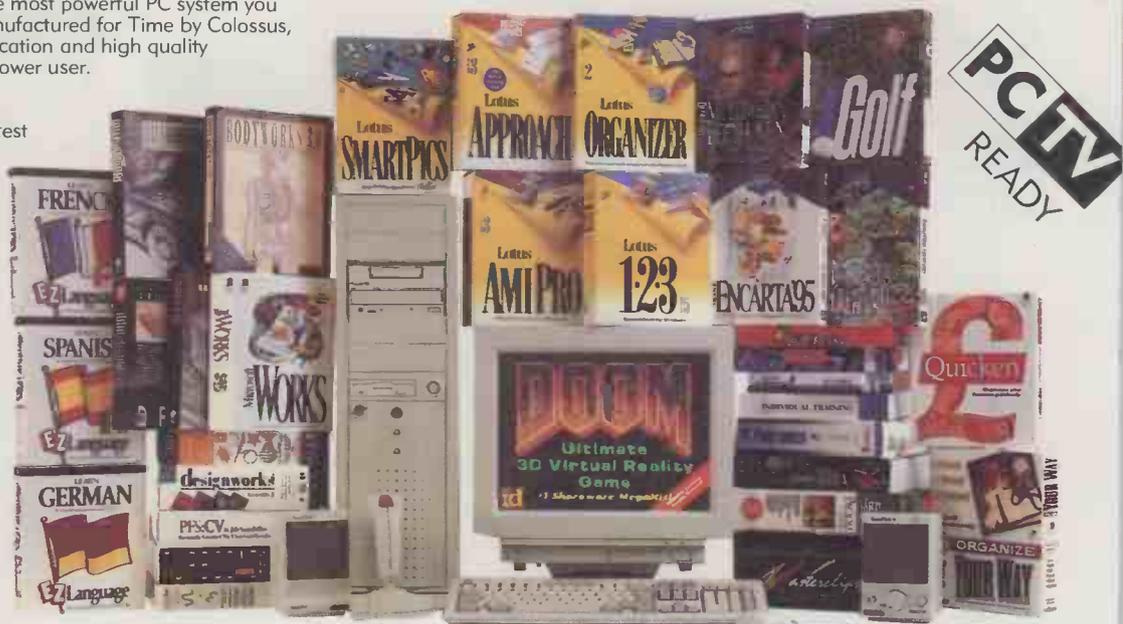
The PC you have always wanted. Now affordable at just £99 per month at APR 0%!

The Ultimate Time Machine is the most powerful PC system you can buy today. This system, manufactured for Time by Colossus, comes with a truly incredible specification and high quality components that are ideal for the power user.

Take a closer look at the specification which includes the fastest Intel® Pentium processors, 1.6Gb enhanced IDE hard disk, a minimum of 16Mb RAM, the fastest 64-bit s3 PCI graphics with 2Mb video RAM, superb 17" screen, super fast 28.8 modem, 3.2Gb tape back up, advanced PC TV system with Teletext and quad speed full-feature multimedia.

What makes the system truly unbeatable is the powerful range of Lotus and CD Multimedia titles - virtually everything you are ever likely to need is included.

If you could afford it, this is the machine you would buy. Now at just £99 per month on an incredible Interest Free Credit Offer, you can afford it!



APPROVED for completion of telecommunications systems specified in our manuals for use subject to the conditions set out in them



System Specification

- ◆ Intel 100 or 133 MHz Pentium® processor
- ◆ Intel Triton Chipset with 256K external cache
- ◆ 16Mb or 32Mb RAM expandable to 128Mb
- ◆ 1.6Gb fast enhanced IDE hard disk with up to 256K cache
- ◆ Super fast PCI local bus SVGA graphics controller with 2Mb video RAM
- ◆ 17" SVGA low radiation colour screen
- ◆ Colossus full-tower case with 9 drive bays and heavy duty power supply
- ◆ 1.44Mb floppy drive
- ◆ 102 Keyboard and Microsoft® compatible mouse
- ◆ Microsoft Windows 95
- ◆ 12 months warranty extendable to 5 years

Multimedia Hardware

- ◆ Quad speed IDE CD-ROM drive
- ◆ 16-bit high quality sound card
- ◆ Twin stereo speaker system
- ◆ PC joystick
- ◆ PC microphone

Fax & Internet Pack

- ◆ BAPT approved 28.8 data and fax modem
- ◆ Easy to use fax software
- ◆ Communications software
- ◆ Introductory subscription to CompuServe with Internet mailbox
- ◆ Advanced PC TV system with Teletext
- ◆ 3.2Gb tape back-up system with software



Software**

See software section for details

Business Software

- ◆ Lotus Software suite including Lotus 1-2-3, Ami Pro, Approach, Organizer 2, SmartPics and Lotus Training
- ◆ GSP Pressworks and Designworks
- ◆ TurboCAD for Windows
- ◆ Organize Your Way
- ◆ CV & Job Search Pro
- ◆ Paciolini 2000 Business Accounts
- ◆ Masterclips SE and Picture This!

Educational Software

- ◆ Fun School 4, Fun School Maths and Typing Tutor
- ◆ Computerworks, Bodyworks and Autoworks
- ◆ EZ Language French, German and Spanish

Leisure Software

- ◆ PC Paintbrush
- ◆ Arts & Letters Draw
- ◆ Doom, Blake Stone, Pinball and Raptor Games

CD Multimedia Software

- ◆ Microsoft Encarta® '95 Encyclopaedia CD
- ◆ Microsoft Works CD
- ◆ Microsoft Golf CD
- ◆ Microsoft Beethoven CD
- ◆ Microsoft Dangerous Creatures CD
- ◆ Time Almanac CD
- ◆ UFO for Windows CD
- ◆ Dinosaur Museum CD

Ultimate Time Machine 3

£99 Per Month

£416.15 deposit and 24 monthly payments of £150 OR
£1640.15 deposit and 24 monthly payments of £99.
Total price £3399 + VAT = £4016.15 inc delivery & VAT.
*APR 0%

133MHz Pentium model +£250
32Mb models £Call
Plus model with Additional MS Office 95 ... +£150

*APR

0% INTEREST FREE CREDIT

Interest Free Credit is available subject to status. Written quotations are available on request. Be sure you can afford the payments before entering into a credit agreement. See page ii for Interest Free example.

Just Look At The Spec !

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CorelDRAW Version 6

If you are buying Windows 95 and are into graphics then this latest version of CorelDRAW is a must!

£145⁴⁵



Quicken V4 & Windows 95

The UK's best-selling personal finance program is available in an unbeatable bundle, exclusive from Software Warehouse.

£69



MS Office 95

Microsoft Office is now available for Windows 95. It includes a host of new features, turn to page four to find out how to get the most out of your PC.

£142⁹⁵



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Confused by Windows 95? I was! Lucky the Software Warehouse Win 95 team helped make the move painless.

Windows 95

Order your copy of Windows 95 from Software Warehouse now and if you buy any other Windows 95 product get it for just £54.95!

FROM £54⁹⁵



See page 2

Microsoft

32 Pages of great deals on software, memory, storage and peripherals!

For 16 More pages of offers read our supplement in the new **PC Advisor** magazine!



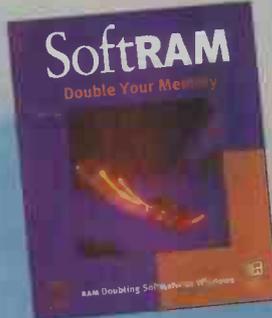
OR call the salesteam and we'll be happy to send you a free copy of our 16 page supplement.

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Page 1



SoftRAM

See page 26

Double your PC's memory for under£50! If your PC needs more memory to run Windows 95 / Windows 3.1 applications then SoftRAM is the safe, cost-effective answer. And it really does work!

ONLY £48⁹⁵

See page 20



SEE P.6 **£48⁹⁵**



SEE P.8 **£99**

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We are often asked how we fulfil so many orders every day. If you have ever wondered what happens after your order is placed - read on...

Your call is answered by one of our trained sales people. Each one can tell you instantly whether the item you want is in stock (currently over 85%), and if not when it is expected.



1



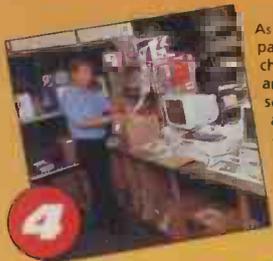
Your order is entered onto our system while you are on the telephone and your credit card authorised instantly (only for goods being shipped that day).

2

A picking note is then printed in Dispatch. One of our warehouse team then check the note and pick your order, ready for packing and dispatch.



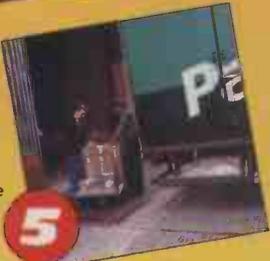
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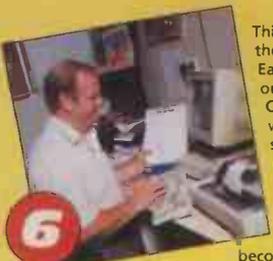
As your order enters packing, it is checked again (we are currently seeking ISO9000 accreditation) to ensure you receive exactly what you ordered.

4

Your order then moves to goods out and is ready for next-day delivery direct to your door. Thanks to this efficient system we can take your order up to 3pm and still deliver next-day!



5



This isn't the end of the line though. Each order includes our Customer Charter Card where YOU get a say in how we run our business. Your comments have enabled us to get this far. We aim to become even better!

6

SOFTWARE WAREHOUSE

INTRODUCTION

A Very Special Offer from Software Warehouse

You will recently have noticed there has been the largest software launch of the last ten years! If you haven't got your copy of Windows 95 yet then we have a very special offer just for you. If you order any product from pages 3 through 7 of this catalogue, then you can buy Windows 95 from Software Warehouse for just £54.95 plus VAT and delivery. But hurry, this offer is limited and must end 31st of October.



Steve Bennett



Only £54.95

Windows '95!

The new ground-breaking upgrade to Microsoft Windows will replace Windows 3.1, Windows for Workgroups 3.11 and all versions of MS-DOS. It's robust, fast and features integrated multimedia, networking and a fantastic new interface!

✓ New Interface

Smarter, easier to use interface features longer file names (up to 250 characters!), one click access to all programs and documents with the 'Start' button. Simpler file and document management.

✓ Bigger, Smoother Video

Windows '95 is a powerful 32 bit operating system and lets your computer process more data effectively making the quality of the video you see vastly better.

✓ Plug-and-Play Upgrades

Upgrading your PC is easier! With new Plug-and-Play technology Windows automatically recognises compatible sound cards, drives and more! No more complicated installation routines and struggling with AUTOEXEC.BAT and CONFIG.SYS.

✓ Plays all Your Music

Windows '95 plays all of the music CDs you currently own. When you place a CD in your computer, Windows automatically detects the disc so you can easily play music in the background as you work.

✓ True 32 bit Multitasking

Windows '95 allows you to run multiple 32 bit applications concurrently. Printing, faxing, communicating, redrawing,

rendering and much more can all be done while you work in another application!

✓ Integrated Access to e-mail, Faxes and the Internet

Windows '95 features built-in access to the kinds of services that have been difficult to access before. Simply point and click your way to the information superhighway!

CD-ROM Version

£59

STOCK CODE: WIN072

Floppy disk Version £59

STOCK CODE: WIN071



Do you need to upgrade to Windows '95?

It is almost certain that all future upgrades of your favourite applications and games will be written specifically to take advantage of Windows '95's unique features. Not upgrading could leave you out in the cold when it comes to the latest software releases. Don't forget that Windows '95 will run all your existing applications. However, new 32-bit applications written for Windows '95 will NOT run on previous versions of Windows.



Call our dedicated Win '95 hotline
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The professional collection of 150 colour clip-art images. Each vector picture is fully editable and scalable without loss of image quality.



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WINDOWS '95 UTILITIES

Get Your PC Ready For Windows 95!



Memory

Windows 95 requires more memory (RAM) to operate to its full potential. You'll need at least 8MB to take full advantage of Windows 95, whereas most PCs are supplied with 4MB.

30-PIN SIMMS

4MB x 9, 70ns.....SIM022.....**£102**

72-PIN SIMMS

1MB x 32 (4MB).....SIM023.....**£99**
 1MB x 36 (4MB).....SIM026.....**£101**
 2MB x 32 (8MB).....SIM024.....**£191**
 2MB x 36 (8MB).....SIM027.....**£219**
 4MB x 32 (16MB).....SIM025.....**£328**
 4MB x 36 (16MB).....SIM028.....**£381**

For More Memory please see page 26



Pace Linnet

Pace Linnet is an integrated voice, fax and data modem. This V32bis, desktop modem supports all data speeds up to 28,800bps and full send and receive fax facilities. They have full error correction and data compression, and MNP10 for cellular connections. The Pace Linnet features on the Microsoft Windows 95 compatible list.



PAC003 PACE Linnet V32+ Fax.....**£164⁹⁵**
 PAC004 PACE Linnet V34 Fax.....**£179⁹⁵**

WHAT DOES WINDOWS 95 PLUG AND PLAY ACTUALLY MEAN?

Plug and Play is the name given to peripherals and hardware that, when attached to a PC running Windows 95, are instantly recognised by the operating system. This means that you'll not need to install device drivers, alter config.sys or autoexec.bat, or change your system BIOS. With Plug and Play technology users can easily add new upgrades to their PCs.

Even if the component that you're buying doesn't conform to true Plug and Play standards, installation is still easier under Windows 95 than with previous operating systems.

Diamond Stealth 64 DRAM

The world's fastest DRAM graphics accelerator! Featuring amazing Windows performance, and super fast DOS performance.

Diamond Stealth 64 DRAM gives you 1280 x 1024 with 256 colours, up to 120MHz refresh rates. Diamond Stealth Video Cards feature on the Microsoft Windows 95 compatible list.



DIA012 D/Stealth 1MB DRAM VLB.....**£119⁹⁵**
 DIA013 D/Stealth 1MB DRAM PCI.....**£149⁹⁵**

Storage

Windows 95 requires more free hard disk space than Windows 3.x. A fast, reliable hard drive is essential to take advantage of Windows 95 and all subsequent applications. Seagate Hard Drives feature on the Microsoft Windows 95 compatible list.



SEA002 Seagate ST3660A 545MB.....**£139⁹⁵**
 SEA003 Seagate ST5850A 850MB.....**£179⁹⁵**
 SEA004 Seagate ST1220A 1.08GB.....**£239⁹⁵**
 SEA007 Seagate ST32430N 2.1GB SCSI.....**£679⁹⁵**

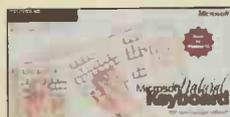
For More Storage please see page 29



Microsoft Natural Keyboard (P&P)

Its unique contoured design encourages a balanced, more natural hand and wrist position. It also features extra function keys that work only with Windows 95.

MIC205 MS Natural Keyboard.....**£68⁹⁵**



Microsoft Mouse 2.0 (P&P)

Extensive ergonomic research and new IntelliPoint software makes the Microsoft Mouse the perfect pointing tool for use with Windows 95. Choose from more than 125 cursors, and with its true Plug and Play simply connect it to your PC and start pointing to the future!

MIC031 MS Mouse 2.0.....**£41⁹⁵**



For More Mice, please see page 24



Turbo Chip

Turbo Chip will convert any 486 SX or DX chip to either a DX 75MHz or 100MHz. If your processor is removable, Turbo Chip will replace it, if not it fits in your OverDrive socket. It also comes with a maths co-processor, 8Kb of internal cache memory (most chips only have 1Kb), and it has a builtin fan.



Turbo Chip features on the Microsoft Windows 95 compatible list.

TUR065 Up to 75MHz DX Chip.....**£199⁹⁵**
 TUR066 Up to 100MHz DX Chip.....**£219⁹⁵**

NEC Six Speed CD-ROM Drives

These drives represent a huge step forward in CD-ROM drive technology. Six-spin SCSI-2, massive 900KB/sec. data transfer, 150ms access time, MPC, XA, DA, caddy-loading, and with one-year warranty. The NEC Six Speeds feature on the Microsoft Windows 95 compatible list.



NEC045 NEC 6X Internal.....**£269⁹⁵**
 NEC046 NEC 6X External.....**£445⁹⁵**

For More CD-ROM Drives, see page 24



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TRUE 32BIT WINDOWS 95 APPLICATIONS



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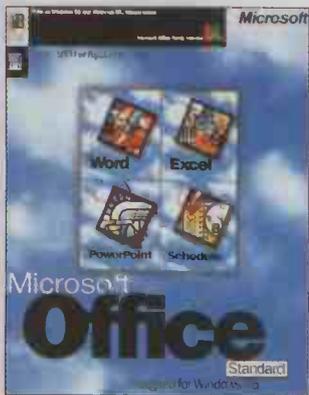
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WHAT IS A 'TRUE' 32BIT WINDOWS APPLICATION?

Although your current Windows 3.1 applications will still run on Windows 95 (some utilities might not) they will not be able to take full advantage of this new 32-bit architecture. By buying a true Windows 95 application you will be able to utilise longer file names, easy uninstall, true multi-tasking and much more. If you're upgrading to Windows 95 take advantage of our £54.95 price when you buy any 32-bit software.

New! Microsoft Office for Windows 95

4 Windows 95-Ready Office Applications in 1 Package



Microsoft Word: Everyday tasks are automatic and complex tasks are made easier by use of Windows 95's exclusive 32-bit technology. Word offers IntelliSense innovations, such as AutoCorrect, which automatically corrects mis-spelled words and typos. Also write and send formatted e-mail within Word using the WordMail editor.

Microsoft Excel: Whether you're working on a simple summary, charting sales trends, or performing advanced analysis, Microsoft Excel helps you to get your job done easily.

- Enhanced IntelliSense technology, plus more intuitive help and integration
- Significant performance improvements help you get your work done faster
- Powerful new analysis tools simplify a variety of complex tasks

Microsoft Schedule+: Manage calendars, tasks and contacts for yourself with the time manager that puts time on your side.

- Store and retrieve names, addresses and phone numbers easily
- Import and export contacts data from applications and insert it into Word documents
- Plan meetings quickly with the meeting Wizard

Microsoft PowerPoint: Create professional-looking presentations that deliver your message in any situation.

- Bring your presentation to life with extended animated builds and sounds
- Take meeting notes and assign action items on the spot with the Meeting Minder
- Type a help request in your own words and the Answer Wizard finds the answer

New For Windows 95!



MICROSOFT OFFICE PROFESSIONAL INCLUDES:



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 - MS Excel
 - MS Powerpoint
 - MS Schedule +
- Plus:
- MS Access - Lets you choose or create one relational database for all levels of users.

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Office Professional	3.5" MIC289 £428⁹⁵ CD MIC290 £427⁹⁵	3.5" MIC293 £208⁹⁵ CD MIC294 £207⁹⁵	3.5" MIC291 £248⁹⁵ CD MIC292 £247⁹⁵

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CorelDRAW! V6 for Windows 95

For other versions of CorelDRAW! See Page 21

Upgrade from £145⁹⁵

Designed for Microsoft Windows 95

CorelDRAW! V6 - The World's Premier 32bit Windows 95 Drawing Software!

CorelDRAW 6 is THE essential drawing package for Windows. If you need to illustrate, photo-edit, 3D-render, present or chart absolutely anything then CorelDRAW! 6 for Windows 95 is the software to choose.

New for Version 6 is increased speed and power, a Multiple Document Interface (MDI), which allows many documents to be open at once or many different views of the same document, and fully customisable hot keys and a status bar. There is greater ease of use with Wizards and Tutor notes as well as increased precision to an amazing 0.1 micron.

To make designing posters or large scale graphics easier, page size support has been increased to over 150 feet by 150 feet! OLE 2.0 support enables in-place editing and OLE automation. There is also OPI (Open Press Interface) support.

CorelDraw! Version 6 includes CorelDRAW! 6, Corel PhotoPaint 6, Corel Presents, CorelDream 3D PLUS 9 Powerful Utilities! And now there's 90 days FREE technical support from Corel - You can't go wrong!

COR122	CorelDraw! 6 - Full Version on CD	£259⁹⁵
COR123	CorelDraw! 6 - U/G from V3 or 4 on CD	£224⁹⁵
COR124	CorelDraw! 6 - Upgrade from V5 on CD	£145⁹⁵

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WINDOWS 95 VIDEOS £18⁹⁵

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PC0169	Introduction to Windows 95	£18⁹⁵
PC0199	Advanced Guide to Win 95	£18⁹⁵
PC0200	Windows 95 - Hints and tips	£18⁹⁵
PC0201	Using the Internet with Win 95	£18⁹⁵
PC0202	MS Networks with Windows 95	£18⁹⁵

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TRUE WINDOWS '95 SOFTWARE

ABC Graphics Suite For Windows 95

ABC Graphics Suite is the complete graphics package for the Microsoft Windows 95 and Office 95 user.

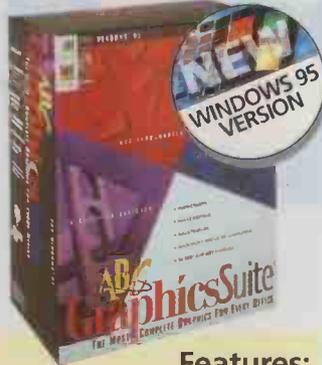
Micrografx has merged ABC FlowCharter, Designer, Picture Publisher and the revolutionary new ABC Media Manager into the ABC Graphics Suite. It combines superior diagramming, flowcharting, drawing, image editing, painting and clipart whilst using the familiar Microsoft Office for Windows 95 interface.

Because ABC Graphics Suite uses the familiarity of an industry-standard interface, you and/or your colleagues can get up and running more easily. ...And because it's a true 32-bit Windows 95 application, its performance is up to four times that of 16-bit applications.

ABC Graphics Suite features award-winning diagramming, imaging, and illustration tools to let you work with greater productivity and let your ideas gain shape speedily. The Drag-and-Drop Clipart Manager allows you to easily incorporate clipart into your work.

ABC Graphics Suite includes:

- ABC FlowCharter
- Micrografx Designer
- Micrografx Picture Publisher
- Micrografx Media Manager
- Visual Clipart Libraries and Fonts



Features:

- Superior diagramming, flowcharting, drawing, image editing features and more
- True 32-Bit with multithreading
- Over 20,000 pieces of ClipArt
- Over 7,500 photographs
- Over 2,000 diagramming symbols
- More than 250 fonts
- Compatible with over 50 file formats including TIFF, BMP, DXF and CorelDraw!
- Comes on two CD-ROMs

ABC006 ABC Graphics Suite .. **£239⁹⁵**
ABC007 Comp. Upgrade **£99⁹⁵**

Timex DataLink

The smart way to organise With the Timex DataLink watch and Windows 95, you can transfer data from a PC onto your wrist!

Using Timex and Microsoft's personal time manager software (included), you enter and store information on your PC. Then elect the entries you want to send your watch. You can also directly link to Microsoft Schedule Plus for Windows.

In addition to telling the time and offering a programmable link to your PC, the Timex Data Link watch features day/date, three year battery life, Indiglo™ night light and it is water resistant at up to 100 metres.

No wires, no cables - Just point the watch at your screen!

Downloading information with the Timex Data Link comms technology is as easy as pointing your wrist at the screen. The watch sensor reads the flashing bars of light - that's the data. In seconds, the watch loads up to 70 different entries, then update as often as you like.

A little black book on your wrist!

Think of your Timex Data Link watch as a little black book on your wrist. It can hold:

- Your telephone numbers - Need a number, just bring it up on your watch.
- Appointments - The watch will beep to let you know that it's time to leave for an appointment or an event. It will even show you who you're meeting with and where.
- Never forget another birthday or anniversary again! A friendly reminder icon appears a week before an event, and then flashes on the day.
- To-Do-Lists - A great memo log that prioritises tasks.
- Alarms - Pre-set up to five alarms a day.

£89⁹⁵ STOCK CODE: TIM014



Only **£54⁹⁵**
(See Page 2)

XaraStudio For Windows 95

Xara Studio is a new class of graphics program combining the best features from traditional drawing programs with some amazing new technology and performance!

Xara Studio is more than just a drawing or illustration program, it's a new type of graphics program. Xara Studio combines all the best features of object-oriented drawing programs, with some new, unique and outstanding capabilities.

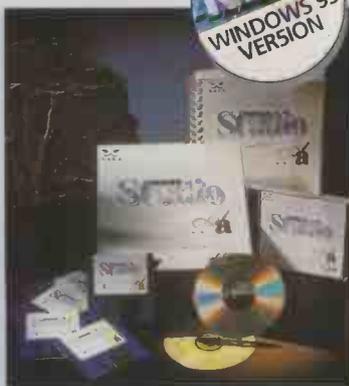
Add this to the fact that it has been designed from the start as a 32-bit application - ie. it carries none of the outdated baggage that 16-bit applications are lumbered with. However, with the addition of a special piece of code from Microsoft known as Win 32s, which we include in the package, Xara Studio can run perfectly well under Windows 3.11.

Unrivalled speed and performance

Graphics programs are usually one of the most computer intensive applications around, and so there most to gain in optimising this type of software. On anything but the simplest drawings large amounts of time are wasted waiting for the screen to redraw after you've performed an edit or a zoom.

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Key Features:

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- Optimised screen dither
- Infinite Undo levels
- Ultra-high precision
- File compatibility • Bitmap support
- Multimedia graphics

XAR001 XaraStudio CD **£179⁹⁵**
XAR002 Comp. Upgrade CD **£99⁹⁵**
XAR003 5-User Pack CD **£579⁹⁵**

MS Publisher For Windows 95

Create distinctive newsletters, brochures and flyers without any design experience!

Publisher for Windows 95 is a major upgrade that focuses on bringing the ease-of-use and efficiency of the Windows 95 operating system and the power and flexibility of an award-winning desktop publishing application together to allow its users to create professional publications quickly, easily and cost-effectively.

Creating professional publications is easy - PageWizards design assistants are the faster and easiest way to make customised publications because they guide you through the design process. Publisher's Office 95 compatibility means that it works just the same - the toolbars, icons, rulers, text, tables etc. all look and work the same. If you need inspiration, just look in the Design Gallery, there are hundreds of professionally designed options!

PUB100 MS Publisher for Windows 95 **£Call**

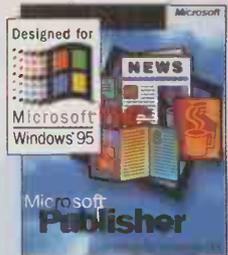
MS Works For Windows 95

Create professional documents easily and quickly with the essential tools in Microsoft Works.

Contains the essential tools for easier everyday computing, Microsoft Works for Windows 95 is the one software package you need no matter what kind of work you want to do. It combines a word processor, a spreadsheet with charting, a database, communication tools, and drawing tools. It does so much for so many, so it's no wonder Microsoft Works is the all-time best-selling integrated application for Windows. It runs only in Windows 95.

MS Works 95 also includes Microsoft Bookshelf 95, a collection of seven easy-to-search reference volumes. Works and Bookshelf contain everything the small or home business needs to create professional documents.

WOR127 MS Works for Windows 95 **£59⁹⁵**



FREE
Microsoft
Bookshelf

Page **5**

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ABOUT WINDOWS 95 UTILITIES

The new Windows 95 32-bit architecture means that your operating system is more powerful than ever before. However, most utilities designed for the old Windows 3.x operating system will not run on Windows 95. The new utilities are all designed to maximise the performance of your Windows 95 system. You can be assured of complete protection, prevention and productivity with Windows 95 utilities.

Norton AntiVirus

The right cure, right now!

Norton AntiVirus provides complete virus protection for Windows 95 in one simple, easy to use package that detects, destroys and prevents virus infections. It works automatically in the background, watching for suspicious disk activity and detecting viruses before they can damage your files.



NOR034 Norton AntiVirus.....**£64⁹⁵** NOR035 AntiVirus Trade-Up.....**£28⁹⁵**

Norton Navigator

One click to go anywhere!

Norton Navigator puts file management at your fingertips, making Windows 95 significantly faster and easier. You can zip or unzip any file in one third of the time that it would take to use a separate application, simply by dragging and dropping. You can access Navigator's file management tools from the Open/Save dialog box of almost any app or from the Windows 95 explorer. You can even access Internet FTP sites directly from the file manager.



NOR036 Norton Navigator**£79⁹⁵** NOR037 Navigator Trade-Up.....**£34⁹⁵**

Norton Utilities for Windows 95

Automatically protect your data with the most comprehensive Windows 95 utilities

Norton Utilities includes new features specifically designed to prepare your system for the transition to Windows 95. It includes the most advanced, comprehensive tools available for system protection and data recovery - true 32-bit utilities with proven award winning technology that recovers data when others can't. Norton Utilities optimises and defragments your disks to improve access times and enhance the chance of full recovery in the event of a crash.

Norton System Doctor runs in the background, constantly monitoring vital system resources and data integrity to ensure stability and reliability, and automatically taking corrective action when needed. If a crash occurs, a rescue disk gets you up and running quickly, automatically repairing and restoring damaged resources.

Pre-installation tune-up

Norton Utilities provides an easy, systematic way of diagnosing, repairing and fine-tuning your Windows 3.x system to prepare it for the installation of Windows 95 or any new application.

Space Wizard

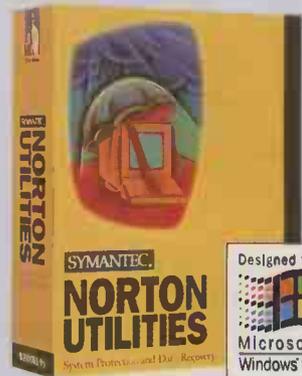
Locates duplicate, outdated, and unnecessary files, freeing disk space before and after Windows 95 installation.

New! Norton System Doctor

Runs in the background monitoring resources and makes your Windows 95 system self-tune.

Exclusive! Emergency Rescue Disk

Includes a ready-made bootable disk that will restart and repair your system even when Windows 95 won't load.



Designed for
Microsoft
Windows 95

Norton Disk Doctor

Provides diagnosis and repair of standard or compressed files.

NOR031 Norton Utilities 3.5"**£99⁹⁵**

NOR033 Norton Utilities CD.....**£99⁹⁵**

NOR032 Utilities Trade-Up.....**£48⁹⁵**

First Aid 95 for Windows 95

Fixes Windows crashes, automatically fixes over 1,000 known problems in Windows 3.11 and Windows 95 and cleans your Windows system to remove clutter and improve performance.

It can take hours to track down even a simple problem in your Windows system. With Technical Support you hold for ages and when you get to speak to someone, it's difficult to explain the problem, let alone implement a solution.

To create First Aid we analysed thousands of Windows problems and then built the exclusive "AutoFix" technology to automatically sense and actually fix thousands of problems in your Windows system. Running in the background, First Aid pops up when it senses a problem and tells you what the problem is in plain English. Then, a click on "AutoFix" corrects the problem. No other product available can do this!

Works with Windows 3.11 and 95

First Aid V2 works with both Windows 3.11 and Windows 95! So, before you upgrade to Windows 95, make sure your system is ready with First Aid. Once you've installed Windows 95, First Aid will continue to monitor your system to assure optimal performance.

Fixes Windows crashes

When a program on your PC crashes it means frustration and a complete loss of work. With First Aid, you won't see cryptic messages or lose all work since the last time you saved it. First Aid actually intercepts most crashes and lets you save your work in all open apps!

Automatically fixes over 1,000 problems in Windows 3.11 & 95

It's maddening when you can't get the spell checker to work or the multimedia system to play. There are so many configuration files,

drivers and settings to mess around with that it's virtually impossible to try and fix the problem. With First Aid, you won't have to because it uses a built-in extensive knowledge base to fix problems.

Cleans your Windows system to improve performance

It's easy for your Windows system to become cluttered with unwanted applications, icons and fonts. These not only take up disk space, they also slow down your PC. First Aid can: Uninstall applications, Clean Up configuration files, Tune Up the PC for optimal performance, and FIX problems.

FREE On-Line Updates!

First Aid uses an extensive knowledge base to diagnose and fix problems. As newer applications are released and more problems and remedies are identified, CyberMedia continually enhances the knowledge base to support these.

Now includes uninstaller!

First Aid now comes complemented by a powerful uninstaller application to keep your system uncluttered.

FIR006 First Aid for Win 3.11**£36⁹⁵**

FIRST AID 95 ONLY
£38⁹⁵

STOCK CODE:
FIR007



WHAT THE PRESS ARE SAYING ABOUT FIRST AID 95

"...takes the headaches out of installing multimedia peripherals."

Erica Schroeder, PC Week

"I put First Aid to the test by hiding a common DLL file... Predictably, Windows balked. But First Aid came to the rescue, searching my hard disk, finding the misplaced DLL, and copying it to where it belonged. Pretty amazing."

Steve Bass, PC World

"Spectacular... A necessity... Just click on FIX and let the program do the repair. This is so much easier than waiting on line for tech support."

Al Creighton, Syndicated Columnist
"...easy to use, comprehensive, and efficient. ...First Aid would be an excellent addition to any PC system."

Daniel Brown, Info World

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Windows™**

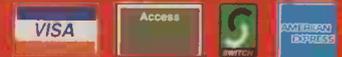
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SOFTWARE WAREHOUSE

WINDOWS '95 UTILITIES

Sidekick 95 for Windows 95

It's The Simplest Way to Stay Organised!

Simple to use, easy to learn and incredibly powerful - Sidekick is already the best-selling personal organiser ever. The new 32-bit Sidekick 95 uses the power and flexibility of Windows 95 to get you organised quicker. It takes up a fraction of the memory other PIMs use, so you can keep it running all the time without affecting your system's performance.

Sidekick 95 helps you simplify your life - not complicate it. With the improved drag-and-drop interface, there's no need to enter information twice or complete complicated import/export procedures. Sharing information between the Calendar, Cardfile, Wordprocessor, Expenses Tracker and Contact Manager is as easy as moving your mouse across the desktop. Sidekick 95 will even dial your phone! Using Windows 95's new "Plug-and-Play" technology, Sidekick automatically looks for and configures any installed modem.

New for Sidekick 95 is an integrated word processor with all the features you need for day-to-day letter writing and document production. What's more it's linked directly to the Cardfile database, so writing properly addressed letters or even mail merging is just a mouse click away. To make life easy, Sidekick will automatically print letters, schedules, notes, names and addresses in over 70 different formats including labels, envelopes and popular paper organiser formats like Filofax™.

STOCK CODE: SID004

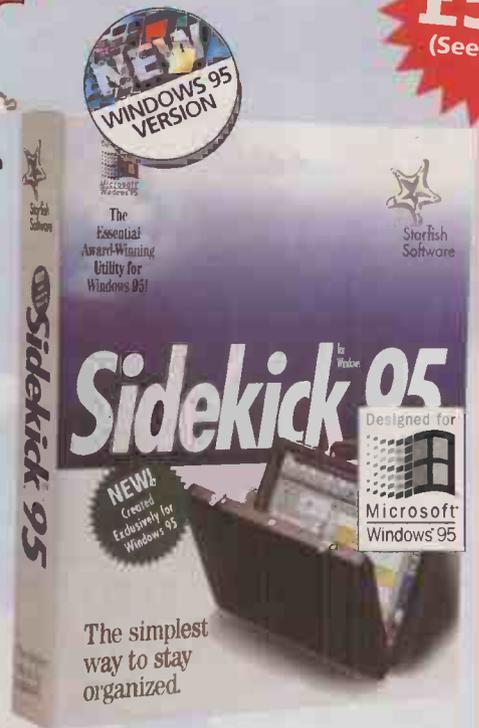
SIDEKICK 95 ONLY
£28⁹⁵ RRP £49.00

SID002 Sidekick 2.0 for Windows 3.11
£27

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If you find it cheaper call us. We will beat ANY genuine advertised price.
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WHO USES SIDEKICK 95?

- ✓ The business & home office professional
Friendly and flexible, Sidekick 95 offers all the calendar, address book and word processing features every overloaded professional needs.
- ✓ The mobile professional
Sidekick 95 is the perfect portable companion - It instantly updates your files from your desktop PC to your portable and then back again.



New Windows 95 Releases • New Windows 95 Releases

Dashboard 95 for Windows 95

The Simplest Way to Organise Windows 95!

Like the dashboard in your car, the new native 32bit Dashboard 95 for Windows 95 helps you to get to where you want to go by keeping everything close at hand. Launch applications, check your system's memory usage, disk space and resources and at last - Windows printing made easy! Dashboard 95 makes choosing and using a new printer simple, just click on an icon of the new printer and Dashboard does the rest.

New for 95 are Dashboard's Virtual Screens. This innovative and useful feature allows you to open applications on up to 9 virtual screens and then switch between them with a simple mouse click. No more cluttered screens!



Customise Customise Dashboard 95 to do exactly what YOU want it to!

Launch Applications
No need to search for programs - just use Dashboard 95's Launcher!

Virtual Screens
Switch between up to 9 virtual screens on your PC!

Easy Printing
Just choose the printer you need by clicking an icon - easy!

STOCK CODE: DAS004

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DAS002 Dashboard for Windows 3.11
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Everything for your PC - Next-day!

Visio 4 - The smart way to create all your business diagrams!

Now more than ever, Visio is the smartest way to create all your business diagrams. Version 4 has been enhanced in virtually every area, and boasts new productivity features, such as Wizards that help you create diagrams and charts automatically. And, with both 16 and 32bit versions in one box Visio 4 is optimised for both Windows 3.1 and Windows 95.

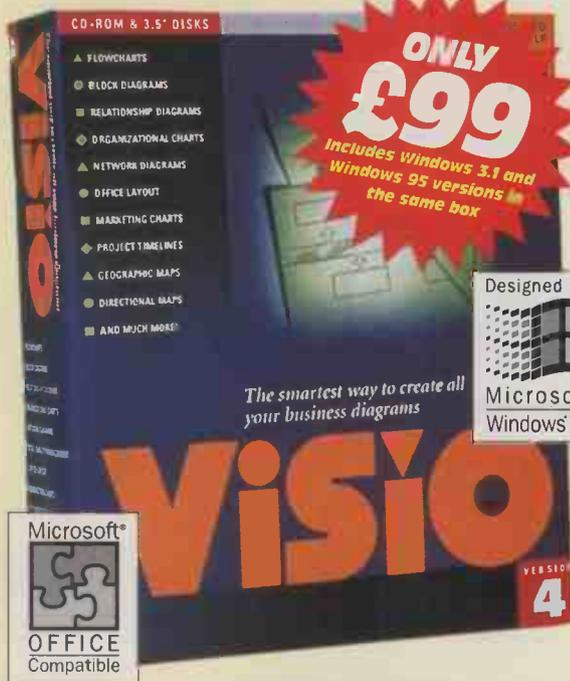
The new optimised 32-bit Visio exploits the advanced capabilities of Windows 95 and will also run on Windows NT 3.51 systems. It offers you significant productivity gains, including these great new features:

- Faster 32bit performance
- Descriptive, long file names makes locating files easy
- 'QuickView' lets you preview diagrams before opening them
- Drag work from a diagram to the desktop to create a Scrap file, then easily incorporate it into different documents by simply dragging and dropping
- Stencils float or can be locked to any side of the Visio window
- Work more efficiently with mouse button menus and actions, including a new pop-up help
- Use Windows 95's new multitasking to continue working on a diagram while other tasks are being done simultaneously in the background

Visio's new Wizards make creating new diagrams a snap. They set up pages, numbering, headers and any number of document features. An 'Organisational' Wizard automatically generates a chart from your data - either a text file or Excel spreadsheet. You can even

generate a project timetable with the 'Timeline' Wizard.

Thanks to new smart data management Visio will automatically connect to MS Office and Lotus Notes. Compatibility with Office toolbars means you are familiar with Visio from the start.



ONLY £99
Includes Windows 3.1 and Windows 95 versions in the same box



only £99.00 STOCK CODE: VIS060

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Extra Visio Shapes & Ideas
In addition to the SmartShapes™ included in Visio, you can select one or more of 15 Add-On SmartShape products for your own particular diagramming tasks or projects. Visio SmartShapes™ are more than static clip art or symbol libraries, because they anticipate how you'll use them and then behave in a useful way. SmartShapes™ resize without distorting, connecting lines stay glued and reroute automatically, and text goes where it should in a format that makes sense.

There are more than 3,000 shapes to choose from. Simply add the shapes you need, when you need them.

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Design and model detailed data networks

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 - Landscape Planning**£39
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- Visio Technical Productivity Packs enable you to produce technical drawings and schematics with the ease of Visio.**
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Upgrade for existing Visio Users ..£99
- Visio Technical Productivity Pack**
Bundled with Visio...£199

ChartXL v2 for Windows 95

The best graphing program available for your PC - now takes advantage of Windows 95!

If you want to create graphs frequently with Microsoft Excel, Lotus 1-2-3 or any other Windows spreadsheet, then you need Harvard Chart XL v2.0. It offers you more flexibility, more ease-of-use, more options and more speed. Harvard ChartXL v2.0 is the powerful graphing package for Microsoft Windows 95, Windows NT and Windows 3.11. It's as easy to use as graph paper, with more graph types than you could possibly imagine!

Over 300 graph types - right at your fingertips!
Harvard ChartXL v2.0 features an amazing range of impressive graph styles. There are options for business, statistical and technical charting - including 3D Pyramid/Pie, 3D graphs, one-touch business statistics and many more.

Key new features!
Automatic formatting lets our pre-designed templates format your raw data, and linking gives you drag and drop ease of use. There's also enhanced spreadsheet compatibility, one-touch statistics and a 3D rotate function.

HAR023 Harvard ChartXL v2.0.....**£148.95**

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Includes Over 300 graph types!

ChartXL is compatible with Microsoft Office 95





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SOFTWARE WAREHOUSE



ACCOUNTS

Pegasus Solo

Fully integrated accounting software, ideally suited to the small business.

Pegasus Solo is ideally suited for every small business, incorporating Sales, Purchase and Nominal ledgers along with Invoicing and stock control, allowing you to keep track of customer's and supplier's transactions. Produce statements and debtors' reports, as well as handling all of your VAT requirements.

PEG001 Pegasus Solo (DOS) **£67²⁰**



Pegasus Solo Payroll

Fully-integrated accounting software for small businesses, covering all aspects of NIC and PAYE.

Pegasus Solo Payroll is ideally suited for every small business. It is a perfect companion for all accounts packages or can be used standalone. It also fits neatly into Pegasus Accounts Solo.

This great, comprehensive package combines ease-of-use with a friendly interface.

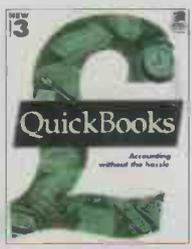
PEG002 Pegasus Solo Payroll (DOS) **£42⁹⁵**

QuickBooks 3.0

Quickbooks 3.0 now includes full stock control - it's the no-hassle accounting package.

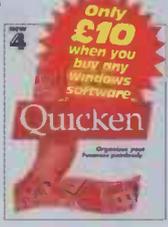
The UK's best-selling accounting package for small businesses. Designed for business people, not accounting experts, Quickbooks is a robust industrial-strength system - the beauty is, that you never get to see the double entry. There's no debits and credits, just simple forms that you already know how to use. This new version adds fully integrated stock control, modifiable invoice formats and audit trails.

QUI016 QuickBooks 3.0 **£84⁹⁵**



Quicken V4.0 for Windows

This new version of Quicken is the fastest, easiest way to organise all your personal and small business finances.



QUI025 Quicken V4.0 **£28⁹⁵**

Quicken Deluxe UK Home Pack Includes Quicken for Windows Version 4, Quicken Home Inventory which allows you to check on your home contents insurance, & QuickTAX Planner '95.

QUI022 Deluxe UK HomePack **£46⁹⁵**

Quicken Deluxe UK Business Pack Includes Quicken for Windows V4, Quicken Invoice UK for Windows and QuickTAX Planner '95.

QUI021 Deluxe UK Business Pack **£46⁹⁵**

TaxCalc for Windows

Are you due for a tax refund? Find out with TaxCalc.

Produced by the Consumers' Association, TaxCalc for Windows helps you to understand and complete your current tax return. TaxCalc quickly and accurately checks the tax you paid last year - you may be due a rebate - and advises you how to optimise your income and allowances for the current tax year. You can print out your Inland Revenue approved tax form and benefit from the extensive on-line help specially written by the Consumers' Association as well as relevant Inland Revenue leaflets and advice on how to deal with the revenue. You will require a 386, with four megabytes and Windows 3.x.

TAX001 TaxCalc for Windows **£29⁹⁵**

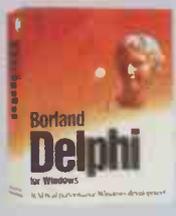


LANGUAGES

Borland Delphi

RADICAL performance Windows development

Delphi - winner of BYTE's Best Technology of Comdex 1994 - facilitates Rapid Application Development (RAD), allowing programmers to smoothly progress from prototype to production. Delphi is the only Windows development tool that combines a high-performance optimising native code compiler with a visual design environment and integrated database access. Object-oriented design provides unlimited extensibility, allowing users to reuse custom components and those from the Visual Component Library.



DEL006 Borland Delphi CD **£157⁹⁵**

DEL006 Delphi RAD Pack CD **£128⁹⁵**

Turbo C++ V4.5 for Windows

C++ is the ideal way to learn how to program in C and it's great fun too!

Looking for a fast, easy and cost-effective way to get into C and C++ programming? You've found it. In award winning Turbo C++. Only Turbo C++ makes learning fun with great sample games and a multimedia introduction. Play the games, and look at the code to see how they work then write your own. Turbo C++ is packed with visual experts that will write much of your applications for you. What used to take weeks to do and months to learn now takes minutes! Use the same tools that the professionals use. Turbo C++ is now available at an all time low price from Software Warehouse.

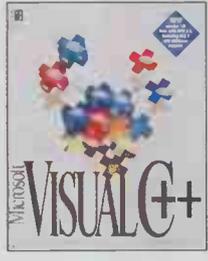


TUR064 Turbo C++ V4.5 Win CD **£73⁹⁵**

Microsoft Visual C++

Powerful 16-bit and 32-bit development from Microsoft.

Microsoft Visual C++ gives you access to state-of-the-art 16- and 32-bit development tools. It supports MFC 3.0 and also Wizard support for OLE, OLE Custom Controls and ODBC.



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MIC222 Visual C++ V2 CD **£259⁹⁵**

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The complete database that includes six ready-to-run applications.

FileMaker Pro from Claris is established as one of the easiest-to-use relational Windows databases. In this new version, Claris have added many hot new features and six full-blown pre-designed applications for you to use or modify in just about any database application.

Order before June 30th and get a FREE Claris T-shirt and a 100-template CD on registering your copy.



CLAO02 Claris FileMaker Pro **£84⁹⁰**

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Fully-featured Windows database.

Alpha 5 goes much further than other Windows databases because it comes with common database functions already pre-built! With Alpha 5 you can create powerful database applications without the need for any programming knowledge. You can easily create forms, reports, mail labels and even stunning WYSIWYG letters with the ease of Alpha 5's drag and drop control.



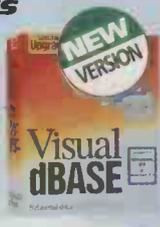
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Visual dBASE combines leading edge tools with a sophisticated, but easy to use, programming language. From interactive use of local data, to deployment of advanced client-server applications, its all done in one highly productive environment. This is the best database on the market for business professionals and application developers.

By using the unique Two-Way-Tools one can switch back and forth between Visual design and programming. This is the best database on the market for business professionals and application developers.



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MIC189	WIN MS Office 4.3 Pro C/U	£269
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WOR063	WIN MS Works v3	£85
WOR064	WIN MS Works v3 CCP U/G	£44
MIC061	DOS MS Works v3	£85

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P4/5

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core063 Corel Office Companion **£63⁹⁵**



Claris Works 4

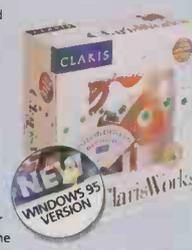
Now with even more productivity features, plus Internet authoring.

While other integrated packages require you to open and close separate applications, copying and pasting information from one to the other, Claris Works makes use of their uniquely developed total integration facilities. It is the all in one answer for business users, home users and for people using their PC for educational uses.

Claris Works Version 4 includes new features to enhance productivity and improve presentation

- There are three new ClarisWorks Assistants (Mail Label, Home Finance and Certificate).
- ExpressStyle redefines the concept of stylesheets
- FastReport automates searching, sorting & reporting
- ReadyArt libraries let you store and organise hundreds of frequently used clip art images
- Internet Authoring with HTML allowing users to publish pages on the internet.

CLA010	V4.0 (Win 95 ONLY)	£128 ⁹⁵
CLA011	V4.0 Upgrade	£48 ⁹⁵
CLA006	Claris Works V3.0	£68 ⁹⁵



BUSINESS SOFTWARE - PRESENTATION & ILLUSTRATION

PFS Job Search

Successfully organise every step of your job search with PFS CV and Job Search.

Start tackling those job interviews with confidence. Use this great Windows application to create impressive CVs and



cover letters that stand out from the pack. Includes 10 professional CV templates and 70 pre-set layouts. Also included is a full WYSIWYG word processor and 12 sample cover letters. A built-in database and mail-merge allows you to quickly distribute your professional CV.

PFS009 PFS Job Search..... **£29**



ASAP

One click is all it takes to create stunning presentations.

ASAP is the truly easy to use presentation software that lets you creatively express your ideas in professional presentations and reports in a matter of minutes. It uses common business idioms such as organisation charts and agendas as well as unique chart types such as cycle and orbit to allow you to discover ways to present your ideas in creative new ways. With ASAP there's no learning curve. If you can use a keyboard, you can use ASAP! Transform simple text into an impressive chart quickly and easily: One click and you're there!

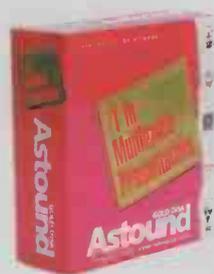
HAR024 ASAP **£98⁹⁵**

For More About ASAP, see our 16 page Supplement

Astound V2

The number one multimedia presentation package.

Astound V2 lets you create dynamic overheads, slides, and much more in just minutes. If you want to impress clients, competitors and colleagues with your presentations all you have to do is choose from Astound's 70 pre-designed templates and then add text, graphics, sound, video and more.



AST002 Astound V2 **£169⁹⁵**

AST004 Astound V2 U/G **£99⁹⁵**

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Photo Library contains a wide range of photo images in both TIFF and BMP formats. All the images contained are royalty free, 24-bit colour photos.

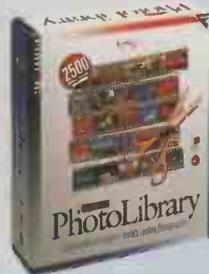


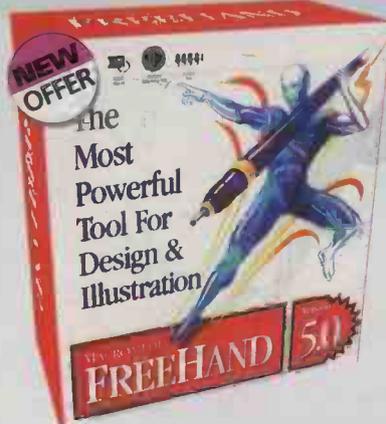
Photo Library also includes Power Library, a powerful picture organiser which builds up an album of all your pictures, allowing you to easily view and browse images before using them. It's an invaluable resource for users of CorelDRAW!, Photoshop and PhotoFinish.

PHI003 Photo Library **£28⁹⁵**

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Macromedia Freehand - For Powerful Design & Illustration



Freehand 5.0 - More new features make it number one for designers, illustrators and artists.

Freehand is the most powerful and easiest-to-use software for design and illustration. Its comprehensive feature set, customisable work environment, and superior performance make it the tool of choice for graphic designers, creative directors, production artists and illustrators worldwide.

Freehand has everything you need to develop simple illustrations or complex designs with the minimum of hassle. Its open architecture allow you to take advantage of drop-in interactive tools and palettes in addition to Illustrator plug-ins. With extensive text handling capabilities, including style sheets, spelling checker, search and replace, text on a path, copyfitting, columns, and linked text blocks, Freehand's features surpass those found in any other design and illustration package. No other application has the features or the flexibility.

MAC010 Macromedia Freehand 5.0 **£399⁹⁵**

Freehand 5.0 Features include:

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- Report Generator gives you information about fonts, colours and linked graphics.
- Create 4-Colour Separations without having to switch to other applications. Plus a new Trapping for custom spreads and chokes.
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PAG018 WIN Aldus PageMaker Classic.....	£58
COR009 WIN Corel Ventura v4.2.....	£115
COR044 WIN Corel Ventura v5 Comp. Upgrade CD...£60	£115
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COR046 WIN Corel Ventura v5 CD.....	£35
PRE001 WIN GST PressWorks.....	£79
GST001 WIN GST Publishing Partners.....	£62
MIC073 WIN MS Publisher v2.....	£57
MIC159 WIN MS Publisher MLP.....	£699
MIC147 WIN MS Publisher 20-MLP.....	£29
PFS005 WIN PFS Publisher v2.....	£565
QUA014 WIN Quark XPress v3.3.....	£565

For More DTP Software, please see page 20



OPERATING SYS.

WIN003 WIN MS Windows 3.11 Upgrade.....	£39
WIN023 WIN MS Win 3.11 for W/groups Add-on.....	£42
WIN021 WIN MS Win 3.11 for W/groups Base.....	£89
WIN016 WIN MS Win. NT Server Workstation.....	£245
WIN054 WIN MS Windows NT Server Upgrade.....	£499

PIMS

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ACT004 WIN ACTI v2.....	£149
ECC001 WIN ECCO Simplicity.....	£49
ECC003 WIN ECCO Professional 3-User.....	£399
ACT005 WIN First ACTI.....	£49
LOT043 WIN Lotus Organizer 1.1 WSL.....	£49
SID001 DOS SideKick.....	£29

SPREADSHEETS

SUP004 DOS CA Supercalc.....	£69
LOT017 WIN Lotus Improv.....	£92
LOT061 WIN Lotus 1-2-3 V5.....	£219
LOT059 WIN Lotus 1-2-3 v5 CCP Upgrade.....	£89
LOT008 DOS Lotus 1-2-3 v3.4.....	£292
ECC004 WIN MS Excel v5 for Win 3.1.....	£222
MIC141 WIN MS Excel v5 CCP Upgrade.....	£89

MS Excel 7

Microsoft Excel for Windows 95 has been designed on your needs and requests. Whether you're working on a simple summary, charting sales trends or performing advanced analysis, Excel is the easy way to get the job done!



MS Excel V7from £84⁹⁵

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WORD PROCESSING

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120 letter templates that get results!

Have you ever been frustrated by a garage over-charging you? By a shop selling faulty goods? For these and many other kinds of problems. 120 Letters That Get Results contains a carefully-worded letter template written by Which? lawyers for you to adapt. A full word processing package is included, as is the text of the Which? book '350 Legal Problems Solved' in an easily accessible questions and answers format. All letters can be exported to your own word processor, then simply insert your details and print and post your professionally-written letters and see the difference it makes to the results

Legal Letters.....

WHICH? software

NEW PRODUCT



£24⁹⁵

WordStar 2.0

WordStar 2.0 is a full featured word processor, including many DTP features for only £27.99

WordStar 2.0 has recently won more accolades in the computer press than any other word processor. It has been highly praised for its extensive feature set and incredible value for money.

WordStar 2.0 includes English spell checker, grammar checker and thesaurus, in fact everything you'd expect to find in a word processor costing 10 times as much.

WOR077 WordStar 2.0£27⁹⁹



LOT014 WIN Lotus WordPro.....	£89
MIC014 WIN MS Word v6 C/U.....	£138
MIC135 WIN MS Word v6 CCP U/G.....	£89
TOP002 WIN TopLevel Fine Words.....	£25
WOR034 DOS WordPerfect v6.1.....	£212
WOR037 DOS WordPerfect v6.1 C/U.....	£95
WOR035 DOS WordPerfect v6.1 U/G.....	£79

MS Word 7

Microsoft Word 7 offers IntelliSense innovations such as AutoCorrect which automatically corrects mis-spelled words and typing errors. New e-mail features are now included, which will help in editing e-mail.



MS Word V7from £84⁹⁵

Accent 2.0 - The Award-Winning Multilingual Word Processor

Accent is the advanced multi-lingual word processor for Windows. This new version means that it's even better!

If you need to work in more than one language, then you need Accent. Designed to give you quick access to the special features that are needed for multilingual word processing.

Accent makes it easy to use different alphabets and characters in the same document. Select the language you wish to write in and a keyboard template appears in the corner of your screen, to help you find the corresponding key on your UK keyboard. With your mouse, you can even click the template rather than depressing the actual key. Accent is full of all the standard word processing features, including style sheets, word count, auto save, import, export etc. All Accent word processors cover over 30 languages including all European languages, plus Russian, Polish, Serbian, Hebrew, Greek, Turkish and many more.

Accent is ideal for student writing projects and reports in foreign languages or for those who do business with clients from Europe and around the world. You can mix different languages within the same document and Accent intelligent enough to run spell checks on whole documents without any problems - most spell checkers will choke on the simple use of garçon or frau in an English text.

Accent even takes dialects into account - for example, Canadian French is not identical to Belgian or Parisian French, and Iberian Portuguese is not that which is used in Brazil. Accent asks you select both a language and a country when you switch languages.

Accent - The award-winning multilingual word processor

PC Magazine called Accent "the best multilingual word processor we've seen at PC Magazine..." Accent was praised for its configurable user interface which can be set to operate in eight different languages (French, English, German, Italian, Russian, Spanish, Portuguese and Finnish).

PC Computing called Accent "a unique tool for the international businessperson... If your company does business around the globe, Accent will be a boon to your productivity."



Accent 1.0 Runner-Up, PC Magazine Technical Innovation Awards

Accent Express

Over thirty languages supported. 30 Truetype fonts in 5 language groups: Western Europe, Eastern Europe, Cyrillic, Greek and Turkish.

ACC002 Accent Express£38⁴⁹

Accent Special Edition

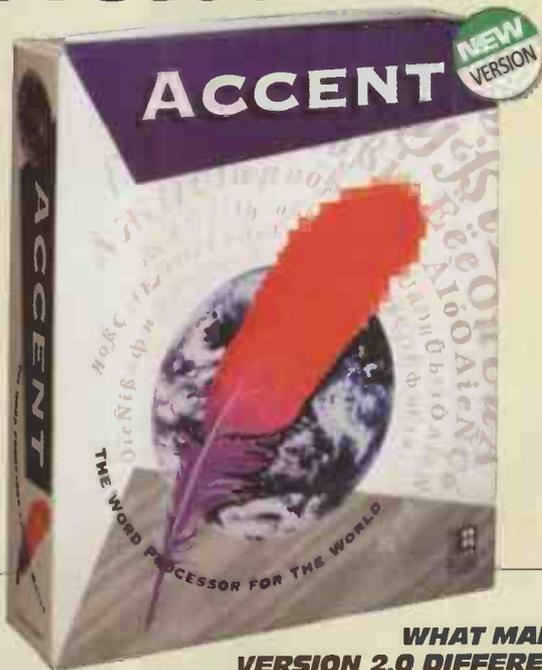
Over thirty languages supported. Spellcheck and Thesaurus in all 8 popular European languages. Word-for-word translation with Berlitz Interpreter. 79 Truetype fonts in 5 language groups: Western Europe, Eastern Europe, Cyrillic, Greek and Turkish.

ACC003 Accent Special Ed£98⁹⁹

Accent Pro

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ACC004 Accent Pro Ed£189⁴⁹



WHAT MAKES VERSION 2.0 DIFFERENT?

- All products can now work with Hebrew and Arabic and can write from right to left, as well as from left to right.
- More fonts are included (Accent Professional includes 150 fonts).
- More menu languages.
- More features including tables and columns.
- More Import/Export filters.
- Free one-month subscription to CompuServe and £10 coupon for advance services.
- Accent Professional 2.0 includes Lotus Organizer and Delrina WinFax 3.1 FREE!

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Integrated

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INTEGRATED

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Software Warehouse's latest outrageous deal on PerfectOffice!

Buy PerfectOffice from Software Warehouse and we will give you a FREE copy of Quicken Version 4. If you're looking to buy Windows 95, get it from Software Warehouse and Novell will refund £29.50 plus VAT when you send a copy of your invoice to them. See terms (below right).

PerfectOffice features new PerfectFit™ technology that takes you beyond common look-and-feel integration to a suite that offers complete inter-connection between programs. With a common user interface, pull-down menus and key dialogue boxes, each program looks and feels alike.

The Desktop Application Director (DAD) is a customisable toolbar that makes navigation around the PerfectOffice easy. It enables you to switch among apps, manage, locate and view files, and automate tasks with a mouse click. Perfect Office features PerfectSense™, a number of intelligent word and grammar correction features. PerfectSense will also help you write better English by automatically rewriting entire sentences for your consideration, correcting both spelling and grammatical errors. Proof reading your business letters just got a whole lot easier!



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1

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2

GroupWise

GroupWise 4.1
Share information with this powerful integrated E-mail/work-group package (client only).

3

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InfoCentral 1.1
The innovative PIM. The perfect way to organise people, places and things.

4

Envoy

Envoy 1.0a
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AppWare

AppWare 1.0
A fifth generation visual programming tool and application developer.

6

Presentations

Presentations 3.0
The perfect way to sell your ideas with graphics-based information.

7

WordPerfect

WordPerfect 6.1
The world's best-selling word processor - it's the Perfect way to create better documents.

8

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Quattro Pro
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- PER019 PerfectOff. Pro. U/G CD.....**£179**
- PER018 PerfectOff. Pro. U/G 3.5".....**£189**
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- PER015 PerfectOffice Pro. CD.....**£365**
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 - Processing of claims and issuing of cheque will be handled by a third party on behalf of Novell.
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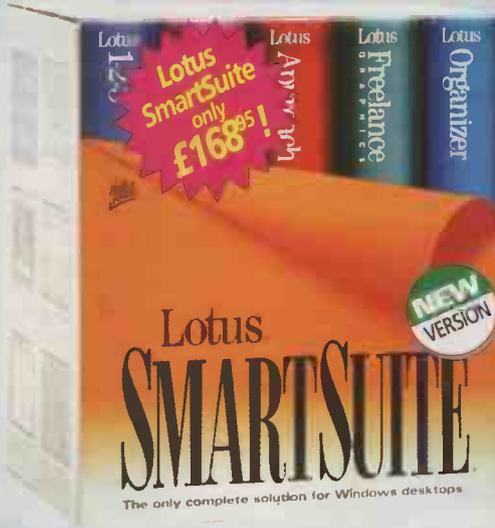
If you own ANY competing software suite, ANY competing spreadsheet, word processor, database, or graphics program, or ANY other Lotus product - Call us now, you qualify for the Lotus SmartSuite upgrade. No proof needed, we trust you!

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SmartSuite 4 includes the Lotus 1-2-3 Release 5 spreadsheet, the Approach 3.0 database, the Word Pro 96 word processor, Lotus Organizer V2 and the Freelance Graphics presentation package. All are specifically designed to take advantage of Notes/FX 1.1, the Lotus facility for exchanging data bi-directionally between desktop applications and Lotus Notes.

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- LOT... Lotus Word Pro '96 **£98⁹⁵**
- LOT034 Lotus Freelance V2.1: Universal Upgrade .. **£84⁹⁵**
- LOT034 Lotus Organizer V2: Universal Upgrade **£44⁹⁵**
- LOT062 Lotus Approach V3 **£82⁹⁵**

LOT0XX SmartSuite V4 **£168⁹⁵**

Lotus Word Pro '96 only **£98⁹⁵!**

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Lotus WORDPRO '96

The team word processor

Lotus Word Pro '96 - Productivity for Teams, Power for Individuals!

Formerly Lotus AmiPro

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Lotus Word Pro 96 is a new breed of word processor - designed for the way you work today. The first and only Team Word Processor, it combines powerful writing and editing features with breakthrough ways to collaborate and share ideas.

Smart Word Processing innovations provide all the tools you need to create persuasive, professional-looking documents. TeamReview and TeamConsolidate features make it easy to gather and manage everyone's contributions to create the final draft.

With Lotus Word Pro 96, individuals and teams can Work Together faster, smarter and more productively. It features a streamlined "smart" interface that makes it easier for teams and individuals to accomplish everyday word processing tasks.

With Lotus Word Pro 96, individuals and teams of business people can work faster, smarter and more productively.

Key features:

- Easy to create, revise and edit shared documents with revolutionary Team Word Processing features.
- Breeze through everyday word processing tasks and get great-looking output with Smart Word Processing features
- Get the most out of Working Together with Lotus Word Pro 96 and its rich integration with Lotus SmartSuite and Lotus Notes. You can even share work over the Internet.
- Exceptional filters bring in all your current word processing files - without losing your formatting.
- Team Computing features bring in all the contributions of the team while providing the individual with control over documents.

LOT Lotus Word Pro '96 **£98⁹⁵**

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Word Pro Single LLP	£POA
Approach Single LLP	£73
Approach 20 User LLP	£1386
Lotus 123 Single LLP	£201
Lotus 123 20 User LLP	£3890
Lotus 123 Single LLP Upgrade.....	£86
SmartSuite Single LLP	£POA
SmartSuite 20 User LLP	£POA
SmartSuite Single LLP Upgrade.....	£160
Lotus Notes Single LLP	£320
Lotus Notes 20 User LLP.....	£6039
Lotus Notes Single LLP Upgrade.....	£166

LOTUS Passport

SmartSuite 50+ Points	£POA
SmartSuite 500+ Points	£POA
SmartSuite 1000+ Points	£POA
Lotus Notes 50+ Points	£265
Lotus Notes 500+ Points	£255
Lotus Notes 1000+ Points	£233

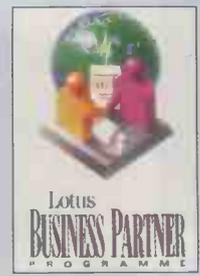
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If you want more than one copy of a Lotus application or comms package, then you must first buy one regular copy of the product which will include full documentation and master disks. For every other machine that you wish to install the product on, you can purchase a Lotus License for that machine (LLP). These licenses can be purchased as a single license or in 20 packs.

Lotus Passport

Lotus Passport has been designed for organisations that require larger numbers of copies of any Lotus products. To register as a Passport customer, your first order must be for 100 points (see below), thereafter you can order in 50 point blocks. The software may be installed in different sites, even in different countries and can be on DOS, Windows, UNIX or Macintosh. Passport is probably the most versatile license program available today. Example units: Organizer and CC Mail are worth half a point, Lotus 123, Word Pro, & Approach are one point each, SmartSuite is worth 2 points.



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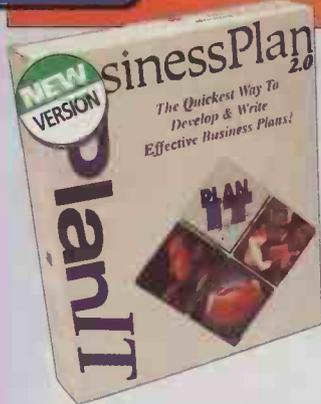


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SAVE up to £100 When incorporating a business.

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PlanIT Business Plan

Business Plan 2.0 is an easy to use package that creates structured business plans for any size of company. It provides users with relevant questions and sample answers from which to create a business plan. It automatically formats it with headlines and subheads, even inserting your company details

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You can preview your plan at any stage - Business Plan 2.0 files are compatible with practically all Windows Word Processor packages or you can print directly from within Business Plan 2.0.

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Business Plan 2.0 helps you identify opportunities and threats to your business through an in-depth analysis of your company, products, competition and industry.

Sales and Marketing

Business Plan 2.0 helps you to develop effective sales and marketing strategies and present them in a coherent manner, which both potential investors and employees will easily grasp. Business Plan 2.0

will provide the right marketing plan and information for you to cross check as your business starts to grow.

On-Line Information

Much valuable time is wasted collecting and collating information when developing and writing business plans. Business Plan 2.0 has done this work for you, providing information in a number of ways, namely:

- On-Line Help & Advice
- Contact Database
- On-Line Business Forum

Over 70 Sources of UK Funding

With over 70 sources and methods of gaining funding, Business Plan 2.0 is an invaluable source of

information, advising you on how to effectively secure vital funds necessary for any successful business. Sources include venture capital, factoring, private financing, government and EC grants, and many more.

3 Year Plans... Instantly!

Financials include:

- 1-3 Year Projected Balance Sheets
- 1-3 Year Projected Profit & Loss
- 1-3 Year Projected Cash Flows
- Break-even Analysis
- Ratios

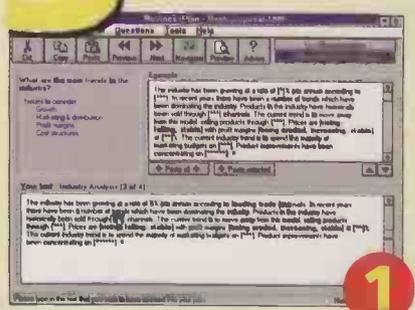
Business Plan 2.0 removes the drudgery of creating financials from scratch, endlessly copying the same information between spreadsheets. Business Plan 2.0 features pre-structured financial templates ready for use, simply type in your income and expenditure details and Business Plan 2.0 will

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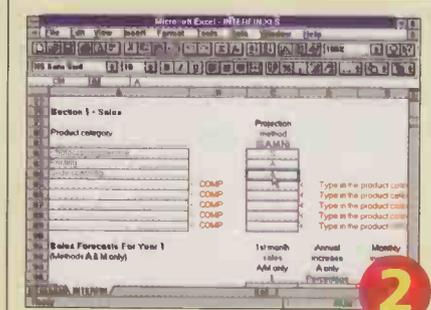
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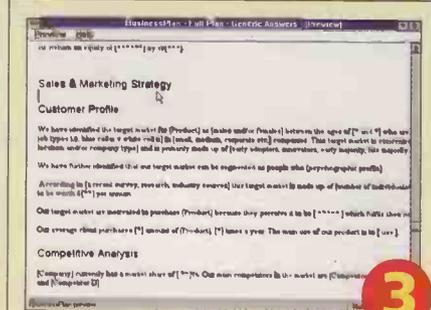
5 EASY STEPS TO PRODUCING EFFECTIVE BUSINESS



1 PlanIT Business Plan
Provides relevant questions and sample answers from which to create a business plan. Automatically formats your business plan with headlines, subheadings, and company details. Plus, QuickText allows you to insert recurring phrases, names and dates.



2 Projected Financials
Pre-structured financial templates are ready to use - simply type in your company income and expenditure details and Business Plan 2.0 will calculate totals, percentages and ratios, creating your projected financials for three years ahead.



3 Print Preview
View your plan at any time in Print Preview mode. Your plan is automatically formatted with all the headers and sub-headers in place. You can print directly from Business Plan 2.0 or use your favourite Word Processing package.

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If you own your own business, you'll have had plenty of ideas for expanding and diversifying your company. Business Plan 2.0 will enable you to find out how your ideas will do in a real-life context. You can test out the options available to you to help you decide which areas to expand into, plus you can prepare professional reports and charts to help you explain your idea to others in your business. Also included are over 70 sources of funding to help you get the backing to expand your business.

automatically calculate totals, percentages and ratios, creating your projected financials for 3 years. Numbers flow from one financial statement to another and you can use your spreadsheet to graph any item in your financials.

Reference Database
Business Plan 2.0 features an on-line database containing thousands of useful names and addresses - including MPs,

ombudsmen, research institutes, trade and consumer associations, institutes and societies. These details can be copied and pasted into other packages.

Business Information Forum (BIF)
Users of Business Plan 2.0 are entitled to 90 days to free access to Plan-IT's on-line business forum, B.I.F., which contains extensive information

NEW FEATURES IN V2 INCLUDE:
MORE NAMES IN REFERENCE DATABASE
NEW, IMPROVED INTEGRATED SPREADSHEET
SPEED OPTIMISED
ALL INFORMATION UPDATED



on business subjects. It covers topics such as:

- Funding & Debt Collection
- Exporting
- Tax, Law & Accountancy
- Marketing Research & P.R.
- Direct Marketing & Advertising
- Employment and Health & Safety

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STOCK CODE: BUS003

What the press are saying about PlanIT Business Plan

"...all the information necessary to write a winning business plan... extensive information on business subjects such as accountancy, more funding, tax, law, exporting, advertising, direct marketing, debt collection, health and safety, employment and PR..."
Computer Shopper, June '95

"...excellent coaching and contacts list... a very effective package for putting together business plans... easy to use and can be applied to almost any type of business"
Home Run Magazine, May '95

"...well worth the money... the package conducts an excellent interview covering business strategies and financial details which leads to an impressive looking plan, ready to be printed out..."
Sunday Times, May '95

What users say about PlanIT Business Plan

"This is an excellent example of business productivity software which will make the user's life easier as well as the intended recipient of the business plan, for example, bank managers like myself!"
Bank Manager, Small Business Loans Dept.

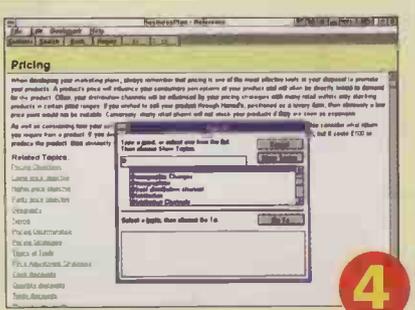
"I found this an intuitive package that lead me through the process of writing a business plan in an easy to follow, step by step process."
Graham Love, MD, India Ocean Trading Co.

"This package will save me hours of time when developing business plans for my clients!"
Richard Wall, Management Consultant

PlanIT Business Plan - 100% BRITISH BUSINESS INFORMATION

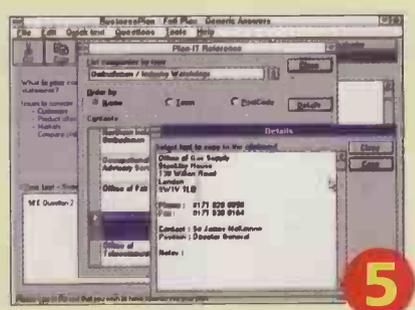
You can be sure of Business Plan 2.0's relevance to your business ideas because it is a 100% British development. All funding information is British and all the database information relates specifically to UK business needs. Over 2,500 names and addresses you need. Everything from the DTI, Health & Safety to MPs and Trade Unions!

PLANS OR YOUR MONEY BACK!



4

On-Line Help
Extensive on-line expert advice is available on the subject of writing business plans. Context-sensitive help ensures that all business reference information is available with a single mouse click, and comprehensive search options make it all easy.



5

Reference Database
On-line database of thousands of useful names and addresses. Includes MPs, ombudsmen, research institutes, trade and consumer associations, institutes and societies, and health & safety organisations. All information can be copied into other packages.

R. BUSINESS PLAN 2.0 IS ANOTHER GREAT PRODUCT FROM RODERICK MANHATTAN

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VIS038 DOS VisualCAD	£189

Animator Studio from Autodesk

Enter the world of animation with Autodesk Animator Studio.

Animator Studio is the ultimate Windows based creation tool for animated presentation, multimedia content or stand alone multimedia information delivery systems.

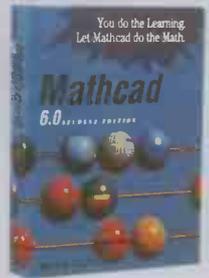
By reading, manipulating and creating industry standard multimedia file formats, Animator Studio allows creativity to blossom while making maximum use of existing multimedia files, digital video or computer graphics. Delivery of audio/visual output is in formats which can be used in all multimedia communication tools, giving a wide range of potential uses: business presentations, multimedia content creation, standalone PC-based information systems, digital video editing or integration with computer graphics, games content, CD-ROM content, training applications, and general 2D animations.

AN006 Animator Studio £395



MathCAD V6 Student Edition

Probably the most friendly maths program around.



As you probably know, calculators are inflexible and limit you to tiny, hard-to-read screens, Spreadsheets box you in, and programming languages are too complex and hard to learn... MathCAD is different.

With MathCAD V6 Student Edition, you use real maths notation to design and solve problems in a live worksheet environment. The user-friendly environment provides instant feedback, recalculating formulae as you work. Analyse data, create models and test scenarios, create quality reports including text, graphics, equations and formulae, then print them out or share them via e-mail and the Internet.

MathCAD V6 Student Edition is easy-to-use with a standard user Interface and Quicksheets that provide quick reference to common maths. If you use maths, you need MathCAD.

MAT007 MathCAD 6.0 Student	£29
MAT004 MathCAD 6.0 Standard	£169
MAT005 MathCAD 6.0 Prof.	£340

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XCAD 3.0 for Windows

The first and only CAD product for Windows and Windows NT to offer fully integrated advanced 2D and 3D for under £400

The latest version of XCAD features more drawing tools than ever before with several notable additions. 3D Cube allows you to create cubes with one command. Extrude Surface gives you a powerful method for transforming 2D shapes into 3D surfaces, plus Surface Fillet, Chamfer, Offset and more.



You can now use XCAD files with a much wider variety of third party products, including renderers, modellers and CAM systems. It supports the major file standards. Its improved functionality and performance make it the

professionals' choice, whilst its user-friendliness is highly rated in the industry. The XCAD Development System adds a whole new level of flexibility. It allows you to create your own commands, add your commands to the pull-down menus, incorporate your C programs into XCAD.

XCAD allows you to shade and view your 3D objects from any point. Its advanced rendering features allow you to see what your designs will look like in real life with Pan, Zoom and Hidden Line Removal features.

XCAD001 XCAD V3 £368⁹⁵

KeyCAD for Windows

High performance CAD at your fingertips.

You can produce drawings, plans and layouts to perfect scale and accuracy. But that's only the beginning, the only limit is your imagination. Whether you're an inventor, hobbyist, craftsman, electrician, architect or contractor, KeyCAD Complete for Windows takes you step by step from concept to realisation. Plus, there are over 375 symbols included for Home, Mechanical, Electrical, and much more.

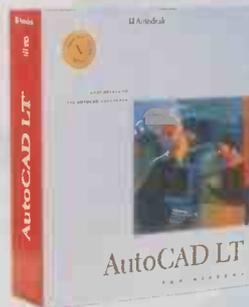


KEY002 KeyCAD Comp. £294⁵

AutoCAD LT Rel. 2 for Windows

Fully-featured and easy to use, it's ideal for architects, engineers, designers and contractors.

AutoCAD LT Release 2 for Windows is a 2D design and drafting package that offers extensive 2D drawing and editing tools, associative hatching, Aerial View, OLE and Clipboard support. Use 3D CAD tools such as 3D extrusions, hidden line removal and shading to create or view 3D drawings. OLE and Clipboard support lets you copy and paste drawings into other Windows programs for higher quality reports and presentations.



AUT025 AutoCAD LT Release 2 for Win... £379

FloorPlan Plus 3D

Now you can design and plan your home, office or garden quickly and easily.

Everything you need is here: large libraries of furniture, fixtures, fittings, landscaping and so on, definable wall types that break when windows and doors are inserted, floor coverings, wiring, plumbing - the lot. With this 3D version, you can now see your design in 3D, walking around in 'virtual reality' style making it ideal for exhibition stands, kitchens, bathrooms, and even planning new building extensions!



THR002 FloorPlan Plus 3D 3.5" £44⁹⁵

THR008 FloorPlan Plus 3D CD.. £44⁹⁵

AutoSketch 2 for Windows

AutoSketch for Windows combines CAD precision, drawing flexibility and Windows simplicity in one value-packed program.

Produce concept sketches, technical diagrams, architectural layouts, electrical drawings, patterns, illustrations, presentations, and information graphics. Freehand curve tools and line options give you the versatility to meet any need.

Easy view features let you choose drawings, symbols and fonts with simple icons, allowing you to create professional illustrations quickly. Other features include: over 600 symbols, TrueType fonts support, DWG Write 4 upward compatibility with AutoCAD and DFX import/export.



AUT027 AutoSketch 2 Win £99

AUT019 AutoSketch 3 DOS £87

AutoSketch Libraries

AutoDesk have introduced two specific libraries for AutoSketch for Windows to aid designers, architects and electrical engineers to produce high quality drawings and diagrams as quickly and accurately as possible. Both libraries contain industry standard drawings and symbols.

AUT013 AutoSketch Electrical Library £65

AUT014 AutoSketch Architectural Library £65

Graphics Converter Gold

Graphics Management made easy

Graphics Converter Gold is the most comprehensive graphics conversion software available today. Fast, easy and totally flexible, convert between over 70 different formats, including POSTSCRIPT, VECTOR, RASTER, PHOTO CD, FAX and many more... Add dazzling special effects and customise images in just minutes! OLE support makes editing and updating images in other Windows applications easy and fast!

No more problems with incorrect file formats - simply convert them! An absolute must for anyone who works with graphics.

Features include: CROP, SCALE, COPY, VIEW, RESIZE, ROTATE, CONVERT, CENTRE, CAPTURE, RE-COLOUR and much more!

Formats include: BMP, CAL, CGM, CLP, CUT, DIB, DXF, EPS, FAX, GEM, GIF, IMG, JPG, PCD, PCT, PCX, PIX, TGA, TIF, TXT, WPG, WMF, and much more!



GC001 Graphics Converter Gold... £29

Drafix QuickCAD

A new concept in CAD.

It is designed to give any Windows user the ability to create precision technical drawings. QuickCAD is unlike other CAD packages, which require drafting skills. Based on the award-winning Drafix CAD Professional program, QuickCAD is not only easy for the new user, but grows as user experience and confidence increases to include a full set of professional features. Includes: FREE CD-ROM with over 500 symbols; background redraw for the fastest Windows CAD; three-level interface with customisable toolset that matches your experience; and, directly reads/writes to AutoCAD files, DWG, DXF or IGES formats.



DRA006 QuickCAD £49

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3D Graphics

3D GRAPHICS

trueSpace V1 - The reality of affordable 3D!

Caligari trueSpace for Windows is an award-winning, revolutionary package that integrates professional 3D modelling, rendering and broadcast quality animation within an easy-to-use, "natural" interface. With trueSpace you can produce photo-realistic images as used on the front cover of Time magazine, or video animations, professional enough for the evening news. Shape objects in clay and use real-time preview to direct your 3D characters like actors on a film set.

Until now, 3D modelling, rendering and animation was really 2D, enhanced with orthogonal views. Unlike other programs using direct manipulation, trueSpace actually mirrors the real world. Working in full 3D perspective you can manipulate 3D objects directly and interactively in real time.

- **Model, Render and Animate!**
3D design couldn't be easier, painting and drawing expand into 3D modelling. Draw 3D, paint on 3D, shape objects like clay and use real-time preview to direct your 3D characters like actors on a film set. Render final slides or video animation at workstation speed with the touch of a button.
- **Seamless Integration**
Most 3D formats such as DWG, 3D Studio, Wavefront, Lightwave, Image and others are supported. Import standard image formats like BMP, TGA or TIF for texture and bump mapping. Output BMP, TGA or AVI/Video for Windows with alpha channel.
- **Welcome to the 3rd Dimension**
trueSpace is the first PC-based animation package that makes adding materials to your objects enjoyable, rather than something to be dreaded! In other programs, painting an object with colours and textures is a stab-in-the-dark process. With trueSpace simply grab a paintbrush, touch the areas you want to colour and watch as they are instantly rendered with the combination of colour, bump and texture mapping you selected.
- **Simply The Best!**
Whether you are a Graphic Artist, Multimedia Designer, Video Professional or simply want to expand into 3D, trueSpace will break barriers to free your expression without breaking your budget. It's the only 3D graphics package with a natural user interface, fully integrated modelling, broadcast-quality animation and photorealistic rendering that also won't blow a hole in your pocket!

STOCK CODE: TRU003

~~RRP £245~~
£149⁹⁵



trueSpace - The award-winning 3D software!

"Excellent, a blueprint for other renderers to follow"
PC Pro, Recommended Award, December 1994

"The most impressive piece of software we have seen in a long, long time. Buy it, use it, enjoy." PC Format

"This is a truly innovative and well-designed piece of software, its speed and impressive array of features should appeal to professional users and its excellent interface and ease of use should attract novices." PC User

"trueSpace's friendly interface goes a long way towards realising sophisticated yet useable PC-based graphics" PC Magazine

5 Great Products from Visual Software

Simply 3D SuperPack!

Everything you need to explore the exciting world of 3D computer graphics.

The Simply 3D SuperPack consists of three programs and hundreds of megabytes of 3D worlds. Simply 3D is a complete multimedia 3D graphics program for enthusiasts, artists and business presenters. Use 2D drawing from popular drawing applications, make them 3D and use the 120 seamless textures and 100 3D objects to create photo-realistic images and animations. The Simply 3D SuperPack also includes three volumes of Simply Scenes 3D virtual worlds (Starter Pack, The Northern Castle and Jurassic Adventure) Plus, Double Vision which lets you create 3D images and animations, just like those old Hollywood movies, from scanned photographs and then view them with the 3D glasses (included). WinBlob makes 3D modelling easy and fun, using "meatballs" to create organic shapes which can then be rendered in Simply 3D.

vis057 Simply 3D SuperPack **£69⁵⁰**



Animate anything with new Visual Reality 2.0

The latest release of the leading 3D graphics and animation package.

Visual Reality 2.0 adds a new Universal Animation System which allows you to animate quite literally anything - cameras, objects, lights, materials and more - all with just a few mouse button clicks. Objects can be twisted, stretched and even morphed in 3D, videos can be played in the background or projected to create animations to broadcast quality and beyond. Visual Models new "munge" facilities allow you to deform any object - including morphing between shapes - and it has an essential unlimited undo feature. Visual Font is the most powerful 3D text building system yet created! It includes automatic 3D bevels, bending of text along a 3D path, and solid shaded preview. Data from popular drawing and CAD packages can also be imported, rendered and animated. All of this functionality is complemented by over 2Gb of 3D data including 500 3D objects for business use, 1500 textures, 9 3D virtual worlds - including The Northern Castle, Pacific Beaches, Orbit City and Jurassic Adventure, 10 3D scenic UniSpheres™, 100 AVI video clips from a Hollywood film library, and 100 high resolution still background images.

vis055 Visual Reality 2.0 (7 CD set)..... **£199**



Features include:

- 2Gb data library
- 500 3D objects
- 800 textures
- 700 seamless textures
- 9 3D worlds
- 10 unispheres
- 100 time-lapse video clips
- 100 photographic backgrounds

Amazing effects with Simply 3D!

Simply 3D enhances Corel Draw! and other 2D draw and paint applications so that you can quickly and easily add 3D effects to your work.

£42⁵⁰

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Double Vision

Create amazing full colour 3D images and 3D animations from photographs.

Designed for ease of use, Double Vision enables hobbyists and professionals to create full colour 3D images - similar to those viewed in Hollywood's "3D Movies" - from scanned photographs or computer generated images. Double Vision Images can be viewed three-dimensionally on-screen or in print using the included 3D stereo 3D glasses. Double Vision comes with a CD containing sample images and 3D animations.

£29⁹⁵

vis056 Double Vision.....



Pro 3D with Visual Reality v1.5!

The professional 3D graphics software with award-winning rendering and animation.

vis054 Visual Reality **£99⁹⁵**



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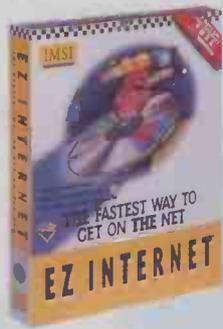
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EZ Internet is not just another Internet product - it's the best on the market with full Multimedia tutorials and all the communications software you need to get connected - fast and painlessly. Designed for "non-techies" so there's no more guessing what to do next - EZ Internet will show you how, and then provide an easy path through all those complicated options.

Learn all about the new revolution of the Information Superhighway - all at your own pace. Simple!

Within minutes you can do everything from visiting World Wide Web sites, to downloading software - even send email to the President of the USA! It's like having a friend show and tell you everything you need, from how to install the communications software and get onto the Internet, to the etiquette for participating in newsgroups. There are even tutorials for promoting your business. Visit KIDS Net, check out the latest breaking news or simply get an update on share prices. Log onto a new world, surf the Net and join millions of Internet users worldwide. Includes 80 hours of FREE access time on the Net via a local UK information provider.

EZ001 EZ Internet for Windows **£29⁹⁵**



New! ReachOut Version 5.0

The fastest way to remotely access your office PC.

ReachOut 5.0 lets you work with your home or office PC - and even access your corporate network - from any other computer, across town or around the world! You can pull up any program and work with any file, from any remote PC. All you need is a computer, a modem and a phone line - ReachOut gives you everything else you need in one package.

The Perfect Productivity Tool

ReachOut 5.0 is the perfect productivity tool for telecommuters who need office resources, mobile executives who need instant access to data, and everyone who needs to take work home, move files from PC to PC, or access technical support from outside the office. With ReachOut 5.0, you can edit documents, update spreadsheets, access E-Mail and on-line services, transfer files, chat with remote users, share CD-ROMs and print documents. You can even use applications that don't fit on your home PC or laptop - ReachOut 5.0 puts all the resources of your office PC at your fingertips. It gives you the power to be more productive - from any place that you choose.

The Number One For Speed

ReachOut Version 5.0 is the number one for both remote control speed and file transfer speed. ReachOut's Stac LZS compression technology lets you communicate up to 42% faster than PC AnyWhere (depending upon the application you use). The new SmartSend reduces file transfer times by up to 90% by sending only the parts of the file that have changed since the last transfer. Transferring files is as easy as a mouse click with drag and drop operation and installation is so easy that you'll be up and running in minutes.

More great features!

ReachOut 5.0 gives you extensive file synchronisation, automatically keeping copies of files up-to-date on all your PCs. IntruderGuard is the complete solution for data security, with features like password protection, call-back, keyboard disabling, screen blanking, and more. ReachOut now supports WinSock (TCP/IP), which means you can access another PC across the Internet or any TCP/IP network.

REA002 ReachOut Remote Control Version 5.0 **£79⁹⁵**

Network Version

You can give support to any other user running DOS or Windows on the network. View and edit their Windows and System files, or diagnose workstation problems. No more time-consuming journeys to other offices! You can use ReachOut's built-in gateway to provide worldwide access to your LAN, providing a cost-effective modem sharing option.

REA007 ReachOut Remote Control 5-User LAN **£149⁸⁵**



Communications Suite from Delrina

Get Delrina's popular WinFax PRO 4.0 and WinComm PRO 1.1 in one package.

Delrina WinFax PRO 4.0 is the best way to send, receive and manage faxes in a Windows environment. Delrina WinComm PRO 1.1 is perfect for accessing on-line services and transferring files and it now features easy access to Internet e-mail. Together these packages set a new standard for ease of use and integration.

WIN036 Delrina Communications Suite **£78⁹⁵**



WinFax PRO 4.0

Delrina WinFax PRO 4.0 is the best way to send, receive and manage your faxes in Windows. Marking up faxes is simple using the on-screen text and graphic tools and, Optical Character Recognition (OCR) lets you convert your received faxes into editable text in your favourite word processing or spreadsheet software for printing or forwarding.

WIN039 Delrina WinFax PRO 4.0 **£59⁹⁵**



WinFax Scanner

The complete fax solution for PC users.

Introducing Delrina's most complete fax solution ever - the new Delrina WinFax Scanner. It turns your fax modem into a fax machine and your printer into a copier. Now you can scan it, fax it, and file it with a simplicity you never thought possible. You'll never have to retype articles, business correspondence or expense receipts again!

WIN089 Upgrade for WinFax Users **£219⁹⁵**

WIN090 New Users **£249⁹⁵**

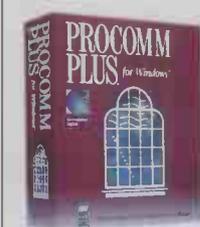


Procomm Plus for Windows V2.1 I.E

Data comms and fax software in one value pack.

Procomm for Windows has long been the No.1 selling Comms. package. This latest edition now includes fax software and many new features: Full support for Prestel and other terminal emulations; Dialling directories including group support; Fax from within applications; Fax mode supports standard & fine resolution and includes host mode for 'fax on demand'. The new easy-to-use interface makes Procomm the ideal package for all PC users!

PRO003 Procomm Plus 2.1 **£56⁹⁵**



Internet In A Box

The first and only Internet kit you'll ever need.

Internet In A Box V2 is the new version of the original, best-selling solution for Windows users who want to get on the Internet. From getting connected to navigating the information, Internet In A Box features easy Internet access, the easiest Windows interface, and the best-selling Whole Internet User's Guide. Plus, you get a complete set of software: the improved Mosaic browser, the Global Network Navigator on-line guide, Electronic Mail, News, File Transfer, the Gopher search tool and Telnet lets you log onto libraries, interactive games and other resources.

"For those who need the very best tools to connect to the Internet, Internet In A Box is the box to buy." (Best Products of 1994, PC Magazine, Jan '95). Also recommended by Byte, LAN Times and PC Computing.

INT011 Internet In A Box V2 .. **£98⁴⁵**



INT017 Upgrade to V2 **£48⁴⁵**

CompuServe Value Pack for Windows

Get on the information superhighway with the world's premier on-line information service with over 3 million members worldwide and over 2000 services.

CompuServe is the world's premier online information service with over 3 million members worldwide and over 2000 services including Internet connections - offered online. CompuServe offers a full range of easy-to-use Internet services including e-mail, FTP, USENET Newsgroups, Telnet, and World Wide Web access.

Other services include online shopping, travel information, news, weather, sport information, company information, games, leisure and much more... Connection to CompuServe is usually no more than a local telephone call away via your modem. The CompuServe Value Pack, Windows Version, is the best way to connect to the Information Superhighway. Within each CompuServe Value Pack is everything a PC and modem owner needs to help them get started, understand and enjoy the new and existing world of online services, including the Internet.

With each pack you get:

- CompuServe Software
- Quick Start Guide
- Comprehensive guides to the CIM software and the CompuServe Information Service
- Comprehensive 'Internet Made Easy' Guide
- A complete directory of CompuServe services
- CompuServe CD
- UK product quick reference card
- FREE subscription to the monthly CompuServe member magazine



COM012 CompuServe Value Pack **£22⁹⁵**

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CAR001	DOS Carbon Copy Plus v6.1	£74
CRO002	DOS Cross Talk v3.1	£67
DEL001	DOS Delrina DosFax v2	£64
LOT055	WIN Lotus CC-Mail Mobile Release 2	£115
LOT051	WIN Lotus CC-Mail 10-User License	£259
NOR016	WIN Norton PC Anywhere v2	£94
NOR023	WIN Norton PC Anywhere Host v2	£58
NOR024	WIN Norton PC Anywhere Remote v2	£65
NOR026	DOS Norton PC Anywhere v5	£94
PCA001	DOS Norton PC Anywhere v5 Remote	£89
PRO004	DOS Procomm Plus EC v2.10	£54
PRO015	DOS Procomm Plus 5-User LAN	£269
REA004	WIN ReachOut View	£59
REA003	WIN ReachOut Host	£69
SMA001	WIN Smart Term 340 Emulator	£169
TER001	WIN Termit v3 Asynch	£159
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WIN040	WIN WinFax LAN v4 Upgrade	£33
WIN022	WIN WinFax Server v4	£99
WIN049	WIN WinFax LAN Starter Kit	£176
DEL005	WIN WinFax Pro 10-user license	£119
DEL004	WIN WinFax Pro 25-user license	£409
WIN037	WIN WinFax Pro 50-user license	£1789

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SOFTWARE WAREHOUSE

COMMUNICATIONS HARDWARE



NEW Dataflex Modems

DataFlex, the leading UK modem manufacturer, has recently been acquired by one of Britain's largest electronics companies. This mix of quality British manufacturing, backed by full BT support and a five year warranty, make the DataFlex range of modems the best value in the market today.

Dataflex 28,800bps HyperGem

A quality, British-built V.34 fax / modem with 5 year warranty at an unbelievable price of only £179!

DataFlex's new HyperGem is available in either internal, portable or desktop versions. They conform to the new V34 standard, and using data compression transfer speeds of up to 115,200bps are achievable. As with all dataFlex products, the HyperGems work straight out of the box - power supplies, all telephone and computer cables, plus free Windows and DOS, comms and fax software are included.



DAT020 DataFlex HyperGem Internal **£179**

Dataflex Comms Office

The DataFlex SuperGem Comms Office is a 14,400bps voice / fax / data modem, bundled with SuperVoice. The ideal home/office modem!

This unique modem combines sophisticated answering machine technology, send and receive fax facilities and full Internet access and data transfer capabilities. The Comms Office comes with the user-friendly, Windows voice software, SuperVoice and Windows fax and data software. SuperVoice uniquely allows other comms software packages to be used concurrently so that switching between the different Comms Office function couldn't be easier. It allows you to save and remotely retrieve voice mail, screen calls, and even has Pager notification and voice broadcasting.



DAT023 DataFlex Comms Office **£169**

Hayes Accura 288 Fax/Modem

Why buy "Hayes compatible" when you can buy the real thing?

The Accura range gives you reliability and compatibility at a competitive price. They come complete with Hayes Data and FAX software, a serial/modem cable and a telephone adaptor - everything you need to go on-line right away. Recently awarded Wh@t Net's Award of Excellence (July 1995) and What PC's Best Buy (July 1995) and PC Power - Platinum (July 1995).



HAY008 Hayes 28.8 Fax Modem **£188⁹⁹**

HAY009 Hayes 14.4 Fax Modem **£148⁹⁹**

Andest Comms Add-Ons

High-speed serial cards and superior fax switches.

The Andest Rocket Board high-speed serial card allows you to take full advantage of high speed modems. If your modem works at over 14,400bps you may find that your older serial cards are unable to process data at higher speeds.

AND011 Andest Serial Card **£39⁹⁹**

The Andest Fax Switches allows you to connect your fax, answerphone, telephone and PC to one telephone line. The Fax Switch automatically detects what the nature of the call, passing it through to the right device.

AND006 Andest MSL 3-Port **£98** AND007 Andest MSL 8-Port **£139**



US Robotics Sportster

The best-selling V.34 modem with fast 28.8bps throughput

The Sportster 28,800 fax / modem provides connection speeds of up to 28,000bps, and with the use of data compression, a throughput of up to 115,000bps can be achieved. Features include fax speeds from 300bps to 14,000bps, Class I, II and Group 3 fax compatibility. DOS and Windows Datafax software is also included free. As with all US Robotics modems, you will receive a five year warranty and free lifetime technical support with this BAVT approved modem.

USR012 US Robotics Sportster 28.8 External **£189**



Free CompuServe Time With This Modem!

US Robotics
The Modem Choice In Data Communications

ZOOM Fax/Modems

An award winning V34 modem for only £148!

Sporting advanced features like remote configuration and callback security the ZOOM fax / modem offers unbeatable value for money. No wonder Personal Computer World have awarded ZOOM Editor's Choice 2 years in a row. ZOOM offer either internal or external versions with a choice of either 14,400bps or 28,800bps speeds. Each modem comes with a five year manufacturers warranty, while the external versions' front panel has a 15 light monitoring display to help you understand the current communication status.

ZOO005 ZOOM 28.8 Internal Fax / Modem **£148**



NEW OFFER

PSION Dacom Gold Card Modems

Portable data communications solution.

The Psion Dacom Gold Cards let you add fax to your notebook, giving you high speed file transfer, real remote LAN access and guaranteed compatibility. Available in a high-speed V34+ Fax version and a V32bis+ Fax version - Europe's leading PCMCIA Data+ Fax modem!

PSI001 V32 14.4 Gold Card **£158⁹⁵**

PSI002 V34 28.8 Gold Card **£189⁹⁵**

PSI003 V34 28.8 Gold Drive PCMCIA Reader **£89⁵⁰**



MODEM COMPARISON CHART

Modem	V.21	V.22	V.22Bis	V.23	V.32	V.32Bis	V.34	V.42	V.42Bis	V.17	Stock Code	Price
Andest Roadrunner Rocket	•	•	•	•	•	•	•	•	•	•	AND008	£119
DataFlex HyperGem Internal	•	•	•	•	•	•	•	•	•	•	DAT020	£179
DataFlex HyperGem External	•	•	•	•	•	•	•	•	•	•	DAT021	£179
DataFlex HyperGem Pocket	•	•	•	•	•	•	•	•	•	•	DAT022	£185
DataFlex Comms Office External	•	•	•	•	•	•	•	•	•	•	OAT023	£169
Hayes 28.8 External	•	•	•	•	•	•	•	•	•	•	HAY008	£189
Motorola 3400 Pro External	•	•	•	•	•	•	•	•	•	•	MOT002	£179
US Robotics Sportster 14.4 Ext.	•	•	•	•	•	•	•	•	•	•	USR001	£125
US Robotics Sportster 28.8 Ext.	•	•	•	•	•	•	•	•	•	•	USR012	£189
US Robotics Sportster 28.8 Int.	•	•	•	•	•	•	•	•	•	•	USR014	£196
ZOOM 14.4 Internal	•	•	•	•	•	•	•	•	•	•	ZOO003	£88
ZOOM 28.8 External	•	•	•	•	•	•	•	•	•	•	ZOO006	£168
ZOOM 28.8 Internal	•	•	•	•	•	•	•	•	•	•	ZOO005	£148

The NEW Motorola Internet Solution!

Motorola 3400 28.8 Data / Fax Modem

Everything you need to connect to the Internet and other on-line services in one box.

Ready, Steady, GO! Motorola brings you the complete open-line access solution, using the latest in modem technology. This 28.8 Internet solution includes all the necessary hardware and software that you need to get your PC online to the Internet.

About the Motorola 3400 fax / modem

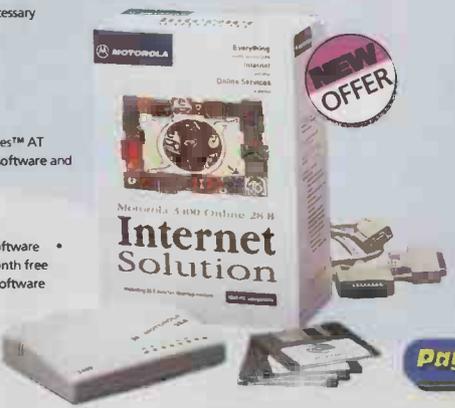
- The Motorola 3400 features: High speed data transfer • Fastest standard modulation protocol • Data error correction and data compression
- Fax error correction feature for clearer faxes • Motorola RISC technology • Automatically selects the fastest possible line speed
- A physical phone number directory for frequently called numbers • Robust performance over standard telephone lines
- Fully BAVT approved • Fax rates of 14,400bps to 2400bps with ITU-T Group 3 • Light weight of only 298 grams • Hayes™ AT compatible command set
- Comes complete with 2 year warranty • Includes Delrina WinComm Lite communications software and Delrina Fax Lite software
- Easy install animated instruction disk • One month free online access to CompuServe.

About the Motorola Online Bundle

- Internet software includes protocol software, file transfer software (FTP), Motorola's World Wide Web browser software
- Electronic mail software • Newsgroup software • VOCALTEC Internet phone software license • One month free access to CompuServe including premium services usage credit
- Special offer for CoSession Remote Control Software
- Heretic online interactive game.

ONL001 Motorola 3400 Internet Solution (with On-line Bundle) **£195**

MOT002 Motorola 3400 (without On-line Bundle) **£179**



NEW OFFER

Page 19

A massive 32,000 items in stock across 3300 different product lines.

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Everything for your PC - Next-day!

FormTool Gold V2.0

The Easiest Way to Create Forms and Automate Your Business.

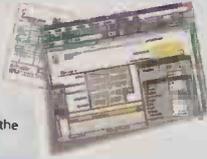
FormTool Gold for Windows from IMSI offers the easiest way to create, fill and print any type of form. With over 550,000 users worldwide, FormTool for Windows is now available in the UK for the first time. Version 2 brings an enhanced user interface that is Microsoft Office compatible, with powerful design and editing tools to create sophisticated and professional forms. With built-in database creation and support, users can extract data and merge databases quickly and easily. Forms can be filled automatically on-screen, making workflow quick and easy, and each form is automatically saved to the database for later retrieval - all in one simple process. Includes ODBC support for use with FoxPro, dBASE, Clipper, Paradox and more. Fields can be added to any form which allow for automatic filling, including things such as date, time, calculations etc.

Includes floating toolbars, drag-and-drop editing, radio buttons, check boxes, automatic word-wrap, OLE 2.0 support, draggable rulers, definable grids, fountain fills, zoom, preview and much more. New Wizards create reports and mailing labels after a few simple questions.

4 EASY STEPS TO FORMS AUTOMATION...

Step 1: Design and edit any form with ease

Whether you are modifying one of the pre-designed forms or creating one from scratch, FormTool Gold's powerful design and edit tools make it easy for you every step of the way. Import bitmap or vector images, insert text fields, create tables with the command duplicator and much more.



Step 3: Fill your form with speed and accuracy

Once your form is designed, filling it is a snap. You define the filling order most convenient for you. Fill it "on-the-fly" or directly from your database for sequential viewing and printing. Even password protect your confidential forms for complete privacy.



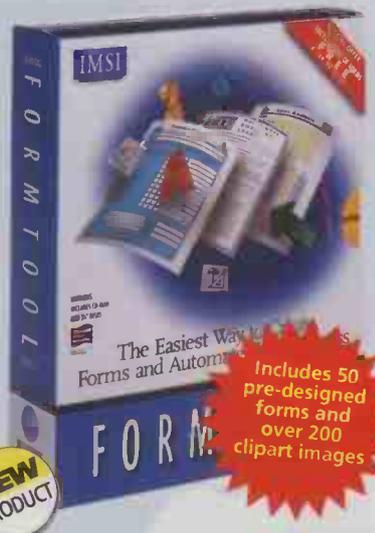
Step 2: Automate your data in one step

At your option, FormTool Gold will create a database associated with your form, which then becomes a "window" to your data. Sort, search, or query the data. Different forms can access the same data, letting you see exactly what you want in the form you want. Every time you complete a form, it is added to the database.



Step 4: Get professional results fast

Your printed forms have never looked so good. And that's not all. FormTool Gold's report and label Wizards give you database reports and industry standard labels at the click of a button. Even fax your form directly from your computer!



Includes 50 pre-designed forms and over 200 clipart images

FOR18 FormTool Gold **£49⁹⁵**

FREE GIFT WITH EVERY ORDER!
SEE PAGE 2 OF THIS ADVERT.

Corel Ventura V5

Power publishing for Windows.

Corel Ventura 5 extends the boundaries of DTP with an intuitive new interface and powerful architecture that supports both structured and free-form documents. Included are over 650 fonts, 17,000 clip-art images, 100 photos and 75 style sheets and templates. Corel Ventura 5 is ideal for producing books, flyers, newspapers, journals, magazines, reports, manuals and brochures.

COR044 Corel Ventura CD **£59⁸⁵**



Labels Unlimited

The easiest way to create great labels - any size or style.

Whether you're creating labels for addresses, file folders, audio/visual, or inventory stickers, Labels Unlimited has the label format that you need. Choose from over 80 A4 size labels for Avery, TENZA, Stampiton and others. Alternatively, you can custom design any format of your own.

LAB003 Labels Unlimited for Windows **£26⁹⁵**

LAB001 Labels Unlimited for DOS **£26⁹⁵**



KeyForm Designer For Windows

Design any form using graphics and data.

This form design/fill system has the creativity of a desktop publisher, the number-crunching power of a spreadsheet and the advanced data interchange capabilities of a database package. With pre-designed templates, easy-to-use layout features and the ability to import graphics and logos, you can design any form in seconds. Also features: automatic date, time and page numbering; auto-prompt for data fields; and, you can text importing from any word processor or spreadsheet.



KEY003 KeyForm Designer **£28⁹⁵**

Serif PagePlus Version 3.0

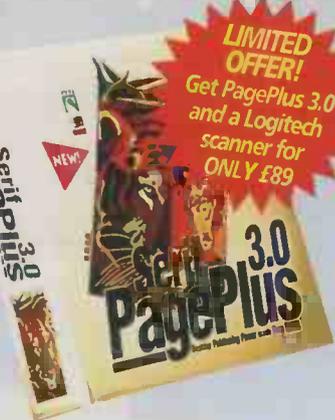
The World's Best Value in Windows Desktop Publishing!

If you are looking for a really powerful Desktop Publisher look no further. PagePlus 3.0 has won hundreds of international awards and accolades for its high functionality, low price and ease of use. It has all the features of DTP packages costing over ten times the price.

Right out of the box you'll be designing and producing professional, graphics-packed newsletters, ads, catalogues, brochures, greeting cards and a thousand other designer publications. Print in colour or black and white to ANY Windows printer or get hi-res colour separations, ready for commercial printing.

WITH PAGEPLUS 3.0 YOU CAN:

- Create impressive flyers, newsletters, reports, invitations, business stationery and more
- Get started in minutes
- Tailor the Help screen for beginners, intermediates & advanced users, providing the right help every time
- Layout publications quickly and easily
- Add graphics, clip-art, photo images from scanners or any Windows graphics package



PAG019 PagePlus 3.0 **£52⁹⁵**

THE PUBLISHING SUITE INCLUDES

- TablePlus - create tables, spreadsheets and equations
- TypePlus - create special text effects
- PhotoPlus - is Serif's award-winning imaging software
- DrawPlus - allows you to create vector drawings

PAG027 WIN PagePlus Suite CD **£79**

PAG021 WIN PagePlus 3.0 Suite **£79**

PAG013 WIN PagePlus 10-User Pack **£299**

"Forms look like being stormed by Toplevel" - PC Direct

Powerful, professional-looking form design and filling with contact database.

Invoices, orders, expenses, BS5750, time sheets, quality control... your business needs professional-looking printed forms. Both Toplevel FastForms and Forms save money on printing costs and give you the flexibility to update form layouts as often as you like. Design your own attractive forms using logos, pictures, text, calculated fields, borders and shading. Great looking forms make small businesses look big and give big businesses control of big administration problems. Whether you're printing blank forms, filling out and printing or filling our pre-printed stationery, this software will make sure it all lines up perfectly, and help prevent staff filling it incorrectly.

What's the difference? Toplevel Forms contains a database to store addresses and other information ready to fill in forms electronically. It also offers power features like spreadsheet functions in calculations and standard phrase support.

Toplevel is a British company and is an international leader in forms software. The entry-level forms software, FastForms, is the market leader in the USA with a 40% market share, so you can be confident of a world-beating product backed by first class technical support.

TOP003 Toplevel Forms **£68⁹⁵**

TOP004 Toplevel FastForms **£24⁹⁵**



Win your own Max Fox T-Shirt!

Max is celebrating the success of Toplevel's British software in the States - and so can you! Just use Forms or FastForms to design a useful, attractive form for Toplevel's forms library.

If Toplevel think your form is good enough, you win an exclusive Max Fox T-shirt. We will ship your competition entry form with your order.



250,000 sold in America

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SOFTWARE WAREHOUSE

Graphics

GRAPHICS

Serif Draw Plus 2.0

The easiest to use drawing package available!

Introducing new Serif DrawPlus 2.0, the complete drawing package for everyone. With over 7,000 clipart images and over 400 TrueType fonts included free, DrawPlus 2.0 is everything you need and more! For ease of use there are two user levels - Intro and Designer - a Hint Line, Tool Hints, and QuickHelp. Serif DrawPlus 2.0 also has QuickShapes for instant creativity and total flexibility to colour, stretch, slant, rotate, mask or envelope any object - including text! Don't be fooled by cheap offers on old-fashioned, out-of-date products. You want super-friendly, modern software that you'll learn in minutes. Released in March 1995, DrawPlus 2.0 won the prestigious PC Direct Hits "Best Draw/Paint/Photo" award just two months after it's launch.



- DRA007 Serif Draw Plus V2.0 **£38⁹⁵**
- PAG029 Serif Monster CD **£14⁹⁵**

Corel Gallery on CD

Add flair to your word processing and presentations with Corel Gallery clip art libraries.

Corel gallery is the easy to use visual clip-art manager on CD-ROM that allows Windows users to drag-and-drop images into any OLE 2.0-enabled application or export images into a number of industry standard formats. Version 1 includes over 10,000 professionally drawn clip art images (over 6000 in colour) with a full colour reference manual. Version 2 includes 15,000 clipart images (10,000 from Gallery 1), and also it includes all of the components required to create stunning multimedia presentations and documents: a state of the art visual multimedia file manager, 500 royalty free photos, 500 fonts, 75 sound clips, and 10 video clips.



- Corel Gallery for Windows will work with all the leading word processing, presentation and DTP packages like Ami Pro, WordPerfect, Word, PageMaker, Microsoft Publisher, PagePlus, PowerPoint, FreeLance and Harvard Graphics
- COR017 Corel Gallery V.1 **£25⁹⁵**
 - COR056 Corel Gallery V.2 **£44⁹⁵**

Wacom ArtPad

Professional graphics tablets for designers, illustrators and Graphic Artists.

Wacom electro-magnetic "give-and-take system" is the unique passive technology employed in all Wacom graphics tablets, eliminating the need for magnets and batteries and allowing for a cordless pen and cursor (puck). It is the realisation of an input device, comfortable to use and sensitive to hand pressure, which can tackle every challenge in painting and drawing. Just as a conventional pen needs paper, Ultra-Pen needs a tablet. The Ultra-Pen is extremely rugged and has a lifetime of at least ten million cycles.



All Tablets come complete with accessories, cables, handbook and software (available in several languages), plus you get are covered by a two-year warranty.

- WAC001 Wacom ArtPad **£149⁹⁵**
- WAC005 A5 Tablet + Painter 3 **£499**
- WAC006 A4 Tablet **£469**
- WAC004 Wacom ArtPad + Dabblor **£179⁹⁵**
- WAC007 A3 Tablet w/Menu Overlay **£599**
- WAC003 Wacom ArtPad + Painter 3.0 **£389⁹⁵**
- WAC008 A3 Tablet w/Electrostatic **£689**

Ultimate Image Bundle

ONLY £29
When you buy Corel Draw!

Only we could offer you so many great products for less than the price of one!

Includes MasterClips 3000 (3000 clips, RRP £79), Corel ArtShow 3 (1000s of images, RRP £39), KeyFonts Plus (1250 fonts, RRP £42) and Softkey Photos (2100 photos, RRP £39). In promotional packaging.

- BUN001 Ultimate Image Bundle (With Corel Draw) **£29**

PC Clip Art Library

The ultimate colour clipart collection.

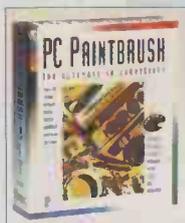
Introducing PC Paintbrush Clip Art Library - the ultimate collection of 12000 hand drawn colour clipart masterpieces. These stunning royalty-free images are ready-to-use in any Windows application. PowerAlbum is bundled absolutely free to help you organise and work with any existing clipart/images you may already have.

- SO018 ClipArt Library (Floppy - 3003 images) **£14⁹⁹**
- CU007 ClipArt Library (CD - 12000 images) **£24⁹⁹**

PC Paintbrush

The popular drawing and painting package with simulation of natural painting techniques.

A fully featured drawing program that lets you export your artwork to most popular Windows programs. It also allows users to simulate natural painting techniques without being a professional artist, and lets users become instantly productive via its easy-to-use interface.



- PAI002 PC Paintbrush **£26⁹⁵**

CorelDraw! 3

The ideal entry-level graphics package.

This award winning software offers excellent type manipulation and drawing features in addition to CorelChart, Corel PhotoPaint and CorelSHOW all in one value-packed box. Also includes over 14,000 clip-art images / symbols, and 250 fonts.

- COR038 CorelDRAW! 3 CD **£42**



For V6 see page 4

CorelDraw! 4

The ideal Desktop Publishing Tool!

Features comprehensive page layout, type editing and illustration tools as well as CorelMOVE animation software. Also includes 18,000 clip art images and symbols, colour separation, OCR software, Corel PhotoPaint, CorelSHOW, CorelChart and hundreds of other features.

- COR012 CorelDRAW! 4 CD **£85**

CorelDraw! 5

Includes the all-new Corel VENTURA 5.

Includes all the packages available in CorelDraw! V.4 but with 825 fonts, 22,000 clip art images, advanced 3D dimensioning, 100 royalty-free photos on CD-ROM, and internal PostScript interpreter, CorelTRACE, Corel MOSAIC 5, ARES Font Minder, Adobe Acrobat Reader, CorelQUERY, CorelCAPTURE and Zandar TagWrite. Unbeatable value for money!

- COR031 CorelDRAW! 5 (3-5) CD ... **£195**

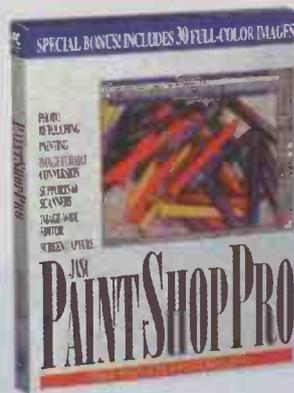
Paintshop Pro V3

Fast and fully-featured photo-editing and graphics conversion in one program!

Paintshop Pro is a highly popular graphics conversion program that now includes full photo-editing facilities. New tools include clone brush, crayon, chalk and user-definable brushes. Special effects and filters include Contrast, Emboss, Wind, Perspective, plus support for Adobe plug-ins. Paintshop Pro offers the features of packages many times its price!

You can quickly convert between image formats either singly or in batches. Paintshop Pro supports all major graphics formats including PCX, IPG, TGA, PNG, PSD, PhotoCD, CDR and WMF-licensed to use patented GIF and TIF format images. You can capture Windows screens as a whole or as a selection. Supports TWAIN scanners, and includes free browser and sample photos.

- PAI003 Paintshop Pro V3.0 **£49⁹⁵**



Paintshop Pro V3 & Kai's Power Tools SE Bundle

You can now get two great award-winning graphics programs in one amazing value package.

Paintshop Pro is now available with award-winning Kai's Power Tools plug-in filters. Your creativity will soar with these famous graphics effects tools which work within Paintshop Pro to offer fantastic effects for photoimages with amazing flair. Create your own Plug-in filters or use the ready-made ones supplied. Ideal for beginners and professionals alike.

Includes KPT Gradient Designer and a useful range of ready-made effects (Pixel Storm, Glass Lens Normal, Find Edges Charcoal, Diffuse More etc.)



- PAI004 Paintshop Pro V3.0 & Kai's Power Tool's Bundle **£69⁹⁵**

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"We will not be beaten on Microsoft Home Software!"

Cliff Bennett, Director



The Software Warehouse Price Pledge applies to everything we sell, but be aware that there are fraudulent copies of some Microsoft Leisure software currently being offered for sale in the UK. We have only seen MS Encarta 95, but if you see any other products at ridiculously low prices proceed with caution. Software Warehouse only sell genuine UK Microsoft products, and our margins are so low that it would be difficult for anybody to legitimately undercut our prices by a significant amount.

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PRIO04	Prince Interactive.....	£30
SC001	Science Adventure.....	£29

Director's Lab

Direct and animate your very own videos

Create your own multimedia videos with Nickelodeon Director's Lab, an all-in-one full service production studio! Make anything you want - electronic greetings cards, cartoons, music videos, school projects, even your own TV production! You're the director so you're in charge.

DIR001	Director's Lab.....	£29 ⁹⁵
SHE002	Sherlock Holmes Box Set (I, II, III).....	£34 ⁹⁵
ARE001	Are You Afraid of the Dark?.....	£34 ⁹⁵

3D Garden Designer 2

Design your ideal gardens... in 3D!

BBC Gardeners' World 3D Garden Designer 2 gives you the freedom to experiment with different garden schemes and see how they look from any angle - as if you were actually there! It even lets you watch your garden maturing through the seasons and over the years. Featured are more than 800 trees, shrubs and flowers.

GAR002	BBC 3D Garden Designer 2 on CD.....	£22 ⁹⁵
GAR001	BBC Gardener's World (DOS).....	£14 ⁹⁵

Family Tree Maker

Trace your family tree history - quickly and easily.

Just enter information about parents, children and marriages to create a great-looking family tree in just minutes. Record birth dates, occupation, medical history and any other information that you wish to print. You can save up to 15 pages per person and also automatically create ancestor, descendant and photo trees, or view your tree in any one of the many different styles.

FAM001	Family Tree Maker.....	£39 ⁵⁵
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BodyWorks V4

A colourful guide through the human body.

BodyWorks 4.0 shows you how and why the human body is the ultimate machine. Explore the body's systems, structures and functions in detail.

With a vast database, BodyWorks lets you study specific areas from head to toe, right down to the most elaborate cell level detail. State of the art animations bring the intricate functions of the body to life with 3D rotations of the body, video clips and much more.

BOO009	BodyWorks V4 CD.....	£32 ⁹⁵
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Ten Top-Selling CD-ROMs for £25!

This selected pack represents the very best CD-ROM products chosen from literally hundreds of submissions, many of which are currently selling as individual packages in retail stores!

- Reunion - The greatest voyage of all has begun. (Ages 14+)
- Dune II - Inspired by the best-selling Science Fiction of all time. (For ages 9+)
- Fighter Wing - The ultimate modern combat jet flight experience. (Ages 16+)
- Wayne's World - Party time... Excellent!!! No-hurl guaranteed! (10+)
- Singalong Kids' Classics - Sing children's musical theatre. (Ages 3-9)
- The Internet For Everybody - An easy to understand 2-hour video. (12+)
- Tom Landry Strategy Football - All the excitement of Pro American Football. (12+)
- Grandmaster Chess - Unmatched skill levels, graphics, sound and 3D perspective. (11+)
- Lemmings & Oh No! More Lemmings - The award-winning puzzle. (Ages 8+)

PUB010	Publishers' Pick 10 CDs.....	£24 ⁹⁵
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Ready Set Grow

Parenting made easy(er)!

Ready Set Grow is a fun, interactive and informative guide to pregnancy, childbirth and the first five years of parenthood. Created by a highly successful physician who is also a veteran mother of four, Ready Set Grow is complete with detailed illustrations, animation, music, sound effects and knowledgeable text. It covers all development aspects of your child's early years, including age-appropriate toys and activities, and parents concerns for each of nine different development stages. Also includes information on topics such as Playing it Safe in Pregnancy, Pre and Post Natal Nutrition and Fitness, Safety and Travel Resources, CPR instructions and a glossary. Detailed illustrations show your unborn baby's growth monthly and how it's development is proceeding. Ready Set Grow will even predict your due date!

Store vital dates, events and information in the address and information book, stores and maintains emergency numbers, babysitter details and much more. This is the ultimate "handbook" for any couple expecting, or who have young children.

RSG010	Ready Set Grow.....	£28 ⁹⁵
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Dorling Kindersley

Nature Encyclopedia

Featuring over 250 species of plants and animals.

Watch the behaviour of animals in their natural habitat, hear bird calls and understand complex environmental systems as microscopic life, the effects of climate and the prehistoric world. Features over 50 stunning video sequences, 60 original animations, 700 photos and illustrations, and 2 hours of sound clips.

DOR009	DK Encyclopedia of Nature.....	£33 ⁹⁵
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History of the World

Uncover fascinating facts and stories through history.

Watch a medieval archer loading and firing his longbow, hear the passion in the actual spoken words of Martin Luther King, and share in the Joy of German crowds as they tear down the Berlin Wall. Investigate historical stories, facts and artefacts from around the world with a simple mouse click.

DOR007	DK Eyewitness History of World CD.....	£33 ⁹⁵
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World Reference Atlas

A remarkable geographical reference for on-screen use.

Explore the world as never before with the ease and clarity of computer-generated maps. Zoom in and out from world and continental overviews to close-up views of the regions of individual countries. The gazetteer includes more than 250,000 different place names and links them to the maps.

DOR006	DK World Reference Atlas CD.....	£44 ⁹⁵
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Ultimate Sex Guide

Discover your full sexual potential.

Benefit from Anne Hooper's years of experience as a sex therapist and counsellor. She will help you to discover your potential in four different ways: through a series of questionnaires, by referring to case files, by following her prescribed programs for better sex, and by browsing through the Sexopedia.

DOR010	DK Anne Hooper's Ultimate Sex Disc CD.....	£29 ⁹⁵
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HOME ENTERTAINMENT - LEISURE

Educate and Entertain Your Family With VCI

Lottery for Windows

Use your PC to play the National Lottery with this best selling title.

Here it is! The sophisticated program that enables you to play the UK National Lottery using your PC, and take part in the excitement of seeing winning numbers create instant millionaires every week.

The program is fully customisable for all lotteries, allowing choice between 3 number algorithms, 'hot', 'due' and 'lucky numbers'. Just input each week's winning numbers to build up a database through the program or use the advanced 'wheeling' system to give the best coverage through permutations.

VCI016 Lottery for Windows (on 3.5") **£10⁹⁵**



LANGUAGE LEARNING

Learning French or German

Enables students of all ages to harness the potential of their PC.

With programs linked to the National Curriculum Learning French / Learning German will enable individual students to progress at their own pace from the basic building blocks of the language through to GCSE standard. Both programs have a clear easy-to-follow Windows interface, as well as the facility to record the tutor and student's voices within a structured 20,000 word learning format.

VCI001 Learning French (Windows/3.5") **£15⁹⁹**
VCI002 Learning German (Windows/3.5") **£15⁹⁹**



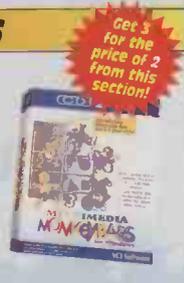
BUDGET CD ROMS

Multimedia Monkeybars

Software to help make learning as stimulating and interesting as possible for 4-7 year olds.

It could not be easier to install and use and will enable your child to discover the alphabet, sharpen hand eye co-ordination as well as number build, count and read clocks. Stunning full colour animation that is alive with laughter, learning and fun. The best in stimulating children's computing!

VCI003 Multimedia Monkeybars (Windows/CD)..... **£10⁹⁵**

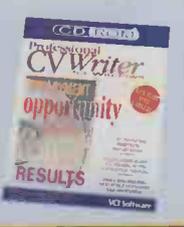


Professional CV Writer

Get ahead with the complete job search program.

More than just a first-class CV creation program, this package guides you through the job search process with maximum impact to ensure success. With preparation worksheets, easy-to-use layout styling and a 100,000 word spell checker, Professional CV Writer for Windows will kick start your career.

VCI004 Professional CV Writer (Windows/CD)..... **£10⁹⁵**



PREMIER COLLECTION

Easy-to-Learn Computing

Step-by-step tutorial that makes learning MS-DOS fun! An absolute must for the new computer user this tutorial is a fully interactive, step-by-step guide to the IBM PC and compatibles. No need for videos, Easy-to-Learn Computing has everything you need to know to use your PC confidently and independently!

VCI005 Easy-to-Learn Computing (DOS/3.5") **£7⁹⁵**



Word Games for Windows

Absorbing entertainment for the first time in one package. Word Games for Windows offers 4 sets of puzzle challenges designed especially for Windows. If you like any kind of word-puzzle game your sure to enjoy Cipher for Windows a truly absorbing code breaking game.

VCI006 Word Games for Windows (DOS/3.5") **£7⁹⁵**



PREMIER COLLECTION PLUS

Riverboat Solitaire

With over 1,000 challenges this is the best ever Solitaire! Increase your playing enjoyment by choosing from the 5 musical selections available as well as many other possible combinations of different colourful backgrounds. Whether you a beginner or pro, you'll appreciate the playability features of Riverboat Solitaire.

VCI007 Riverboat Solitaire (Windows/3.5") **£10⁹⁵**

Jackpot for Windows

Five classic casino games with great sound and graphic effects. With Jackpot for Windows you can have all the fun of trying your luck at the casino without actually losing your shirt! It's easy to install in Windows and makes ideal entertainment during coffee breaks in the office or evenings at home.

VCI008 Jackpot for Windows (Windows/3.5") **£10⁹⁵**

CREATE & LEARN

Adventures in Storybookland

For pre-school children and early readers playing alone aged 3-8. A fun puzzle adventure game, designed to stimulate observation, reaction and logic skills, as well as providing absorbing computer entertainment.

VCI013 Adventures in Storybookland (DOS/3.5") **£15⁹⁵**

Playing with Shapes

Interactive learning program suitable for children aged 3-7. Playing with Shapes is one of a series of attractively designed computerised learning kits. With the help of Cleo the Clown, the child is stimulated to recognise different shapes within layouts and pictures.

VCI011 Playing with Shapes (DOS/3.5") **£15⁹⁵**

Playing with Colours

Interactive learning program suitable for children aged 3-7. Playing with Colours is one of a series of computerised learning kits designed to offer children a different kind of learning experience, providing direct contact with important themes using entertaining and effective techniques.

VCI012 Playing with Colours (DOS/3.5") **£15⁹⁵**

Wonderbrush

Graphic art and software kit that will appeal to all age groups. Wonderbrush gives the younger user access to some of remarkable design tools, lines, circles as well as rectangles and a 256 colour palette to include text and numbers. The programs capabilities will appeal to older age groups and will provide the potential for hours of fun-filled and satisfying creative.

VCI014 Wonderbrush (DOS/3.5") **£15⁹⁵**

Cartoonin'

Amazing new animation program that's fun for all the family. The TV and movie cartoon industry has been revolutionised by the terrific computer capability of computer animation, and as the power of domestic PC processors has increased, programs incorporating some of this capability has become available to home users. Cartoonin' is a fascinating and exciting program to use.

VCI015 Cartoonin' (DOS/3.5") **£15⁹⁵**

Fairytail Puzzles

Absorbing and stimulating games for young people between the ages of 4 and 10.

Eighteen high quality puzzles, based on delightful illustrations from classic fairy tales, each from 6 to 120 rectangular or interlocking pieces, giving a total of 324 puzzle variations, and featuring timed scoring mechanisms for a number of different players.

VCI010 Cinderella & Puss in Boots (DOS/3.5") **£15⁹⁵**



Absorbing and stimulating games for young people aged 4-10. Eighteen high quality puzzles, based on delightful illustrations from classic fairy tales, each from 6 to 120 rectangular or interlocking pieces, giving a total of 324 puzzle variations, and featuring timed scoring mechanisms for a number of different players. Each program is designed to give entertainment for all ages, including adults, by offering different levels of difficulty.

VCI009 Pinocchio (DOS/3.5") **£15⁹⁵**

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Creative Labs Sound Cards

This month Creative Labs introduce five new sound cards and kits.

All SoundBlaster cards feature a built-in IDE interface, midi interface, enhanced stereo synthesiser and speech synthesis software. Plus Creative DOS Utilities: Creative Record, Mix & Play Utilities, Creative Mixer, Creative Quick CD, Creative FM Intelligent Organ. Includes microphone port, line-in & line-out jacks, speaker connectors, microphone and MIDI/joystick ports.

- SOU100 Multimedia Home CD Kit.....**£295**
- SOU014 SoundBlaster Pro Value.....**£52**
- SOU015 SoundBlaster 16 Value IDE.....**£66**
- SOU017 SoundBlaster 16 Pro AdSP.....**£134**
- SOU018 SoundBlaster AWE 32/IDE Full.....**£165**
- SOU027 SoundBlaster AWE 32/IDE Value...**£114**
- SOU010 SoundBlaster CD16 Discovery 2X..**£189**
- SOU019 GameBlaster CD Kit 4X.....**£299**



CD-ROM DRIVES

- | | | | | | |
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| MIT001 | Mitsumi Triple Speed CD..... | £149 | NEC045 | NEC 6X Internal CD..... | £269 |
| MIT008 | Mitsumi PCMCIA Dual Speed CD..... | £199 | NEC046 | NEC 6X External CD..... | £445 |
| CDR008 | NEC 3XP SCSI Portable 3X CD..... | £255 | PAN001 | Panasonic CR562 Dual Speed CD..... | £95 |
| CDR009 | NEC 4X Pro External Quad Spd. CD..... | £579 | PAN006 | Panasonic Interface Card..... | £15 |
| NEC040 | NEC 4X E-IDE Quad Speed CD..... | £139 | CDR017 | Toshiba Internal Quad Speed CD..... | £249 |
| NEC041 | NEC 4X E-IDE 4X CD & MS Encarta 95 .. | £159 | NEC005 | Enhanced IDE Interface..... | £29 |

CD952 2X PCMCIA CD

The easiest solution for multimedia on your notebook!

The CD952 runs off your notebook's motherboard via the PCMCIA Interface card you don't need an external power supply. Plus, because it runs off the PCMCIA interface, you enjoy faster access times and greater data transfer rates than with parallel port CD-ROM drives. The CD952 features everything you need in one package: CD-ROM drive, PCMCIA card and cable. Features include: Compliant with PCMCIA 2.1 standard; Easy to install device driver software; No external power supply required; Weight: 1.3kg; Double speed data transfer rate: 307.2KB/sec; Average access time: 350 ms (1/3 stroke); 64KB memory buffer



- PCM011 IC CD592.....**£259⁹⁵**

NEC Six Speed CD Drive!

These drives represent a huge step forward in CD-ROM Drive technology. Six-spin SCSI-2, massive 900KB/sec data transfer, 150ms access time, MPC, XA, DA, caddy-loading, 1-year warranty.

- NEC045 NEC 6X Internal.....**£269**
NEC046 NEC 6X External.....**£445**



GoldStar CD Drives

Lightning fast CD-ROM drives!

Full PhotoCD, MPC Level 2 support, CD-i, Video CD, CD-DA, CD-ROM/XZ, compatibility with Windows 3.1 and 95, making them probably the most compatible drives for today's and tomorrow's standards.

- GOL002 R520B 2X E-IDE.....**£86⁹⁵**
Data Transfer Rate: 300 KB/sec.
GOL003 R540B 4X E-IDE.....**£128⁹⁵**
Data Transfer Rate: 600 KB/sec.



Cyberman CD PCMCIA CD-ROM Drive

The portable CD-ROM drive for Windows 95

The Cyberman CD is a slick, slimline, dual speed CD-ROM drive that comes complete with Windows 95 drivers and is the first slimline CD-ROM drive with an optional built-in 16-bit sound card. It can be used anytime, anywhere - just plug in and play! The unit weighs 1.5 pounds, has an access time of 325 millisecond and a transfer rate of 353KB/sec, has a 256Kb buffer memory with a type II PCMCIA interface and comes with Labtec headphones. The Cyberman Sound Version also functions as a stand alone CD-player. A quad speed version is also available (without sound).

- CYB002 Cyberman CD (Dual speed without sound).....**£279⁹⁵**
CYB003 Cyberman CD (Dual speed with 16-bit sound).....**£379⁹⁵**
CYB004 Cyberman CD (Quad speed without sound).....**£379⁹⁵**
CYB005 Cyberman Bundle (CYB002 + MS AutoRoute Express).....**£299⁹⁵**



Illuminatus v3

Illuminatus features everything you need to make multimedia work for you!

Illuminatus gives you everything you need to create your own edutainment programs for kids, electronic brochures, catalogues and newsletters on disk, computer-based training, special material for special needs, interactive curriculum vitae, multimedia encyclopaedias, audio visual greetings cards, multimedia scrapbooks and more without the need for any programming skills.

Quickly and easily combine text and graphics!

You can quickly and easily combine text, graphics, sound, animation, video and actions onto screen-sized pages. Publish interactive multimedia documents on all kinds of floppy disk and CD-ROM. It's as easy to use as a DTP program but as powerful as an authoring tool.

Supports industry standard multimedia formats

Illuminatus v3 supports industry-standard multimedia formats including PCX, BMP, TGA, TIFF, Kodak PhotoCD, WAV, Midi, AutoDesk Animator ELC/ELI files, Microsoft AVI Video and MPEG motion video.

Includes Free CD-ROM!

Illuminatus includes over 5,000 clipart images, sound files, animations, icons and buttons plus over 100 professional-quality multimedia publications for you to adapt for highest-quality interactive programs in moments. Full tutorials are included.

- ILL001 Illuminatus v3.....**£99⁹⁵**

FREE CD-ROM PACKED WITH MULTIMEDIA
OVER 100 READY-MADE PROFESSIONAL QUALITY MULTIMEDIA PUBLICATIONS

Digital Workshop's
ILLUMINATUS v3
MAKE MULTIMEDIA IN MINUTES

includes both Windows 3.1 and Windows 95 versions!

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ACCESSORIES

Primax Game Pads

Primax - Putting you in control of your game-playing!

Primax Firestorm GamePads are ergonomic with a stylish design and finish, they put you in complete command of your game playing. They connect to a standard games port and are compatible with all PCs from XTs to Pentiums.

Two versions are available: the first comes with a 1.5m cable and the second is an infra-red version which is sensitive from up to 12m from your receiver, with a powerful PRO mode for experienced players with two extra fire buttons.



- PRIO50 One player Cable Version.....**£10⁹⁵**
PRIO51 One player Infra-red.....**£23⁹⁵**
PRIO52 Two player Infra-red.....**£33⁹⁵**

Primax Speakers

High power speakers with superior sound - they're ideal for multimedia and games!

Primax SoundStorm Speakers are a range of high-Watt speakers producing superior stereo sound quality. They are full multi-purpose, and not only can you use them with your PC, but also with TV sets, CD-players, cassette players etc.



They are all magnetically shielded and feature on-off switches, volume, bass and treble controls. They are fully plug and play and will work with any sound card.

- PRIO53 60-Watt PMPO Speakers.....**£29⁹⁹**
PRIO54 120-Watt PMPO Speakers.....**£39⁹⁹**
PRIO55 240-Watt PMPO Speakers.....**£49⁹⁹**

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| CHF001 | CH Flight Stick..... | £28 | MOU003 | Mouse Tracer..... | £XX |
| CHF002 | CH Flight Stick Pens..... | £49 | MC202 | MS Home Mouse (Serial)..... | £29 |
| GRA010 | Gravis GamePad..... | £19 | MC031 | Microsoft Mouse PS/2 & Serial..... | £39 |
| STY001 | IMSI PC Stylus (PS/2)..... | £29 | PR112 | Primax Mouse..... | £9 |
| PET002 | IMSI Pet Mouse Serial..... | £15 | QUI018 | Quickshot Starfighter 5..... | £9 |
| MOU006 | IMSI Serial Pebble Mouse..... | £19 | QUI019 | Quickshot Super Warrior 5..... | £13 |
| STY002 | IMSI Stylus Serial..... | £29 | SPE004 | SpeedMouse..... | £10 |
| LOG003 | Logitech Cordless Mouse..... | £52 | TOR002 | Tornado Joystick..... | £XX |
| LOG027 | Logitech Mouseman Sensa Wood..... | £39 | | | |
| LOG020 | Logitech Pilot Mouse Beige..... | £17 | SBE001 | Screenbeat SB203 Speakers..... | £12 |
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MULTIMEDIA CARDS

Desktop Video Editing for Windows

Miro Video DC1

The ultimate desktop video editing system for Windows!



The ideal video solution for real-time capture and playback of video sequences comes with Adobe premier or VideoStudio software. Capture digital VHS video to your hard disk and add transitions, titles and special effects, then print to tape in full-size NTSC or PAL, with SVHS and VHS quality, and up to 16.7 million colours. Comes complete with MJPEG hardware compression. There are no jumpers or dip switches to set and you get a two year warranty.

- MIR005 DC1 + Video Studio **£349⁹⁵**
- MIR004 DC1 + Adobe Premiere **£435⁹⁵**

Miro Video 20TD Live

Integrated graphics accelerator, video overlay and TV reception - all on one board!



Watch any TV or cable channel on your PC and then capture, store and edit any TV clip or edit video from any external sources. Play back AVI movies or TV images in full-screen size and at full speed. This card is also one of the fastest graphics cards available. There are no jumpers or dip switches to set and you get a two-year warranty.

- 20TD Live 2Mb VLB or PCI **£314⁹⁵**

Miro Video 12PD

An incredibly low-cost graphics accelerator and AVI movie board!



The Miro Video 12PD is a unique graphics card and the only one of its kind on the market today. With full screen AVI and software MPEG playback, it can display up to 1280 x 1024 resolution and capable of 16.7 million colours, making it the ideal graphics card for CD-ROM users. This plug and play card is compatible with VLB or PCI buses and is the best value all-in-one graphics and multimedia accelerator.

- 12PD Live 1Mb VLB or PCI **£94⁹⁵**
- 12PD Live 2Mb VLB or PCI **£134⁹⁵**

MiroCONNECT 34 Wave

The Miro 34 Wave is not only the most advanced sound card available, it also includes a V34 fax/modem, including voice mail features.



It features CD-quality stereo sound with true SoundBlaster compatibility and 32 voice WaveTable synthesis. You can even connect a CD-ROM to the MiroCONNECT 34 Wave. The communications feature brings complete telephone capabilities to your home or office in an easy one-slot solution. With no jumpers to set and a complete suite of communications and audio software, you'll be productive within minutes. This card is the ultimate in communications solutions for your PC, surf the 'Net, graze CompuServe, listen to your latest CD whilst it deals with your telephone calls... all in one card!

- MIR012 MiroCONNECT 34 Wave **£POA**
- MIR013 Miro PCM10 Sound Card **£79⁹⁵**
- MIR014 Miro PCM1 Pro Sound Card **£129⁹⁵**

STB - Award Winning Performance in Video Cards at Low Prices!

STB Velocity 64V

MPEG playback, AVI acceleration and a massive 1600 x 1200 resolution.



The STB Velocity 64 Video is based around the S3 Vision 968 controller with 2MB or 4MB of ultra-fast EDO VRAM. It features the Xing MPEG Plus Player for CDi and CD Video playback, AVI acceleration, a massive 1600 x 1200 resolution and 16.7 million colours at 1280 x 1024 to provide the ultimate in graphics quality and acceleration.

- STB012 Velocity 64V 2Mb EDO RAM PCI.. **£199⁹⁵**
- STB013 Velocity 64V 2Mb EDO RAM VLB. **£199⁹⁵**
- STB014 Velocity 64V 4Mb EDO RAM PCI.. **£329⁹⁵**
- STB015 Velocity 64V 4Mb EDO RAM VLB. **£329⁹⁵**

Powergraph 64

The unbeatable 64-bit price/performance accelerator.

The STB Powergraph features the S3 Trio 64 controller with 1MB or 2MB fast DRAM for the support of display of resolutions up to 1280 x 1024, colour depths up to 24-bit (up to 16.7m) and refresh rates up to 100Hz. Combine these features with STB's Vision Windows desktop control and a lifetime warranty, and you get unrivalled price/performance from a 64-bit graphics accelerator.



- STB010 Powergraph 64 2Mb PCI **£139⁹⁵**
- STB011 Powergraph 64 2Mb VLB **£129⁹⁵**
- STB016 Nitro Cirrus 5434 1Mb ISA **£94⁹⁵**
- STB017 Nitro Cirrus 5434 2Mb ISA **£138⁹⁵**
- STB018 Nitro Cirrus 5434 2Mb PCI **£138⁹⁵**

Movie Machine II - The Complete Video Digital Centre

- On-board Tuner with Teletext
- Real-time video effects and live mixer
- Transfer titles and graphics to video
- Live video overlay up to 1280 x 1024 resolution
- SVHS and VHS input and output
- Studio quality digitization
- Optional MJPEG and MJPEG extensions for 1 slot solution



- MOV005 Movie Machine II (includes tuner) **£489⁹⁵**
- MOV006 MJPEG Extension Card for MM II **£289⁹⁵**
- MOV007 MPEG Extension Card for MM II **£239⁹⁵**
- MOV008 Movie Machine II Power Pack (includes MJPEG & MPEG) **£989⁹⁵**
- Fast FP/S 60 **£489⁹⁵**
- MOV009 MJPEG Extension Card for MM Pro **£289⁹⁵**

Movie Machine Pro

Editing with Movie Machine Pro is easier than anything you've ever done. Use Movie Studio to choose your video sources, mix or cut and then use the T-Bar to add real-time digital effects: fades, zooms, flips, colour reversals, mozaic, luma and chroma keying, stroboscopes, etc. Of course, you can also set the speed and direction of the effects.

Movie Machine Pro
£289⁹⁵
STOCK CODE: MOV011

Advanced Acceleration Technology from Matrox

Whether you're working with 256, 65k or 16.7m colours, MGA Millennium delivers consistent Windows performance at all display resolutions.

MGA Millennium's superior image load speed makes it the fastest graphics board for accelerating word processing, spreadsheets and such demanding Windows applications as desktop publishing and photo retouching which require true colour acceleration at up to 1600 x 1200 resolution. MGA Millennium also greatly reduces eye strain and headaches caused by the annoying flicker found on most monitors. Its 220MHz DAC offers rock solid, flickerless displays at all resolutions for the ultimate in clarity and readability.

You can run full screen video clips at up to 30 frames per second for the smoothest playback of multimedia, games and education software. MGA Millennium provides superior video playback of Microsoft DCI files by accelerating colour - conversion and video upscaling directly in hardware. It is also supplied with a software MPEG Player that enables you to decode MPEG titles under Windows.

MGA Millennium Features include:

- MGA 64-bit processor
- High performance true colour
- Up to 8Mb WRAM
- Smooth AVI Video Playback
- Real time 3D rendering
- 16.7 million colours at resolutions up to 1600 x 1200
- Optimised PCI Interface for 120MB/sec. Image load speed
- Hardware accelerated DCI playback
- Free MPEG Player for Windows
- 220MHz DAC for flicker-free screen refresh

NEW PRODUCT

Matrox Accelerator from £249⁹⁵

matrox

- MAT008 MGA Millennium/21 2Mb WRAM PCI **£249⁹⁵**
- MAT009 MGA Millennium/41 4Mb WRAM PCI **£349⁹⁵**

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SOFTWARE WAREHOUSE PC



OPERATING SYSTEMS

PC DOS 7 - More memory and complete compatibility!

IBM PC DOS 7 gives you more memory for your DOS and Windows games and applications, plus a robust set of DOS and Windows utilities.

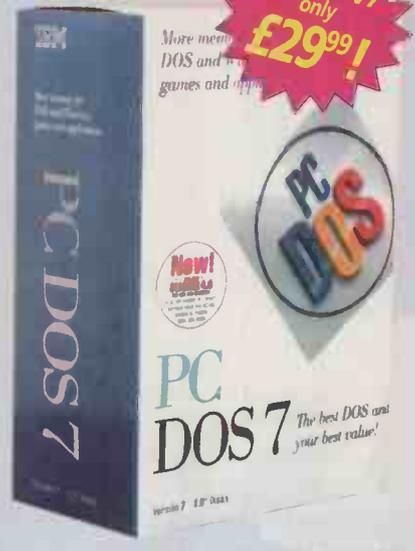
IBM's PC DOS is generally regarded as the best DOS in the computer industry. Version 7 provides more memory for your DOS and Windows games and applications, and upgrading all DOS/Windows systems is easy. It includes Stac Electronic's complete Stacker 4.0 disk compression technology - a dynamic

memory optimiser to give you maximum memory. Plus, you can access on-line help for ease-of-use, a program scheduler so you can go to sleep while your PC does the work, REXX programming language, and the latest in PCMCIA and much more.

Why choose PC DOS 7?

- **Free-up more conventional memory!**
Free up to 60KB more memory than PC DOS 6.x or MS-DOS 6.xx to improve your PC's performance with Windows, games etc.
- **More hard disk space!**
Comes with integrated STACKER 4.0 compression software - the industry leader!
- **Protect your system or network!**
PC DOS 7 includes Anti-Virus, the best integrated virus detection software available - it can detect over 2100 viruses!
- **More hardware support!**
Take advantage of the latest hardware support for docking stations, PCMCIA, pen, CD-ROM and more.

- **FREE, fully-featured Windows and DOS utilities!**
Save money with fully-featured, fully-functioning utilities available with both DOS and Windows interfaces. PC-DOS 7 comes with: Stacker compression, Anti-Virus, Central Point (PC Tools) Backup - diskette, tape, disk; Central Point Undelete; and much more.
- **Synchronise files and design powerful programs!**
With PC DOS 7 you'll be able to automatically synchronise files between two computers and design powerful REXX programs that you can run with other operating systems - including IBM OS/2 Warp (see below).
- **Refined over 14 releases!**
PC DOS 7 is IBM's 14th release of the classic DOS operating system. Each new release is tested and refined with users' feedback to make it work better for you.



PC DOS V7 only £29.99!

IBM004 PC-DOS V7 Upgrade £29.99



PC DOS gives you more free memory to run your applications!

OPERATING SYSTEMS - OS/2

Turn your PC into a true multi-tasking Windows PC with IBM's OS/2 Warp!

Turn your PC into a true multi-tasking Windows PC. Have all the power, flexibility and features of future versions of Windows today!

Your Windows desktop can look and work the same as it does now, or you can make use of the easy-to-use OS/2 Workplace Shell and discover the productivity of true drag-and-drop computing. Run multiple Windows applications right alongside your DOS favourites and the new ultra-fast 32-bit OS/2 programs. And don't forget OS/2's multitasking capabilities allow you to run many different applications at the same time and not just have them open simultaneously.

This new version of IBM OS/2 now works in only 4Mb of RAM and on any 386SX or above. OS/2 now supports Windows 3.1 or 3.11, so why settle for Just Windows when you can use IBM OS/2 Warp to add extra power to your system.

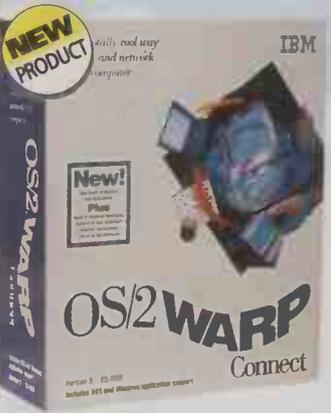
FREE Bonus Pack!

OS/2 comes with a Bonus Pack of full 32-bit applications which would collectively retail at over £1000. IBM Works, a mini-suite of 32-bit applications including word processing, spreadsheet, charting, data filling and report writing. IBM's Internet Connection Package, lets you seamlessly navigate through the Internet with easy-to-use graphical interfaces. IBM CompuServe Access software is included as is Fax Works, which enables you to fax documents from within your existing programs.



- OS2004 OS/2 Warp CD £47.99
- OS2003 OS/2WarpFloppy £57.99

OS/2 Warp Connect - on line access to resources and information, remotely or from the desktop?



OS/2 Warp Connect supports all the most popular network operating system as well as Personal Communications /70 for OS/2 - IEEE 80. Entry Level, IBM Database Manager/2, IBM TCP/IP, Lotus Notes, and CC Mail. OS/2 Warp Connect supports LAN applications that interface to the NetBIOS, Netbeui, variety of IBM and OEM communications adapters including asynchronous, ISDN (basic and primary rate), synchronous (switched and non-switched 56) and x.25 (direct and via asynchronous PAD).

OS/2 Warp Connect offers multiple security features to ensure that only authorised users gain access to the LAN via its remote services. Instead of passwords, OS/2 Warp Connect supports passphrases, which offer better security.

- Share local resources - such as files, applications and printers - with co-workers using the new IBM Peer for OS/2
- Combine industrial-strength LAN-based TCP/IP functions along with the ease of use features in the Internet Connection for OS/2

- Integrate easily with IBM or non-IBM LAN servers - locally or remotely
- Install locally or remotely from your CD-ROM on the LAN
- Run DOS, Windows, and OS/2 applications simultaneously on your desktop. True multitasking! Your applications can reside on your system, on your server, or on your peers computer.
- Work smarter with BonusPak - an integrated set of full-function applications.
- Communicate and collaborate with your co-workers.
- Includes Lotus Notes Express to let you track and share information.

- OS2011 OS/2 Warp Connect V3 on CD £99.95
- OS2013 Upgrade from OS/2 2.x - CD £79.95
- OS2010 Upgrade from OS/2 3.0 - CD £54.95
- OS2012 Upgrade from DOS or any other operating system £89.95

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Scanning

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SCANNING

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MICROTEK ScanMaker II - The best value A4 flatbed around?

MICROTEK has spent 10 years investing in scanner research and development, resulting in a comprehensive range of high quality scanners for both beginners and professional users.

The economical ScanMaker II is an all-rounder that is probably the best value A4 flatbed scanner on the market today. It reproduces your hard copy in 16.7million colours at a maximum resolution of 1200 x 1200dpi. It can even be specially equipped to meet your specific needs. For instance, if most of your scanning is text-based just add an ADF-600 50-page document feeder; or for film scanning, choose the backlit TMA-II transparency attachment. All MICROTEK scanners include a TWAIN-Module for TWAIN-compliant Windows software plus an additional ASPI driver and a SCSI card.

SCA001 Microtek ScanMaker II ... **£299**



MICROTEK ScanMaker II Specifications

- Type: 24-bit colour flatbed scanner
- Maximum resolution: 1200 x 1200dpi (interpolated)
- Scanning area: 21.6 x 35.6cm (approx. A4) Optical resolution: 600 x 300dpi
- Scanning modes: 1-bit / 64 greyscales simulated
8-bit / 256 greyscales; 24-bit / 16.7million cols.
- Scanning method: 3-pass with RGB filter

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Until the end of the Summer, if you buy any Logitech product you'll receive a FREE Mitsubishi Mobile Phone. The terms and conditions are simple: Send a copy of your receipt and registration card to Logitech before 31st October; Only one mobile phone per person; Must be over 18; Call for full terms and conditions. (Not available with MouseMan Sensor.)

Last chance to get your **FREE** Mobile Phone!

ScanMan Colour

Scan every colour the human eye can see.

Ideal for designers who want to scan large colour pages or odd-sized originals. It's the most versatile handscanner ever! Its 24-bit hardware captures 400dpi images in 16.8million colours with 256 greyscales or linart. It is one of the few colour handheld scanners that require no warming-up time.

£25 OFF!



- LOG007 Logitech ScanMan Colour **£145⁹⁵**
- LOG013 Logitech EasyTouch **£108⁹⁵**
- LOG016 Logitech ScanMan PowerPage **£299⁹⁹**

Visioneer PaperPort - The fastest way to get paper into your PC!

If you ever have trouble finding your keyboard under all your papers, faxes, reports, mail and clippings? PaperPort makes your paper work for you!

PaperPort is compact and it can scan an A4 page in as little as six seconds! It then instantly displays the digital image on your screen. Once you've got your scanned document you can fax it, file it, edit it, copy it, or send it via e-mail. You can scan at either 200 or 400 dpi. PaperPort comes with a range of software including desktop and drag-and-drop metaphors which help organise, manage, locate, fax, edit and print documents. Store your documents in familiar file folders using long file names and find them using keywords, titles and dates. It also includes WordScan OCR software which converts scanned documents into editable text.

You get all this in a compact package that only weighs 2.5 pounds, and sits easily on desk and fits easily into your briefcase. So whether you work at your desk or on the road, PaperPort puts a fax machine, office copier, filing cabinet and personal typist - literally - at your finger tips.

vis061 Visioneer PaperPort **£299⁹⁵**



It's the compact desktop scanner!

What can you do with PaperPort?

- Fax it: Drag your document to the fax button, select a recipient, and PaperPort software uses your fax modem to transmit it.
- File it: Scan your papers and use PaperPort to organize and retrieve letters, reports, etc.
- Edit it: PaperPort comes with powerful WordScan (OCR) software that quickly turns your document into editable text and puts it in your word processor.
- Copy it: Copy pages without waiting to use the office copier.
- E-Mail it: Scan documents and send them via electronic mail.

Vista T630 Colour Scanner

High performance budget colour scanners from the world's largest digital imaging manufacturer.



UMAX

An outstanding specification at an incredible price! The UMAX T630 gives you 600x300dpi optical scan resolution for up to 4800dpi output, via a triple pass scanning mechanism.

Comes with Photoshop LE software, SCSI interface and all cables.

The T-630 was awarded PCW Editor's Choice in July 1995 - "...don't let appearances put you off: this scanner is wonderful... Raw colour scans are accurate, bearing a great resemblance to the originals and easily corrected. This is our budget best buy, putting many more expensive scanners to shame."

vis050 UMAX Vista T630 **£349**

PageOffice

PageOffice provides a single solution for transforming piles of paper into useful information on your PC.

The PageOffice hardware/software combination is capable of importing printed documents whether text or graphics, into your computer - processing them and then delivering each to its appropriate location. This great value bundle comes complete with all the software you need for scanning text, graphics and all the utilities you need to file your documents, E-mail your documents, fax them, print them or even edit them. In addition, you can use your existing software to add that extra finishing touch.

The PageOffice is an easy to use input device that acts as the electronic equivalent of an in-tray for your personal computer. The PageOffice comes complete with SCSI interface and cable, a ten-sheet automatic document feeder and scans at 300dpi. This revolutionary scanner scans a full A4 page in just 6.4 seconds.

PAG030 UMAX PageOffice **£288⁹⁵**

Vista S8

High image quality, single pass A4 colour scanner.

With an optical resolution of 400x800dpi (interpolated up to 6400x6400dpi) this high speed scanner brings out the richness and detail of originals. It captures 24-bit colour and comes with powerful scanning software that includes auto-density, descreening and network scanner sharing facilities.

vis052 UMAX Vista S8 **£549⁹⁵**

PRIMAX The leaders in scanners!

Primax are the largest mouse and scanner supplier that you've probably never heard of.

Primax have chosen Software Warehouse as its first business partner to market the Primax range in the UK. Primax are one of the world's leading manufacturers in mice, game pads, sound cards, speakers, flatbed scanners, cables, printer-share devices, and communications hardware. All Primax products are supplied with a two-year warranty and are backed by years of intensive research and development. Software Warehouse will be stocking the leading products from the Primax range in both our retail outlets and through our mail-order operation.

FREE 30-Day Paintshop Pro Evaluation Copy with every Primax Scanner!

Primax Scanners

This exciting new range of Primax scanners are ALL supplied with Finishing Touch photo-styling software and ReadIRIS text recognition software (OCR). ALL are TWAIN compatible and come with UK support and warranty.

Primax Greyscale Hand Scanners

The Primax greyscale scanners scan at 100/200/300 and 400 dpi and have a wider than normal scan width of 105mm. The 32 greyscale scanner will actually scan up to 256 using software emulation. The 256 greyscale scanner scans at true 256 greyscales via its hardware.

PR1101 Primax 32 Greyscale **£44⁹⁵**

PR1102 Primax 256 Greyscale **£54⁹⁵**

Primax Colour Mobile Scanners

The mobile version includes all the features as above, but also includes motorised rollers. This unique feature allows a hand scanner to perform at the same accuracy as a flatbed scanner. You simply place the scanner on the image to be scanned and press the start button on screen, and the scanner automatically moves itself across the image. It determines the speed of scanning with reference to computer speed and image complexity. This is absolutely essential for colour or greyscale images. It also connects to your parallel port, making it ideal for use with portables or in offices where more than one person needs to scan images and documents.



PR1104 Primax Colour Mobile **£149⁹⁵**

Primax DataPen

Simply the fastest way of entering text and, on average, 20-30 times faster than using the keyboard. Run the DataPen over the text and it will input text from where the cursor lies. The OmniFont OCR software runs in the background and allows it to recognise any font between 8pt and 22pt text size. It can be used in all applications running under Windows. There's even a spell checker in eleven languages. The DataPen is easy to install and connects to your standard parallel port.

PR1105 Primax DataPen (Win) **£199**

Primax Colour Hand Scanners

The Primax Colour Hand Scanners scan at up to 400dpi resolution. They are able to scan black and white, greyscales and 24-bit true colour (16.8 million colours). They come with a high-speed, 16-bit interface card.



PR1103 Primax Colour **£99⁹⁵**

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Storage

STORAGE

ARCsolo and ARCserve - Complete Workstation Back-Up/Restore

ARCsolo is the first back-up solution for stand-alone PCs, workgroups and servers to take full advantage of the workgroup connectivity features found in Windows for Workgroups, Personal NetWare and LANtastic.

- Simple installation and interface. Novice Windows and NetWare users will find ARCsolo's menu-driven installation procedure straightforward. Once it's installed you will be guided through the back-up/restore process with ARCsolo's intuitive Microsoft Windows Graphical User Interface and its graphical tree views in Intelligent Restore.

- Flexible BackUp/Restore. ARCsolo can be customised to suit your individual needs. BackUps can take place immediately or can be scheduled for daily, monthly, hourly or any other Increment. Select from several methods of full and incremental back-up operations. Fileservers with several partitions/volumes can be submitted as one job. You can also specify the number of times ARCsolo will retry busy files before continuing the backup.

- ARC009 ARCsolo for DOS **£79⁹⁵**
- ARC010 ARCsolo for Windows **£79⁹⁵**



NEW PRODUCT

ARCserve for NetWare is the automated back-up and restore solution for your entire Novell network.

This award-winning software backs up all file servers and attached PCs running DOS, OS/2 and Windows (included), as well as UNIX and Macintosh (offered as options). Maintaining the same innovative functions as ARCserve DOS Edition 4, the Windows edition provides enterprise-wide back-up for networks of all sizes.

- ARC002 ARCserve V5.0 for NetWare 5-User **£164⁹⁵**
- ARC003 ARCserve V5.0 for NetWare 10-User **£336⁹⁵**

ARCserve for Windows NT is a comprehensive data management software solution for Microsoft Windows NT.

As part of Cheyenne's ARMS (Architecture for Reliable Managed Storage) strategy, ARCserve for Windows NT's 32-bit multi-threaded architecture provides native support for heterogeneous Windows NT networks, which include Windows NT workstations and servers, and Windows for Workgroups. ARCserve for Windows NT is ready "right out of the box" - simply install and go!

- ARC008 ARCserve for Windows NT **£595⁹⁵**



NEW PRODUCT

Call for pricing on larger user packs

Adaptec SCSI Controllers

Adaptec Total CD - 16bit SCSI host adapter for CD connectivity.

A line of innovative SCSI host adapters specifically designed for the single user and small office environment. Total CD host adapter kit provides one of today's simplest, most effective connections to the expanding world of CD-ROM applications. Just plug in the board, connect the cable, and tune in to new dimensions of information and entertainment. It's that simple!

- ADA001 Total CD Kit **£34⁵⁰**
- ADA002 Total Connect Kit **£54⁵⁰**



NEW PRODUCT

SCSI Master - Unmatched compatibility for high performance ISA systems.

SCSI Master Kit offers high-speed I/O and connectivity for demanding data and graphics-intensive applications, such as multimedia and desktop publishing. This kit also implements multi-threaded I/O for high performance transaction processing and fault-tolerant networking. The SCSI Master Kit provides true multitasking connectivity between your PC and SCSI-2 peripherals.

- ADA006 SCSI Master Kit ISA **£169⁹⁵**
- ADA007 SCSI Master Kit EISA **£239⁹⁵**
- ADA008 SCSI Master Kit PCI **£169⁹⁵**



NEW PRODUCT

SlimSCSI - Instant connection for portables to powerful new peripherals using the PCMCIA slot.

The APA-1460 SlimSCSI host adapter delivers instant, high-performance peripheral connections to your PCMCIA portable PC. The SlimSCSI is perfect for quick connection of up to seven external SCSI-2 devices like CD-ROMs (including single- and multi-session PhotoCDs), hard disk drives, HP scanners, SyQuest, Bernoulli, Floptical, and SCSI tape drives.

- ADA003 SlimSCSI - SCSI to PCMCIA **£79⁹⁵**
- ADA004 MiniSCSI - Parallel to SCSI **£54⁹⁵**



NEW PRODUCT

WangDAT - For High Performance DAT Drives

The ultimate in DDS compatibility from WangDAT.

The WangDAT models 3100 and 3200 DAT drives offer the ultimate in DDS compatibility, featuring DDS and DDS-DC data compression formats. With their small, 3.5" form factor, these drives are the perfect choice for today's more compact systems, providing 2GB capacity in DDS mode, and 4GB up to 8GB with data compression. Both drives offer impressive performance with a fast, 30-second search capability and typical transfer rates from 183-366KB/sec.

WangDAT key features include:

- Precise tension control • Direct drive, real motors
- Reel brakes for gentle tape-handling under power loss
- A four-head, self-cleaning drum • An independent capstan motor

- WAN001 WangDAT 3100 SCSI 2GB Int. **£529⁹⁵**
- WAN002 WangDAT 3200 SCSI 4GB Int. **£579⁹⁵**
- WAN003 WangDAT 3400 SCSI 8GB Int. **£639⁹⁵**
- WAN004 WangDAT 3100 SCSI 2GB Ext. **£649⁹⁵**
- WangTek Tape Drives
- WAN005 WangTek 5150PK Int. 250-500MB. **£264⁹⁵**
- WAN007 WangTek 5525es Int. 525MB SCSI. **£289⁹⁵**
- WAN008 WangTek 5525es Ext. 525MB SCSI. **£396⁹⁵**



DAT Drive shown with case open

NEW PRODUCT

New! Maxtor Drive Kits

These drive kits are the simple solution for upgrading your PC.

Included in every Maxtor pack are full step-by-step instruction manuals, drive rails and screws, 5.25" mounting bracket, a dual hard drive interface ribbon cable and all software required. The MaxBlaster software provided will allow you to partition and prepare your hard drive, and allows the drive partitions to extend beyond the limitations set by DOS and your computer's CMOS BIOS.

- MAX019 850Mb (12ms) IDE Kit... **£199**
- MAX018 540Mb (12ms) IDE Kit .. **£159**
- MAX020 1.2Gb (12ms) IDE Kit... **£289**



Western Digital Digital Drive Kits

The Western Digital range of hard drive kits offer, the highest level of quality backed by a three year warranty.

A major step forward in upgrading your PC - these drive kits contain everything you need to easily extend the storage capabilities of your PC: A Caviar 3.5" quick access time drive, rails, screws, 5 1/4" chassis, manuals and installation disk. The Western Digital installation disk will even get around the limitations on drive partition sizes, set by DOS, allowing your new drive to be configured as one large partition (no need for separate drive letters). The cost per megabyte of these new storage devices, is in fact now cheaper per megabyte than a floppy!



- WES006 Western Digital 540MB IDE Kit **£169**
- WES007 Western Digital 850MB IDE Kit **£199**
- WES008 Western Digital 1.2 GB IDE Kit **£269**
- WES010 Western Digital 1.6 GB IDE Kit **£375**

Please note: Before buying bare drives, please check you have the necessary cables and fixings, as they do not come with individual drives. You will also need a screwdriver and remember to power down your PC before removing the cover.



Pictured above right are the Western Digital Caviar drives (without top cases!). These high quality drives come with a 3 year manufacturers warranty.

- WES001 IDE Western Digital AC2540A 540Mb **£154**
- WES002 IDE Western Digital AC2700A 730Mb **£159**
- WES003 IDE Western Digital AC2850A 850Mb **£175**
- WES005 IDE Western Digital AC3312 1280Mb **£275**
- WES009 IDE Western Digital 1.6Gb **£349**

NEW PRODUCT

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V1025	WIN Beginners Guide to PCs.....	£17
V1013	WIN WordPerfect for Windows Beginners.....	£17
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V1039	WIN Paradox 5 for Beginners.....	£17

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This is it! The definitive training package on a CD-ROM. Imagine a resident expert in your computer, when you get stuck, up pops a friendly face and demonstrates the task in hand! Always on-hand with friendly advice and expert tuition, it's like having your own personal trainer in your computer!

These innovative CD-ROMs make sense as a pop-up instructor or as part of a much more structured learning program. The complete training course lasts for around 6 hours and can be worked through topic by topic, from start to finish. Or, with intermediate topic selection, you can pick the topic you want to learn and go straight to it.

Each CD is packed with video and audio clips to steer you through the course and to help make learning quick and enjoyable. And because all BVG CD-ROM tutorials don't have to have the full application running, you can take the tutorial to any machine.



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BVG003	WIN Access 2.0 Advanced.....	£39
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BVG008	WIN Word 6.0 for Windows.....	£39
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BVG010	WIN Programming in C++.....	£39

J.I.T. Corel Training

An exciting new approach to learning CorelDraw!

All of JIT's products are designed to run in a parallel window to CorelDraw or Corel PhotoPaint. In that way the learner is able to work right along with the instructions, using either the graphics provided on the CD, or directly within their own application. A complete set of 'VCR-type' controls to pause, repeat and skip forward or backward within the relevant training make this the easiest way to learn Corel Draw.



CorelDraw! V6 Now Available

JIT CorelDraw 3,4 or 5.....£29⁹⁵

EZ Language

Popular vocabulary & pronunciation tutor in Spanish, French, German, Italian, Russian and Japanese.

This CD is the fun and easy vocabulary and pronunciation tutor. In just minutes, you'll be learning new words and phrases in six foreign languages. See pictures with the words and listen to native speakers' voices. It's like having your own personal language instructor available at your command. This full multimedia approach makes learning fun, fast and it's perfect for travellers, students and anyone else who wants to communicate in a new language.

Words and phrases appear in both English and the foreign language to help you learn quickly. You can even search for a specific word to find its translation. If you have a sound card you'll be able to hear a foreign speaker pronounce the words properly and if you have a microphone, you will even be able to record your own voice to monitor your improvements.



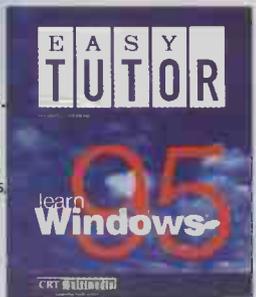
EZ1001 EZ Language.....£33⁹⁵

EasyTutor - Learn Windows 95

The easiest way to get the most out of Windows 95.

EasyTutor gives you hands-on experience, animation, video and audio to help you learn Windows 95 quickly and easily. The new Intelligent Learning Technology™ (ILT) acts like your own personal tutor. EasyTutor includes ten separate modules addressing all of the features and benefits of Windows 95, plus a whole range of hints, tips and tricks. You can display your progress against features that you've chosen to learn with the Progress Map feature. Then you can test what you've learned with the interactive quiz.

Included on the CD-ROM are both Windows 3.1 and Windows 95 versions so you can get to grips with Windows 95 before you've bought it.



EA5007 EasyTutor Learn Windows 95 CD.....£19⁹⁵

UTILITIES

Auto Addressing System

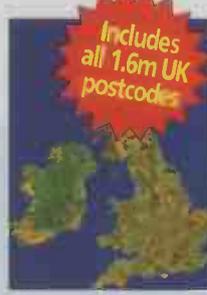
The Automatic Addressing System from Arc Ciel is a database that holds all of the UK's 1.6million postcodes, covering all of Britain (including Northern Ireland).

With this unique Windows-based program you simply input a postcode and it will tell you the road name, town, city and county, which can then be directly pasted into most Windows applications, including Word, Excel, WordPerfect etc.

In the system are 24 million individual addresses across 1.6million postcodes. You can load the whole of the UK (taking up just 10Mb of hard disk space) or one of ten regions.

Additional features are the search facility, where you enter part of an address and find the postcodes; and a background operating mode where addresses can be referenced from a database system, including Access, FoxPro and Visual Basic.

ADD004 Auto Addressing System.....£149⁹⁵



Includes all 1.6m UK postcodes

WinDelete V2

No other un-installer is safer or more thorough than WinDelete!

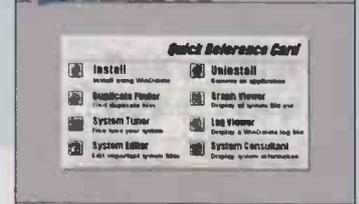
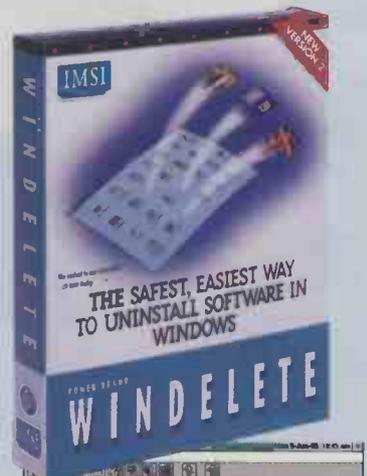
New WinDelete Version 2 is the latest version of this award winning Un-Installer program. This release offers new features and enhancements that is easier and safer to use, with a lot more power. Market research shows that today's users want a product that is safe and simple, without accidentally deleting files it shouldn't. WinDelete stands out in its ability to meet these needs.

Application installations are monitored to enable better removal, covering every type of application and system support file. Comprehensive installation logs are maintained to ensure thorough removals. Changes are previewed before being executed, and the new range of tools facilitates better system management.

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WinDelete V2's simple-to-use Interface

WIN050 WinDelete Version 2.....£29⁹⁵

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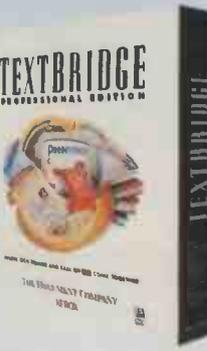
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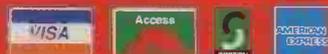
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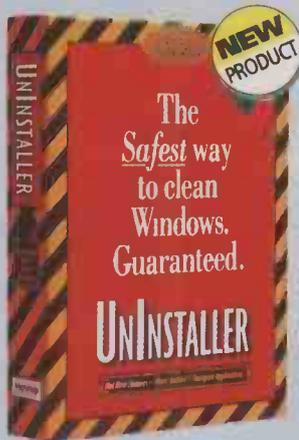
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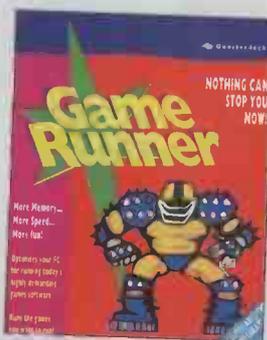
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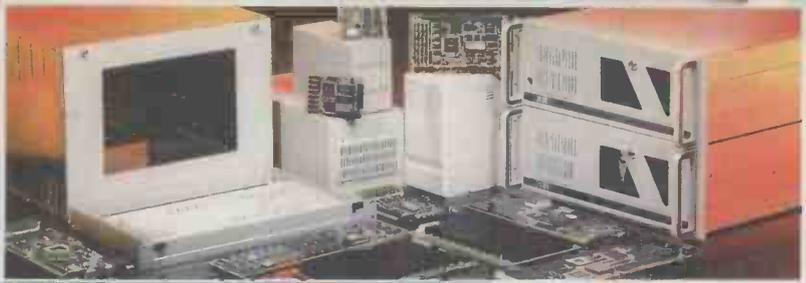
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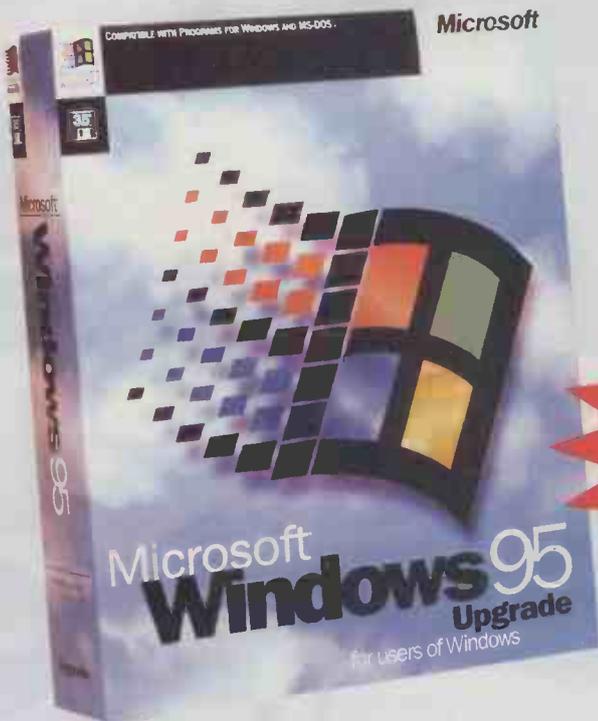
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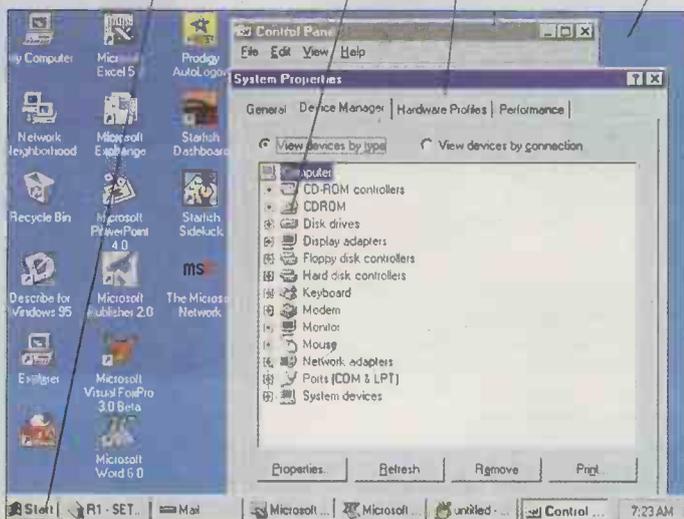
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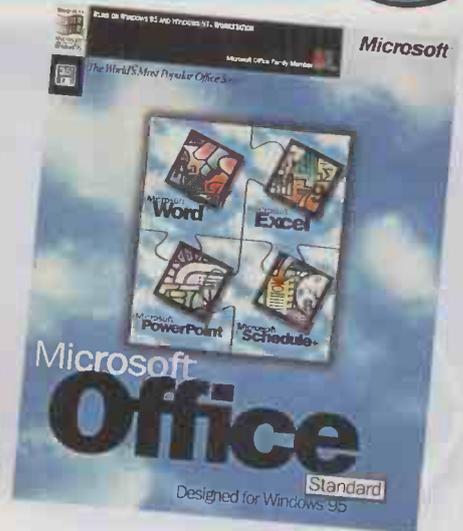


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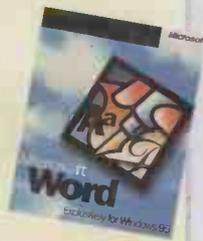


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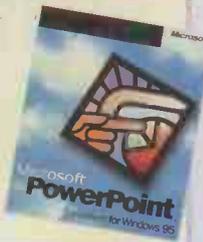
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HP LaserJet 4SiMX (PC,NW)

£2965

HP DESKJET 340

NEW



£173

PROFESSIONAL PORTABLE PRINTER

ColorSmart™

600x300 dpi² plus HP REt, 300x300 dpi colour (opt), Very portable shape, 2kg, Battery, case & Recharger options. Integrated 30 sheet feeder. Colour Kit £31

Infrared Adapter (IrDA) £32 Mac Adapter cable £19

HP DESKJET 1600C



£829

FAST COLOUR NETWORK CAPABLE

ColorSmart™

Black (8ppm) & Colour (4ppm), high capacity

HP DeskJet 1600CM (PC,NW,Mac) £1219

HP LASERJET 4V



£1365

16ppm, 600dpi² plus HP REt, 2 trays, PCL5e

A3

HP LaserJet 4MV (PC,Mac,NW)

£1975

HP SUPPORTPACK

3 yr On-site Maintenance with next day response

HP ENGINEERS NO FUSS, NO FURTHER EXPENSE SEE PAGE 15 FOR BUNDLE OFFERS

TAKE COVER
Buy HP Support Pack

HP ACCESSORIES AND MEDIA

Network Connectivity

HP JetDirect MIO Internal J2552A £289
Combo Ethernet & LocalTalk £249
HP JetDirect EX external J2382B £299
HP JetDirect EX Plus 3 J2593A (3 parts) £190

Adobe PostScript Level 2

PostScript Level 2 for HP LJ4P £229
PostScript Level 2 for HP LJ4Plus £325
PostScript Level 2 for HP LJ4V £245
PostScript Level 2 + 1MB RAM for HP LJ5P £225
PostScript Upgrade kit for HP DJ1600C £399

High Quality Media

HP Premium Inkjet Paper - A4, 200 shts 51634Z £16
HP Premium Glossy Paper - A4, 50 shts C3837A £43
HP Premium Transparency - A4, 50 shts C3835A £40
HP JetSeries CX coated - A4, 200 shts 51630Z £16
HP LaserJet Labels - various from £13
HP DeskJet Labels - various from £23

Paper Handling

Duplex unit HP LJ4Plus £289
Duplex unit HP LJ4SiMX £375
A5 Paper Feeder - HP LJ4L £59
A5 Paper Feeder - HP LJ4Si £75
1000 sht output stacker - HP LJ4Plus £219
2000 sht output stacker - HP LJ4Si £845
500 sht Lower Paper Cassette - HP LJ4Plus £190
1500 sht Hi Capacity Feeder - HP LJ4Si £319

DUPLIX NEEDS EXTRA RAM

Flash SIMM Kit

1MB for HP LJ4/LJ4Plus/LJ4Si £250
2MB for HP LJ4/LJ4Plus/LJ4Si £325

SEE PAGE 18 FOR COMPREHENSIVE LIST OF ORIGINAL HP MEMORIES

No 1 for HP

HEWLETT PACKARD

Premier Reseller
Personal Computer
Products



Access



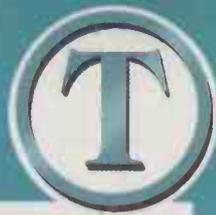
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MOBILE PCs



- ★ Lightest - 3.3-3.8lbs
- ★ Full size keyboard
- ★ 8.5" DSTN or 9.5" TFT screen
- ★ 486DX2-50 or 486DX4-75 CPU

HP have a mobile PC to suit every need; from the HP Palmtop 200LX, complete with DOS, Lotus 1-2-3 & HP PIM, through the world's lightest colour notebook, the HP Omnibook 600, to the class leading HP Omnibook 5000, offering Intel Pentium™-90 processor and PCI architecture.

- ★ Intel Pentium™-90, 2.9v
- ★ PCI architecture with 256kb cache
- ★ 10.4" VGA or SVGA-TFT
- ★ Instant ON, Lithium ION Battery, up to 3hr life



Model	Price
HP Omnibook 600	range starts from just
HP Omnibook 4000	range starts from just
HP Omnibook 5000	range starts from just

PRICES CUT

£1299(a)
£1425(a)
£3685(a)

PERFORMANCE PCs



- ★ Intel Pentium™ Processor : 75, 90, 100 or 120MHz
- ★ PCI architecture with local bus IDE & video, min. 8MB RAM
- ★ MS Windows for WorkGroups 3.11

VE: 270MB or 540MB HD, **VL**: 420MB or 840MB HD, ISA slots, fast IDE on LB PCI/ISA slots, Enh. IDE on LB

Model	Price
HP Vectra VE P/75 from just	£975(a)
HP Vectra VL P/75 from just	£1075(a)
HP Vectra VL P/90 from just	£1150(a)
HP Vectra VL P/120 from just	£1475(a)

PRICES CUT

£975(a)
£1075(a)
£1150(a)
£1475(a)

TAKE COVER
Buy HP Support Pack
£125

FLATBED SCANNERS

HP ScanJet 3P

- ★ Monochrome - 1024 shades
- ★ 300dpi enh. to 1200dpi
- ★ Up to 12ppm scanning

HP PicturePlace
- an image editor



£245

Calera WordScan 3.0
- an OCR package

HP ScanJet 3C

- ★ Colour (brilliant)
- ★ 600dpi enh. to 2400dpi
- ★ HP ColorSmart Support

WHILE SUPPLIES LAST



£635

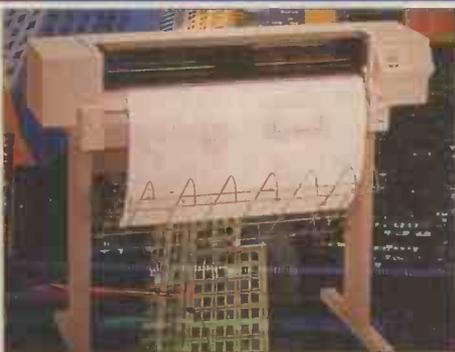
HP DeskScan II

- easy to use scanning utility

Corel PhotoPaint
- Image editing software

Calera WordScan 3.0
- an OCR package

PERFORMANCE PLOTTERS



- No Pens
- No Mess
- No Fuss

FANTASTIC NEW MODELS AT LOWER PRICES

Sharper, faster every time

Model		A1	A0
HP DesignJet 230	Mono - Single feed	£1435(a)	£1975(a)
HP DesignJet 250c	Colour - Single feed	£1799(a)	£2449(a)
HP DesignJet 750c	Colour - Roll feed	£3699(a)	£4395(a)
HP DesignJet 755cm	Colour - Roll feed - Printer		£4575(a)

Brilliant, near photographic large format printer. In-house production made easy. Less £10/print on coated media. Postscript Level 2, 68MB RAM, sample roll, light-fast inks.

HP OFFICEJET LX

Best selling all-in-one solution for the small business and the home.

- ◆ High quality Printer
- ◆ Group 3, Paper + PC Fax
- ◆ Complete with Fax s/w
- ◆ Convenience copier

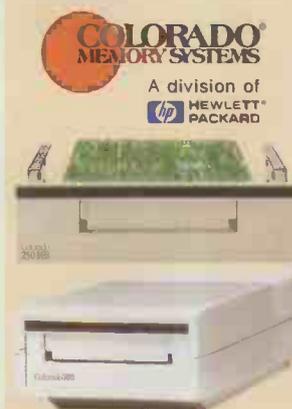
1 YR EXPRESS WARRANTY

FAX COPY SCAN PRINT



£499

PERSONAL BACKUP



	Jumbo	Trakker	Travan
	350	700	1400
	350	700	T1000
Form Factor	5.25"	5.25"	5.25"
Software	✓	✓	✓
QIC-40	R/O	R/O	R/O
QIC-80/XL	R/W	R/O	R/W
QIC-3010		R/W	R/W
QIC-3020		R/W	
QIC-Travan			R/W
Max.Cap (Comp)	340	680	1.3GB
	340	680	800
Warranty	1yr	2yr	2yr
	2yr	2yr	2yr
Price	£72	£115	£179
	£142	£199	£108

The Tapes(b)

Colorado	3-pk	3M		each	5-pk
DT-350	fm't'd	£52	DC2120XL	unfm't'd	£14
DT-740	fm't'd	£66	MC3000XL	unfm't'd	£21
DT-1000	fm't'd	£85			£100
DT-1400	fm't'd	£70			

The Software - Colorado Backup for Windows
Every current HP Colorado & HP Surestore drive ships with this easy to use yet powerful back up application. It supports QIC and DDS formats and most popular PC networks.

- Automation capability
- Data Compression
- Runs in background
- Library facility

TRAVAN The next generation QIC format, retaining backward compatibility and providing forward path up to 4GB. Developed by 3M, Travan offers 3.5" low profile form.



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Hewlett-Packard

PERFORMANCE WITH RELIABILITY - HP OFFERS IT ALL

FILESERVERS



Fileserver computers are the heart of today's networks. As with any critical equipment, they should be very reliable, from a strong company with expertise in design and manufacturing and, perhaps most crucially, be supported by outstanding warranty and repair terms.

HP NetServer LF

Intel 486DX2 & Pentium Processors (Single). PCI/EISA and SCSI-2 interface. High internal storage capacity. Drive array (RAID) options with HOT-SWAP.

HP NetServer LH

Intel Pentium Processors (Single). PCI architecture and Fast-SCSI-2 interface. ECC memory expandable to 192MB RAM. HOT-SWAP READY - 6 bays (up to 24GB)

HP NetServer LS

Intel Pentium Multi-processor (Scaleable). PCI architecture and Fast + Wide - SCSI-2 interface. 32MB ECC RAM exp to 768MB. HOT-SWAP Bays for Fast-Wide SCSI-2 drives.

	CPU	RAM	HD	Price
HP Netserver LF	4-66	8	1GB,CD	£2299(2a)
HP Netserver LH	5-75	16	1GB,CD	£4095(2a)
HP Netserver LH	5-100	32	Chassis,CD	£5995(2a)
HP Netserver LS	5-100	32	2GB,CD	£6825(2a)
HP Netserver LS	5-100*2	64MB	Chassis,CD	£11,000(3a)

All HP Netservers carry a 3 year OS-next day warranty which can be upgraded to same day 4 hour response. Additionally, all HP Servers come with manageability tools and the option to have remote diagnostic tools.

NETWORKING

HP Networking - Affordable Pricing

Instrumental in establishing the 10Base-T ethernet standard, HP has now paved the way for the next standard, using 100VG-AnyLAN - offering a 10-fold increase in bandwidth using existing 10Base-T twisted pair cabling.



In the field of management, HP has strong integration in products such as the AdvanceStack range, HP OpenView management application with SNMP protocol support and the Desktop Management Initiative.

From connecting PCs and printers using Infra-red to connecting remote sites,

HP has it all - at affordable pricing.

PC Adapter Cards

PC LAN Adapter NC/16 TP (ISA)	£59
PC LAN Adapter/16 TP Plus (ISA)	£67
HP 10/100VG Adapter (ISA)	£97
HP 10/100VG Adapter (EISA)	£147
HP 10/100VG Adapter (PCI)	£130

Intelligent Hubs

HP AdvanceStack 100VG Hub15	£1750
HP AdvanceStack 100VG SNMP - Bridge Module	£825
HP AdvanceStack Hub 8U (RJ45)	£129
HP AdvanceStack Hub 16U (RJ45)	£249
HP AdvanceStack Hub 24	£699
HP AdvanceStack SNMP module	£370
HP AdvanceStack Dial-A-Lan 4A module	£1,330

Technomatic is a Premier Hewlett-Packard partner & able to supply all PC products. Please call with your requirements.

HIGH CAPACITY BACKUP

WORLD LEADER IN DAT BACKUP



PROTECT YOUR



HEWLETT PACKARD

INFORMATION

IT'S YOUR BUSINESS

DAT technology offers one of the fastest means of safely backing up large amounts of data. Native capacities up to 8GB, autoloader mechanisms and scheduling software makes it fuss-free
★2GB up to 48GB
★Stand-alone or networked

- WHY TAKE A CHANCE??

BACK IT UP

Model	Ext	Int
HP SureStore 2000 2GB (DDS)	£729	£625
HP SureStore 5000 4GB (DDS)	£799	£695
HP SureStore 6000 8GB (DDS-2)	£899	£799
SCSI card (ISA)	£125	
SCSI card (PCI)	£189	



£285

DATA STORAGE
DATA PROCESSING
DATA COMMUNICATION

HP POWERWISE UPS



- High Quality UPS
- Excellent Comms Capability
- Outstanding Monitoring Management s/w
- 2 year Exchange warranty

INTELLIGENT, TRUE ON-LINE UNINTERRUPTIBLE POWER SUPPLIES

RELIABILITY

The UPS constantly monitors the power supply, its own components and the batteries. Batteries can be swapped without system shutdown. Uptime can be extended simply by adding up to 5 extra battery packs.

COMMUNICATION

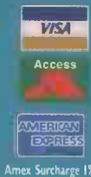
The UPS has a direct serial link to the server and an optional SNMP ethernet interface for continuous network connectivity. Power Management s/w allows complete monitoring, logging and altering.

HP Powerwise 1000VA UPS	£795	HP SNMP Ethernet (TP) Interface	£385
Additional Battery Pack	£345	HP Powerwise Assistant Software	
HP Powerwise 2100VA UPS	£1195	Network 3.12, 4.01, 4.11	£92
Additional Battery Pack	£495	MS Windows NT	£92
		SCO Unix 3.2 v4.2, UnixWare 1.1	£92

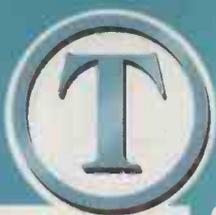
SHAPE DATA SECURE DATA SHARE DATA - SUCCEED with HP

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DESKPRO



**Asset Management
Capable Desktop**

- ★ ADVANCED ARCHITECTURE
- ★ NETWORK READY

The Compaq DeskPro is the intelligent choice for your network. Features include Asset Control, Fault & Security Management, Power Saving modes and Plug & Play Capability.

- ★ Choice of cases
- ★ High performance

Model	CPU	RAM	HD	Case	Price	Code
4/66-270	486	8	270	3x3	£936(a)	EURCP0600
4/100-270	486-100	8	270	3x3	£1026(a)	EURCP0603
5/75-420	5/75	8	420	3x3	£1269(a)	EURCP0608
5/90-420	5/90	8	420	4x4	£1410(a)	EURCP0619



FREE Microsoft Windows 95 Upg CALL

PROLINEA

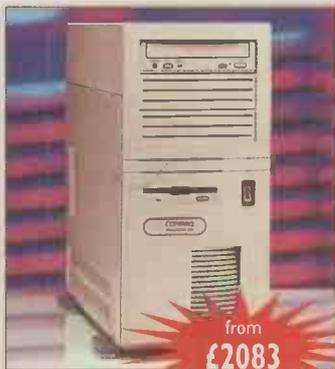


**High Performance
Low Price Point**

The Compaq Prolinea offers a choice of fast, flexible configurations at outstanding prices. Boasting technology such as Intel Pentium™ processor, PCI architecture, LBIDE & Video etc, the Prolinea will run the most demanding applications.

- ★ Best selling desktop
- ★ User-friendly Design
- ★ Choice of specification
- ★ Extended Warranty Option

Model	CPU	RAM	HD	Case	Price	Code
4/66-270	4-66	8	270	3x3	£915(a)	EURCP0602
4/100-420	486-100	8	420	4x4	£968(a)	EURCP0609
5/75-420	5-75	8	420	4x4	£1130(a)	EURCP0620
5/90-420	5-90	8	420	4x4	£1218(a)	EURCP0622



from **£2083**

**PROSIGNIA
300**

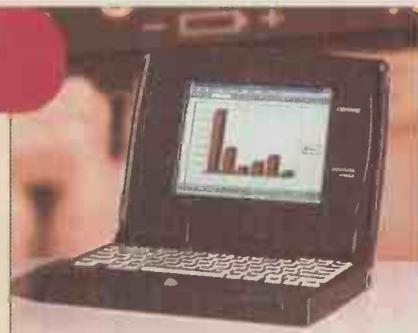
**ENTRY-LEVEL
SERVER**

- ★ Intel Pentium™ Processors
 - ★ PCI, Ethernet, Fast-SCSI-2
 - ★ 16MB RAM, min-1GB HD, CD (MS Win 95 offer does not apply)
- Note: Monitor is optional on all desktops & servers.

**CONTURA
420**

- ★ Highly Portable
- ★ 486DX4-75 CPU
- ★ 10.4" Colour Screen
- ★ Up to 5.5 hours life

The Contura 420 sets the standard for entry-level mobile computing. It offers



PCMCIA slots and a range of docking options for office use.

Model	CPU	RAM	HD	Screen	Price	Code
Contura 420C	4-75	4	350	DSTN	£1560(a)	EURCP2474
Contura 420C	4-75	8	420	DSTN	£1730(a)	EURCP2475
Contura 420CX	4-75	8	420	TFT	£2269(a)	EURCP2476

ON-SITE WARRANTY

3yr OSM	486 Desktops	£200
3yr OSM	Pentium Desktops	£300
3yr OSM	Mono Notebooks	£200
3yr OSM	Colour Notebooks	£300

MONITORS

All monitors listed are Asset Management Capable.		
14" 1024 up to 1024 x 768	£250(a)	
15" 1515F up to 1024 x 768	£345(a)	
17" QV172 up to 1280 x 1024	£799(a)	

THE SMARTEST NOTEBOOKS



**INCREDIBLE
PRICE
CUTS**

**AS MUCH
AS 25%**

All IBM Notebooks have PCMCIA slots to allow convenient connection of peripherals

Model	CPU	RAM	Screen	HD	Price
TP370c	4/75	4	10.4" TFT	340	£2315(a)
TP755c	4/75	4	10.4" TFT	340	£3339(a)
TP755CE	4/100	8	10.4" TFT	540	£3845(2a)
TP755CD	4/100	8	10.4" TFT	810,CD	£4495(2a)
TP755CV	4/100	8	10.4" OHP	540	£4785(2a)
TP755DV	4/100	8	10.4" OHP	810,CD	£5455(2a)
TP755CX	5/75	8	10.4" SVGA	1.2GB	£4600(2a)
TP701Cs	4/50	4	10.3" DSC	340	£1885(2a)
TP701C	4/75	8	10.4" TFT	540	£2995(2a)



IT'S HOT TECHNOLOGY

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WHATEVER
YOU
WANT**

IT SHOUTS

IT'S CRYSTAL CLEAR

VALUE

APTIVA



Complete system computer, monitor, software, keyboard, mouse and support



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EXISTS
PAPA**

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FAMILY
AFFAIR**

IT'S OUTSTANDING



APTIVA 910 4/66, 4, 540, 14" STANDARD £775(ab) BAMBIRO	APTIVA 911 4/66, 4, 540, 14" MULTI-MEDIA £944(ab) MUMMUMMUM	APTIVA 914 4/66, 8, 540, 14" MULTI-MEDIA £999(ab) LIL' SISTER	APTIVA 921 4/100, 8, 540, 14" MULTI-MEDIA £1098(ab) BIG BROTHER	APTIVA 930 P/75, 8, 540, 14" STANDARD £1059(ab) UNCLE HARVEY	APTIVA 931 P/75, 8, 540, 14" MULTI-MEDIA £1270(ab) MUMMUMMUM	APTIVA 941 P/100, 8, 850, 15" MULTI-MEDIA £1750(ab) SCARLETT
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£285

ERGOVISION 580+LR

- ◆ 15" FST Multiscanning Monitor
- ◆ Up to 1280 x 1024 Non-interlaced
- ◆ Horizontal Freq 30-65KHz
- ◆ 0.28mm Dot Pitch



£515

ERGOVISION 880LR

- ◆ 17" FST Multiscanning Monitor
- ◆ Up to 1280 x 1024 Non-interlaced
- ◆ Horizontal Freq 30-64KHz
- ◆ 0.28mm Dot Pitch



£589

ERGOVISION 885LR

- ◆ 17" FST Multiscanning Monitor
- ◆ Up to 1600 x 1200 Non-interlaced
- ◆ Horizontal Freq 30-82KHz
- ◆ 0.26mm Dot Pitch



£879

ERGOVISION 1080LR

- ◆ 20" Auto-scanning, low radiation, ultra high resolution
- ◆ Up to 1600 x 1200 Non-interlaced
- ◆ Horizontal Freq 30-82KHz
- ◆ 0.26mm Dot Pitch

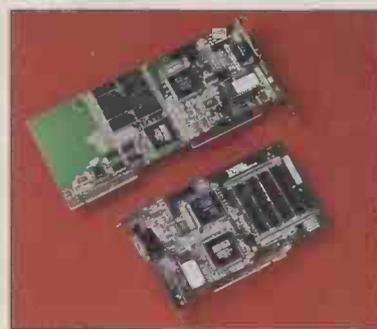
COMMON FEATURES FOR ABOVE MONITORS

- ◆ Microprocessor Control
- ◆ Low Radiation & Anti-Static CRT (MPR2)
- ◆ EPA ENERGY STAR Compliant
- ◆ Windows 95 compatible
- ◆ Flicker Free Operation
- ◆ 2 year RTB warranty
- ◆ VESA DPMS Compatible

GTS WINTURBO(a)

- ◆ Super Fast 64 Bit Windows Accelerator
- ◆ Powered by ATi Mach 64 Processor
- ◆ VESA DPMS Compatible
- ◆ 2MB & 4MB VRAM Versions Available
- ◆ Up to 1280 x 1024 Resolution
- ◆ Up to 100Hz Refresh Rate
- ◆ On-Screen Colour Calibration

2MB ISA	£194	VLB	£195	PCI	£196
GTS WinTurbo Plus					
4MB ISA	£338	VLB	£339	PCI	£340



GTS WINTURBO POWERED BY



A CULTURE OF SERVICE



PCMCIA ME3000II-2 BNC/TP ETHERNET ADAPTER £85(a)

ETHERNET POCKET LAN ADAPTER

E3000II



- ◆ Superior performance using EPP mode
- ◆ Allows printing and networking together

£69(a)

BNC & TP CONNECTORS

- ◆ Dual media with AutoDirect
- ◆ Power from mains or PS/2 mouse port
- ◆ Supports switchless hardware configuration
- ◆ Drivers for: ODI for Netware, NDIS 2.0 & 3.0 for Lan Manager & WFWG, Packet for TCP/IP
- ◆ Diagnostic using s/w & LED
- ◆ Power cable & mains PSU included

ETHERNET COMBO ADAPTER



GE2000D

£28(b)

5 PACK £135(a)

- ◆ Fully Novell NE2000 compatible
- ◆ Drivers for: IPX & ODI for Netware Windows for Workgroups NDIS for Lan Manager Packet for TCP/IP
- ◆ BNC & RJ45 connectors
- ◆ Jumper & Jumperless
- ◆ Auto-Setup hardware using software
- ◆ Auto-Detect media type
- ◆ Auto-Detect 8 bit or 16 bit Bus
- ◆ Includes diagnostic software
- ◆ Up to 35% performance improvement

Genius

7

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OF EXPERIENCE**
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WORLDPORT MOBILE RANGE(a)
PCMCIA Dual Standard
(28.8 + HST + Fax) £161
Pocket Dual Standard
(14.4 + HST + Fax) £125

USR HIGH SPEED DUAL SERIAL PORT
Essential for all windows users
faster than 9,600. 2 yr warranty **£49 (a)***

*While stocks last, free S/W must be requested at time of purchase



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NOW INTERNET READY &
INCLUDES MODEM CABLE**

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14.4 + Fax Desktop (Ext) £105
14.4 + Fax PC Card (Int) £106
28.8 + Fax Mac & Fax £165
14.4 + Fax Mac & Fax £109
PC/AT Modem Cable 9/25 £8

Sportster®

14.4 + FAX DESKTOP

£105 **LOW PRICE**

28.8 + FAX EXTERNAL

£159

AMAZING VALUE BUNDLE

Sportster 14.4 Fax Modem + Panasonic CD-ROM Drive + IBM OS/2 32 bit operating system (CD) + Internet s/w + Internet Connection + IBM 32bit wordprocessor + IBM 32 bit spreadsheet + IBM Faxworks + CompuServe Information Manager + Modem Cable + CD-ROM Interface & Cable **£199**
Carr £12



AUTHORISED RESELLER

5 year WARRANTY

MODEL

MODEL	SPEED					ERROR CORR.	DATA COMP.	FAX	ASYNCHRONOUS	DIAL UP	LEASE LINE	FORMAT								
	28800 (V34)	19200 (V32 terbo)	14400 (V32bis)	9600 (V32)	2400 (V22bis)							1200 (V22)	1200/75 (V23)	300 (V21)	V42	MNP 2-4	V42bis	MNP 5	9600	14400 (V17)
SPORTSTER 28.8 + FAX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SPORTSTER 14.4 + FAX			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COURIER V34	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WORLDPORT 28.8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WORLDPORT HST DUAL STD CELLULAR			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

APPROVED for Connection to telecommunication systems specified in the instruction, for use subject to the Conditions set out in them.

FREE DIRECT TECHNICAL SUPPORT

5 YEAR WARRANTY



The Intelligent Choice in Data Communications

Courier

LIMITED OFFER SPECIAL COMMS BUNDLE

FROM £238



COURIER PROFESSIONAL RANGE(a)
V34 + Fax Desktop Bundle (USR/MD/E250) £279*
inc **FREE** USR High speed Dual Serial Port
FREE 25/9 Modem Cable
FREE Datatalk 4 DOS (Full Version) DS Fax (Win)
FREE Quiclink II Fax & Coms s/w
V34 + Fax Desktop Modem only **£238**
V34 + Fax PC Card modem **£239**

Seagate Hard Drives

High Performance Drivers for Servers



Hawk™ Family

- Fast SCSI-2 Interface
- 5,400 RPM Spindle Speed Performance
- Average Seek Time of 9.75MS
- External Transfer Rate of 10MB/Sec.

5 Year Warranty

Item #	Capacity (MB)	Form	Cache	MTBF	Price
ST31230N	1,050	LP	512	800K	£295
ST32430N	2,147	LP	512	800K	£425
ST15230N	4,294	HH	512	800K	£799

Fast ATA Interface

Medalist™ Family



- Transfer rates up to 16.6MB/sec
- Master/Slave Capability
- Backward compatible with standard IDE

3 Year Warranty

Item #	Capacity (MB)	Cache/Buffer (KB)	Avg. Seek Time (MS)	MTBF (HRS)	Price
ST3660A	545	120	14	300K	£109
ST31270A	1282	256	12	300K	£199



Seagate



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NETWORK ADAPTERS



LINKBUILDER FMS II HUBS

ETHERLINK III: THE PRICE PERFORMANCE ADVANTAGE

- ◆ Parallel Tasking Ethernet Adapters
 - Performing multiple tasks at the same time
- ◆ Automatic self-tuning during operation
 - To set and maintain optimum performance
- ◆ High level of component integration
 - Improves reliability and reduces cost
- ◆ One step auto configuration utility
 - Trouble free installation
- ◆ Lifetime 3Com warranty

Full range of 3Com products, including LinkBuilder FMSII Hubs, available. Call for details

Adapter

			IPk(b)	5Pk(a)
3C509 B	BNC	ISA	£65	£315
3C509 B	TP	ISA	£66	£309
3C509 B	Combo	ISA	£75	£349
3C579 B	BNC	EISA	£145	£699
3C579 B	TP	EISA	£144	£699
3C590 B	Combo	PCI	£99	£479
3C529 B	BNC	MCA	£142	£699
3C529 B	TP	MCA	£139	£685
3C589 B	Combo	PCMCIA	£139	£695

NEW

CALL FOR 20 PACK PRICES & VOLUME DISCOUNTS

NEW FAST ETHERNET ADAPTERS NOW AVAILABLE

3C595 TX	PCI	10/100	£199
3C597 TX	EISA	10/100	£209

CALL FOR MORE INFORMATION

LinkBuilder FMS II 12 TP Port Hub	£375(a)
LinkBuilder FMS II 24 TP Port Hub	£675(a)
LinkBuilder TP/12	£259(a)

Canon

Canon INCREDIBLE BUBBLE-JET PRINTERS!

BJC-4000 COLOUR

ONLY
£217!

BEST PRICE

BJ-200EX MONO

£158!

+ FREE
Avery Label Pro
RRP £56

The brilliant choice for full-colour printing

- 720 x 360 dpi B&W on plain paper
- Colour text output at 360 x 360 dpi
- Five pages per minute
- 70 scaleable TrueType fonts - 7 resident bitmapped fonts

Canon: The Complete Collection

BJ-30 portable monochrome printer	£139
BJC-70 portable colour printer	£219
BJC-600e colour printer	£321
BJC-800 A3 colour printer	£975
BJ-230 A3 Monochrome Bubble Jet Printer	£239
BJ-330 A3 Monochrome Bubble Jet Printer	£395

The professional monochrome printer

- 720 x 360 dpi resolution
- 20 Truetype fonts included
- Laser-quality text and graphics
- Auto feeds 100 sheets, 50 transparencies or 13 envelopes
- Four pages per minute
- One year warranty
- Compact design

PRICES SLASHED

Canon

DON'T FORGET SPARE CARTRIDGES

Canon	BJ-30	BJC-70	BJ-200ex	BJC-600c	BJC-4000
Black	£10.75	£9.29	£16	£6	£7
Colour	-	£14	-	£7*	£14

*specify C/M/Y Cartridges



Access



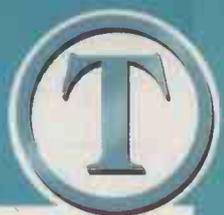
Amex Surcharge 1%

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MOTOROLA

THE 28.8 INTERNET SOLUTION

3400 PRO DESKTOP MODEM

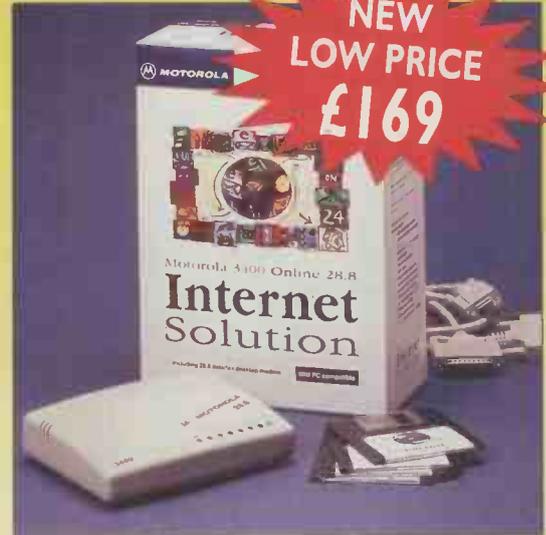
- ◆ Data: V34 (28.8Kb/s) to V21 (300bps)
- ◆ Fax: 14.4Kb/s to 2.4Kb/s
- ◆ Compression: V42bis & MNP5
- ◆ Correction: V42 & MNP2-4
- ◆ Command Set: Hayes AT compatible

Package includes:

- ◆ Modem
- ◆ Telephone & power cables
- ◆ IBM PC/AT compatible modem cable
- ◆ Windows fax and comms software
- ◆ Easy install disk & user software
- ◆ Motorola telephone support
- ◆ 2 Year Motorola warranty

3400 ONLINE INTERNET SOLUTION

- ◆ 3400 PRO desktop modem (see left)
- ◆ Internet Software
 - Protocol software
 - File transfer software (FTP)
 - Worldwide web browser s/w
 - E-Mail s/w
 - Newsgroup s/w
- ◆ Internet phone software (Vocaltec)
 - Make cheaper international calls to other Vocaltec users
- ◆ Internet membership option for instant access



NEW LOW PRICE £169



3400 ONLINE INTERNET SOLUTION £169

- EVERYTHING YOU NEED TO CONNECT TO THE INTERNET

3400 PRO DESKTOP MODEM £157



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EASY INSTALL
INCLUDES ANIMATED INSTRUCTION DISK



V34 + FAX £189

"If you want a top of the line portable data communications solution, this product is the best you can get" - PC Magazine (January 1995)

Benefits of Psion Dacom Gold Card:

- ◆ Add fax to your notebook
- ◆ High-Speed file transfer
- ◆ Real remote LAN access
- ◆ Flash Upgrades available
- ◆ UK Market Leader
- ◆ Guaranteed compatibility
- ◆ Free lifetime technical support

Gold Card V34 + Fax £189(a)

- ◆ Rated 28.8Kbps - The ultimate tool for intensive data transfer and remote LAN connectivity applications. Twice the speed of V32bis, up to 115.2Kbps. eg 200Kbyte file-15.6 second transfer time

Gold Card V32bis + Fax £157(a)

- ◆ 14.4Kbps - Europe's leading PCMCIA Data + Fax modem, ideal for medium usage communications, BBS access and fax applications



CONNER TAPE•STORE DATA PROTECTION

TAPE•STOR 800 TRAVAN

- Simple & fast way to protect your data
- Up to 800MB (with compression)
- Up to 9.5Mb/minute backup rate
- Full QIC-80, Accutrak, Travan TR-1 QIC wide compatible
- Includes one Travan tape

Tape•Store 800 Internal £129
Tape•Store 800 Parallel £209



TAPE•STOR 4000 Up to 4Gb on one tape

- 2Gb native capacity, up to 4Gb with compression
- Up to 54Mb/minute backup rate with compression
- Transfer rate optimised with fast sense
- IDE & SCSI options
- QIC 3080 compatible
- Optional backup s/w for Netware available

4000 Internal IDE £379 4000 Internal SCSI £399 4000 External SCSI £469

TAPE•STOR 420 Price Performance solution

- QIC-wide, QIC-80 & Irwin Acctrak 250 compatible
- One-inch high design
- Up to 420MB capacity with compression
- Up to 9.5MB/minute effective backup rate
- Floppy interface or parallel port

Tape•Store 420 Internal £95
Tape•Store 420 Parallel £225



Motorola Psion • Conner 10



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- ◆ EZ Configuration : Auto or one step configuration
- ◆ EZ Installation : Simple driver installation
- ◆ EZ Desktop Management : SNMP PC agent
- ◆ Compatible : Driver support for most popular nos
- ◆ Outstanding Performance : Unique multitasking data transfer
- ◆ Reliable : SMC lifetime warranty, MTBF of 400 years



LOW COST HUBS & REPEATERS

- ◆ Plug and Play, No configuration required
- ◆ Desktop models & Rack mountable, segmentable models
- ◆ Small footprint, compact
- ◆ Exceptional value and reliability

EtherEZ	ISA	BNC	£58	£275
EtherEZ	ISA	TP	£58	£249
EtherEZ	ISA	BNC/TP	£65	£299
Also available			1pk(b)	5pk
EtherPower	PCI	BNC/TP	£95	£449
Ultra 32c	EISA	BNC/TP	£125	-
EtherPower 10/100	PCI	BNC/TP	£159	£739
EtherPower 10/100	EISA	BNC/TP	£179	£789

Call for PCMCIA & Pocket Adapters

Model	TP	BNC	AUI	Price
Tiger TP12	12	1	1	£249(a)
Tiger TP6	6	0	1	£124(a)
Tiger TP6B	6	1	0	£126(a)
Tiger CX3	0	3	1	£219(a)

NEC VALUE SERIES



XV15 £279 XV17 £559

- 15" and 17" diagonal flat square technology
- 13.8" and 15.6" viewable image size
- 0.28 dot pitch
- Max Res: 1280 x 1024 @ 60Hz
- Frequency: Horizontal: 31-65Khz
Vertical: 55-100Khz
- Intelligent Power management system
- Ideal for entry level business, windows applications office, home education and entertainment

IMAGES OF QUALITY

NOKIA quality from only £475(a)



- ◆ 17" flat, square tube
- ◆ 0.28mm dot pitch
- ◆ 1024 x 768 at 80HZ
- ◆ Integral 2 watt speakers
- ◆ Digital controls
- ◆ Power saving
- ◆ MPR II

MULTIMEDIA READY

VALUEGRAPH 447V MONITOR



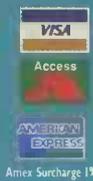
The Tray Cradle II

Want to improve the quality of your hand scans by about 100%? Get The Tray Cradle II. It enables accurate full-page scanning of both sides of a 21.25 cm document to produce the same high-quality image that you could only get otherwise from a full-page scanner. The Tray is compatible with all 10 cm black-and-white, greyscale, and colour hand scanners. An alignment grid is included to help square up small documents, photos, and more. If you do any regular amount of scanning at all, but just don't have the budget for a flatbed scanner, this is what you've been waiting for!



**AC18374
£19.95**

**GREAT PRICES
SAVE £££'s**



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At Last .. A Multi-Tech Modem For The Home Office And Small Business

Announcing the amazing value packed Multimodem 2834ZDX from Multi-Tech Systems.

Superior Performance. With blazing V34 data rates up to 28,800bps and fax speeds of 14,400bps, and with V42bis data compression data transfer rates of up to 115,200bps are achievable. Multi-Tech also gives you full backward compatibility to all ITU standards including V32bis (14,400bps) and the V32 terbo (19,200bps) standard.

Fully Featured. 10 LED indicators to monitor every aspect of your connection. Plus help screens, non-volatile memory and windows communications and fax software you need.

Unmatched Warranty. A 10-year warranty direct from Multi-Tech eliminates worry and makes the MultiModemZDX ideal for the home or small business.

BABT Approved - And it's a Multi-Tech!



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28,800bps (V34) £155
19,200bps (V32terbo) £107

LOW LOW PRICES



**TECHNO
VALUE**

ZDX 2834 £155(a)
ZDX 1932 £107(a)
INCLUDES MULTIEXPRESS
FAX SOFTWARE
FOR WINDOWS

MULTI-TECH HIGH SPEED SERIAL PORT £49(b)
PC/AT MODEM CABLE 9/25 £8
FOR THE PROFESSIONAL COMMS USERS

MT2834 BLK DESKTOP NEW £345(a)
FREE HIGH SPEED SERIAL PORT

MT1432 BLK DESKTOP £269(a)
MT1432 MK POCKET £345(a)
MT1432 LTI PCMCIA £175(a)

MicroSolutions backpack® PORTABLE SOLUTIONS

PARALLEL PORT DEVICES: Ideal for mobile user, convenient for desktop PCs, simple installation, just connect Backpack to your printer port and your printer to the Backpack. You don't lose print capability.

backpack® TAPE DRIVES

- Industry Standard Formats
 - Supports EPP & IEEE 1284 ports
 - DOS & Windows Backup s/w included free
 - Unattended backups • 2 yr manuf warranty
 - Compact design and easily portable
- Backpack TD 800MB Travan **£189(a)**

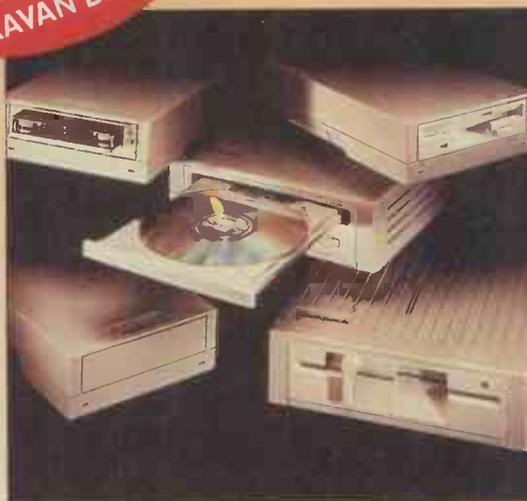
backpack® CD-ROM DRIVES

- 250ms access time (4x) • Photo CD comp
- Quad speed (4x), up to 600KB/S transfer rate
- Audio sockets for headphones & line out
- MPC II compliant with EPP
- CD-S Models available with 16bit built-in sound

Backpack CD-S 4X inc sound **£319(a)**
Backpack CD 4X **£255(a)**
Backpack CD 2X **£225(a)**

**NEW
HIGH CAPACITY
TRAVAN DRIVE**

PRICE REDUCTIONS



**NO FREE SLOT?
NO PROBLEM**

backpack® HARD DRIVES

- Compatible with DOS v3.1 and above
- Supplied device driver uses 5K
- Supports EPP & IEEE 1284 parallel ports
- Full drive single partition under all DOS versions
- Transfer speeds up to 600KB/S
- Can be daisy chained with other Backpacks

Backpack HD 420MB **£259(a)**
Backpack HD 850MB **£319(a)**
Backpack HD 1200MB **£375(a)**

backpack® FLOPPY DRIVES

- Windows and Dos support
- Software drives supplied

Backpack FD 35 1.44MB **£115(a)**
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Hayes • Kensington • Connectix

Hayes **LOW PRICES**
Authorised Dealer

2.8.8K V.34
£175

FREE MODEM CABLE

ACCURA 288 + FAX
- up to 28,800 bps NOW V34 **£175(a)**

ACCURA 144 + FAX
- up to 14,400 bps (V32 bis) **£99(a)**

Common Features

- Full error correction & data compression
- Up to 14,400 (V17) fax incl. Group 3 fax
- FREE Hayes Smartcom LE data & fax Windows S/W
- AutoFax Detect between fax & data calls

CALL NOW FOR NEW MODEMS WITH VOICE TECHNOLOGY

Thinking Mouse (a)

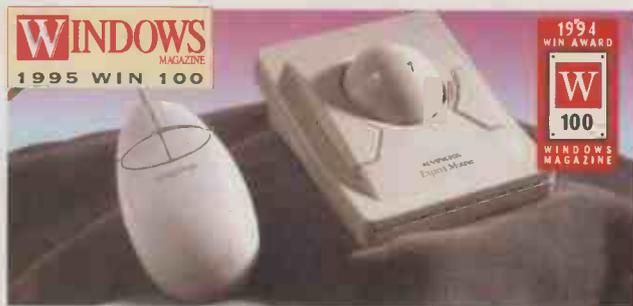
Four programmable buttons! Spend less time clicking and more time working. With just one click you can double-click, drag, scroll, or highlight large blocks of text, add your signature, and save or print files. Other features include custom acceleration, pop-up menus for your favorite applications, "HotSpots" in each application. It looks better, it feels better, and — best of all — it works better! All Kensington Input devices come with a manufacturer's five-year warranty, toll-free technical support, and a no-risk, 90-day trial.

IN5358 **£62.95**
Manufacturer: Kensington

Expert Mouse 4.0 (b)

Next generation trackball Kensington's award-winning Expert Mouse® trackball brings you advances in trackball technology — introducing the Brilliant Cursor™ and Slow Cursor commands — that give you smoother, superior cursor control. Windows-compatible software offers advanced acceleration, programmable mouse button commands, application sets, plus other user-programmable features. Includes the manufacturer's five-year warranty, a no-risk 90-day trial, and toll-free technical support. Microsoft compatible.

Serial, PS/2 **£79.95**
IN3770
BUS **£98.95**
IN3780



The new standard!

Kensington Mouse

The Kensington Mouse was designed to fit the hands of all shapes and sizes! It has oversized, easy-to-use buttons that help to make sure that smaller fingers don't have to reach when clicking, and large fingers never

have to curl their fingers to use it. Its symmetrical design makes the Kensington Mouse comfortable for both right and left handed users. It even comes with easy-to-use software that makes it simple for you to execute multi-step commands with a single click.

Serial Mouse **£35**
PS/2 Mouse **£45**

FAXFRIEND AUTO FAX & DATA SWITCH



- Fax & phone on one line
- East to install
- Fully BABT approved

- Remote control from any extension
- No recorded voice, tones or clicks

SCANA FAX

MAKES YOUR FAX MACHINE INTO A SCANNER



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- Full A4 page format
- Up to 200x200 dpi
- Works with Windows, Mac & Dos

- 3 year maintenance warranty
- Includes WinFax Lite

QUICKCAM

Take Pictures and make movies with your PC



Quickcam is the simplest and most affordable way to add image input to a windows-based PC. Users can immediately create movies and take pictures after simply plugging it into the standard parallel port of virtually any PC. In business, Quickcams are used for low cost video conferencing, live World Wide Web Pages, video mail composition, and the creation of standard Video for Windows movies for presentations. As a still camera QuickCam takes quality snapshots for print or electronic reproduction in the full range of PC-generated documents such as letters, faxes, e-mail messages. Quickcam for Windows provides both still and video images at up to 320x240 pixels in size in six-bit grayscale. Video images typically are captured at 12 frames per second or more.

REQUIREMENTS
Parallel Port, 4MB Ram, Windows 3.1 or higher





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 WIN95 U/G + 4MB 32BIT £159 SAVE £10
 WIN95 U/G + 4MB 36BIT £169 SAVE £10
 WIN95 U/G + 8MB 32BIT £264 SAVE £15
 WIN95 U/G + 8MB 36BIT £273 SAVE £15



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UPGRADE YOUR 486 TO A PENTIUM® PROCESSOR



**FROM ONLY
£79**

ITEM NO	DESCRIPTION	SOCKET NEEDED	PRICE
NEW	INTEL PENTIUM® OVERDRIVE 83MHZ		£199
EUREX1248	INTEL PENTIUM® OVERDRIVE 63 MHz		£175
EUREX0003	INTEL DX2 OVERDRIVE 25-50 MHz	Yes	£79
EUREX0004	INTEL DX2 OVERDRIVE 25-50 MHz	No	£79
EUREX0006	INTEL DX2 OVERDRIVE 33-66 MHz	Yes	£99
EUREX0005	INTEL DX2 OVERDRIVE 33-66 MHz	No	£99
EX6330	INTEL DX4 OVERDRIVE 25-75 MHz	Yes	£105
EX6332	INTEL DX4 OVERDRIVE 25-75 MHz	No	£105
EX6339	INTEL DX4 OVERDRIVE 33-100 MHz	Yes	£135
EX6331	INTEL DX4 OVERDRIVE 33-100 MHz	No	£135

Pentium is trademark of Intel Corporation

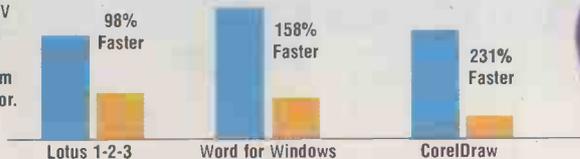


**FROM ONLY
£175**

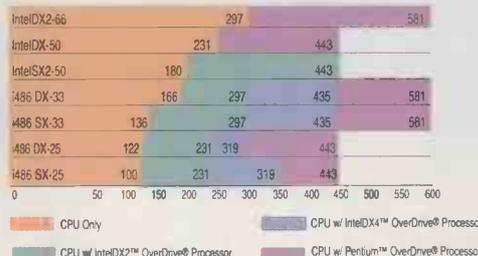
Intel Pentium® OverDrive Processor

The Intel Pentium® OverDrive processor, with advanced microprocessor technologies, will make your software run faster than ever before. It's our most powerful CPU upgrade for boosting the performance of your existing Intel 486SX or DX and IntelSX2 or IntelDX2 processor-based PCs. With superior upgrade option features, you'll experience a significant performance gain across a wide variety of software applications. Just install an OverDrive processor in place of your current i486 CPU, or plug it into an upgrade socket, depending upon your system design.

Performance for a 33-MHz Intel486 DV CPU-based system before and after installing a Pentium OverDrive processor.



iCOMP™ Index



UPGRADE YOUR OLD 386 - MAKE-IT 486!

Quick and Easy 386 to 486 upgrade!

Now it's easier and more affordable than ever to convert your 386 to a full-powered 486. Gain faster speed, dramatically enhance memory management increases Windows performance, and more. Just replace the old chip with the new Make-it-486, it could not be easier. Your system is instantly recognised as a 486 by all the latest software you have been wanting to try. The Make-it 486 will clock double the current CPU speed for 16, 20 & 25MHz and increase performance for 33 & 40MHz (non-doubling) adding a full 8K internal cache instead of the limited 1K offered by other upgrade chips and will support a 387 math coprocessor.



Make-It 386 SX 16/20/25 MHz to 486 32/40/50 MHz: £99
EUREX0901
Make-It 386 DX 16/20/25 MHz to 486 32/40/50 MHz: £99
EUREX0900

286 UPGRADES ALSO AVAILABLE

Upgrade your 286 to a 486 for a new lease of life for the increased performance of your 286 that currently runs too slow or not at all with some software packages. Clock doubling technology with optional math coprocessor. This easy to install chip may require an additional adapter if your current CPU has a retaining clip*.

286 to 486 clock doubling with math coproc: EX6197 £145
286 to 486 clock doubling: EX6196 £99

*286 LCC adapter EX6223 £45



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LASER PRINTERS (a)

HEWLETT-PACKARD	SPEED/RES	RAM/FONTS	LANG.	I/F	1 Year RHP	3 Year OSM	CANON 1 year OSM	Speed/Res	RAM	Lang	I/F	Price
HP LaserJet 5L NEW	4ppm/ 600dpi	1Mb/ 265	PCL5e	B	£355	£450	LBP-430V	A4 4ppm 300	1/2MB	P4	B	£362
HP LaserJet 5P	6ppm/ 600dpi	2Mb/ 455	PCL5e	B,A,IR	£580	£710	LBP-1260	A4 12ppm 600	3MB	P5	B	£900
HP LaserJet 5MP	6ppm/ 600dpi	3Mb/ 805	PCL5e	B,A,IR	£725	£855	EPSON 1 year OSM					
HP LaserJet 4 Plus	12ppm/ 600dpi	2Mb/ 455	PCL5e	B,S	£979	£1140	EPL3000 New	A4 4ppm 300	1MB	P5	B	£375
HP LaserJet 4M Plus	12ppm/ 600dpi	6Mb/ 805	PCL5e	B,S,A,N	£1295	£1465	EPL5200+	A4 6ppm 300	1MB	P5	P	£460
HP LaserJet 4V A3	16ppm/ 600dpi	4Mb/ 455	PCL5e	B,S	£1365(3xa)	£1590(3xa)	EPL9000	A4 8ppm 600	2MB	P5	B,S	£1195
HP LaserJet 4MV	16ppm/ 600dpi	12Mb/ 805	PCL5e	B,S,A,N	£1975(3xa)	£2199(3xa)	EPL9000PS	A4 8ppm 600	6MB	P5,PS	B,S,A	£1359
HP LaserJet 4Si	16ppm/ 600dpi	2Mb/ 455	PCL5e	B	£2087(3xa)	£2587(3xa)	NEC					
HP LaserJet 4Si MX	16ppm/ 600dpi	10Mb/ 805	PCL5e	B,A,N	£2965(3xa)	£3455(3xa)	SuperScript 660	A4 6ppm 1200x600	256KB	G	B	£409
							SuperScript 660i	A4 6ppm 1200x600	256KB	G,PS	B	£569
							PANASONIC					
							KXP4430 2yr OSM	A4 5ppm 300	1MB	P5	PS	£475
							KXP4440 2yr OSM	A4 10ppm 300	1MB	P4	PS	£695
							KXP6100 NEW	A4 6ppm 300	256KB	G	B	£269
							KXP6150 NEW	A4 6ppm 300	1MB	P4	B	£309

I/F:- P=Parallel, B=Bi-directional Parallel, S=Serial, A=AppleTalk, N-Ethernet
Lang:- G=GDI (Win 3.1), P4=HP PCL4, P5=HP PCL5e, PS=PostScript, S2=PostScript Level 2

MEMORY UPGRADES?

We can offer a large range of memory upgrades - SEE PAGE 18

FLASH SIMM KITS

For HP LJ 4/4Plus/4Si

Download and store logos and template forms in your printer. Dramatically improve speed and return-to-app time. These kits contain: flash SIMM module, manual and software (Win).

1MB	£250	2MB	£325	4MB	£499
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SWITCHES

SWITCHES(b)	Price
AUTODATA SWITCHES	
2:1 2 PCs to 1 PRN	£19
4:1 4 PCs to 1 PRN	£29
8:1 8 PCs to 1 PRN	£75(a)
MANUAL DATA SWITCHES	
Reversible & Inexpensive Par Ser	Par Ser
2 in > 1 out	£10 £10
3 in > 1 out	£16 £16
4 in > 1 out	£20 £21
2 way cross over	£24 £24
AUTO CROSSOVER SWITCHES	
4PC > 2PRN Parallel Once a data path has been set it can be switched by soft code.	£85(b)
Bi-Directional Coverters Par>Ser/Ser>Par	£65(b)

TONER CARTRIDGES(b)

HEWLETT-PACKARD	Price	PANASONIC	Price
Laserjet IIP/IIIP/IIIP	£46	4410/4430	£29
Laserjet I/II/III/IIID	£46	4410/4430 Drum	£95
Laserjet 4/4M/4M+M+M	£66	4410/4430 Developer	£90
Laserjet 4V/4VM	£109	4420	£26
Laserjet I/II/III/IIIMX	£75	4420 Drum	£57
Laserjet 4L/4ML/4MLP	£42	4420 Developer	£57
Laserjet 5P/5MP	£54	4400/5400 Drum	£55
Laserjet 5L	£Call	NEC	
		560/60/62P/102/102P	£109
		610	£79
		EPSON	
		EPL 7100/7500/8100	£115
		EPL 4000/4100/4300	£64
		EPL 5000/5200	£83
		EPL 5600	£110
		LEXMARK	
		4039 Toner	£165
		Opra (7K)	£139
		Opra (14K)	£189

COLOUR PRINTERS (a)

Model	Price	Cartridges
Canon BJC4000 (A4)	£217	Blk £7 Colour £14
Canon BJC600e (A4)	£321	£6 £17*
Canon BJC800 (A3)	£975	£14 £18*
Canon BJC-70	£219	£9.29 £14
Epson Stylus Pro XL (A3)	£1539	£12 £23
Epson Stylus IIs	£269	- -
Epson Stylus II NEW	£315	- -
HP Deskjet 600 (A4)**	£207	£20 £22
HP Deskjet 660C (A4)	£275	£20 £22
HP Deskjet 850C (A4)	£333	£18 £17.50
HP Deskjet 1200C (A4)	£630	£17 £19.50*
HP Deskjet 1200C/PS (A4)	£995	£17 £19.50*
HP Deskjet 1600C	£829	£18 £19.50
HP Deskjet 1600CM	£1219	£18 £19.50
HP Deskjet 340* (A4 Port)	£173	- -
HP PaintJet XL300 (A3)	£1599	£14 £15*

*Colour kit only £29 if purchase with printer
**Requires optional colour kit *Specify C/M/Y/Cart

HEWLETT-PACKARD COLOUR LASERJET £4195(3xa)

TEKTRONIX PHASER 340

The revolutionary low-cost colour printer offering up to 4ppm in full colour. Ideal for PC & Mac environments **£3650** (1a)

BLACK PRINTERS (a)

Model	Price	Cartridges
Canon BJ-30	£139	£10.79
Canon BJ-200ex	£158	£16
Canon BJ230 (A3)	£239	£16
Canon BJ300 (A4)	£352	£11
Canon BJ330 TF (A3)	£395	£11
Epson Stylus 820 NEW	£218	-
Epson Stylus 1000 (A3)	£325	£8.50
Epson SQ870 (A4,Cont)	£439	£17
Epson SQ1170 (A3,Cont)	£595	£17

Canon BJ-200ex



£158

DOT MATRIX PRINTERS

EPSON		PRICE CUT		Model		PIN		Colm		Price		Blk		Rib	
FX870	9	136	£245	£4.50	LQ570+	24	80	£215	£5						
FX1170	9	136	£305	£6	LQ1070+	24	136	£295	£7						
LX300	9	80	£99	£4.50	LQ1170	24	136	£432	£7						
LQ100	24	80	£105	£5	DFX5000+	9	136	£1159	£22.50						
LQ300 NEW			£149	-	Price subject to change										

PRINTER MEDIA(b)

EPSON	Price	EPSON EPL5000/5200	Price
STYLUS COLOUR COATED PAPER		PostScript	£249
360 dpi A4 200 sheets	£18	Local Talk Kit	£379
720 dpi A4 200 sheets	£20	CANON SHEET FEEDERS	
Transparencies A4	£49	BJ300 1st	£87
		BJ330 1st	£90
		2nd	£65
		2nd	£65
		See Page 3 for HP Media	

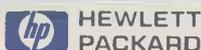
PRINTER CABLES(c)

Length	25M/36M	36M/36M	25M/25M
1.8m	£4	£6	£4
3m	£6	£8	£6
5m	£7	£10	£7
10m	£15	£17	£18

25M/36M is standard PC parallel cable 25/25 & 36/36 are for use with printer switches

PLOTTERS AND DIGITISING TABLETS

HP PLOTTERS



Size	A1	A0
DesignJet 230	C4694A £1435*	C4695A £1975*
DesignJet 250C	C3190A £1799*	C3191A £2449*
DesignJet 750C	C3195A £3699*	C3191A £4395*
DesignJet 755CM		C3198A £4575*

DesignJet prices includes one year OSM. 3 Year OSM option £420, £390 if bought with Plotter. Full range of accessories, including legs or bins, available. *Carriage on request.

PLOTTER MEDIA(a)

HP Paper A0 150 sheets	£64
HP Paper A1 200 sheets	£42
HP Paper 36" Roll	£29
HP DJ650C Paper 24"x150ft	£23
HP DJ650C Paper 36"x150ft	£29
HP DJ650C Paper A1 100 sheets	£43
HP DJ650C Paper A0 100 sheets	£83

HP PLOTTER PENS(c)

17825P, 17826P, 17725T, 17726T	£6.30
Ink Cartridges (c)Blk/CMY	
DesignJet 200/220	£16
DesignJet 600	£16
DesignJet 650	£20.40/£20.40

Summagraphics

INKJET PLOTTERS	A1	A0
Summajet Mono	£1819*	£2345*
Summajet Colour	£2345*	£2625*
LEGS	£220*	£320*

Call for cartridges & paper, *Call for carriage

DIGITISERS (S=Stand Opt)	A4	A3
SummaSketch III	£225(a)	£435(a)
SummaSketch FX	£275(a)	£495(a)
Summa Grid IV 1824 A2 Tablet (S)	£959*	£959*
Summa Grid IV 2436 A1 Tablet (S)	£1279*	£1279*
Summa Grid IV 3648 A0 Tablet (S)	£1695*	£1695*
Manual A1/A0 Tablet Floor Stand	£195(a)	£195(a)
Cursor: 4 Button	£99(a)	16 Button
MicroGrid Ultra 1724 A2	£2199*	
MicroGrid Ultra 2436 A1	£2649*	
MicroGrid Ultra 3648 A0	£2999*	

GENIUS TABLETS



HiSketch SP Model	Price
1212 SP (12"x12")	£120(a)
1812 SP (18"x12")	£185(a)
1812D SP (18"x12") LCD coord disp	£210(a)

Features:-

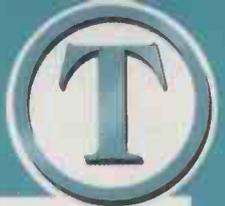
- Windows 3.1 & ADI drivers • Up to 19,200 bps data rate
- 5 to 90 pairs/sec sampling rate
- 1000 lines per inch resolution
- ± 0.01 inch accuracy • Proximity sensing
- AutoCAD R10/11/12 compatible templates
- Multi-directional puck • 3 button stylus

ESSENTIAL FOR MODEM USERS

High speed serial card 2 x 16550 serial ports, £29 (b)
1 x enhanced parallel port, 1 x game port



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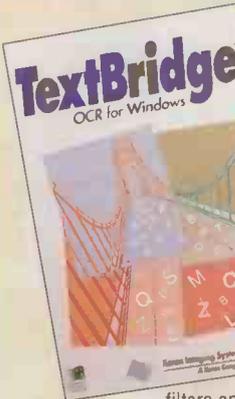
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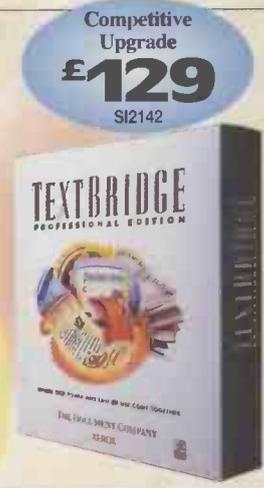
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TextBridge Professional not only delivers the highest quality accuracy, but actually re-constructs your documents in your word processor, making them fully editable.

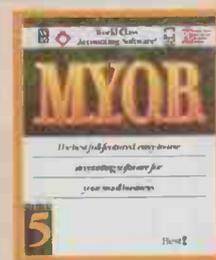
- DocuRT technology rebuilds cell tables for editing
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- OLE 2.0 drag-and-drop
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EUROC0076 **£269**



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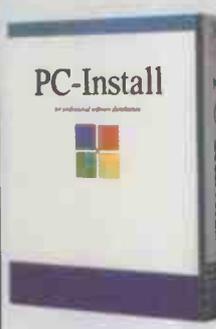


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FROM £89

PC-Install for Windows UT6553 (3.5") **£99**
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NETWORK BACKUP
SEE STORAGE PAGE

ETHERNET PRODUCTS(a)

GENIUS COMBO CARD
GE2000D Lifetime warranty, BNC & TP, NE2000 compatible, s/w & h/w configure, T Piece. See Taxan/Genius page for more info.
£28(b)
5 pack **£135(a)**



B = BNC, A = AUI, T = TP, I = ISA, M = MCA, E = EISA, V = VLB, P = PCI

NETWORK BUS					
			IPK	5PK	20PK
3COM					
3C509B	B A -	I-16	£65	£315	£1199
3C509BTP	- - T	I-16	£66	£309	£1149
3C509B-Combo	B A T	I-16	£75	£349	£1299
3C529B	B A -	M-32	£142	£709	-
3C529B-TP	- A T	M-32	£139	£709	-
3C579	B A -	E-32	£145	£699	-
3C579-TP	- A T	E-32	£144	£699	-
3C590	B - T	P-32	£99	£479	-

SMC Ethercard Plus					
			IPK	5PK	20PK
Ether EZ BNC	B - -	I-8/16	£58	£275	£979
Ether EZ TP	- - T	I-8/16	£58	£249	£849
Ether EZ Combo	B - T	I-8/16	£65	£299	£1059
EtherPower EISA 10/100	B - T	E-32	£179	£789	£2899
EtherPower PCI 10/100	B - T	P-32	£159	£739	£2599
Ultra Boot Rom Multi-Protocol	-	-	-	-	£29

Novell - Genuine Cards					
			IPK	5PK	20PK
NE2000 +	B - -	I-16	£49	£219	POA
NE2000T +	- - T	I-16	£49	£219	POA
NE2000+3	B - T	I-16	£59	£279	POA

D-Link Ethernet					
			IPK	6PK	50PK
DE220C	B - -	I-8/16	£39	£209	£1599
DE220T	- - T	I-8/16	£39	£209	£1599
DE220CT	B - T	I-8/16	£45	£245	£1899
DE510CAT VLB	B A T	V-32	£199	-	-
DE320CT MCA	B - T	M-32	£99	-	-
DE400 EISA	B - T	E-32	£149	-	-
DE530 PCI	B - T	P-32	£99	-	-
DEDE220X Novell Boot Rom	-	-	£19	-	-

Intel EtherExpress (E.XP)					
			IPK	5PK	20PK
E.XP PRO 16C	B - T	I-8/16	£59	£285	£1099
E.XP PRO Flash 16C	B - T	I-8/16	£69	£319	£1199

Ethernet for Portables					
	BNC	TP	DUAL		
Genius E3000D-II with printer Multiplexer built-in & EPP support	-	-	-	£69	
Xircom Pocket III	£185	£186	£199		
SMC Elite Note	-	-	£159		
D-Link DE600	-	-	£99		
D-Link DE620 EPP Support	-	-	£129		

PCMCIA					
	BNC	TP	DUAL		
3COM 3C589B	-	£115	£139		
Xircom PCMCIA - Performance range	£129	£135	£149		
SMC Elite Card	-	-	£115		
Genius ME3000II - LOW PRICE	-	-	£89		
D-Link DE650	-	-	£99		

*While stocks last

Boot ROM for NE2000 & clones TEC/NK/R09R **£10(c)**

Cables & Accessories							
Length (m)	3	5	10	15	20	25	30
Thin	£6	£8	£12	£16	£20	-	£27
TP	£9	£12	£17	£22	-	-	£30
100M Reel	Thin	£45(2xa)	300M TP	£169(2a)			

BNC T-Piece 5 Pack	£15(c)	BNC F-F Barrel 5 Pack	£15(c)
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RJ45 TP Connectors 20Pk	£20(b)		
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FREE NETWORK SOFTWARE WITH EVERY NETWORK 3.12 OR 4.1	NOVELL NETWORK	5 User	10	25	50	100	250
Netware 4.1 CD ROM (a)		413	944	1493	2033	Call	Call
Netware 3.12 (a)		395	963	1443	1940	Call	Call

PRINTER SERVER (a)

Please verify exact version of protocol supported with manufacturer

CONNECTION	PROTOCOL								PRICE	
	PARALLEL	SERIAL	MIOPPP	NOVELL (IPX)	NETBIOS	WANG	WINDOW NT	TCPIP (UNIX)		APPLE TALK
Intel Netport Express XL BNC/TP										£299
Intel Netport Express XL Token Ring										£449
Intel Netport Express EL BNC/TP										£255
Intel Netport Express EL Token Ring										£389
HPJetDirect Ex Plus 3 - Special Offer while stocks last										£299
HPJetDirect Ex										£249
HPJetDirect J2552A MIO LJ4 Series										£289
EMULEX NetQue BNC/TP										£399
EMULEX NetJet MIO LJ4 Series										£369

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-Free Surge Bar	BC400 VA	£115(a)	
SU 750 VA	BC600 VA	£149(a)	
£229(a)	BC900 VA	£250(a)	
SU 900 VA			
£349(a)			

PowerAlert For: Network £49 Unix £89 Dos/Win £55

American Power Conversion (APC) 2yr swap-out.			
Smart-UPS (Line-interactive)	SU1400	£599(+)	
SU250	£169(a)	SU2000	£910(+)
SU600	£210(a)	Back-UPS (off-line)	
SU700	£259(a)	BK400	£119(a)
SU900	£369(a)	BK600	£159(a)
SU1000	£389(+)	BK900	£275(+)
SU1250	£510(+)	BK1250	£349(+)

Powerchute for Netware £55 For Unix £95 For Win £59
For VMS (Tape) £195 For Win NT £95 For HP/UX £119
+ = Call for carriage, volume discounts available

HUBS & REPEATERS

Model carr (a)	Ports	SMNP Stackable	Price
	TP BNC AUI	Option	
HP ADVANCE STACK HUBS			
Advance Stack 8U 8	-	Yes No	£99*
Advance Stack 16U 16	-	Yes No	£249
Advance Stack 12+ 12	1	Yes Yes	£399
Advance Stack 24+ 24	1	Yes Yes	£699
Advance Stack 48+ 48	1	Yes Yes	£1249
*While stocks last			
3COM			
L.Build FMS II	12 OPT	1 Yes Yes	£375
L.Build FMS II	24 OPT	1 Yes Yes	£675
SMC			
Tiger TP6	6 OPT	1 No No	£124
Tiger TP6B	6	1 No No	£126
Tiger TP12	12	1 No No	£249
Tiger CX3	3	1 No No	£219
Elite 3812TP	12 OPT	2 Yes Yes	£399
Genius 1000/D	12	1 2 Yes No	£199
Techno			
8TP Port	8	- 1 No No	£89
4 Port Repeater	- 4	2 No No	£339
2 Port Repeater	- 2	2 No No	£185

FREE NETWORKING SOFTWARE

With every NetWare 3.12 or 4.1 from Technomatic

- WanderLink
- Netmagic
- Config Pro for NetWare Basic
- GroupEase for Windows
- McAfee's 30-day Test Drive

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COMMUNICATION SERVER(a)

US Robotics Fax Server 1 Port £929 2 Port	£1149
US Robotics Comms Server	£999
Comm Server Software	
WinPort V5 1 modem	£135
FaxPort V5 5 user	£275
Novell Connect 2 port	£279

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All Techno starter kits contain 5M BNC cable & terminators. All Techno add-on kits contain 3M BNC cable. All starter kits contain everything necessary to connect stated no of PCs.

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Item Description	Full	MLP
MS Windows NT 3.51 Workstation	£218	£199
MS Windows 95 Upgrade	£59	-
Windows for WG 3.11	£89	£86
Add-on for Win 3.1/W4WG 3.1	£42	£39
Add-on for MS-DOS	£41	£40
Techno W4WG Add-on Kits		
For those users with MS Windows 3.1 installed		
Techno W4WG 2 Stn Starter Kit	£149(a)	
Techno W4WG 1 Stn Add-on Kit	£69(a)	
Techno Hardware only Kits		
For those users with MS W4WG 3.11 installed		
Techno 5 Stn Starter Kit H/W only	£175(a)	
Techno 2 Stn Starter Kit H/W only	£66(a)	
Techno 1 Stn Add-on Kit H/W only	£35(a)	

NOVELL Personal Network

Personal Network (PNW)	£44(b)
Techno Personal Network Kits	
Techno PNW 5 Stn Starter Kits	£209(a)
Techno PNW 2 Stn Starter Kits	£89(a)
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5 pack	£265
A1 upgrade 1 user .. £29 5-user ..	£79
10 user	£125
Lantastic for OS/2 1 user	£69
5 user	£299
Lantastic Central Station II	£Call
Lantastic Utility Pack	£199
Lantastic Powersuite	£Call



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MEMORY FOR LASER PRINTERS^(b)

1MB 2MB 3MB 4MB 8MB

HEWLETT PACKARD Original Memory

LASERJET 4L	£73			
LJET 4/4M/4S/4SIMX/IIIS/II, D/JET 1200C	£139	£225	£415	
LJET 4/4M/4P/4+/4M+/4V/4MV/ 5P/5MP/COLOR/DJ1600C/CM	£139	£205	£385	

HEWLETT PACKARD 3rd party memory

LASERJET IIP/IIIP+/III/IIID/IIIP	£59	£89	£155	
LASERJET III/IIID	£65	£95	£159	
DESIGNJET 200/600/650C			£129	£259
PAINTJET XL300 (NEED EXPCBOARD 069.00)	£49	£85	£129	£259
LJET 4/4M/4S/4SIMX/IIIS/D/JET 1200C	£49	£85	£129	£259
LASERJET 4L	£59			
LJET 4P/4MP/4+/4M+/4V/4MV/ 5P/5MP/COLOR/DJ1600C/CM	£45	£85	£129	£255

BROTHER 3rd party memory

HL4/PS/V/E	£79	£125	£185	
HL6 SERIES		£119	£195	
HLB-D/E/V	£79	£115		
HL10-V/DV/PS/DPS		£102	£179	
HL10-H	£49	£89	£129	£259

CANON 3rd party memory

LBP-4, LBP-4+, LBP-4Lite	£89	£125		
LBP-8II, 8IIR, 8IIT	£65	£95	£159	
LBP-8IIM/III+/IIIR	£99	£129	£169	
LBP-8IV,LBP-4U,LBP-4i	£49			£119

EPSON 3rd party memory

EPL-4000/4100/4300/ACTION				
LASER II	£62	£109	£159	£229
EPL-5000/5200	£55	£89	£120	
EPL5200+		£85		
EPL 5600 (2 SOCKETS),1600	£45	£85	£119	£249
EPL7500			£249	
EPL8000/EPL8100	£70	£111	£155	£205

KYOCERA 3rd party memory

F-800/A/T	£75	£109	£179	
F820/850/1800/A/5000/1500	£65			
F1000A	£79			
F1200S/2000S/2200S/3000A/3300	£79	£115		
FS1500A (ECOSYS)	£79			

PANASONIC 3rd party memory

KXP-4410/4430	£89	£129	£199	
KXP-4420/4450/4451	£69	£109	£179	
KXP-4455		£119		
KXP-4450	£69			
KXP-4440/5410 EXP+MEMORY	£72	£109	£193	
KXP-4440/5410 ADD ON				
MEMORY	£39*	£84		
KXP-4400,(KXP-5400 2MB ONLY)	£65	£95	£175	

STAR 3rd party memory

LP4	£79	£119	£199	
LP8	£79	£115	£195	
LS-5/5EX/STT EXPBOARD+ MEMORY	£76	£131		
LS-5/5EX/STT ADD ON MEMORY	£55	£69*		

SHARP 3rd party memory

JX-9500PS	£49*			
JX-9500/E/H/9700			£195	
JX-9400,9460,9600,9600PS,				
JX-9660,9700E	£65	£79*	£179	

OKI 3rd party memory

OL400	£69	£99		
OL400E/EX,410E/EX	£69	£109	£179	
OL410,OL810	£75	£115	£185	
OL800,OL820	£69	£109	£179	
OL830,OL840		£89		

PCMCIA^(b)

Type I Version 1.0 SRAM 1Mb/2Mb **£125/£159***

CO-PROCESSORS^(b)

Performance accelerator for CAD, spreadsheets, graphics & DTP

80287-8 to 20MHz	£59
80387SX-16/20/25MHz	£58
80387SL-16/20/25MHz	£58
80387SX-33MHz	£65
80387-DX-16 to 33MHz	£58

SIMMS^(b)

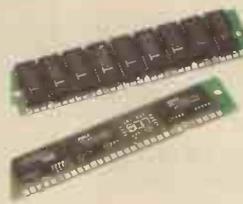
72 PIN 70NS

Type	Size	Price
1x32	4Mb	£110
1x32 (EDO)	4Mb	£145
1x36	4Mb	£120
2x32	8Mb	£220
2x32 (EDO)	8Mb	£279
2x36	8Mb	£229
4x32	16Mb	£370
4x36	16Mb	£399

Call for 60 & 80NS

DRAMS

44256-70NS (256K x 4)	£5.40
1Mb x 1-80/70NS	£4.90
1Mb x 4-80/70NS	£25
256K x 16-70 SOJ	£22



All generic memory supplied is made by reputable manufacturers such as **Toshiba, Samsung, Goldstar, Fujitsu, TI, NEC, OKI** etc.

30 PIN

1Mb x 9-70/80N (9 chip)	£31
1Mb x 9-70 (3 chip)	£30
4Mb x 9-70/80NS	£115
4Mb x 9-60NS	£119
256K x 9-80NS/70NS	£15

CACHE RAM & TAG RAM (SRAMS)

8K x 8 20NS cache	£4.50
32K x 8 20NS cache	£7.00
32K x 8 15NS cache	£7.50
128K x 8-20 cache	£26

FREE
 Anti-Static wrist strap for each order on memories except DRAM and Cache RAM

Just give us a call with your system details and we do the rest

LOOK ★ FOR LIMITED SPECIAL OFFER

MEMORY FOR COMPUTERS^(b)

	2MB	4MB	8MB	16MB
--	-----	-----	-----	------

IBM Original memory

THINKPAD 360/700/20/50/55	£130	£225	£450	
THINKPAD 755 DIMM		£225	£655	£1145
PS1/NP/2		£190	£375	
PS/2 95X/PMF/AMT				£1145
THINKPAD 750/755 DRAM		£199	£399	£999
THINKPAD 340/360			£380	
PS/NOTE	£95			
APTIVA PC300		£180	£360	£720
Perf/PC700		£190	£375	£750
PS/2 SERVERS ONLY (ECC MEMORY)		£205	£415	£835

IBM 3rd party memory

T/PAD 700,720,750,755,CL575X	£169	£299		
T/PAD 330/340/355/360/730C/370	£159	£259*	£489	
T/PAD 701 SERIES	£149	£275	£479	
PS/2 L40SX,PS/NOTE 182,T/PAD 350	£89	£149	£285	£459
PS/2 NS1 SLC,SX	£89	£159	£299	
PS/2 N33 SX	£89	£149		
PS/2 90/95,95XP 486 OMF,OMT (ECC)	£85	£129	£259	
PS/2 568S75SLC,568S75X,M575LC	£85	£129	£259	
PS/VP 6381-FY1/FYE/KY/MYO/MY1/VYO	£119	£429		
PS/VP 6382, (CJ/K/FW)	£129	£259	£429	
PS/VP 6384 F/M/V/(EXCEPT F00/F20/F23/F40/F43/M00/M20/M40/M43/M50/M53/W40/W53)	£129	£259	£429	
PS/VP 6384 F00/F20/F23/F40/F43/ M00/M20/M40/M43/M50/M53/W40/W53	£136	£499		
PS/VP C00/C2A/C20/C4A/C40	£85	£139	£259	
PS/1 2133-G,S,W43/174/154,2155-G,S,W44	£136	£499		
PS/1 2133-G,S,W11/G,S,W13/81/111/451/461/471/483/551,2168-452/473/493/573, 2155-G,S,W14	£85	£129	£259	
PS/1 2133-571/642/652,2155-582/592/593	£119	£249	£439	
PS/1 2168-574/584/594/653/873	£85	£129	£259	
PS/1 PRO 386SX,2123 (EXCEPT E31/E81)	£85	£139	£259	
PS/1 PRO 386SX,2123 E31/E81	£119	£249		
APTIVA	£87			
TREKA				
HURDLA 486,SPRINTA 486DX/DX2/SX	£136	£476		

COMPAQ 3rd party memory

CONTURA 3/20,3/25,3/25C	£75	£155	£259	
CONTURA 400/410 SERIES		£149	£275	
CONTURA 4/25,CX,EX		£155	£250	£549
CONTURA AERO		£140	£329	
CONCERTO, LITE ELITE		£159	£309	£579
LTE LITE 4/25,4/25C,4/25E,4/33C	£159	£299	£499	
LTE 386 LITE/20,25,25C,25E	£89	£185	£299	
SPLIT/M & i/ PROSIGNIA PC (NEED EXP. BOARD)	£85	£129	£259	
DP 3/25i, 3/33i,4/25iS,4/33i,4/66i	£85	£129	£259	
DP 386/20E,25E,20,25		£155		
DP 386/33L,486/25/33L/50LSP 486/E SERIES	£95		£295	
D/PRO M&SPLIT (NOT LT486/33) EXPBD	£215	£249	£375	
PROLINEA 3/25S,3252S	£68	£238		
PROLINEA 4/25S,4/33,4/50,4/66,CDS				
PRESARIO,PROLIANT 1000 486DX2-66	£85	£129	£259	
PROLINEA MT 4/33S,MT 4/50,MT 466	£85	£129	£259	
NEW PROLINEA FAMILY (PENTIUM X 2)	£119	£249	£399	
PROSIGNIA PC SERVERS	£129	£259	£439	
SYSTEM PRO XL 486/50				
P486,P486/66,P486C,P486C	£85	£129	£259	
DESKPRO XE 433S,450,466	£85	£129	£259	
DESKPRO XE 560,5/66M,5/60M				£495
PROLINEA MT	£85	£129	£259	£439
PROLINEA NET 1-25S/E/TR	£85	£129	£259	
PRESARIO CDS 633,CDS 860,660	£129	£259	£439	
DESKPRO XL 450,466			£258	

COMPAQ Original memory

Contura 386	£80	£155	£255	
Contura 486		£155	£265	£995
Contura Aero		£140	£259	
Contura 400		£190	£370	£880
LTE Lite 386	£140	£275	£515	£1575
LTE Lite 486		£220	£440	£1575
LTE Elite/CONCETO		£220	£440	£880
PROLINEA 486	£110	£190	£309	
PROSIGNIA/DESKPRO	£120	£195	£309	£765
DESKPRO XL 486			£360	£685
NEW PROLINEA/DESKPRO		£185	£355	£655

TOSHIBA 3rd party memory

T2000/SX/SXE,T2200SX,T1800,T1850/C,				
T1000LE	£85	£159	£295	
T2100 SERIES,T2150		£149	£295	
T3100SX		£85	£159	
T3200SX		£85	£159	
T3200SX		£85	£119*	
T2400/T2450/T3600		£129	£299	£559
T3400		£169	£299	£569
T4400C/SX/SXC,T6400,T6600	£85	£159	£289	£539
1900,1910,1950/C,1960,4500,4600,				
4700,4800,4850,4900,DYNAPAD T200		£169	£299	£599
DYNAPAD T100X		£159		
TS200/T5200C/T8500	£59*		£345	

Memories for AST, Olivetti, Canon, NEC, Gateway are available, please call if the upgrade you require is not listed.

DELL 3rd party memory

320N/N+,212N LAPTOP	£95			
325N/NC NOTEBOOK	£99			
NL25,NL20 NOTEBOOK	£110			
3165X/LT,3255X,320X/LT	£68			
LATITUDE 433M/MC,450M/MCX		£149	£279	£449
LATITUDE XP 450C/CX,475C,4100CC				
320SX,325P,325D,333D/P		£129		
486P&D/66/50/33/25/20/1/6		£129	£429	
PERFORMANCE ME SERIES		£129	£258	£429
PERFORMANCE T/L/M SER,466i,433/Si		£11		



TECHNOMATIC

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Prices valid from 5/1/0195

MONITORS (MULTISYNC COLOUR) Carr £8 for 14"115" £12 for 17"-21"

Resolution: A B C D E Price

TECHNOVision Affordable Monitors	A	B	C	D	E	Price
TV14 0.28mm	72	72	60	-	-	£149
TV15 0.28mm	90	90	78	60	-	£209
TV17 0.28mm	100	90	76	60	-	£379



14" £149
15" £209
17" £379 **INCREDIBLE VALUE**

TAXAN

The Art of Vision
(2 year RTB warranty)

CALL FOR ON-SITE

400LR	14"	75	60	8	-	£189
410LR	14"	75	60ni	-	-	£199
420LR	14"	100	100	80	60	£239
580+LR	15"	100	100	80	60	£285
880LR	17"	100	100	80	60	£515
885LR	17"	100	100	100	76	£589
895LR	17"	120	120	105	79	£799
1080LR	20"	110	110	100	76	£879
2100LR	21"	120	120	112	84	£1499
Crystall Vision 200 Dualscan LCD Panel						£1249

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14C	14"	60	56	87i	-	£170
15B	15"	100	-	72ni	-	£262
17A	17"	60	72	70ni	76ni	£679
17C	17"	100	72	60	60	£429
20T	20"	160	131	103	76ni	£1239
21B	21"	160	131	103	84	£1349

NEC PLUG & PLAY MONITORS

2V	14"	75	75	70	-	£229
XV15	15"	100	100	80	60	£279
XE15	15"	120	100	80	60	£389
XV17	17"	100	100	80	60	£559
XE17	17"	120	100	80	60	£679
XP17	17"	160	130	100	76	£898
XE21	21"	120	100	80	60	£1339
XP21	21"	160	130	100	76	£1749

SONY

CPD 15 SFI	15"	£315	T1461 (New)	14"	£169
CPD 17 SFI	17"	£599	TX-1537	15"	£325
GDM 17 SEIT	17"	£839	TX-1562	15"	£265
GDM 20 SEIT	20"	£1419	TX-1751	17"	£619
GDM 20 SEV	20"	£1319	TX-1732	17"	£435
			TX-2051	20"	£969
			TX-2151	21"	£1359

Panasonic 2YR OSM

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A=640x480 B=800x600 C=1024x768 D=1280x1024 E=1600x1200 All frequencies are shown in HZ, as per manufacturers spec

VDU Glass Filter to reduce glare & provide protection. TUV & SSI approved.
Mirus ECO 14"-15" £35(b) CAD 16"-17" £59

GRAPHICS CARDS

MODEL	RAM	ISA	VLB	PCI
TAXAN 64 BIT ATI MACH ACCELERATOR				
WIN TURBO+ 64	V4MB	£338	£339	£340
WIN TURBO 64 (Upgradeable)	V2MB	£194	£195	£196
WIN BOOST + 64	D2MB	£134	£135	£136
WIN BOOST 64 (Upgradeable)	D1MB	£98	£99	£100
ULTRA PRO	V2MB	MCA £228 EISA £229		

DIAMOND - VIDEO MPEG ALSO STANDARD STEALTH 64 AVAILABLE CALL FOR PRICES	RAM	ISA	VLB	PCI
STEALTH V64-2 VIDEO MPEG	V2MB	-	£255	£259
STEALTH V64-4 VIDEO MPEG	V4MB	-	£335	£336
STEALTH D64-2 VIDEO MPEG	D2MB	-	£165	£166
STEALTH D64-1 VIDEO MPEG	D1MB	-	£125	£126
SPEEDSTAR 64	D1MB	ISA £105	ISA D2MB	£169

MATROX - NEW MILLENNIUM PCI WITH FAST WINDOW RAM

MILLENNIUM	2MB VRAM	-	-	£255
MILLENNIUM	4MB VRAM	-	-	£369
IMPRESSION PLUS	V2MB	£265	-	£265
IMPRESSION PLUS	2MB VRAM UPGRADE	-	-	£149
MILLENNIUM UPGRADE	2MB	£150	4MB	£270
MILLENNIUM MPEG HARDWARE PLAYBACK MODULE			6MB	£380
MILLENNIUM MPEG PLAYBACK & CAPTURE MODULE				£199
				£239

ORCHID

KELVIN 64-2	D2MB	£121	£123	£122
KELVIN 64-1	D1MB	£88	£90	£89
STANDARD SVGA ISA	512KB	£29	1MB	£45
TRIDENT 9440 PCI	1MB	£59		

EPSON A4, 24/30 BIT COLOUR SCANNERS

All bundles, except scanner only, come complete with software, interface (PC), cables and drivers.
GTX Bundle: Omnipage Direct, Photoshop LE
GTI Bundle: Photoshop V3.00 (full version),
 Please specify clearly model and bundle when ordering.
1 YEAR ON-SITE SWAP OUT ON FLAT BEDS

Model	6500S	8500P	8500S	9000P	9000S	Auto
Scan Res.	300dpi	400dpi	400dpi	600dpi	600dpi	Document
Output Res.	1200dpi	1600dpi	1600dpi	2400dpi	2400dpi	Feeder
Colour Depth	24bit	30bit	30bit	30bit	30bit	£349(a)
Interface	SCSI	Parallel	SCSI	Parallel	SCSI	Transparency
Scanner only	-	£429	-	£529	-	Unit (up to 5"x5") £439(a)
GTX-PC	£465	£495	£575	£599	£678	
GTI-PC	-	-	£759	-	£859	

PC PARTS MICE



Microsoft

Microsoft(b)	
MS Mouse V2 Serial & PS/2	£36
MS Mouse V2 5pk Serial & PS/2	£169(a)
MS Mouse V2 Bus	£48
MS Home Mouse Serial + 18 games	£24
Logitech(b)	
Pilot II Mouse PC Serial	£17
Pilot II Mouse PS/2	£18
Pilot Trackman PC Serial New!	£27
Mouseman Serial (or PS/2)	£31
Mouseman Cordless Small	£49
Trackman II PC Combo	£42
Trackman Portable Ser + PS/2	£32
Trackman Voyager	£47
Hard Mouse Mat	£4(c)
Genius(b)	
Hi Mouse range includes mouse mat, 9-25 adaptor and Paintbrush IV	
Hi Mouse Serial Only	£19
Hi Mouse Serial & PS/2	£21
Mouse One Serial	£9
Hi Point Serial	£20
Clips on to keyboard, includes carry case and 9-25 adaptor, ideal for notebook user	

SCANNERS HAND AND A4(a)

Genius Scanmate Colour SE (800dpi)	£95
Genius Scanmate Colour Pro (1600dpi)	£119
Genius Scanmate 256 (Grey)	£55
Logitech Scanman 32 PC Windows	£56
Logitech Scanman 256 PC Windows	£77
Logitech Scanman Colour Windows	£149
Logitech Scanman Easy Touch Parallel	£99
Logitech Scanman Power Page	£298
Trust 1200 A4 Flat Bed	£299
Trust 2400 A4 Flat Bed	£389
Epson LapCat A4 Sheet Feed PC Kit	£329

KEYBOARDS

Microsoft Natural Keyboard	£65(a)
KeyPro Programmable Keyboard	£39
• 12 programmable function keys	
• Built in LCD calculator	
• Diagonal cursor keys	
• Key-lock function* XT/AT compatible	
• Angled template holder with 5 templates	
CHERRY 102 Key AT Keyboard	£37
German made using high quality key switches	
Mitsumi XT/AT Keyboard	£25
Ergo Wrist Rest	£4(c)

FREE WRIST REST

CABLES

(Cable only order Min £30 ex carr)	
Printer Cables : See page 15	
Printer Switches : See page 15	
SCSI Cables : See page 20	
Networking Cables : See page 17	
Inside PC	
Dual IDE Hard drive cable YCB/DS/H17Z	£8
Single IDE cable YCB/DS/H22Z	£6
Dual Floppy Drive cable YCB/DS/F08Z	£7
"Y" Power splitter cable YCB/DS/W10I	£8
Mains	
Mians to PC 2m cable inc plug YCB/WR/M13Z	£6
Mains to PC 4m cable inc plug YCB/WR/M15Z	£9
PC to monitor 2m mains cable YCB/WR/M06Z	£7
4 way mains ext block surge protected YCB/WR/P06M	£19
Serial	
Modem cable 2m 9f to 25m YCB/MD/Y16Z	£8
Modem cable 2m 25f to 25m YCB/MD/Y14Z	£9
File transfer cable Universal 9 & 25 each end YCB/MD/Y02Z	£18
- can be used with Laplink & similar programs	
PS/2 to AT serial port adapter GEN/PD/M06X	£5
Monitor	
Monitor ext cable for SVGA 15pin 2m YCB/MP/L03I	£15
Keyboard	
Keyboard ext cable PC/XT/AT coiled YCB/PD/K09X	£7
Keyboard extension cable PS/2 coiled YCB/PD/K12I	£9
PC/AT keyboard to PS/2 system cable YCB/PD/K06X	£10
Carriage 5 cables	£6
Additional cable	£0.30



SALES 0181-205 9558
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PRICES EXCLUDE VAT @ 17.5%



AMAZING! HARD DRIVE PRICES

SEAGATE	1GB	IDE	£175
CONNER	2GB	SCSI	£525
MICROPOLIS	4GB	SCSI	£825

PCMCIA DEVICES(a)

HARD DRIVES TYPE III CALLUNA HD

10MB	£219	130MB	£399
170MB	£325	260MB	£399

PCMCIA FOR DESKTOPS(a)

Cardport ISA £159

- 2 x Type III slots
- 1 x ISA half card with rear slot
- 1 x drive bay with front slot
- Full s/w suite for card & socket

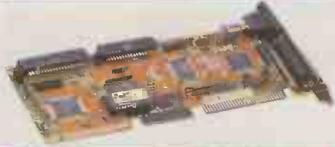
Cardport Solo £99

- 1 x Type III slot
- 1 x drive bay with front slot
- Full s/w suite for card & socket

Cardport Uno £89

- 1 x Type III slot
- 1 x ISA half card with rear slot
- Full s/w suite for card & socket

PC PARTS (b)



High Speed Multi I/O Cards

- Enhanced IDE mode 3 (ATA-2) for VLB card
- Standard IDE mode for ISA card
- 2 x 16550 UART buffered serial ports
- 2 x 2.88Mb floppy disk support
- Multi-mode parallel port (standard, B0Dir, ECP, EPP)

IDE-4 ISA £39(b) **IDE-5 VLB** £59(b)

IDE-2 AT HD/FD/2S/1P inc cables £14
IDE-3 VLB HD/FD/2S/1P card £17
I/O-1 AT 2S/1P/1G £14
I/O-2 XT/AT Dual Serial Port £14
I/O-4 XT/AT Dual Parallel Port £14

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Teac 1.44Mb 3 1/2" FD + 5 1/4" Kit £36
Teac 1.2Mb 5 1/4" Floppy Drive £42
Teac 2 IN 1 : Dual Floppy Drive £69*

3 1/2" + 5 1/4" in half height frame

*While stocks last

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IDE - 0MB fitted

- Support for Dos, Windows, NT, OS/2 Netware, SCO AT&T UNIX
- Hardware disk mirroring (RAD 1)
- Up to 4 drives supported • Fast ATA support
- 4 x 30 pin Simm sockets (16MB max)
- Auto configure & drive select

TIC 101 ISA 0Mb £59
TIC 20V VLB 0Mb £65

SCSI - 0MB fitted

- Support for Dos, Windows, NT, OS/2 Netware, SCO AT&T UNIX
- AHA 154X compatible
- Supported by Corel SCSI (approved)
- Hardware disk mirroring • S/W configuration
- 4 x 30 pin Simm sockets (16MB max)

TSC 101 ISA 0Mb £125

SUPER IDE CONTROLLER

FUTURE DOMAIN ISA IDE CONTROLLER WITH BIOS

- Supports Drives > 528MB
- Supports up to 4 Devices
- Including CD-ROM Drives

ONLY £45

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Store 100MB on one 3.5" disk!

- Expand your data storage inexpensively
- Each 3.5" disk holds 100MB
- Zip Drive is compact and weighs 1lb
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- 29MS seek time
- Drive comes complete with manual & s/w

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Zip Drive 100MB (Parallel) £150(a)
Zip-Zoom PC SCSI Interface £69(a)
Zip PC Disks, 100MB formatted 5pk £55(a)

PANASONIC 5.25" OPTICAL DRIVES

LF7304 1.5Gb SCSI int drv £1477(a)
LF7300B 1.5Gb SCSI ext drv £1539(a)

PARALLEL PORT DRIVES(a)

BackPack Hard Disk Drives

420Mb	£259	850Mb	£319	1.2Gb	£375
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BackPack Floppy Disk Drives

1.44Mb	£115	1.2Mb	£125
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BackPack CD-ROM Quad speed £255
BackPack CD-ROM 4x5 (with sound) £319

Tape Drives - Also see Colorado section
BackPack ti 700 Travan £189

SCSI CONTROLLERS(b)

COREL SCSI - Support the widest range of SCSI card & devices in Dos, Windows & Netware.

COREL SCSI II S/w for Dos/Win v2 £65
COREL SCSI II Network Manager £267

ADAPTEC - INDUSTRY STANDARD SCSI

BUS TYPE	CARD ONLY	ASPI S/W KIT	
		ONLY	S/W KIT
1505	ISA	-	£42
1515	ISA	-	£62
1542C	ISA	£125	£162
1640	MCA	-	£235
2742T	EISA	£209*	£245
2842	VLB	-	£162
2940	PCI	-	£178

*Single Channel

ADAPTEC PARALLEL PORT ADAPTERS

T358 MiniSCSI EPP (1Mb/sec) £125

PCMCIA SCSI CONTROLLERS

ADAPTEC PCMCIA SCSI card £165

FUTURE DOMAIN PCMCIA SCSI 2G0 £165

DPT FAST SCSI-2 Ideal for Servers
CACHING CONTROLLERS
DPT ISA 16 Bus Mastering kit £199
DPT EISA 32 High Performance kit 0MB £329
DPT PCI High Performance kit 0MB £299
DPT Caching Module Upgrade 0MB £299
DPT Disk Array Module Upgrade £299

SCSI ACCESSORIES

SCSI DEVICE CASES WITH PSU(a)
 Includes: 50-way Centronics input & output, PSU, mains cable, fan, activity LED, SCSI ID switch, mounting screws

Single	Dual	Quad
3.5" HH	£79	-
5.25" HH	£65	£139

SCSI CABLES(c)

INTERNAL (50-way IDC-IDC) Length

1 device 28cm	£6	2 devices 45cm	£9
4 devices 1m	£22	6 devices 1.4m	£32

EXTERNAL

50-way Centronics each end	1m	£18
50-way Micro-D each end	1m	£45
50-way Centronics to Micro-D	1m	£38
25-way D to 50-way Centronics	1m	£25

TERMINATORS (50-way Centronics)
 Passive £9 Active £29 Forced Perfect £69

TAPE BACKUP NEW

COLORADO BACKUP SYSTEMS (a) NEW LARGER CAPACITIES
Internal Tape Backup Solutions

TRAVAN T1000 400MB/800MB £108

Jumbo 350 170/340Mb (QIC-80XL)	£72
Jumbo 680 340/680Mb (QIC-3010)	£115

Jumbo 1360MB NEW £179

KE-10 External Mounting Kit £61
FC-20 Fast Controller card £49

Full range of accessories & mounting kit - Call

Parallel Port Backup Solutions

Trakker 350 170/340Mb (QIC-80XL)	£142
Trakker 680 340/680Mb (QIC-3010)	£199
Tracker Carrying Case	£39

Colorado Backup Software Win v2 £39
 Colorado Backup for OS/2 £60
SU53J Unix/Xenix Backup s/w £79

NEW HP SURESTORE DAT BACKUP (a)
 HP's new Surestore range of drives gives the system user the flexibility to choose the correct drive and options to suit all needs. All network kits contain Cheyenne backup software, call for full details. Unix solutions also available.

	Int Drive	Ext Netware Drive	Bundle
Surestore 2000 2Gb	£599	£699	£935
Surestore 5000 4Gb	£695	£799	£1759
Surestore 6000 8Gb	£795	£899	£1849

NEW HP AUTOLOADER 48GB SURESTORE 12000e £1999
 CALL FOR FULL DETAILS

HP Support Pack for Surestore £210(b)
 (Provides 3 years OSM direct from HP)

TECHNO DAT Drives Kits (a) 1 yr RTB warranty

Leading DAT Drives (HP)	INT
TEC 2Gb DAT (C35470)	£489
TEC 2-8Gb DAT (C35480)	£589
TEC 4-16Gb DAT (C1533)	£699
TEC 24-48Gb DAT Autoloader (C1533)	£1549

Cheyenne Backup Software (a)

Arcsolo DOS	£89	Win	£95	OS/2	£135
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Arserve NLM

No. of Users	5	10	25	50	100	250
v4 for DOS	174	289	489	619	699	815
v5 for Win	174	335	575	695	795	995

EXABYTE HIGH PERFORMANCE TAPE DRIVES

- SCSI-2 Interface • Mini cartridge (DC2000 format)
- 1Gb native, 2Gb compressed
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- Kits complete with PC card, s/w, cable & 1 cartridge

EXABYTE 2501 F51Gi Internal Kit £539(a)
EXABYTE 2501 F51Ge External Kit £649(a)
EXABYTE 2501 Bare drive only £399(a)

TAPE CARTRIDGES

Colorado Formatted - 3 Pack(c)
DT-120 (QIC-40) £49 **DT-250 (QIC-80)** £42
DT-350 (QIC-80XL) £52 **DT-740 (QIC-3010)** £66

Iomega QIC-3010 (for Jumbo 680)
Formatted 1Pk £21 **3Pk** £59

3M QUALITY TAPE CARTRIDGES

Unformatted	1(c) 5pk (b)
DC2120 (QIC-80)	£9 £40
DC2120XL (QIC-80XL)	£14 £66
MC3000XL (QIC-3010)	£20 £95
DC6150	£12 £55
DC6250	£15 £70
DC6525	£17 £80
Exabyte DC3000XL (1Gb)	£23 £105

4mm DDS DAT tapes - 5 tapes per pack

3M (1Tape)	SONY	HP
1.3Gb 60m	-	£45
2Gb 90m	£9	£55 £55
4Gb 120m DDS-2	-	£75 £79

HP DDS DAT Cleaning Kit - 2 tapes £24

DISKETTES (c)

3M 3.5" DISCS (10/PACK)	HD	£6.00	HD Formatted	£7.00
BULK DISCS 3.5" HD (1.44MB) FORMATTED	50:	£25.00	100:	£44.00
	200:	£82.00	(b)	

Floptical Diskettes 21Mb 5pk £70 **10pk** £130

Magneto Optical Diskettes

128Mb	£17	10pk	£155
230Mb	£24	10pk	£219
1.5Gb	£99	5pk	£475

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BAD BLOCK - EMERGENCY!!
 Recover lost data on hard disk or floppy with SPINRITE 3.1 "the most comprehensive data recovery package available. If you can't get your data back with this, you're in trouble!" PC PRO April 95. No PC should be without it.
CE80 S23 Spinrite 3.1 Data Recovery £99

MODEL SIZE (Mb) PRICE

Fast - SCSI-2 Drives (a)		
IBMIGB	Pegasus	£309

HP 1GB SCSI £316

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IDE		
CF-425A	425.	£95
CF-635A	635	£119
CF-850A	850	£139
CF-1275A	1200	£195
Fast SCSI-2		
CFA540S	540	£149
CFP1080S	1080	£289
CFP2105S	2GB	£525
CFP4207S	4GB	£799

SEAGATE

IDE		
ST3491A	428	£99
ST3660A	545	£109
ST5850A	850	£145
ST31220A	1050	£175
FAST SCSI-2		
ST5660N	528	£199
ST31230N	1050	£295
ST32430N Hawk	2100	£625
ST32550N B/cud	2100	£715
ST15230N Hawk	4000	£799
ST15150N B/cud	4000	£1049
ST410800N	9090	£1579

FUJITSU (a)

IDE		
M1603T	545MB	£115
M1606T	1090MB	£199
FAST SCSI-2		
M2637SA (2.5")	240MB	£175
M1603S	545MB	£145
M1606S	1090MB	£269
M2932S	2017MB	£575
M2934S	4350MB	£799

MICROPOLIS (a)

FAST SCSI-2

4221S (LP) 3.5"	2050	£619
3243S (HH) 3.5"	4294	£825
1991S (FH) 5.75"	9100	£1549

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Housing Chassis (a) IDE: £49 **SCSI:** £69
Caddi Drives (a)
IDE 525MB £169 **850MB** £235 **1GB** £315
SCSI 545MB £249 **1GB** £399 **2.1GB** £799

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"Y" POWER SPLITTER (YCB/D5/W101) £8(c)

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PLEASE CHECK CURRENT PRICE AND AVAILABILITY BEFORE ORDERING. ALL DRIVES ARE 3.5" FORMAT UNLESS OTHERWISE SHOWN.

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FREE CD'S

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Game Empire
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ONLY £49(a)

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Complete multimedia solutions at Technomatic prices with the world's most popular family of sound cards, based on the ultra-fast TEAC CD-56E six-speed CD-ROM drive. Which with an access time of only 139ms is ideal for video for windows, and full Video-CD compatible and Windows 95 certified.

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- Multisession, photo-CD compliant

Microsoft family pack and the brilliant Techno Hi-Fi Pro (25W) mains speakers with volume, bass and treble controls are included with kits 2PT-5PT. Only Creative Labs full retail products used, bundled with the latest full software suite and full UK Creative technical support. Only full UK retail boxed TEAC drives used, with UK technical support and warranty.

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- KIT 2PT SB16 Value + TEAC CD-56E + Techno HI-FI Pro Speakers **£315(a)**
- KIT 3PT SB16 Pro ADSP + TEAC CD-56E + Techno HI-FI Pro Speakers **£359(a)**
- KIT 4PT SB Awe Value + TEAC CD-56E + Techno HI-FI Pro Speakers **£368(a)**
- KIT 5PT SB Awe-32 + TEAC CD-56E + Techno HI-FI Pro Speakers **£425(a)**

Microsoft Family Pack



An amazing bundle of Microsoft CD-ROM's. The Microsoft CD-ROM's are MS Encarta 95, MS Works for Windows, MS Dangerous Creatures, MS Money, MS Golf and MS Scenes + Aldus Photostyler SE provided with Creative 563 drive. Scenes is on a 3.5" disk, money is part of works.

Pioneer DRU-A124X Based Kits

Complete multimedia solutions at Technomatic prices with the world's most popular family of sound cards, based on the superb Pioneer DRU-A124X quad-speed CD-ROM drive. Which with an access time of only 139ms is ideal for video for windows, and full Video-CD compatible and Windows 95 certified.

- Fast access time 139ms
- Quad speed 900kb/sec transfer rate
- Enhanced IDE interface
- Multisession, photo-CD compliant

Microsoft family pack and the brilliant Techno Hi-Fi Pro (25W) mains speakers with volume, bass and treble controls are included with kits 2PP-5PP. Only Creative Labs full retail products used, bundled with the latest full software suite and full UK Creative technical support.

- KIT 1PP Pioneer DRU-A124X drive +AT bus interface card **£125(a)**
- KIT 2PP SB16 Value + Pioneer DRU-A124X + Techno HI-FI Pro Speakers **£229(a)**
- KIT 3PP SB16 Pro ADSP + Pioneer DRU-A124X + Techno HI-FI Pro Speakers **£270(a)**
- KIT 4PP SB Awe Value + Pioneer DRU-A124X + Techno HI-FI Pro Speakers **£292(a)**
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MULTIMEDIA UPGRADE KITS

- Discovery Multimedia Kit 2X Value **£139(a)**
 - Discovery Quad Speed Multimedia Kit **£264(a)**
 - GameBlaster Awe32 Multimedia Kit **£286(a)**
 - GameBlaster CD16 Multimedia Kit **£155(a)**
 - Easy CD16 Discovery Multimedia Kit **£112(a)**
 - Aztech Personal Voyager System Multimedia Upgrade (ext) **£179(a)**
 - Aztech Personal Deluxe Voyager Multimedia Upgrade (ext) **£229(a)**
- The Aztech Voyager kits are based on wavetable, 16bit sound cards.

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- Video for Windows Real Time Video Compression**
- Adobe Premiere for Windows V4.00 **£399(a)**
 - Intel Smart Recorder Pro (IN) **£285(a)**
 - Miro 20TD Live (MO) "PCI OR VLB vers" **£298(a)**
 - Video Blaster RT300 (CT) **£265(a)**
 - Video Spigot **£84(b)**
 - Video Blaster SE-100 **£165(a)**
 - Video Blaster RT300 **£240(a)**
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 - Miro DCI + VideoStudio (SVHS In & Out) (MO) **£339(a)**
 - Miro DCI + Premiere (SVHS In & Out) (MO) **£430(a)**
 - Miro DCI Pro + ViTC Controller (SVHS In & Out) **£799(a)**
 - Miro MPEG-1 encoding s/w (MO) **£185(a)**
 - Black Widow VGA-Pal Encoder Professional Plus (BW) **£219(a)**
 - Black Widow VGA-Pal Encoder Professional R/C (BW) **£195(a)**
 - Techno MPEG Playback card, 24bit chips used in Philips CDI machines. No feature conn **£180(b)**
 - Nogavision PCMCIA Video digitiser **£379(b)**
 - SPEA Crunch It M-JPEG Capture Card **£380(b)**

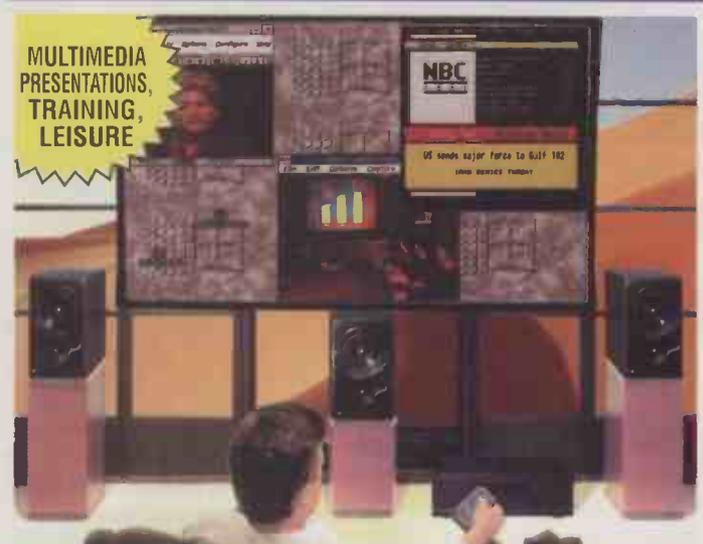
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- Amazing combination of television/teletext card.
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- Amazing combination of television/teletext card and Updata share capture software. Please call for details. C4, current share data supplied on request.
- WIN-TV CELEBRITY + VIDEO OUT+VIDEO DIRECTOR V2 **£449(a)**
- Desktop video editing based on WIN-TV CELEBRITY requires compatible Video Camera & Recorder.

LCD PANELS

Product	Colours	Display	Price
Campus 300 Panel	2.1M	Data only	£2199(a)
Campus 700 Panel	16.7M	Data/Video	£2599(a)
Impact 21 Panel	2.1M	Data only	£2399(a)
Impact 24 Panel	16.7M	Data/Video	£3299(a)
Prolite 400W portable projector "light source for panels"			£599(a)
Sharp XV315P Projector + Pal Encoder			£1550(a)
Sharp XV3300S Projector			£4995(2a)
Sharp XV3850E Projector			£6995(3a)

TECHNO OPTORIAN SYSTEM PAT APP



SYSTEM CONSISTS OF: ONLY £1999(3a) (Ex VAT)

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- HARMON KARDON ANYZON AMP**
- TV ENCODER**
- COLOUR PAL PROJECTOR**
- CONNECTING CABLES**

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Optorian is truly breathtaking when being used with the latest simulators like Flight Unlimited, or racing games like HI-Octane.

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SOUND BLASTER MULTIMEDIA HOME CD



This high quality kit was designed specifically for your home and office, and allows you to work, learn and play. The kit includes a quad speed drive, 16 bit sound card with Advanced Signal Processing, stereo speakers and a complete range of Microsoft titles that makes this kit both versatile and invaluable. It is perfect for the home as well as an excellent choice for games and educational applications for all the family.

£268 (a)

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CREATIVE

SOUNDBLASTER 16 VALUE

TECHNO VALUE
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SoundBlaster is the industry standard for PC audio and this cost effective, true 16 bit sound card will fit effortlessly into your PC and give you CD quality audio at a price you can afford. The card features 16 bit stereo sampling and playback, and enhanced FM stereo music synthesiser, MIDI/joystick interface and 4Vv per channel amplifier. It has the new IDE interface system that allows simple connection to any compatible CD-ROM drive and like all the SoundBlaster range it includes a whole host of audio software. Software included: Creative Ensemble, Wavestudio, Mosaic, Talking Scheduler, Sound LE.

SOUNDBLASTER AWE32 VALUE

TECHNO VALUE
£121 (b) (ex VAT)
 Price subject to change

Designed as a low cost sampled wave synthesis sound card, the AWE32 Value features the Advanced WavEffects system allows you to play sampled instruments stored on the card that sound just like the real thing. This means that MIDI music files sound like an orchestra and it makes games sound like you are actually there. It supports General MIDI, QSound, Reverb and Chorus and the E-mu Sound Font library. The card includes an upgrade socket for the Advanced Signal Processing chip and a CD-ROM interface.

SB AWE32 IDE
£162 (b) (ex VAT)

SB V2 Value	£24(b)
SB 16 PRO IDE	£83(b)
SB 16 PRO ADSP IDE	£104(b)
SB 16 MCD ADSP	£89(b)
WAVEBLASTER II	£89(b)
ADSP UPGRADE	£39(b)
Blasterkeys Midi Keyboard	£109(b)
Aero Duet	£83(b)
Midi Cable for Creative Soundcards	£21(b)

Sound Blaster Audio Cables only available when ordering devices
 Mitsumi, NEC 2xi/3xi, NEC Quad/4xi or Toshiba £9.95 each

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This is a complete PC based communications product, that will save you time and improve your productivity. The built in answering machine is able to receive voice messages that can be accessed remotely. With a built in fax machine, modem and sound card. Phoneblaster brings big business capabilities to your small office.

Features include a Data/Fax Modem, with a Modem Transfer rate of 28.8K/14,4K/9600/4800/2400bps. Fax features Fax-on-demand, fax broadcasting and fax forwarding. Signature and logo support for quick faxes. Automated cover sheet generation. Rotating, scaling, zooming, half-toning and edge-smoothing with PCX, TIFF and BMP support. A Full-featured, full duplex speakerphone with noise cancellation provides uninterrupted, clear communication between parties. Voicemail sending broadcasting and forwarding. Microphone/handset switching for recording and a Speaker/Handset switching for playback.

Data communication includes a mini Bulletin Board Service facility and simple file transfer capability. Bundled software includes Supervoice™. This assists you in making your home or office telecommunications more efficient and convenient. It answers your telephone, takes messages, forwards calls, alerts your pager, sends and receives faxes and provides fax-on-demand services. All of this while you're busy in another application or away from home or office.

Creative TextAssist™ us a Windows-based text-to-speech system that provides high quality, realistic voices as well as tools for adjusting pitch, phoneme length, volume and speed. Ideal for reading back e-mail, spreadsheet data and text on the desktop.

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Multimedia - Hardware

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SCSI DRIVES

SCSI CD-ROM drives are an easy way of attaching a CD-ROM to a wide range of operating systems. Drivers for SCSI CD-ROM drives are supplied with SCSI controller card.

NEC (NE)

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The latest in CD-ROM technology with a transfer rate of 900kb/s (6X), and an access time of 200ms. Video CD compatible with caddy loading.

NEC 6Xi (internal)	£264
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NEC 3Xp 450kb/s (3X), 250ms	£242
NEC AT SCSI I/F (16bit)	£42
NEC PAR SCSI I/F (16bit)	£90
NEC 3Xi (internal)	£175



FROM £175

TOSHIBA (TS)

XM3601B (int) 660kb/s (4.4X), 150ms	£210
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XM3601S (ext) 660kb/s (4.4X), 150ms	£277
XM3601SA (ext kit) 660kb/s (4.4X), 150ms	£341
XM5201B (int) 510kb/s (3.4X), 190ms	£119
XM5201BA (int kit) 510kb/s (3.4X), 190ms	£195
XM5301B (int) 600kb/s (4X), 190ms	£135
XM5301BA (int kit) 600kb/s (4X), 190ms	£209
XM5302 (int) 500kb/s, 180ms	£109



FROM £109

PANASONIC (PA)

Panasonic LF1004 PD writer system, combined 4X CD-ROM drive and optical disk drive. CD-ROM part 600kb/s transfer rate, 195ms access time. Optical disk size 650Mb re-writable. LF1004PD int bare £449
LF1004PD int kit £569
LF1004PD optical media £37



FROM £449

IDE DRIVES

IDE drives are the most cost effective way of adding a CD-ROM drive to a computer, using the same I/F as the hard disk drive. Dual IDE cable (CB) £8 or a secondary IDE I/F (MT) £11(b) may be needed.

MITSUMI (MT)

Mitsumi FX400 (int) 600kb/s (4X), 230ms	£99
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Mitsumi FX300 (int) 450kb/s (3X), 250ms	£65
Mitsumi FX300 kit (int) 450kb/s (3X), 250ms	£76
Mitsum FX300 + OS/2 Warp	£95



FROM £65

NEC (NE)

NEC QUADX (CDR272)	
NEC QUADX (int) 600kb/s (4X), 220ms	£115
NEC QUADX kit (int) 600kb/s (4X), 220ms	£126

FROM £115

AZTECH (AZ)

Aztech CDA268-01	
CDA268-01 (int) 300kb/s (2X), 320ms	£49
CDA268-01 kit (int) 300kb/s (2X), 320ms	£59
CDA468-01 (int) 600kb/s (4X), 235ms	£95
CDA468-01 kit (int) 600kb/s (4X), 235ms	£105

FROM £49

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Due to a bulk purchase we can offer two of the best available double speed CD-ROM drives, with a free shareware CD-ROM. The Aztech CDA268-01 IDE CD-ROM drive is PCWORLD mag Best Buy CD-ROM drive, complete with SB audio cable and a dual IDE cable. This CD-ROM drive is fully VIDEO-CD (Whitebook) compatible (and all current standards) with an access time of only 320ms. The Panasonic CR562 drive is one of the best selling CD-ROM drives ever made, with an access time of 320ms and a transfer rate of 300kb/s. The drive comes complete with a data cable and an audio cable.



FROM £48

CDA268-01 (int) 300kb/s (2X), 320ms	£49
CDA268-01 kit (int) 300kb/s (2X), 320ms	£59
Panasonic CR562 (int) 300kb/s (2X), 320ms	£48
CDA268-01 kit (int) 300kb/s (2X), 320ms	£58

FREE CD-ROM

PIONEER

The Pioneer DRU-A124X is one of the fastest IDE based quad speed CD-ROM drive's currently available with a random access time of only 150ms. The transfer rate is an equally impressive 614kb/s. A free shareware A free shareware CD-ROM is included.



ONLY £118(a)

DRU-A124X ONLY

£118

DRU-A124X + SB16 Value IDE Kit

£179

DRU-A124X + SB AWE32 Value IDE Kit

£242

Secondary IDE I/F card

£11(b)

Dual IDE cable

£8(b)

DRU-124X SCSI version (4.4X)

£189

Pioneer DRM624X 6CD Changer

£419(a)

CybermanCD - 'The Portable CD ROM drive for Windows 95'

Innovative Communications

CYBERMAN CD 2X PCMCIA CD ROM DRIVE £265



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The Cyberman CD (CM2-SX) is designed for the newest generation of 'sound ready' computers. Can play Audio CD's, comes complete with headphones and is fully Windows 95 compatible

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£255(a)

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- 3) THE DAILY TELEGRAPH 1992 (MPC), contains a full years edition of the Daily & Sunday Telegraph 1992. Complete with sophisticated search facility using words, dates and subjects.
- 4) THE INTERACTIVE PERIODIC TABLE (MPC), examine the elements through animations and pictures.
- 5) WORLD WAR II ARCHIVES (MPC), re-live the events of World War II through the actual sites and sounds of history. Film, photos and documents are sourced from the Imperial War Museum.

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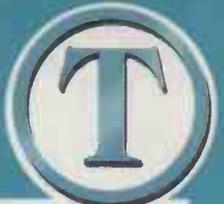


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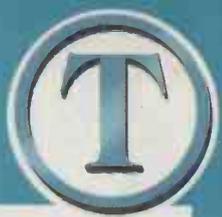


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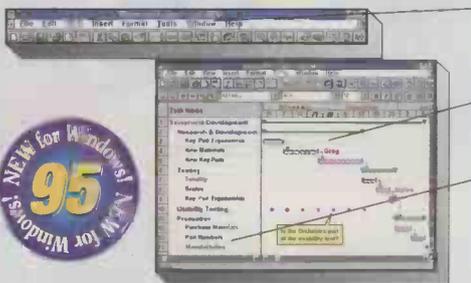
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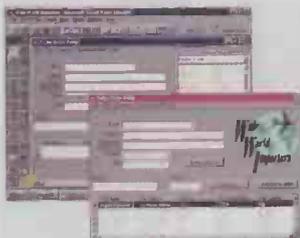
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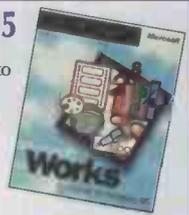


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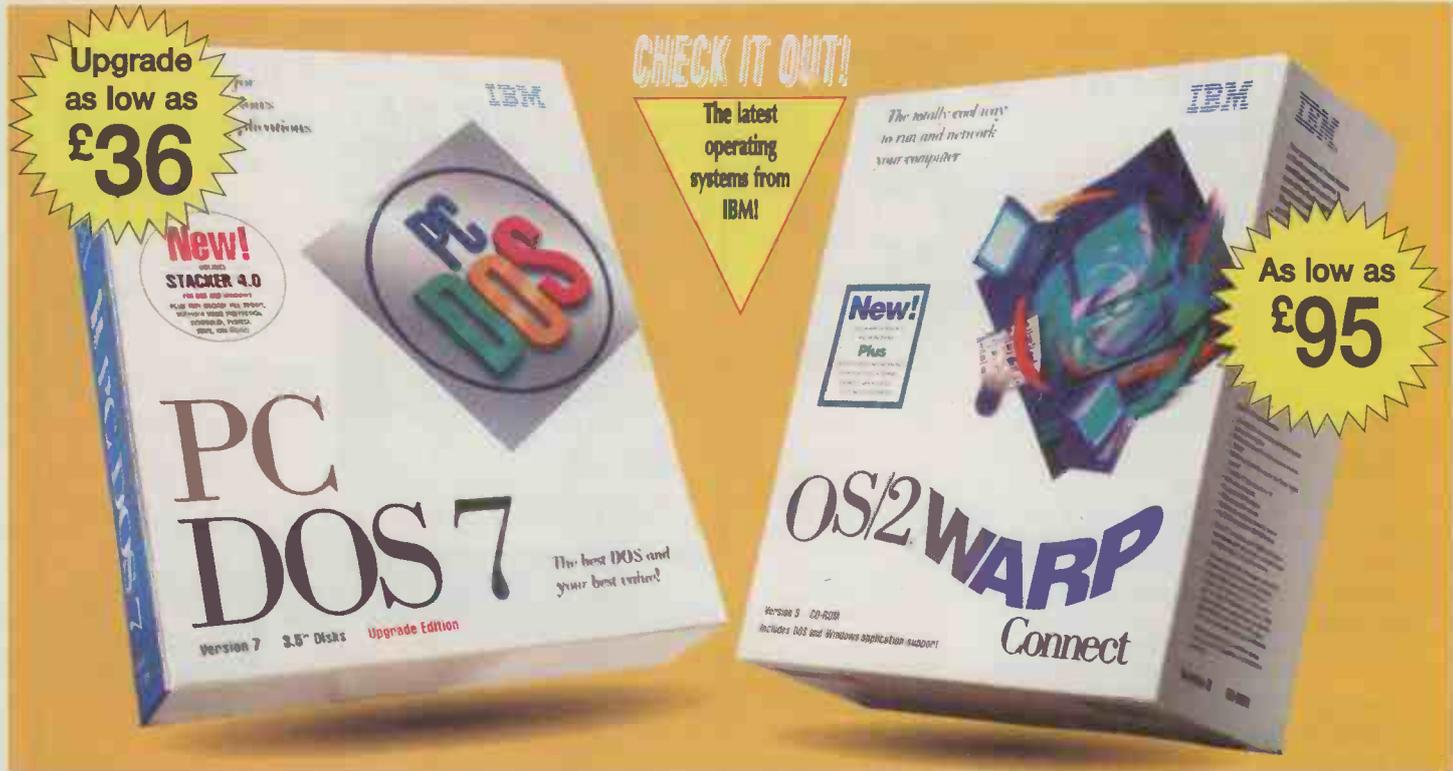
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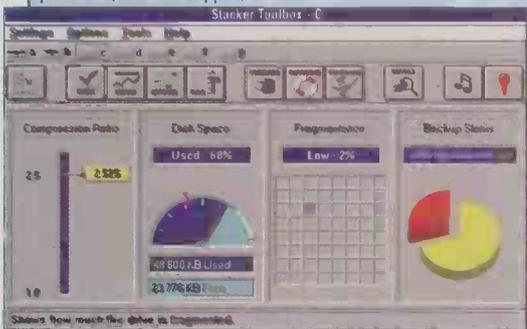
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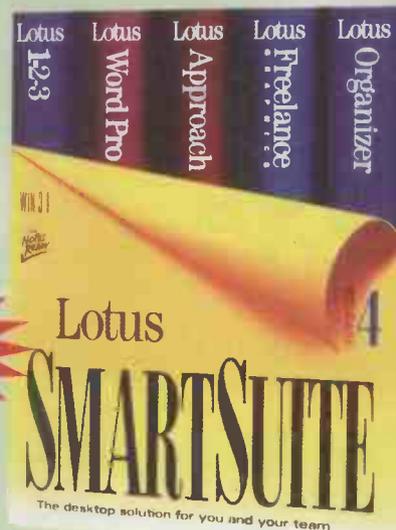
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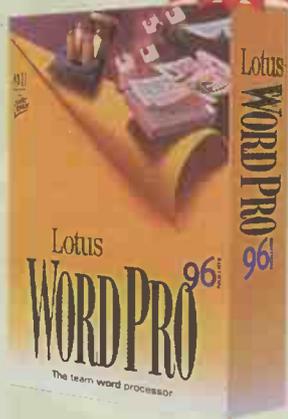
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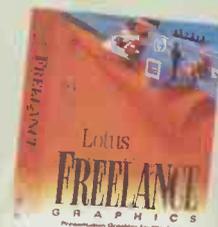
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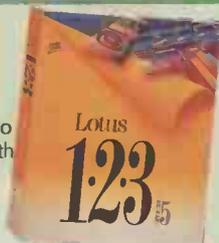
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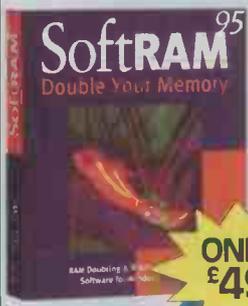
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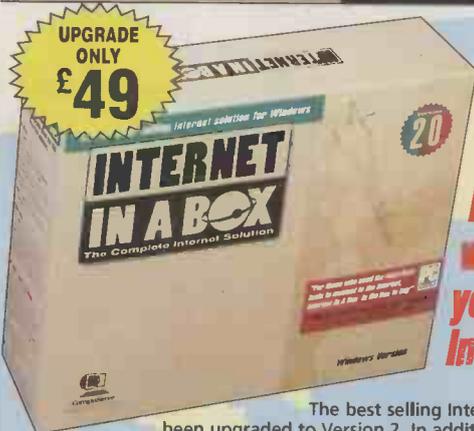
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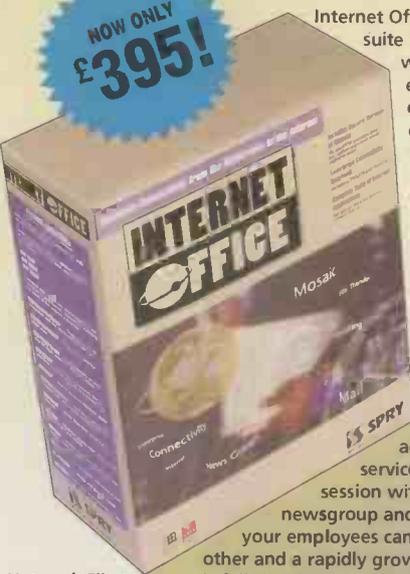
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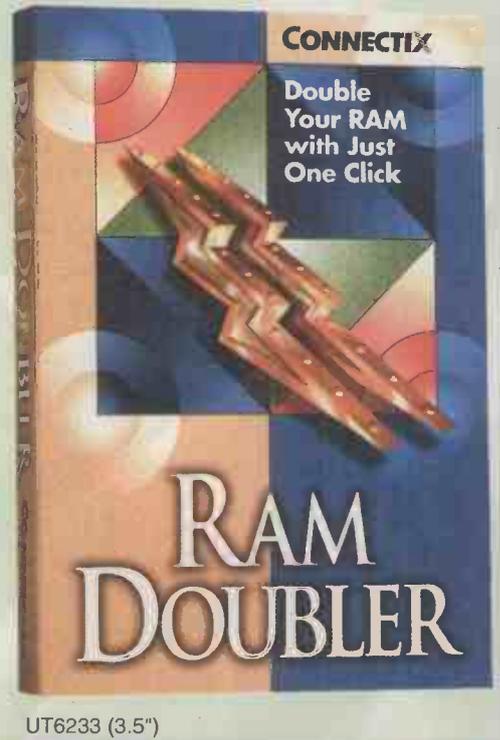
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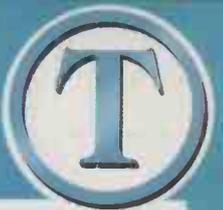
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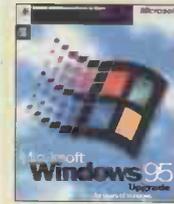
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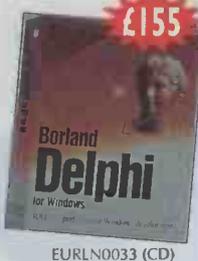
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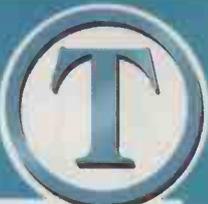


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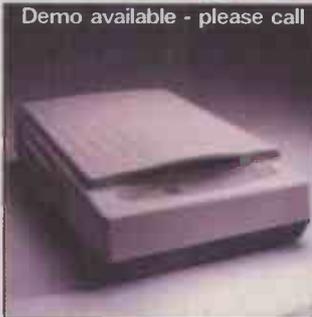
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	1 YEAR	2 YEAR	3 YEAR
FS-400	£75	£125	£150
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FS-3500	£199	£333	£399
FS-5500	£260	£416	£499

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- From portable compact A4 models up to desktop A3 sizes
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- Colour portable printing!
- 360 x 360 dpi colour
- True black printing
- Built in 30 sheet feeder
- Can handle envelopes
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- Universal adaptor available
- Fast drying inks
- Very light to carry **£218**

personal colour



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- True black with colour
- 360 x 360 dot per inch colour
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- Built in 100 sheet feeder
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- Optional high capacity tank
- Compact design
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desktop colour



CANON BJC-800

- A3 colour printing!
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- Cost effective proofing
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CANON BJ30 portable A4 mono printer	£147
CANON BJ200ex desktop A4 mono printer	£165
CANON BJ230 compact wide carriage printer	£235
CANON BJ600e dedicated A4 colour printer	£319
CANON BJ300 A4 mono tractor fed printer	£355
CANON BJ330 A3 mono tractor fed printer	£398
CANON BJC820 colour Macintosh printer	£1219
CANON 430W Windows laser printer	£358
CANON LBP1260 laser printer	£891

We can also supply extras and consumables for your Canon printer.

CANON BN100C PRINTBOOK -486sx25 processor, 120Mb HD, 4Mb Ram ; with built-in printer	£1570
CANON BN120C PRINTBOOK -486sx33 processor, 340Mb HD, 4Mb Ram, with built-in printer	£2319
CANON BN120C PRINTBOOK -486dx4/100 processor, 500Mb, HD 8Mb Ram, with built-in printer	£2498
CANON BN120C PRINTBOOK -486dx4/100 processor, 800Mb, HD 8Mb Ram, with built-in printer	£2769

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- Includes sheetfeeder
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• HP600C,660C BLACK	£22	HP 4PLUS,4MPLUS	£68
• HP600C,660C COLOR	£24	HP 4V,4MV	£109
• HP850C BLACK	£24	HP IIIISI,4SI,4SIMX	£89
• HP850C COLOUR	£22		
• HP 1200C BLACK	£21		
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• HP 1600C COLOURS	£25		

HP MONO DESKJETS	£40
HP COLOUR DESKJETS	£65
HP DESKJET 1600C	£100
HP LASERJET 4L,4ML	£100
HP DEKJET 5P,5MP	£135
HP DESKJET 4PLUS,4MPLUS	£170
HP DESKJET 4V,4MV	£220
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Sportster 14.4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sportster 28.8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Courier V34	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WorldPort 28.8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
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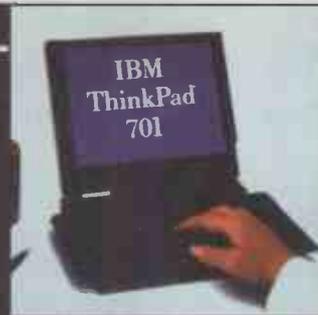
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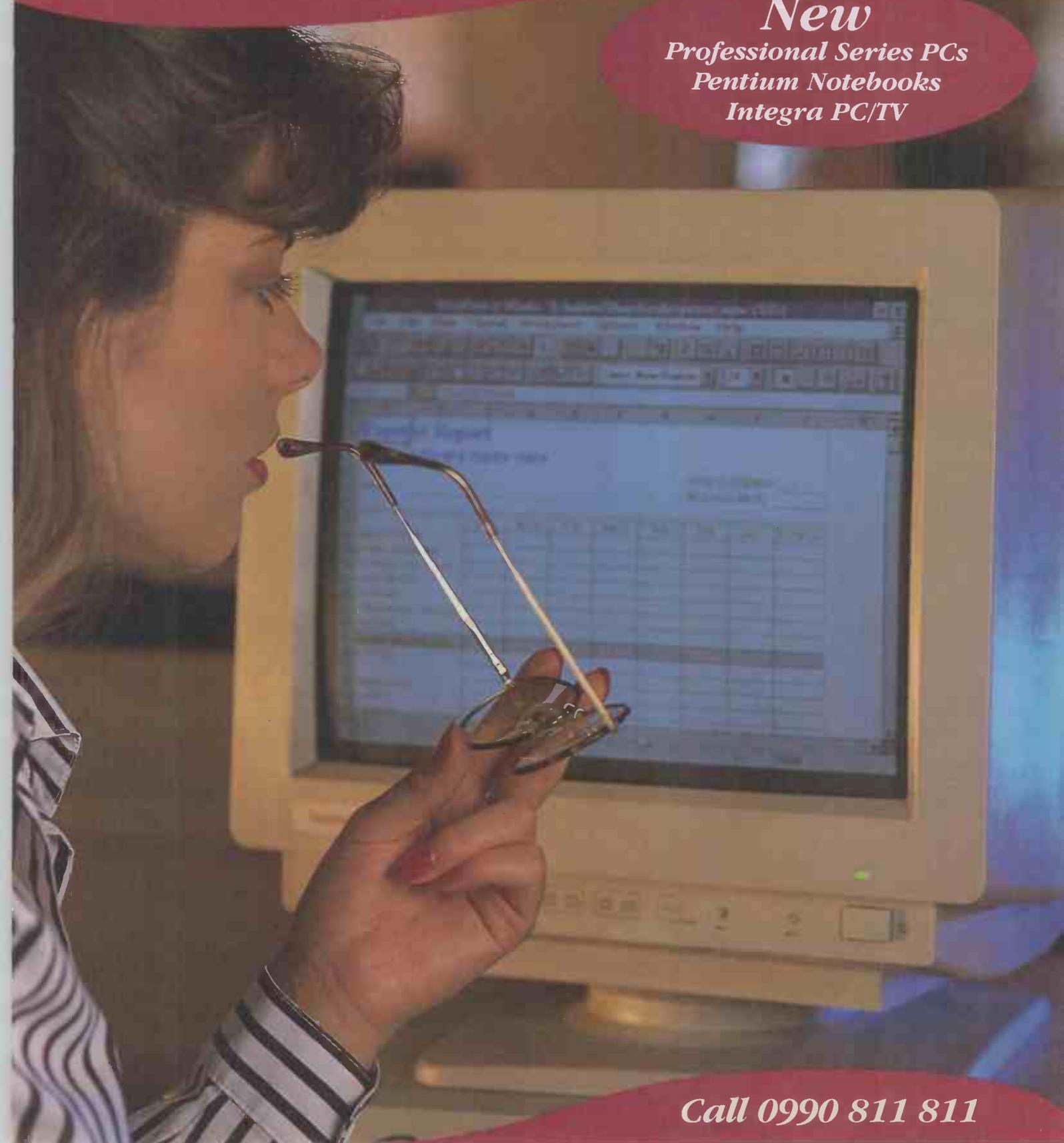
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* Source: The ROMTEC "Investigating PC Usage and Demand" Survey, February 1994. © ROMTEC Plc, 1994.



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- 14.4 bps Internal Fax/Modem/Ansaphone **£100**
- 28.8 bps Internal Fax/Modem **£200**
- Canon BJ-30 Mono Ink Jet Printer **£169**
- Canon BJC-4000 Colour Ink Jet Printer **£279**
- OKI OL400W **£269**
- OKI OL600EX **£319**

For more printer options, please call

- Warrior Joystick **£29**

Windows '95 Up-grade Pack

Special offer £195 ex.VAT

Take full advantage of this special offer

- Windows '95 (fully installed)
- 4Mb to 8Mb RAM
- 14.4 bps Fax/Modem/Ansaphone

See User Guide



Technical Guide



Impressive specifications

- 80MHz 486DX2 Processor
- Intel Pentium® OverDrive Ready
- 4Mb RAM (expandable to 128Mb)
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 540Mb Seagate ST3660A EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
- Quad Speed Sony® CD-ROM
- PCI 64-bit Accelerated Local Bus Graphics
- 1Mb Video RAM (expandable to 2Mb)
- Creative Labs® Soundblaster 16-bit Stereo Soundcard & Stereo Speakers
- 14" SVGA Non-Interlaced (1024x768) MPR-II 0.28dp Low Radiation Colour Monitor
- Ergonomic Keyboard and Microsoft Compatible Mouse
- Slimline Desktop Case
- Pre-loaded software (see above)
- The Amstrad Promise

Select or build your own personal PC.

If you've never specified your own PC before, here are a few hints.

1. Choose from our carefully configured range of PC packages (for example, a PC9486i or PC9555i).
2. Select from your PC package and add from the upgrade options available.

Alternatively, start from scratch and build your perfect, personally customised PC with our Tailor-Made service.

For further information or advice, just call 0990 811 811 to discuss your needs.



Day 1 Call and discuss your system requirements.

Call 0990 811 811



See User Guide



Technical Guide



Amstrad PC955i Multimedia P75

More space to explore

£ 1149 +VAT
£1367.70 inc. VAT & delivery

Finance options available, call for details.

Our Intel 75MHz Pentium® based PC955i Multimedia P75 package offers everything you'll find in the PC9486i Premier Multimedia, but with a CPU that will really get the most out of multimedia software. Double the "thinking space" with 8Mb RAM and a 256Kb Cache as standard ensures that the PC955i Multimedia P75 will simply race through even the most demanding of computing tasks.

Amstrad PC955i Multimedia P90

£ 1299 +VAT
£1543.95 inc. VAT & delivery

Finance options available, call for details.

By including an Intel 90MHz Pentium® Processor, an extra 1Mb video RAM and a set of amplified Yamaha YST-10 stereo speakers, you will find blistering performance for all your multi-media software.

Non Multimedia P90 Option

Excludes CD-ROM, soundcard, speakers and MS Encarta, Links Pro & Descent Destination Saturn software and 1Mb Video RAM.

£ 999 +VAT
£1191.45 inc. VAT & delivery

Finance options available, call for details.

Impressive specifications

- Intel 75MHz Pentium® Processor
- 8Mb RAM (Expandable to 128Mb)
- 256Kb Cache
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 540Mb Seagate ST3660 EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
- Quad Speed Sony® CD-ROM
- PCI 64-bit Accelerated Local Bus Graphics
- 1Mb Video RAM (Expandable to 2Mb)
- Creative Labs® Soundblaster 16-bit Stereo Soundcard & Stereo Speakers
- 14" SVGA Non-Interlaced (1024x768) 0.28dp Low Radiation Colour Monitor
- Ergonomic Keyboard and Microsoft Compatible Mouse
- Slimline Desktop Case
- Pre-loaded software (see below right)
- The Amstrad Promise



Impressive specifications

- Intel 90MHz Pentium® Processor
- 8Mb RAM (Expandable to 128Mb)
- 256Kb Cache
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 540Mb Seagate ST3660A EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
- Quad Speed Sony® CD-ROM
- PCI 64-bit Accelerated Local Bus Graphics
- 2Mb Video RAM
- Creative Labs® Soundblaster 16-bit Stereo Soundcard & Yamaha YST-10 Speakers
- 14" SVGA Non-Interlaced (1024x768) 0.28dp Low Radiation Colour Monitor
- Ergonomic Keyboard and Microsoft Compatible Mouse
- Slimline Desktop Case
- Pre-loaded software (see above right)
- The Amstrad Promise

Upgrade options

- | | Price
ex.VAT |
|-----------------------------------|-----------------|
| • Intel 90MHz Pentium® Processor | £90 |
| • Intel 100MHz Pentium® Processor | £180 |
| • 8Mb to 16Mb RAM | £220 |

For more memory options, please call

- | | |
|---|------|
| • 850Mb Hard Disk Drive | £50 |
| • 1.05Gb Hard Disk Drive | £100 |
| • 2Mb Video RAM | £40 |
| • 15" Digital SVGA Non-Interlaced (1024x768) MPR-II Colour Monitor | £70 |
| • 17" Digital SVGA Non-Interlaced (1280x1024) MPR-II Colour Monitor | £310 |
| • 14.4 bps Internal Fax/Modem/Ansaphone | £100 |
| • 28.8 bps Internal Fax/Modem | £200 |
| • Yamaha YST-10 Amplified Speakers | £39 |
| • Canon BJ-30 Mono Ink Jet Printer | £169 |
| • Canon BJC-4000 Colour Injet Printer | £279 |
| • OKI OL400W | £269 |
| • OKI OL600EX | £319 |

Call for other printer options

- | | |
|--------------------|-----|
| • Warrior Joystick | £29 |
|--------------------|-----|

See User Guide



Technical Guide



Software loaded and ready to go for PC955i Multimedia P75 & P90



MS Windows 95



WordPerfectWorks v2.0 for Windows



Quicken v4.0 for Windows



Links Pro CD



MS Encarta CD



Descent Destination Saturn CD

Upgrade options

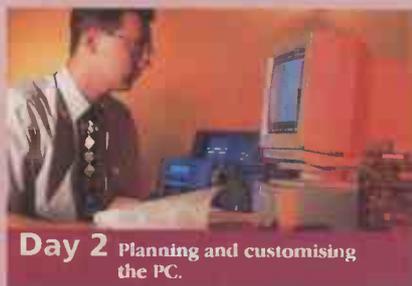
- | | Price
ex.VAT |
|-----------------------------------|-----------------|
| • Intel 100MHz Pentium® Processor | £90 |
| • 8Mb to 16Mb RAM | £220 |

For more memory options, please call

- | | |
|---|------|
| • 850Mb Hard Disk Drive | £50 |
| • 1.05Gb Hard Disk Drive | £100 |
| • 15" Digital SVGA Non-Interlaced (1024x768) MPR-II Colour Monitor | £70 |
| • 17" Digital SVGA Non-Interlaced (1280x1024) MPR-II Colour Monitor | £310 |
| • 28.8 bps Internal Fax/Modem | £200 |
| • Canon BJ-30 Mono Ink Jet Printer | £169 |
| • Canon BJC-4000 Colour Injet Printer | £279 |
| • OKI OL400W | £269 |
| • OKI OL600EX | £319 |

For more printer options, please call

- | | |
|--------------------|-----|
| • Warrior Joystick | £29 |
|--------------------|-----|



Day 2 Planning and customising the PC.



Day 3 Picking the components to build your PC.

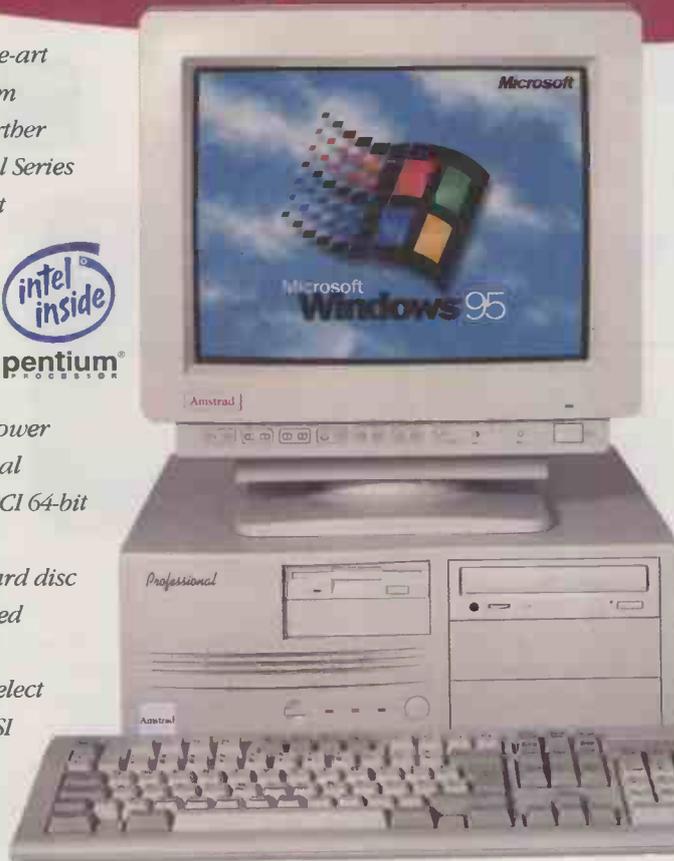


Day 4 Commence the build process.

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PCs for the professional

If your looking for a system that offers both state-of-the-art computing power and maximum expandability – then look no further than Amstrad's new Professional Series power systems. Designed without compromise, every component has been carefully selected to provide the very best leading edge performance, reliability and value. Available in both high-profile Desktop and Midi-Tower cabinets, all Amstrad Professional Pentium series models feature PCI 64-bit accelerated graphics and PCI Enhanced IDE for maximum hard disc drive performance. For advanced options, just add our Intel PCI combination network card or select from our range of PCI based SCSI II Seagate 'Barracuda' Hard Disk Drives. Unbeatable!



User Guide



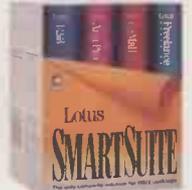
Technical Guide



Software loaded and ready to go for the P90, P120 and P133



MS Windows 95



Lotus SmartSuite (Free upgrade to Windows 95 version supplied)

Amstrad Professional P90

£1449 +VAT

£1720.20 inc. VAT & delivery

Amstrad Professional P120

£1599 +VAT

£1896.45 inc. VAT & delivery

Amstrad Professional P133

£1675 +VAT

£1985.75 inc. VAT & delivery

Impressive specifications

- Intel 90MHz Pentium® Processor (with Triton chipset)
- 8Mb RAM (expandable to 128Mb)
- 256Kb Cache
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 850Mb Seagate ST5850A EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
- Quad Speed Sony® CD-ROM
- PCI 64-bit Accelerated Local Bus Graphics
- 2Mb Video RAM
- 15" Digital SVGA Non-Interlaced (1024x768) 0.28dp Low Radiation Colour Monitor
- Ergonomic Keyboard & Microsoft Compatible Mouse
- 14.4bps Internal Fax/Modem/Ansaphone
- Professional Desktop Case
- Pre-loaded software (see above right)
- The Amstrad Promise

Impressive specifications

- Intel 120MHz Pentium® Processor (with Triton chipset)
- 8Mb RAM (expandable to 128Mb)
- 256Kb Cache
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 850Mb Seagate ST5850A EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
- Quad Speed Sony® CD-ROM
- PCI 64-bit Accelerated Local Bus Graphics
- 2Mb Video RAM
- 15" Digital SVGA Non-Interlaced (1024x768) 0.28dp Low Radiation Colour Monitor
- 28.8bps Fax/Modem
- Ergonomic Keyboard & Microsoft Compatible Mouse
- Professional Desktop Case
- Pre-loaded software (see above right)
- The Amstrad Promise

Impressive specifications

- Intel 133MHz Pentium® Processor (with Triton chipset)
- 8Mb RAM (expandable to 128Mb)
- 256Kb Cache
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 850Mb Seagate ST5850A EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
- Quad Speed Sony® CD-ROM
- PCI 64-bit Accelerated Local Bus Graphics
- 2Mb Video RAM
- 15" Digital SVGA Non-Interlaced (1024x768) 0.28dp Low Radiation Colour Monitor
- 28.8bps Fax/Modem
- Ergonomic Keyboard & Microsoft Compatible Mouse
- Professional Desktop Case
- Pre-loaded software (see above right)
- The Amstrad Promise

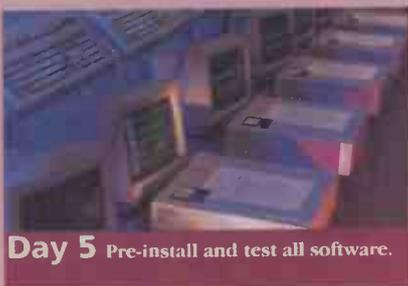
Upgrade options

- 16Mb to 32Mb RAM **£440**
- For more memory options, please call*
- 850Mb Hard Disk Drive **£50**
 - 1.05Gb Hard Disk Drive **£100**
 - Hewlett Packard Colorado T1000 Tape Streamer **£169**

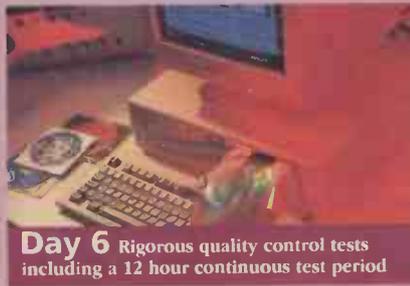
SCSI-II Fast Wide Upgrade Packs:

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 - 4.0Gb SCSI-II Seagate ST15150N Barracuda Hard Disk **£1,299**
 - 2.0Gb SCSI-II Tape Streamer **Call**
- All SCSI-II upgrade come with a Bus Logic K946C PCI Fast wide controller card*
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 - Creative Labs® 16-bit Soundblaster Soundcard & Speakers **£85**
 - Creative Labs® AWE 32 Soundblaster Card & Yamaha YST-10 Speakers **£270**
- All soundcard up-grades include MS Encarta, Links Pro and Descent*
- Intel Etherexpress 10 PCI Combo Card **£99**
 - Canon BJ-30 Mono Ink Jet Printer **£169**
 - Canon BJC-4000 Colour Injet Printer **£279**
 - OKI OL400W **£269**
 - OKI OL600EX **£319**

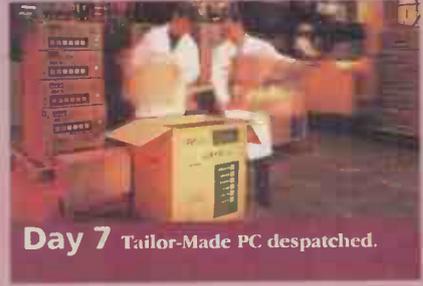
For more printer options, please call



Day 5 Pre-install and test all software.



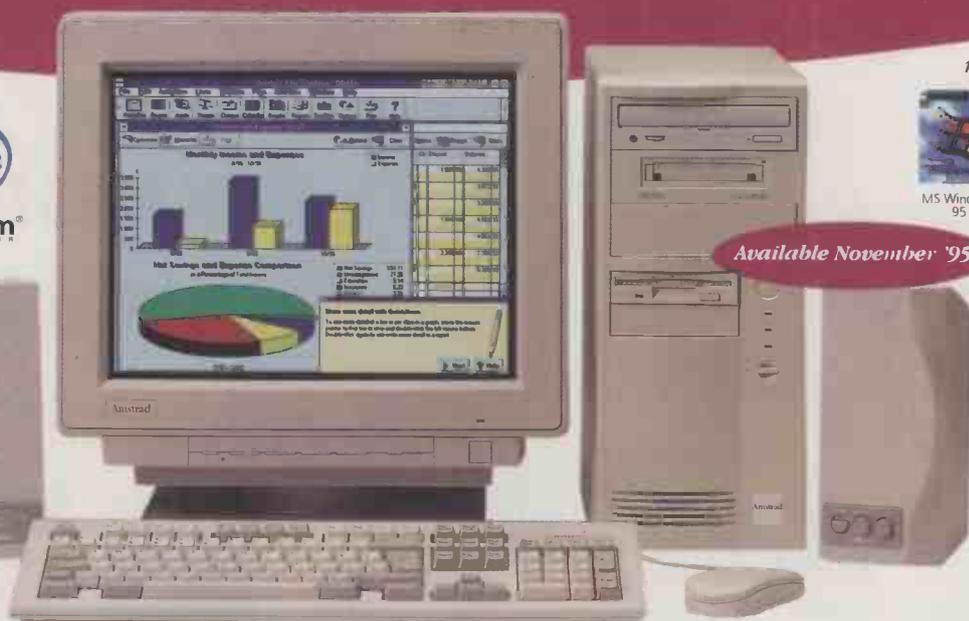
Day 6 Rigorous quality control tests including a 12 hour continuous test period



Day 7 Tailor-Made PC despatched.

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Premier Computers for Ultimate Performance



Software loaded and ready to go for Amstrad P150 Premier



Available November '95

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£2699^{+VAT}

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Looking to reach the ultimate heights of PC performance? Then look no further. The Amstrad Professional P150 Pinnacle offers the fastest Intel Pentium® Processor available today, plus a huge one Gigabyte Hard Disk with a Hewlett Packard Tape Streamer providing data storage security, an enormous 17", fully flicker-free monitor, a Creative Labs® AWE 32 Soundcard with amplified speakers, and a blistering-fast 28.8 bps fax/modem – all delivered in our Super Midi-Tower case.

See User Guide



Technical Guide



Impressive specifications

- Intel 150MHz Pentium® Processor (with Triton chipset)
- 16Mb RAM (expandable to 128Mb)
- 256Kb Cache
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 1050Mb Seagate ST31220A EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
- Hewlett Packard Colorado T1000 400/800 Tape Streamer
- Quad Speed Sony® CD-ROM
- Creative Labs® AWE 32 Soundblaster Card & Yamaha YST-10 Speakers
- PCI 64-bit Accelerated Local Bus Graphics
- 2Mb Video RAM
- 17" Digital SVGA Non-Interlaced (1280x1024) 0.28dp Low Radiation Colour Monitor
- Ergonomic Keyboard and Microsoft Compatible Mouse
- 28.8 bps Internal Fax/Modem
- Professional Super Midi Tower Case
- Pre-loaded software (see above)
- The Amstrad Promise

The top-of-the-range Amstrad NB555i provides you with an Intel Pentium® 75MHz Processor, PCI Accelerated Graphics, CD-ROM, stereo soundcard and speakers, with a 10.4" TFT active matrix colour display screen. Supplied with Lotus SmartSuite and Windows® 95 pre-installed on a massive 810Mb Hard Disk Drive; such performance and value could only come from Amstrad.

On the other hand if it's a high-performance, essentials only, Notebook you need, the Amstrad NB486 is ideal for all your off-site daily computing tasks.

See User Guide



Technical Guide



Amstrad NB486

£1499^{+VAT}

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Finance options available, call for details.

Impressive specifications

- Intel 75MHz Pentium® Processor
- 8Mb RAM
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 810Mb EIDE Hard Disk Drive
- 1.44Mb 3.5" Floppy Disk Drive
- Double Speed CD-ROM
- 16-bit sound, stereo speakers and microphone
- PCI 32-bit Accelerated Local Bus Graphics
- 1Mb Video RAM
- 10.4" TFT Active Matrix Screen
- 84 key Keyboard, 12 function keys & mousepoint
- Pre-loaded software (see below)
- One year return-to-base warranty

Upgrade Options	Price ex.VAT
• 14.4 bps PCMCIA Fax/Modem	£199
• Quality Carry Case	£30

Impressive specifications

- 100MHz 486/DX2 Processor
- 8Mb RAM
- VESA Enhanced IDE 32-bit Hard Disk Interface
- 470Mb EIDE Hard Disk Drive
- 1.44Mb 3.5" Floppy Disk Drive
- VESA 32-bit Accelerated Local Bus Graphics
- 1Mb Video RAM
- 10.4" Dual Scan Screen
- 84 key Keyboard, 12 function keys & trackball
- Pre-loaded software (see below)
- The Amstrad Promise

Upgrade Options	Price ex.VAT
• 14.4 bps PCMCIA Fax/Modem	£199
• Quality Carry Case	£30

Amstrad NB555i

A high performance multimedia TFT colour Notebook

£2799^{+VAT}

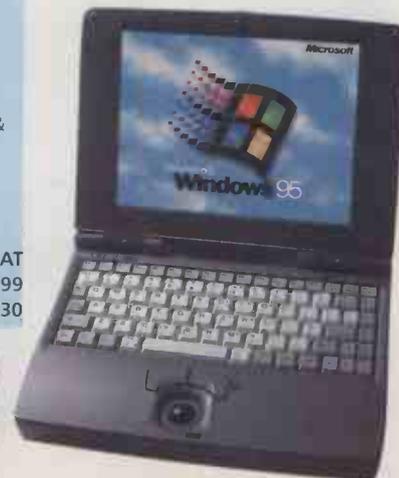
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Amstrad NB555i software included



Amstrad NB486 software included



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Homework, family finances, letters, spreadsheets, even complex business documents and software - the Integra makes light work of it all. What's more, as the Integra has been designed to be fully future-proof, using leading-edge PC components, it's so easy to upgrade as your computing needs increase.

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The Integra comes complete with a 14.4 bps datafax/ansaphone that allows you to send and receive faxes to other PCs with suitable modems, or to any standard fax machine. The modem also acts as an answering machine that can recognise a voice from a fax. So if a friend calls while you are out, the Integra will take a message for you.

All models can be supplied with a speakerphone. Please call for details.

The Integra also gives you access to the Internet, the exciting world of the Information Super Highway. Every unit comes with a free 30 day trial from Demon - the UK's No.1 consumer service provider.



An entertainment centre

TV, Teletext & Video Capture

The Integra includes a full-function TV including teletext with remote control. The TV picture runs in Windows, so you can watch TV whilst you are working on your PC. It is also possible to connect your VCR or Camcorder. Even more revolutionary is the Integra's video capture facility, which allows you to freeze the action, edit and save it for printing or transmitting.



A multi-function CD player

The Integra has an in-built Quad Speed CD drive. This gives you immediate access to the exciting world of information and games on CD-ROM. What's more, you can also play audio CDs while you work

and run photo CDs using the latest pre-installed software from Kodak. The MPEG option also allows you to watch films from the ever-increasing range available on CD-ROM. In addition, the ultra-sharp digital sound and picture quality will enable you to keep pace with tomorrow's technology.

User Guide



Technical Guide



Software loaded and ready to go for Integra Premier, Premier P75 and Power Pro P90:



MS Windows 95



WordPerfect Works V.2



Quicken For Windows V.4



Links Pro



MS Encarta



Descent Destination Saturn

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Impressive specifications

- 80MHz 486 DX2 Processor
- Intel Pentium® OverDrive ready
- 4Mb RAM (expandable to 128Mb)
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 540Mb EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
- Quad Speed Sony® CD-ROM Drive
- PCI 64-bit Accelerated Local Bus Graphics
- 1Mb Video RAM (expandable to 2Mb)
- Creative Labs® 16-bit Soundblaster 16 Stereo Soundcard and Stereo Speakers
- 14.4 bps Internal Fax/Modem/Ansaphone
- TV with Fastext & Remote Control
- Amplifier & Microphone
- Kodak Compatible Photo-CD Software
- 30 Days FREE Demon Internet Trial
- Sound Impression Software
- Windows 95 Pre-installed (only).
- The Amstrad Promise.

NB: 8Mb RAM is the minimum recommended memory for optimum Windows 95 performance.

Integra Premier With comprehensive software suite

£1099 +VAT

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Finance options available, call for details.

Impressive specifications

- 80MHz 486 DX2 Processor
- Intel Pentium® OverDrive ready
- 4Mb RAM (expandable to 128Mb)
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 540Mb EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
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- PCI 64-bit Accelerated Local Bus Graphics
- 1Mb Video RAM (expandable to 2Mb)
- Creative Labs® 16-bit Soundblaster 16 Stereo Soundcard and Stereo Speakers
- 14.4 bps Internal Fax/Modem/Ansaphone /Speakerphone
- TV with Fastext & Remote Control
- Amplifier & Microphone
- Kodak Compatible Photo-CD Software
- 30 Days FREE Demon Internet Trial
- Sound Impression Software
- Pre-loaded software (see above)
- The Amstrad Promise.

NB: 8Mb RAM is the minimum recommended memory for optimum Windows 95 performance.

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£1399 +VAT

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Finance options available, call for details.

Impressive specifications

- Intel 75MHz Pentium® Processor
- 8Mb RAM (expandable to 128Mb)
- 256Kb Cache
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 540Mb EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
- Quad Speed Sony® CD-ROM Drive
- PCI 64-bit Accelerated Local Bus Graphics
- 1Mb Video RAM (expandable to 2Mb)
- Creative Labs® 16-bit Soundblaster 16 Soundcard and Stereo Speakers
- 14.4 bps Internal Fax/Modem/Ansaphone /Speakerphone
- TV with Fastext & Remote Control
- Amplifier & Microphone
- Kodak Compatible Photo-CD Software
- 30 Days FREE Demon Internet Trial
- Sound Impression Software
- Pre-loaded software (see above)
- The Amstrad Promise.

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Impressive specifications

- Intel 90MHz Pentium® Processor
- 8Mb RAM (expandable to 128Mb)
- 256Kb Cache
- PCI Enhanced IDE 32-bit Hard Disk Interface
- 540Mb EIDE Hard Disk Drive
- 1.44Mb 3.5" Sony® Floppy Disk Drive
- Quad Speed Sony® CD-ROM Drive
- PCI 64-bit Accelerated Local Bus Graphics
- 1Mb Video RAM (expandable to 2Mb)
- Creative Labs® 16-bit Soundblaster 16 Soundcard and Stereo Speakers
- 14.4 bps Internal Fax/Modem/Ansaphone /Speakerphone
- TV with Fastext & Remote Control
- Amplifier & Microphone
- MPEG Decoder for Video CD
- Kodak Compatible Photo-CD Software
- 30 Days FREE Demon Internet Trial
- Sound Impression Software
- Pre-loaded software (see above)
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SPEED	40MHz	50MHz	66MHz	PCI-75MHz	PCI-90MHz
RAM	2MB	4MB	4MB	8MB	8MB
MAX. RAM	16MB	64MB	64MB	128MB	128MB
CACHE		256KB	256KB	256KB	256KB
FLOPPY	1.44MB	1.44MB	1.44MB	1.44MB	1.44MB
HARD DISK	130MB	420MB	420MB	520MB	520MB
VIDEOCARD	1MB SVGA	VL 1MB	VL 1MB	DS PCI 2MB	DS PCI 2MB
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2482UFN	DMP 2000/3000	1.89	1.69	1.49
2486UFN	DMP 4000/1512	2.59	2.39	2.19
2868UDN	LQ 5300	4.49	4.29	4.09
2746UMS	PCW 9512	2.09	1.89	1.59
CITIZEN				
2939UDN	120D/SWIFT80 COL	2.19	1.99	1.79
2965UDN	SWIFT 132COL	3.99	3.79	3.59
EPSON				
2273UFN	LX/FX800/850/40/80/85	2.39	2.19	1.99
2273UFN	COLOURED	4.39	4.19	3.99
2454UFN	LX/LG80/86	1.99	1.79	1.59
2320UFN	MX/FX100/S1000/S0	2.69	2.49	2.29
2320UFN	COLOURED	6.89	6.69	6.49
2409UFN	LQ/LP 1500/1550	2.79	2.59	2.39
2477UDN	LQ500/S070/200/300/S070	2.59	2.39	2.19
2273UFN	COLOURED	4.39	4.19	3.99
2478UDN	LQ1000/1050/70/70/170	2.79	2.59	2.39
2320UFN	COLOURED	6.89	6.69	6.49
1065UFN	7X80	1.39	1.19	99
2877UDN	LQ2500/S0/EX800/1000	2.89	2.69	2.49
2884UDN	DFX5000/8000	9.99	9.79	9.59
2986UDN	LQ100	2.99	2.79	2.59
2274UFN	ERC 03	2.29	2.09	1.89
2785UFN	ERC 18	2.69	2.49	2.29
2999UFN	LX 100	2.99	2.79	2.59
IBM				
2847UFN	PROPRINT 132 COL	3.49	3.29	3.09
2848UFN	PROPRINT 80 COL	2.99	2.79	2.59
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2698UFN	MT80	3.99	3.79	3.59
2739UFN	MT86/7	3.09	2.89	2.69
2740UFN	MT86/88	4.19	3.99	3.79
2358UFN	MT140/280/290	4.09	3.89	3.69
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2254UFN	P1/P2/P6	2.99	2.79	2.59
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2961UDN	P2030	3.59	3.39	3.19
OKI				
1066UFN	8082/9293	1.39	1.19	0.99
2450UFN	182/192/193/320	2.69	2.49	2.29
2755UFN	292	4.89	4.69	4.49
2756UFN	2934	5.59	5.39	5.19
2835UDN	393/395	9.79	9.59	9.39
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2953UFN	KXP1540/1624/54/2624	3.29	3.09	2.89
2904UFN	KXP1123/24/145/	2.89	2.69	2.49
2984JRD	2123/4/2180	3.89	3.69	3.49
2737UDC	KXP190/191	1.99	1.79	1.59
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2761UDN	NL10ND10NR10	3.19	2.99	2.79
2861UFN	LC10/LC20	1.89	1.69	1.49
2861UFN	COLOURED	5.69	5.49	5.29
2868UDN	LC15/FR10/FR15	2.29	2.09	1.89
2410UFN	RADIX 15SR 10	3.59	3.39	3.19
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CP5MMP	5 MTR	9.99	9.59	8.99
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CC1MU	1 MTR	4.99	4.59	3.99
CC2MM	2 MTR	5.99	5.59	4.99
CC3MM	3 MTR	6.99	6.59	5.99
CC5MM	5 MTR	7.99	7.59	6.99
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CSX2AT	2 MTR	6.95	6.59	5.59
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CS5MF	5 MTR	7.99	7.59	6.99
CS7MF	10 MTR	9.99	9.59	8.99
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CEMXT5	2 MTR	5.99	5.59	4.99
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CEMPS5	5 MTR	10.99	10.59	9.99
CEMXT5	2 MTR	6.99	6.59	5.99
CEMXT5	5 MTR	8.99	8.59	7.99
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OCDDT	Pastel	5.99	5.59	4.99
OCDDT	Mid	6.59	5.99	5.59
OCDDT	Strong	7.99	7.59	6.99
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Pastel : Blue, Green, Pink, Yellow, Cream				
Mid : Salmon, Mauve, Emerald				
Strong : Canary or Sun Yellow, Aqua or Deep Blue				
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News & Views

VISUAL BASIC 4.0

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- Load & recompile Win16 VB3 apps for Win32 (95 & NT)
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- Rich set of Windows 95 controls
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- Integrated Visual SourceSafe & Component Manager
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- Create & remotely execute OLE servers for true 3-tier distributed applications

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The latest version of Visual C++ now brings one year's worth of free updates & information to your desk.

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- Component Gallery includes over 100 pre-built objects
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- Fast database support with JET 3 engine and data access objects
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We stock many items for which there is no space in these advertisements.

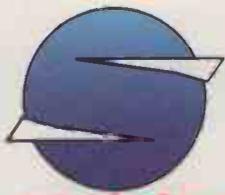
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BASIC LANGUAGE

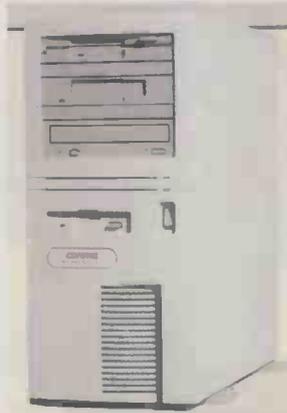
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1GB SCSI hard disc
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P75 Multimedia



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COMPUTER BUYER MAGAZINE JULY 1995

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- Medium Tower Case with 200W PSU
- Teac 1.44 Floppy Disk Drive
- Seagate 545MB Mode 3 IDE Hard Disk Drive
- Creative Labs Sound Blaster 16 Value
- NEC CDR272 Quad Speed CD ROM Speakers
- Trident 9660 PCI Graphics Card
- ADI 4V 15" Non Interlaced Monitor
- 8MB RAM (2x 1MB-36 SIMM)
- WINDOWS 95
- Mitsumi 2 button MS compatible mouse

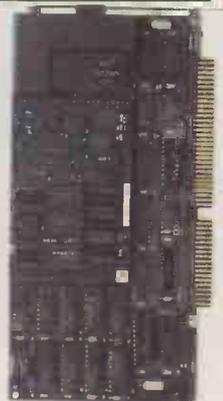
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Mirage PCI 2MB with Microstation s/w	£132.50
ORCHID	
Orchid Helix 64 PCI 1Mb	£116.00
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Yamaha CD Recorder x4 Speed	£1,699.00
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Pentium PPIIO 256Kb Cache SPIDE, No CPU (75/90/100MHz)	£147.00
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Intel Zappa with TRITON chip Pentium 75-120MHz, EIDE & VIO, no CPU	£160.00
Intel Endeavour Pentium 75-120MHz, EIDE & VIO, Sound Blaster, no CPU	£220.00
MOTOROLA	
Motorola Atlas PowerPC 604 100MHz, EIDE & VIO, SCSI 2, Crystal Sound	£800.00

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Exabyte SCSI all models	£CALL
Sony DAT SCSI 4GB	£718.00
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From chips to systems, maintenance and software support, one call does it all!

● A pilot is flying a small, single-engine charter plane with a couple of very important executives on board. He's coming into Seattle airport through thick fog with less than 10m visibility when his instruments go out. So he begins circling around looking for a landmark.

After an hour or so he starts running pretty low on fuel and the passengers are getting nervous. Then, a small opening in the fog appears and he sees a tall building with one guy working alone on the fifth floor. The pilot banks the plane around, rolls down the window and shouts to the guy "Hey, where am I?" To this, the solitary office worker replies, "You're in a plane." The pilot rolls up the window, executes a 275 degree turn and proceeds to execute a perfect blind landing on the runway of the airport five miles away. Just as the plane stops, so does the engine — the fuel has run out.

The passengers are amazed and one asks how he did it. "Simple," replies the pilot. "I asked the guy in that building a

simple question. The answer he gave me was 100 percent correct but absolutely useless, therefore that must be Microsoft's support office and from there the airport is just a mile away."

● Calling technical support is always a harrowing experience, but at least the personnel are trained to be heart-warmingly reassuring while they try several apparently random "solutions". Except, that is, at one large corporate printer manufacturer, where we

were assured that a problem with their printer would be fixed by using a LaserJet 4 driver instead of the native one. When we reported that this didn't work, the support person seemed rather shocked. "Oh," he said, "their drivers usually work better than ours." Even this was topped after he had tried several tricks, all to no avail. He cut short the conversation and told our hapless hack, "That's all the ideas I have. I'm afraid you're on your own now."

Telecommunications Dictionary

Term	Definition
Modem	What landscapers do to dem lawns.
Token Ring	A virtual engagement gift.
Ethernet	A device for catching the Ether Bunny.
Block Parity	One heck of a good time.
Carrier Detect	Raison d'être for premarital blood tests.
Serial Interface	A spoon.
Terminal Emulation	A function performed by a canary that lies on its back with its legs in the air.

Sorry, our mistake

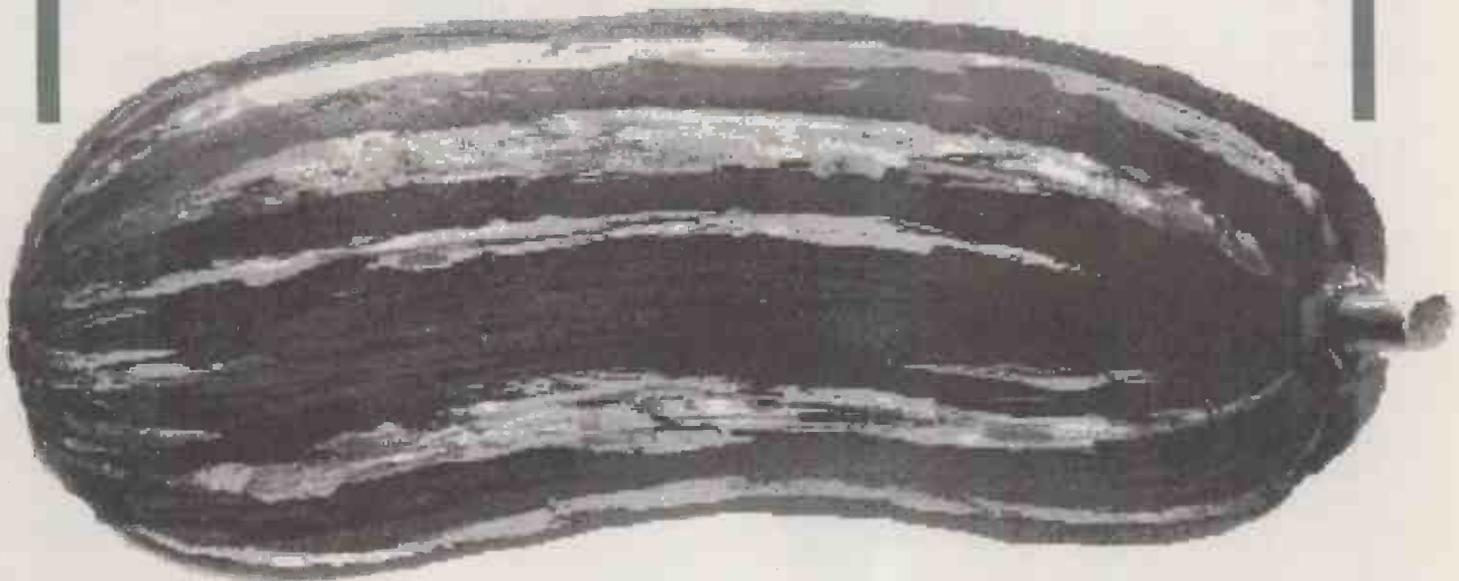
Please ignore the coloured bars in the overall performance graph in October's docking notebooks group test. The figures are right, but the bars are wrong. Apologies to all concerned.

You might well ask why we have printed a picture of a marrow — and the connection with PCs is indeed obscure. BACS, the "union" of the major British banks, decided it was time to dabble in this new-fangled IT to promote the use of direct debit for paying bills. "Right," we hear you say, "the banks are getting up to speed

on this at last. We'll be able to switch on our PCs, click a number to call our bank, go through an identification routine, and get a neat list of all our direct debits which we can deal with at our leisure." Sadly, it's not quite like that. BACS has set up a Web site at <http://www.directdebit.co.uk/> which it has

populated with pictures of fruit and veg. You can see a marrow. You can see a pineapple. You can see several garden sheds. What you *can't* see is anything remotely to do with your bank account.

And the point of it all? You tell us. It seems that someone is leading someone else up the garden path.



Chipchat

A powerful business partner for when you're on the move



The Viglen Dossier® ADVANCED Sound is a range of portable notebook sized PCs that offer flexibility and power for people on the move. This range provides many advanced features that rival even the most powerful desktops. It is available in two main processor ranges, the

Dossier® 486 for processors up to 486DX4 100MHz and the Dossier® P5 for Pentium® processors from 75MHz to the powerful 90MHz. There is a choice of exceptional colour screen types for each range, Dual Scan or a high contrast fast TFT and also a Mono screen for 486 models. In addition to the features shown below, the Dossier® ADVANCED Sound also includes sound hardware compatible with SoundBlaster and Microsoft Sound system allowing you to manipulate sound and music to enhance your productivity. Plus there is a whole range of accessories and upgrades making the Dossier® ADVANCED Sound a notebook that needs to be seen and heard to be believed!

Designed for



SPECIFICATION

Dossier® 486:

- Intel SL enhanced 486DX2 66MHz, 486DX4 75MHz, and 486DX4 100MHz.
- 4MB RAM, upgradeable to 20MB.
- 260MB HD upgradeable to 720MB.
- Choice of Mono (9.5" STN), Colour DSTN (10.3" Dual Scan STN), or Colour TFT (9.5" TFT) screen.
- Battery Life: 5.5 hours on 486DX mono with full power management, 4 hours without, 4 hours on 486DX colour with full power management, 2 hours with-out. (High processor speeds will reduce battery life).

Dossier® P5:

- Intel Pentium® processor 75MHz and 90MHz.
- 8MB RAM, upgradeable to 40MB.
- 540MB PCI IDE HD, upgradeable to 720MB.
- Choice of Colour DSTN (10.3" Dual Scan STN), or Colour TFT (10.4" TFT).
- Battery Life: 2 hours on Pentium® 75MHz colour with full power management, 1.5 hours without. (High processor speeds will reduce battery life).
- Infra red wireless link control Windows.

For both the Dossier® 486 & P5:

- Dimensions (mm): 279W x 43H x 216D closed
- Weight with battery: 2.7kg (6lb) for mono, 2.9kg (6.5lb) for colour Dossier 486 and 3.09kg (6.8lb) for colour Dossier P5
- 3.3 volt technology.
- Comprehensive power management with doze, sleep, suspend and resume.
- 8K internal cache. (486) and 16K (Pentium® processor).
- 3.5", internal 1.44MB floppy drive.
- Local bus accelerated Super VGA Graphics with 1MB Video DRAM (PCI local bus graphics for Dossier® P5).
- 1 Serial, 1 Parallel, 1 PS/2 port, 2 PCMCIA type 2 or 1 type 3, 1 expansion socket for docking station.
- 85/86 key keyboard.
- Ergonomic large tracker ball with arm rest to reduce wrist fatigue.
- NiMH battery.
- Audio with built in speaker and microphone and socket for external speakers and line in (16-bit stereo for Dossier® P5).
- Ability to record, compress, store and playback voice, sound and music.
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DOSSIER 486 SD	COLOUR 10.3" DUAL SCAN	260MB	4MB	£1399
DOSSIER 486 ST	COLOUR 9.5" TFT	260MB	4MB	£1899

DOSSIER P5		INTEL PENTIUM® PROCESSOR 75MHz		
MODEL NAME	DISPLAY	HARD DISK	RAM	PRICE
DOSSIER P5 SD	COLOUR 10.3" DUAL SCAN	540MB	8MB	£1999
DOSSIER P5 ST	COLOUR 10.4" TFT	540MB	8MB	£2799

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486DX4 75MHz £39	540MB Hard Disk £139	8MB RAM £149
486DX4 100MHz £69	720MB Hard Disk £239	12MB RAM £299
		20MB RAM £639

P5 UPGRADE OPTIONS

P5 CPU UPGRADE TO:	P5 HARD DISK UPGRADE TO:	P5 MEMORY UPGRADE TO:
Pentium® Processor 90MHz £99	720MB Hard Disk £129	16MB RAM £309
		24MB RAM £679
		40MB RAM £1359

OPTIONS

The following are only some of the options available specifically to the Dossier range. For a full list of other items look at the 'Viglen Upgrades and Options page' or for a free copy of the Direct Guide please call our sales department.

N4ADXK0	Docking station for Dossier486	£309
N4XDELUX	Deluxe padded carrying case	£49
N4XPSXDC	Universal car battery adaptor	£69
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PAMMPS03	External amplified speakers	£23



WHAT TO BUY FOR BUSINESS
February 1995
Dossier 486



WHAT TO BUY FOR BUSINESS
February 1995
Dossier P5



March 1995
Dossier 486 Highly Recommended



May 1995
Dossier P5/90



June 1995
Dossier 486



"...the Viglen is a 'no nonsense' machine at a competitive price."
March 1995 Viglen Dossier 486 ADVANCED Sound
"...this hot-rod: it's very, very quick."
March 1995 Viglen Dossier P90



LCD Status icon display panel including battery charge gauge.



Easy to upgrade CPU. Up to DX4 100MHz for Dossier 486 and up to Pentium® 90MHz for Dossier P5. Also easy to upgrade RAM and hard disk.



Two separate PCMCIA type 2 slots or one type 3 allowing a host of PCMCIA cards (for modems, networks, storage and more) to be used.



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MONTHLY PAYMENT SCHEME
see order page



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Viglen®

A value range of PCs giving you leading edge technology

SPECIFICATION

Contender® PCI:

- Choice of processor, memory and enhanced IDE drives.
- 16K Cache RAM built into CPU plus 256K second level external cache.
- 3 ISA, 2 PCI and for Professional and Medium Tower models an additional PCI/ISA shared slot.
- Now with Triton Chipset.
- One 3.5" floppy drive.
- 2 Serial, 1 Parallel printer port (EPP).
- Choice of case styles, **Executive** (slimline) or **Professional** for desktop use or **Medium Tower** for desktop or floor standing use.
- **Executive:** Dimensions (mm): 350W x 110H x 385D
One free 5.25" drive bay.
- **Professional:** Dimensions (mm): 380W x 150H x 415D
Two free 5.25" drive bays.
- **Medium Tower:** Dimensions (mm): 170W x 380H x 420D
Three free 5.25" drive bays and two free (one internal) 3.5" drive bays.
- High Performance PCI bus Windows accelerated Super VGA card with 1MB (upgradeable to 2MB) video DRAM option for even faster performance.
- Viglen ENVY 14P, 14" Super VGA Colour Monitor.
- 102 Key compact ergonomic keyboard.
- Genuine Microsoft Mouse.
- Microsoft® Windows® 95 supplied as standard - option for Windows 3.11 and MS-DOS® 6.22 (please specify).
- Microsoft® Works for Windows® 95 pre-installed and ready-to-run.
- User friendly manuals.
- 12 months **parts and labour** collect and return warranty. Low cost on-site option up to 5 years available.
- **Free lifetime hotline technical support.**
- Extensive range of application software.

OPTIONS

For a list of some of the options available with all Viglen PCs, refer to the 'Viglen Upgrades and Options' Page or for a free copy of the Direct Guide please call our Sales Department. The following are some of the options you can choose specific to the Contender PCI:

PDDXPST2 High Performance Diamond Stealth 64 DRAM SVGA card
(1MB upgradeable to 2MB as used in the Genie range) instead of the standard Contender SVGA card **£29**

PDDXPAT4 High Performance ATI Mach 64 SVGA card with 2MB of VRAM instead of the standard Contender SVGA card **£149**

PDDXPST5 Highest Performance Diamond Stealth 64 Video SVGA card with 2MB of VRAM instead of the standard Contender SVGA card. This card allows the fitting of an optional high performance MPEG module for full motion video applications **£179**
For the optional MPEG module providing CD-i and Video CD compatibility (when a CD ROM is fitted) please add a further **£229**



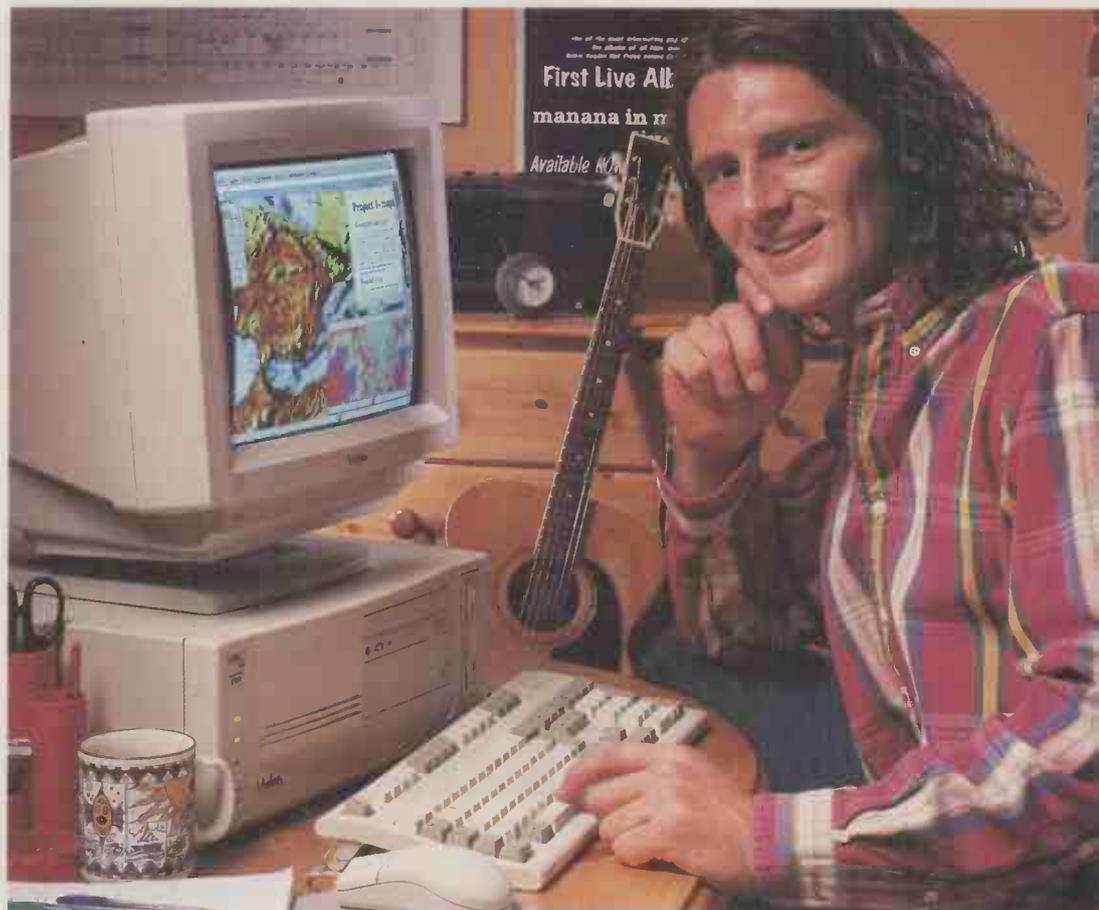
Executive Professional Medium Tower

The Contender® PCI is a value range of personal computers providing the performance edge and future proofing of PCI local bus technology as well as the ease of use of Plug and Play software. It is one of

the lowest cost PC investments you can make without compromising quality, reliability or support. And you won't be disappointed when it comes to performance either.

The Contender® PCI is available in a choice of three case styles (Executive, Professional and Medium Tower) and in a 486 and Pentium® processor range. It offers amazing value for money and is ideal for most home and office applications such as word processing, accounts and spreadsheets.

With a host of options including multimedia, the Contender® PCI makes the perfect PC for everyday use.



THE PRICE YOU PAY

COLOUR SUPER VGA		P5/75	P5/90	P5/100	P5/120
HARD DISK	RAM	Pentium® processor 75MHz	Pentium® processor 90MHz	Pentium® processor 100MHz	Pentium® processor 120MHz
540MB	8MB	£1099	£1199	£1279	£1429
1GB	16MB	£1429	£1499	£1589	£1739
1.6GB	32MB	£2059	£2149	£2229	£2379

The prices above are for complete Contender PCI Executive, Professional and Medium Tower systems ready to run with Microsoft® Windows® 95. To order please quote the relevant model along with the hard disk and RAM capacity required and PLEASE DO NOT FORGET to specify the case style required. **ALL PRICES EXCLUDE VAT AT 17.5%**

For 486 Processor Models - Please Call



SEE 'VIGLEN UPGRADES & OPTIONS' PAGE

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Now you can lead the race with next generation performance



Executive

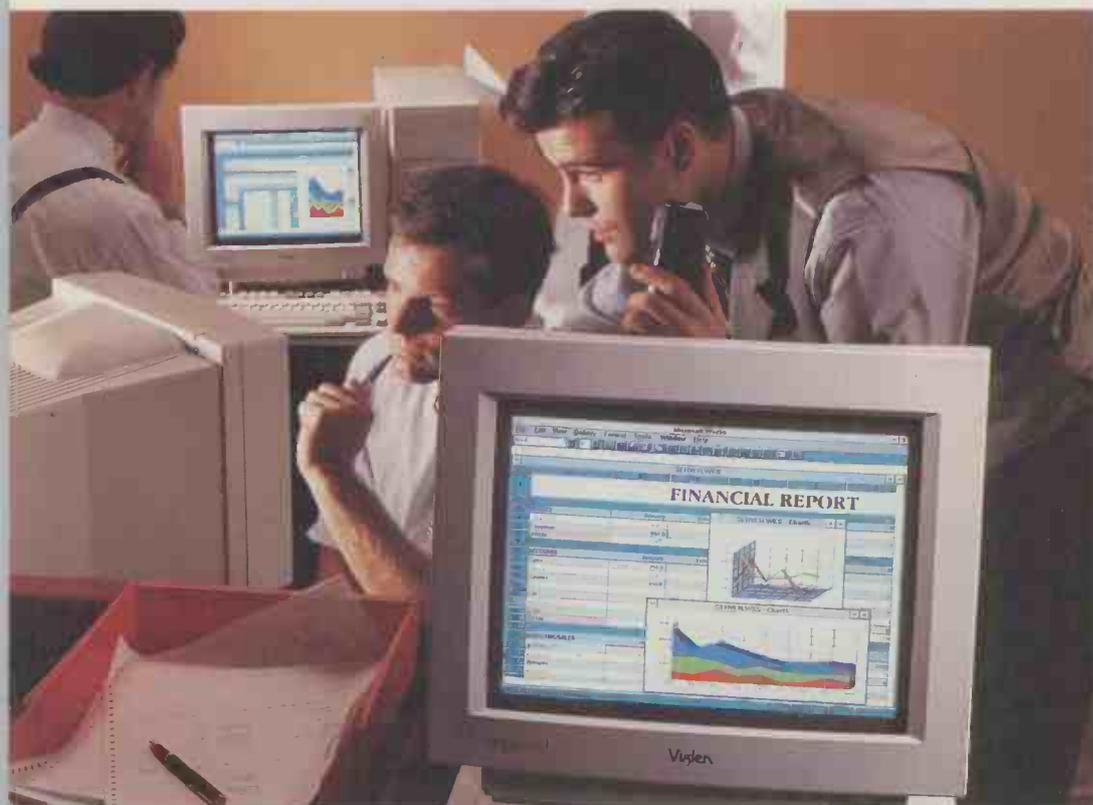
Professional

Medium Tower

The Genie[®] PCI is the flagship of the Viglen range of personal computers, providing the highest performance systems which are in the

forefront of leading edge technology. The Genie[®] PCI was one of the very first systems to incorporate the new PCI local bus architecture with all its performance advantages as well as the easy to configure plug and play software thus eliminating the guesswork of yesterday's technology. PCI local bus has now become the industry standard for PCs. The Genie[®] PCI has carried on incorporating the advances of new technology such as the Triton chipset, EDO RAM and currently provides one of the fastest PCs yet. Available with incredibly fast PCI graphics cards, enhanced IDE hard disks and the highest specification 15" Monitor. If performance is your requirement, then the Genie[®] PCI is the choice for you.

Designed for



SPECIFICATION

Genie PCI:

- Choice of processor, memory and hard disk capacity.
 - 2 ISA, 3 PCI, and for Professional and Medium Tower models an additional PCI/ISA shared slot.
 - 256K secondary WRITEBACK cache.
 - One 1.44MB floppy drive.
 - Triton Chipset.
 - Capable of Mode 4 Enhanced IDE.
 - EDO DRAM as standard.
 - Capable of accepting Pipeline Burst Cache.
 - Socket 7 as standard upgradeable to Pentium Processors up to 133MHz and above.
 - On board sound system.
 - 2 serial, 1 parallel printer port (EPP)
 - Choice of case styles, **Executive, Professional or Medium Tower.**
- Executive:** Dimensions (mm):
350W x 110D x 385H
One free 5.25" drive bay.
- Professional:** Dimensions (mm):
380W x 150D x 415H
Two free 5.25" drive bays.
- Medium Tower:** Dimensions (mm):
170W x 360D x 420H
Three free 5.25" drive bays and two free (one internal) 3.5" drive bays.
- CPU upgradeable to future Intel Pentium[™] Overdrive processors.
 - High Performance PCI bus Windows accelerated Super VGA card with 1MB (upgradeable to 2MB) video DRAM option for even faster performance.
 - Viglen ENVY 15P Super VGA 15" FST colour monitor.
 - 102 key compact ergonomical keyboard.
 - Microsoft mouse with Microsoft Mouse Manager software utilities.
 - Microsoft[®] Windows[®] 95 supplied as standard - option for Windows 3.11 and MS-DOS[®] 6.22 (please specify).
 - Microsoft[®] Works for Windows[®] 95 pre-installed and ready-to-run.
 - User friendly manuals.
 - 12 months **parts and labour** warranty with option for low cost parts and labour maintenance for up to **5 years**.
 - **Free lifetime hotline technical support.**
 - Extensive range of application software

OPTIONS

For a list of some of the options available with all Viglen PCs, refer to the 'Viglen Upgrades and Options' page or for a free copy of the Direct Guide please call our Sales Department. For the Genie range may we suggest a larger 17" monitor, a multimedia upgrade and perhaps a Microsoft[®] Office for Windows[®] 95 application suite as an ideal option. The following are some of the options you can choose specific to the Genie PCI Pentium[™] processor based range:

- MSSP00E2 Pipeline Burst Cache option** £30
- PDDXPAT4 High Performance ATI Mach 64 SVGA card** with 2MB of VRAM instead of the standard Genie SVGA card £139
- PDDXPST5 Highest Performance Diamond Stealth 64 Video SVGA card** with 2MB of VRAM instead of the standard Genie SVGA card. This card allows the fitting of an optional high performance MPEG module for full motion video applications £169
- For the optional **MPEG module** providing CD-I and Video CD compatibility (when a CD ROM is fitted) please add a further £229
- PAMNP504 15 watt speakers** (Model: QS-816) to connect to Genie PCI £36

THE PRICE YOU PAY

THE GENIE PCI PENTIUM [®] PROCESSOR BASED RANGE						
COLOUR SUPER VGA	P5/75	P5/90	P5/100	P5/120	P5/133	
HARD DISK	RAM (EDO)	Pentium [®] 75MHz	Pentium [®] 90MHz	Pentium [®] 100MHz	Pentium [®] 120MHz	Pentium [®] 133MHz
540MB IDE	8MB	£1299	£1379	£1469	£1619	£1699
1GB IDE	16MB	£1599	£1679	£1769	£1919	£1999
1.6GB IDE	32MB	£2199	£2289	£2379	£2529	£2619
2GB SCSI-2	32MB	£2499	£2589	£2679	£2829	£2919

The prices above are for complete Genie PCI Executive, Professional and Medium Tower systems ready to run with Microsoft[®] Windows 95. To order please quote the relevant model along with the Hard Disk and RAM capacity required and PLEASE DO NOT FORGET to specify the case style required. ALL PRICES EXCLUDE VAT AT 17.5%



June 1995
Viglen Genie Pentium
PCI 120MHz
(fitted with PB Cache)



Feb 1995
PC Today



April 1995
Genie PCI P5/90



June 1995
Genie PCI P5/90



January 1995
Genie PCI P5/160



August 1995
...the best benchmark scores
Computer Buyer has seen
Viglen Genie PCI 133MHz



NetWare
Tested and
Approved



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UPGRADES &
OPTIONS PAGE



PCI LOCAL BUS



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Fax 0181 758 7080

Viglen[®]

Viglen Limited, Viglen House, Alperton Lane, Alperton, Middlesex HA0 1DX.

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FOR MORE

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TAKE ADVANTAGE OF THE SOFTWARE BONUS...



In addition to Windows 95, all Viglen systems are now supplied with Microsoft® Works for Windows® 95 an easy to use integrated package comprising a word processor, spreadsheet, database and electronic communication software; the ideal tool to run a small business.

Works for Windows® 95 manuals and disks are not included but these can be provided at small additional cost. Please quote the following **Order code WAPCMD95** Works for Windows® 95 Manual and disks **£9.99+VAT**

...AND SOFTWARE BONUS UPGRADE

The additional software bonus obtained from Viglen gives you a choice of upgrading to further powerful applications from Microsoft® at very competitive bonus upgrade prices. These bonus upgrade prices are only available when ordered with a Viglen PC at the time of purchase. The following applications are available. Please add the relevant order code when ordering.

Microsoft® Office for Windows® 95



This is the latest version of the most popular and powerful integrated software package from Microsoft featuring the technology of Intellisense. The package includes Word for Windows® 95, Excel for Windows® 95 and Powerpoint for Windows® 95 and Microsoft Schedule+. Supplied pre-installed with full manuals and disks.

Order code WAPMMX9A Bonus Upgrade price (Floppy Disk version) £169 + VAT or **WAPMMY9A Bonus Upgrade Price for CD version) £159 + VAT.**

Microsoft® Office for Windows® 95 Professional



This is the same as Microsoft® Office for Windows® 95 with the addition of the latest version of Access for Windows® 95 - the powerful yet simple to use Windows based database. Supplied pre-installed with full manuals and disks. **Order code**

WAPMMX9B Bonus Upgrade price (Floppy Disk version) £249 + VAT or **WAPMMY9B Bonus Upgrade price (CD version) £229 + VAT.**

Viglen Consumer Bundle



Microsoft® Publisher 2.0, the easy to use desktop publishing package, plus Microsoft® Money 3.0 for money management made simple. Both these packages are fully pre-installed and supplied with full manuals and disks.

Order Code WAPMMX60 £49 + VAT

Software may be supplied in Viglen OEM packaging

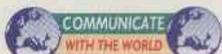
CD ROM DRIVE OPTION

Take advantage of the ability to use all the new software that is being supplied on CD ROM format and add an IDE CD ROM double speed photo CD compatible drive to your system for only **£39 + VAT**

Please quote **order code DCDDNP01** when ordering.



JOIN THE SUPERHIGHWAY



Why not add a fax/modem to your system and join the information superhighway. The Viglen FM1414 Fax modem provides you with 14,400

baud fax and data facility with **Internet** and **CompuServe** access software as well as a free starter pack. All this and the ability to receive and send faxes within Windows for only **£89 + VAT**

Order code CMDN0VGF when ordering.



UPGRADE YOUR MONITOR

The Viglen desktop and tower systems are supplied with either a 14" or 15" Colour Monitor as standard. To enhance your viewing further, you can upgrade to one of our superb 17" Colour Monitors the ENVY 17P or the even more enhanced ENVY 17PE.

Upgrade from:
Contender Range
Contender Range
Genie Range
Genie Range

Upgrade to:
ENVY 17P
ENVY 17PE
ENVY 17P
ENVY 17PE

Price to add:
£330 + VAT
£410 + VAT
£240 + VAT
£320 + VAT



NEW PCMCIA ON YOUR DESKTOP



You can now add a PCMCIA facility on all Viglen desktop and tower systems. This allows you not only to use PCMCIA cards on your desktop but also to transfer cards and information from your notebook PC to your desktop. There are

three choices. If you require any one of these, please add the relevant product code to your order and we will factory fit it for you.

- PDCPX10** Single PCMCIA (Type 1,2 or3) slot at the back of the System. **£134 + VAT**
- PDCCKPX20** Two PCMCIA slots (each type 1,2 or 3), one at the back and one at the front fitted to a 3.5" drive bay (this is not suitable for an Executive case style). **£159 + VAT**
- PDCCKPF20** Two PCMCIA slots (each type 1,2 or 3), one at the back and one at the front fitted in a 3.5" floppy and PCMCIA drive combination thus not requiring an additional drive bay. **£254 + VAT**

FIRST CLASS SUPPORT FROM VIGLEN

Unlike many PC manufacturers, Viglen puts equal emphasis on its after-sales service - that means not only a comprehensive standard warranty on every product but a choice of service packages that offer total cover for up to five years.



All Viglen PCs are supplied with a 12 months collect and return warranty (UK only). This covers your Viglen PC and any other options that are factory fitted, covering parts and labour.

In addition to these standard warranty terms, we provide a better and quicker response than some of our competitors, Viglen offer a choice of additional low-cost on-site options to meet specific user requirements - See to the right.

Do not forget, when you compare our services with our competitors, please read their small print. With Viglen, you have a choice and your choice is clear.

Additional On-site Options

For complete peace of mind choose one of the additional low-cost on-site warranty options.



This option converts the standard Viglen warranty into a next business day on-site response for 12 months covering parts and labour. **Order code ZSM2NBD £39-** for all desktop and Tower models. **Order code ZSM12DSS £149-** for Dossier portable range.



This option converts the standard Viglen warranty into a 4 hour on-site response for 12 months covering parts and labour. Please call for details of this individually tailored package.

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Fax **0181 758 7080**

Viglen®

Special Configurations direct to you

Viglen produce a wide range of PCs and options to give you the ultimate choice. We have also designed a number of special configuration packages offering an abundance of software applications to suit specific needs and budgets.

For education, entertainment, personal accounting, business management or high performance computing, we have the package to fit your needs. We also have the latest multimedia systems combining sound, text, animation and video into one easy to use system. There is a Viglen Special Configuration that's just right for you.

Designed for

Microsoft®
Windows®95



 **3 DAY DELIVERY**

We have a selection of special configuration Multimedia models which we can deliver within 3 days from clearance of payment. Simply, phone us for more details.

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The Home Multimedia PC provides everything you need for a good performance Multimedia system including an abundance of software to get you started.

NEW

only
£47.79
per month
APR 19.9%
FAST 2 WEEK
monthly payment
scheme

£1149

+ Delivery and VAT =
£1308.95



8MB RAM
540MB HD
14" SVGA Colour Monitor
Double speed CD ROM Drive

PENTIUM® PROCESSOR 75MHZ

- Viglen Contender® Executive ES System
- Fast PCI Local Bus Accelerated Graphics
- 1MB Video DRAM
- 2 serial, 1 parallel, 1 PS/2 port.
- 1 games port
- 3.5" Floppy Drive
- Ergonomic Compact Keyboard
- Genuine Microsoft® Ergonomic Mouse
- Microsoft® for Windows® 95 Ready To Run

Plus

- Multimedia Sound
- Stereo Amplified Speakers
- Microphone
- Microsoft® Works for Windows® 95
- Microsoft® Money
- Multimedia CD Titles from Microsoft®: Encarta® 95, Musical Instruments and Golf

ORDER CODE: SXEQ8054



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PLAY**

**PCI
LOCAL BUS**

2 PERFORMANCE MULTIMEDIA PC

The Performance Multimedia PC brings together the fast 75MHz Pentium® processor, along with a fast VGA card and 15" monitor to provide one of the best price/performance systems available and is ideally suited for business and home.

only
£60.66
per month
APR 19.9%
FAST 2 WEEK
monthly payment
scheme

£1399

+ Delivery and VAT =
£1661.45



8MB RAM
530MB HD
15" SVGA Colour Monitor
Fast 64 bit PCI Graphics card
Quad speed CD ROM Drive

PENTIUM® PROCESSOR 75MHZ

- Viglen Genie® PCI Professional with Intel Pentium® 75MHz Processor
- 2 serial, 1 parallel, 1 games port
- 3.5" Floppy Drive
- Ergonomic Compact Keyboard
- Plug and Play Software for easy upgrading
- Genuine Microsoft® Ergonomic Mouse
- Microsoft® Windows® 95 Ready To Run

Plus

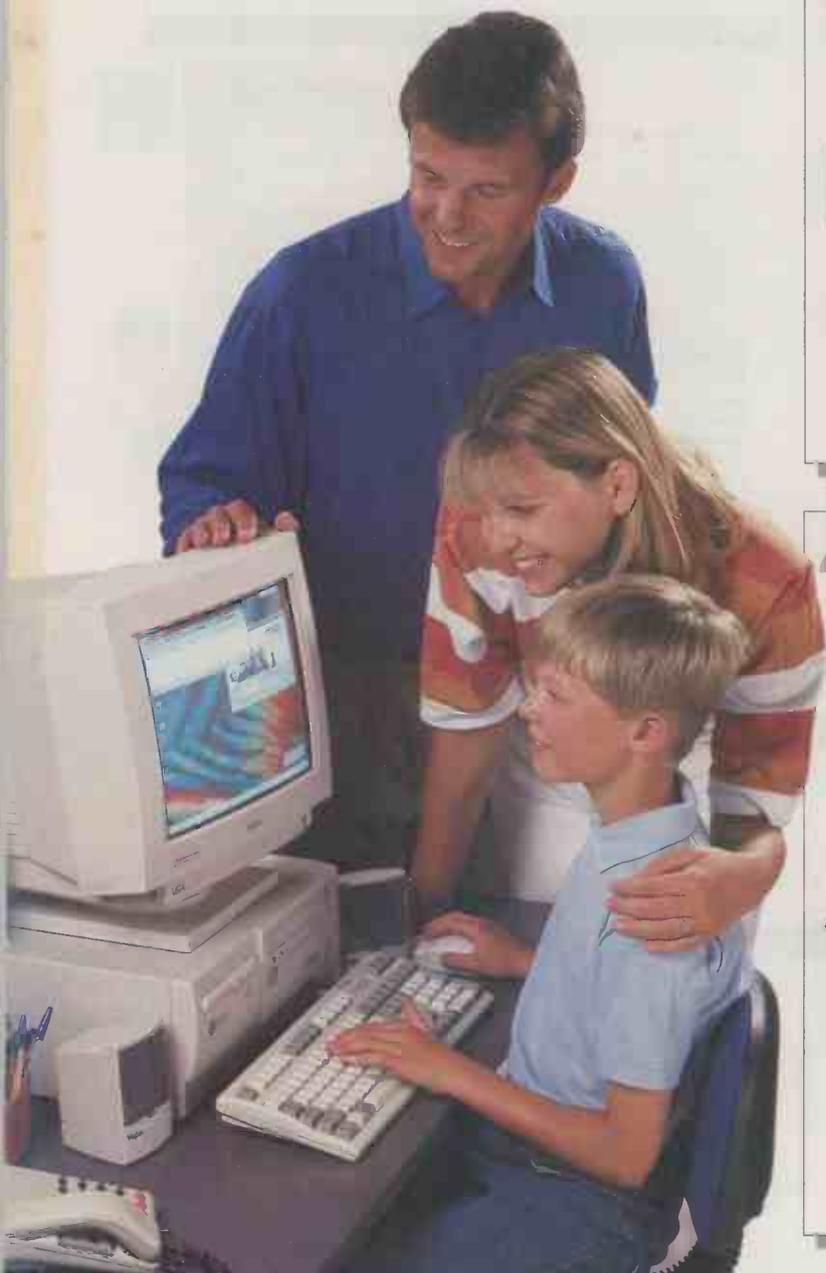
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- Stereo Amplified Speakers
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- Microsoft® Publisher
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- Multimedia CD Titles from Microsoft®: Encarta® 95, Musical Instruments and Golf

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**PCI
LOCAL BUS**



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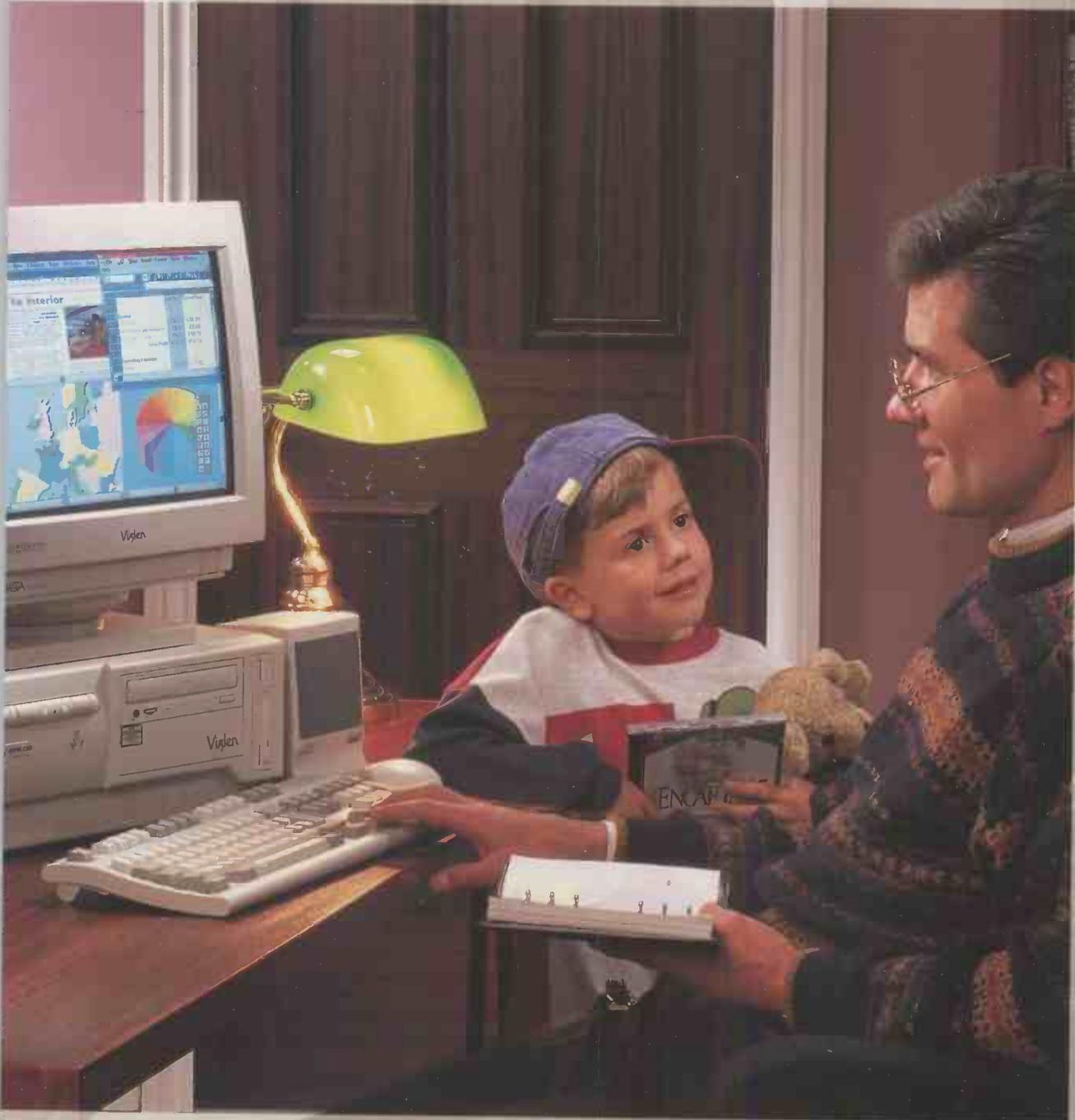
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Personal Computers



Setting the standards
in Personal Computing.

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► **Direct to you.**

Software packages

The Viglen Special Configurations are each supplied with a different variety of software packages which are pre-loaded, include full user manuals and disks and are ready to use. Here, we have briefly outlined each package to help you decide which Special Configuration is right for you.



Microsoft® Works for Windows® 95

Five essential tools for easier everyday computing. Word processing, spreadsheet, database, graphics and communications tools.



Microsoft® Money

A complete set of financial management and planning tools to manage your investments and expenditure.



Microsoft® Publisher

This desktop publishing software is the key to producing professional quality output, layouts and clip art.

MULTIMEDIA TITLES



Musical Instruments

Features 200 instruments – many rare and exotic – from around the world. Hear and play 1,500 authentic sound samples of instruments and jazz, classical and rock ensembles.



ENCARTA® '95

The complete interactive Multimedia Encyclopedia. This best selling and award winning title condenses 28 volumes into one CD. Maps, charts, sound and pictures bring information to life!



GOLF

Rise to the true-to-life challenge of Microsoft® Golf. Realistic graphics and sounds combine with true golf ball flight paths, accurate swing control and a choice of courses.

SOFTWARE BONUS UPGRADES

All the special configurations shown can be further upgraded to include one of the following professional integrated software applications from Microsoft at a very special bonus upgrade price. If you require pre-installation please specify and allow extra delivery time for these options



Microsoft® Office for Windows® 95

A popular and powerful integrated software package from Microsoft featuring the technology of

Intellisense and including Word for Windows® 95, Excel for Windows® 95 and PowerPoint for Windows® 95 and Schedule+. Supplied pre-installed with full manuals and disks. Order code **WAPMMY9A Bonus Upgrade Price £159+VAT (CD version with full manuals)**



Microsoft® Office Professional for Windows® 95

This is the same as Microsoft® Office

for Windows® 95 with the addition of the latest version of Access for Windows® 95 the powerful yet simple to use Windows based database. Supplied pre-installed with full manuals and disks. Order code **WAPMMY9B Bonus Upgrade Price £229+ VAT (for CD version with full manuals).**

Please note some software may be sup

17" MONITOR UPGRADES

Upgrade your special configuration Business System with one of our superb 17" Colour Monitors, the ENVY 17P or the even more enhanced ENVY 17PE

Upgrade from: Performance/Power/Ultimate 120

to: ENVY 17P

Price to add: £240+VAT

Upgrade from: Performance/Power/Ultimate 120

to: ENVY 17PE

Price to add: £320+VAT

Upgrade from: Ultimate 133

to: ENVY 17PE

Price to add: £80+VAT



3 POWER MULTIMEDIA PC

The Power Multimedia PC takes the Performance Business Multimedia PC a stage further, with a faster processor and higher Hard Disk capacity, providing increased performance capabilities.

only **£63.73** per month APR 14.9% **EASY 2 OWN** monthly payment scheme

£1559
+ Delivery and VAT =
£1849.45

8MB RAM
1GB HD
15" SVGA Colour Monitor
Fast 64 bit PCI Graphics card
Quad speed CD ROM Drive

PENTIUM® PROCESSOR 90MHZ

- Viglen Genie® PCI Medium Tower with Intel Pentium® 90MHz Processor
- 2 serial, 1 parallel, 1 games port
- 3.5" Floppy Drive
- Ergonomic Compact Keyboard
- Plug and Play Software for easy upgrading
- Genuine Microsoft® Ergonomic Mouse
- Microsoft® Windows® 95 Ready To Run Plus
- Genuine 16 Bit SoundBlaster Chip
- Stereo Amplified Speakers
- Microphone
- Microsoft® Works for Windows® 95
- Microsoft® Publisher
- Microsoft® Money
- Microsoft® Multimedia CD Titles from Microsoft®: Encarta® 95, Musical Instruments and Golf

ORDER CODE: SXDN8100



5 ULTIMATE 133 MULTIMEDIA PC

If the Ultimate 120 system was not powerful enough, Viglen offer you even more power and specification with this ultimate 133 configuration. This system provides more memory, higher capacity hard drive, a 17" monitor and the most powerful Pentium® processor yet

NOW WITH 6X CD ROM

only **£117.99** per month APR 14.9% **EASY 2 OWN** monthly payment scheme

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+ Delivery and VAT =
£3423.95

32MB EDO RAM
1.6GB HD
17" ENVY 17 Colour Monitor
Stealth 64 Video VRAM with 2MB
Six speed CD ROM Drive
14400/14400 Fax Modem,
Internet Access Software
256K Pipeline Burst Cache

PENTIUM® PROCESSOR 133MHZ

- Viglen Genie® PCI Medium Tower with Intel Pentium® 133MHz Processor
- 2 serial, 1 parallel, 1 games port
- 3.5" Floppy Drive
- Ergonomic Compact Keyboard
- Plug and Play Software for easy upgrading
- Genuine Microsoft® Ergonomic Mouse
- Microsoft® Windows® 95 Ready To Run Plus
- Genuine 16 Bit SoundBlaster Chip
- Stereo Amplified Speakers
- Microphone
- Microsoft® Works for Windows® 95
- Microsoft® Publisher
- Microsoft® Money
- Multimedia CD Titles from Microsoft®: Encarta® 95, Musical Instruments and Golf

ORDER CODE: SXDV8160



4 ULTIMATE 120 MULTIMEDIA PC

This configuration is 'the hottest PC money can buy' according to PC magazine which after reviewing 24 other top of the range systems awarded the Genie its Editors' Choice for the Ultimate PC. We have configured this system to be similar to the reviewed PC except that we have added a fast modem, and reduced the price. You will also need to add a 17" monitor option (see '17" monitor upgrades' above) to obtain the reviewed specification.

NOW WITH 6X CD ROM

only **£89.64** per month APR 14.9% **EASY 2 OWN** monthly payment scheme

£2199
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16MB EDO RAM
1GB HD
15" SVGA Colour Monitor
Stealth 64 Video VRAM with 2MB
Six speed CD ROM Drive
14400/14400 Fax Modem,
Internet Access Software
256K Pipeline Burst Cache

PENTIUM® PROCESSOR 120MHZ

- Viglen Genie® PCI Medium Tower with Intel Pentium® 120MHz Processor
- 2 serial, 1 parallel, 1 games port
- 3.5" Floppy Drive
- Ergonomic Compact Keyboard
- Plug and Play Software for easy upgrading
- Genuine Microsoft® Ergonomic Mouse
- Microsoft® Windows® 95 Ready To Run Plus
- Genuine 16 Bit SoundBlaster Chip
- Stereo Amplified Speakers
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- Microsoft® Works for Windows® 95
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- Microsoft® Money
- Multimedia CD Titles from Microsoft®: Encarta® 95, Musical Instruments and Golf

ORDER CODE: SYDUA100



July 1995
Viglen Genie
Pentium PCI
120MHz

646

6 PROFESSIONAL BUSINESS PORTABLE PC

This configuration combines the fast 486DX2 66MHz with a large memory and Hard Disk capacity along with a fast modem and large colour screen to make it one of the most powerful and flexible notebook PCs for the Professionals on the move.

only **£67.37** per month APR 14.9% **EASY 2 OWN** monthly payment scheme

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+ Delivery and VAT =
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8MB RAM
540MB HD
10.3" Dual Scan Colour LCD Screen
14400/14400 Fax/Modem

486DX2 66MHZ

- Viglen Dossier® ADVANCED Sound notebook sized (6.5lb) portable PC with 486DX2 66MHz Processor
- 1 serial, 1 parallel, 1 PS/2 port
- 2 PCMCIA ports, socket for docking station option
- CPU Upgradeable
- 3.5" Floppy Drive
- Built in speaker and microphone for multimedia sound
- Built in large tracker ball
- Microsoft® Windows® 95 Ready To Run
- Lotus Organizer
- Plus
- Microsoft® Works for Windows® 95
- Microsoft® Money

ORDER CODE: SXSG8034



At Viglen we believe in putting you first.



At Viglen, PC also means Pleased Customers.

Our customer first philosophy ensures every aspect of our business is geared to customer satisfaction. In recognition of this the 1993/4 Computer Weekly Datapro Survey consistently rated Viglen first for reliability, sales support and overall satisfaction. Viglen were also highly commended in The Daily Telegraph and First Direct Customer First Awards 1994.



The entire Viglen product range provides the best value for money available. Viglen topped the price performance ratings in the 1993/4 Computer Weekly Datapro Survey.



Widely regarded as the best support in the industry, each Viglen product purchased gives **FREE lifetime access to our technical support** telephone service and bulletin board.



Our sales staff will gladly guide you through the jungle of computer jargon with help on the ideal system for you.



Technical specialists are always available for more specialised advice.

Each Viglen system has a **12 months parts and labour warranty**, including collection from and return to you at our expense (mainland UK only). For complete peace of mind there is also a further choice of low-cost on-site service packages for up to 5 years. With mission critical systems, such as file servers, our 4 hour response premium on-site service is available.



Our pedigree is impeccable, with over 19 years experience in providing quality manufacture and support services.



Don't worry about compatibility. Viglen's PCs are guaranteed to run all software that operates on equivalent IBM PC/AT. Viglen is licensed under the relevant IBM patents.



Viglen's desktop systems are made in the UK to exacting quality control procedures to give you added confidence in our products.



Extremely competitive repair and upgrade services are always available from our service department.



As a Novell authorised OEM Viglen take the work out of networking by providing the very best in network solutions and support - for 2 to 250+ users. In-house Novell certification labs and the availability of more than two Certified Novell Engineers at all times mean that Viglen are a networks supplier to rely on.



Our quality and reliability standards are second to none, thanks to the latest design and manufacturing processes approved to BS5750 quality standard. The Datapro survey rated Viglen first for reliability.

Remember to carefully read the small print of our competitors when comparing services. At Viglen we believe in giving you a choice and making that choice crystal clear.



Viglen - Once again, Viglen PCs take the hardware honors in the U.K. User Survey, with the highest ratings for Overall Satisfaction, Price/ Performance, Expansion Capability, and Ergonomics.

Ordering direct couldn't be easier *phone, post, or fax.*

If you require any help or advice on choosing a system to suit your requirements please call our Sales Department. To help us identify your requirements please state the product code (where applicable), description and price of items required.

When you have decided on your system please fax or phone your orders. You will need to add £15.00 per system for courier delivery, add 17.5% VAT on top. Collections may be made by prior arrangement. Please allow 7-10 working days for delivery, except for Viglen special configuration models which we will do our utmost to despatch within 3 working days from clearance of payment.

BY PHONE

Credit card, Switch, Connect or American Express card holders can order by telephone. Just call us and ask for our Sales Department.



Official orders from educational establishments, government departments and PLCs accepted.

Very competitive Lease Rental arrangements are available for bona fide businesses, educational and government establishments.

EASY 2 OWN monthly payment scheme is available to private purchasers subject to status. Typical example of payment calculation of PC costing £799 + VAT = £799+£15 (delivery) +17.5% VAT = £956.45 total cash price. 10% deposit of £95.65 required followed by 36 monthly payments of £31.27 (APR=19.9%). For finance over £1499 + VAT, APR drops to 14.9%. Additional payment protection insurance is available. Viglen Ltd is a licensed credit broker.

EDI. Purchase orders via electronic data interchange accepted using INS Tradanet service.

Public sector customers may also purchase at special prices through the HMSO.

Please ring 01603 694153



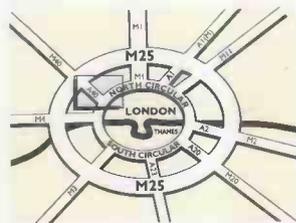
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Showroom open
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Saturdays 9.00 - 1.00
Showroom closed
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Some manufacturers think that small page printers are bought by people with small IQs.

They'll sell you a printer with little *ECOSYS* room for upgrades, so they can sell you another as soon as your needs grow.

Kyocera thinks you deserve better.

Which is why we've introduced the ECOSYS FS-400 – a small printer with a big future.

It accepts an extra 250-sheet paper feeder. It offers

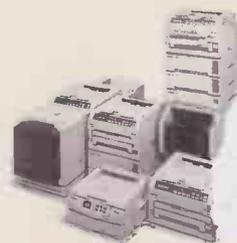
optional PostScript emulation. Its memory grows to a useful 5 MB. It can connect to virtually any network. And its LAN interfaces are all SNMP compliant.

For the same price, other low-end systems offer you none of this.

What's more, the FS-400 provides low ECOSYS running costs, and a very competitive on-site warranty.

Get a great deal on a little printer.

Ask for the ECOSYS FS-400.



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