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P232

Personal Computer World

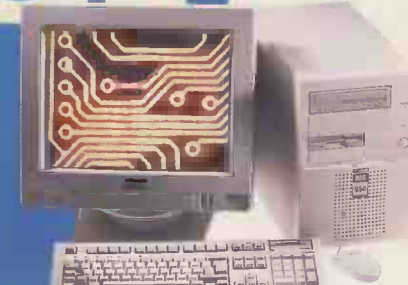
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Business Publications

WIN a DAN
Pentium 133MHz
p119

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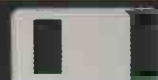
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ALL DIMENSION SYSTEMS INCLUDE : MICROSOFT WINDOWS 9

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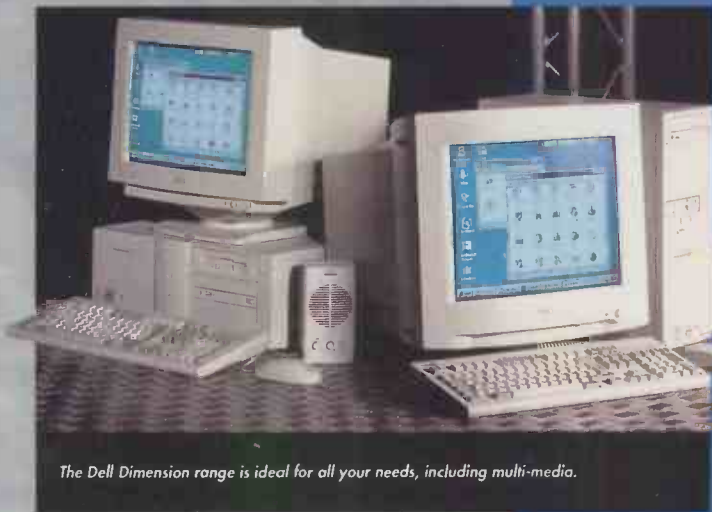
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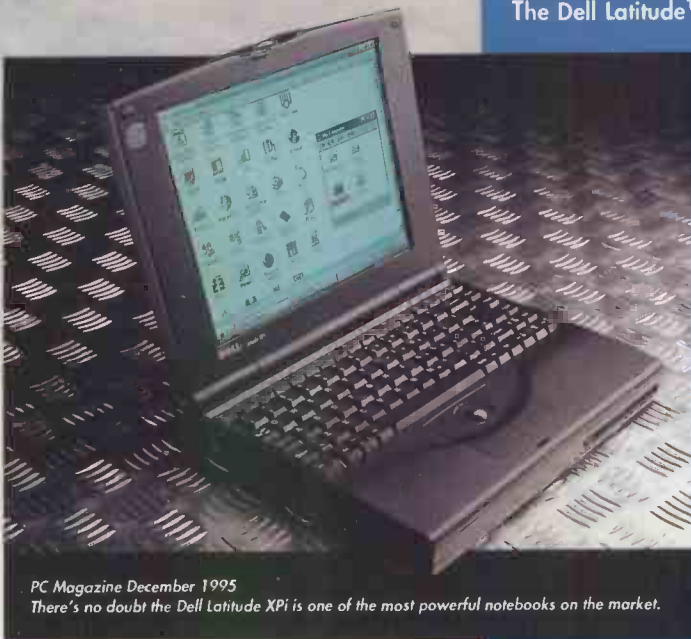
All Dimension and Latitude PCs come with customisable and extensive service and support packages. Automatically, this includes a 1 year 'Collect and Return' service as well as unlimited access to Dell's Openline™ Hardware Technical Support Service - another award winner. This service runs throughout the lifetime of your PC. Should you encounter a problem, you'll be pleased to

hear that 90% of all queries are solved over the phone in less than 5 minutes. That's a benefit of dealing with the company who actually built the machine.

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PC Magazine December 1995
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Contents

V34 Modems 198

So you want to get online? First step is to get hold of a fast, up-to-the-minute modem. Geoff Marshall tested fifteen, priced from as little as £139.

PCW Cover Photography by Bruce Mackie



Cover Disk or CD-ROM

● Cover Disk 8

Hey! Tiny Elvis is alive and kicking on our disk. Plus, find your way with our mini version of the AA's A to B route planner.

● PCW Interactive CD-ROM 9

650Mb of programs, with demos, games, a selection of the best utilities, and more... (CD-ROM Notes continue on page 102.)

Group Tests

Visual Programming 130

● Visual Basic once ruled the roost but now it has a whole host of young pretenders with which to contend. Tim Anderson checks out the opposition.

V34 Modems 198

● 15 fast modems on test.

Awards '96 Nominations 119

● Your chance to vote for the 1996 PCW awards and WIN a Dan Pentium 133.



Features

Enhanced CDs 8 8

by GEORGE COLE

Are interactive albums a passing fad or the next CD-ROM revolution? We explain what they are and check out a selection.



Dominic O'Brien 9 8

by MICHAEL HEWITT

Want to beat the odds? Dominic O'Brien reveals how a PC and a brilliant memory helped him to blackjack gambling success.

Amstrad PcW 16 1 0 6

by SIMON ROCKMAN

A sense of *déjà vu* surrounds our review of this new desktop machine.

Pentium Pros 1 2 2

by DYLAN ARMBRUST

A mini round-up of the first superfast Pentium Pro machines to hit the PCW office.

ABC GraphicsSuite 1 7 5

by PAUL FISHER

Powerful, general-purpose graphics software for Windows 95 that doesn't cost an arm and a leg.

Access 7 for Win95 1 8 4

by ELEANOR TURTON-HILL

Easier than ever for non-programmers to use, but the phrases "a dog" and "runs like" tend to spring to mind.

Ergonomics & RSI 1 9 0

by NICKY GLATTER

Are you sitting comfortably? A lot of PC users aren't, and repetitive strain injury could be the result.

Cheap laser printers 2 1 8

by ELEANOR TURTON-HILL

Personal laser printers churn out excellent black and white text and graphics, and can cost as little as £300. We test out the latest generation.

Delphi Tutorial: Part 4 2 2 2

by TIM ANDERSON

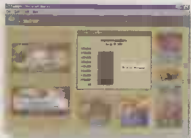
In the final part of our Delphi tutorial, we tackle building a database application and making Delphi's data-aware components slot together.

First Impressions 55

57 Gadgets

58 Viglen Genie PCI 166MHz
Intel's fastest Pentium yet and the quickest way to run Win95.

60 Microsoft Money for Windows 95



61 Power Computing Power 120
The new breed of Macintosh clones arrives.

63 Quarterdeck QEMM 8.0
A memory manager that's worthwhile even with Windows 95.

65 Dell Latitude ST120

66 AST vs Brother home PCs

68 Canon BJC-610



72 Apple Newton 2.0

73 Connor EIDE tape backup

73 Diamond Multimedia Edge 3D
The first of the do-it-all video cards with support for MPEG and sound.

74 Wacom UltraPad



76 MoreMem and TopBar 4.0

76 Mannesmann Tally T7010T

78 SMS link for Psion 3a

78 Hewlett-Packard 5simx

80 DataBecker Family tree



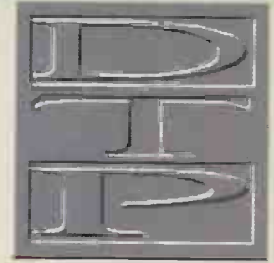
Long Term Tests

- 84 Canon BJC-600
- 85 TurboCAD 2

Regulars

- 18 Newsprint**
Microsoft in massive assault on the Net. Amstrad revives its word processor. NexGen unveils Pentium Pro-beater. Intel launches 166MHz Pentium — and says P100 set to become entry level. BT stands firm on ISDN prices... but disk-based phone directories get cheaper. Cambridge firm pioneers electronic paper. Tulip offers notebook-like desktop PC. Macro bombs highlight new online threat. Cheap Macs on the way as Motorola signs UK PowerPC deal.
- 31 News Analysis**
 - Tim Bajarin on Oracle's new approach to home computing.
 - Ben Tisdall looks at customer service.
 - Clive Akass asks why BT charges so much for its faster digital lines.
- 37 Computations NEW!**
Rowland Morgan has fun with statistics.
- 39 Sounding Off** by Michael Hewitt
- 41 Homefront** by Tim Nott
- 43 Straight Talking** by Barry Fox
- 45 Business Matters** by Nick Beard
- 48 Letters**
- 357 PCW Marketplace** The best place to compare hardware and software prices.
- 358 Buyer's Charter**
- 647 ChipChat**

Hands On



- 291 Introduction
- 292 Windows 95
- 296 Windows 3.1
- 298 OS/2
- 300 32-Bit
- 303 DOS
- 304 Word Processing
- 308 Spreadsheets
- 312 Databases
- 316 Graphics & DTP
- 322 Multimedia
- 326 Sound
- 330 Visual Programming
- 337 Numbers Count
- 338 Networks
- 342 Comms
- 348 Macintosh
- 351 Computer Answers
- 353 Beginners

CUTTING EDGE

2 3 1 Introduction

PCW Online

2 3 2 Focus: Hot Java
"Java Jim" Smith spills the beans

2 3 8 Net.answers

2 4 2 Net.news (incorporating Net.surf)

2 4 9 Net.newbies

2 5 0 Focus: HTML part 2

PCW Futures

2 5 9 Innovations

2 6 1 Horizons

2 6 3 Bluesky

2 6 5 Retro Computing

PCW Media

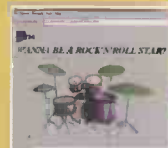
2 6 6 Books

2 7 4 CD-ROMs

PCW Fun

2 6 9 Kids' Stuff

2 7 9 Screenplay (with Leisure Lines, page 282)



Left Java jive

Below Explore Compton



Interactive Encyclopedia



Above Kids' Stuff:

Maths Workshop

Left Screenplay:

Mortal Kombat 3



PCW Cover Disk

If you've always poo-pooed claims that Elvis is alive and well and stacking shelves in Asda, proof to the contrary is here at last. Tiny Elvis is an invaluable utility which allows The King to randomly pop up onto your desktop. He'll dance, and provided you have a sound card, he may even offer some constructive criticism of your Windows setup.

A to B

The AA's nifty A to B Route Planner could save the day for the directionally challenged — we've squeezed the cut-down version onto our cover disk. It includes the UK's 150 biggest towns and cities. Even though the number of cities is limited, the number of possible combinations you can try runs to several billion. The locations supported range from Blackpool to Bognor Regis, Winchester to Wolverhampton. If you would like to upgrade to the full release of the program, call the number that appears in the program and remember to quote "ATO B/PCW"

IMPORTANT

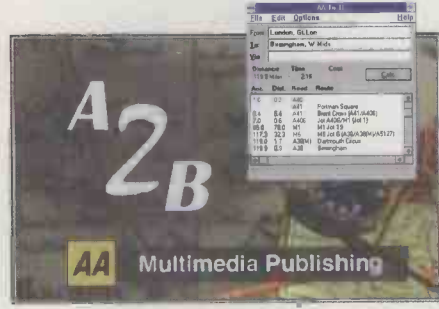
If you have problems with the Cover Disk such as receiving a "Cannot read from drive A", error, please return the disk to the duplicator: TIB plc (PCW), TIB House, 11 Edward Street, Bradford BD4 7BH (who may be contacted on 01274 736990) together with a stamped addressed envelope and two 25p stamps.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

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 Cover Disk hotline on weekdays between 10.30am and 4.30pm on 0891 715929. Calls are charged at 39p per minute cheap rate and 49p at all other times.

The PCW cover disk is virus checked at every stage of production. However, PCW will not accept liability for any problems arising from the use of the disk. Installing or running any of the programs on the disk indicates your agreement to this condition.

You are advised not to install any software on a networked PC before checking the disk. While PCW maintains a high standard of quality control, disks may be damaged in transportation. Check the disk's shutter before inserting it in the drive by sliding it to the left and allowing it to spring back.



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PCW Interactive CD-ROM



David Price introduces this month's blockbuster of a CD-ROM, crammed with fantastic multimedia demos, fast-action shoot-em-ups, stunning soccer games, a selection of the best utilities, and much, much more. It may be cold outside, but PCWI brings you a CD-ROM to warm the most frozen of cockles.

MAIN FEATURES

Demos

This month the PCWI CD-ROM is under siege from more explosive demos than Mururoa Atoll. Included is Tempest 2000 — hectic new arcade action from the resurgent Atari and their top programmer Jeff Minter who reputedly owns a real-life Llama farm! While Endor Fun promises mind-bending and

F E B R U A R Y 1 9 9 6



PCW INTERACTIVE: Entire Contents List

DEMOS

- Actua Soccer** — A bigger hit than Eric Cantona at Selhurst Park.
- The Art of Magic** — Learn where to stick your wand.
- Endor Fun** — Mind bending, stategy, and subliminal messages — it's no endor fun.
- Picture Album** — Produce your own photo albums and accompanying text.
- Retros** — Stylish demo and video selection from the beat combo of the same name.
- Tempest 2000** — Llama-man and Atari programmer Jeff Minter's pulsating shoot-em-up.
- Triazzele** — Rotate your pieces devillishly, puzzle fiends.
- Hexen** — The Doom creators bring you an excellent new game
- You're Hired** — Job interview test simulator.

FEATURES

- Oakley date services** — Oakley's superb and complete Smart software.
- Linux** — The powerfully compatible operating system for PCs

WINDOWS 3.1 & DOS

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- Sound Effects Generator** — Create and edit sounds like you never believed.
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- Tiny Elvis** — Stunted Presley arrives unexpectedly.

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



Personal Computer World

READING

- Delphi** — Hands on the Delphi files accompanying the magazine tutorial
- Windows 95** — A mixed bag of pulsating Microsoft tools.
- Visual Basic Hands On** — The file bonanza from the VB articles continues.
- PCW Back Issues** — Tip toe down memory lane.

C O N T I N U E S O V E R

F O L D H E R E

WINDOWS 95

- Otto's Resolve** — Unmissable Context Menu for shortcuts.
- Win95 Graphic Display Drivers**
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CONTINUES ON PAGE 103



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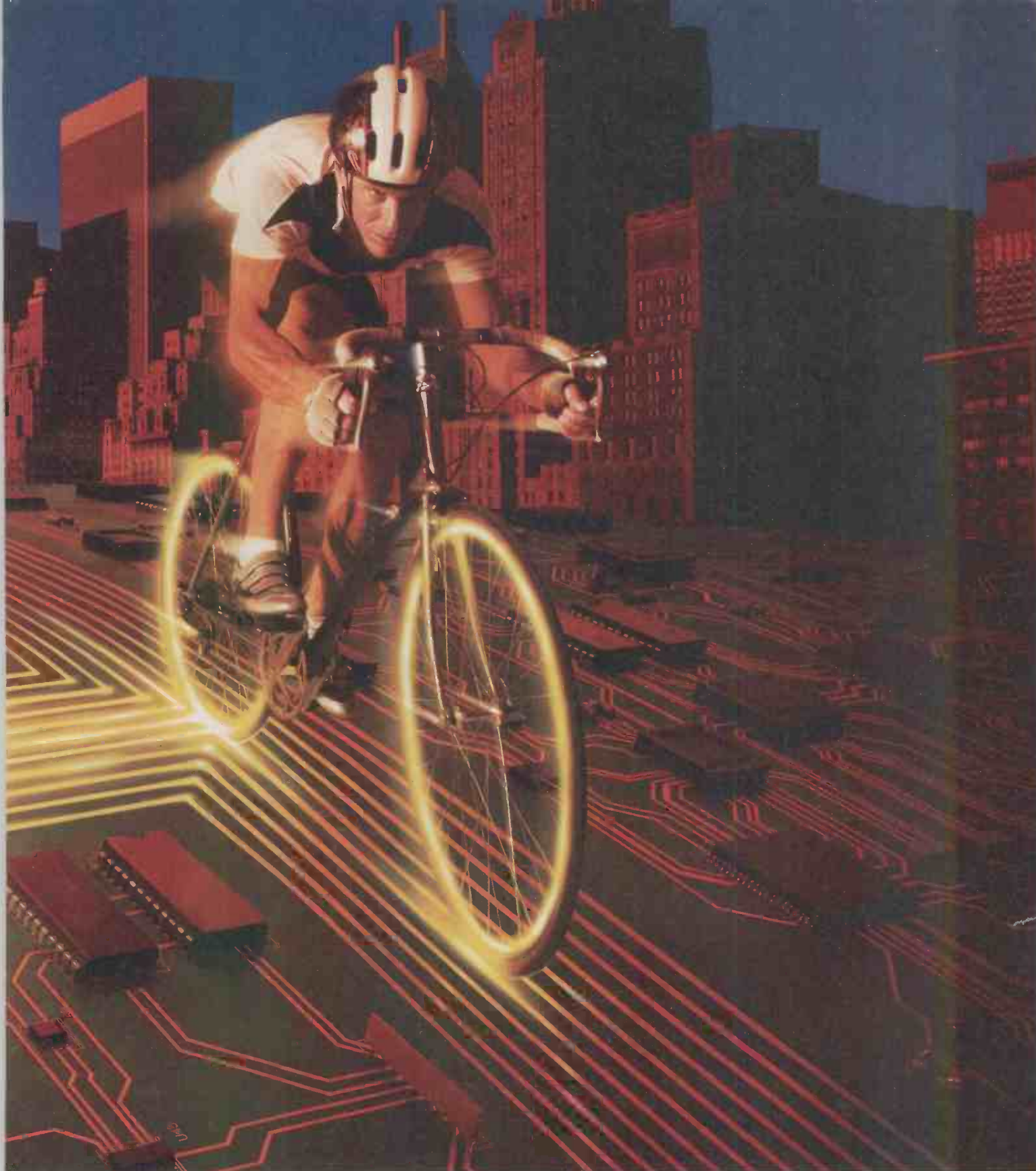
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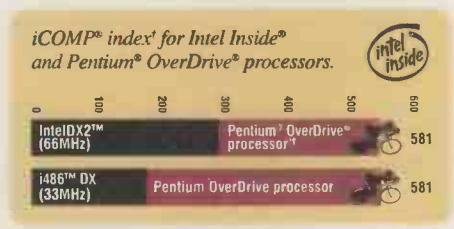
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Editorial

For a long time, dragging a free "journalist's account" out of CompuServe was like rock-climbing in roller skates. Then Microsoft relaunched Microsoft Network, about a zillion Internet Service Providers appeared, and America Online decided to launch in the UK. It's now hard to get within 50 yards of anyone at CompuServe without being knocked off your feet by a ton of free accounts.

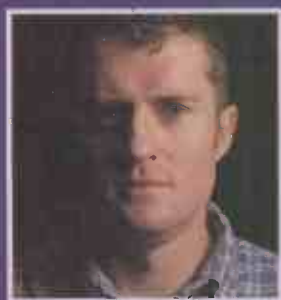
Perhaps I am exaggerating a little, but the Internet is responsible for waking quite a few slumbering giants. The Online Information Show was a dozy backwater a couple of years ago; full of librarians dusting off text-based CD-ROMs.

Last year, in early December, it was held at Olympia (this year, perhaps Earls Court?) and was chock-full of Internet stuff. At the show, companies who for years have charged a bomb for providing "business intelligence" on private networks were scrabbling to get onto the Internet. MAID, for example, which sells the Corporate Profound database, announced it had turned all its mainframes into a giant Web site.

One by one, the main objections to using the Internet are being eliminated. The bandwidth is low and it falls over all the time: telecomms companies and large corporations are continually putting in new pipes to remedy that. Most of the content costs nothing and is worth little: people are now talking about four levels of Internet access; free, pay as you go, subscription and premium (where you subscribe and pay as you go).

Increasingly, the Internet and online have become synonymous, which is why companies like Microsoft and CompuServe are frantically backpedalling on their proprietary bulletin board approaches and re-launching, with heavy emphasis, on the Internet.

● Microsoft joins calls for cheaper digital lines, page 21



Ben
Tisdall
Editor

Next Computer Month

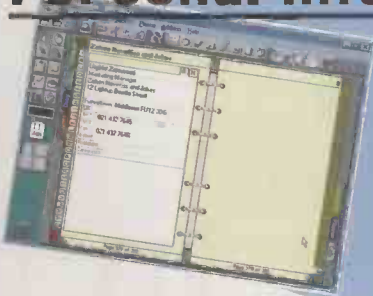
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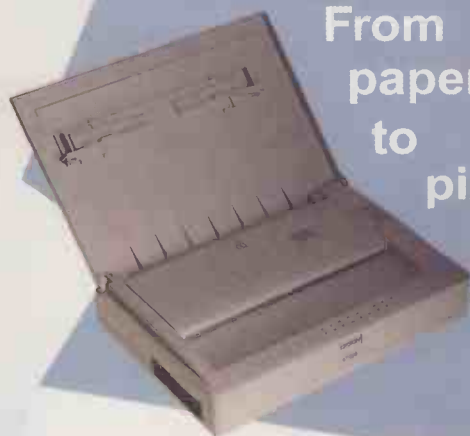
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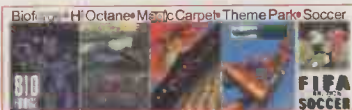
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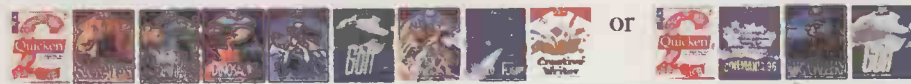
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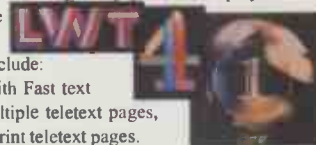
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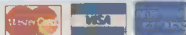
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- Generation gap** 19
NexGen says chip puts Pentium Pro power on a Pentium board
- Same old digital line** 21
BT stands firms as Microsoft joins call for cheaper ISDN lines
- Paper chase** 22
New polymer diodes could lead to "electronic paper"
- Bomb threat** 24
Macro bombs highlight peril of new fashion for downloading mini-apps
- Mac clones** 29
British PC makers may build PowerPC boxes rather than fight box-shifting giants
- Software bestsellers** 29

One snippet of news almost got lost in Gates's Net strategy speech: there will be no Windows 96.

Instead there will be a major free add-on for Net users which will "integrate folders and Web pages," Gates said.

This will allow you to view page hierarchy of Web sites, or navigate your PC like it is a Web site. This will only work with sites that support the features.

Gates said there will be a major upgrade of Microsoft Office, which will also be bound tightly to the Net. All applications will support the Web page-description language HTML.

The effect of all these changes will be to merge the browser into Windows, so that you will not have to start a separate application to use the Web.

See www.microsoft.com for more details.

Amstrad revamps its PCW word processor

Amstrad has launched a PC/TV, the Amstrad Integra, and updated versions of its best-selling PCW word processor.

Amstrad chairman, Alan Sugar, claimed the £899 Integra was "a breakthrough in price". Sugar sees it as the first generation of a technology that will migrate onto large-screen TVs in the future.

The entry-level product has an 80MHz 486DX2 processor and just 4Mb of memory. Upgrading to the 8Mb needed by Win95 costs £110; the soft-

ware bundle of WordPerfect Works, Quicken 4, Links Pro, Encarta and Descent adds another £100.

Otherwise, it is reasonably well specified with a quad-speed CD-ROM, PCI bus, TV with Fasttext and remote control, a 540Mb hard disk and a 14.4bps fax/modem.

Long-time readers may be more interested in the new PcW 16 (review, page 106). The original PCW 8256, launched in 1984 to instant acclaim, sold 800,000 in a year. This success

was consolidated by the PC1512, launched in '86 at £399.

Amstrad's PcW 16 also costs £399. It comes with a much improved screen, a Canon bubblejet printer, and a 3.5in floppy drive which will read DOS disks. Software now includes a diary, address book and spreadsheet.

The PcW 16 is also available with an Oki laser printer for £499 or on its own for £299.

The decision to launch a new PCW was based on a hunch and continued interest from existing users, said Sugar. Users will be able to transfer existing PCW files onto the new disks. **Ben Tisdall**

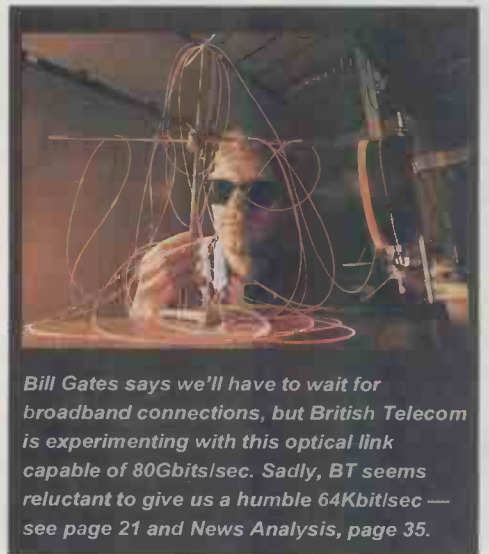
Gates strikes Internet gold

Bill Gates nailed his colours to the Internet mast last month with a strategy speech that could prove as important as the Win95 launch – and provoked calls for a new monopoly probe.

He described the Net as "the new goldrush" and said online transactions of as low as one cent would become viable, opening up vast business possibilities.

Most controversial was a range of software moves that will squeeze specialists like Netscape. Gates announced:

- New free versions of his Internet Explorer browser for Windows 3.1, NT and 95 as well as the Mac OS. In Win95, it allows you to drag-and-drop hypertext links to the desktop where they appear as shortcuts – and that's just the start (see story, left).
- Visual Basic Script, with security features for online use. Browsers will be able to run VBS apps. It is clearly designed to compete with Java (see page 29).
- Active VRML, to enable 3D animations. It will require extensions to the Web's HTML scripting language.
- A "digital signature initiative" to use encryption techniques to certify the source of a file.
- Internet Studio, a new Web authoring tool. Allows you to give Web pages magazine-quality graphics. Viewers will be freely available.



Bill Gates says we'll have to wait for broadband connections, but British Telecom is experimenting with this optical link capable of 80Gbits/sec. Sadly, BT seems reluctant to give us a humble 64Kbit/sec — see page 21 and News Analysis, page 35.

The speech was a retreat in that Gates appeared to be relaunching his Microsoft Network (MSN) more as a friendly Internet gateway than as a CompuServe-style provider of services.

MSN access was bundled with Win95, provoking a monopoly probe which at one point threatened to scupper the launch. MSN proved a damp squib because it was not ready in time. UK lines were unusably slow.

That will change: Gates has signed up leading UK provider Unipalm-Pipex to supply fast local-call access all over the country.

Clive Akass

NexGen unveils the chip that launched \$840m AMD deal

NexGen has released details of the processor that inspired rival chip-cloner AMD to instigate a \$840 million merger late last year.

The Nx686, which will launch later this year (96) in a 180MHz version, would present a major challenge to Intel's Pentium and Pentium Pro if it lives up to its hype. Key claims are:

- It will run 32-bit applications as least as fast as a Pentium Pro, which is reckoned to be 35 percent faster than a Pentium.

- It will run 16-bit (that is, pre-Win95) applications up to 50 percent faster than a Pentium of the same clock speed. The Pentium Pro, optimised for 32-bit server applications, actually runs them 25 percent slower.

- It will save costs by using existing Pentium boards.
- The power consumption will be low enough for mobile use.
- It has built-in multimedia acceleration.

The Nx686 has no on-chip Level 2 cache like the Pentium

Pro, but has a large Level 1 cache: 32Kb for data and 32Kb for instructions.

AMD will drop its proposed sixth-generation K6 chip if the NexGen merger is approved as expected. Instead, Nx686 will be sold as the K6 and will include some AMD technology.

NexGen has also announced 120MHz and 133MHz versions of its Nx586 processor.

Clive Akass

• *PowerPC challenge* — page 30.

Pentium power

Intel has announced the immediate availability of 150MHz and 166MHz Pentiums — and said 100MHz and 120MHz versions will be driving entry-level systems by the middle of this year.

The latest 3.3-volt devices are based on a 0.35 micron manufacturing process and will cost \$547 and \$749 respectively in 1000-plus quantities.



Lord Owen could start a new publishing trend with his latest book *The Balkan Odyssey*. It comes with a CD of extra material like the picture above. The CD was created on a PowerMac with the aid of Apple's Media Tool.

Lord Owen said: "The wealth of video footage and the filmed testimonies add weight and value to the printed word."

AOL sets foot in Page Three land

America's favourite family online service is launching in Britain, a little unsure of our views on language and sex. It has built up four million users with offerings of games, news and shopping — and Internet access with full parental control. Unlike CompuServe, it charges no premiums for specialist services. UK prices will be £5.95 a month plus £1.85 for each hour above five hours.

Last year AOL had to reverse a decision to ban the word breast after breast cancer patients complained that they could no longer discuss their ailment.

AOL UK chief, Jonathan Bulkeley, said of the land of Page Three girls: "We will have to get used to things here."

A rather more robust line is taken at www.durex.com, a new site set up by Durex maker LIG. It offers advice on romance and safe lovemaking, complete with details of the correct way to put on a condom.



Short Stories

CD giants agree new 4.7Gbyte format

- Final details have been announced of the specification for the next-generation heavyweights, with an initial capacity of 4.7Gbytes.

An agreement in broad terms was announced at Comdex in Las Vegas (see Newsprint, January), where industry heavyweights promised the first discs would be available by the end of this year.

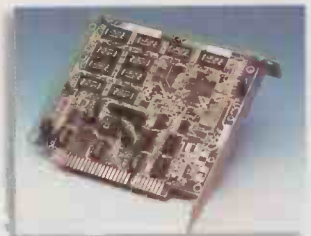
The new standard is based mainly on the proposed SD format, but uses more robust error correction from the rival MMCD proposal. It will be called the DVD (digital video disc).

Penguin online

- Penguin, which pioneered the high-class paperback, has gone online. You can order books or search for titles from its site at www.bookshop.co.uk/penguin.



3D card



- A 3D graphics accelerator for the PC is set to bring a new level of realism to the games market, according to Number Nine.

The £229 FX Reality is based on Rendition's Verité 3D graphics engine.

Number Nine 01256 381194

Flash offer

- The PCD-896 card holds between 1Mb and 16Mb of solid-state flash memory which is used to emulate a standard PC drive. Prices start at £109 for 1Mb.

IMS 0703 771143

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PC REVIEW
OCTOBER 1995



PCX
OCTOBER 1995



Microsoft joins calls for cheaper digital lines

British Telecom is standing firm against increasing pressure to reduce the minimum £400 sign-on charge for a fast digital ISDN line.

Among those lobbying for a cut in the charge has been Microsoft, whose new MSN online service will shortly offer ISDN access.

UK desktop product marketing manager, Andrew Lees, told me BT would not budge, and he believes the charge should become a political issue. He said: "This country could fall behind if we don't increase the takeup of ISDN. £400 is not significant for a big organisation but it is a lot for individual users."

BT claims that an ISDN link actually costs more than £400 to install, and that smaller sign-on charges elsewhere in Europe are offset by higher usage fees.

This argument does not stand up in Germany. Deutsche Telekom charges about £59 for a basic installation and about 10p for a six-minute peak-rate local call, ISDN or standard — admittedly more than BT.

But a 15 percent VAT charge which comes into force this month [January] will not be passed on to the customer, leaving VAT-exempt businesses about 13 percent better off (the difference is due to tariff boundary changes). This means digital

calls actually average out cheaper in Germany than standard ones, because proportionately more businesses use ISDN, so there is no question of ISDN users being surcharged to recoup installation costs.

Ian Macgregor, senior UK marketing manager for Deutsche Telekom, believes BT is discouraging ISDN takeup because it does not have the capacity to match the potential demand.

BT was early in moving from the old analogue system to digital, so that many of its digital switches predate ISDN and have to be upgraded, Macgregor said: "There is always a risk that if you enter the market first, you enter in a less developed form. In Germany we are entering a situation where the PSTN (the old phone network) is being sidelined by this new ISDN."

Clive Akass

ISDN installation becomes more competitive if you have a lot of lines. There are two bands: ISDN 2, with a minimum two 64Kbits/sec channels; and ISDN 30, with a minimum 15. Charges are:

	Installation	Per quarter
ISDN 2 Two channels	£400	£84
ISDN 30 15 channels	£594	£209
Per channel extra	£99	£34.95
Per 30-plus extra	£58.67	£34.95

British Telecom may have kept its ISDN prices high but it has slashed the prices of PhoneDisc, its CD-based national directory. This started out at about £2,000, plus hundreds of pounds a year for quarterly updates.

Cheeky, when it is your personal details they are selling, and

the equivalent for the entire US can be bought for a few dollars. Anyway, a single-user version can now be bought for £199. There are various deals for networked versions.

But a new CD-based directory from TDS Informs (see screenshot below) still looks a bargain

at £40. It lists only UK business numbers, but it is fast and easy to use and will even do phonetic searches for when you are unsure how to spell a name.

A network version should be available this month. Prices start at £299 for up to 10 users.

• PhoneLink is now offering a free DIR service for subscribers to its TelMe online information system.

TDS 01494 465646; PhoneDisk 0800 919199; TelMe 0800 991155

Short Stories

Confusion over EC's CE label on EMC

● New regulations on electronic equipment coming into force this month are causing fear and confusion in the computer industry. Not least because of the acronyms: all new computer equipment has to carry the EC's CE label to show it conforms to EMC guidelines.

The CE label means the equipment complies with European (EC) regulations, the most important of which for PCs involve limiting electromagnetic (EMC) interference.

However, much equipment is likely to be sold without the label because there is a three-month waiting list at testing labs.

Smaller PC makers fear they may be pushed out of business by the need to test every configuration they sell.

Keith Warburton, president of the Personal Computer Association, warns: "We believe that many computer manufacturers do not intend to comply." He says this could give them a price edge over more scrupulous vendors.

Contest date

● Get your entries in quick if you want to compete in the 1996 British Computer Society programming competition — closing date is 26th January. Teams aged between 17 and 30 will face tasks using C or C++.

BCS 01793 417417
http://www.bcs.org.uk

Online sales

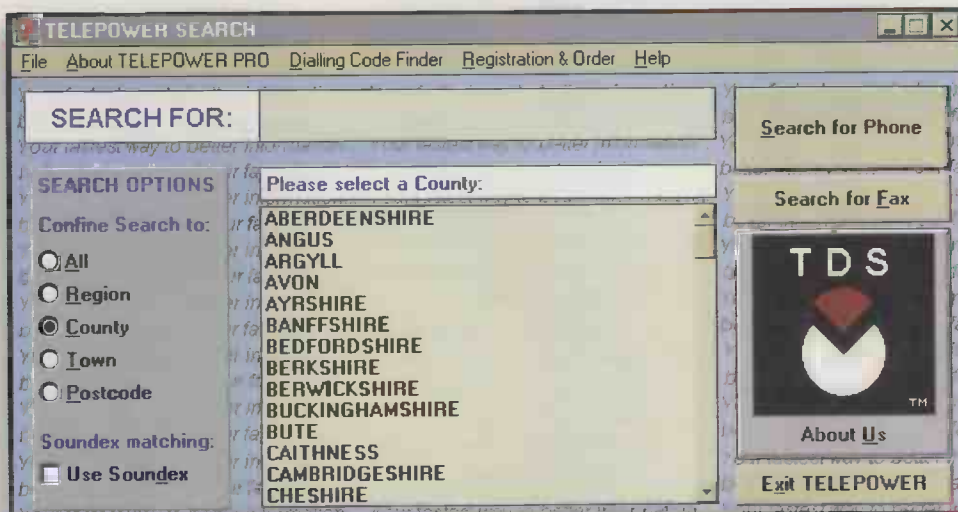
● UK Online is to sell Internet software kits through Dixons. Starting price, including email and ten hours free access, is £10.

UK Online 01749 333300

Cheap laser

● Texas Instruments is selling its 600dpi Win/4 Windows-only laser printer for £399.

TI 0181 875 0044



Short Stories

BBC closes Networking Club

● The BBC has stopped selling Net access and is closing its Networking Club – to the fury of some members. The BBC will continue to have a Web presence, with activities concentrated at a new Multimedia Centre.

BBCNC members have been passed on to Pipex, which has in any case been providing their lines: the BBC was a reseller.

A BBC insider said the closure was apparently due to aggressive competition. But he added: "The decision foxed me and many others because we could see the club being a big success."

"We were sending out 100 [information] packs a week and getting responses from about a third of them. And that was without any marketing. They just wouldn't do any marketing."

The BBC said in a statement: "The BBC remains totally committed to on-line development."

Escom clamps down after FAST practice

Staff at high-street computer chain Escom have been selling software without proper licences, backup disks or manuals, the company admits.

They seem to have clinched sales by bundling software that was not covered by Escom's deals with its software suppliers, according to Geoff Webster, chief executive of the Federation Against Software Theft (FAST).

FAST moved in following complaints from customers. "Escom senior management

were appalled when they learned what was going on," he said.

Escom claims to be Britain's third biggest PC retailer less than a year after moving into British high streets by taking over the Rumblelows chain early last year. It has agreed to

train its staff fully on licensing and customers' rights.

Escom UK head, Geoff Saunders, said the problems had arisen because of an inadequate command structure after the Rumblelows purchase. "To be frank, the issues raised by FAST were one of a number of concerns at the time.

"We were very pleased to receive the information from FAST, particularly in view of the fact that it was so specific, so that we could do something about it."

Escom customers who believe they have not got proper licences are invited to contact their local store with proof of purchase.

FAST 01753 527999

If you're wondering whether you would be better off hiring a computer, you might turn to Livingston Rental's new Web pages. Easy-to-use browse and search tools facilitate your choice.

Livingston Rental 0181 943 5151
<http://www.livingston.co.uk>



Rival high-speed links have no parallel

Three serial technologies competing to supersede parallel SCSI as a high-speed peripheral link were all demonstrated at Comdex.

Parallel links are more bulky than serial, and tiny differences in transfer rates on each parallel line cause problems at high speeds. The three alternatives are:

● Firewire, better known as 1394. Backed by Apple, it runs at up to 100Mbps/sec, though 400Mbps/sec is planned. It is used at the moment for consumer items like Sony's new digital camcorder, but mass pricing may give it a



wider role.

● Serial Storage Architecture (SSA). First developed at IBM's UK labs at Havant (now Xyratex). Uses a bi-directional loop on which each device has two inputs and two outputs, giving four 20Mbyte/sec data paths. In practice, the transfer rate is rather less. The loop can be broken without stopping

data flow.

● Fibre-channel. A dual loop of copper or fibre runs at 100Mbyte/sec. Drives can be hot-plugged in and out. Like SSA, it uses SCSI protocols.

Storage vendors seem to be keeping all their options open, backing fibre channel, SSA, and SCSI.

Xyratex, which bought fibre-channel specialist Peer Protocols, offers storage systems based on all three.

David James, program manager of test-systems marketing, said: "SSA exists today as a stable technology with firm specifications. Fibre channel is not quite there yet."

He said SSA silicon is cheaper, though there are plans to reduce fibre-channel costs. But fibre can also add 50 percent or more to the power consumption of a drive, leading to cooling problems.

"SSA uses interleaving to allow several devices to talk at once. Fibre-channel allows only two devices to talk at the same time, so it needs to arbitrate between them. This arbitration can be a big overhead if you are accessing lots of small records. So fibre-channel is best for applications like video-on-demand, where you have long bursts of data."

The slower Universal Serial Bus will be included on all Intel motherboards later this year and is expected eventually to oust the familiar but sluggish PC serial and parallel ports.

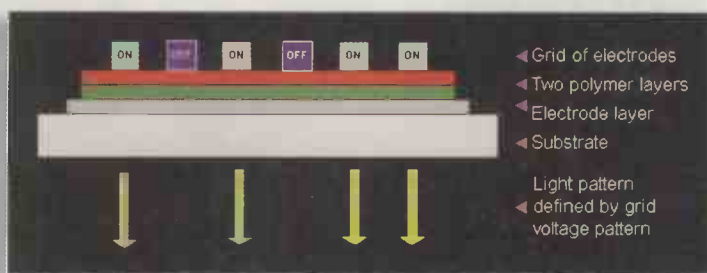
LEP into the age of electronic paper

A new display technology that could lead to something akin to electronic paper is emerging from the laboratory and into commercial products.

It uses light-emitting polymers (LEPs), which behave much like the light-emitting diodes (LEDs) used as status lights: they light up when a forward voltage is applied (diodes, like valves, resist current in one direction).

The difference is that LEP can be produced as a flexible sheet — and, crucially, it lights up only at the point of electrical contact. This means the pixels that make up an image can be defined by a simply-made pattern of electrodes.

An active matrix screen, by contrast, needs a self-contained transistor for each pixel. Current active-matrix screens are also only about three percent efficient — much the same as prototype LEPs, according to Cambridge Display Technology (CDT) business development manager, Mark Gostnick.



Light fantastic: the LEP screen in action

But LEP screens could become as much as 25 percent efficient — that is, a quarter of the energy they consume will be emitted as useful light. This will make them much easier on batteries and potentially as bright as cathode-ray tubes: CDT believes they could eventually see off the CRT. Other uses include virtual-reality systems and head-up displays.

Moreover, LEPs work in reverse: light can cause a current to flow. So LEP displays could become input as well as output devices, making them even more like paper. Also, different polymers produce light at a different wavelength, enabling the creation of colour screens.

CDT was set up to develop the technology, which is based on discoveries made at Cambridge University by Professor Richard Friend in 1989. Backers include the rock group Genesis and Cambridge University itself, but CDT is seeking further investment. Professor Friend, Cavendish professor of physics at Cambridge, is a director.

The first products, expected in 1997, will be unexciting back-lighting panels and numeric displays. Screens are not expected to appear before the turn of the century.

The relative ease of manufacture should lead to cheaper displays. But Gostnick said: "The launch price will be a commercial consideration."

CDT 01223 276351

Clive Akass



**Tim Bajarin
in the US**

Grist to the Pagemill

● Intel's Mike Richmond said recently that the Gutenberg Press ushered in the first age of publishing, the Mac ushered in the second, and the Internet is bringing in the third, which will change publishing for centuries.

Apple has made the Mac a great Net client, but has missed its role as a Net publisher. But a new Mac program from DTP pioneer Adobe makes Web pages very easy to create. You don't need to know HTML. You create content by editing it on the screen.

You can think of it as PageMaker for the Web. In fact, Pagemill reminds me of my first PageMaker demo in 1985 where I had a hunch then that this product would have a big impact.

It beats PC products such as WebMaster from Quarterdeck and Netscape's 2.0 Gold.

Apple needs to push this Net connection to its advantage, just as it did with PageMaker in the early days of desktop publishing. The Net could seriously impact Apple's ability to stay in the market forefront.

Tinseltown trivia

● Computer luminaries like Intel chief Andy Grove (and me) mixed with Hollywood stars for the world premiere of Disney's Toy Story in San Francisco.

It is a good family film, but notable mostly for being the first to be animated completely by computer. Here are some trivia:

The 110,064 frames took more than 800,000 machine hours to render and 500Gbytes to store. An individual frame could take between 45 minutes and 20 hours using 300 Sun workstations. The maximum weekly output was 3.5 minutes of film.

QuickView Plus looks good

Win95 users will have discovered by now that its QuickView viewer is a poor animal that gives you a crude text view of files in certain formats. (Many may not even realise that Win95 has a viewer: you don't get the module unless you go out of your way to choose it during the Win95 installation.)

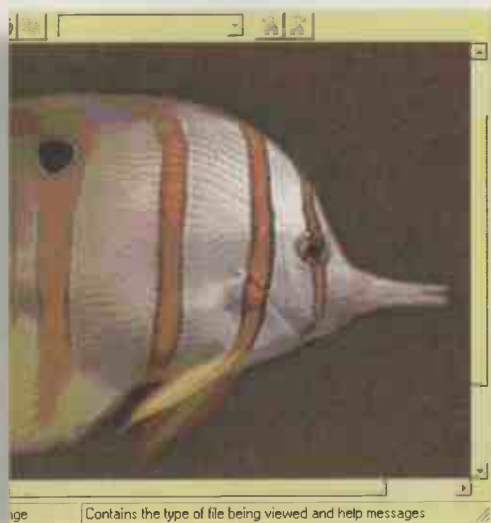
Microsoft licensed the

technology from Inso,

publisher of the Outside In viewer. Now Inso is offering QuickView Plus, which replaces the standard version in Windows 95 and allows you to scan graphics, spreadsheet, and word-processor files.

The facility is available in File Open boxes as well as the Win95 Explorer. It costs £39.99. A Win 3.x version is available.

Software Compatibility Centre 01344 885224



Short Stories

Stackable storage

● Digital has come up with two storage enclosures, which it claims offers a new flexibility for big users of storage. The idea is that you can mix and match from a range of mission-critical storage devices. Internal SCSI connections cut out the need for a mesh of exterior cables.

The smaller device accommodates two 3.5in devices; the other, four 3.5in devices and one 5.25in CD drive (or one 3.5in, one 5.25in and one CD drive).

Digital also claims to have boosted the performance of its StorageWorks RAID array by 67 percent.

Digital 0500 827140

Slow business

● The US market for PCs is almost saturated, and sales growth will stem from people buying second and third machines, according to a new survey.

PC sales are increasing faster in Europe and the Far East than in the US, says the survey by New York-based Link Resources. Up to four in ten US homes will have a PC by the end of the year, and more than one in ten will own two PCs.

Share deal

● Shareware programs and news can now be accessed via a new site set up by the International Association of Shareware Professionals (ASP) at www.asp-shareware.org.

WinFax Pro 7.0

● The new WinFax Pro 7.0 for Win95 includes over 100 new fax-based features to help non-technical as well as advanced users. It costs £99, or £35 for an upgrade.

Delrina 0181 207 3163

Quick fix

● QAS has announced Win95 versions of its QuickAddress Rapid and QuickAddress Pro address-processing packages.

QAS 0171 498 0303

Oracle announces new Web tools

On the day that Microsoft announced an avalanche of Internet initiatives, Oracle had an announcement of its own. Based around existing Oracle 7 server technology, the new Oracle WebSystem is claimed to bring a degree of intelligence to Web-based information on both the Internet and internal company LANs. WebSystem consists of the client PowerBrowser and an Oracle WebServer.

Oracle has released a beta version of its browser, PowerBrowser (available on Oracle's Web site) which is designed to run with Oracle WebServer.

A Basic interpreter and relational database built into the browser will interact with WebServer, allowing information to be updated on the fly.

Network Loadable Objects (NLO) written in Basic are

designed to turn static data into dynamic data including multimedia content. Intelligence can track a site for visitors' preferences and build a profile so that next time they log on, dedicated data is automatically loaded onto the PowerBrowser.

In keeping with the current spirit of co-operation (which really means that no-one wishes to be seen as the company that broke the open spirit of the Internet while secretly trying to gain advantage), Network Loadable Objects will be used to support Java applets and Adobe Amber which loads Acrobat viewers into Web browsers.

Oracle claims Power-

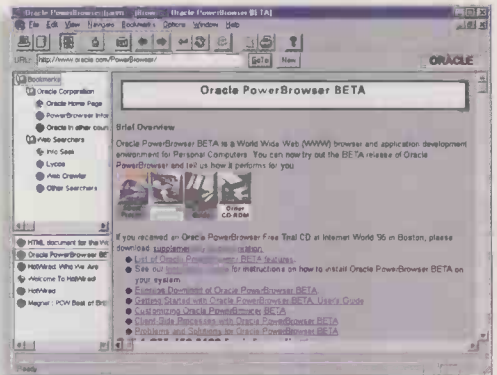
Browser will fully support HTML 3.0, and will submit its NLO and Database Markup Language (DBML) to the World Wide Web Consortium for approval as standards. DBML is designed to extend HTML to allow Web browsers to link to SQL databases.

PowerBrowser will later include a Personal Publisher option, a drag-and-drop HTML editor to create Web sites, and browser apps for use in PowerBrowser. PowerBrowser will be free but WebServer options will start at around £4,000.

Oracle UK 01344 860066

<http://www.oracle.com/>

• See Tim Bajarin, page 232.



Tulip tunes in to tomorrow

A new machine from Tulip confirms the belief of those who believe the notebook is evolving into tomorrow's desktop.

The Tulip ID-45 system box is only 3.8in deep and has notebook features such as two Type 3 PC Card slots (rather than an expansion board) and an exterior power supply that sits by your mains socket. It uses a DX4/100 chip but a Pentium version should be available next year.

Stereo sound and Ethernet connectivity is built into the motherboard. The ID-45, targeted for

front office use and special projects, also has sophisticated

power management which can be tuned to allow a network manager access at minimum power drain.

It comes with an elegant 14in swivel monitor, although Tulip UK's new managing director, Neil Grayston, said a future option could be a stand-alone colour active-matrix screen.

Tulip is also offering a 75MHz Pentium-based £1399 PC/TV, with a built-in 14.4Kbps modem, quad-speed CD, and sound card. Grayston claimed that frame-grabbing and other facilities put it ahead of rival models.

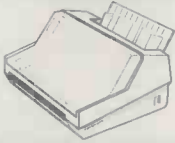
Tulip 01293 420200



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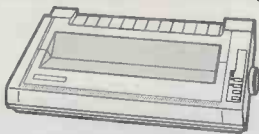
270Mb DRIVE, 4Mb RAM
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132 COLUMN



DATAPRODUCTS 24 PIN
Wide carriage dot matrix printer, 76 CPS LQ/216 draft, friction & tractor feed, parallel I/f. **£129.99**

132 COL + NLQ



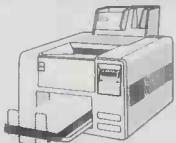
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PHILIPS CD ROM



CD ROM DRIVE CLEARANCE
CM 205, internal, s/speed **£34.99**
CM 215, bare drive, s/speed **£59.99**
CDD 462, external, s/speed **£49.99**

15PPM LASER



SEIKOSHA OP115 PRINTER
300 dpi, 1Mb RAM, 5 fonts. HP II, IBM & Epson modes. 250 bin, parallel and RS232. **£499.99**

£75 NLQ PRINTER



SAMSUNG 0912 DOT MATRIX
120 CPS + NLQ mode, IBM and Epson modes, tractor/friction feed, auto load. 1 year on-site. **£74.99**

SHARP UX-135



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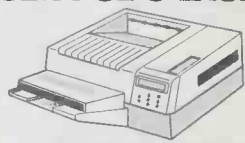
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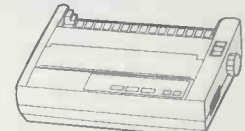
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200 CPS + LETTER QUALITY
67 CPS LQ, 80 col, 8K buffer, Epson & IBM modes, 6 fonts, tractor/friction feed. Parallel I/f. **£99.99**

WINPRO 486DLC



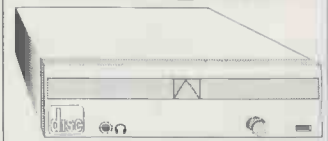
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Short Stories



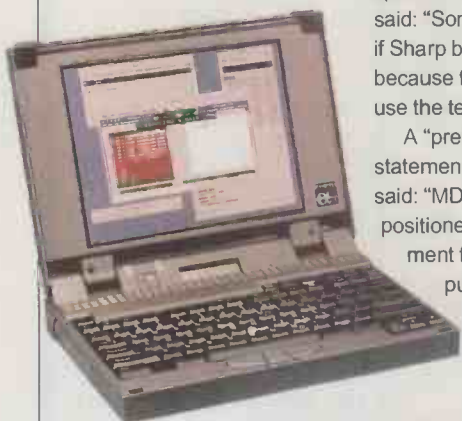
Act 3a

● Symantec has developed a version of its contact manager Act! for the Psion 3a organiser. It will cost £99, on either solid-state disk or floppy.

Psion 0171 262 5580

Slow business

● One in four businesses in the UK still lacks a PC — though six in ten of this minority plan to buy one within a year, according to a Compaq survey.



Tadpole packs Alpha power

● Tadpole has launched what it claims is the world's most powerful portable, the Alphabook 1, driven by Digital's 233MHz Alpha 21066 AXP chip.

It packs the power of an Alpha workstation into a rugged 7.151b notebook case. Prices start at £9550.

Tadpole 01223 428200

Foreign affair

● Ever had to deal with unmatched plugs and sockets or foreign pay phones when travelling with your notebook? TeleAdapt offers help, on a Web page, on world phone systems.

TeleAdapt 0181 421 4444
http://www.teleadapt.co.uk

SHARP CHALLENGES THE FLOPPY WITH CHEAP MINI-DISK DRIVE

Sharp is preparing a new challenge to the floppy disk with the launch of an internal 140Mb mini-disk drive with a factory price of around £130. Exterior and portable versions are also in the pipeline.

The "super-floppy" drive will take exactly the same £15 mini-disks that are used in the Sony Mini-Data drive, which costs more than three times as much. Sony originally announced its MD drive, which also plays audio mini-disks, as a successor to the floppy disk.

But Sony says it has no plans for a cheaper internal version of the drive. A spokesman for the company said: "Sony will be very pleased if Sharp brings out a drive, because the more people who use the technology, the better."

A "preliminary product" statement issued at Comdex said: "MD Data is being positioned as a floppy replacement for the personal computer. Also, a line-up of mini-disk consumer products is in planning (personal digital

assistant, still camera). Mini-disk will offer a single medium across many applications platforms." The statement said the new drives would go into mass production in the second half of next year.

However, the MD drives may still arrive too late to fight off rival drives from Iomega and Syquest, both taking disks of a

similar capacity, and the Jaz and MAXit drives (see below).

Initial specs of the Sharp drive do not enthrall: the data transfer rate is 150Kb/sec, about that of a single-speed CD, and the mean access time is 300 milliseconds.

Sharp UK said the drivers would not be available before the end of this year (96).

A new contender in the burgeoning super-floppy market is launched this month by Xyratex, the former IBM research establishment that was bought out by its UK management.

The MAXit drive will cost £356, or £311 for the internal version, and will take 540Mb magnetic disks costing about £40. As important for its prospects is the fact that it will read and write 230Mb Syquest disks, which have become a standard medium for exchanging desktop-publishing and graphics files.

But the MAXit will come against Iomega's Jaz drive, listed at \$499 in the US, which is likely to sell at much the same price with VAT when it arrives in the UK — probably before the end of March. The Jaz drive takes 1Gb disks costing about £60.

The MAXit will come out initially with a SCSI interface for both Mac and PC, but a parallel version will follow.

Xyratex 01705 486363



More for less: the world's first 36-bit flatbed scanner is halved in price

The price of Microtek's ScanMaker III, the world's first 36-bit A4 flatbed colour scanner, has been halved to £1499. It is bundled with Adobe Photoshop LE, Caere OmniPage Direct 2.0, Microtek's own batch scanning and colour correction software, and is fitted with a transparency adaptor.

An additional £100 upgrades Photoshop to the full version.

Scanning in 36 bits allows a greater tonal dynamic range and more subtle variations between shades.

Information can be lost during image corrections, but

starting with 36 bits at least ensures you get a good 24 bits. It's like a 130mph car performing well at 70mph.

In July 1995 PCW reviewed 18 A4 colour flatbed scanners including the ScanMaker III and the Agfa Arcus II, then the only 36-bit models available and both weighing in at around the £3000 mark with transparency adaptor.

Also at the same price was the 30-bit Umax PowerLook Pro, which beat the other two on speed and was only just pipped on quality by the Agfa; the PowerLook Pro has since

been upgraded to 36-bit. The Microtek, with a poor overall result, didn't come close.

At £1499 the ScanMaker III represents considerably better value than before, but now puts itself in the cut-throat end of the market. Consider the Umax S8 Pro at around £1500, or the countless wonders from Hewlett-Packard, Epson, Agfa, and again Umax, all under £800.

Gordon Laing

Microtek from Computers Unlimited
0181 200 8282; Agfa UK 0181 231 4200;
Umax from IMC 01753 830999;
Epson UK 01442 61144;
Hewlett Packard 01344 369222

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IBM 486 75MHz



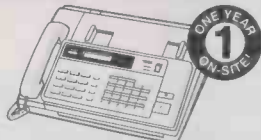
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PSION II XP



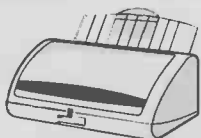
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SHARP UX-254



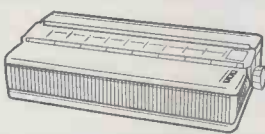
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OLIVETTI DM 282



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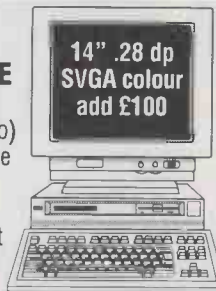


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- Lotus Write version 2 - word processor
- MS-Access ver 1 - relational database
- CA-Textor, SuperCalc & SuperDB for DOS
- CA-SuperCalc for Windows - spreadsheet

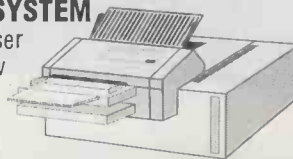


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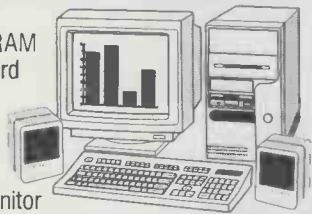


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SOTEC 486SX



COLOUR NOTEBOOK
25MHz chip, 210Mb removable drive, 4Mb RAM, dual scan colour, DOS 6/Win 3.1 **£699.99**

24 PIN PRINTER



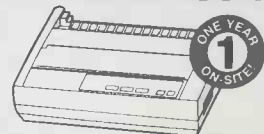
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SAMSUNG SP2417 PRINTER
80 col, 200 CPS/53 CPS LQ, 8K buffer, sheetfeeder. Colour kit/ribbon. 1 year on-site. **£149.99**

IBM MODEM



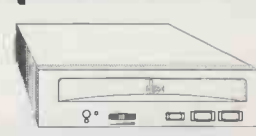
THINKPAD PCMCIA CARD
Type II fax/modem, 2400/9600 speed. US import with all software /manuals. Not BT approved. **£49.99**

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Virus experts in race to beat the macro bombs ...

Anti-virus experts are racing to plug the security gap caused by the new macro bombs. Major anti-virus packages now offer first-fix protection against known macro viruses like Concept, believed to be one of the most widespread viruses in the world only weeks after its release.

But no-one has yet come up with a foolproof way of neutralising any mischievous macro, whether or not it reproduces to qualify as a virus.

WordPerfect keeps its macros safely apart from its documents, but Microsoft cannot not do this without function-loss and major re-engineering.

Word macros become part of the document and are sent with it. Jimmy Kuo, senior virus researcher at McAfee's, says that even with Microsoft's help, deciphering the Word format has been a major problem

for researchers tackling the new threat.

Switching off Word's auto-execute facility defuses some macro bombs but does not prevent you passing them on; nor does it stop bombs that pose as an existing macro. But Kuo said: "One thing we have suggested to Microsoft is to have auto-execute off as a default, rather than the other way round."

A novice programmer could bodge up something very nasty using Concept as a template, but this very simplicity may have limited the damage.

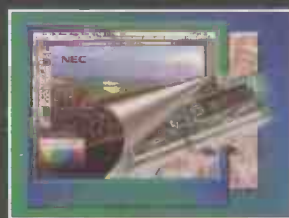
Carey Nachenberg, virus-engineer with Norton Anti-Virus publisher Symantec, said: "Most virus writers are aged between 13 and 24. They do it to show how clever they are. I think macro viruses are beneath their dignity."

● McAfee has just launched WebScan, which places

downloaded documents in quarantine while it checks them out. It can be downloaded on a try-before-you-buy basis from www.mcafee.com. It has also launched anti-virus products for all major operating systems including Win95.

McAfee UK 01344 304730

EDO modules



NEC has launched 4Mb, 8Mb and 16Mb SIMM modules using its new EDO chips, which are claimed to be 25 percent faster than standard DRAM.

NEC 01235 529595

... but the problem of power over security may be with us for ever

The macro-virus scare is only part of a wider problem posed by the new fashion for downloading mini-programs.

Java and the new net-ready Visual Basic languages produce mini-programs that can be downloaded and executed. Both can be run by browsers to perform a one-off task like presenting a form to be filled in by a user.

A macro-laden Word document is in effect also an executable file — unlike plain email, which is inert text. The danger with executables is that they may do things you know

nothing about, such as spying on your system.

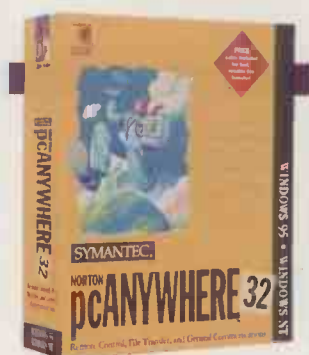
Both Java and VB designers limit what their products can do in host systems. But Norton's virus guru, Carey Nachenberg, believes Java may not be completely secure. "My guess is there are ways in which you can use Java that the designers haven't thought of."

Andrew Lees, Microsoft's desktop products manager, says you cannot have the full power of a macro language and absolute security. "Ultimately, you have to trust where you get a document from."

This is one reason why Microsoft is plugging the idea of digital signatures (see page 21) using encryption to guarantee a source. Lees said: "Downloading a file is no different from buying a can of beans from a supermarket. You trust that it is not poisoned because you trust the source."

A good point. Except that the Concept virus (see above) was inadvertently distributed six months ago by Microsoft on a Windows 95 technical disk. It is now among the most widespread in the world.

Clive Akass



PC Anywhere is going places

● Symantec claims the new PC Anywhere is the first all-32-bit remote-control module. It includes Norton's anti-virus software.

PC Anywhere supports various gateways and networks including a TCP/IP Internet connection.

The package can be used with Win96 and NT but not Win 3.1 (the rival 95-ready LapLink allows a Win95 machine to run a Win3.x one remotely).

Symantec 01628 592222

Teletext deal

● Compware is offering Teletext Viewer software for £50, and a suitable PC capture card for £169.

Compware 01223 425293 (evenings)

Multimedia start

● A new series from Andromeda Interactive aims to introduce children to the art of multimedia presentations. Each £30 CD carries stills, video, sound, and text clips on a theme like cars or space, plus a sophisticated Edit suite.

Andromeda 01235 529595

Spell tutor

● Starspell, a CD to help kids of all ages and abilities to learn spelling, is available for £50 from Fisher-Marriott. It is designed for use at home and in schools.

Fisher-Marriott 01203 616325



Short Stories

Pippin the Web post

● Apple president Michael Spindler showed the Pippin set-top box using Netscape to access Web pages, and described it as the first device capable of taking the Internet to the mass market.

Pippin, which uses a TC as a monitor, also incorporates a CD drive and can access online video and games.

SoundEdit16 upgrade

● Macromedia announced version 2.0 of SoundEdit 16, described as "a significant upgrade" to the audio package which runs native on the PowerMac.

New features include batch processing of files, and advanced compression.

128-bit PCI graphics board

● Number Nine has launched a 128-bit graphics and video accelerator for the Power Mac. The PCI-based Imagine 126 with 8Mb of VRAM supports resolutions up to 1600 x 1200 in 16.8 million colours. A 4Mb board costs £319.

Number Nine 01256 381194

Travelling modem

● Portable Add-ons has released a fax-modem approved for use in 16 countries. Software with the £259 Euromodem V.34 lets you change configurations easily for each country.

Portable Add-ons 01483 241333

Mac studio

● A Power Mac-based multimedia studio has been set up at the Abbey Road recording studio made famous by the Beatles.

Newsprint welcomes feedback from readers. Send your news and views to Clive Akass at clive_akass@pcw.cmail.com, compuserve.com or cakass@dial.pipex.com

Mac clones spearhead assault on Wintel reign

Several British PC makers are considering building PowerPC boxes rather than fight mega-boxshifters like Gateway and Dell, according to Motorola.

UK marketing manager, Gordon Stubberfield, says the company sees an initial market among businesses who plan to standardise on Windows NT, with its new Win95-style front-end, rather than the relatively untried Win95 itself. Unlike 95, NT runs native on the PowerPC.

But a wider market could be opened in the second half of 1996 with the release of products based on the PowerPC platform, formerly known as the Common Hardware Reference Platform (CHRP). This will run NT, Unix, OS/2, AIX and, last but not least, the Mac OS.

If it lives up to expectations, it could allow system builders to offer Macs at PC prices, with PC-style software bundles — and most importantly, be capable of working with cheap PC peripherals. One of the big

problems of owning a Mac has been the cost of add-ons; and a perceived benefit, especially among first-time buyers, is that the Mac OS is easy to use.

Moreover, there is a joker lurking in PowerPC pack. IBM has developed a chip called the PowerPC 615 that runs Intel code, native. In principle it works like the NexGen (see page 19), with an outer shell of hard-wired logic translating Intel code into RISC instructions for the PowerPC core.

A PC based on this chip could in theory be used by just

about any major operating system. IBM engineers are said to be struggling with the problem of getting it to switch operating systems without rebooting.

Motorola has signed a deal to supply PowerPC boards, using the 603, 603e and 604 chips, to UK distributor Flashpoint. Mark Hobbs, marketing manager of Flashpoint's parent Macro group, said several UK system builders are interested but it was too early to name names.

Clive Akass

Motorola 01628 39121;

Flashpoint 01753 538715



CHRP, CHRP... visitors inspect the new common platform at Comdex

Top 10 Windows and DOS

Product	Manufacturer	Last month
1 Encarta 96	Microsoft	-
2 Windows 95 U/G	Microsoft	1
3 First Aid 95 for Win95	RMG	4
4 MS Office 4.2 U/G	Microsoft	8
5 MS Cinemania	Microsoft	-
6 MS AutoRoute Exp UK & IRE	Microsoft	5
7 Magnaram 95	Quarterdeck	-
8 MS Office Pro 95	Microsoft	3
9 Dr Solomons Anti Virus Quarterly	S&S International	-
10 MS Plus for Win95	Microsoft	6

Top 10 DOS

1 Frameworks XE v1.0	Ashton Tate	-
2 Flight Simulator v5.1	Microsoft	2
3 PC DOS Version 7	IBM	1
4 MSDOS v6.22	Microsoft	-
5 Turbo C++ v3.0	Borland	4
6 QEMM 7.5	Quarterdeck	3
7 Norton PC Anywhere	Symantec	-
8 SimCity 2000	Maxis	-
9 Turbo Pascal v7.0	Borland	7
10 Pegasus Solo Accounts	Pegasus	10

Top 20 Windows

Product	Manufacturer	Last month
1 Encarta 96	Microsoft	-
2 Windows 95 U/G	Microsoft	1
3 First Aid 95 for Win95	RMG	4
4 MS Office 4.2 U/G	Microsoft	8
5 MS Cinemania	Microsoft	-
6 AutoRoute Exp UK & IRE	Microsoft	5
7 Magnaram 95	Quarterdeck	-
8 MS Office Pro 95 U/G	Microsoft	3
9 Dr Solomons Anti Virus Quarterly	S&S International	-
10 MS Plus for Win95	Microsoft	6
11 Uninstaller 3.0	Microhelp	10
12 Cleansweep 95	Quarterdeck	-
13 MS Publisher v3.0	Microsoft	-
14 CorelDraw 5 to 6 U/G	Corel	20
15 MS Office 95 v7	Microsoft	-
16 RAM Doubler	Connectix	9
17 MS Office Pro 4.3	Microsoft	11
18 Norton Anti Virus Win95	Symantec	-
19 CorelDraw 3	Corel	-
20 Smartsuite	Lotus	7

Figures supplied by Software Warehouse and relate to bestsellers for November 1995.

An alternative access

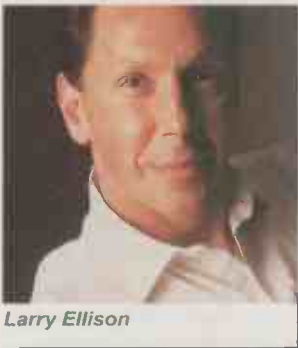
Oracle has seen the light and it costs only \$500.

Tim Bajarin reports on a new approach to home computing.

The PC industry has become complacent, following the Windows 95 launch. Conventional wisdom is that the computing world is ruled by Intel and Microsoft, with Apple getting a thin slice. Desktop power, already at what was recently considered to be mainframe level, can be expected to rise further to handle a new dimension of rich digital media types.

So a proposal by Larry Ellison, chairman of Oracle, for a \$500 PC has introduced a refreshing element of controversy. It involves a new approach to delivering information and entertainment to offices and homes.

Ellison sees his cheap,



Larry Ellison

rudimentary PC being used to access processing power as well as data; all the work will be done by the back-end server. The PC will be able to use any chip or operating system, thanks to a new network OS layer that will also work with the software running on the servers.

The most amazing part of this vision, apart from an entire shift in the computing model, is the \$500 access device on which Ellison is working. It will contain 4Mb of DRAM, 4Mb of flash RAM, a \$50 microprocessor, a \$50 ATM chip or similar network option, keyboard, mouse, infra-red port, PCMCIA slot, and monitor.

Ellison reckons he can build it for about \$330. Upgrades, debugging and maintenance will only need to be done at the server end. In essence, the user will rent the

operating system, applications and information. Instead of paying \$85 for an annual Windows upgrade, you would pay, say, a \$15 annual OS fee. The applications, or Java applets (see *Cutting Edge*, p232) would be cheap too, compared with most of today's prices. In addition, you would have an almost unlimited amount of information from the Internet and other suppliers.

Of course, this vision assumes a greater bandwidth than is generally available today, and a relatively inexpensive price. Ellison revealed his vision at a Comdex panel shared by Ray Smith, chairman of the Bell Atlantic phone company.

Smith said Bell Atlantic will rapidly deploy various high-speed data conduits to facilitate this type of computing model. It will push ISDN (64Kbits per channel) into the home, charging \$19.95 per month for the line and \$0.01 per minute during prime time, for use of the line.

Over time, to facilitate video-on-demand services, it will deploy ADSL, which can deliver 1.5Mbits/sec down the line with a 64Kbits/sec return channel (ISDN delivers 64Kb). In 1997 it will add VDSL, which can send up to 10Mbits/sec downstream and

640Kbits/sec upstream.

Both Ellison and Smith see the network as a computer accessed by a multitude of low-power devices. Microsoft chairman Bill Gates scoffs that there is no need, given the power available at the desktop and that the model would create a new generation of slaves to the mainframe.

One analogy is with real estate: Gates offers users land and allows them to build on it as they please, purchasing the plans and tools from him and paying maintenance costs. Ellison would be a benevolent landlord offering low-cost, low-maintenance apartments with the benefits of a personal residence.

Ironically, they could both be right. Ellison's view would bring computing to a whole new generation of users who can't afford a PC. And it could be applied to set-top boxes, handheld computers and other digital devices. Gates would give new versions of an OS and applications to users who could afford the more powerful desktop PCs and wish to retain independence from a network supplier.

The models will co-exist: exactly how, may come down to the demographics of each user. Nevertheless, Ellison's ideas should give the PC industry a lot to think about.



ANALYSIS

Ricoh points the way

Innovation last year in portable computing was limited to processor upgrades — except for the improved handwriting technology in the Newton and the DEC HiNote Ultra. But Ricoh showed off a really cool device called the G1200; an 8.5in x 11in colour tablet weighing only 4.5lb, complete with a built-in CD-ROM drive. I believe it could usher in a computing concept I call "personal presentations". The CD-ROM drive enables you to make elaborate multimedia presentations. And, with new software like Software Publishing's ASAP, you can even create presentations on the fly. The screen can be driven by a pen or your finger, but an auxiliary keyboard will be available.

The G1200 has two PC Card slots, so you can use it for comms as well. It will have a price of around \$3,500. But the concept is powerful, and prices could fall if other manufacturers take it up.

Some service; no smiles

We aren't receiving a decent level of customer service from direct sellers. Ben Tisdall asks why.



It's good to talk... if you can get a call-back

ANALYSIS

What level of service do customers have the right to expect from PC manufacturers who sell direct?

In the December issue we printed a letter from a disgruntled Gateway 2000 customer. Generally speaking, Gateway is one of the more respected direct vendors but the numerous letters we've received, outlining similar experiences at the hands of Gateway and others, suggests a problem.

The direct channel offers the advantage of build-to-order, but lacks the buffer of a dealer. Shouting down the phone at a faceless support person doesn't have the same impact as marching into your local computer dealership.

A recurring complaint is that manufacturers don't return phone calls, yet the larger direct vendors have sophisticated customer databases. When you first make an enquiry, your details will be added to a database. Thereafter, each time you call you'll be asked for a customer reference number of some kind.

At Dell and Gateway, for instance, the database holds a history of each customer, their past purchases and enquiries. Yet at Gateway, if staff promise to investigate and call you back, there's no alarm system to remind them.

The priority at every direct vendor, and often a hard one to meet, is to answer incoming phone-calls. If, as at Dell, illuminated displays are flashing on the sales and support floors telling you how many calls are waiting and then being lost, outgoing calls can easily assume a low priority.

Another common complaint is that the system is impersonal. A former Gateway

customer who now gives the company a wide berth, is Sam Phillips, the MD of a small multimedia developer. He complains: "You never get to speak to the same person twice. The best you can do is leave a voice-mail message. I must have called 20 times about two hard drives I was buying from them."

John Shephard, Gateway's UK and Ireland country manager, says Gateway is considering "buddy systems" so that small groups of sales or technical support people cover for each other, but points out that Gateway's long trading hours make it impossible to guarantee that the same people will always be available.

But it's clear that at Gateway, major corporate accounts expect, and get, a better service than the little guys. "With major accounts, one of the initiatives is a dedicated team. Three names are given out to major accounts," admitted Shephard.

Most of the direct manufacturers aim for delivery times between five and ten working days. In an industry where product life-cycles are measured in months, supply problems often mean they are unable to meet these commitments.

Paul Berry, MD of Simply Computers, cites the case of 540Mb hard drives: "You'll see them advertised in your magazine, but you won't be able to buy them," he said. The drive manufacturers, it seems, have already made the transition to 1Gb as the entry level, even though they're more expensive for consumers.

Gateway, for instance, is

currently at the receiving end of a worldwide shortage of the high-end 4Mb WRAM Matrox Millennium graphic cards. Each day, update sheets are passed from operations to the customer response team which then hits the phone to alert customers about shortages and delays. At the time of order placement, customers are invited to check on its status by calling a freephone number while they're waiting for their machines. It sounds fine in theory, but combine a peak in demand, a large intake of new staff, shortage of components, Gateway's decision to move its third-party support from HP to ICL and the sheer bad luck that is bound to befall a proportion of customers, and the potential for disaster is considerable.

Credit card authorisations only last for nine days, at which point vendors are forced to take the money or reject the order. But we've heard from readers who've had to wait six weeks for kit to arrive.

According to Howard Davis, at market research company Context, "The general trend within the industry is for margins to be squeezed. This is pushing down product reliability, which surfaces as customer support calls. The vicious circle is pretty clear."

Users are able to buy increasingly powerful PCs for lower and lower prices. But it seems that if you buy direct, you can't be certain of receiving a level of service and support which the customers of any high street department store would take for granted.

IT'S NOT IF, IT'S WHEN

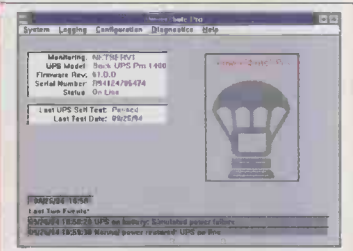
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If you're about to invest in a new multi-tasking operating system like Windows 95, experts say it may be time to invest in APC protection. Why? Because bad power is the largest single cause of data loss, and on a multi-tasking system, your vulnerability is multiplied. When full protection is as affordable as a new mouse, it just doesn't make sense to leave your premium machine unprotected.

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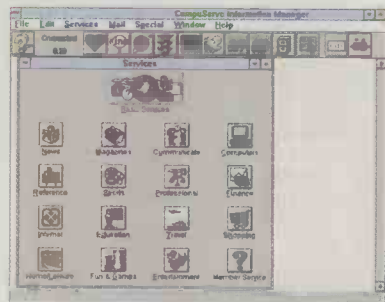
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The price ISDN't right

Web-surfing by modem is like watching a film projected erratically at one frame per second: you get only a flicker of the possibilities. Modems were fine when almost all online activity was text-based, but even modest graphics on a Web page are enough to overwhelm the fastest 28.8Kbits/sec models. Modems are yesterday's technology.

Today's readily available technology is ISDN; an all-digital phone link which gives you 64Kbits/sec per channel (you get a minimum of two channels) and allows you to chase those hyperlinks almost as easily as turning the pages of a book. Better still is a leased line such as the one we have at PCW; this effectively puts you online permanently so that the Net becomes like an extra hard disk of infinite capacity.

Basic ISDN is more affordable for most pockets; or rather, it should be. An ISDN adaptor can now be bought for under £200, the price of a fast modem, and ISDN running charges are similar to those of a standard line. But the start-up cost is still high. You may need to buy adaptors to use your fax machine and voice phone, which are designed for standard analogue lines, or pay extra for a PC ISDN interface with analogue jacks built-in. BT can charge £400 to plug you in (see *Newsprint*, page 21) — up to ten times the price of an ISDN link on the continent.

There are no plans to reduce prices, according to BT's ISDN business development manager June Campbell. "We already lose money installing ISDN lines," she told me last month. "They cost us more than we charge." Low sign-up charges on the continent, she continued, are offset by high online costs, so British Telecom works out

ISDN technology is more affordable, so why does BT charge so much for its fast digital lines? Clive Akass reports.

cheaper in the long run. And, she claimed that although ISDN takeup is far higher in Germany and France, most lines are used like conventional analogue links. "The number of people using ISDN for purposes such as fast file transfers [for which it was designed] is actually higher in the UK."

Bob Jones, MD of ISDN specialist 3Com-Sonix, dismisses these arguments. He says: "BT loses money on installing a standard line and makes up the cost in line rentals. No-one will mind paying a little extra per minute for ISDN, but they will balk at paying £400 to sign on."

In a sense, the argument is already out of date. Basic ISDN can cope with the low-resolution pictures and small-frame video clips that the Web throws at us today. But, whatever the BT salesmen tell you, a single 64Kbit channel is too slow for high-quality video-conferencing and other, demanding, multimedia data; a magazine-standard colour picture can still take you minutes to download.

Sooner or later we will be viewing 64Kbit/sec ISDN with the same faint amusement with which we recall 64Kb memories, and wondering

how we coped with so little.

There is no technological reason why every home cannot have a cheap 2Mbits/sec or 10Mbits/sec fibre link.

Britain is well placed to lead the world in online services: we're small enough to wire up relatively easily and wealthy enough to afford the long-term investment; we speak the international language and our comms infrastructure is in some respects more advanced than that of the US. Additionally, our TV and radio services, and thus potentially our online content, are among the best quality in the world.

Bill Gates said at Comdex that data networks need initially to go through a "mid-band" phase because online services are not yet generating enough money to justify massive investment in a broad-band infrastructure.

That may be true of the US (though see Tim Bajarin's *Analysis* on page 31), but politicians in Britain are more likely to question whether it is in the national interest to wait for revenues before investing. Just as they might soon start to question whether it is in the national interest for BT to discourage ISDN.

● BT ISDN helpdesk 0800 181514



A 13th-century map, from a British Library CD, indicates the wealth of unique material Britain has to offer the online world

ANALYSIS

Adaptor or modem?

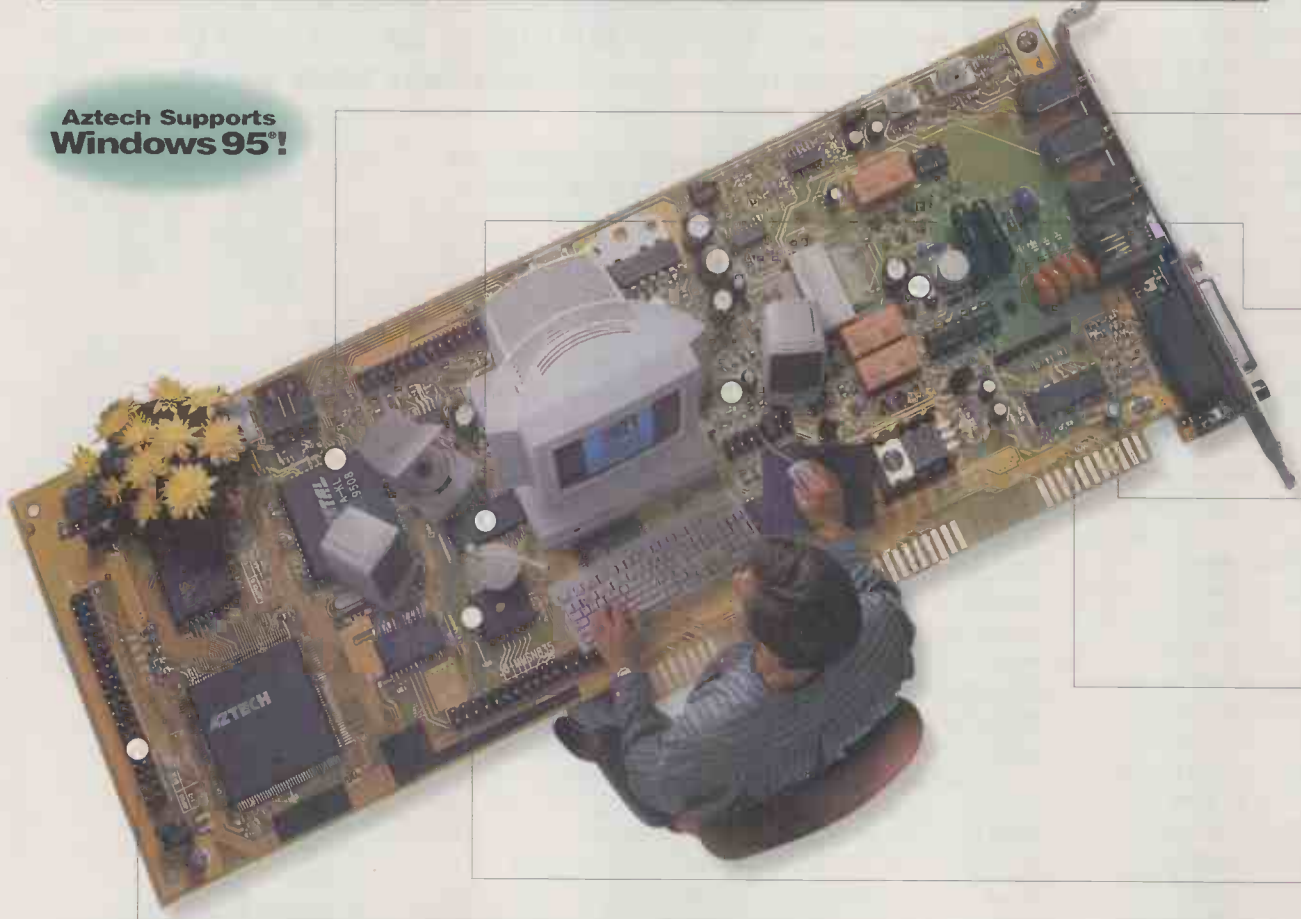
There is some confusion over ISDN terminology. A conventional phone produces an electrical analogue of sound vibrations; a modem allows you to pass digital data down an analogue line by MODulating an audio signal at one end and DEModulating it at the other.

A basic ISDN adaptor does neither because it links a digital device (such as your PC) to a digital line. Nevertheless, it is often called an ISDN modem. More confusing, an adaptor may include a kind of reverse-modem which digitises an analogue signal, and vice-versa to allow you to use analogue devices like your old phone and fax machine. (Fax data thus passes from digital to analogue and back again before transmission.)

All-digital fax machines and phones will drop in price when ISDN use is widespread.

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Computations

WILL the information age save the planet?

Computerless wartime Britain defeated Nazi Europe while importing a mere six or seven supertankers of paper products a year.

Who's playing master-race today? We are. Heavily-computerised, we import at least 24 supertanker loads of printing paper alone. Even our domestic production of printing paper is currently three times the gross imports that sufficed for World War II.

The chip has saved energy, not trees. While executive men wring their hands about mayhem in the temperate forests, secretary women press buttons on chip-powered printers, copiers and faxes. Less than 50 transmission reports exhaust a typical fax-roll without conveying a single message.

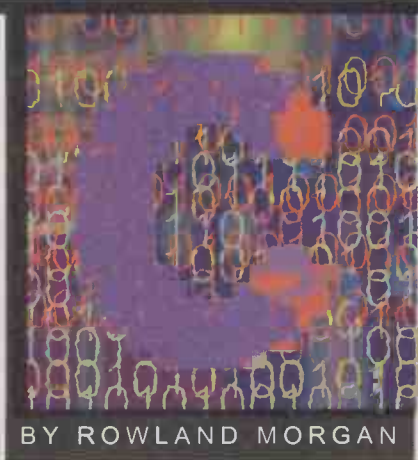
UK-made printing paper only contains 11 percent recycled fibre, most of it industrial, and the guarantees on most machines ban fully-recycled paper. The Canadian province of British Columbia, a major UK supplier, has cut more wood in the last two decades of computerisation than it did in the preceding 100 years.

Eco-printer maker, Kyocera, expects a modest-sized network printer to use a stack of virgin paper tall enough to punch a hole in the ceiling every month (25,000 sheets). Offices in the USA now generate more than 775 billion pages of paper per year. That's about six million sheets per working minute, or a stack nearly one kilometre high. A year's US office paper would stack 12,000 times higher than Mount Everest.

In the midst of this improbable scenario, the UK's £40 billion-a-year environment administration has no hard paper-recycling target for business, and zero statistics on volume, although many collecting outfits struggle on through wild price fluctuations.

Hopeful visions of a paperless office accompanied the arrival of the personal computer, but soon faded. It seems likely that the vision of an Internet future that cuts paper use will prove equally fantastic unless heroes emerge to impose the 50 percent recycled fibre-content requirement in office paper that common sense dictates. The Government could make a start with its paper purchases, worth £64 million a year.

● Sources: CSO Fighting With Figures (657 Kilo tonnes in 1942, 573 Kilo tonnes in 1943)/Euromonitor European Marketing Data & Statistics (1.5 million tonnes)/Kyocera Electronics (UK) Ltd/IEEE Environmental Forum 1994/UK Paper Federation (Graphics papers: 4.2 million tonnes used, 1.8 million tonnes produced)/Demos.



BY ROWLAND MORGAN

CAN computerisation remedy this anomaly?

BT offers a £100-£400 CD-ROM, and an online service costing five to seven pence per number-search which 12,000 big subscribers use. It's considering discounts for forfeiting the right to a book, but it means paying for what is now free. It's clear that the directory should be a Web site that is free, like the books. Three million Internet subscribers would cancel at least 3,000 tonnes of phone books straight away. It's been working for ten years in France where the Minitel network, linked to the phone system, saves by comparison 10,000 tonnes of paper a year.

● Sources: HoC Official Report vol 267 no 5 col 77/BT/Teleshare 2000/Quid 1995, Robert Laffont, Paris.

STATELLITE

All Britain's present energy needs could be met with hydrogen from one percent of its water supply.

● Source: The Worldwatch Institute: State of the World 1995.

EVERY mobile phone contains a toxic battery that must be scientifically reclaimed every 18 months. Most of them are still dumped.

There are 3.5 million British mobiles; more than all the handsets Britain had when Alfred Hitchcock moved to Hollywood. The USA has over 40 million; three times as many as Mexico's conventional phone system. By the year 2000, over 100 million will be in use worldwide, and there will be as many mobiles in Britain as conventional telephones in the whole of India. There'll be a mobile for every fourth adult in America. Japan will have more mobiles than all the telephones in China. There may even be a clockwork mobile phone, designed by my neighbour, clockwork-radio genius Trevor Bayliss. But worldwide, eight out of ten people seldom use any kind of telephone.

● Sources: Marketline/Euromonitor/Baygen Ltd/Panos

SAMPLE GREEN CONFIGURATION

Printer: Ecosys FS-400. No cartridge. Low ozone emissions. Recycled-paper friendly. Low wattage. Computer: Colossus P133. Energy: doze and standby options, Energy Star 8W-80W. Radiation: CE regulation low. Recycling: company motherboard scheme.

STATELLITE

Experts on recycling listed in the University of London's A-Z of university experts (covering more than 3,000 areas of expertise): 0

● Source: University of London A-Z of Experts.

HOW many people in the world really count?

Novelist Will Self recently claimed that for him it was fewer than half a dozen. Whether or not they count, people want a telephone, and 91 percent of UK households now have one, totalling nearly 21 million residential exchange lines. And all of them qualify for at least one telephone book. Adjacent areas can qualify, and in a London borough this can mean 19 free books for one line. A business with 500 lines, averaging over 7,000 calls a working day, can receive pallet-loads of phone books. BT actually has to advertise for subscribers receiving too many to cancel them.

The nation's telephone books use 61,000 tonnes of paper a year, and delivering them would require a 40Km jam-up of 2,650 juggernauts.

Every 18 months, BT prints 20 million new books using anything up to 77 percent non-consumer-recycled fibre. On this basis, when the Chinese reach British levels of telephony they'll be using 1.2 million tonnes of paper a year for phone books — nearly the whole of UK graphic-quality production.

STATELLITE

A conventional personal computer produces about 16 times its own weight in global-warming gases per year.

● Source: Edwin Datchesski at the Environment Council, London (0.8 tonnes CO₂ from electricity generation).

Happy New Year

To all our customers

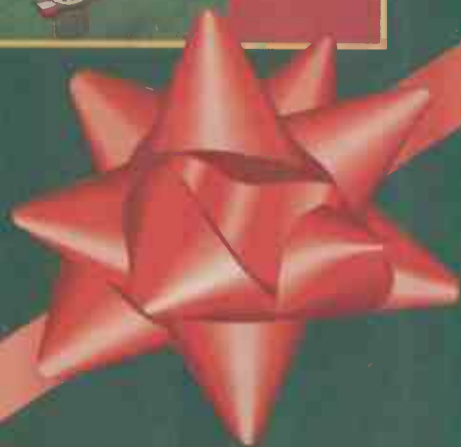


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Sounding Off



Michael Hewitt

Just as all new microwave ovens now come supplied with a Delia Smith or Sophie Grigson opus, so multimedia PCs tend to arrive bundled with numerous free CD-ROMs. Some programs can be moderately life-enhancing. But in amongst the gems, there's always the CD-ROM equivalent of Noisettes of Tabasco-marinated Guinea Fowl with Prunes — something you try once, spit out, and give to the dog. This is how I'd classify the majority of PC voice recognition programs.

Back in July, a few weeks after having taken delivery of my current hardware, I yielded to temptation and installed a freebee that had come along with it.

As you're probably aware, they all work in much the same way: you say "Excel" into the microphone, and it automatically fires up Word for Windows; then you say "PaintShop Pro", and it formats your hard disk... and so on. Anyhow, the thing stayed on my PC for ten minutes, five of which I spent persuading it to turn itself off.

Since then, I've been cautious about such strokes of technological genius. So when IBM said it was sending round a machine loaded with its "revolutionary" VoiceType system, I took the usual precautions of hanging garlic around the door frame and installing a crucifix.

As well as voice-activating keyboard and program functions, VoiceType also converts spoken English into typewritten text. That's the theory, anyway. I suppose some authors would get their rocks off by trying to write their column using it? Not me. That's not to say, however, that the system doesn't work; it does — to a degree. It's just that, having spent several days playing with it, I came away thinking (as you do of microwave egg-poachers): "Nice, but what is the point?"

VoiceType requires a 486 or better, at least 16Mb of RAM and a spare grand for the special card and software. Once you've got these elements together, you kick off with the so-called Enrolment session.

Presumably, VoiceType is attuned by default to the sound of a US West Coast drawl. Therefore during

Enrolment, you've got to teach it to recognise the voice of someone who talks proper. This takes about three quarters of an hour — if you come from Glasgow or Birmingham it doesn't bear thinking about — and necessitates reading 120 simple sentences into the machine.

Having done this, you've then to go away and occupy yourself for three or four hours (trying to find something good to say about Microsoft Network, for instance) while the computer processes your words of wisdom and sets up recognition algorithms. But then, it's showtime.

Unfortunately, you can't pretend to be Jean-Luc Picard and speak to the computer in your everyday voice. Instead, you've got to make like Vincent Price in "The Abominable Dr Phibes" and carefully enunciate each word separately ("Six — killed — you — Victoria, — my — beloved, — so — six — shall — pay — the — price — and — die!"). This is a pain in the arse, but if you can manage it, your words are converted, as if by magic, into text on your computer screen.

Well, perhaps 95 percent of the time, they are. VoiceType's built-in context analyser allows it to distinguish between homonyms such as "there" and "their" fairly well, which makes occasional stupid errors all the more irritating: "Tax person liquidators" for "Thermal image cameras" and "wayside" for "VoiceType" are but two that spring to mind. And, this is after several hours of training the system, too.

OK, so the technology is in its

infancy and that's to be expected — no matter. But this brings me back to my first question: what is the point? Certainly, for disabled people such a system (once perfected) would be ideal. But why would anyone want to use it in a business or journalistic environment?

Some would argue, as IBM does in its promotional literature, that you can speak faster than you can type. Yes, if you say the first thing that comes into your head, you can. Maybe *Sun* columnists are a ready market for this sort of technology. But for the rest of us, a keyboard forces us to pause and reflect; to think about what we want to write. What about people who haven't learnt how to use a keyboard? Well, instead of shelling out well over a grand for VoiceType, why don't they just pay £60 for *Mavis Beacon Teaches Typing* and take a couple of weeks to learn?

Don't misunderstand me. I look forward to the day when I can talk to my computer, but I want to be able to say: "Computer; turn on the television... defrost my vegeburger... take us out of earth orbit..." and that sort of thing. Otherwise, I regard speech recognition as technology for technology's sake. And having thus declared my position I can now *guarantee* that in five years time, everyone will be using it.

Don't you get irritated by journalists who use their columns to plug their own products or books? I do. There's no way that I'd say anything along the lines of: "If you've got any money left after Christmas, why not buy *Travels with a Laptop*, by Michael Hewitt (ISBN 1-85032-164-7) available for £9.95; a handy laptop companion that, in non-technical language, demystifies modems, acoustic couplers, phone plugs, and communications software to help you communicate from anywhere in the world via your laptop."

Aah, would that others had my level of self-control. ■



The Sharp JX-9200 laser printer. Good for business. Bad for inkjets.

Laser printers have always been good for your presentation, but not quite so good for the annual budget. The new Sharp JX-9200 is set to change all that. After all, at only £299* you can now have a laser printer for the price of an inkjet.

What's more, we've lowered its operating costs by creating a new system that doesn't use any developer and continually recycles the toner. Because there's no waste, the cartridge lasts longer.

You'll also be pleased to learn this won't affect the definition of your print, in fact, it's

better than ever. (Especially the JX-9210 which has 600 x 600 DPI.)

With its fast print speed of 4 pages per minute and a rapid first page print out of only 28 seconds, the JX-9200 will save you time as well as money.

That's not all. The JX-9200 is compatible with all versions of Microsoft Windows™ software†, including Windows 95™.

Combine this with the 'Graphic User Interface' and you've got a printer that'll actually talk you through the entire printing process. So even if something goes wrong, the

problem and the solution immediately appears on your PC screen. What's more, the JX-9200 also happens to be the smallest laser printer in the world. Not only can it print on a sheet of A4, it can actually sit on one.

So if you're a growing business, why not invest in the JX-9200? At £299*, it'll certainly look good on paper.

To find out more call free on 0800 262 958, quoting reference PCW H1.

SHARP
INTELLIGENT THINKING

Homefront



Tim Nott

Of all the talismans and trinkets that you need to carry around to live a full and active life, which would be the worst to lose? Consider the following nightmare scenarios — feel free to tick as many as you like.

(A) You have driven to a remote spot in the highlands, locked your car, gone for a bracing walk and returned to find that by some inexplicable and previously unnoticed accident, you have dropped your keys somewhere among the heather of Ben Doon and it's starting to get dark.

(B) You queue up at the check-in desk for your flight to San Francisco. For the seventeenth time that morning, you feel inside your coat pocket for your passport and ticket and... *for the first time*, they are not there any more.

(C) Your notebook PC greets you with a cheery: "Cannot read from drive C:"

(D) You sip the last of your coffee and brandy and reach for your credit card to pay the impressive bill, incurred wining and dining the boss's daughter/son... it has vanished.

(E) You stagger from a taxi at 3am outside your house, and search your person for the cash needed to pay the driver. It seems to have disappeared. Never mind, you know you have a tenner stashed behind the clock on the mantelpiece so you reach for your front door keys and... yup, they've gone, too.

(F) You are standing, in the moonlight on Westminster Bridge, having just exchanged phone numbers with the most wonderful person you have ever met in your entire life. As you embrace tenderly for the first time, your elbow knocks your Filofax from the stone balustrade and into the Thames below.

Yes, well, it brings me out in a cold sweat just writing about it. But never mind — the day is coming when you won't need to carry all these artefacts around. I have been reading Bill Gates' vision of the future.

The Wallet PC will do away with things such as cash, tickets, keys and queuing. Book a flight and your reservation will be recorded in your Wallet; just wave it at the departure gate and you'll be through. Wave it at your car or house and all will be unlocked, just for you. Wave it at the waiter or taxi-driver and electronic cash will trickle from your pocket to theirs. It will do all sorts of other tricks, such as make phone calls, tell you where in the world you are, and take photographs.

This is all fine and wonderful, and it would be churlish of me to point out that like so many of Bill's visions ("A computer on every desk; a computer in every home") it does give Microsoft the opportunity to sell millions of new operating systems. But there is a more serious snag to this vision. What if you lose the Wallet PC? No tickets. No money. No credit. No keys. No identity. You will be an un-person.

Protest all you like as airport security escorts you gently, but firmly, from the departure lounge. Watch powerlessly as the authorities tow away your car. You don't have the key to open or start it, or any identification to show that you are the owner. You don't have any money to make a phone call but even if you did, the

phones don't take cash, anyway. You spend the rest of your days living in a cardboard shanty town with other, Wallet PC-less travellers, on the outskirts of the airport. Such nutrition that you are able to scavenge consists of cold, leftover in-flight meals from also-ran airlines with poor security.

But the *really* chilling thing is that you won't have to lose your Wallet PC in the physical sense at all. Suppose, by one of those incredibly unlucky coincidences that affect computer users; Something Goes Wrong? There you stand, horror-struck, reading the message on the Wallet's screen: "Ticks.EXE has caused a General Protection Fault in Passport.dll and will be closed down. Cannot open Money.doc, drive C: not responding. Phone.EXE cannot communicate with COM:1. You are at departure gate 17, Gatwick South. Do you want to take a photo?"

Fortunately, Bill Gates is not the only visionary. Instead of the Gatesian "one gizmo does everything" approach, Nicholas Negroponte, of the MIT Media Labs suggests taking everyday objects and making them smarter. You don't need door keys, not because they are incorporated into some whizzo personal accoutrement, but because your front door recognises you. It opens without you having to put down your shopping, turns on the lights and puts the kettle on.

And thanks to the brainpower of AND, the Dutch software house, frequent travellers at Schipol Airport have for some time been able to use a smartcard-cum-fingerprint scanner to bypass the formalities. And though there's not much chance of getting a GPF in your finger, the card stores two "back-up" fingers. Now, that's what I call being digital. ■

DECISION MAKER



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"If you're looking for an easy-to-use program for applying powerful query and thematic tools to map data, Atlas GIS has the advantage."

InfoWorld, September 19, 1994

"Atlas becomes the value leader in the growing Windows desktop mapping market."

J. Steinburg, Business Geographics, October 1994

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Straight Talking



Barry Fox

Japanese electronics factories practice a draconian system of quality control (QC). The production lines check progress through all stages of manufacture but independently the company's head office employs its own staff who work in a separate area of the factory.

It's their job to take random samples of the finished products, and check that the factory has not missed any problems. To the factory staff, these QC inspectors are the enemy. This is why most Western electronics companies have folded, been taken over by Japanese companies or adopted Japanese working practices.

Apricot's first range of PCs were beautifully styled, but because a resistor in the power supply was under-specified, they overheated and broke free from the circuit board. If Apricot had soak-tested a few PCs the factory would have known to change the resistor for one with a higher Wattage rating. Instead, Apricot's customers had to find out the hard way. Then Japan's Mitsubishi took over.

Look on the back of most Western brand or no-name hardware, and you will see a label admitting that the product was bought from factories in Taiwan, Korea or China. Unless their own company name is at risk, these factories will often cut corners on QC. Before long, most PC hardware will be made in Japanese or Korean-run factories, and carry Far Eastern brand names; consumers can only benefit.

The Western software publishers will last longer, simply because of the language and cultural barriers. So our only hope is to shame or bully them into practising QC, with a positive feedback loop between the customer helpline and the developers.

In the eighties, Quarterdeck developed a terrific program called Desqview which allowed multitasking

with DOS programs. Desqview came with a memory management system called QEMM and a good analysis tool called Manifest. It was a winning combination. But thanks to Quarterdeck's rotten marketing, Microsoft had time to make Windows 3.1, DOS 6 and Memmaker work well enough to bring Quarterdeck to the point of collapse.

Now, under ex-Phillips, ex-Apple, Gaston Bastiaens, Quarterdeck is riding high again with some good new Web and utility products. All the company needs now is QC with a feedback loop into the developers. For years there was a truly stupid problem with QEMM. Although Setup is gloriously easy and automatic, it leaves some machines with a big "WARNING" message that comes up on every boot. It tells the user to modify Config.sys by adding the parameter SH:N because there is no Shadow RAM.

If the average Joe, who bought QEMM on the promise of simplicity, tries to edit his Config.sys with a wordprocessor, he risks adding control codes which upset bootup. QEMM routinely makes a lot of other changes to the user's Config.sys. If it is smart enough to detect the No Shadow RAM problem, it could perfectly well make the extra small change to Config.sys. A QC checker would spot this kind of nonsense. I've raised it many times, but the WARNING is still there in new QEMM Version 8. A QC checker would never have let Quarterdeck's European office release the latest version of the Cleansweep uninstall utility with a promise on the box that it

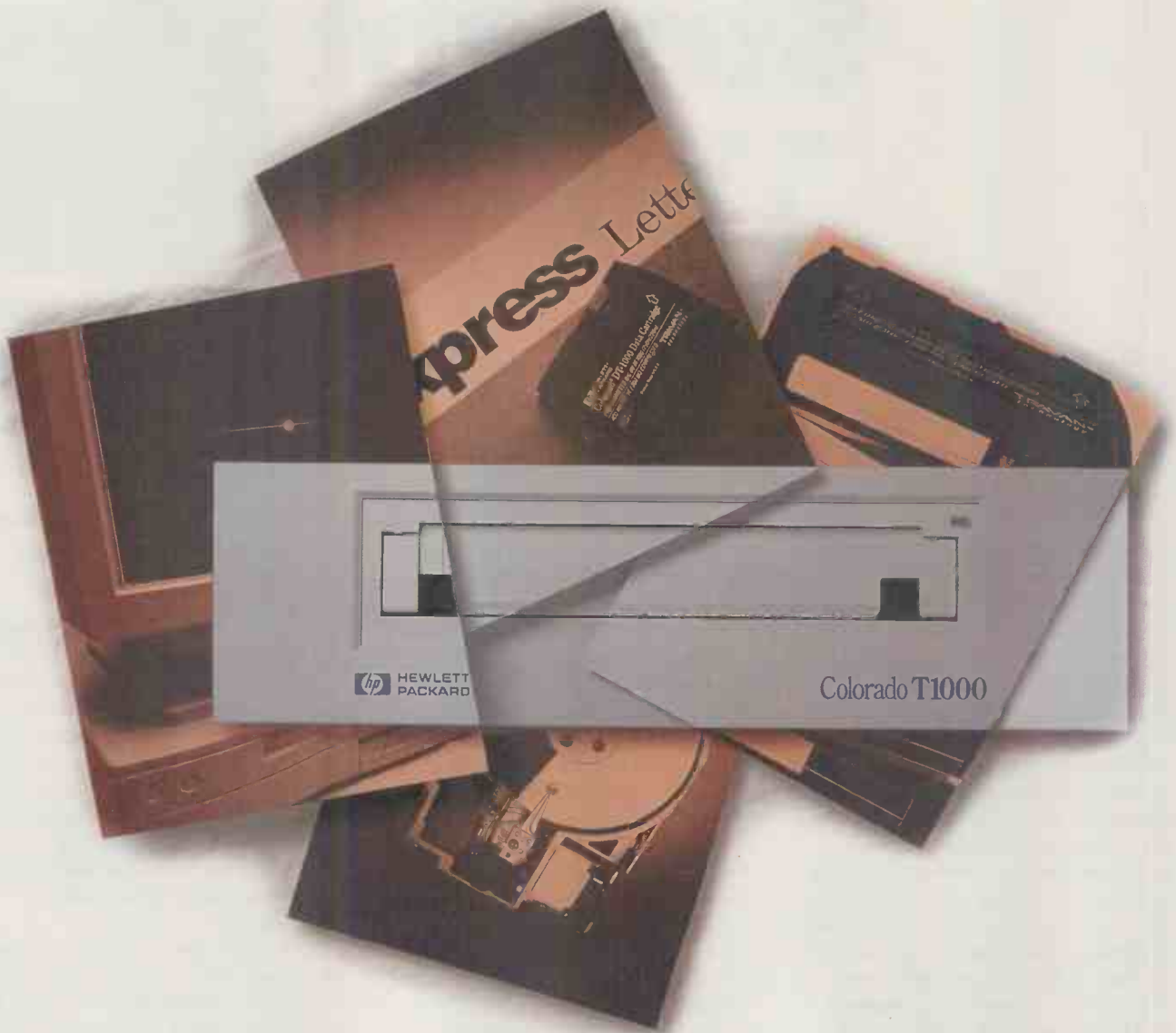
works with Windows 3.1, when in fact it doesn't. (Tip: ask for a voucher which entitles you to a free Windows version when it's ready). Nor would the European outfit have released a batch of CD-ROMs which contain Quarterdeck's Mosaic but won't install because the serial numbers on the jewel box are wrong. (Tip: Try changing a "c" for "0").

Canon can't. Even the Japanese lose sight of QC when they sell software, probably because it is sourced outside Japan. Canon has admitted to me that there is no known way to stop some of its Colour Bubblejets printing text in jumbo font from Window's Notepad, and throwing up errors on large files. Windows is hardly an obscure program. Printing edited ASCII from Notepad is hardly an outrageous requirement.

Netscape's Jim Clark seemed a sensible chap. He's now selling his famous browser in a shrink-wrap package. On installation I got a long error message, telling me that it wouldn't install on a PC with Win32s. In the UK, Netscape can't help. But there is someone in the US who helps journalists get their systems working. Sorry Jim. What interests me is what help can the customer expect from a local phone call, not what a company will do to help journalists write unreal reviews.

For years I've used and recommended Norton Commander as a great way to manage files. Recently I loaded the new, improved, Version 5. The improvement is that it needs more free base memory, so it gives error messages and runs slower on systems that worked perfectly well with previous versions. After several weeks, Symantec was unable to explain the thinking behind this unique strategy of product enhancement, quality control and customer satisfaction. ■

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Business Matters



Nick Beard

Document imaging systems are to be avoided. They are expensive, troublesome, and tend to be used to avoid the real effort of putting document management strategies into effect. We have one; for other reasons.

Here's how it works. Last month I wrote about the work we are doing in piloting the "client/server" version of our clinical workstation. As regular readers will know, I am employed at a medical centre in Scotland.

We have installed an integrated suite of clinical information systems, enabling us to operate mostly without paper medical records. The systems, mainly from the Cerner Corporation, run on a Digital VAX 7620. We use PCs to access the applications. The GUI workstation is X-based. Replacing X with MS Windows requires careful planning, and knock-on effects of each adjustment in a sensitive system must be anticipated.

This is not the only client/server applications work in progress. Our financial systems suite is also being prepared for the shift to Windows, and there are several data-access applications we have built in Visual Basic and Access to enable easy access to complex data. Working with Crystal Reports, our programmer has been frenetically trudging through the mire of management reporting to produce a simple "executive information system".

Document imaging systems allow documents to be captured into electronic information systems as pictures of the original. It is akin to faxing the document into your computer. Cerner does not provide document imaging so we use Image Engine from Imnet.

The elements of a document imaging system are scanning, indexing, storage, retrieval. There are

refinements to these elements (such as quality control of the scanning and indexing processes, or stored-image location-management) but in essence these are the main areas. Scanning takes place either on demand or retrospectively. Once a system is in place, continuous scanning is probably the best approach, preventing a backlog of pages. One of the main attractions of document imaging systems is the relative ease with which document legacies can be brought into the modern systems fold, so bulk scanning of old records is usually necessary. Scanning is a potentially laborious process; the documents must be organised, sequenced and labelled.

The "context" in which a document is viewed may be lost on-screen. It's easy to recognise a page as the fifth in a paper file, and the subject matter may be gleaned by flicking to the first page. But this isn't always the case in poorly designed document viewing systems. Scanning quality is a crucial early step in the overall process. We use a scanner with a sheet feeder and hardware compression.

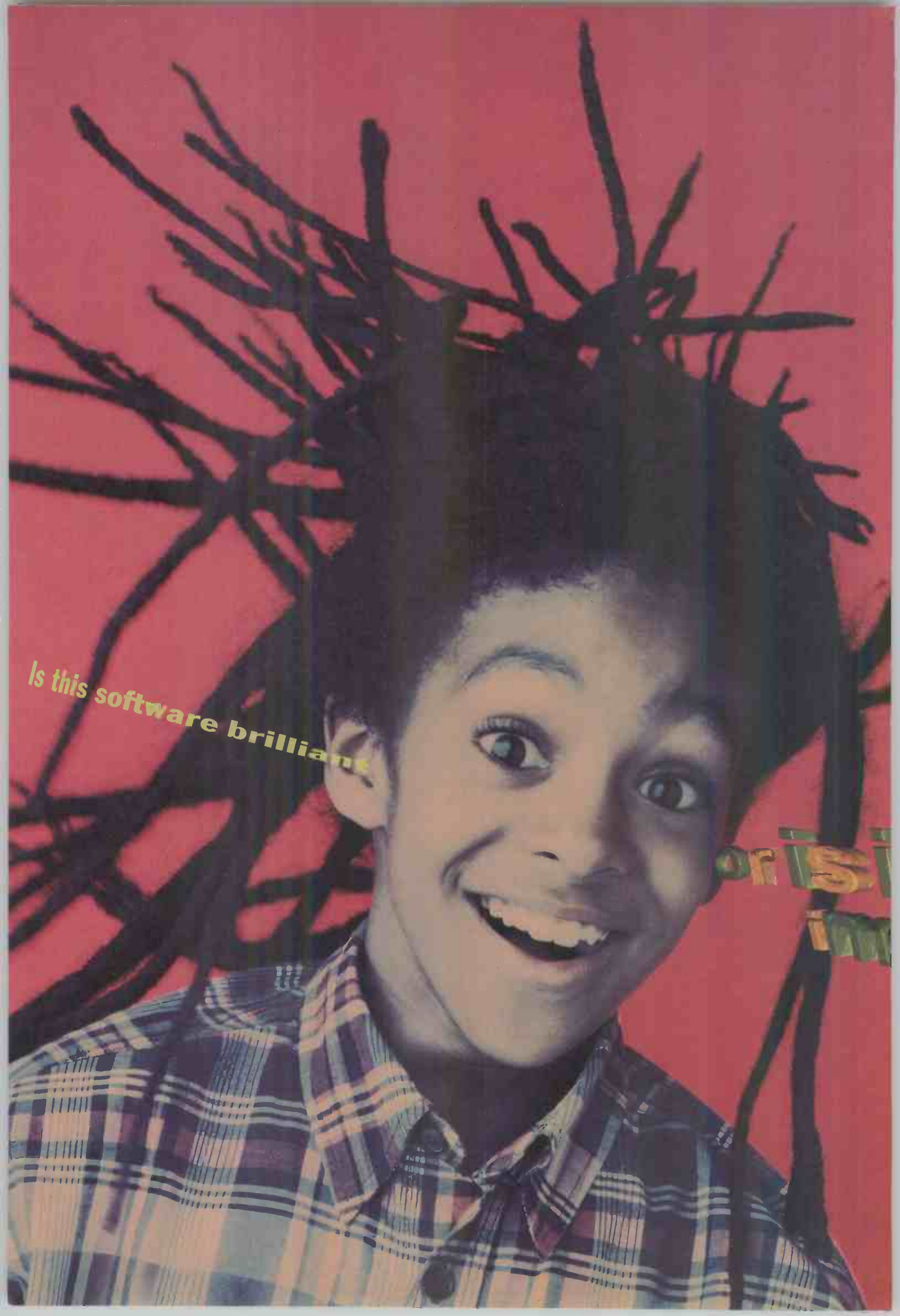
Once the image has been acquired, it's indexed; a labelling process, enabling document retrieval. Once a document has been scanned and filed electronically, it's a huge task to find it unless it has been properly indexed.

When we first acquired the system, we bought an optical jukebox. Images were written simultaneously to magnetic disc and to the optical platter. The magnetic disc served as a cache, so that recently scanned

images (pertaining to current or recently "active" patients) would be available faster. When the magnetic cache was full, the images would be deleted on the basis of age, so that subsequent retrieval would be from the jukebox. But the optical jukebox failed, and we've decided not to replace or repair it. We had not filled the cache, and have now increased its size. Many people automatically associate document imaging with optical storage when there is no need to. Document images can be stored in the same way as almost any other data.

Image retrieval is what distinguishes a document imaging system. Our clinical systems link to the imaging system in a seamless fashion. To retrieve information, users click a representative "icon". Numeric information, such as lab results, is visible in the icon; clicking pulls yet more data. Textual information (e.g the interpretation of an X-ray image) is retrieved as text. Scanned images; clicking the icon causes the picture to appear. The Oracle repository (the electronic medical record) keeps an index of document location. If the location is an Oracle table, great. If not, it sends a message to the Image Index, stating "Dr Hughes is at workstation address ABC.124.XX, and wants image reference PQ45." The image is sent directly to the PC and the client-based image viewer pops into action. On summoning the information, the user does not necessarily know that it will be a document image. Thus the document imaging piece is effectively "hidden"; so the user interface is consistent.

Systems management involves remembering rules of thumb which only a professional should break. "Document imaging systems are to be avoided" is one such rule of thumb.



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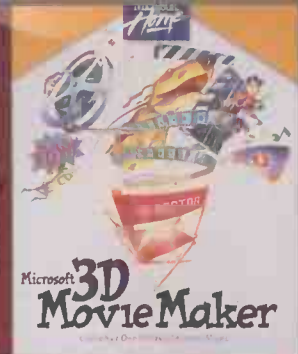
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"I'D LIKE TO THANK EVERYONE who made this movie possible," I tell the hushed Hollywood audience.

"The director," (me) "the producer," (me) "the scriptwriter," (me) "and 3-D Movie Maker from Microsoft®" (not me). Oscar in hand, I leave the stage to wild applause and the adulation of every critic in luvviedom.

And why not? 3-D Movie Maker has unleashed an awesome imagination on the world. It allows me to write my own plot and dialogue, choose sets, cast and costumes, shoot from different camera angles, play with special effects and make 3D animated movies.

When I'm not making films, there's always the Microsoft® Creative Writer and Fine Artist CD-ROM to inspire me, or Microsoft® Explorapedia™ - The World of Nature, a wildlife epic. Other big influences include Kipling's storybook 'How the Leopard Got His Spots', and Scholastic's The Magic School Bus™ Explores the Ocean, the latest in the series.

(Buy Creative Writer and Fine Artist on one CD-ROM and one other specified children's title between 1st November 1995 and 30th April 1996 and claim a third title free.†)

Now luvvie, if you'll excuse me, the romantic sub-plot of Return of The Exploding Chicken needs some work.

Microsoft

WHERE DO YOU WANT TO GO TODAY?

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Letters

Net niggles

Latest Internet snobbery:
 "Oh yes, I have an email account but I never use it".
 Latest Internet excuse;
 "I got your email but my reply must have got lost in the linternet".

Grrrr...

Walter Gray

wagray@dra.hmg.gb

Attention, Adobe

I was pleased to learn, on reading PJ Fisher's "First Impression" of PageMaker 6.0, that I was not the only one who thought PageMaker had no drag-zoom facility.

In fact, it was not "sorely lacking" — it's always been there in version 5.0 (and, for all I know, in earlier versions). After several years of wishing one could select an area to zoom, I discovered that control-spacebar produces a tool to do just that. There must be many users who, like me, spent a lot of time fiddling about with the zoom shortcuts and the scroll bars to get the bit we were working on to occupy the whole screen.

Perhaps Adobe will be a little more thoughtful, though as they haven't bothered to update the interface for version 6.0, maybe not.

Tony Brooks

(Computer Consultant to Charities)

East Sussex

Poetry corner

It felt like an earthquake
 But we know it's not that
 The post has arrived
 And your mag's squashed the cat!

I use the wheelbarrow
 To manhandle the tome
 Down through the hall
 To a solid floored room.

I thumb through the pages
 Till my digit's sore
 And search for the item
 I've been waiting for.

My blood pressure's rising
 A stroke is a risk
 Instead of a CD
 There's a high-density disc.

A long time ago
 I'd sent in a form
 Requesting a CD
 As my monthly norm.

The floppies kept coming
 So early this year
 I phoned "Subscriptions"
 And made my choice clear.

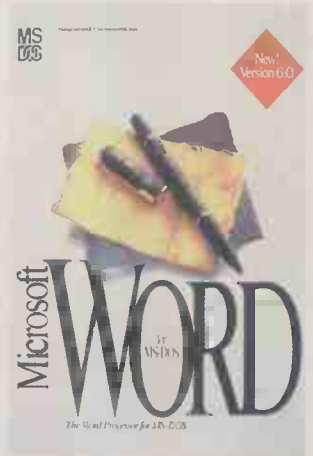
Who's using my CDs?
 Where did they go?
 Can you retrieve them?
 Please don't say "no"!

Phil Grix
South Humberside

The keys to success

Like Adrian Bailey (Letters, December issue) I train

students to use Word 6. But, unlike Mr Bailey, I see no problems with the program, and I think the reason for this is that I came to computer teaching from a different direction. Most word-processing teachers seem to be either professional teachers or professional computer users; they have never earned their living typing, so they tend to use the mouse much more than touch-typists do. I've recently retired from secretarial work and, with 40 years of keyboard experience, I naturally go for the keycodes first. After all, one uses a word processor to key in text, and that means fingers on the keyboard — why take them off it for formatting? So for font and paragraph formatting, I go over the keycodes time and time again, and as far as toolbar buttons are concerned, concentrate at first on the five on the left: new document, open document, save, print, and print preview.



Here are a few new and useful things available on Word 6 (I'm working from memory so far as Word 2 is concerned, so no doubt loads of people will tell me if I'm wrong): keycodes for superscript and subscript, keycodes for leading apostrophes (necessary with Smart Quotes), keycodes for copying and pasting formats, dashed and dotted line borders, the borders toolbar, uneven width newspaper columns, accessing menus with right mouse button,

Help wanted

Ten or twelve years ago I invested in a word processor called an Amstrad 8256. I had an urge to write magazine articles for profit. Now, I do not suppose you even remember what an Amstrad 8256 was, but it paid for itself within the first twelve months — and I'm still using it. No repairs, no breakdowns, and it still looks like new. So you can stop snorting in derision.

I decided to get up to date, I bought your magazine — this was going to be easy. Choose what fitted my requirements and then go for it. Return to line one — HELP.

Is it absolutely necessary to write in an unknown language and present such a totally confusing picture?

I laid down what I thought I would like to bring me into line with the present and serve me into a new millennium. Please

control any irresistible urge you may have to roll about the carpet holding your sides, because it all seems so simple to me.

I have two thousand pounds to help me attain my objective. I want a machine and package which will:

- be a word processor and support my writing;
- store my research data;
- provide a "card index" system for my sources; and
- allow me, as a marine historical artist, to draw, paint and view from different angles the product of my research in order to decide the best angle from which to create the work of art.

There are grandchildren to consider because I would like to encourage them in the future and it may well be that the Internet would assist me (try getting details of the rigging of a Dutch East Indiaman c1720 without splashing out on several trips to Amsterdam and Rotterdam as I

AutoCorrect (what a wonderful thing), a menu for non-printing characters in capitals, Draw revamped and, best of all, the ability to create customised toolbars with text buttons. With these I can set up demonstrations on the screen. Students can click on buttons marked "Start demo", "Next Step", "End", and various functions demonstrate themselves. It's fun and it works.

**Mrs J Elliott
Upminster**

Thumbs up from down under

Just a quick note to say how much I am enjoying *PCW*, which has appeared in my local newsagent in the deep south of South Australia. I particularly like the no-nonsense journalistic style of the interviews and comments on new products, compared to the "soft soap" approach of Australian (and American) journos who avoid negative comments lest they upset an advertiser in their particular

have had to do).

If, at this point, you and your colleagues feel this is so simple it is hardly worth spen... no, wasting time on, then please take the time to jot down on a postcard what you recommend would fit the bill and one reader would be in awe of your professional expertise and warmth.

**Philip Dyson
East Sussex**

PCW replies:

We would generally recommend a PC running Windows 95 and with at least 16Mb of memory. Ironically though, Amstrad has just launched a follow-up to its PCW8256 word processor — the PcW 16. We've reviewed it on pages 106-110. It won't offer you Internet access, but in most other respects it might fit your requirements.

magazine.

The adverts run in your magazine are a great way of comparing products, for both technical advancements and value for money in comparison to products available over here.

Finally, I am a new Internet user and I am stunned by the vastness of the Net, and am awed by the fact that it is possibly just the beginning of a global information network that would have been a fairy story only a few years ago.

To everyone at *PCW*, keep up the good work.

**mark bellgrove
mambo@ozemail.com.au**

F-Prot: the choice of the professional

I was disappointed to find that in your anti-virus software group test you only reviewed the shareware version of F-Prot, particularly since the other packages in the test were "professional" versions. As a result, people may well ignore one of the best packages around.

F-Prot Professional includes DOS, Windows, Windows 95 and OS/2 versions, all in the one box, for £100 (with four quarterly updates). The Windows version has a resident VxD-based program, Gatekeeper, which does the same job as the DOS TSR and with very little loss of performance. The scanner is quick, there is the facility for full scheduling of scans, and it works with any network. In fact, the network features alone set it apart, because most other vendors require you to buy a separate package for networks and then it often only works with NetWare. F-Prot Professional has extensive network functionality, including remote administration of scanning on workstations and remote updating.

Furthermore, F-Prot Professional takes an enlightened view of licensing. Anyone whose office PC has a licensed copy of F-Prot can

make a copy and use it at home, for no extra charge. There are multiple-user licences available at greatly reduced rates, and these are restricted to covering just one site in an organisation.

I have no connection with the publishers or writers of this software, but I do use it.

**Phil Stanton
phil@equinox.co.uk**

PCW replies: F-Prot is supplied and supported in the UK by Portcullis Computer Security (0181 868 0098)

Wakey, wakey

I have a message for Peter Brown (Letters, October): Keep complaining as loudly as you like. When are software houses going to wake up to the fact that the term "upgrade" does not apply to the vast amounts of money we have to spend bringing our PCs up to their exacting specifications?

As for Kenneth Henry (Letters, December): I'm sure planet Earth would be obliged, Kenneth, if you would be good enough to take yourself and your arrogant stupidity off to planet Gates. And stay there.

**Harry Knibb
harry@knibb.demon.co.uk**

The Z Files

Considering how rude the writer of the letter "Correct Diagnosis" is about Nick Beard's lack of knowledge, he astounds with his own ignorance. In particular, Intel did not design the Transputer. It was Inmos. Also, the work which I think the correspondent refers to was a formal spec (in Z) of the IEEE floating point standard. The spec was then used to produce the Transputer's (sorry, I can't remember which model) microcode. This was a sterling piece of work. The Z spec enabled consistency checking of the IEEE format and some bugs in the standard to be found.

Formal methods were also used in the design of the

VIPER chip, that sank under the weight of law suits. Formal methods are simply another tool in the engineer's toolbag. Some things they do well. Some they do less well.

**Dr Gary Morgan,
Advanced Computer
Architecture Group,
Department of Computer
Science,
University of York**

Fuller figures, please

I applaud your decision to adopt the Doom 2 benchmark as part of your VNU benchmarks, but please give the actual figures for these in the review. Performance for Windows often scarcely correlates to games video performance, so providing a single figure that is effectively the product of both of these does a disservice to both the gamer and the Windows user. The figure may mislead certain groups: for example, a Windows user might choose a recommended machine only to find its net performance owed significantly to a games performance that he or she did not care about.

The fps rating figure given by the Doom benchmark has a clear and useful meaning. I'm sure users want the actual figure. You could still provide the combined rating, but also give separate Windows and games ratings.

Finally, you nearly explained exactly what the users had to do to run the benchmark. Please give the complete details. I am sure your advertisers would welcome this, as users could easily compare their own machine with the ones reviewed and realise just how slow machines manufactured a couple of years ago are at running 3D games

**Jeff Rollason
100031,3537@
compuserve.com**

Make room for Macs

I'm worried about you. Having found no Mac software whatsoever on your last cover

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CD, I don't know whether you're still committed to being a real cross-platform magazine aimed at all users (and one of very few at that) or another PC magazine clone. I daren't take out a subscription while you're still teetering between the two. Your fence-sitting shames even Paddy Ashdown. Get your act together. "No room", really! The only times I've heard that before are:

1. That notorious innkeeper scene in the Bible. He was probably lying.
2. Microsoft Windoze(TM) when its pathetic little resources thingy has run out of space. It's *definitely* lying.

Reprovingly,
Matthew Powell
 mcp26@hermes.cam.
 ac.uk

Horror story

I am full of sympathy for Mr Geal and his problems with Gateway 2000, as I had a similarly horrific experience at their hands. I purchased a P5-66 machine from them in March '94. After two hard disk crashes and several days worth of time spent restoring system files (never mind redoing work which was unretrievable) I decided enough was enough. They had already admitted to me that there was a problem with that particular model of machine (why couldn't they have told me this when I bought it?). They had even instructed me to change a jumper setting on the motherboard, changing the speed from 66kHz to 60 (effectively knocking £300 off the value) before they finally

Less PR, more people

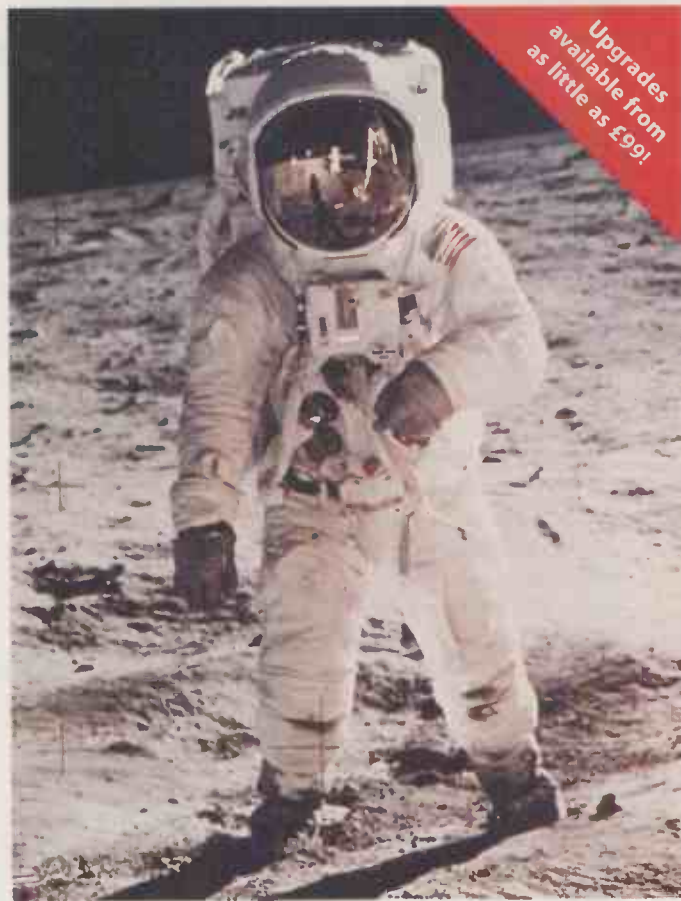
Judging by the number of complaints in recent issues of *PCW* about hardware and software reliability and service, all is not well with some manufacturers and retailers. In recent months I have found:

1. Products are being advertised well before they are available. When you phone to enquire about availability it's like a well-rehearsed script. "We're expecting them in at the beginning of next month..."
2. Sales staff at supposedly specialist retailers are becoming as ill-informed as their brethren in the high street multiples. I recently overheard a salesman at the counter of one of your regular advertisers telling a customer that their PC was better than a competitor's because it had an Intel processor whereas the other had a Cyrix one, and "everyone knows they fall over all the time." When questioned as to what he meant by this, he crashed in a flood of meaningless waffle.
3. Managing Directors and PR agencies give one set of replies to you and those whose letters you publish, and another to the rest of us. When I wrote to one of these people recently to let him know how much I had been required to spend because of the poor reliability of his equipment (just outside its one year of warranty) and the ignorance of his technical support staff, all I got in reply was a form letter saying it was being looked into, followed by a deafening silence.
4. Internet Service Providers are being economical with the truth about the speed of the service they provide. I've decided that www is nothing to do with the world wide web, it's "Why are We Waiting?" In the case of my own provider the service is unusable at peak times, even with a fast modem.

Surely *PCW* is big enough to take the side of its readers and start publishing our views as to who is a saint and who is a sinner in the PC supply world.

Ransey Tyrwhitt-Drake
 ransey@titraka.demon.co.uk

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



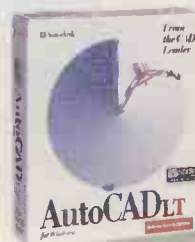
But it could be a 'giant leap' for your productivity.

If you're using outmoded design tools, the chances are that your productivity and competitiveness are being seriously restricted. All too often, though, the move to CAD can seem as daunting as stepping into a new world.

Fortunately, finding the solution is as easy as the solution itself... **AutoCAD LT Release 2**, from Autodesk - the makers of AutoCAD and the world leaders in design software.

Because AutoCAD LT is windows-based, it's remarkably simple to use. At the same time, it can take large professional projects in its stride. And Release 2 includes a range of exciting new features carefully structured to work with you in a giant leap forward in design capability and productivity.

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 and bring your productivity-leap
 a step closer.

DATECH
 COMPUTER 2000 GROUP

Autodesk

decided they'd designed-in the wrong power supply.

Having lost confidence in both machine and technical support, I decided to return it to them for a refund — as far as they were concerned, under their limited 30-day money-back guarantee, from my point of view because the machine failed to live up to the conditions of the Sale of Goods Act. I sought legal advice and was told that I had a good case for reclaiming the substantial cost of return carriage of the machine to Ireland (which Gateway normally don't cover) and for damages, given the amount of my valuable time which their faulty machine wasted.

When the free legal advice afforded by my trade association ran out, I was told I could institute a small claims court action to recover the £100 plus return carriage and £500 damages. But when I approached my local county court, the story was that Gateway would almost certainly have the action transferred to Dublin, so I should take out an action in the equivalent Irish court.

While I don't want to bore you further with the details of my particular case or Gateway's cavalier attitude, I should like to sound a note of

warning to your readers.

While Britain and Ireland are both members of the EU, the fact of the matter is that if you buy something by mail order outside the jurisdiction of British courts, you have major headaches involved in getting any kind of redress when things go wrong. Perhaps the multi-page adverts which your magazine and others carry from Gateway and other non-UK companies should come with some kind of warning — "What will you do if something goes wrong?"

I for one will never again buy from someone I can't sue in a British court. Friend in the business? They have to be joking.

Clive Tully, Norwich
(Member, British Guild of Travel Writers)

Posing a problem

Further to your article in PCW's "Guide to getting online", is it any wonder that "Women in particular are vulnerable to harassment from men" when articles such as yours, purporting to be a simple explanation of the Internet, start with a quarter-page photo of a woman posing in nothing much more than a pair of high heels and black stockings? What has that got to do with the

Internet?

We are actively working to demonstrate the advantages of telematics, and "Women in particular" constantly ask me if it isn't true that the Net is full of porn. It looks like their worst fears are confirmed on opening PCW's Comms supplement.

Kate Whittle
for Microsystem —

computer training and support for women

PCW replies:

Unfortunately, the caption for the picture you mention was omitted from the final page by our repro house. It read: "One view of the Internet is that it's full of junk and porn." Without the caption, the picture does look gratuitous.

Hindsight

10 years ago: February 86

The sought-after inside front cover advert was taken by PC Communications' Breakout internal modem. It offered V.21 300/300 and V.23 1200/75 and was a snip at £499 + VAT. It allowed sluggish access to the dazzling online services of the day like Telecom Gold and Prestel.

Update

28,800 V.34 modems are now available for under £200. See this month's cover story.

5 years ago: February 91

"Cheap 486 rivals" ran PCW's front cover. The prices of the two machines reviewed were £3,534 and £4,065. Those prices

included VGA monitors, around 100Mb of hard disk, a 25MHz 486 processor and 2 or 4Mb of memory.

Update

It's a truism that personal computers get constantly cheaper and more powerful. Even so, it's surprising just how much they've come down in price in half a decade.



Panther Nx P100

"25% faster than Pentium systems"†

† PC Answers Windows 95 review, September 95

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The new 2400dpi¹ GT-5000, at around £350¹ includes PhotoPaint 5 and CorelDraw 4 for effortless retouching and design, and Xerox document software, an office on your desk. Then, add an award-winning 720dpi Stylus Color inkjet for photo-real printing or copying.

But why stop there? There are two more award-winners from Epson. The 3200dpi¹ GT-8500 at £540¹ and 4800dpi¹ GT-9000 at £630¹. Both available with brilliant software for your PC.

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HOT POINTS.

Your fingers, after all, are the ultimate pointing device. So instead of rolling around a mouse or track-ball, now for perfect cursor control you can just glide

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First Impressions



Contents

- 58 Viglen Genie PCI 166MHz
- 60 Microsoft Money for Win95
- 61 Power Computing Power 120
- 63 Quarterdeck QEMM 8.0
- 65 Dell Latitude ST120
- 66 AST vs Brother home PCs
- 68 Canon BJC-610
- 72 Apple Newton 2.0
- 73 Conner E-IDE tape backup
- 73 Diamond Multimedia Edge 3D
- 74 Wacom UltraPad
- 76 MoreMem and TopBar 4.0
- 76 MT T7010T portable printer
- 78 SMS Link for Series 3a
- 78 HP LaserJet 5Si
- 80 Data Becker Family Tree

First Impressions includes the irresistible "Gadgets" selection on page 57. Highlights include a 166MHz Pentium Pro Viglen Genie — as fast as you can get; Microsoft Money for Win95 — home finance looks good; Power Computing's nice-price Mac clone; and Dell's desirable Latitude ST120.



VNU European Labs

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

developed and enhanced to reflect hardware and software developments.

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

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

● To make them easy to read at a glance, all the graphs in *PCW* are now drawn so that the bigger the

bar, the better the result. Normally we'll also include the original data we worked from: for example, the time in minutes and seconds to print a page in a comparative test of printers.



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Accurate Technology **Internet: info@accurate.co.uk**

Farrier House, 48 Denmark Street, Wokingham, Berkshire RG40 2BB

Windows is a registered trademark of Microsoft



Newton Keyboard

If you're impatient with the handwriting recognition of the Newton and fancy a faster means of input, then how about the keyboard pictured here? Designed specifically for the Newton, you can now bang out those reports and emails in no time.

It costs **£79**, so call the **Newton Customer Hotline** on **0181 730 2048**. Check out the review of the new Newton operating system on page 72.

Sharp ZR-5000

The ZR-5000 personal communicator (called the Zaurus outside Britain) is Sharp's answer to the world-beating Psion 3a. It has 750,000Kb of available memory, an infra-red port, and a PCMCIA slot that can take a dataphone card. The ZR-5000 has a keyboard but it will also take pen input via an icon-driven interface; there is no handwriting recognition. It costs **£399** from **Sharp** on **0800 262958**. See next month's *PCW* for a full review.



Gyrations GyraPoint Desk

Gyrations' GyraPoint Desk pointing device can be used on a flat surface like a standard mouse, but since this is *PCW's* Gadgets page, it may come as no surprise to find that you can pick the mouse up and continue pointing and clicking with a natural wrist motion. It all works thanks to Gyrations' patented mini gyroscope, and is in no way a flash in the pan. Not only is it extremely comfortable to use in a

computer environment, and ideal for presentations particularly in the

radio version, but look out for it in virtually every TV remote control of the future. Phone **Ideal Hardware** on **0181 286 5000** with **£119** ready.

Chinon ES-3000

Digital cameras which once were esoteric are now commonplace. How about this groovy model from Chinon, which along with a 3X zoom lens and the usual auto everything, features a PCMCIA slot for removable flash memory cards — no more image capacity problems. The 1Mb built-in memory can store five images at 640 x 480 with the minimum compression, 10 at medium, or 40 at 320 x 240 with the maximum compression.

Chinon's UK dealer is **NBA** on **01483 301970**. The ES-3000 costs **£749**.



Gadgets

PCW Gadget Photography by David Whyte

HARDWARE

Viglen Genie PCI MDT P5/166MHz

Faster chip + modified motherboard = speed like you've never seen.
This 166MHz Pentium Genie really flies, as Adele Dyer found out.

The next-generation Pentium Pro chip [see page 122] will be the heart of the fastest Intel-based PCs, but only if you're running 32-bit applications under a 32-bit OS. Anyone using a combination of 16- and 32-bit apps including games, under DOS, Windows 95, 3.x, or OS/2, will be best off with the fastest conventional chip they can get their hands on, and they don't come any faster than the Intel 150MHz and 166MHz Pentiums released in the new year.

We got our hands on a Viglen Genie PC, wrapped around the fastest 166MHz Intel Pentium chip, and the speed really shone through from the first moment we powered it up. We tested it with Windows 95 — a notorious slow starter — and the extra speed of the chip was immediately apparent. Other little giveaways are its smoothness of operation in, for example, moving windows around and opening and closing applications. The overall feel was of a machine that was more than capable of running anything we could throw at it, with ease and sophistication.

When we ran the Doom2 and benchmark tests we were seriously impressed. It easily outclassed even the fastest P120s we looked at last month. We ran a short test which primarily tests the speed of the processor and the video card by not dropping any frames in a short, action-packed sequence. The P166 scored a staggering 64 frames per second, over 20 percent faster than the best P120 we tested last issue.

The same excellent performance was demonstrated in the benchmark tests. These test a machine's performance on a number of applications, including Word, Excel and Access. It sailed through all of them with flair and verve, coming out well ahead of the P120s.

The speed improvements have come about through two innovations — a faster chip and a modified motherboard. The latter, a revised Endeavor from Intel, allows you to clock the CPU at two and a half times the speed of the board; the Triton chip set runs at 66MHz.

All of this was doubtless helped by the hard drive, a 1Gb Quantum Fireball. This

is one of the fastest EIDE hard disks around at the moment, helped in part by its excellent caching.

The rest of the kit is roughly the same as in the Viglen P120 we tested in the last issue. The video card is a Matrox Millennium with 2Mb of WRAM, the CD-ROM drive a six-speed EIDE from Teac — a winner, incidentally, in our CD-ROM drive roundup last month.

There is no separate sound card. Instead there is a Vibra 16S chip on the motherboard with a riser card for all the IO connections. If you're not too fussed about such things as wavetable sound, this has the advantage of freeing up a valuable extra ISA slot.

To round off the spec, there is 256Kb pipeline burst cache on a stick and 16Mb of EDO RAM, which is rather inconveniently located under the hard disk. The chip itself nestles under a very flat heat sink with a Socket 7 ZIF socket. A fan on the case draws the heat away from the chip, while the flat heat sink leaves enough room for full-length cards.

The 17in monitor supplied has a reasonably dark and flat tube, offering high contrast with low distortion. The controls include rotation, barrel and pincushion, as well as giving you scope to set the level of red and blue and to run at either 9300K or 6500K.

The P166 copes with consummate ease whatever you wish to throw at it and seriously outpaces its older, slower brothers. On the price front, in early 1996



you are looking at a mark-up of around £160 over a similarly-specified P150, £240 over a P133 or £350 over a P100. As usual the fastest Intel chip costs quite a premium, but with system prices continually falling, the asking price of around £2,400 seems almost reasonable. Let's face it: if you've got over £2,000 to spend on a machine, you might as well get the fastest one you can; and right now, the Pentium 166 is the fastest machine for running a combination of 16- and 32-bit applications.

PCWDetails

Price £2,477 approximately
Contact Viglen 0181 758 7000

Good Points The fastest chip for running 16- and 32-bit applications.

Bad Points P166 systems will cost around £350 more than P100s.

Conclusion Even so, Viglen's super-system seems reasonable at around £2,400.

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PCW 01/96



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SOFTWARE

Microsoft Money for Windows 95

The rehabilitated Money is good enough to have rival personal finance packages quaking in their boots. Be very afraid, says Paul Begg.

Microsoft's attempted purchase of Intuit, the developer of the top-selling personal finance package Quicken, was perceived by many as a covert admission that Microsoft's own personal finance software, Money, was an inferior product. When the acquisition of Intuit fell through, people wondered if Microsoft would ditch Money or, if not, how it would market a program it had been prepared to abandon. Well, Microsoft didn't dump Money, they changed it. Now Windows 95 specific, it won't work under Windows 3.1.

Money 95 is a very slick program that

Conveying a businesslike approach with its manilla-coloured folder, it is also up-beat. This is a serious program handling serious matters in a way that won't frighten even the dumbest user. From the main screen you can choose one of several options. You can go to the account register, payment calendar, account manager, investment portfolio, report and chart gallery, the payees and categories section, or launch a planning wizard. The US version has one addition, a link to online banking services. No agreement has been reached between either Microsoft, Intuit or any UK bank to provide similar services so the feature has been removed from the UK version.

The payment calendar is where you can set up

Left The attractive opening screen makes business look comfortable

Below All the information you need, at hand and easy to find

transactions such as when you should make your final holiday payment.

The investment portfolio keeps a record of your current investments and their value, allowing you to update the market prices as they change. Investment accounts is the place to record and track investments with a fluctuating market value, such as shares, gilt-edged stocks, bonds and PEPs. For assets such as property, you should open a tailored asset account in Money.

The Report and Chart Gallery is where you can get a complete view of your financial status. You can see where and to whom your money has gone, track trends (noting when there seems to be higher than average outgoings and why this is the case, thus enabling you to compensate for it). There are 26 reports and charts that group your finances into five areas: spending habits, what I have, what I owe, investments, and taxes. Money lets you personalise this area, creating up to 50 reports and charts to an area called "favourites", which is really a way of getting quick access to the information that interests you most.

There is a section called payees and categories, a particularly useful feature that I'd like to see expanded. This section allows you to list the name, address, phone number and account number of the people to whom you pay money. Money will even dial the phone number for you and there is a place for making brief notes. Finally, Money has five planning wizards to take you step-by-step through tasks such as calculating loans and mortgages or setting up a retirement goal.



bears no resemblance whatsoever to the earlier versions and which could even shake Quicken's grip on the home market. Quicken's original success was based on Intuit having identified a market need and filling it with a simple-to-use product that did everything a user might want it to do. Additional features have been added over the years, with the result that Quicken has put on weight and developed the muscle to handle small business tasks. In the process, it has lost something of its original simplicity. Money now looks great, handles well, and it clearly targeted at the home user. Quicken would do well to watch out.

The clever thinking behind Money is reflected in the attractive main screen.

Date	Payee	C	Payment	Balance
17/2/95	Headren Building Society	455.00		8,014.26
13/2/79	Sunway Stores	87.89		7,946.27
21/7/95	UK Global Network Telecom	35.00		7,911.27
1/6/95	Global Industries PLC		2,000.00	10,000.00
13/6/79	Sunway Stores	48.73		10,419.52
17/6/95	Headren Building Society	455.00		9,963.52
18/6/95	Royal National Bank Current		3,500.00	13,463.52
1/8/95	South of Thames Water	258.95		13,204.57
21/8/95	UK Global Network Telecom	35.00		13,169.57
10/2/22/95	Playmen's Inn	141.00		13,028.05
13/2/81	Escape Travel Agents	2,070.00		10,958.05
Minimum balance		5,000.00		
Opening balance				10,188.05

scheduled payments — regular incomings and outgoings such as salary cheques and standing orders. With this information entered, Money automatically enters it into the transaction ledger. In this way your records will always be up-to-date, which is essential if you are living on a tight budget. The calendar can also be used to record reminders of single

PCWDetails

Price £29.99

Contact Microsoft 01734 270001

Good Points It's simple and non-frightening.

Bad Points No bad points spring to mind, though additional features such as a Home Inventory would be useful.

Conclusion A solid home finance package that looks good and is easy to use.

HARDWARE

Power Computing Power 120

Cliff Joseph gives the thumbs-up to Power Computing's Power 120: a powerful, reliable Mac Clone at a nice price.

Apple's attempts to license the Mac OS haven't exactly taken the market by storm. Radius is losing money hand over fist, while Daystar's Mac clones haven't seen the light of day in the UK.

Power Computing is the only company that has managed to get any of its products into the UK, but at least it's come up with something that's well worth a second look. Two models are currently available. The Power 120 reviewed here is a large tower design, and there is also an entry-level desktop unit called the Power 100.

The "120" refers to the machine's processor, a 120MHz PowerPC 601. That's a clever choice by Power Computing as Apple doesn't produce a 601-based Power Mac that runs at this speed. This allows Power Computing to offer something that is clearly different from any of Apple's own product range.

At around £1900 plus VAT, the Power 120 is slightly more expensive than Apple's 100MHz Power Macintosh 7500, but it's also noticeably faster. In fact, the Power 120 performs just as you'd expect — 20 percent faster overall than the Power Macintosh 7500 in our benchmark tests. This makes it a good choice if you want more power than the 7500 can offer, but don't want to pay £3000 or more for Apple's PowerPC 604-based Power Mac 8500.

The rest of the machine's hardware configuration is fairly straightforward; 8Mb RAM, 256Kb of level 2 cache, 540Mb hard disk, and quad-speed CD-ROM. All the peripheral connectors conform to Mac standards, with serial ports for printer and modem, Apple Desktop Bus (ADB) for keyboard and mouse, and Power Computing has even used Apple's high-speed GeoPort telecommunications interface as well. The on-board sound system provides 16-bit, 44kHz audio input and output — though there's no microphone supplied as there is with all Apple products — and there's also a built-in Ethernet interface.

Only two features of the machine's design give any cause for criticism. The

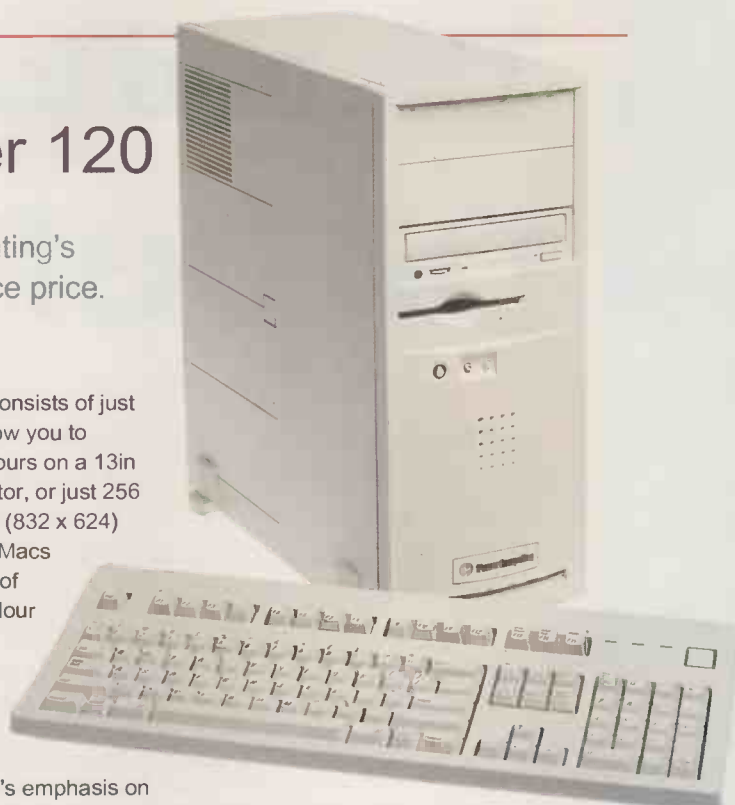
on-board video system consists of just 1Mb DRAM. This will allow you to display thousands of colours on a 13in or 14in (640 x 480) monitor, or just 256 colours on 15in and 17in (832 x 624) monitors. Apple's PowerMacs tend to use at least 2Mb of VRAM, giving greater colour depths, and not having true 24-bit colour even on a 13in or 14in monitor seems like a bit of an oversight, especially given the Mac's emphasis on graphical applications.

It is possible to buy an optional display card which will provide greater colour support, but while this is fine for graphics professionals, not everyone will want to do this. This card fits into a processor direct slot (PDS), a proprietary Apple bus used in a number of Mac models.

More significant is Power Computing's decision to stick with NuBus expansion slots in this model. Apple's Power Macs have now all adopted the PCI bus architecture (apart from its consumer-orientated Performa models). This allows the machines to be upgraded with new CPU daughterboards as well as allowing them to use PCI-based graphics cards such as Apple's new QuickDraw 3D graphics accelerator.

If you've already got some expensive NuBus graphics accelerators or digital video cards, then Power Computing's choice of the NuBus architecture allows you to go on using those cards. But if you're looking to buy a new machine with an eye to future upgrades, the lack of PCI slots is a disadvantage. Power Computing has recently launched a PCI-based machine in the US, but we were unable to find out when this is likely to be available in the UK.

Of course, the most important question to ask about any Mac-compatible machine is whether or not it is truly Mac-compatible. In this instance, the answer seems to be a simple "yes". The operating system and some of the



machine's basic chipsets are directly licensed by Apple, ensuring complete compatibility. A previous user had made a bit of a mess of the System Folder, but once this was corrected we experienced no software compatibility problems with the machine at all.

Power Computing has also bundled in some useful software to round out the package. There are copies of ClarisWorks 3 (not the latest, which is 4.0), Now Utilities and Now Up To Date, plus a US version of Quicken, which seems a bit pointless. There's also FWB's hard disk and CD-ROM toolkits, which are definitely worth having.

The Power 120 isn't going to have Apple quaking in its boots just yet, though a PCI version and the price cuts that Power Computing is promising once its manufacturing volumes are ramped up might just do the trick. Nonetheless, this is a powerful and reliable Mac-compatible machine at an attractive price.

PCWDetails

Price £1,899 (excluding monitor).

Contact Computer Warehouse
0181 838 5553

Good Points Affordable and fully Mac-compatible.

Bad Points Uses NuBus rather than PCI slots.

Conclusion A genuine alternative to the "official" Power Mac range.

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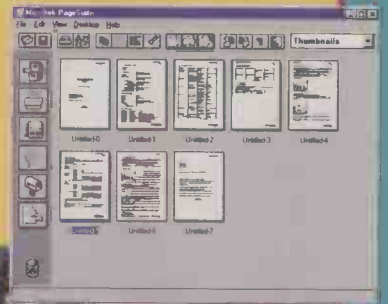
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SOFTWARE

Quarterdeck QEMM 8.0

Quarterdeck have excelled themselves with the best way to streamline your system under Windows 95, says Eric Adler.

QEMM from Quarterdeck has long been recognised as the leading memory management software and the new version offers improved system optimisation from within Windows 95. This is a full 32-bit program, providing advanced memory management and diagnostic procedures which radically improve system performance, making it well worthwhile to use Qemm in place of the Microsoft system tools.

The Qemm 8 package is fast approaching a full system management toolbox. It includes the Quarterdeck Magna RAM memory multiplier, an improved version of the Manifest system diagnostic program which provides detailed information on DOS and Windows memory usage, IRQ interrupt settings, hardware settings, system files, PMCIA adapters, network resources, CMOS settings and processor testing.

The processor testing routines can, for example, be used to read the manufacturer's initial settings on Pentium and other advanced chips; detecting the difference between a genuine Intel P100 and an overclocked P75 or a Nextgen chip. This facility will be of particular value to readers considering buying a computer which happens to have the heatsink glued onto the CPU, so making it difficult to read the manufacturer's labels by other means.

Inclusion of a 32-bit implementation of QEMM Magna RAM memory compression, which is also available as a separate program, makes this package especially good value. Magna RAM compresses data in memory, making better use of RAM and reducing the need for virtual memory on hard disk (swap file hard disk access is far slower than compressed RAM). This feature appears to be 100 percent transparent and does not affect Benchmark times, but makes more memory available for resource hungry programs reducing the number of hard disk hits used for virtual memory.

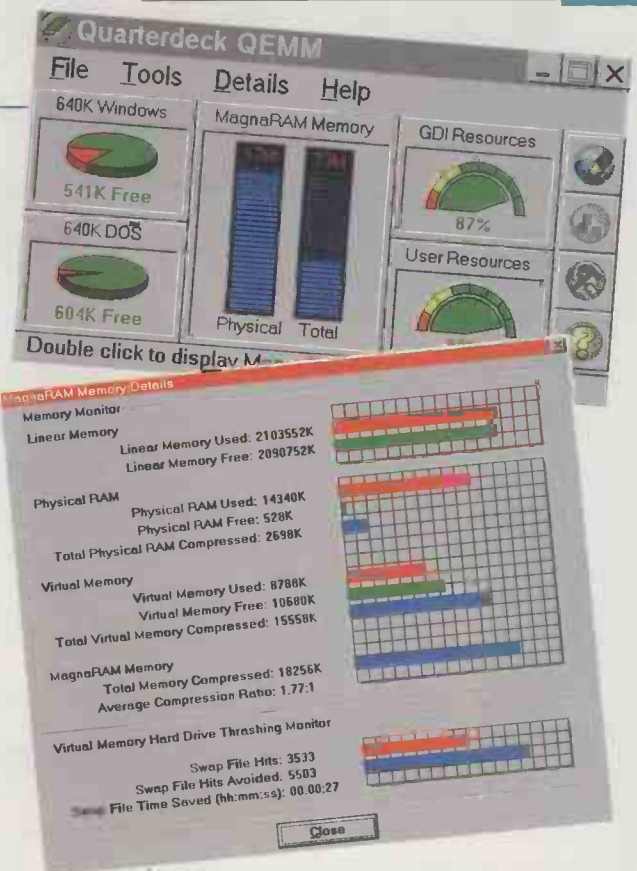
The virtual memory hard drive thrashing monitor confirms the first intuitive appraisal of Magna Ram

performance and shows that at least fifty percent of hard disk hits can be avoided and saving a few seconds per hour may at first appear trivial, the result is a smoother running system with far less frenetic windows swap file activity.

Magna RAM does not merely reduce swap file activity, many programs are able to use the compressed RAM — Mathematica 2.3 enhanced running in WIN95 thought it had 24Mb of free RAM available on a 16Mb machine and performance-improved accordingly - allowing more active notebooks to be opened with simultaneous kernels without loss of performance. US Navy Fighter, "The Program" (see PCW CD-ROM Dec 95) and other memory hungry programs can be run in Windows 95 after QEMM optimisation, which previously required Windows 95 to be closed down and reopened as a DOS session.

A previous weakness of QEMM was its lack of SCSI support; it was not possible to run QEMM optimise with several popular SCSI controllers without first manually editing the configuration. QEMM 8 now includes improved support for SCSI adapters and other bus mastering devices, so that with this version, memory conflicts caused by SCSI controllers are a thing of the past, QEMM 8 installed and optimised on a WIN95 system with an Adaptec controller in less than five minutes without any hassle or fuss.

Quarterdeck are pioneers of memory management software. They gained their reputation in the days of DOS, when the superiority of QEMM compared to Microsoft products in freeing up conventional memory — loading TSRs and device drivers into upper memory, permitting larger programs to be run in limited Ram — was sufficient to ensure the success of the company. Nowadays Quarterdeck produce more than just



Top This Quarterdeck QEMM MagnaRam monitor clearly shows system resource usage

Above Virtual memory hard drive monitor shows reduced swap file hits and system time saved

memory management software and QEMM is far more than a simple optimisation program, but in its own way QEMM 8 is as far in advance of the features offered in Windows 95 as the original Qemm was in advance of Dos. Qemm 8 will still out-optimize a system compared to Microsoft and makes more memory available for programs which require it.

PCWDetails

Price RRP £79.95 (street price £50 - £60), upgrade from any previous version £29.95
 Contact 01245 496699, fax 01245 495284
 Email: qservice@qdeck.com

Good Points

Excellent software which brings out the best in a Windows 95 or Win32s system

Bad Points

Should have been included in Windows 95.

Conclusion

A very stable, easy-to-use product which will fine-tune (supercharge?) any Windows 95 system.

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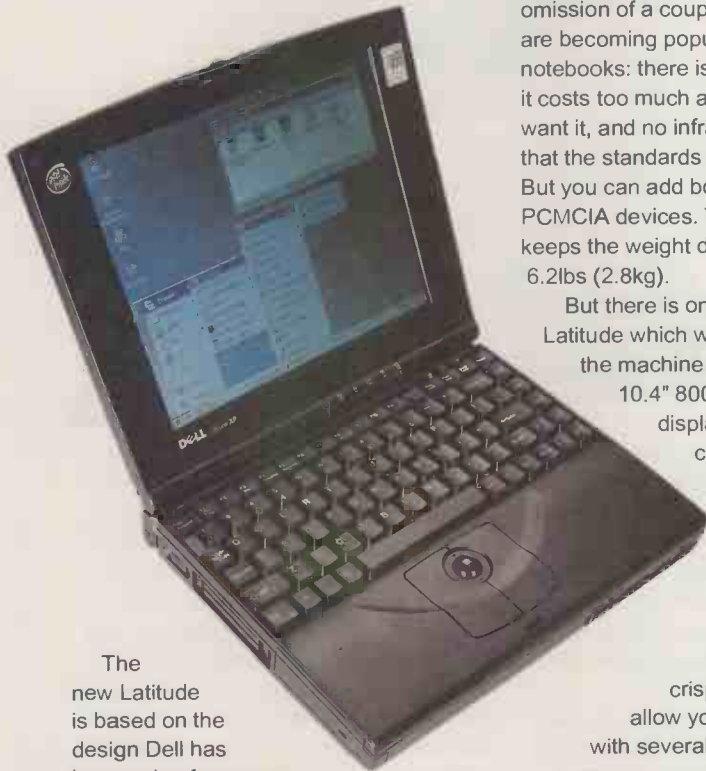
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HARDWARE

Dell Latitude ST120

Fast, with long-life batteries and a quality screen: Simon Rockman didn't want to part with this new notebook.

Latitude notebooks are designed by Dell and built by Sony. This gives them their most valuable ingredient: the lithium ion battery. Development of this new technology has been pioneered by Sony so while other companies have lithium ion, Dell has always been a little way ahead. The result is notebooks with a longer battery life at the same weight as rivals.



The new Latitude is based on the design Dell has been using for some while but with the new 3.3v 120MHz Pentium and Pico power technologies chipset. The Pentium is 2.9V internally, so it doesn't draw very much power and can be used in the film mounting preferred by notebook manufacturers. The result is a very fast machine with an acceptable battery life.

Dell doesn't quote a life, but refers to the "Veritest" test in which the battery lasted four hours on a single charge, using a mixture of Microsoft applications. We got a similar result which is encouraging since quoted times and real

life are often so far apart.

In addition to long life the battery has some other remarkable characteristics. There is no memory effect (more accurately called voltage depression), and a bar graph of LEDs on the battery shows the remaining charge. The computer can be recharged in 90 minutes.

The long battery life is helped by the omission of a couple of baubles which are becoming popular on some notebooks: there is no sound – Dell says it costs too much and customers don't want it, and no infra-red port – Dell says that the standards haven't settled yet. But you can add both of these as PCMCIA devices. The lack of a CD-ROM keeps the weight down to a sensible 6.2lbs (2.8kg).

But there is one thing about the new Latitude which will immediately make the machine a pleasure to use. The 10.4" 800 x 600 active matrix display capable of 65,535 colours, which is good enough for the anti-aliased fonts and 3D icons in the Windows 95 plus pack. The screen is extremely crisp, and big enough to allow you to actively multitask with several windows open at once.

The machine comes with 8Mb RAM on the motherboard, but the smallest machine on the Dell price list is 16Mb – 8Mb might be available as a special order but you really would want to do something odd to specify that. There are two sockets for DIMM (dual in-line memory modules) which, using 16Mb DIMMs makes the machine expandable to 40Mb. If 32MB DIMMs become available, it would be possible to expand the Dell to 72Mb. With the 16Mb supplied with the review machine, it felt very quick under Windows 95.

There is full compatibility with plug

and play and power management, which means the machine wears a "Designed for Windows 95" sticker to match the Intel Inside (please give us a discount on the chips) one. The screen is excellent, and makes going back to a conventional notebook feel like staring through a porthole. It really is possible to see that you would be more productive with a higher resolution machine.

The PCMCIA sockets are well supported and include simple DMA facilities, something which is likely to become an increasing trend since some PCMCIA cards will demand this.

The build quality of Latitudes has always been excellent. One long term test machine survives a very rough life and has only suffered minor wear and tear. The new machine is compatible with the docking station of the old models and has the same up-and-over garage door-type flap at the back to protect the keyboard, printer, monitor and serial ports, but there is a new, beefier power supply and hence a new, deliberately incompatible, power socket.

There is a 16550 UART to give high speed serial connections and the external video will display at a resolution of 1024 by 786 in 256 colours thanks to the Cirrus Logic video chipset. Performance is helped with a 256k cache, which puts it on a par with (fill in name when I've done the test) reviewed in January's Pentium desktop roundup.

Faster, more competent machines are regular visitors to the VNU labs, but it's rare for it to be so painful to have to send one back.

PCWDetails

Price £3599

Contact Dell 01344 720000

Good Points Very fast; amazing screen; long, long battery life

Bad Points I don't have £3,599.

Conclusion Roll on next Christmas.

Spec Dell Latitude ST120, 16Mb RAM, 810Mb hard disk

HARDWARE

AST Advantage 613e vs Brother Solo

Brother beats AST in the war for the home PC market, says Ken McMahon.

Brother and AST are the latest in a long line of office PC manufacturers falling over themselves to get a slice of the home market with living room-friendly products. Unlike most of the PCs we looked at in the November issue, neither of these two offers built-in TV reception. They do, however, come with Windows 95 pre-installed, serious software bundles for work-from-home types and a selection of Multimedia CD-ROMs and a quad-speed CD-ROM drive for fast and furious entertainment.

There the similarity ends. For one thing, the machines look quite different. The AST comes in two bits — a “pizza box” processor unit which houses the Cyrix M1sc100/75MHz processor, 850Mb hard disk, the Toshiba CD-ROM drive, floppy drive, and 14.4kb/sec fax modem. The modem card occupies one of the three available expansion slots. There is 8Mb of RAM fitted as standard.

The 14” tilt and swivel monitor which sits atop the processor box is thoroughly feeble in every respect. It’s so bulbous that there is very noticeable distortion of the screen image at the edges which is impossible to eliminate by adjustment. It

also means you can’t easily make use of the entire available area, which, on a 14” monitor, is a serious drawback.

1MVRAM provides 256 colours at 800 x 600 or 32,000 colours at 640 x 480 pixels. At the higher resolution however, the monitor’s maximum refresh rate is a mere 60Hz at and that speed it’s so flickery that even a few minutes viewing is very tiring on the eyes. As if that wasn’t enough it wasn’t until we tried to adjust the brightness and contrast to obtain a better picture that we discovered they were already set to maximum.

By contrast with some other manufacturers, who provide their own custom-built GUI as an alternative to Windows, AST have opted for Spot. This

is a helper application that sits on the Windows 95 desktop as an always-open, always-on-top window. Spot is fairly unobtrusive — a small blue spot the size of a pea, but when the pointer rests on it (you don’t need to click) a four-quadrant collar appears. From this you can select from any one of four pop-up menus; Fun & Learning, Communication,

Financial and Productivity and Ask AST.

In addition to MS Works you get Quicken,

Multimedia Connect Lite, Cinemania 95, Encarta 95 and MS golf. The external speakers produce very nice sound from the Creative Labs Vibra 16 sound card.

The Brother Solo PC, as the name suggests, houses the motherboard. This contains an Intel Pentium 100MHz processor, 14” or 15” monitor, speakers, 500Mb hard disk, CD-ROM, floppy drive and everything else in one off-white unit very similar in style to the Apple Performa 5300 and Compaq Presario.

The Solo has a few unusual hardware features. A button below the power switch puts the system into suspend mode manually, should you decide to wander off for a while. You just press the keyboard or move the mouse to start things up again on your return. An overscan button on the left panel next to the picture adjustment controls provides an oversize picture right up to the screen edges and on the other side there’s a sound mute button next to the volume wheel and headphones jack. The built-in microphone is mounted invisibly directly



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More than just a monitor

67
PERSONAL COMPUTER WORLD

below the screen area.

Round the back you'll find one parallel and two serial ports, a joystick port, VGA in and out and PS/2 style mouse and keyboard sockets. The 16-bit soundcard provides line in and out jacks and a midi port as well as bass and treble boost switches. The S3 trio64 with 1Mb on-board VRAM (expandable to 2Mb) produces a nice steady image at 72Hz at 800x600 and will display 16 million colours at 640 x 480 at 60Hz.

Bundled software includes MS Works, MS Money, Dangerous Creatures and Encarta 95. Unusually, Brother doesn't include any GUI assistance for novice users, but the manual is very clear and comprehensive.

The Solo chassis design mounts the

motherboard vertically and the "split and swing" casing provides easy access to the insides. Optional upgrades include a TV tuner, MPEG card, video capture card, Fax/Modem card and LAN card. There is 8Mb RAM fitted as standard, upgradable to 128Mb. There are 4 vacant expansion slots, two of them PCI bus, so there's plenty of room to accommodate upgrades.

In terms of performance there's not much between these two machines. But in every other arena the Brother machine wipes the floor with the AST. The overall design, the display, expansion options and everything else about it with the exception of the soapbar mouse and "clicky" keyboard is superior.

PCWDetails

AST Advantage 613e

Contact 0990 611611

Price About £1400

Good Points Good performance.

Bad Points Very poor-quality display.

Conclusion The display makes it a definite non-starter.

Brother Solo

Contact 01279 416888

Price £1399

Good Points Excellent integral design; good hardware spec for a home PC.

Bad Points Unpleasant keyboard.

Conclusion Excellent overall design makes it a serious contender with other all-in-one machines.

HARDWARE

Canon BJC-610

Superb quality colour inkjet at a nice price — Eleanor Turton-Hill bags a bargain.

The BJC-610 is Canon's latest colour inkjet printer. It's equipped with four separate ink cartridges, offers 720 x 720dpi resolution and handles a variety of different paper types. Like other printers which have appeared recently, this one is compatible with both Windows 3.x, and Windows 95 and the whole system is designed to comply with the Microsoft Windows Printing System. This optimises the speed of the printing process and feeds relevant error messages back to the user during the printing process. It will also talk to you at appropriate moments if you've got your PC wired up for sound (you can disable this if you prefer).

The driver supplied is easy to install and gives an impressive degree of control over all kinds of printing functions. A range of settings allow you to configure the printer for best results according to the type of document you want to produce, the type of paper you're using, and the resolution you need. For the highest quality results the driver should be set to "graphics" or "photographic" mode, with the resolution on its highest gauge, and the correct paper selected. The BJC-610 can cope with many different types of media including glossy paper, transparencies, and high gloss film.

Each of the four cartridges (black,

cyan, yellow and magenta) slot inside the printer individually, and this arrangement has advantages when it comes to cutting down on running costs. If you use one colour more than the others, it can be replaced separately. This is particularly relevant to the use of black which tends to be the first colour to wane. For this reason the black cartridge is twice the size of the others.

High resolution or high gloss paper has a dramatic effect on the quality of output, and the driver must be adjusted to the correct paper setting if you want to exploit this fully. The BJC-610 can cope with many different types of media including glossy paper, transparencies, and high-gloss film, and if you're really looking for professional colour results, this printer certainly delivers the goods.

In our tests, the BJC-610 gave consistently high quality results with excellent depth and contrast in all colour tones and a near-photographic quality to some images. Pure text also came out crisp and clear, especially in its high quality mode, but this tended to be slow.



If you want to print something out quickly there's a high speed option which produces a draft quality output. The list price for the BJC-610 has been set at £449, but the street price is expected to drop to as little as £370 which makes it excellent value for money.

PCWDetails

Price £449 (RRP), £370 (expected street price)

Contact Canon 0500 246246

Good Points Great quality of output; well designed.

Bad Points Slow for high-quality output. Some large full-colour graphics documents took over 20 minutes to complete.

Conclusion Absolute bargain.

“ Showing flowers on the Internet has really helped my business grow. With pictures from

my new DC40 camera, my floral arrangements look as fresh on my home page as in my store front window. I just wish people would stop sniffing my screen. ”

— IBM PC 700
Florist



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SOFTWARE

Apple Newton 2.0

Slow handwriting recognition, lack of compatibility and a high price burden the Newton. Simon Rockman comes to the conclusion that you're better off buying a Psion.

There is a PCW tradition that reviews are written on the computer that is being reviewed. Being a stickler for tradition, it goes without saying that I had to write this piece on the Newton. Then the whole review had to be printed out and typed into a notebook, since the Newton connection software for the new 2.0 version of the operating system isn't ready. Either way, this must be one of the few PCW reviews to have been electronically handwritten rather than typed.

What makes this Newton special is that it represents a technological step backwards. When the first Newton was launched it was hailed as a technological breakthrough, because it could recognise joined-up handwriting. The new Newton

still does this – in fact it does this better than the original – but has the advantage that it also supports printed text. The cursive recognition still tries to match scrawled words to the dictionary, but words printed letter by letter ignore it.

You should bear in mind that you may need to adapt your writing style to suit the Newton. The decision to include printed recognition came from Apple's realisation that owners were prepared to modify the way they wrote to use the machine. This is something of a blow for advocates of handwriting recognition who have been claiming that the technology will soon be able to cope for about five years. It took the success of a third party program called Graffiti.

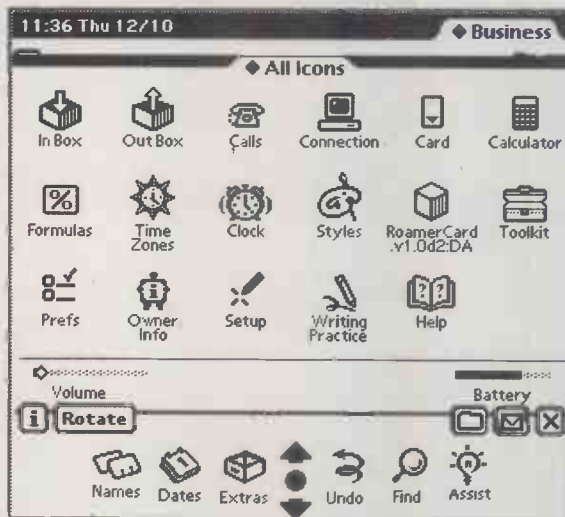
Apple has designed the new OS to be more flexible, recognising that the real market for the machine is in vertical applications, and extending to suit the needs of third-party developers. The press information says that there are now better links to PC and Macintosh machines, although this didn't seem evident when we actually wanted to do it, a problem exacerbated by compatibility problems between the new and old OS. Even PCMCIA data cards which have

been formatted under the old OS cannot be written to on the new machine, although they can be read; the best way to get data from a new Newton to an old one is to beam it using the infra-red link. The manual is easy to read cover to cover, but looking anything up is frustrating, particularly if you use PC terminology.

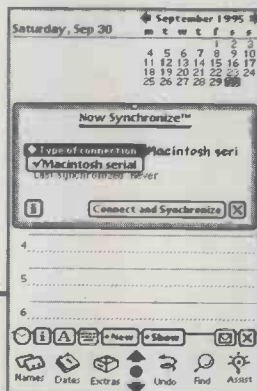
The link to a digital mobile phone works very well – once you tackle the errata which takes you round the houses – and

still does this – in fact it does this better than the original – but has the advantage that it also

Left The checklist document Below The Newton gets the message



Above The landscape view makes the Newton 2.0 different Right The link to PCs won't be available for a while

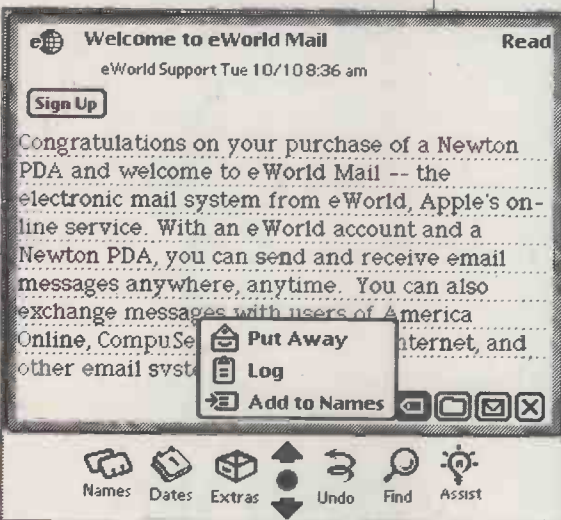
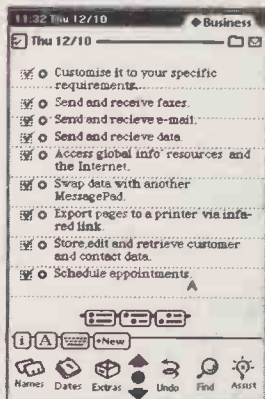


faxing a single page works well, but multiple pages are cut short. The best thing about using a data card is that it allows you to plug your Apple into your Orange.

For all the improvements, the Psion Series 3a still has the Newton beaten. It's too expensive, and the recognition is too slow. The basic machine costs £424 plus VAT with generous and comprehensive discounts for people who have older Newtons and versions of the OS.

PCWDetails

Price £424
Contact Newton Customer Hotline
 0181 730 2048
Good Points Excellent technology.
Bad Points Still not ready for the market.
Conclusion Buy the Psion.



HARDWARE

Conner E-IDE tape backup

Goodbye, backup anxieties; by Nicola Kingsley.

The Conner TapeStor drive should fulfil most capacity requirements, storing up to 2Gb in native uncompressed form or 4Gb with compression. Each cassette costs around £15, giving a reasonable Mb/£ ratio, and is fully compatible with the QIC-3080 standard, transferring up to 54 Mb/minute. Insert the supplied dedicated controller card, slot in the tape unit in a spare 5.25" bay, load the software (Backup Exec for DOS or Windows from Arcada Software), and initialise the drive. After manually resolving a brief interrupt conflict, the system finds the drive, performs a quick self-test on to the tape and is ready to go. No device drivers are required in your configuration files.

The first full back-up is easy to perform, and from then on only differential or incremental backups are required. These save space by only adding newly created or amended files.

What makes this Conner so

interesting is that it is the first E-IDE tape drive. In theory, you should be able to connect it to a spare E-IDE channel on your controller, thus sparing a precious slot and interrupt. Unusually, Conner prints a disclaimer in the manual to discourage this route, but I went ahead with a Promise EIDE 4030 Plus VL cacheing controller (£89 from Datrontech). My two IDE hard drives were daisy-chained as master and slave of one channel, while the Conner was set as master of the other. I even managed to fit a six-speed E-IDE CD-ROM drive as a slave device on the same channel as the Conner. All four drives worked perfectly under the single controller, although a little trial and error was required on the master and slave settings. All in all, the Conner drive is an excellent device, particularly since it can be fitted to an existing E-IDE controller, and even daisy-chained with an E-IDE CD-ROM drive.



PCWDetails

Price £495

Contacts Conner 01628 777277
Datrontech 01252 303500

Good Points Large capacity and can be fitted to an existing E-IDE interface.

Bad Points Lower capacity solutions much cheaper.

Conclusion Ideal choice if you've got E-IDE and want large capacity.

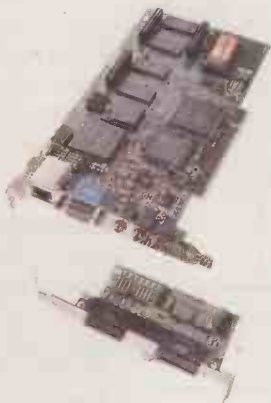
HARDWARE

Diamond Multimedia Edge 3D

Wavetable audio has the edge here; by Gordon Laing.

Coming soon to a PC near you are the next breed of do-it-all video cards. They'll boast hardware-accelerated 3D graphics facilities rarely found outside arcade machines and high-end games consoles. Most, including the Diamond, will also offer software MPEG playback under a fast Pentium. Diamond's Edge 3D 3240XL may indeed have the edge over the others, boasting wavetable audio and support for Sega PC games.

The wavetable audio does not exist on built-in ROM, where the samples are downloaded into your PC's RAM instead. You can choose 1Mb of compressed sounds or 6Mb, but the latter noticeably slows a 16Mb system. Both sound banks



support General MIDI, but neither sounded as good as a dedicated ROM-based wavetable sound card. DOS game support was varied, and although we got General MIDI music under Doom and Descent, we failed to get sound effects outside the supplied games.

Despite fitting all the circuitry on a single half-length PCI card, Diamond ran out of room on the blanking plate. It managed

to squeeze on the video port, three sound connectors and a telephone jack port, with adapter for a standard joystick. Interestingly another blanking plate is supplied with ribbon connectors to the main board, offering two Sega Saturn control pad ports — you'll have buy pads at around £20 each, since none are

supplied.

The Edge 3D comes with three CD games which make use of the 3D acceleration. Virtua Fighter remix from Sega PC is slower than the Saturn console version, but still the only 3D fighting game on the PC. Nascar racing is alright, but sadly Descent: Destination Saturn was not included as promised.

As a video card the Edge 3D is good, although the picture is slightly soft. Four versions are available: 1Mb DRAM £229, 2Mb DRAM £279, 2Mb VRAM (reviewed here) £359, and 4Mb VRAM for £499. All will work under Windows 95.

The Edge 3D is certainly a highly capable and fully-featured card but there are some oddities. Before buying, we'd recommend you check out the forthcoming round-up.

PCWDetails

Price £359

Contact Datrontech 01252 303500

Good points Jack of all trades.

Bad points Master of few.

Conclusion Compare to competitors before buying.

HARDWARE

Wacom UltraPad A5 Graphics Tablet

So you want to paint like Picasso with the ease of an Etch-a-Sketch? Take Wacom's tablet and, like Nicola Kingsley, release the artist in you.

Roll up all you budding artists — here's a graphics tablet that makes drawing on the screen as easy as ABC. Having said that, if you are feeling creative, then this new model from Wacom is able to stretch to most professional demands. At the reduced price of £329 (formerly £389), it starts to look even more attractive.

The UltraPad A5 package includes the tablet, with an active 21 x 15cm A5 area, pen, small 12V transformer, 9-pin serial connector with 25-pin adapter, and driver software. The power supply plugs into the serial connector at the back of the PC, leaving one quite flexible cable to the actual tablet. Because the pen is light and cableless, and the tablet weighs in at 880g (1.9lbs) with a thickness of 13.9mm, it feels neat and convenient to use, even on your lap.

Installing the tablet is as quick and easy as installing a mouse, and if you use a spare serial port you can have both running at the same time. But you must remember to switch on the pad before launching Windows, or it will not load the drivers. With its pressure-sensitive features, the tablet enjoys compatibility with a wide range of art packages, including Photoshop, FreeHand, Painter, CorelDraw and AutoCAD.

The first difference between a mouse or trackball and the pen is absolute positioning. The cursor does not need to be wheeled across the screen, each position on the tablet corresponds to one on-screen. This is actually a little tricky at first for mouse-users but the new technique is acquired soon enough. The tablet can still see the pen up to about 5mm from the surface, enabling you to draw onto a sheet of paper placed on top, or to trace a printed design directly on to the screen.

The tablet is supplied with Wacom's UltraPen Eraser, an improved version of the UltraPen Classic. The Eraser tip can be used either as an eraser or a second tool. There are other pens available, the



Trace over your favourite pictures with the pressure-sensitive option

UltraPen Pencil and Ink, for example, if you prefer the feel of lead or ink on paper, but still want to draw on-screen.

With 256 pressure levels, it's possible to produce quite natural-looking brush strokes, pencil/pen lines and eraser strokes of varying thickness and shade. Drawing and sketching in graphic

packages becomes far more fluid and enjoyable, with smooth curves and free sweeps of the brush. The tilt-sensitivity of the pen enables you to change the thickness of your line by moving the pen from a vertical to a more horizontal position.

The Wacom control panel software allows optimisation of the UltraPad for specific software applications. User-programmable macros and functions and various customisable settings can be set up and accessed from a row of buttons at the top of the tablet, giving you control of the application and preventing all that tiresome switching from tablet to screen toolbar.

This is a good fun graphics tool. It makes drawing and sketching on-screen more natural and realistic, and offers an admirable range of features for the price.

PCWorld Details

Price £329

Contact Computers Unlimited
0181 200 8282

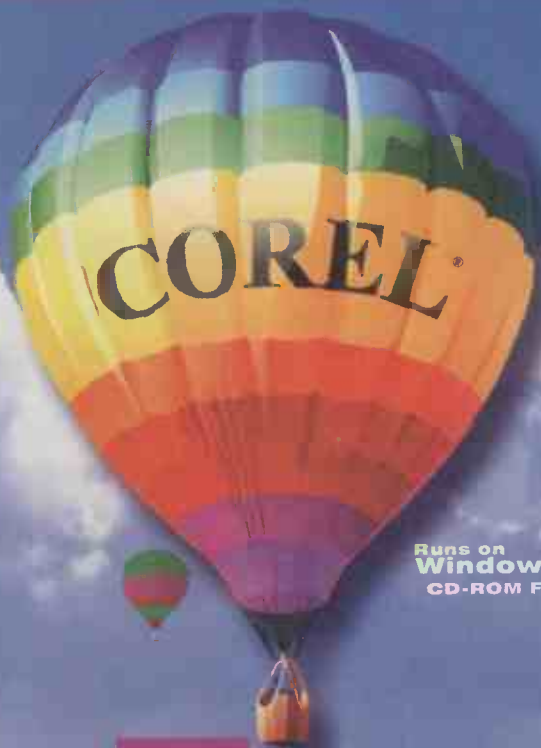
Good Points Supports tilt, pressure and eraser.

Bad Points Some may want a larger active area.

Conclusion Excellent tool for the computer artist

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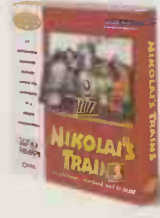
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SOFTWARE

MoreMem and TopBar 4.0

Windows memory manager; by Eleanor Turton-Hill.

If you've been using Windows 3.x for any amount of time (like about five minutes), you'll be familiar with the following error message: (mem.gif)

One of the fundamental weaknesses of Windows 3.x is its dependence on DOS for handling resources. It doesn't matter how much memory you have on your system, Windows is still limited to the 640Kb restriction imposed by DOS. Windows uses a device driver called HIMEM.SYS, to access all the memory on your system but this does not solve the basic problem that certain low-level operations like interrupt handling need to use the area below 640Kb. The problem is not helped by the fact that some software loads DLL files needlessly into this area.

MoreMem is a utility designed to solve this problem by ensuring that only essential files are loaded into conventional memory. It works by breaking up free DOS memory into many

small compartments, so that DLL files cannot physically fit into any given area. DLL files are then forced into extended memory thus freeing up space under 640k for essential files.

MoreMem is easy to install and can be configured to make the most of your particular combination of applications. When you load Windows, MoreMem automatically executes and provides you with a resource monitor and task switcher called Topbar. Topbar keeps you informed of any changeable data on your system including the time and date, as well as more important aspects of your system like DOS memory, system memory, GDI resources, and USER resources. As memory levels fall below user-defined thresholds, Topbar changes its background colour from green to yellow to red.

You may well be wondering why anyone should invest in a memory utility for Windows 3.1 when they could just go



TopBar sits in the corner of the screen and continually monitors your resources. The traffic-light colour code works as a warning when resources deplete

out and buy Windows 95. After all, Win95 has superior resource handling and costs only £59. The problem is that Windows 95 requires a much higher specification PC than Windows 3.x, and ultimately, the cost in hardware upgrades is substantial, especially if you're a reasonably large organisation with 100 or more PCs to upgrade. So, utilities like MoreMem will find a market for some time to come.

PCWD details

Price 1-user licence £40
10-99 users £35
100-499 users £30

Contact Accurate Technology
01734 773889, fax 01734 771260
Internet: info@accurate.co.uk

Good Points It works.

Bad Points None worth mentioning.

Conclusion An invaluable utility for anyone still using Windows 3.1

HARDWARE

Mannesmann Tally T7010T

Looks aren't everything; by Dylan Armbrust.

Have Tally will travel. This would describe the Tally T7010, Mannesmann's recent portable printer offering. It looks good. Measuring 30cm(w) x 13cm(d) x 6cm(h) and weighing less than 1.5 Kg or 1.8kg with NiCad battery, it is one of the smallest portables around. But beauty is only skin deep. Signs of trouble came when I lifted the cover and extended the paper support arms, only to find they popped off with little effort. However, with the supports firmly back in place, the sheet feeder can hold up to 15 sheets. There are three function

buttons and LEDs on its operating panel to control the printer and display the varying printer states.

Portability is accomplished by the use of a special ten AA battery pack that comes standard with the T7010. If you're willing to spend and extra £50 or £100, Mannesmann will supply you with a NiCad or Ni-MH battery respectively — no lithium ion option however. The AA or NiCad battery packs will print about 80 pages each, while the Ni-MH will do about 140. Mannesmann also offer a fast-charger/conditioner for £140, allowing recharge in 40 minutes. Otherwise, you can recharge the battery in the printer by plugging in the AC/DC adapter and setting the recharge function.

The T7010 managed to pass our tests, but only with a helping hand. Nine times out of ten the review model had a paper jam when expelling its

paper, unless I intervened and pulled it out. No amount of fiddling would rectify this. Calling the technical support line only yielded the supremely unhelpful observation that "there was a problem with a printer" (tell me something I didn't already know). This aside, it's average print speed was 2.23ppm. The quality of printed text was clear and very readable but the T7010 came up short on the graphics side.

It comes with its own drivers for Windows 3.1x or higher or you can use an HP DeskJet 500 driver. The Tally T7010 is an adequate printer, as long as you ensure it ejects its paper properly, but I'd carefully consider your printing needs before going with this portable.

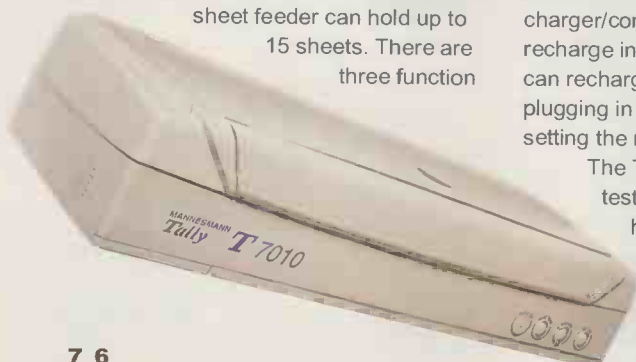
PCWD details

Price £249 (RRP), £199 (Street)
Contact 01734 771688

Good Points Quick, clear text printing.

Bad Points Poor paper feed and expensive batteries/charger.

Conclusion Good for straight text, but not much else.

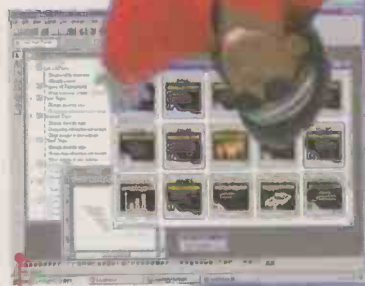


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HARDWARE

SMS Link for Psion Series 3a

Have Psion, go Orange; by Simon Rockman.

There are 200,000 people with Psion Series 3a organisers in the UK. There are 300,000 people with Nokia GSM 2110 or Nokia Orange mobile phones. A good number of people have both. Psion and Nokia have produced a system which allows the Series 3a to be plugged into either Nokia phone, to send short messages using the SMS facility of the phone. Short Message Service (SMS) is part of the international specification for mobile phones. It uses the signalling channel to send and receive messages through the phone, even if you are talking at the time. The limitations are that it is slow — a message can take up to a minute to send, and messages are limited to 160 characters.

Some phones allow you to compose messages by typing them in using the letters on the numeric keys. The Psion link offers a number of advantages. The 3a is smaller than a desktop but its keyboard is considerably better than the

hunt and peck system of a mobile phone. You can compose several messages, then plug the phone in to send them. You can also set up bulk mailing lists and send messages to a number of people. Received messages are read back into the Psion and can be edited or replied to.

We tested the link with Vodafone GSM and Orange networks, both seemed to work equally well. Orange phones need upgrading. It is not possible to send messages from one network to another — although this is technically possible, the UK networks don't have the necessary agreement. Using the Vodafone system it is possible to send messages to users of some overseas networks.

Vodafone charges 10p a message while Orange charges £2 a month to have the ability to send plus 10p a message. Both networks have a bulk message tariff, but the systems are still in their infancy and all messages are uncharged — you



should check regularly to make sure no charge has been implemented before sending lots of messages.

Prices have not been set in stone, but Psion expects to charge about £60 for the cable with the software on floppy disk and £80 for the cable with the software on flash ROM.

PCWDetails

Price £60 cable and software on disk, £80 cable and software on flash ROM
Contact Psion on 0171 258 7368

Good Points Cheap email.
Bad Points Limited users.
Conclusion Great potential.

HARDWARE

Hewlett-Packard LaserJet 5Si

Filling the gap left by its predecessor; by Simon Head.

The HP LaserJet 5SiMX is the new network printer from Hewlett-Packard. Like its predecessors, the 5Si is available in two versions, the 5Si, which is PCL only, and the 5Si MX, which is both postscript and PCL. Somewhat surprisingly, the printer has no infra-red capability. One of the ideas behind infra red was that you would find a spare printer and point your IRDA equipped notebook at it to print documents.



The paper trays are an improvement over the previous range of HP printers because they are adjustable to take any size of paper, rather like the trays in a photocopier. HP no longer expect you to purchase a new paper tray for every size of paper. The printer has two paper trays, each capable of a 500-sheet capacity. The top tray can do sizes up to Letter and Legal. The bottom paper tray can handle paper sizes up to A3.

The engine is rated at 24ppm and because the paper is fed through the printer in a landscape orientation, the same engine can print on both A3 and A4. An internal duplex paper tray is available for double-sided printing and other options include an internal hard disk, a high capacity paper feeder and a multiple output bin mail sorter.

The printer's front panel is a two-line LCD display. The name of the .EXE file that sent the print job is displayed when

the job is being printed. If your .EXE file has a meaningful name like WINWORD.EXE, this can be useful.

The HP LaserJet 4Si has been in need of a redesign for some time and the 5Si certainly fills the slot left by the 4Si. While this printer is not groundbreaking in the way previous versions of the HP LaserJet have been it does signal HP's entry into the high-end network printer market. Coupled with HP's JetAdmin software the only feature the printer lacks is the 1200x1200dpi capability that is available on the Lexmark Optra range.

PCWDetails

Price 5Si £ 2,779
 5Si mx £4,049
 Duplex £494
 High Capacity Feeder £955
Contact Hewlett-Packard 01344 360000

Good Points A big improvement over the HP 4Si providing 24ppm network printing.
Bad Points Not able to print at 1200x1200dpi and no IRDA infra-red port.
Conclusion Not groundbreaking, but worthy successor to the ageing 4Si.

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SOFTWARE

Data Becker Family Tree

Paul Begg branches out and looks at an inexpensive genealogical database.

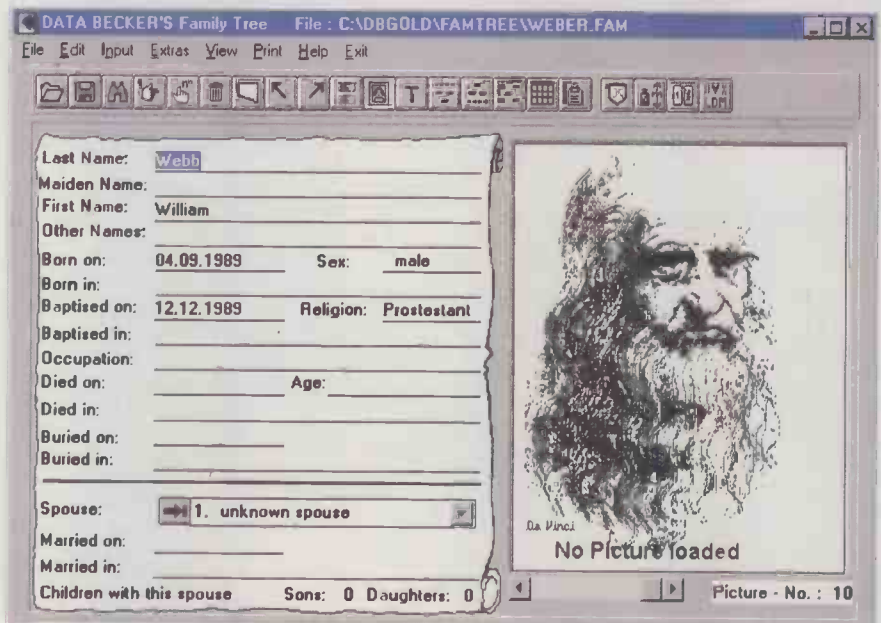
Shareware offers a wide variety of excellent programs which you can try-before-you-buy, and there are several superb commercial packages. Into this highly competitive field — and to some extent bridging the gap between shareware and commercialware — comes Data Becker with a low-cost starter program called Family Tree.

The first thing I checked was whether Family Tree supported GEDCOM. If it hadn't, this evaluation would have stopped here. GEDCOM (Genealogical Data COMMunication) is the standard for transferring genealogy data between different software packages. This is important, because the chances are that as your research continues, you'll need to move to a more powerful genealogical database.

You won't want to copy all your data manually from one software package to another (and risk mis-entering details in the process), so GEDCOM will save time. GEDCOM also enables you to supply data on a floppy disk to someone else, or vice versa, and it is essential if you want to use the International Genealogical Index and Ancestral File material of the Church of Latterday Saints (LDS, otherwise the Mormons). Family Tree does support GEDCOM, so off we go...

Family Tree's opening screen is deceptively simple. There are places to enter Christian and surnames, second names, and maiden name. Plus the place and date of birth, baptism, death, and burial. The date format is 03.09.1967. You can also enter sex, age at death (though both are entered automatically) and occupation. I was irritated by the occupation field allowing only one occupation. Many people change occupations and are successful at all of them — would you define James Herriot as a vet or an author?

You can add up to four spouses, which should be sufficient for most people, but could turn out to be a limitation, especially when in this case "spouse" includes parents of illegitimate children. In the past it was not uncommon for a man to have married perhaps two or



three times when young wives died in childbirth, or for a woman to be widowed at least twice and sometimes more often.

An icon bar along the top of the screen gives access to some neat add-ons. You can add notes to each entry. You can also add text and links into your own word-processor — there are no fields provided for recording source information. This is essential, as it is common to find several birth years for a single individual born before the introduction of birth records; an age provided on a marriage certificate can suggest a year of birth different from that indicated on a death certificate and both might differ from the birth year indicated by the age a parent gives when registering the birth of a child.

You can display and print an ancestor chart, descendants chart and a family chart — printing a section of a tree or the whole tree on separate pages which can be stuck together to produce a chart — and also display sortable lists of the individuals on the database.

There's a list of forenames and their meanings, an excellent, if rather short, list of old terms and measures, a calendar from 1699 to 2199 which gives you the day on which someone was born, the phase of the moon and the astrological

Top An ancestral Table — see where you came from

Above A simple data chart accompanied by a photograph gives Family Tree a "family album" look

sign. One particularly brilliant idea is the utility for converting Roman numerals to numbers — MCMXCVI to 1996. Add all this to a list of useful UK addresses and other helpful advice and information hidden away in the Help files, and Family Tree emerges as an excellent beginner's package.

PCWDetails

Price £14.95

Contact Data Becker 01420 22707, fax 01420 22807

Good Points Has GEDCOM, good basic data entry, some nice add-on features.

Bad Points One will almost certainly outgrow it as one's research goes further back.

Conclusion Well-priced, thoughtfully put together. A good choice for anyone embarking on the constantly growing hobby of genealogy.

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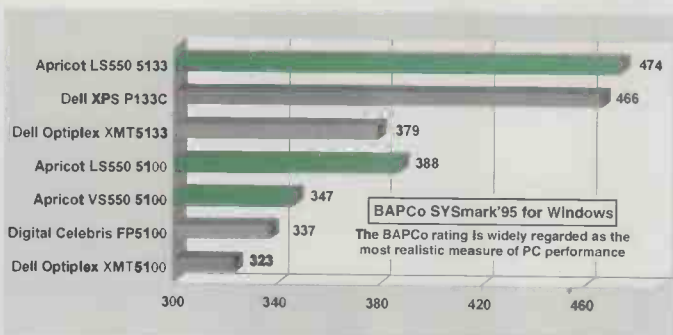
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Apricot LS & VS series and backed by industry-leading multimedia components: a quad-speed CD-ROM from Sony and Creative Labs SoundBlaster audio technology.

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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**Canon BJC-600****1** YEAR
TEST

Canon's first colour bubblejet isn't Speedy Gonzales, says Andrew Dornan, but it's a damn good solid workhorse

Canon has been making inkjet printers for several years now, based on 360dpi bubblejet technology. The BJC-600 is the first bubblejet to print in colour.

Unlike many colour-capable inkjets, this printer has four separate ink cartridges (yellow, magenta, cyan and black) so it can print pure black and colour simultaneously. The print head is designed to hold five cartridges, not four, but there is a special high-capacity black cartridge to fill the extra space — a good idea since most people use black a lot more often than the colours.

The three colours mix to give full-tone blue, red and green, with dither patterns for more exotic shades. The printer's 100-sheet feeder can hold plain paper, envelopes, business cards or transparencies, though Canon recommends special coated paper. This produces nice results, but after a few sheets the coating can lubricate the feed mechanism and let the paper slip. The only cure is to clean the small claws which drag the paper in — an awkward and fiddly procedure. A line-feed button would give more control here, but as it has pretences to be a page printer, the BJC-600 doesn't have one.

Canon's claimed speed is 2ppm, but this only applies to "draft" at 180dpi — fine for Arial text, but very messy with DTP documents. The standard 360dpi mode produces adequate letter quality, taking about a minute to get through each page. Printing speed is no faster in monochrome than colour mode, though the



Windows driver does take noticeably longer to rasterise colour images on a slow PC.

Drivers are supplied for Windows and a few DOS applications, but everyone else has to rely on emulation: the Epson and IBM standards, and previous bubblejets. These all supported monochrome only, so Macintosh users wanting colour will be disappointed.

Earlier bubblejets used a very expensive integrated ink cartridge and print head, prompting several companies to sell cheap-and-dirty refill kits. This time, the cartridges are just small bottles of ink which Canon has done its best to make impossible to refill. The manual says the print head itself need be replaced only once during the printer's life, but declines to estimate how long this might be.

An initial problem is that the print seems very dark: blue looks almost black under indoor light. However, the driver can reduce the concentration of ink

The BJC-600, an old bubblejet that won't let you down

sprayed on to the page. This prolongs cartridge life as well as making colours more vivid, but it's only possible under Windows.

After its first appearance in February 1994, the BJC-600 was upgraded in March 1995 to the BJC-600e, which is identical except for new "smoothing" technology. This has now been superseded in turn by the BJC-610, reviewed in this month's *First Impressions*.

PCW Verdict

Useful and reliable.

Price £449 RRP, for its current version, the BJC-610.

Contact Canon 0181 773 3173

SOFTWARE

TurboCAD 2

2 YEAR
TEST

TurboCAD 2.0 for Windows has served FRK Jarvis well. Clear, user-friendly functions make it accessible, it's fast for a low-spec drawing package, and at under £100 it won't break the bank.

Early in 1994 I bought the then new TurboCAD 2.0 for Windows to run on my 486SX25 with 4Mb of RAM and Windows 3.1, a decision I have never regretted. Version 2 was superseded by 2.03 in November 1994, and this was issued as a free upgrade to all registered users. The new version increases speed dramatically and turns a workmanlike package into one that really flies.

The quickest way to learn is to produce your own drawings, and this is helped by the simple and intuitive icon-driven functions. The uncluttered screen has a typical Windows layout, with well-defined toolbar buttons which change the palettes to provide the required detail for the chosen tool. Snap functions and drawing mode tools are down the left-hand side, and there are line style and symbol buttons at the foot of the screen.

All technical drawings, whether on paper or screen, start with the choice of paper size and scale, and the same is true of TurboCAD through the options menu. The printer parameters are set up through File print/Plot setup, and having made these simple settings, the screen shows the print area superimposed on the drawing area. The rulers and edit bar show the units you have chosen, and from here on it is very much like producing a full-size drawing with all work carried out in real-world dimensions. A grid can be used to help and there is a choice of arrow or cross-hair cursors, although the latter does slow it down.

Drawing is straightforward and intuitive, and you can

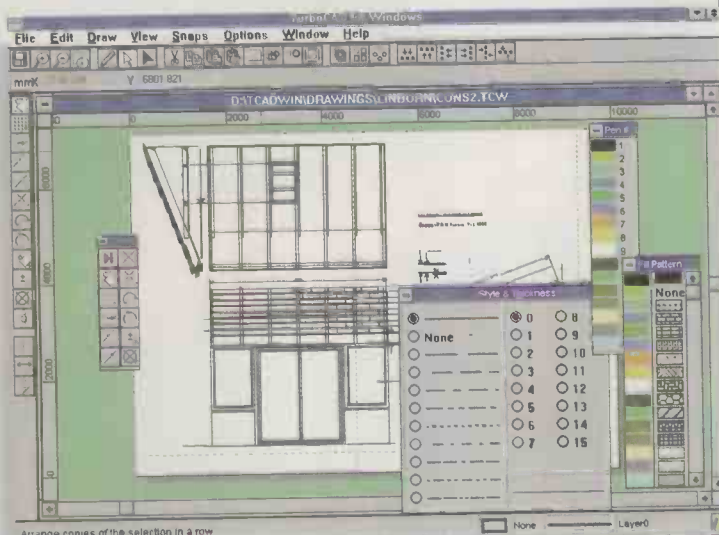
draw on up to 256 layers. Right-clicking brings up a floating toolbar of the most commonly used snaps for the next operation only. Right clicking on some tools brings up a dialogue box for parameter setting. It's all very obvious and easy to use, and there are several keyboard shortcuts as well.

Version 2 of TurboCAD introduced handle-based editing, which is accessed via the Select Edit button. Using this, it is simplicity itself to align parts of the drawing, group or ungroup, move lines around or delete them. The Edit facilities are also excellent, and Trim to Line and Line Meet are particularly useful. The Associative Dimensioning works well too, and printing is a doddle.

You might well ask if there is a down side to all this enthusiasm: unfortunately there is. You must remember, for example, to turn off the Ortho switch when trying to move objects. The largely redundant zoom tools could be replaced by two levels of the more frequently used Restore Previous View, which at present is in the View menu.

One potentially useful feature that is not so well documented is the ability to incorporate bitmaps in the drawing.

TurboCAD 2: workmanlike in use and professional in quality



There is no advice as to how to scale such a bitmap, and the handle-based edit function does not work on them. It takes a while to rescale the bitmap file by trial and error to get it to fit. Printing the bitmap is also a somewhat hit-and-miss process.

You are asking a lot if your system is as restricted as mine, and the program slows noticeably as a drawing becomes more complex, particularly if there are large areas of fill. After all, it is not only recording the parameters of all the vectors you are drawing, but is keeping a record of past transactions to support multiple-undo.

Sometimes the scroll bars seem to forget where you are and scroll only a part of a drawing — a sure sign that things are clogging up. But it is an easy matter to save your work and exit, to clear all this cargo. Beware also of the dreaded tcwxxx.tmp files clogging your Windows directory, and make sure you periodically clear them out.

To help increase productivity, the relatively cheap symbol libraries provide easy access to ready-drawn components, which are a real boon, but you have to remember that they are based on US practice and don't include standard metric features.

To sum up: TurboCAD 2.03 is incredibly good value for money at the current street price of about £99.95. You will not often find yourself waiting about, which is remarkable considering the lowly spec of the machine it will run on. It is easy to learn and use, full of useful features, and can be used to produce professional-quality drawings. Watch out for the CD version.

PCW Verdict

Good value for money, excellent manual and easy to manipulate.

Price £99.95 for version 2.03. New version soon to run under Windows 95 and with 3D capability. No price as yet.

Contact IMSI 0181 581 2000

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Sound and Vision

The Enhanced CD — the interactive album — after years of waiting, it's finally happened. But is it the ultimate pop-culture novelty, or is it just the record industry's wanabee? George Cole is your juke box jury as he assesses this new medium and judges some of the Enhanced CDs soon to be on offer.

There is more to some music CDs than meets the ear. Coming soon to a record store near you is a new generation of Enhanced CDs — compact discs designed to play on both audio CD decks and CD-ROM drives. Pop an Enhanced CD into an ordinary CD player and you hear music; put the same disc into a CD-ROM drive and you'll see pictures, video, text, lyrics and other information related to the artist.

The music industry is keen to reach the growing number of consumers with home PCs, and some see the Enhanced CD as a good way of doing it. Some record companies already have Web sites where fans can get the latest news and gossip on their favourite artist, as well as merchandising information. Now, record companies are planning to put Web browsers onto Enhanced CDs, giving users access to their Internet sites.

For some, the Enhanced CD is the most exciting development since the launch of the CD, while for others it's a technical dead-end like CD Video and the three-inch CD single. The jury's still out, so we looked at the latest releases to see just what's what.

Sarah McLachlan The Freedom Sessions

A Track One title from Canadian singer Sarah McLachlan, *The Freedom Sessions* includes eight new versions of music tracks with a running time of around 30 minutes.

The disc played normally on my

aging Philips CD audio deck, which ignored the data in track one. The disc is easy to set up and use on a Macintosh: just pop it into your CD-ROM drive, click on the disc icon and you're in. If you haven't got QuickTime 2.0, you just drag the folder to your Extensions folder and re-boot. As usual, Windows 3.1 users go via the File Manager to start things moving. Navigating around the disc simply involves clicking on various on-screen pictures and icons, and there are "easter eggs" you can click on to reveal surprises. There's a help icon if you're not sure what to do.

There is plenty of extra material on the disc, including a multimedia presentation of McLachlan's trip to Cambodia and Thailand with the World Vision charity.

One of the best sections is the CD screen where you can click on an album cover and see track listings, or click on a song title to hear it. On some tracks you can even view a video clip. The touring guide shows a map of the places the band visited on their US and Canada tour, while Sarah gives us her feelings about the different places. You get to meet the band, watch QuickTime video clips of songs, and go to a merchandising



Take a trip to Cambodia and Thailand with Sarah McLachlan



The Freedom Sessions clicks, in the value for money stakes

screen guidance, and it's really a question of pointing-and-clicking your way around the program. It's a good way of getting to know the Cranberries at both a personal and musical level.

PCW Verdict

A great concept, and a disc that gives you a good idea of what the interactive medium can offer. Cranberries fans will love this disc, but they'll have to pay a fairly high price premium for it.

Price £19.99
Contact Island Records 0181 910 3333

section where you can order CDs, posters and other goodies.

PCW Verdict

Nicely put together, with good sound and graphics. It's easy to install and use. Pretty good value, especially if you're a Sarah McLachlan fan.

Price £18.99
Contact BMG Interactive 0171 973 0011

**The Cranberries
Doors and Windows**

This is one versatile disc: use it on an ordinary CD deck, Mac or PC CD-ROM drive or a CD-i player. If your CD-i deck has an MPEG digital video cartridge, you'll get full-screen video on some material.

Doors and Windows is a Track One title and I tried it on a music CD player, a Mac CD-ROM drive and a CD-i player

and had no problems with any of them.

The disc has five music tracks by this Irish band; around 20 minutes' playing time. The title, *Doors and Windows*, refers to the way you navigate the disc, so the opening screen shows the band members sitting on a couch behind which are doors and windows you can click on to enter. You can "interview" the band, watch video footage of the band's performance at Woodstock 94 and look at song lyrics, tour video footage shot by the band, and photo albums. There's a complete discography, too. The screen shots look great, and every so often a band member magically appears on screen and makes a remark.

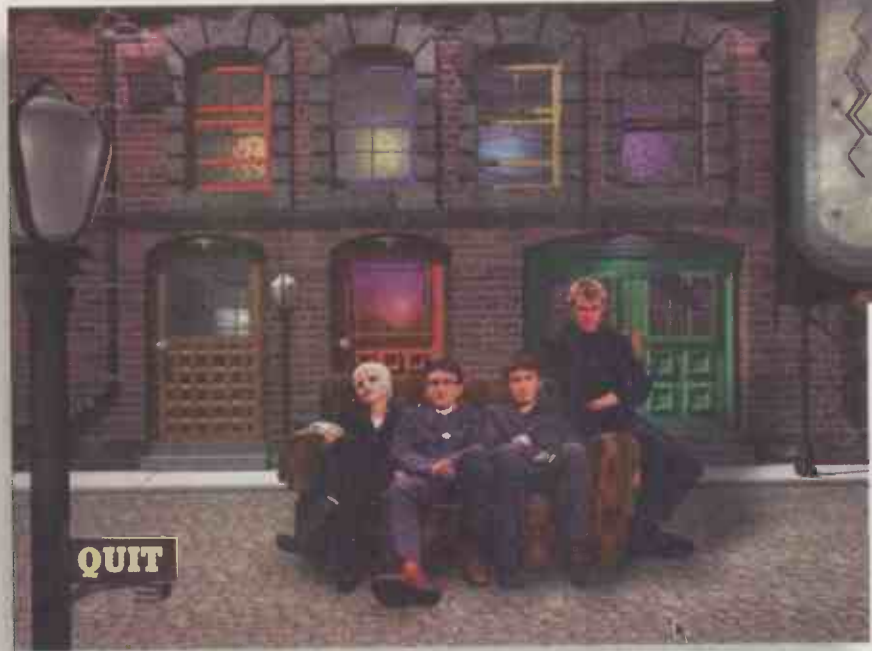
The disc has obviously been made to very high production standards and everything looks and feels class. Mind you, there's very little in the way of on-

**EBN
Telecommunication Breakdown**

EBN calls itself a multimedia group and has a reputation for making off-the-wall, audio/video presentations; they made the puppet-like George Bush sing "We Will Rock You" on U2's Zoo-TV tour. This CD is no exception and features lots of scratch video taken from thousands of hours of US TV broadcasts.

Telecommunication Breakdown is nicely packaged in a long gatefold sleeve, and there is even a Macintosh floppy for buyers without a CD-ROM drive; a nice touch. This is a Track Zero disc, so there is no track one data to worry your music CD player. The CD-ROM data can be played on Mac or PC drives and QuickTime is the preferred software video format.

The audio tracks last for over 70 minutes and the CD-ROM data includes



Above Every so often, a Cranberries band member magically appears on screen and makes a remark
Left The Cranberries — sitting comfortably but fairly expensively on Doors and Windows

an interactive video wall and three videos. The video wall consists of a matrix of 16 tiny TV screens on which you can click to see a full-screen presentation (Bill Clinton makes a guest

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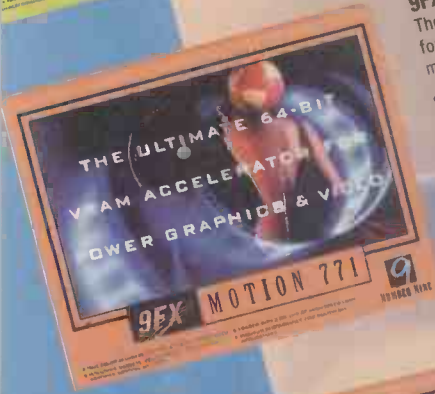
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Left *The (thankfully) sax-less Bill Clinton on Telecommunication Breakdown*
 Bottom left *If you've got nothing better to do, why not sit in front of the EBN test card?*
 Below *An invitation from Day At The Beach Productions*



appearance in several of them). There's a good help guide and it's very easy to find your way around.

The music is best described as ambient/techno. The video presentations are fast-moving, in-*yer*-face productions. You'll either love it or hate it, but you certainly won't be able to ignore it.

PCW Verdict

A good package and an interesting concept. The price is very reasonable and a lot of care has gone into the production. No UK distributor has yet been announced.

Price \$14.99

Contact TVT Records 001 212 979 6410

Various

Don't Play Track One

No prizes for guessing what type of Enhanced CD this disc is. *Don't Play Track One* features music from ten new artists ranging from ambient, to classical, to reggae.

The disc is designed for PC CD-ROM drives and the installation process is quick and easy. The disc uses Video for Windows 1.1, which you can install on to your PC from the CD-ROM. You can also use a test screen to check whether your system is correctly configured for digital audio, CD sound and graphics. There's

the option of preloading graphics on to your hard drive to save time when playing the disc, which is a good idea because the installation process takes several minutes on average (a snail icon crawls across the screen as the graphics are being loaded).

The graphics take over 20Mb of hard disk space but there's an option to auto-delete them after play, or save them. The opening screen consists of a circle of icons on which you click to select a song. Unfortunately, there's no guide to tell you what song you've selected, so it's a case of suck it and see. The interactive graphics vary in quality and interest, and some offer more interactivity than others.

PCW Verdict

A nice idea and, not surprisingly, a bit of a mixed bag. Well worth checking out if you're feeling adventurous.

Price £19.95

Contact Day At The Beach Productions 0171 233 9924

**The Durutti Column
 Sex and Death**

A confusing disc, this one: the Mac version is a Track One disc, but the Windows version uses the CD Plus format. This is because Apple's CD Plus authoring software wasn't ready in time, so rather than hold back, Factory Too decided to push ahead.

Like all music CD audio/CD-ROM

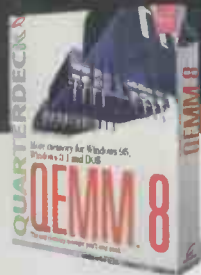
discs, you need a fairly powerful machine to get the best results. Factory recommends a minimum of 8Mb RAM and 35Mb hard disk space for the interactive portion ("the virtual sleeve notes"), which runs much smoother from the hard drive.

This is a nice package; you get ten music tracks, which will play on any audio CD deck, plus a nifty little screensaver which uses only 128Kb of RAM and can be used to control music CDs played on your CD-ROM drive as well. The graphics look good, due to a combination of Photo CD, and Adobe's PhotoShop and Illustrator.

The home screen presents you with a track listing which you click on to call up further information. This includes a text description plus brief commentary from composer/guitarist Vini Reilly. Most of the screens have hotspots which you can click on to see pictures, video clips or read more text.

For me, the most interesting snippets were Vini's description of the various drugs he's been prescribed to tackle anxiety and depression, and the on-section Fender Stratocaster, where you can "strum" the strings and discover what the various controls do.

There are plenty of hidden surprises on the disc, but you never feel lost thanks to a very effective navigation system which makes it easy to return to your last spot, or go back to the home page.



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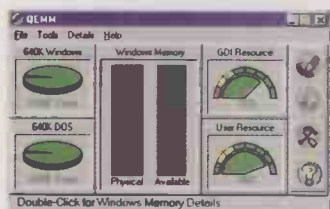
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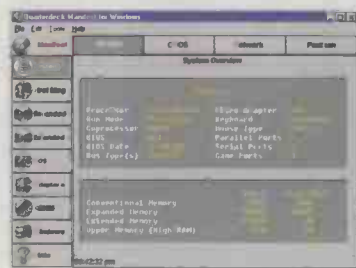
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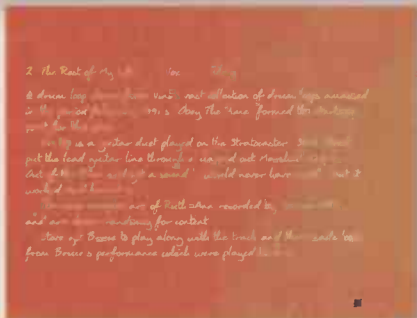
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PCW Verdict

A good example of how CD Plus should be used. The music comes first, but fans will appreciate the amount of thought that has gone into the interactive portion, too.

Price about £14.99
 Contact Factory Too 0161 834 4440

Mike Oldfield
The Songs Of Distant Earth
 Best known for his mega-selling Tubular Bells, Mike Oldfield's *The Songs of Distant Earth* is inspired by the Arthur C Clarke book of the same name.

Oldfield was given a copy of the game, *Myst*, and this seems to have inspired him to enter the world of Enhanced CDs. The disc consists of 17 music tracks lasting over 55 minutes and Track One data designed for Mac CD-ROM drives. The extra data consists of a short, animated program (around three minutes long) which uses the first two songs: *In the Beginning*, and *Let There Be Light*.

The animation appears to have been made with Autodesk's 3D Studio, or similar package, and looks great: you are sucked inside a giant spacecraft and transported to a futuristic city; a strange

creature metamorphoses into a chair. There's very little in the way of interaction — you just sit back and enjoy the show. The visuals really do add to the music, and apparently there are plans to develop a longer version.

PCW Verdict

Not much in terms of interactivity, but this isn't always a bad thing. A nice little bonus for Oldfield fans.

Price £15
 Contact Warner Records 0181 997 7571

Right *Nyack from New York: so good, they named it... once*
 Below *Play Mysty for me? Inspiration for Mike Oldfield*

Nyack
11 Track Player

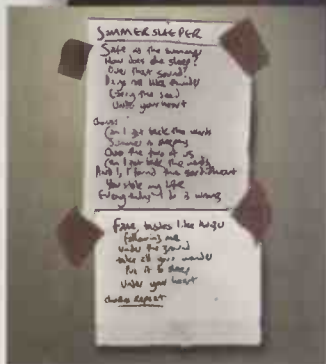
This disc has the distinction of being the first CD Plus title to be launched in the UK — on sale only days after the official release of the Blue Book standard.

11 Track Player consists of 55 minutes of audio followed by an interactive guide to the band. *Nyack* is a new indie band from, unsurprisingly, *Nyack* in upstate New York. I had problems using this disc because my CD-ROM drive didn't have





Left **Eight-ball**
In the corner,
Fast Eddy



Bottom (left)
Nyack waxes
lyrical

the appropriate driver software. However, the disc's developer, multimedia

The production seems rough and ready (Wild Tangent describes it as "garage multimedia"); it's far away from the polish offered by The Cranberries' disc. But this fits well with the band's image and you don't have to pay over the odds for the CD-ROM portion.

company Wild Tangent, kindly came to my rescue. The data track is designed for both PC and Mac CD-ROM drives and is ignored by the CD player. With Track One discs, it's possible to play the data track on your audio player accidentally, but my efforts to fast forward past track 11 and into the interactive program were thwarted.

The interactive section, devised by Nyack, consists of a scrapbook of photos and videos shot by members of the band. There are song lyrics, performances and a tour of Nyack itself.

PCW Verdict

A good introduction to Nyack. It's not a state-of-the-art production, but three cheers to Echo for not charging a price premium for the interactive program.

Price £12
Contact Echo
0171 229 1616



The technology

Enhanced CD is the generic term for a CD designed for both audio CD players and CD-ROM drives. Music artists such as Prince, David Bowie and Peter Gabriel have launched CD-ROM titles, but these are not Enhanced CDs because they won't play in ordinary CD decks. There are three main types of Enhanced CD:

Mixed Mode (aka Track One)

These put CD-ROM data on the first track, followed by music data, which plays on any audio CD player. The system works well, although some older CD decks may try and play the CD-ROM data, resulting in a blast of white noise through the speakers. For this reason, most Mixed Mode CDs have a warning sticker telling audio CD users to skip the first track.

CD-ROM Ready (aka Track Zero)

CD-ROM Ready is designed to avoid the Track One problem. It works by hiding the CD-ROM data in the pre-gap, which comes just before the first track. The pre-gap is normally around two seconds long, but CD-ROM Ready discs extend this to 30 minutes or more. Several systems use the pre-gap, including Ardent Records' AudioVisual CD, Aix Entertainment's i-trax and Active Audio, developed by PAMS and BMG.

Another advantage of CD-ROM Ready is that CD-ROM owners don't need additional software to use it, although some CD-ROM drives, notably those from NEC, can't read this type of disc.

CD Plus (aka Track Two)

CD Plus has been developed by Philips and Sony, with help from Apple and Microsoft. The CD Plus standard, known as the Blue Book, is a mix of CD audio (Red Book), CD-ROM (Yellow Book) and multisession (Orange Book) standards.

A 50-60 minute music CD has around 200Mb of spare data which can be used for pictures, text, sound and software-based video like QuickTime or Video for Windows.

The system works by recording music data in the first session and data in the following one(s). Music CD decks simply play the music and ignore the CD-ROM data, while CD-ROM drives play the extra information. However, only around 65 percent of the world's CD-ROM drives are multisession-compatible, and those that are may need additional software drivers to play the discs.

Microsoft has made Windows 95 compatible with CD Plus, and Apple's latest CD software also recognises the new discs.

Other Discs

Rainbow CD

A Track One disc, developed by Philips and designed to play on audio CDs, PC and Apple CD-ROM drives, and CD-i decks.

Video CD Plus

Developed by OmniMedia, it mixes interactive programs with a linear video programme. The video plays on any Video CD deck, and the extra data can be seen on a PC with an MPEG card and CD-ROM drive. Some Video CD Plus titles will contain software-based MPEG-1 video and a Web browser.

CD-i Ready

A format that mixes Red Book tracks, which play on any music CD, and Green book tracks, which are read by a CD-i player.

CD Plus Graphics (CD+G)

Part of the original Red Book audio CD standard, it uses spare subcodes to display teletext-type words and pictures on a TV screen. Mainly used in Japan for karaoke.

Editor's Choice



So will the Enhanced CD take off? In many ways, its success is in the hands of the record companies. Many music fans would probably be willing to pay an extra £3-£5 for an interactive guide to their favourite artist, but what if you don't want to know the name of the singer's dog, or don't own a CD-ROM drive? And, how many people would want to take an Enhanced CD out of their hi-fi system, run upstairs, boot up their computer and then use the interactive program?

Even so, the Enhanced CD is certainly more marketable than a music CD-ROM such as Peter Gabriel's Xplora 1, which costs around £50, may only be used a few times and then consigned to the back of the CD collection. With an Enhanced CD, if the worst comes to the worst and you get sick of the interactive element, you can use it just to play the music.

The biggest problem is compatibility. Audio CDs are buy-and-play items — you slip the disc in your audio CD deck, press play, and away you go. CD-ROMs are not so simple to install and use. They can be fiddly to set up and you may find that your drive isn't compatible with the disc. For these reasons, our Editor's Choice is the Cranberries' Doors and Windows. Not only does it offer high-quality sound, graphics and video, but it will play on a PC and a multimedia player attached to your TV. Nice disc, shame about the price.

Expect to see many more Enhanced CDs from companies such as Sony (artists lined up include Bob Dylan, Michael Jackson and Mariah Carey), Atlantic, EMI and Microsoft, and from artists such as Squeeze, Fleetwood Mac, Santana, The Beastie Boys and The Rolling Stones.





XM-5402B: How

If Sir or Madam is hungry for data buffer capacity, may we recommend the Toshiba XM-5402B in the 256 KB version? Or, if you have a smaller appetite, we can serve you this tempting new CD-ROM drive with a 128 KB data buffer.

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The choice is yours with the XM-5402B, and so are the significant savings in cost and space, thanks to the ATAPI

interface which eliminates the need for additional interface boards and allows ultra-simple drive integration.

Making the XM-5402B a deliciously cost-effective solution.

Like Yours

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Done, Sir?

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So, for a mouth-watering combination of advanced technology and highly

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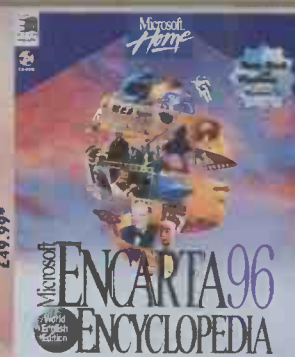
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Microsoft

WHERE DO YOU WANT TO GO TODAY?™

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at



Beating the Odds



Dominic O'Brien is a man with a memory — and then some. Memorising whole packs of cards, he was able to make about £1,000 a day from playing blackjack. Not satisfied with this, O'Brien soon devised a way to get his laptop to take care of the hard work, and now the sky's the limit. Michael Hewitt meets a bit of a wild card.

Three years ago, World Memory Champion Dominic O'Brien began playing blackjack seriously. Since then he's been barred from almost every casino in the UK, and a good number in the USA. There seems little doubt when he starts touring Europe early next year, the story will be repeated. It's not that he has any objectionable personal habits or gets drunk and abuses the dealers. As far as the casinos are concerned, it's far worse than that: O'Brien keeps winning. His strategy was developed in part using a computer.

"When I won the World Memory

PCW Illustration by Stephen Caplin Card Rosette Photography by David Whyte



Championships a few years ago, friends suggested that I put my skills to use in the casinos, playing blackjack," he said. "Here, a trained memory can help you beat the system. One of the commonest methods, and the one that I employ, is card counting. You assign a value to each card as it's dealt and memorise it. In this way, you get to know what sort of cards are left in the pack, and so can alter your bets accordingly." (See panel "Playing Blackjack", page 100.)

O'Brien, who holds the world record for memorising cards, can recall an entire pack in 45 seconds. His system is

mnemonic, based around various journeys. To memorise 52 playing cards, he imagines a journey comprising 52 individual stages. It could be around his house, his home town, or both. Stage one — the first card to be dealt — is his bedroom. Stage two — the second card — is his landing. Stage three — the third card — is the stairs. Eventually, the 52nd card takes him to somewhere on the outskirts of town.

"Once you've got the journey sorted out, you imagine each card as a person. In my case the king of clubs is Saddam Hussein. The queen of diamonds is

Margaret Thatcher, while the four of diamonds is my bank manager, and so on. The cards always represent the same person. So if the first card is the king of clubs, I imagine Saddam Hussein standing in my bedroom. If the second card is the four of diamonds, it's my bank manager standing on the landing."

Initially, O'Brien had to work out various counting strategies. The way blackjack is played, and therefore the method of counting, can vary from casino to casino. The game can be affected by factors such as the number of players and the number of decks. O'Brien's first



piece of serious R&D hardware was his kitchen table. He explained:

"I dealt out around 100,000 hands of blackjack on to the table and analysed each one. In this way, I became very proficient at card-counting and started to develop various strategies. But dealing manually was very time-consuming. However, I then got hold of a computer program called the Universal Blackjack Engine. This can deal and analyse 100,000 hands in under a minute. Using this, I was able to easily prove or disprove different counting theories. I ended up with a bunch of statistics and with these in hand, went out with the intention of making a killing on the tables."

And for a short time, he did. O'Brien toured casinos in the Midlands and on the south coast, lightening their banks to the tune of up to £1,000 a day. Alarm bells soon started to ring however, and the casino "jungle telegraph" went into action. Before long, O'Brien found himself to be *persona non grata* all around the country.

When the tables turn

"They were on to me almost straight away. The trouble with playing casinos in the UK is that they're all private clubs, so you have to be a member. In the time it took me to apply for membership, they'd passed my details among themselves, so my membership applications started getting turned down."

So it was time to move on. Fortunately for O'Brien, the Americans have rather more liberal gambling laws. In the USA, as in Europe, you can walk in off the street and get a game if you feel so inclined. O'Brien got together with friends and raised £15,000. With money in one bag and laptop in the other, he headed Stateside and visited casinos in Connecticut, Mississippi and Nevada, including of course, Las Vegas.

"Every evening in my hotel bedroom

Playing blackjack

In blackjack, both the player and the dealer attempt to score as close to 21 as possible without exceeding it or, to use the parlance, "busting". The card suits — spades, hearts, diamonds or clubs — aren't significant. All that matters is the value of the card. Two through nine equal face value, while tens, jacks, queens and kings have a value of ten. An ace counts as either one or 11, at the player's discretion.

Play is as follows: First, the deck is shuffled and cut. Then, all the players make their wagers, laying down a chip, or cash, on the table. Next, working clockwise round the table, the dealer deals one card to each player, face-down, and one card to himself, face up. This is repeated a second time until everyone has two cards.

The idea is to beat the dealer's score. So at this point, if the player's two cards exceed the value of those of the dealer, he usually "stands" — sits smugly. If, on the other hand, he's only got, say, a two of diamonds and a two of clubs, but the dealer has a queen and a five, the player will sometimes ask for additional cards, or a "hit". He can ask for as many hits as he wants, provided their total doesn't exceed 21. If it does, he "breaks", and the dealer wins. But if he's got, say, a queen and a four — total score 14 — he may decide to risk it and ask the dealer for an additional card, hoping that the value of that card is no more than seven.

He may be lucky and get, for example, a three of spades, taking his total score up to 17. Most likely he'll stand. At this point, the dealer has to ask himself if he's feeling lucky. Should he risk drawing another card in an attempt to exceed 17? If he does, and it's four or below, he wins. If it's five or more, he goes bust and the player wins. And so on to the next hand.

There's obviously a large element of chance in blackjack, but players can adopt certain strategies to give themselves an advantage. Card counting is the best known. Here, the player memorises the cards as they're dealt. In this way he can work out the value of the cards that are left in the deck as play goes on, and amend his gambling strategy accordingly.

If, for instance, all the picture cards are dealt early on in the game, this means that the pack comprises mainly low-value cards. Generally speaking, the advantage is likely to be with the dealer, so a seasoned gambler will only bet low stakes at this point. If, however, the low value cards have all been dealt out and high value cards remain, the advantage is likely to be with the player. In this position, a pro will start to increase the size of his wager.

before I visited each casino, I'd program the playing conditions into my computer. So, for instance, if the casino played a two-deck game with three players at the table, I could just push a button and see what would happen over a million separate hands. From this, I could determine both the counting strategy to use, and whether or not a game was worth playing."

A brilliant disguise

With the constant threat of getting caught hanging over him, O'Brien adopted various subterfuges to put the casino management off the scent. He attempted to disguise himself by progressively shaving off his beard. On other occasions, he worked with another player. Card-counters typically start to raise their stakes after playing low. But if you have a partner, he can do the counting, signal to you when the deck looks favourable, and you can then move

in and place a high bet. This only works for a short time, however. In total, O'Brien visited 46 US casinos and managed to get barred from 13.

"Mostly it was very polite. I'd get a tap on the shoulder and be told: 'Thank you, Mr O'Brien, but I'm afraid you're a bit too good for us.' There was one occasion, though, when a manager came up to me and said: 'Have you heard of route 66 [the road out of town]? Take it. There'll be trouble if you try to get back in.'"

Nevertheless, by the end of his visit, O'Brien had managed to add \$10,000 to his £15,000 stake — a profit of over £6,000. ("Not a fortune, but I'd proved I could beat the system.") The casinos of Europe now beckon, O'Brien hopes to repeat his success there.

"I'll have my laptop with me and so be prepared for every eventuality. It's a very valuable tool. In my opinion, every serious card-counter should use a computer in this way."

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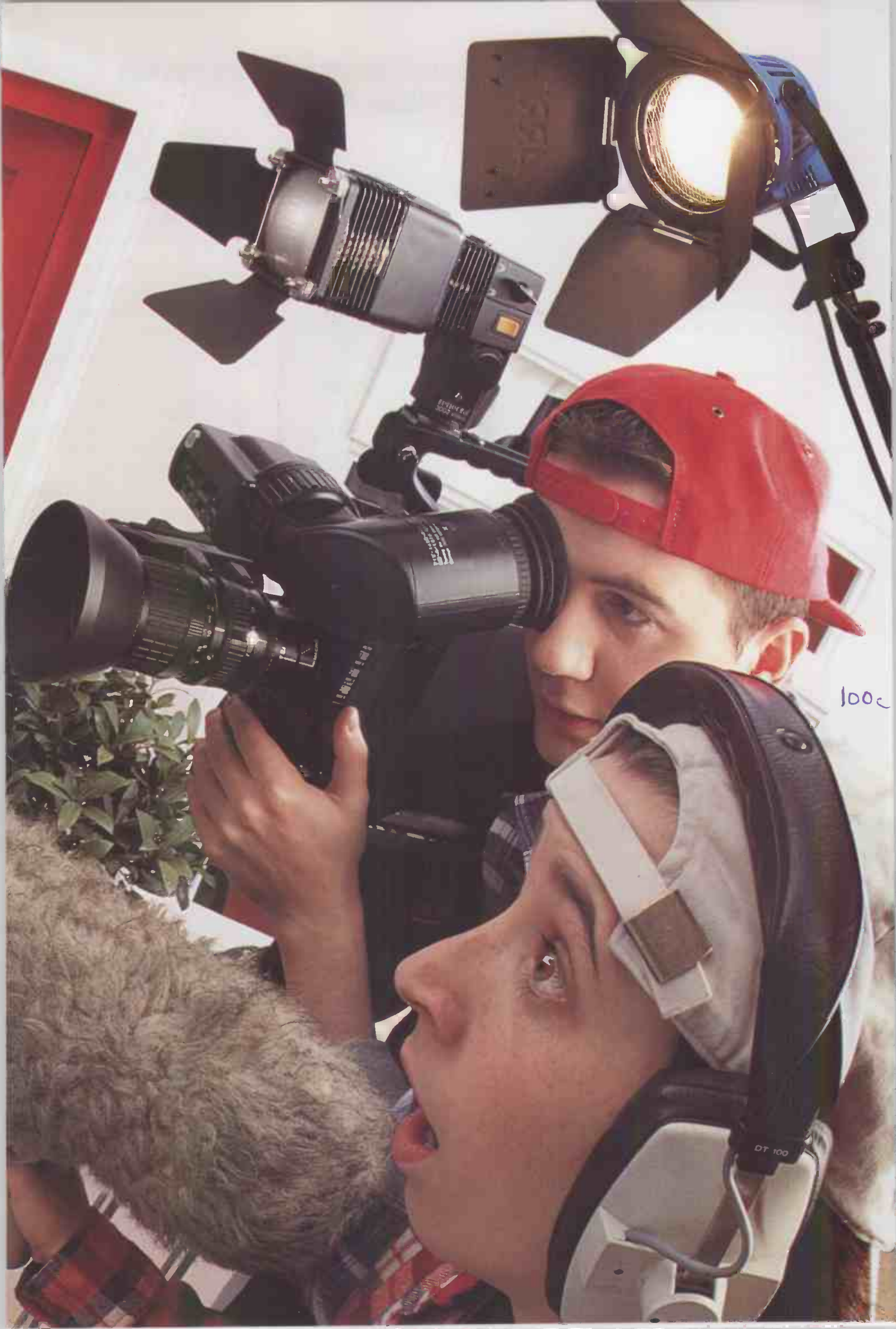


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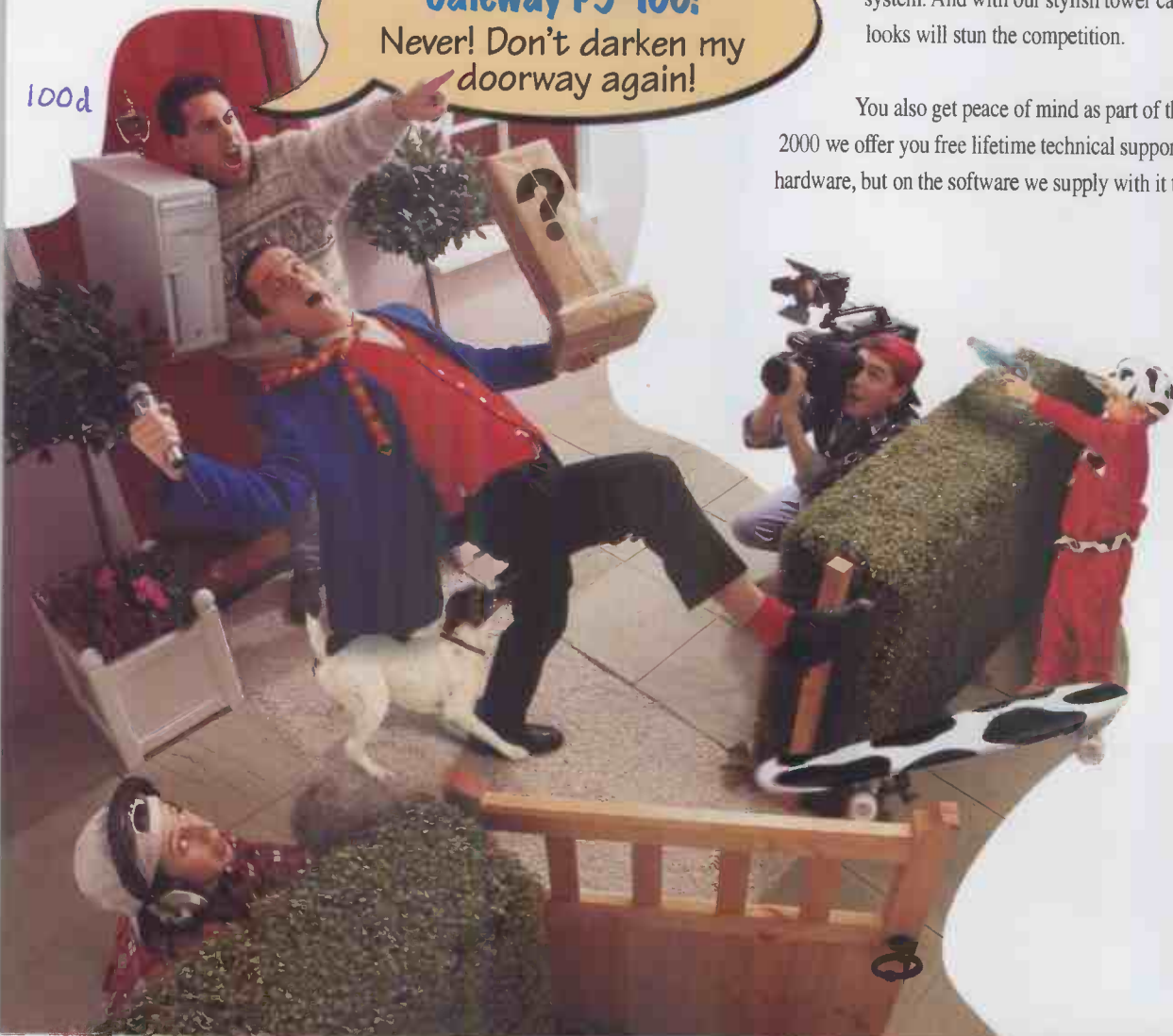
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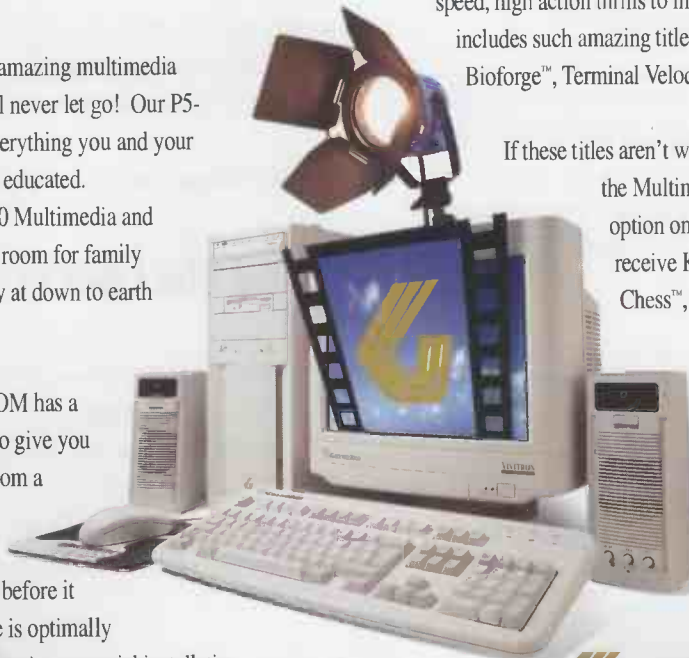
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With the Solo™ from Gateway 2000, you can step out whenever you like. This amazing portable gives you everything you'd get with a desktop multimedia system, but in a package that weighs under six pounds! The Solo lets you escape the office without leaving it behind. Packed into its stylish and compact frame are all the features that make this portable think and act like a desktop.

You can choose from either 75MHz or 90MHz Pentium processors and a removable hard drive that will pack up to 1.2GB of portable power. The huge screens, 10.2 inch VGA screen on the V75 or the 10.4inch SVGA on the S90, combined with 1MB Video RAM give you sharp, clear images whatever your location. The Solo comes with Windows 95 and Microsoft Office Professional 95 and, as the world's first portable with a keyboard specially designed for Windows 95, its short cut keys make your life even easier, while the EZ Pad™ Pointing Device is a dream to use.

With the large screen, modular CD-ROM drive (interchangeable with the 3.5" floppy drive), integrated 16-bit sound card and built-in stereo speakers your presentations will have never looked so good. You can listen to music while you work, or, dare we say it, run your favourite games! The Solo lets you travel the Internet, send and receive e-mail,

Please, please try my portable... it's almost as amazing as Gateway's Solo!!!

NO!

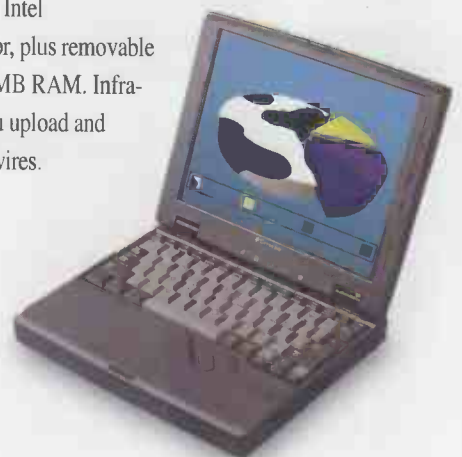


transfer data using infra-red technology and connect to external kit such as keyboard, mouse and monitor, should you wish to. The Lithium-Ion batteries give you hours of computing power on the move.

- The Gateway 2000 Solo - more computing, more places.

...And The Liberty™ Will Set You Free

The Liberty is the most portable of portables, weighing in at only 4.2-pounds, and smaller than an A4 sheet. It has a 10.4-inch dual scan STN colour display and Intel 100 MHz DX4 processor, plus removable hard drive and up to 24MB RAM. Infra-red connectivity lets you upload and download without any wires.



A Gateway 2000 PC Is Not Just For Christmas, Our Service & Support Last The Lifetime Of Your System

Here at Gateway 2000 we pride ourselves on being your friend in the business, and like a true friend we'll always keep the door open for you. We give you free lifetime Technical Support on all Gateway 2000 hardware and supplied software, so if you ever have any problems or queries, please call us on our freephone numbers – it won't cost you a penny. Our technicians have been trained to answer questions and provide solutions over the phone, and we promise to help you with every problem, large or small. You may call at any time, from 8am to 9pm weekdays, and 9am to 6pm Saturdays. And to help you by being there when you need us most, from Jan 1 1996, we're extending our hours of business to 8am to 10pm Monday to Saturday.

All major components in Gateway 2000 Desktop and Tower PCs are backed for a full three years, and portables have a one year back-to-base warranty. We're working really hard with our service partners, ICL Sorbus, to bring you the highest possible level of service. During the first year, if there's a problem we cannot solve over the phone, and our technicians determine that you need an on-site service, we can send an engineer to your location, and can let you know the date and time when you can expect their visit to the nearest four hours.



For further information on extended service warranties please contact our Customer Service department, who can also assist you with any queries you may have during the course of your order.

We also offer a choice of methods of payment so you can pick the one that best suits your circumstances. If for any reason you're dissatisfied with your Gateway 2000 system you can return it within thirty days for our no-quibble money back guarantee. We refund you the entire amount you paid less the shipping charge.

We want you to be entirely happy with your Gateway 2000 system and the service you receive from us. Remember, when we say you've got a friend in the business, we mean it!



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Uncompromising Accessories

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.

■ Microsoft® Works™ for Windows™

All the tools you need to run a business: word processor, spreadsheet, database and electronic communications.

■ Microsoft Office™ 95

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.

Microsoft's most popular applications: Word, Excel, PowerPoint and Access.

■ Generations Software Bundle

This Bundle, standard on all Family PCs, is packed with Microsoft titles for all the family. In addition to MS Works 95, MS Golf, MS Publisher and MS Encarta 95, it contains:

MS Cinemania 95, the film buff's dream.

MS Julia Child, an extensive culinary guide, full of recipes and useful hints. MS Music Central, bringing the world of music into your home. MS Bob, a comprehensive, easy-to-use package comprising eight essential programs: Letter Writer, Calendar, Cheque Book, Household Manager, Address Book, EMail, Financial Guide and Geo Safari.

■ Games Bundle

A standard offering on Gateway Family PCs, and available as an option for £50 on other systems. It includes the following exciting options:

FIFA Soccer, the most realistic soccer simulation ever created. PC Descent, set in the mines of the moon, is a game of survival. Players battle against menacing robots and other terrors, trying to escape alive. Hi-Octane puts you in the 21st Century, racing your armour-plated Hov-Car at speeds faster than a Ferrari. Bioforge is set centuries in the future, where you use your skill to stop a madman's interstellar plot. Terminal Velocity is a high-speed 3-D space combat game operating on up to 27 levels. SuperKarts leaves other racing games in the dust with 16 heart-stopping race tracks.

■ Starter Pack

Available as an alternative to the Games Bundle on all Family PCs, this multimedia bundle is also available as an option on all systems for £50:

Kiyeko and the Lost Night, a children's interactive story about the adventures of a young Indian. Battle Chess - Chess with a difference, where characters engage in mortal combat. Word Stuff, an educational adventure for children, designed to improve language skills in English, French and German. Rosetta Stone, total language learning software for beginners and intermediates in English, French, German, Russian and Spanish. World Atlas brings geography to life with 400 detailed maps and interesting facts. Magic Carpet makes you a Wizard, with the power to reunite the world after an international disaster.

■ Superscape Virtual Reality Software

Now a virtual reality software package that works with standard PC hardware. Explore and experience virtual 3-D worlds in real time!

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Creative Labs 16-bit Sound Blaster sound card. 2 Altec Lansing ACS40 speakers. £70

■ Wavetable Audio Multimedia Kit

Ensoniq Soundscape 16-bit Wavetable sound card with Altec Lansing ACS31 speakers. £170

■ CH Flightstick £29

■ 28.8 Data/Fax Modem £199

■ Network Cards

ISA and PCI Ethernet Cards and ISA Plug n Play Token Ring Cards. Call for details.

■ Vivitron™ Monitor Upgrades

Call for details.

■ Hewlett Packard DeskJet 600 £249

■ Hewlett Packard 660C Printer £299

■ Hewlett Packard LaserJet 5L £399

■ Jumbo 1400 Tape Backup Unit £139

■ 2GB SCSI Bundle

Kit includes 2GB SCSI drive and Adaptec AHA-2940 PCI SCSI Controller. £700

■ SCSI DAT Tape Drive £649

PORTABLE OPTIONS

■ 28.8 PCMCIA Data/fax modem.

■ Memory upgrades.

■ Liberty 720MB removeable 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!



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



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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:

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■ Freephone technical support.

■ On-site service (desktops only).

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Overall Systems Test Results

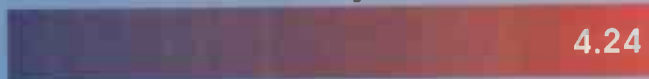


Gateway Pentium 100MHz



Nov 94 PCW

NexGen P90 by Dan



Oct 94 PCM

Twinhead Pentium 60MHz notebook



Aug 94 PCW

HiGrade DX-100MHz notebook



Aug 94 PCW

IBM Aptiva 486 SX 33MHz



Nov 94 What PC?



All of the above machines were top of their class in recent tests.

The numbers game

Over six months and more than £1 million later, VNU European Labs is testing over 300 products a month (or a staggering 3600 per year) for our 40 computer magazines and our 1.8 million European readers in 10 countries. Drawing on our extensive database of over 3000 suppliers and vendors, we collect over 220 individual data items and over 110 feature points for every product. That means over 5 gigabytes of data racing at 10 megabits per second over 3Km of labs network cable every single day.

Because we don't want to overload you with information, an army of over 30 journalists and

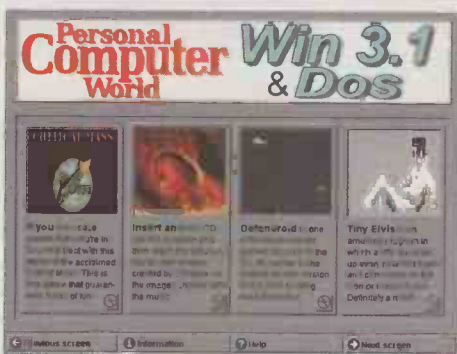
lab technicians put in more than 1300 hours a week to interpret and distil the data down into the single numbers you see above. But despite the baffling number of numbers we deal with every 365 days, we never forget that you and your needs are number 1. That's why we work with market leading titles such as *Personal Computer World*, *Personal Computer Magazine*, *pplan* and *What PC?* to give you what you want, numbers.

If you would like to find out more about the VNU European Labs use this number to call us 0171 316 9062 and ask for John Barnes.



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controversial subliminal messages, so decide for yourself. And don't miss Actua Soccer, a cutting edge game which is as close as you or George Graham can get to the real thing. Plus there are many more fabulous demos to try out.

Windows 95

We bring you the latest gadgets and gizmos to complement your flashy new Windows 95 operating system.

Utilities

As usual we bring you the backup to some of our most popular magazine articles, and among this stash of goodies is the indispensable Windows 95 Microsoft Power Tools and some Delphi gems. Plus there's Oakley's complete set of SMART software, a

powerful operating system, and the ever present incredible shrunken Elvis will bring your PC to new heights of usefulness.

Mac software

If Al Bunny's Typing, Cribbage and Sonix fail to quicken your pulse then you must already be in cryogenic suspension! Includes all this and over 20Mb more fun, games and utilities.

About last month's CD-ROM

Some readers may have received a General Protection Fault when running the CompuServe demo on last month's disc. If this happened to you, you should not use the front-end to call it up, but you can run the demo and install the new version of WinCim if you double click on the program CSERVE.EXE in the root directory of the CD using File Manager (or Windows 95 Explorer).

Configuring Video for Windows

If you select the "New users start here" button, on the first page of PCW Interactive you'll have the opportunity to install the latest version of the 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

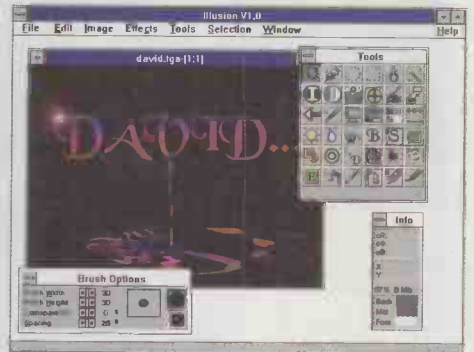
install this new version as it contains the latest drivers which deliver higher quality, a larger size and a faster playback rate. If you don't install the new version, some videos will display the message "Cannot display this video", or give similar warnings.

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 recourse to hardware additions 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



Mind-bending strategy with Endor Fun



Graphics editing with Illusion



All that Jazz Jackrabbit



Jumpin' Jazz Jackrabbit



Could it be Magic? Yes, just like that



Right and below *Retros*: dig that crazy beat combo
 Far right *Triazzle*: Rotate your pieces in a devilish fashion, puzzle fans



the option for full screen video selected, then all video in other applications will also be full screen. If you don't want this, then re-run PCW linteractive 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 in the PC partition of the disc to see if it can be correctly read. The process takes up to 35 minutes and generates a verification code if the disc passes the test. If the CD-ROM fails this test, try cleaning it with a light solution of washing-up liquid and dry it with a lint-free cloth and run the test again. If it still fails, return your CD-ROM to the magazine for a free replacement.

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

CDTEST D:

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

IMPORTANT — READ THIS!
General Protection Faults

If you receive General Protection Faults when running PCWI or playing any digital

videos, your graphics display driver may not be entirely 100 percent Microsoft compatible. The answer is therefore to install one of Microsoft's own drivers, as follows (but NOT if you are using Windows 95, as the drivers supplied with it are even newer than the ones on this disc):

1. Run "Windows Setup" from File Manager, then select "Options" followed by "Change System Settings".
2. Scroll through the list of displayed graphic dri-

vers 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:\SYSTEMSVGA256" (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 do in 95 percent of cases) you may wish to contact the supplier of your graphics card to see if they have an updated graphic driver. If Microsoft's drivers don't work you will need to contact your graphics card supplier anyway.

If 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 reinstall Video for Windows.

If PCWI is slow to load or runs slowly

You need at least 4Mb of RAM free to



use PCWI. If necessary you can obtain this by creating a permanent swap file of up to 4Mb. 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 Advice & Contacts

The **PCW CD-ROM** is virus checked at every stage of production. However, PCW will not accept liability for any problems arising from its use. You are advised not to install software on a networked PC before checking the disc.

For technical support on the CD-ROM and the programs on it call the VNU 24-hour Hotline on 0891 616 444. This is a computerised touch-tone advice system providing hints and tips on a wide range of topics. It also offers you the opportunity to speak to a member of our technical support staff during office hours by pressing the "0" key on your keypad. Calls cost 39p min off-peak and 49p at all other times (tone phones only).

Using the computerised system, you can access the information you need very quickly. If you ask to speak to a member of our technical support staff and we cannot answer your question immediately, we will offer to call you back at our expense. Outside office hours you can leave us a message by pressing the "9" key. If you leave your phone number, we'll call you back at the earliest opportunity during office hours.

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Generation

When the Editor said that a visit to Amstrad was "right up my street", it wasn't because the Amstrad PcW 16 deserves a place in the Retro column. But there's a very strong sense of déjà VDU about the new PcW. In some ways it's very much an up-to-date machine, but one which owes more to William Latham Sholes than to Charles Babbage. While Babbage was the father of the modern computer, Sholes was the inventor of the typewriter which was lambasted for being heavier, harder to use and altogether inferior to the fountain pen.

Simply does it

The simple feel of the new Amstrad PcW 16 takes some getting used to. It was originally intended to be part of a complete "Home Office" system, with adjacent bubblejet printer and fax. That may yet happen, but in the meantime the "Home Office" moniker spawned a codename. Since the Home Office is in Queen Anne Street, the machine is known as "Anne". Its predecessor, the Amstrad PCW8256, was called "Joyce", after Alan Sugar's secretary — he wanted a machine so simple even Joyce could use it. Anne is designed to be even simpler than Joyce. It succeeds.

The insides are simple too, with monochrome, a Z80 processor running at 16MHz, and 2Mb RAM. The machine is named after the clockspeed. Standalone Z80s are not available at this clockspeed, but they are as part of a larger ASIC (application specific integrated circuit) and there is talk of a 20MHz version — still a far cry from the 120MHz Pentium, but remember that the Anne ASIC only uses 0.8 micron fabrication. This is also primitive compared with the 0.35 micron technology of the latest Pentiums.

The ASIC is capable of Sinclair Spectrum-like attributes — there is an

option to change the background colours. But the monitor on the first model is monochrome; a colour screen would double the price. Before condemning this as crude, bear in mind that the Amstrad PcW16, complete with software, is cheaper than a copy of Microsoft Office.

Software

For simplicity's sake, software is held in flash memory. There is a single 1Mb chip on the motherboard, with space for a second megabyte. The code is written in assembler, so while Office may take 100Mb on a PC hard disk, the PcW software takes a few hundred kilobytes. The software is loaded into the machine on the production line, so that the machines always have the latest release when they leave the factory. The flash can be upgraded and Amstrad expects there will be a newer release of the software to add significant features after it ships.

My biggest surprise about the PcW 16

is that it lacks a dedicated printer. Not long after Amstrad completed the first PCW project, the company was rumoured to be looking at an all-in-one DTP machine which would allow pages to be made up with columns and pictures and would print out to a built-in printer. With one lot of RAM, the machine cost could be brought down significantly. At the time it was rumoured that the project had been nixed by the cost of laser printer engines, and this is confirmed by the new PcW. It appears that Canon won't sell the raw engines, and neither will any of the other manufacturers. While the PCW8256 had the electronics for its dot-matrix printer in the main ASIC, the PcW 16 uses a conventional printer set-up with an off-the-shelf printer plugged into a centronics port. Although the Amstrad direct pricing for the Canon BJ30 and OKI GDI LED printer is amazingly competitive, it's not the integrated engineering solution Amstrad has adopted before.

In many ways the forerunner of the



gap

The idea behind the Amstrad PCW 8256 was maximum simplicity, and it was amazingly successful. But in the age of the notebook and the Pentium, does the new PCW16 take the "back to basics" idea too far? Simon Rockman takes a stroll down memory lane.

PcW16 was not the Joyce but the NC200, the notepad computer with the codename "notepad". This uses built-in software and garish buttons, both of which grace Anne.

The PcW16 is a desktop machine which, like a television, stays on all the time. There is a standby button which puts it into low power mode, alarms can wake the machine or flash a LED on the keyboard. Alan Sugar once said he builds computers for "the lorry driver and his wife", and the PcW16 fits the bill: like an Amstrad tower system hi-fi, it looks the part but behind the façade it's very basic.

Operating system

The PCW8256 used its own operating system, written by Locomotive Software, but offered CP/M (the operating system we all used before DOS and then Windows), so there was a vast amount of software for it. The PcW16 uses its own operating system from Creative Technology (a small UK-based company which first came to Amstrad's notice through a competition in *Amstrad User* magazine). The new OS offers no CP/M compatibility — although this may emerge later — but CP/M was long in the tooth back then, so there won't be much mileage today. There is context switching but no multi-tasking, so if you are doing a long mailmerge and want to look up someone in the database, you will have to pause the printing. The overwhelming feeling generated by this machine is that it's been simplified for the developers at the expense of the users.

There is a 3.5in disk drive (disc in Amstradese). This is PC-compatible and will read and write DOS and PCW9512 disks, but also has its own file format which handles 32-character filenames. Files on the floppy disk can only be read from the root of the disk. Files can also be stored in flash RAM, so Windows 95-style 256 character filenames were deemed excessive. Files are spread over the flash memory to even out the use and the area purged when a program has

problems saving. The user is warned when the flash RAM is 85 percent full. For Amstrad PCW8256 owners, there will be a version of the Locolink software. External programs are loaded into flash RAM and run from there.

Buying cheap, feeling cheated

Even if you keep reminding yourself that this isn't aimed at the Microsoft Word power-user and that it is exceptionally cheap, you can't help feeling cheated. The PcW 16 may have a mouse and a graphical user interface, but the word processor does not support graphics. This is planned for a later release of the software but it seems a rather glaring omission. The review software was a long way from completion, so it was difficult to tell what will and will not be implemented.

Text cannot be put into multiple columns.

There is a 50,000-word spellchecker, import in Locoscript 1, 2 and 3 formats, ASCII, and a subset of RTF. There is no toolbar or macro

language and the print preview only shows a page at a time. There is a line of help along the bottom of the screen, and help files, but no searching for subjects or hot-links between topics. The software is due for a major speed-up and is forecast to reach "Windows on a 386-type speed". As it is, menus don't fill in until after they drop down.

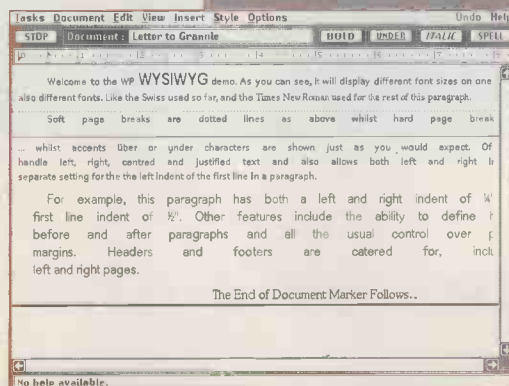
The software uses its own font formats. Holding fewer fonts releases space for documents, which is all very



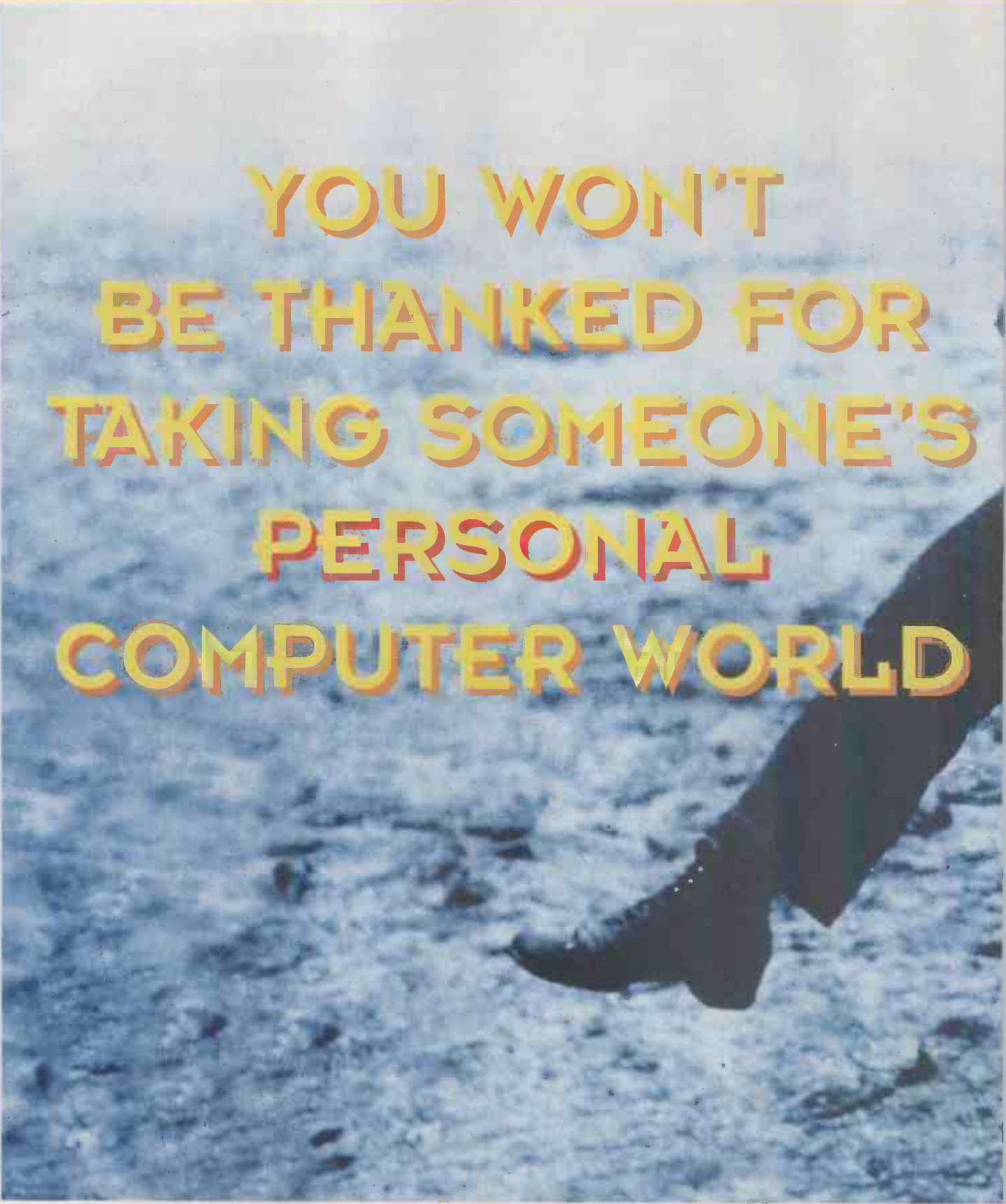
Above
The file
manager is an
improvement
on DOS, but
limited to root
files



Above The front screen
provides a simple introduction,
reminiscent of Microsoft
Works



Left The word processor. This
is the core application: it can
read LocoScript files but looks
better on screen



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well, except some of the font handling is crude. Printing is even cruder. You get what fits on a sheet, no more, no less, and the formatting is limited. The PcW spreadsheet is quick but a little basic: it will import and export .CSV and import .DIF format, which means with a bit of jiggery-pokery you can import Excel files, but this does rather go against the grain of an easy-to-use machine. There are full scientific functions, but only one level of undo and no graphing in the first release.

The database is fixed format, flat file; you can't even edit the headings, so multiple phone number headings stay as number 1 and number 2 — there's no room for Home, Work, Fax and Mobile. The only file formats supported are .CSV and NC200, but Amstrad says it will handle big files. The database is a stubborn beast, presenting the information it wants in the way it wants to. Printing is done through the word processor. There is a simple Windows-style calculator and a file manager. If a hard disk is fitted, this will have to be upgraded to cope with subdirectories.

Some time spent reading the manuals supplied with grown-up software might have helped the designers. There is a strong overall feeling that not enough time was spent on anything.

A step back

The Amstrad PcW16 represents a significant enhancement on the

What's on board

- 1Mb RAM, upgradable to 2Mb as a third party option. There is unlikely to be a 2Mb machine but more memory can be added by a competent electronic engineer
- Serial I/O chip. This controls the mouse, the external serial interface and the floppy disk drive
- Main ASIC. With over 20,000 gates, this is the guts of the machine. It contains the memory management unit, the Z80 CPU core, real-time clock, keyboard and display drivers. The screen is mono, and despite the ASIC's ability to implement attribute colour, the software uses stipples to get a grey
- Lead to the floppy drive. This is compatible with CPIM and DOS disks. It also uses its own format
- 1Mb flash. This stores the OS and the main programs, and leaves about 200Kb free for documents. As with the main RAM, it can be upgraded to 2Mb
- Hard drive interface. Amstrad has left space for third parties to add an internal IDE hard disk but is unlikely to supply this as standard

PCW8256. It's much easier to use and has very much better print quality. It is also very cheap. But this is 1996, not 1986, and times have changed.

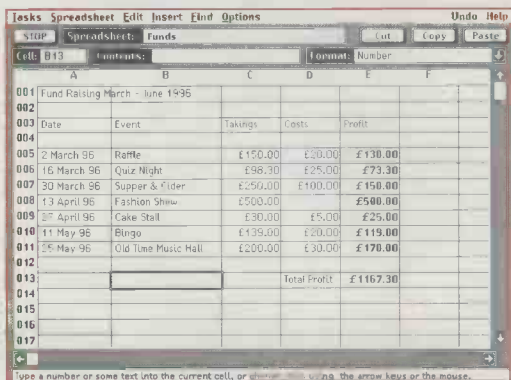
It's impressive to see that file sizes can be 4Kb instead of the 20Kb taken up by a Word document. It's also good to see that assembler language programming is not dead — this adds weight to the argument that if modern programs were hand-crafted in assembler rather than bolted-together objects they would not need gigabytes of disk space.

There is still a market for a typewriter replacement, but it needs to be simple. And this is not the same thing as having few options. Over the last few years we've seen great

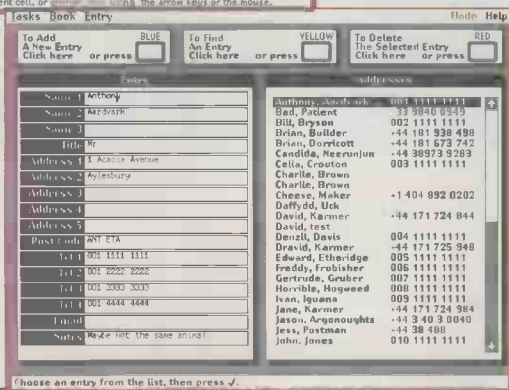
strides in usability — before Microsoft ships a new program, the denizens of Seattle are invited into the company to test the software for themselves. Amstrad has paid lip-service to usability with a pretty front-end, but overall, the PcW16 seems untested. Usability ideas which might seem a good idea to the programmers and designers will not necessarily be practical in the field.

The operating system and software are less sophisticated than that built into a Psion Series 3a. Amstrad has never produced exciting machines but deep down, the CPC and the original Amstrad PCW were sound. They employed solid engineering — down to a price — but usually succeeded in avoiding the problems of cutting corners too fine.

The PcW 16 is too little, too late. If this is the swansong for Amstrad's computer development, it's a sad way to bow out.



Above The spreadsheet is simple, but not necessarily simple to use. Right Despite the simple buttons, the address book can be confusing. You need to press stop to exit the edit mode



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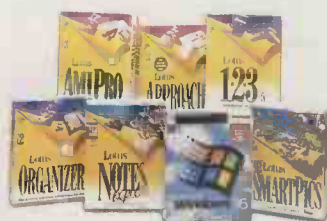
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- Built-in stereo speakers
- VESA local bus graphics with 1Mb video RAM
- 10.5" dual scan colour screen (mono or TFT VGA colour screen options available)
- Built-in TouchPad
- Dimensions 287x200x47mm Weight 6.2lbs

Software

- Microsoft Windows 95
- Lotus 1-2-3
- Lotus Ami Pro
- Lotus Organizer
- Lotus SmartPics
- Lotus Approach
- AutoRoute Express
- Quicken v4

MJN Powerlite P75 MM colour

- Intel 75MHz Pentium® processor
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- 256k fast cache
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- Built-in TouchPad
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- Built-in stereo speakers
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- Microsoft Windows 95
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- 10 Best PC for the Home
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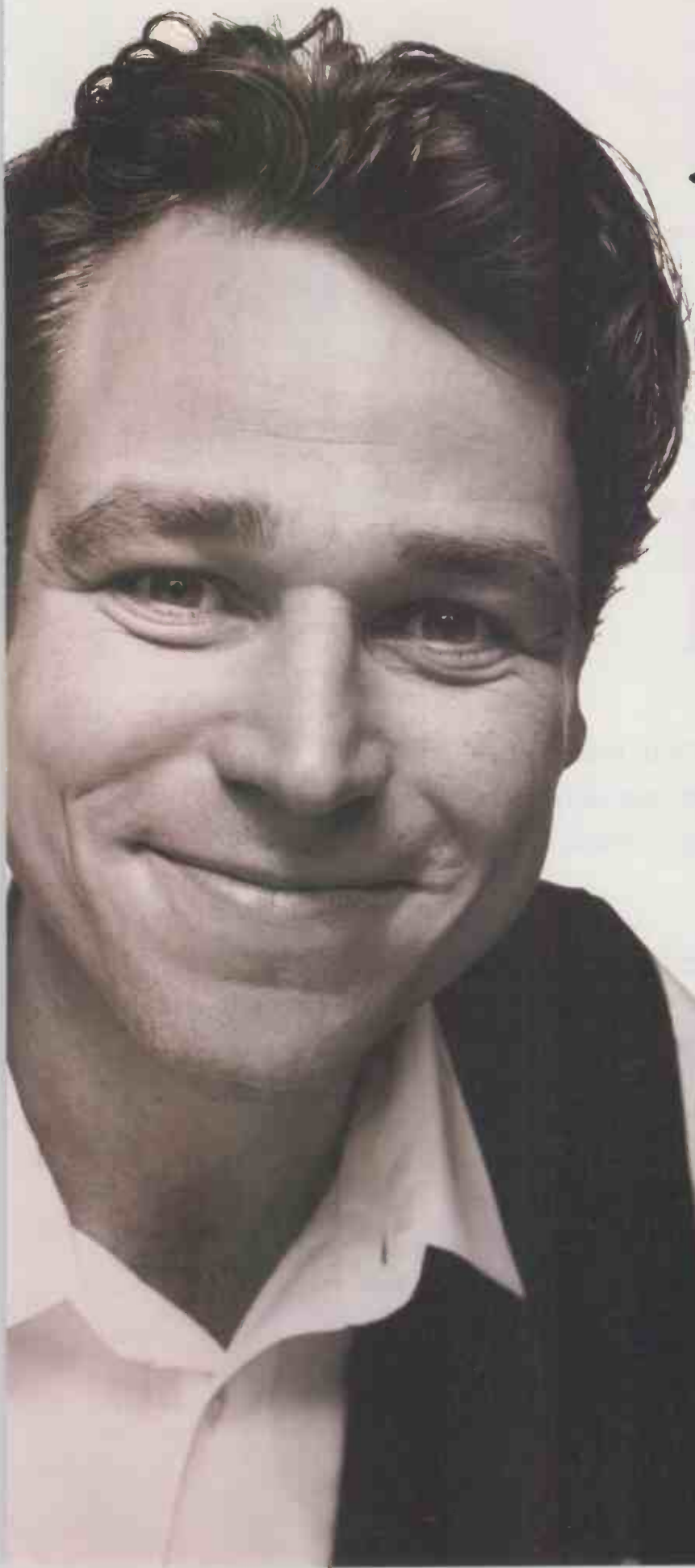
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PCW Details

HP Vectra XU 6/150

Price £5,167 (RRP); £4,133 (expected street price)

Contact Hewlett Packard 01344 369222

Good Points On-board SCSI-2 controllers with high-performance graphics and network cards included.
Bad Points Adaptor cards are a tight fit and quite close to the inside of the casing. No monitor is included in the package.

Conclusion A high-end machine, intended for high-end use and offered at a high-end price.

We test half a dozen of the latest PCs to incorporate the Pentium Pro — the fastest 32-bit Intel processor on earth. Dylan Armbrust reveals all on these desktop flyers.

As surely as night follows day, so too had Intel to produce the successor to the Pentium processor. And it has. The newest Intel chip off the old block is the Pentium Pro, and this month saw the first wave of desktop machines to make use of it.

The Pentium Pro is not, as some may think, an extension of the current Pentium line but a new chip altogether. With the introduction of "dynamic execution" and an on-chip L2 256Kb cache, the Pentium Pro is the fastest 32-bit Intel processor available.

Most manufacturers are expecting the first Pentium Pro workstations to be used for CAD/graphics, finance, and 3D animation purposes and this is where the marketing effort is directed. But with the

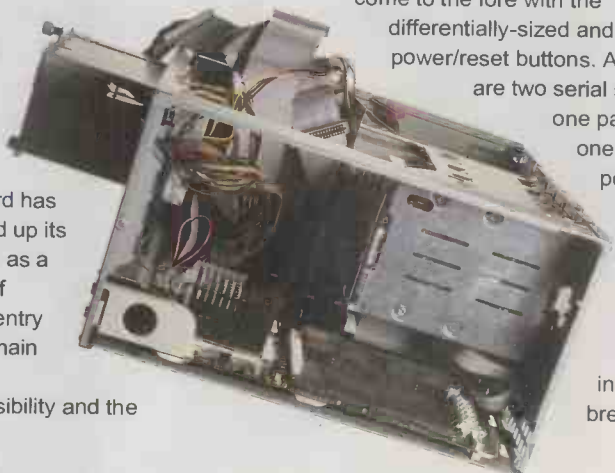
PCW Pentium Pro Photography by Bruce Mackie

price for a 150MHz chip starting at £625 (almost the price of a full DX4-100 system) it ain't cheap.

Here, we've tested six of the latest desktop machines to incorporate the new chip.

HP Vectra XU 6/150

Hewlett-Packard has once again held up its solid reputation as a manufacturer of PCs. Since its entry into the PC domain it has steadily increased its visibility and the



Vectra XU 6/150 dual processor is its newest high-profile, high-powered participant.

The HP is housed in the same stylish mini-tower case as that of the Vectra XU 5 series. Up front, a Sony quad-speed SCSI CDU76S CD-ROM fills a 5.25in bay, leaving one 3.5in and two 5.25in drive bays ready for use. Nice touches come to the fore with the

differentially-sized and recessed power/reset buttons. At the rear are two serial sockets,

one parallel port, one SCSI-2 port and two mini-DIN keyboard and mouse ports.

Getting inside is a breeze. Two



flicks of a latch and a pull, and you're in. The first thing you notice is the eye-popping size (1.5in) of the Pentium Pro's heat-sink.

The HP is a dual-processing model, although our review machine had only one CPU and as a result there is a dedicated second fan with a moulded air channel that keep the chips well ventilated.

The fact that HP uses its own motherboard contributes substantially to what it offers. The motherboard incorporates the Intel 82450KX (Orion) chip set but HP has opted to use its own 168-pin, 72-bit wide, ECC Dual Inline Memory Modules (DIMMs). Our unit had 32Mb of RAM but with eight DIMM slots the HP can upgrade to 256Mb. A Creative Labs Vibra 16S on-board sound chip is included, too. The presence of the on-board Ultra-SCSI adaptor combined with the Quantum Fireball 1080S 1.2Gb SCSI-2 hard drive and CD-ROM show that this model is meant for high-end use.

There are three PCI, one PCI/ISA and three ISA slots. An HP 10/100VG selectable PCI network card and Matrox MGA Millenium PCI graphics card with 2Mb WRAM (WindowsRAM) fill two of the PCI slots. Although there is plenty of room for full-length cards, the end slots place the cards a bit close to the metal casing for our liking.

Its list price made the HP the most expensive of the group but the expected street price is lower, of course.

Regrettably, we didn't have the HP in the labs long enough to be able to complete our battery of tests, so we are unable to provide a fair and accurate comparison with the other machines. Nevertheless, the HP returned 30.39fps (frames per second) on the Doom 2 test and achieved the highest score in the group. Other test results indicated performance equal to, or above, the IBM's. The presence of on-board SCSI controllers and its 72-bit DIMMs appear to have made their mark.

IBM PC 360 S150

This machine stands out, pure and simple: pure in its processing speed and simple in its design.

The PC 360 S150 comes in a new, no frills, durable mini-tower. The front exterior has one 3.5in floppy drive and three 5.25in bays — one is occupied by the CD-ROM.



PCW Details

IBM PC 360 S150
Price £3,965
Contact IBM 0800 919929

Good Points It's fast, has lots of room for expansion, and a strong warranty.

Bad Points Expensive, and little extra offered in the way of hardware.

Conclusion A fast, solid machine but a bit on the expensive side.

Keyboard and mouse are standard IBM fare, although IBM erroneously supplied us with a US keyboard. A padlock loop at the rear allows you to secure the case but it's a bit thin so we'd view it more as a deterrent than as real security. The I/O ports consist of two serial and one parallel, and that's it.

The interior is by far the most accessible in this group; just remove two screws and slide off a side panel. The inside of the case is wonderfully clear of cables with plenty of space for expansion cards and room for an extra hard drive. IBM uses an Intel motherboard and PCI chipset so there are less extras on offer than the HP model. Two of the four 72-pin SIMM slots are filled with 32Mb of ECC RAM and can be upgraded to a maximum of 128Mb.

The subsystem, consisting of a Quantum Fireball 1.2Gb hard drive and Teac CD-56E six-speed CD-ROM, is controlled via the on-board EIDE interface. A Matrox MGA Millenium graphics card with 4Mb of WRAM fills one of the three dedicated PCI slots, leaving another shared ISA/PCI and two ISA slots ready for use.

As with most Pentium

Pro machines, there are two cooling fans on the inside. One sits directly over the CPU while a second draws air in from the front to cool the motherboard and expansion cards.

The IBM did very well in our tests, coming in first in the overall ratings. It performed 11 percent faster than the lowest-scoring PC in the group (see page 129).

Our review unit, with 32Mb of RAM, came loaded with Windows NT 3.51 rather than OS/2, but IBM gives you the choice of either at no extra cost. In terms of affordability, the IBM sits in the middle of the pack but that's for the computer only.

The IBM has a three-year BTB (Back to Base) warranty and is a strong contender in its class, but for its price it lacks the extras offered with other models.

Dell Dimension XPS Pro 150

The Dimension XPS Pro 150 is Dell's contribution to the Pentium Pro line of currently available PCs. Featured as the top system in Dell's Power Platforms, it came in at fourth place in our overall test

PCW Details

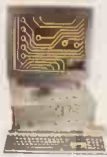
Dell Dimension XPS Pro 150
Price £3,934
Contact Dell 01344 728000

Good Points A 17in monitor, 2Gb HDD, and sound card are part of the package.

Bad Points Messy interior with awkward access to SIMM slots.

Conclusion All-in-one system with solid performance and value for money.





results, with a normalised benchmark of 0.91. It also managed a reasonable Doom 2 test score of 20.52fps (see page 129).

The XPS Pro 150 is housed in a mini-tower and is not a desktop Pentium Pro model in the true sense of the word. It comes with one empty 5.25in and one 3.5in expansion bay. The I/O ports are the same as that of the other Pentium Pro machines using the Intel ATX motherboard. A Nokia D1728 17in SVGA monitor comes with the Dimension XPS Pro 150 package, although it wasn't included with our review unit.

Removing the case cover from the Dell was easy; all you need to deal with is one thumb screw and two pinch latches. Once inside, we found that Dell differentiated itself from the rest in the group by dint of being the messiest interior of all. There was ribbon and power cabling overflowing well onto the motherboard and the positioning of the hard drive rendered access to the RAM difficult — this is due primarily to the small interior space of the unit compared with the other mini-towers in the group.

A second, more interesting difference in the Dell was the makeup of its subsystem. This was the only machine not to have a Matrox MGA Millenium graphics card. Instead, it carried a Number Nine Imagine 128 PCI card with 4Mb of RAM. Also present was a Creative Labs SoundBlaster 32 AWE ISA sound card.



PCW Details

Olivetti M6-950 Suprema

Price £4,027

Contact Olivetti 0181 785 6666

Good Points Nice-looking case, clean interior, comes with a monitor.

Bad Points Skimpy warranty.

Conclusion A solid mid-range performer.



all-in-one, ready-to-go, power machine, the Dell Dimension XPS 150 is worth a look.

Viglen Genie Pro 150

If you're looking for good price/performance value in the Pentium Pro range, you'll find Viglen one of the most competitive brands around.

Our review unit was a pre-production model so the external case wasn't final, but all else was as it should be by the time we went to press. A CD-ROM and 3.5in floppy drive fill two of the machine's drive bays, leaving an extra two bays available for future upgrades. A Microsoft Mouse and Viglen keyboard complete the externals.

Because Viglen uses the Intel ATX motherboard and Orion chipset it has the same configuration of I/O ports, PCI/ISA expansion and SIMM slots as the other Intel users. Our review model came with 32Mb of ECC RAM filling all four of the memory slots, but it can be upgraded to 128Mb. A clear interior with neatly bound cables allowed for unfettered access to all expansion and SIMM slots — this is helpful as it provides space for full-length cards, despite its small interior.

With its subsystem, Viglen has opted for a Western Digital 1.6Gb Caviar 31600 hard drive and Toshiba XM-5302MB six-speed CD-ROM. Similar to the other Pentium Pro machines is Viglen's use of the Matrox MGA Millenium graphics card with 2Mb WRAM. An interesting feature of the Genie Pro is that there isn't a spare

Our review model came with 32Mb of ECC RAM, expandable to a maximum of 128Mb. A Seagate ST32140A 2Gb EIDE hard drive and Teac CD-56S six-speed CD-ROM rounded off the Dell's internals.

Dell has positioned itself well for the first wave of Pentium Pro machines. Considering its price, the 2Gb HDD, sound card and 17in monitor, it offers just that little bit more than

PCW Details

Viglen Genie Pro 150

Price £3,969

Contact Viglen 0181 758 7000

Good Points Compact design, easily accessible SIMM and expansion slots.

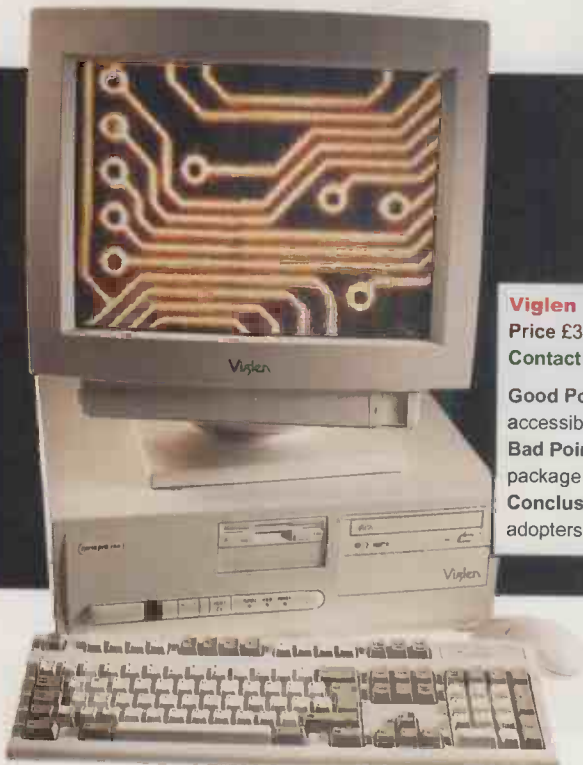
Bad Points Small monitor in a standard package.

Conclusion A good buy for early adopters or entry-level power users.



its competitors in this group. An added bonus is that it performs well and comes with an adequate warranty.

For those seeking an





bay for another internal hard drive.

Although our model came with an Envy 17PE 17in colour monitor, this isn't part of Viglen's regular offer. An Envy 15P 15in SVGA monitor is standard with the Genie Pro range but this seems a bit small considering it's meant to be a high-end PC.

In our lab tests, the Viglen had a high overall result of 0.96. This put it in second place, just behind the IBM and slightly ahead of the Olivetti, showing that this little machine packs quite a punch.

This PC is directed at the entry-level workstation market. With few expansion bays available it seems best suited for CAD and DTP rather than as a potential server. It comes with Windows NT for Workstations 3.51, a one-year parts and labour warranty, and lifetime technical support. For those business users wanting a Pentium Pro machine, the Genie Pro is definitely a budget buyer or early adopter model.

Olivetti M6-950 Suprema

What a smart-looking machine this is. Olivetti calls the Suprema a tabletop tower box, but we call it a mini tower. Its price places it fourth in the pack but it came up third in our lab tests, marginally behind the Viglen — not so remarkable considering it had an almost identical hardware and BIOS configuration.

The Suprema has a very simple exterior design. A CD-ROM and 3.5in floppy drive occupy two of the forward expansion bays. A free 5.25in and 3.5in expansion bay and a single recessed power button are all that remains at the front. Olivetti's keyboard is nice, with rounded keys and a gentle travel action. An Olivetti DSM 50-172 17in colour monitor was supplied with our review model.

You open the case in the old-fashioned way and undo six screws. Having cleared this hurdle, one faces the subsystem which is similar to that of the Viglen. With the Intel ATX motherboard, one finds the same I/O, SIMM and expansion slot availability as most of the others in the group. Olivetti has opted to use an E-IDE Quantum Fireball 1280A hard drive and Matrox MGA Millennium PCI graphics card with 4Mb of WRAM to reinforce its high-end workstation status.

Oddly, Olivetti has only supplied a Matsushita CR-581 four-speed CD-ROM with the Suprema, as opposed to the six-speeds found in most of the other Pentium Pro models. For hard drive expansion there's a 3.5in bay and all four



PCW Details

Fujitsu ICL Ergo Pro 660/150

Price £4,695

Contact Fujitsu ICL 01344 472000

Good Points 2Gb SCSI HDD, 17in monitor, strong warranty.

Bad Points Slow performance, cheap keyboard and messy interior.

Conclusion A disappointment considering Fujitsu's reputation.



SIMM slots are filled with 32Mb (expandable to 128Mb) of ECC RAM.

One noticeable feature of the Olivetti is the spacious interior design: no problem exists with loose cables, inaccessible SIMM slots or cramped space for expansion cards. Access to all of the above is completely free of obstruction. For the next batch of Supremas, Olivetti will be adding a swing-out hinge feature for the motherboard that will make access and upgrading even more of a breeze.

From a performance perspective the Olivetti did well, achieving a consistent third place in the group. With an overall result of 0.92 it was the mid-performer of the pack. It managed a rating of 19.62fps against the unofficial Doom 2 benchmark.

The Suprema comes loaded with Windows NT for Workstations 3.51 and toll-free tech support but has only a one-year cost-free warranty.

Fujitsu ICL Ergo Pro 660/150

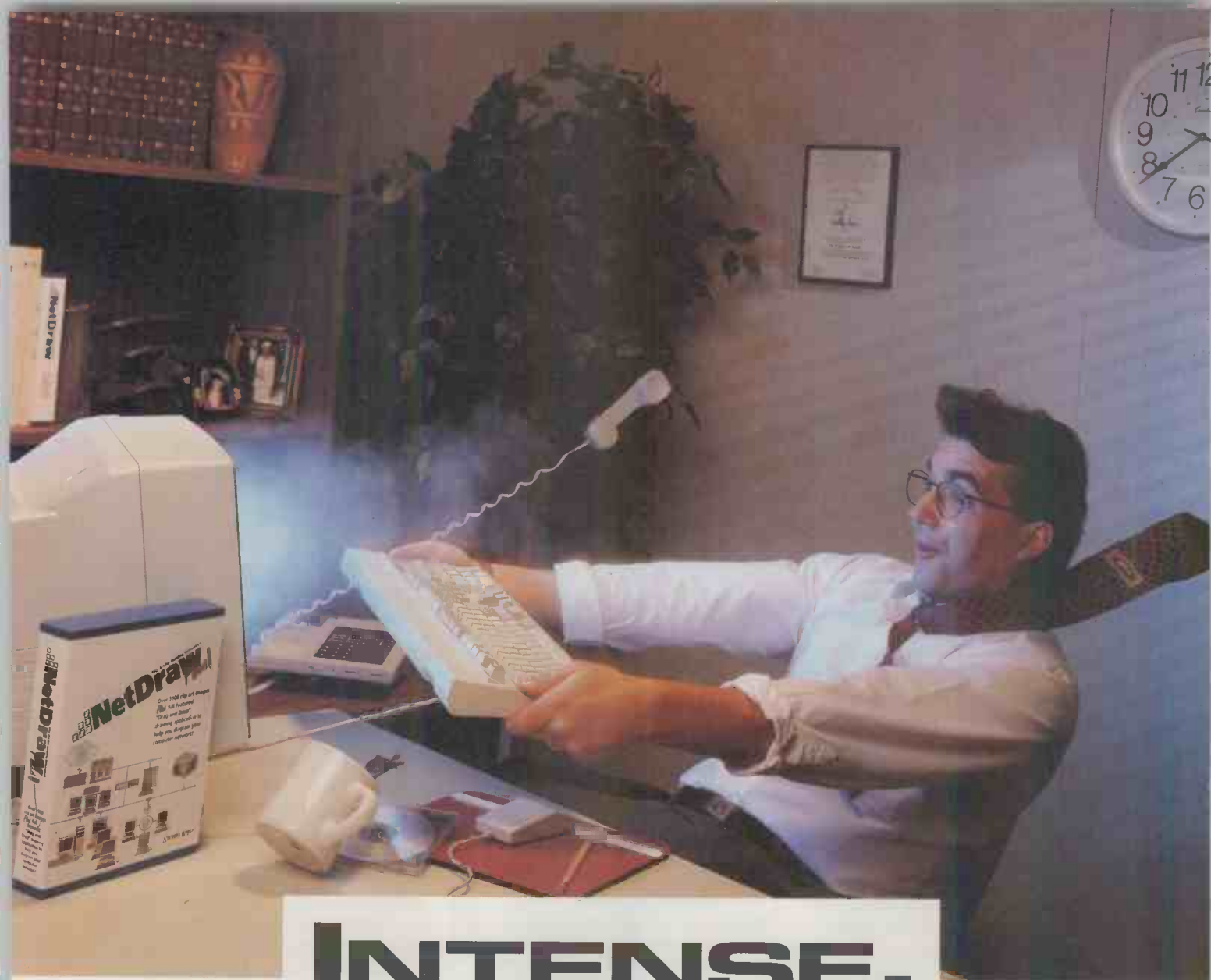
The Fujitsu ICL Ergo Pro is built like a tank: having an identical case to the IBM, except for the front plate, it's hard to

describe it any other way.

The exterior is an example of pure utility: one floppy drive, three 5.25in expansion bays and a power button with attitude, are all that face the user. The back of the PC holds the same Intel ATX motherboard I/O configuration: two serial, one parallel and PS/2-style keyboard and mouse ports. The keyboard is a bit cheap and thin and we had to reinsert its space bar when we set up. Fujitsu also included an ErgoPro 172P 17in colour monitor.

A look inside the PC proves to be more interesting. Having removed the side panel and waded through the forest of loose cables you see that Fujitsu has high expectations for the Ergo Pro. A Seagate ST32550 2Gb hard drive and Sony CDU76S quad-speed CD-ROM (ErgoPros are now shipped with six-speeds) are run from an Adaptec 2940 PCI SCSI controller. The Ergo Pro is further complemented by ICL's own ErgoGraphix 664 PCI graphics card with 4Mb RAM and a Creative Labs SoundBlaster AWE 32ve full-length ISA card.

Additionally, our review model came with 32Mb of ECC RAM filling all four SIMM slots, although 16Mb is the starter level. There's space for an extra hard drive and, like all Pentium Pro PCs, the Fujitsu uses the Orion PCI chipset. On the upgrade side, two PCI and two ISA slots were left vacant for expansion. Only one fan cools the whole system but it is positioned directly over the CPU.



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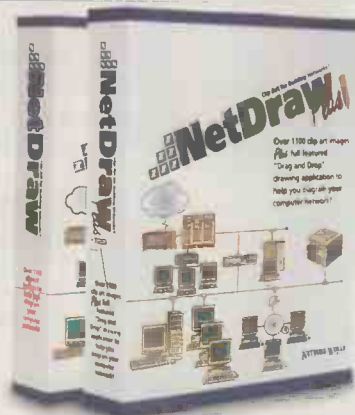
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network NEWS


VNU BUSINESS PUBLICATIONS





The Ergo Pro is the second most expensive machine in the group but this isn't surprising considering its subsystem. With 32Mb RAM, SCSI hard drive and an ErgoGraphix graphics card its price should relate to performance, but oddly this wasn't the case. The Fujitsu came in last of the pack, scoring 0.89 compared to the IBM. In the Doom 2 test, the ErgoPro came in last with a meagre score of 18.6fps.

The Ergo Pro 660/150 standard package includes Windows NT for Workstations 3.51, 16Mb RAM, a 17in monitor, and a three-year warranty (first year on-site and second and third-year BTB), one of the best of the group.

Editor's Choice

The phrase "seen one, seen 'em all" comes to mind having reviewed these Pentium Pro machines. With the exception of the HP, they all used the Intel motherboard. This uniformity was reflected in the results, as the margins between the first and last place machines was only 0.50 in relative performance.

Another common trait in our review models was the dominance of the Quantum Fireball hard drive and Matrox MGA Millenium graphics card. Creative Labs was also a familiar brand used for those machines that incorporated sound capability. Over 50 percent of suppliers used these state-of-the-art components to give their machines that extra boost necessary for a high-end workstation.

Oddly, one feature that wasn't present (but was expected) in most of the models we reviewed, was SCSI. Only HP and Fujitsu included SCSI capability, although it didn't make a difference to the Fujitsu in terms of overall performance.

It was a close contest, though, and the Editor's Choice goes to the Dell Dimension XPS Pro 150. It wasn't the fastest machine in the group but its combination of extras made it the obvious choice. It has all the bells and whistles you'd expect of a power machine. The sound card, six-speed CD-ROM, monitor, graphics card with 4Mb, plus its low price, pushed Dell above the line.



PENTIUM PRO TABLE OF FEATURES

	Dell	Hewlett Packard	IBM	Olivetti	Viglen	Fujitsu ICL
Manufacturer	Dell	Hewlett Packard	IBM	Olivetti	Viglen	Fujitsu ICL
Model Name	Dimension XPS Pro 150	HP Vectra XU 6/133	PC 360 S150	M6 950 Suprema	Genie Pro 150	ErgoPro 660/150
Tel No	01344 720000	0990 474747	0345 727272	0800 447799	0181 758 7000	0345 441122
Fax No	01344 723198	0171 735 5565	0345 727272 (fax back)	01908 203464	0181 758 7080	01344 473333
Price (excl VAT)	£3749	£5167	£3965	£4027	£3969	£4695
Expansion Bus						
Free PCI only slots	2	1	2	2	2	2
Free ISA only slots	2	2	2	3	3	2
Free shared PCI/ISA slots	1	1	1	1	1	0
Motherboard Manufacturer	Intel	HP	Intel	Intel	Intel	Intel
"No. of spare 3.5" bays"	1	2	1	1	1	1
"No. of spare 5.25" bays"	1	3	2	1	1	2
Hard disk						
Manufacturer	Seagate	Quantum	Quantum	Quantum	Western Digital	Seagate
Size	2Gb	1.2Gb	1.2Gb	1.2Gb	1.6Gb	2Gb
Interface	E-IDE	SCSI	E-IDE	E-IDE	E-IDE	SCSI
RAM and Secondary Cache						
Main RAM	32Mb	32Mb	32Mb	32Mb	32Mb	32Mb
Max RAM	128Mb	256Mb	128Mb	128Mb	128Mb	128Mb
SIMM Type (pins)	72	168 pin DIMM	72	72	72	72
Multimedia						
CD-ROM Speed	6 speed	4 speed	6 speed	4 speed	6 speed	4 speed
Sound Support	●	●	○	○	○	●
Graphics						
Graphics Card Manufacturer	Number Nine	Matrox	Matrox	Matrox	Matrox	Fujitsu ICL
Graphics Card Model	Imagine 128	MGA Millenium	MGA Millenium	MGA Millenium	MGA Millenium	ErgoGraphix 664
Graphics Card RAM/Max RAM	4Mb/4Mb	2Mb/8Mb	4Mb/8Mb	4Mb/8Mb	2 Mb/8Mb	4Mb/4Mb
Monitor Included	●	○	○	●	●	●
Other Information						
Windows NT for Workstations 3.51	●	●	●	●	●	●
Standard Warranty	1 year BTB	1 yr on-site/2 yr BTB	3 years BTB	1 year on-site	1 year BTB	1 yr on-site/2&3 BTB
Toll free tech support line	○	○	●	●	○	○

KEY ● Yes ○ No



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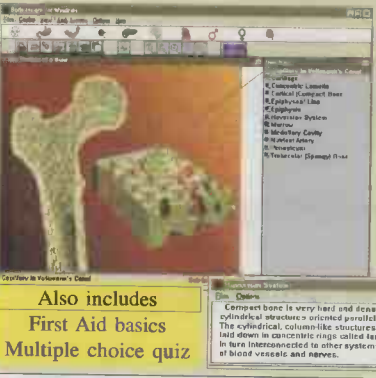
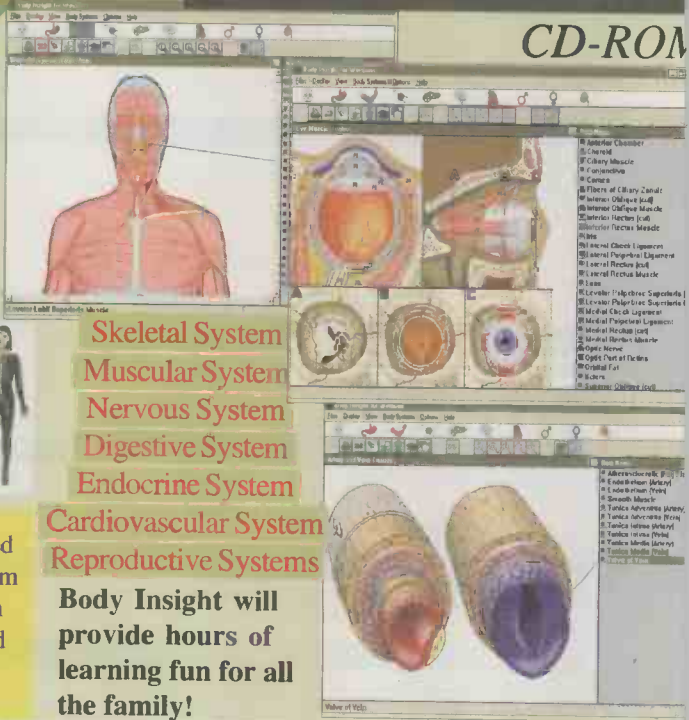
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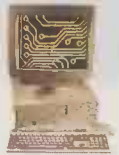
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How we did the tests

Pentium Pro systems differ fundamentally from earlier PCs not only in their CPU, but also in the expected system software. There is very little point in running a partially 16-bit operating system like DOS or Windows 95; Pentium Pro can only hasten 32-bit code like NetWare, Windows NT, OS/2 and Unix. For this reason, all the systems submitted were configured with Windows NT Workstation 3.51 and 32Mb of RAM.

With a change not only in the hardware but also in the operating system, Pentium Pro scores are clearly incomparable with previous test results — even though the test operations themselves have not altered. The greatest performance improvement we measured was attained by 32-bit Excel running on the IBM. This managed to complete the recalculation and graphing tests at roughly six times the speed of our reference 486 DX4/100 and ran the entire Excel test suite about 3.5 times faster overall. The slowdown for the overall figure stems mainly from disk access. 32-bit Word for Windows also had new skates fitted; across all the tests it ran 5.6 times faster on the Olivetti than on the reference machine. So 32-bit applications at last have a worthy hardware platform, and the performance side of Moores Law is going as strongly as ever.

Several of the older 16-bit Windows and DOS programs gained extra speed from the test systems, but we are not convinced that the speed gains are entirely down to the Pentium Pro chips. Database access tests, for example, ran like a shot. But all the review machines were fitted with 32Mb of RAM, and all but two were using the NTFS file system whose superior caching is designed to deliver faster disk access for disk-intensive programs.

Despite the speed increases, Windows NT's Win16-on-Win32 architecture always muddies test results for DOS and Windows 3.x



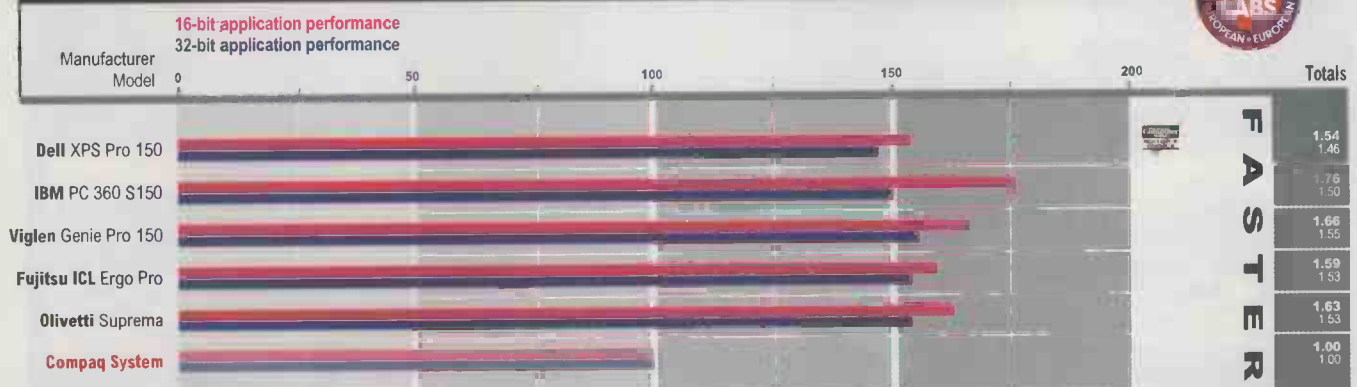
applications. Firstly, our evaluation systems would not run the WordPerfect for Windows tests. The current version of Windows NT Workstation and WordPerfect 6.1 for Windows have certain compatibility problems, and so the WPWin test was weighted out of the reference score that was produced on a Windows 95-based Compaq system. Novell is still investigating the cause of the problem. The other important factor is that 16-bit Windows support in Windows NT carries a fairly heavy overhead, so that although all the scores are "good" (i.e. nobody would complain about application performance), the relative improvement is probably not worth the expense and disruption of an upgrade. Keep in mind that although the 16-bit Windows application scores accurately represent performance, they are not doing justice either to Windows NT or to the Pentium Pro chip.

Windows NT itself is subject to several factors that influence overall performance. Some of these are under the user's control (such as the choice of NTFS or FAT file systems) but others are influenced by the hardware itself. Although several of the systems we examined were built around the same motherboard, there remained differences in performance that are down to differences in the system firmware, video BIOSs and so on. NT and other 32-bit operating systems may benefit from a system BIOS that contains the BIOS-32 extensions. IBM's BIOS provides a good BIOS-32 implementation, the end result of which was the IBM's slight lead in running the 32-bit application test.

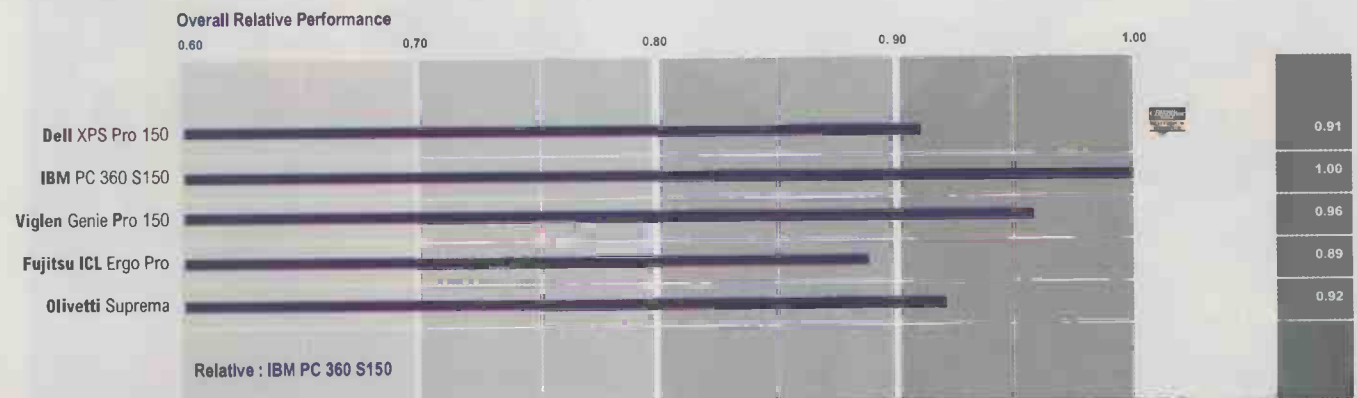
One further note on the IBM BIOS; we needed to install a flash upgrade to solve, apparently, random crashes generating the blue NT "Stop" screen. The upgrade completely fixed this problem and all shipping machines will be supplied with the stable version. With this exception, the systems were tested in the state in which the manufacturers supplied them.

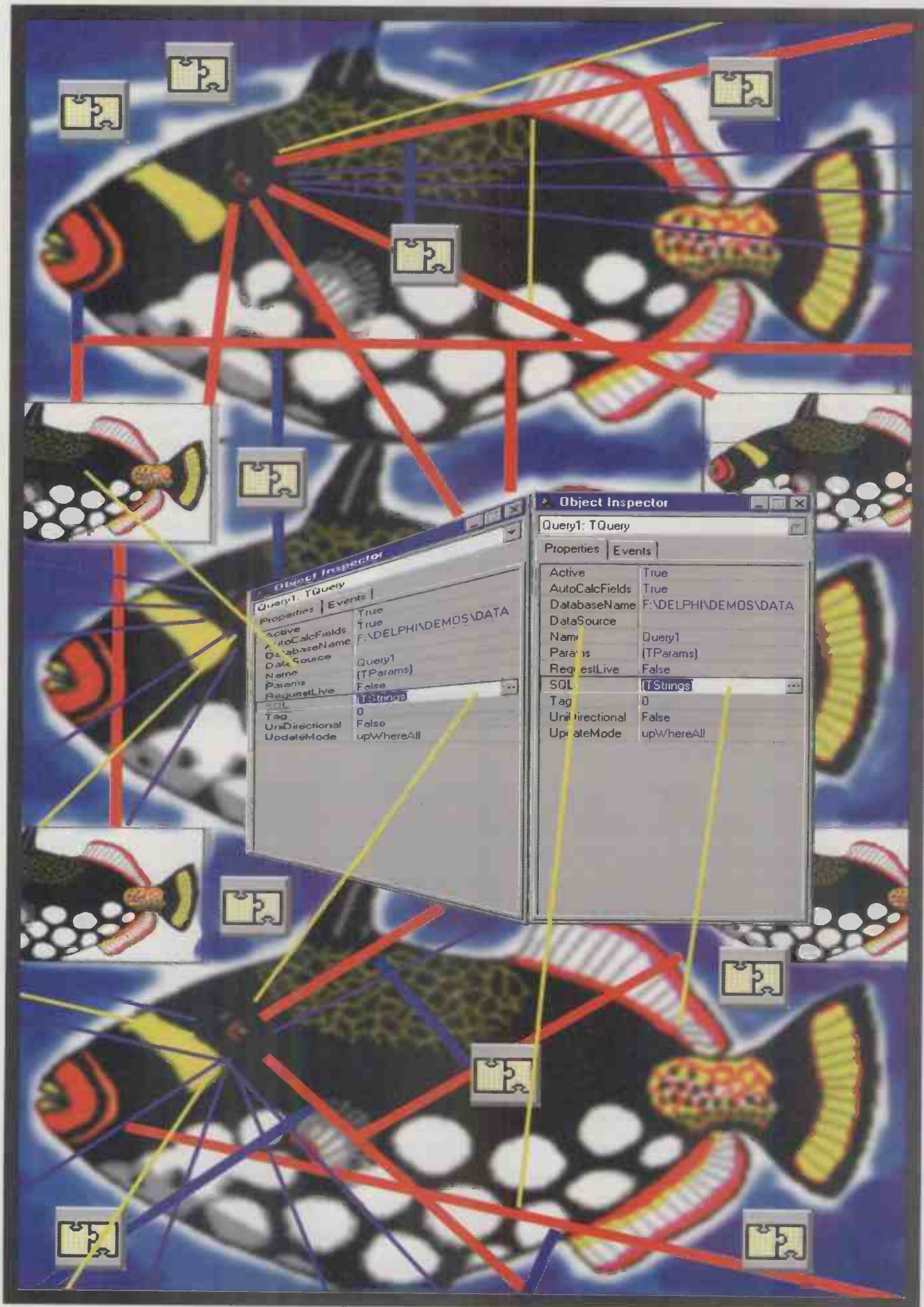
Julian Evans

Performance Results



Due to time constraints, we were unable to finish testing the HP machine. Initial results were encouraging, however.





VISUAL PROGRAMMING TOOLS

Once there was Visual Basic. Now, visual development tools are everywhere.

Tim Anderson surveys the scene and tests leading contenders.

Visual is the development tool buzzword of the nineties. Microsoft, IBM, Borland, Computer Associates and others have rushed to slap a "visual" tag onto their programming products. It's marketing, since there is an association between "visual" and "easy" in the mind of the public. With a few clicks of the mouse, your in-house order entry system or shrink-wrap home accounts package is complete and ready to run. The reality is different. Most visual tools do not represent visual programming as defined by the academics. True visual programming implies a language with a visual syntax, where the whole flow and detail of an application is expressed visually. Commercial examples are Novell's AppWare and IBM's VisualAge. But this kind of programming is still uncommon. To most people, visual programming implies a graphical design tool for creating a user interface, along with some graphical utilities for the programming environment itself. The bulk of the programming behind the user interface is good old-fashioned textual code. This is no bad thing, since few developers are ready to abandon their language skills in C, C++, xBase, Basic, Pascal or others. In any case, the jury is

VISUAL PROGRAMMING CONTENTS

- 132** PowerBuilder
- 134** Power Objects
- 136** SQL Windows
- 134** AM for Windows and OS/2
- 138** Visual FoxPro
- 138** Visual dBase 5.5
- 149** Visual Basic 4.0
- 157** Delphi 2.0
- 160** Watcom C++ & Visual Programmer
- 164** Visual C++
- 167** VisualAge C++
- 132** Object Wars
- 142** Getting At Data
- 145** Visual Components
- 147** Case Studies
- 170** Table of Features
- 170** Editor's Choice

still out on whether a truly visual language can achieve the concise efficiency of well-written textual code. To prove the point, Novell's genuinely visual AppWare has not been taken up widely, while hybrids like Microsoft's Visual Basic and Borland's Delphi have been storming successes.

Seeing the object

Even hybrid visual tools are not just about interface building. Visual developers cannot escape objects, since

visual programming and object orientation are profoundly linked. One reason is the natural correspondence between a interface element like a button or a text box, and an equivalent class in an OO language. Another reason is that both visual programming and OO are all about reusable code. Every visual environment gives you this in some degree, since the visual interface hides underlying code which has been written for you. But early visual development tools were not very open: you could only work with the built-in objects supplied when you bought it. Visual Basic introduced the Visual Basic Extension (VBX), add-on objects which appeared in the toolbox and could be used just like native controls. VBXs were an enormous success and spawned a whole new product category. They made VB a highly productive environment, increasingly so as vendors came up with more and more packaged solutions to common problems.

Did I say object orientation? The snag here is that Visual Basic's OO, especially in versions 3.0 and earlier, is a fake. A VBX is just a Windows DLL which hooks into the VB environment, and almost all VBXs are written in C or C++. Visual Basic developers cannot write their own language extensions without resorting to

a completely different tool. Second, the VBX is an extension to VB, no more and no less. It became obvious that truly useful objects should be portable between environments, so that what you develop with one tool can be seamlessly integrated with another. VBXs are quite unsuitable for this, although some products like dBase for Windows, Delphi and some C/C++ compilers have come out with VBX compatibility by emulating Visual Basic's low-level support. In the meantime computing academics and technical purists have torn their hair out over VB's success, since it has popularised a form of development which is closed and which respects few OO principles.

Good though it is, the VBX era is drawing to a close. The next generation of visual development tools must deliver a broader range of benefits. Here are some of them, listed in order of increasing difficulty:

- You should be able to create your own custom objects, both visual and non-visual.
- The creation of custom objects should support basic OO principles such as inheritance and encapsulation.
- Objects should be portable and accessible to other applications and programming tools.
- Objects should be distributable over a network.
- Objects should be portable and accessible to other computer platforms and operating systems, even in real time across the internet.

None of the systems in this group test meet all these requirements. There is also an unresolved standards war (see *panel, above*) which makes it hard for vendors wanting to implement universal components. But it is already clear that the best systems will be those that are open and extensible, while those which use only proprietary visual and non-visual components will look increasingly unattractive.

Visual Programming and Databases

The main focus of this group test is on general-purpose visual development tools. If you are developing database applications, you need to take note of the many specialist database products that also feature visual development. General purpose tools like Visual Basic and Delphi also major strongly on database support, so bear in mind that all these

Object Wars

The prospect of universal objects is enormously enticing to vendors who would have the widest possible market. Naturally, the biggest players want to go one step further and to control the standards themselves. Hence the creation of an industry-wide Object Management Group (OMG) to define object interoperability standards such as the Common Object Request Broker Architecture (CORBA). A related initiative is OpenDoc, a universal object container that might replace the traditional application/document process with an empty canvas into which any compliant object could be placed. Successfully implemented, OpenDoc could bring many of the benefits of visual, drag-and-drop programming to end-users who have no programming skills whatsoever, since in one sense every OpenDoc document is a custom application. A key supporter of CORBA and OpenDoc is IBM, whose System Object Model (SOM) is CORBA compliant. As yet the technology is mostly future promise; for example, there are no commercially available OpenDoc containers as far as we are aware.

Unfortunately the OMG and CORBA is on collision course with Microsoft, who have near-control of the PC desktop. Rather than support the OMG, Microsoft

would rather develop extensions to their existing OLE technology, which it is claimed can bring the same benefits. On the face of it, Microsoft's initiative should have little chance against a standard supported by the rest of the industry. But the advantage of independence is that progress can be made without the lengthy and delicate business of reaching agreement in standards committees. OLE is steadily progressing. Its latest achievement is the OLE control or OCX, which with the release of Windows 95 and Visual Basic 4.0 has become a practical and widely supported proposition. Unlike the VBX, OCX controls use standard OLE protocols and have potential both as programming components and as objects which users insert into documents. An example of this flexibility is Microsoft Excel, which can be opened as an application in its own right, or used as a document component in Word, or used as a programming component with its own properties and methods in Visual Basic. Opponents of OLE point out that not only is it proprietary and Windows-centric technology, but it is also an impure object model based upon the principle of containership rather than inheritance. But OLE is not going to go away; it is here and it works. Both OLE and CORBA are important standards, and there will be an uneasy co-existence before a clear winner emerges.

distinctions are blurred. In this section we've summarised some of the leading contenders.

PowerBuilder

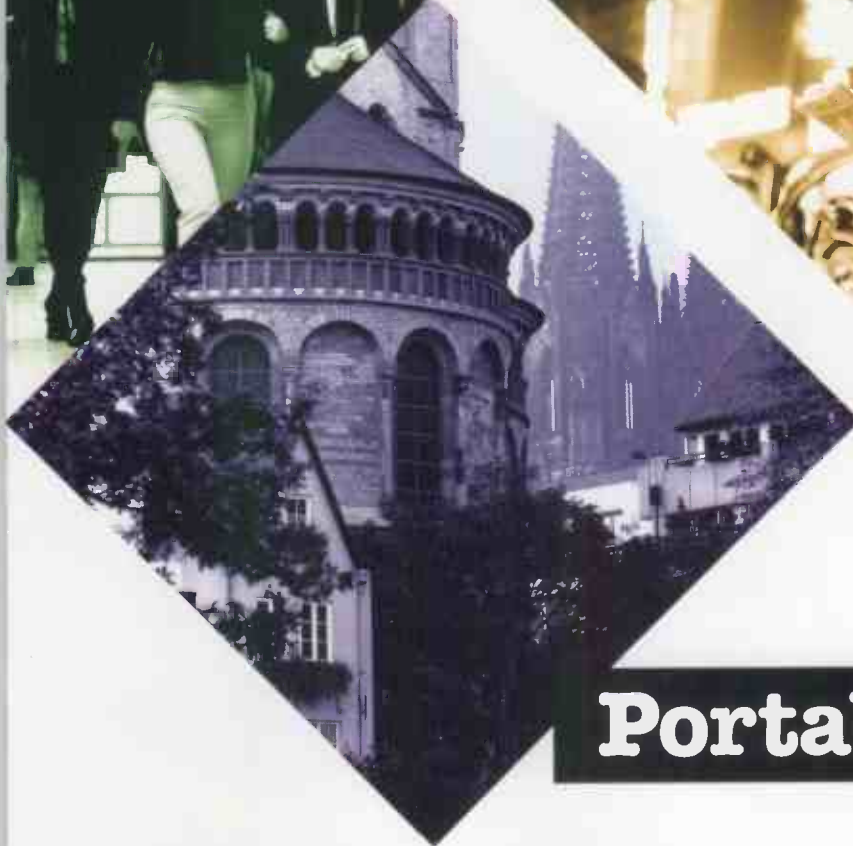
Powerbuilder is a well-established rapid application tool specifically designed for creating client-server systems. It was developed by PowerSoft, now part of Sybase, but is designed to work with all the leading server databases using native drivers or ODBC. Watcom is also part of PowerSoft, so Watcom SQL comes as part of the package. Even so, it is best seen (like Gupta's SQL Windows) as database-independent software for building client-server front ends.

PowerBuilder adopts a modular approach to application development. PowerBuilder components are called objects, and examples include the Application object, DataWindow object, Function object and Window object. Each of these object types has an associated design tool called a Painter. To build an application, you create objects using

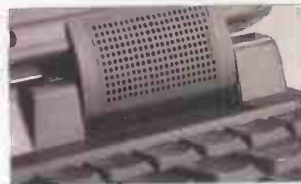
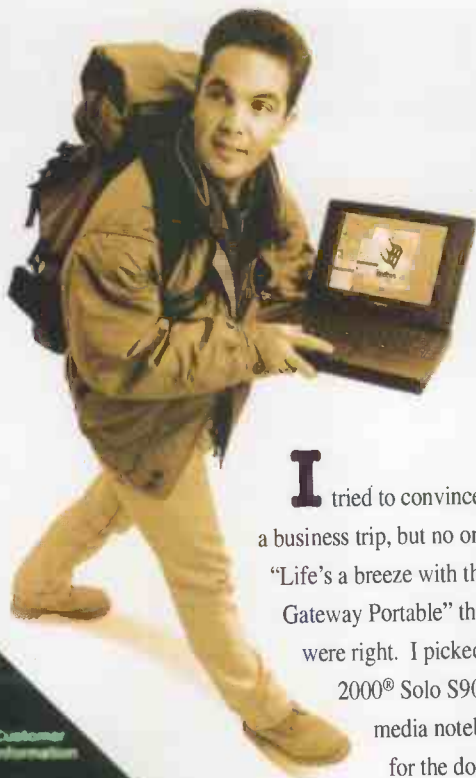
these painters, and link them together either visually or with scripts. PowerBuilder objects are stored in libraries, and these can be shared between applications, enabling code reuse. Encapsulation, inheritance and polymorphism are supported making PowerBuilder an effective object-oriented tool. VBX controls can be used in the 16-bit version, and PowerBuilder is an OLE automation client.

There are several attractions. PowerBuilder's modular design encourages well structured applications. It is designed from the ground up for client-server work, so has excellent features to handle transactions, security, validation and SQL generally. PowerBuilder works well with ODBC, but also supports native drivers. Speed of execution is only fair, and PowerSoft are working on a tool that will convert application code to C++ to improve performance. PowerBuilder 5.0 will introduce support for remote objects, the aim being to enable client applications to use business rules running on the server.

Gateway 2000



Portable PCs



Gateway Solo models feature two integrated stereo speakers.

I tried to convince them it was a business trip, but no one believed me. "Life's a breeze with the mobility of a Gateway Portable" they said, and they were right. I picked up my Gateway 2000® Solo S90 Best Buy multimedia notebook and headed for the door. Nothing like a bit of travel to broaden the mind.

"Wow, I love this machine!"

Stopping only to bid farewell to my erstwhile best friend Brodie the Border Collie, there I was, off on a trip round Europe with everything I needed to make a really good job of my report. I remember thinking, "Wow, I love this machine!" It's got a powerful 90MHz Intel® Pentium® processor, active matrix SVGA colour display, 16MB RAM, hefty 720MB removable hard drive, and CD-ROM drive – in fact it's got everything you want in a high-end desktop – all in a six-pound portable PC.

First stop Victoria Station. Quietly grooving to my favourite music – easy with the built-in 16-bit sound stereo speakers and CD-ROM drive – I was assailed by four girls. "I can't believe it!" said Claire from Bradford. "You've got a Gateway 2000 notebook too! We're here for the

conference, but we wouldn't go anywhere without one, would we girls?"

"No way," chorused the others, as they produced a Gateway Solo S75 from one handbag and a Gateway Liberty™ from another.



132b

"It handles everything I need", said Susie.

"That's what I love about Gateway 2000 portables," said Susie from Sheffield, "there's something for everyone and they're fantastic value too! I take my Liberty everywhere, it only weighs just over 4 pounds, and with a 720MB removable hard drive, 100MHz 486DX4 Intel processor and the super 10.4-inch dual-scan colour screen, it handles everything I need it to do with ease."

Tempted as I was to tarry a while, I bid farewell to my new-found friends and headed for the boat train. Aboard the ferry to France I settled down to some serious work on my

**More con
more p**



report. The four-hour journey was well covered by my Solo's Lithium-Ion battery giving me up to six hours working time between recharges.

Once on French soil, I plugged into the nearest phone socket and e-mailed the first part of my report back to the office. Hmm, I thought, that'll blow them away back at base!

Paris proved a doddle to negotiate and avoiding the tasty delights of the Pigalle by night, I checked into an hotel to recharge the batteries. Mine and my Solo's.



EZ Pad pointing device for easy cursor navigation.

1



Next morning I headed north for Cologne where a successful meeting with my German colleagues was concluded by them calling

Gateway for details of their whole range of portable PCs with a one-year back-to-base warranty and lifetime technical phone support! Not really what I'd planned, but who's complaining?

My German colleagues made a free call to Gateway 2000.



Friday, 10.00am and I'd already done the Dutch deal. Spreadsheets, data and graphics all downloaded effortlessly from my Solo, direct onto our client's desktop.

Back in the UK it's a toss-up who was most pleased to see me, my boss or my faithful collie. Both were left panting for more!

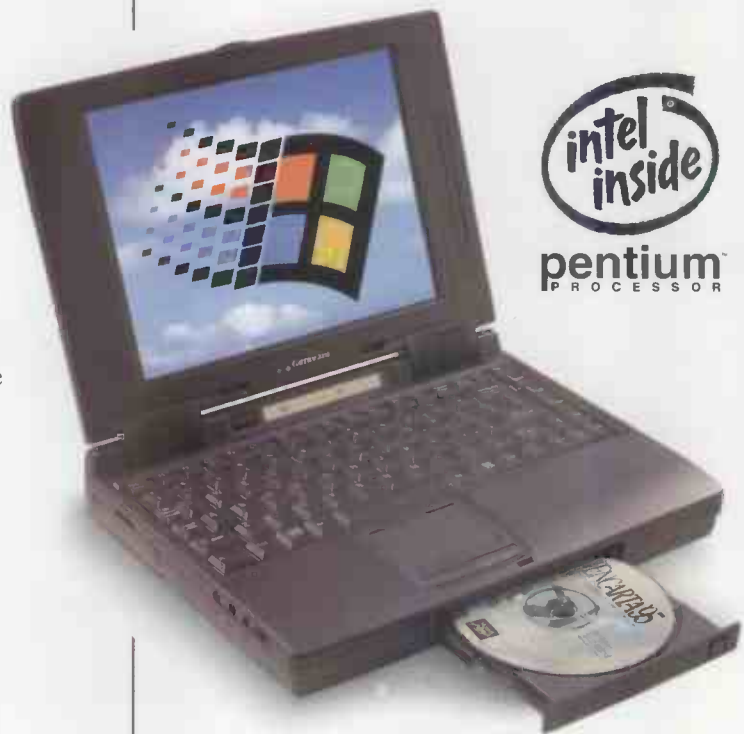


Gateway Solo notebooks are optimised for Microsoft Windows 95

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places.**

By nightfall I reached Maastricht. Dinner done, I spent a couple of hours working on my Solo, before getting sidetracked into a little cruise on the Internet. Fantastic!



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- Intel 100MHz 486DX4 Processor
- 16MB RAM
- Infrared Capability
- 720MB Removable IDE Hard Drive
- 2 NiMH Batteries & AC Pack
- Instant On
- PCMCIA 28.8 Fax Modem
- 78-Key Keyboard & Pointer
- Parallel, Serial, VGA & PS/2 Ports
- Microsoft Windows 95
- MS Office Professional 95
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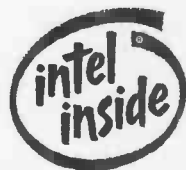
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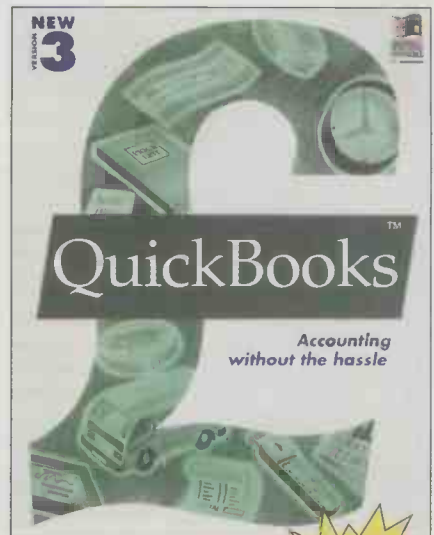
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PowerBuilder is a modular system based on different types of object. Objects are customised with tools called painters. This shows the Window painter, with the painter toolbar along the bottom of the screen. The main toolbar at the top is mainly used to open other types of painter

then drag it onto the form's property sheet. Click the method and a code window opens for editing.

Power Objects supports inheritance and user-defined classes, which you can store in libraries. It is also an OCX client,

although only 16 bit at the time of writing. A local SQL database called Blaze is bundled with it, along with native drivers for Oracle or SQL Server. Blaze is rather slow, but is handy for prototyping. As you would expect, there is a particularly rich set of database methods and events, making data validation and transaction handling much easier than in Visual Basic. Another advantage is that parallel Windows and Macintosh versions exist, ideal for mixed environments.

Oracle's Rob Bruce claims that, "the market needed a really easy to use client server tool. Visual Basic is a not designed for client server. It is a general purpose tool." But he is hoping Power Objects will not steal the thunder of Oracle's high-end Designer 2000, which includes a forms and reports generator. Instead, Oracle plan a facility to import Power Objects forms into Designer 2000.

Power Objects is interpreted, but can create standalone executables which include the runtime libraries. Performance is the same either way: rather slow. Nor is it as flexible as Visual Basic. But what it does have is one of the neatest visual implementations of object-

PCW Details

PowerBuilder
 Price £195 Desktop, £3,295 Enterprise
 Contact PowerSoft 01494 555555

Good Points Database management, object-orientation

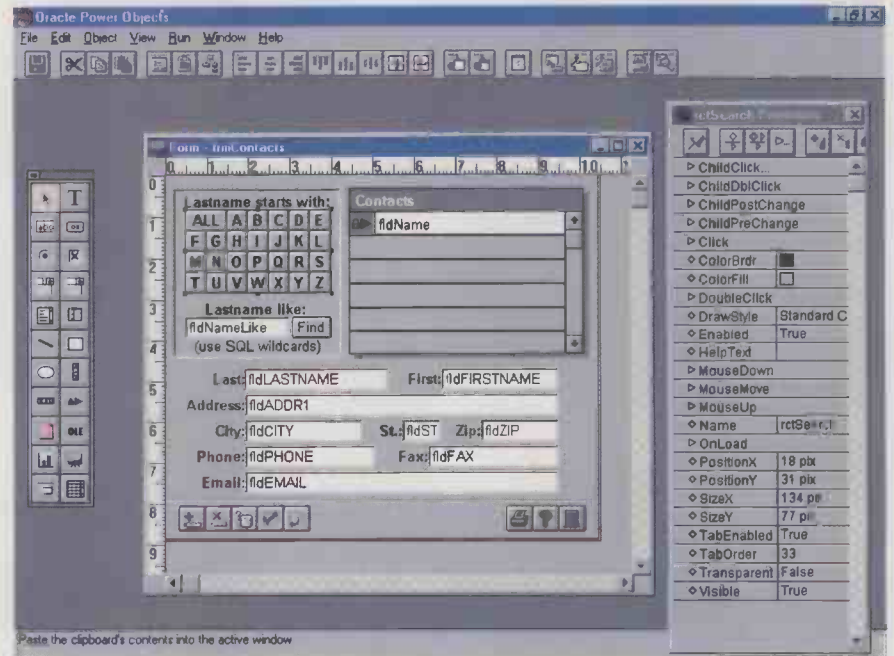
Bad Points Slow at times; quirky interface.

Conclusion Worth considering for database work.

Power Objects

Part of the fallout from Visual Basic's success was that server vendors like Oracle found their customers using VB client applications. Oracle's response has been to produce a brand-new visual development tool tailor-made for their databases.

Power Objects is the result. It combines a VB-like language with simple but tidy object-orientation implemented with visual tools. For example, to add a user-defined method to a form, you enter its type and arguments onto a grid, and



PCW Details

Power Objects
 Price £345 standard, £1675 client-server
 Contact Oracle 01344 860066

Good Points Elegant design, more OO than VB, Mac version.

Bad Points Slow, limited drivers.

Conclusion Useful for quick Oracle solutions.

Oracle Power Objects uses a version of Basic very like VB, but unlike Visual Basic is intended only for database development, and is fully object-orientated. The property sheet at the right includes both properties and methods. Custom properties or methods can be added with a couple of mouse clicks

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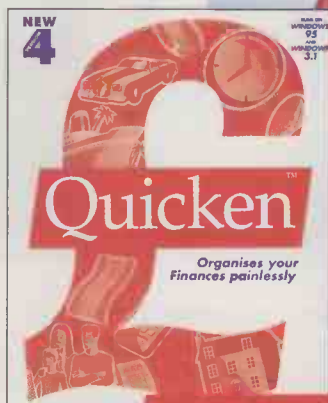
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I found Quicken an absolute doddle to use, simple to start and easy to learn. And now there's even a CD version that uses a "Talking Tutor" – it's like having your own

personal coach on screen to show you how to get the most from Quicken. It literally took only minutes to get me started. The screen displays are so simple it's just like using an ordinary calendar, cheque book and bank statement. Once you're up and running you'll be amazed at what you can do with your money.

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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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Now I never wonder where my money goes because Quicken analyses my spending for me. And it's really easy to do. At the touch of a button Quicken produces full colour graphs and charts of my finances, and I can customise these to give me the exact details or summaries I need. I must warn you though, it will give you a surprise or two when you see what things add up to – like running your car, or dining out. It really teaches me where I'm wasting money

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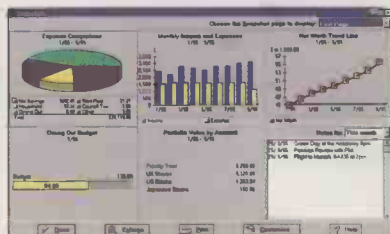
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Quicken runs on Windows 3.1 and Windows 95.

orientation around, and on the Mac as well as Windows. If you're connecting to Oracle, it's worth checking out.

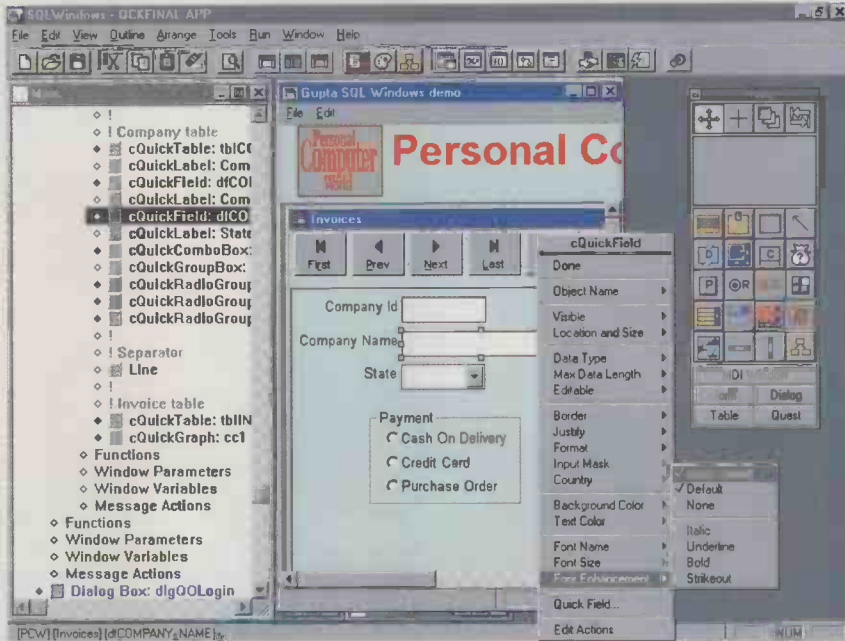
SQL Windows

Gupta is an independent company specialising in client-server database software. The company offer a suite of products, with the flagship being SQLWindows, an object-oriented visual development tool. A distinctive characteristic is the outline window, which displays a tree view of your application, updated as you build it.

Objects are placed on forms using a VB-like tool palette. Right-clicking displays the Customizer, broadly equivalent to VB's property list. SQLWindows has its own language, called SAL, which includes the ability to call DLL functions. An irritation is that SAL is case-sensitive.

SQL Windows has several strengths. First, it is (like PowerBuilder) totally geared for database development, unlike more general purpose tools such as Visual Basic or Delphi. Second, it is highly customisable, letting you build your own visual or non-visual classes and even supporting multiple inheritance. Third, it is well integrated with a range of client-server tools, including the Quest query builder, Team Windows repository for version control and project management, native database drivers for all leading servers, and the SQLBase PC database server for local networks.

The performance of SQL Windows front-end applications is only fair, although there is now an option to convert some parts to C code for compilation into a DLL, with corresponding speed improvements. Version 5.0 supports VBx's, but OXC and/or OLE automation will have to wait



SQLWindows is a well-established visual development tool for database work. Applications can be navigated using an innovative outliner, seen on the left of this illustration. Forms are designed with drag-and-drop from a toolbar. Right-click an object to open the Customizer, in this case for a QuickField object

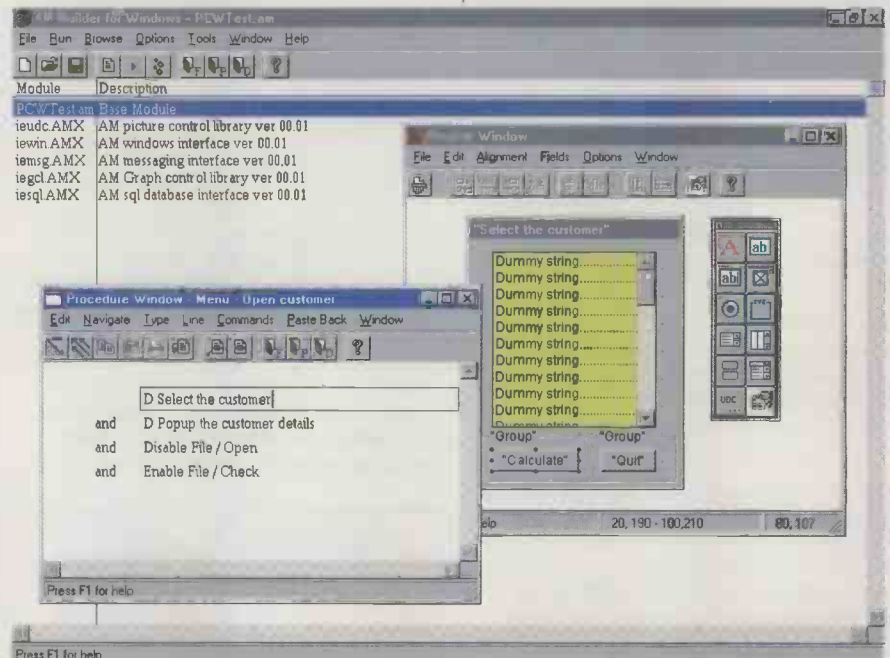
for the Windows 95 version in preparation.

AM for Windows and OS/2

AM is an established tool for building front-ends to OS/2 client-server

of procedures and modules, which can be expanded for editing as required. AM therefore encourages a logical and highly structured approach. A window painter, data dictionary, function list, and several

AM takes a hierarchical approach to application building. The primary window lists all modules and libraries. Modules contain procedures, which can be opened for editing as required. Including the function "Display Window" opens the window painter for visual design

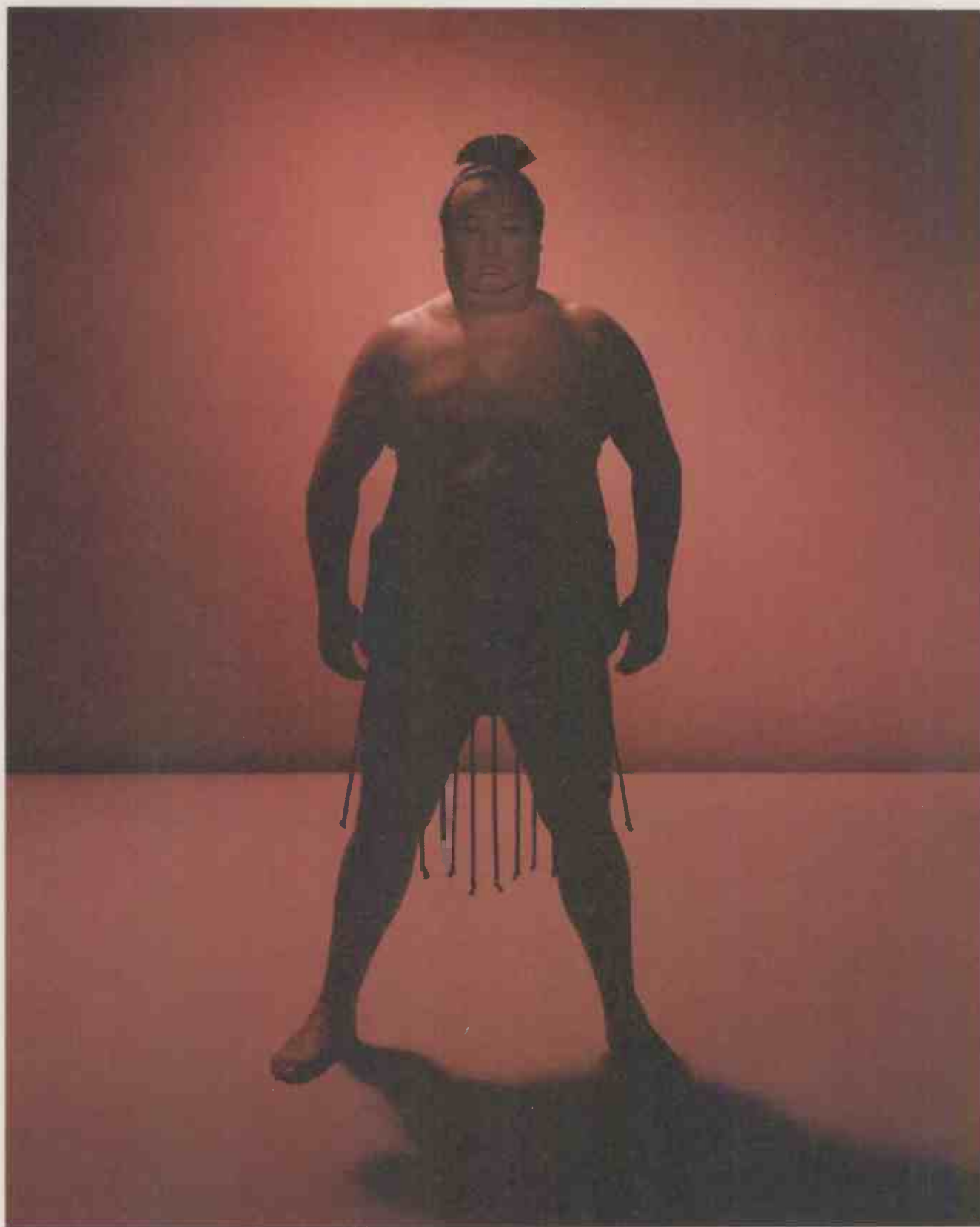


PCW Details

SQL Windows
 Price: £695 Desktop, £3495 Corporate
 Contact: Gupta 01628 478333

Good Points: Full range of tools, useful outline view.
Bad Points: Steep learning curve, proprietary language.
Conclusion: A versatile client-server tool.

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PCW Details

AM for Windows and OS/2
 Price £195 AM Builder; £3,500 AM Enterprise
 Contact Intelligent Environments 01932 772266
Good Points OS/2 and Windows versions.
Bad Points Limited, proprietary language.
Conclusion Good for mixed OS/2 and Windows environments.

wizards assist development. Data access is with native drivers or ODBC. Where AM's HyperLogic language is insufficient or too slow, functions can be written in C and made available to AM through AMX component libraries.

The AM approach combines plenty of hand-holding with a sound structure and good database integration. There is no support yet for OLE automation or OCX components. The main difficulty faced by AM is in persuading developers to learn a new, non-standard language (HyperLogic), and to be willing to turn to C to plug any gaps they find. AM is not object oriented, a disadvantage for those who are coming to expect object technology. It is also interpreted rather than compiled, so performance will not match Borland's Delphi. In some respects AM is reminiscent of TopSpeed's Clarion,

with its own language and some excellent ideas, but likely to remain a niche product.

Visual FoxPro

It is hard to imagine a more procedural language than the old xBase, as seen in dBase III, for example. All that has changed, with the two leading xBase vendors, Borland and Microsoft, both releasing visual, object-oriented versions of their products.

Microsoft's Visual FoxPro does lots of things right. Once a poor cousin to Visual Basic as an interface builder, the new version is in many ways superior. There is OCX support, a visual class builder, and a comprehensive range of built-in classes. The xBase file format has been smartened up, to include engine-level referential integrity, triggers, and tying DBF tables into a proper database structure. In addition, migration to client-

Can this really be xBase? Microsoft's Visual FoxPro lets you set referential integrity rules at table level. It also has full object orientation and a superb range of visual tools. The price is very heavy system requirements

PCW Details

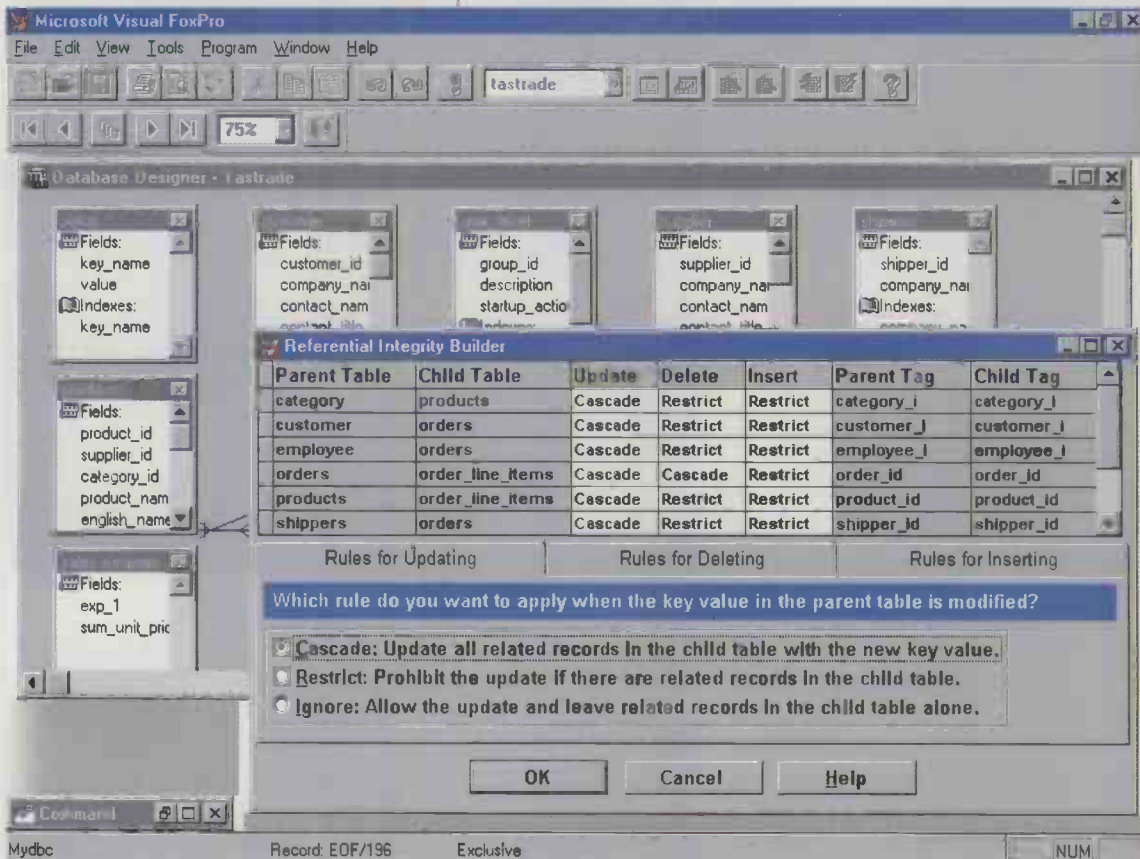
Visual FoxPro
 Price £159 standard, £349 professional
 Contact Microsoft 01734 270001
Good Points OO, fast database engine, improved DBFs.
Bad Points System requirements, bloated language.
Conclusion Great if your hardware can cope.

server using a Visual FoxPro front-end is made feasible with a range of connection tools using ODBC. Finally, and unlike Visual Basic 4.0, FoxPro has a properly object-oriented language featuring encapsulation and inheritance.

Where Visual FoxPro comes unstuck is in its heavy system requirements, or put another way, its poor performance on typical PC systems. The database engine is nearly as fast as before, but the interface is sluggish unless a Pentium with 12Mb or more is available. Another snag is that years of adding new features and language components, while taking none away, have made the package unwieldy and intimidating for newcomers.

Visual dBase 5.5

Borland's visual version of xBase addresses the same problems as Microsoft's effort, but solves them by a





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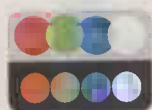
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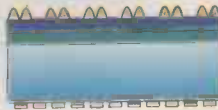


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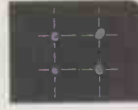
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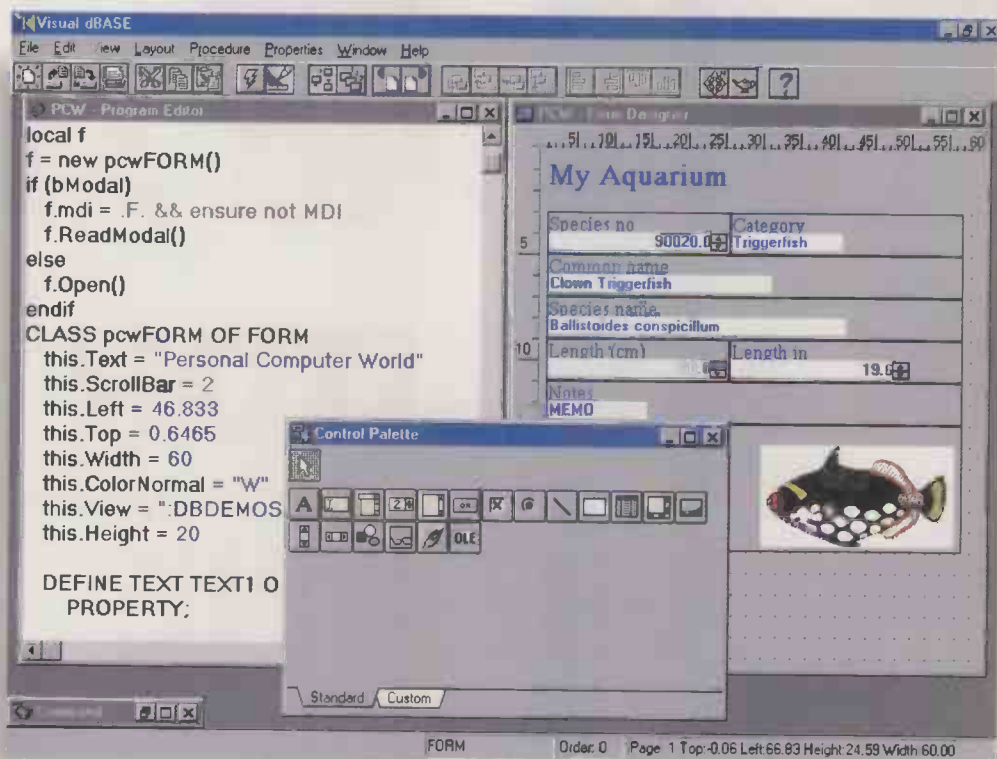
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With Visual dBase, Borland has at last delivered an excellent xBase Windows product. While probably too late to make a great impact, there are some great features like the "two-way tools" illustrated here. You can switch between editing the code which defines the form (left), or doing visual development (right), giving the developer the best of both worlds

different route. After an unsatisfactory first attempt with version 5.0, Borland have evolved Visual dBase into a highly capable product. The database engine is the same as that used in Paradox and

Delphi, which means that dBase developers can if they wish use the superior Paradox table format, or connect to server databases via IDAPI drivers or ODBC. There is good object-orientation

including visual classes, and impressive "two-way tools" that let you switch between writing code and developing visually. The interface is snappier than that found in FoxPro, and the product performs well in 8Mb.

Visual dBase does have weaknesses. It is less comfortable than FoxPro with very large databases, although arguably these should be handled by a SQL server engine in any case. The report writer is merely a bundled Crystal Reports. It is a 16-bit product with VBX but not OCX support. But the main problem with Visual dBase is not the product itself, but its history. Many xBase developers have deserted to FoxPro, Access or other products, and newcomers see it as a language for legacy systems. There is also tough competition from Borland's own Delphi, which uses the same engine but with a faster, more flexible language.

Getting at data

A high proportion of software development is either database software, or needs to connect to a database as some part of its functionality. As a result, all visual development tools offer some database support, some have complete database engines built in, and others exist solely to build workstation applications for client-server systems. Many traditional distinctions have become blurred as PCs have become more powerful and more often networked. For example, desktop favourites like Paradox, dBase and FoxPro can function as client-server front-ends, while server databases like Oracle, Interbase and Watcom SQL can be used as PC desktop databases. A lot of tools now support ODBC, the Microsoft-sponsored standard for database connectivity, and despite much groaning about inconsistent standards, poor drivers and version control problems, its use seems to be growing. A properly set-up ODBC installation can perform very well; but there are plenty of pitfalls. Whatever method is chosen, the golden rule is to be sure that satisfactory performance is possible on the intended target system before adopting a specific solution.

This is particularly important when evaluating vendor's performance claims. For example, Borland's Delphi and TopSpeed's Clarion compile to native machine code and therefore execute your code faster than alternatives. That does not mean that database searching and updating is necessarily faster, as that depends on the performance of the network and of whatever database drivers and engine are being used. Since database drivers and engines are invariably compiled to machine code, these should perform equally well with a compiled language like Delphi, or an interpreted language like Visual Basic. Another factor is that under Windows any application spends much of its time calling the Windows API, and these functions execute at the same speed irrespective of which application calls them. In most (but not all) applications, wresting good performance from the back-end database is more important than the execution speed of the client front-end.

PCW Details

Visual dBase 5.5

Price £169

Contact Borland 01734 320022

Good Points Two-way tools; works in 8Mb.

Bad Points Crystal Reports; slower than Delphi.

Conclusion The best dBase yet.

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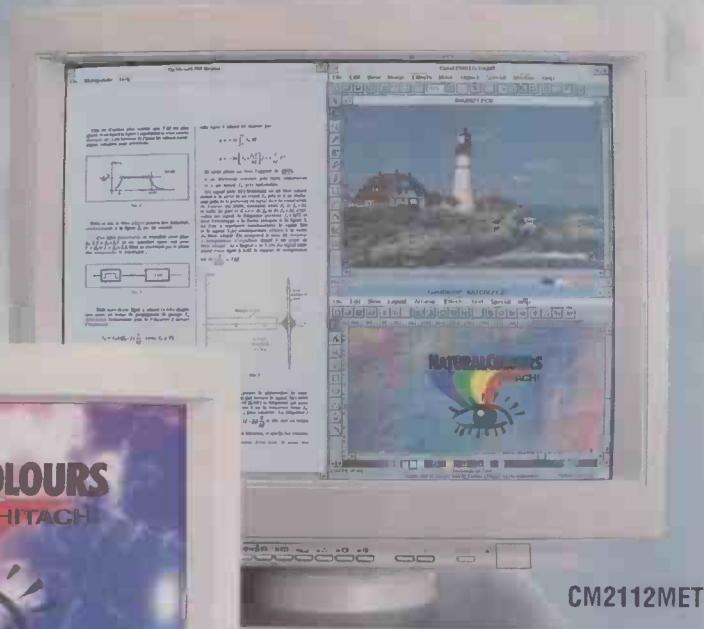
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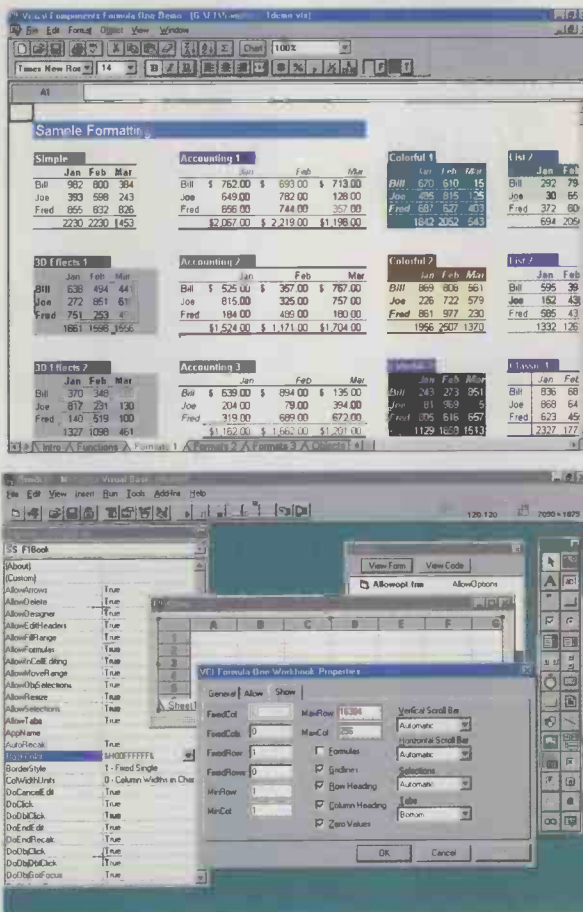
Visual Components

Until recently, visual component meant VBX, and there is a huge number available. Since the launch of Visual Basic 4.0 in September 1995, the VBX has given way to the OLE control, OCX standard. But OCXs are of limited use under 16-bit Windows. Some applications, such as Microsoft Access 2.0, do support the 16-bit OCX, but Visual Basic 3.0 does not, thereby greatly reducing the market. Many Windows users have not yet upgraded to Windows 95 or NT, and many VB users are (justifiably) staying with VB 3.0 for 16-bit development. Realistically, VBX remains the standard for the Windows 3.1 installed base, with OCX the 32-bit format. Both categories are well supplied, with hundreds of add-ons available. Here, we look at a key example, along with comments from component vendors themselves about how they see the future.

Formula One

Ever since Visual Basic 3.0 was released with a feeble bundled grid control, the add-on market has been bursting with replacements. Of these, Formula One is currently the best. The newest version 3.0 release is OCX-only, but does come in both 16- and 32-bit versions. One of its most important features is support for the Excel 5.0 file format, making it more or less compatible with Excel 7.0 as well. Not all Excel's features are supported: charts, VBA modules and function arrays, for example, are ignored by Formula One. Care is needed, since if your application reads an Excel file, changes it and writes it back, any unsupported elements in that sheet are lost for good. But partial compatibility is better than nothing.

Using Formula One is a matter of installing it into your application and then setting its properties. In most environments, right-click on the control to display its property sheet. This also gives you access to a workbook designer, essentially a mini spreadsheet application that allows you to create and design worksheets.



*Top Formula One does a very passable impression of Excel
Above Right-click an OCX control,
and it displays a property sheet
through which it can be customised*

Formula One has a particularly strong range of formatting options. Its real power lies in 130 built-in functions, which your application can use to analyse data.

One feature of Formula One will lose as many friends as it gains. It will no longer connect to a Visual Basic data control, and instead connects directly to any ODBC source. Visual Components have their eye on the broader range of OCX containers, and have chosen to adopt this more universal solution to data access. But VB developers will miss the ease of use offered by quick connection to a data control. It also means that distributed applications will need a correctly configured data source, a process notorious for its many pitfalls.

Formula 1 costs £195, from Visual Components Europe on 01892 834343

Component vendors speak

Tim O'Pry is President of MicroHelp Inc, a leading creator of add-on components. "The VBX design never was open. It was solely for Visual Basic, and Microsoft were surprised by its growth. Although other vendors started supporting it, Borland for example, the market was always 90% VB. Developers in other languages did not embrace it — its performance wasn't good enough.

"OCX, on the other hand, is pretty good. It does carry a lot of baggage, and OLE on a 16-bit operating system is not practical. It runs better on Windows 95. With NT on a Pentium OLE begins to make real sense. My opinion is that it will be two or three years yet before it really catches on. Until then, the VBX is not dead, and those still writing for 16-bit will continue to use it."

Tim has mixed feelings about Visual Basic 4.0. "They've got to get rid of all the overhead. Executables need a minimum of 1Mb in runtime add-ons. I would

like to see a native code compiler — there's no technical reason why not." Even so, he doesn't see VB losing out to rivals. "Delphi is interesting and neat, but I don't see it supplanting C++ or VB." Microhelp will not therefore be producing Delphi VCLs. What about SOM and OpenDoc? "OpenDoc is very interesting. But it doesn't have the staying power, because the people behind it can't make it stick. Novell is backing away from OpenDoc. I don't think it has much of a chance. Distributed OLE is the wave of the future, but it will take a while yet."

David Whitehead runs Contemporary Software, part of Intersolv and a leading component distributor in the UK. He agrees that the OCX market has been slow to get going. "A number of people haven't the hardware to use OCX, but are unwilling to user VBX controls. And the OCX standard changed a few times right up to the release of VB 4.0." Despite the popularity of Delphi, David does not see much market for VCL components. "Crystal have built a VCL control, but others are hoping that Delphi will follow the OCX standard. Borland will have to go to OCX."

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Case Studies: Real-world Visual Development

Delphi Rules

Mark Smith is a contractor and independent consultant. "Compared with Visual Basic 3.0, I find I can deliver Delphi applications in about 60% of the time. The environment and toolset is richer and more reliable. The components that one gets to use within Delphi generally offer more features, and work better than in Visual Basic. And a Visual Basic application gets slower and slower as you add bound controls. With Delphi, this doesn't happen. The controls don't have the same overhead. I've used C++ as well but Delphi is a great deal easier to program. As for Visual Basic 4.0, I'll have a look at the Enterprise edition. But the next version of Delphi offers more, with enhanced 32-bit capability."

Mark also likes the Borland Database Engine. "I'm happy with it. Access people say it doesn't offer updatable queries. But you can have a query running, and bind a table to it, to give the same results. And it is fast." Mark's main frustration is with Delphi forms. "I would like to be able to wrap up forms as components. For example, a generic database form that other order entry forms could inherit from. At the moment you can't do proper subclassing with forms."

Visual Basic

Nick Marsh leads the development team at NBI Information Management Services, creating software for document management and workflow systems. "We're writing client-server front-ends, with various servers including Oracle, SQL Server and Ingres. Visual Basic is a good all-round tool, extensible through VBX controls. It is widely accepted by our clients, and it's easy for us to recruit staff. We do write some code in Visual C++. But we need rapid application development, and for that C++ takes too long and requires a greater skill level."

Nick's main problems are with the links to server databases. "In order to get performance, we've had to use the SQL passthrough option which to some extent negates the advantage of ODBC, in that your SQL has to be different for each back-end database. There are also limitations on using the data control, so you lose out on some of the benefits. In this respect VB doesn't compare so well with development environments where access to the back-end

User's Guide



**Borland
Delphi
for Windows**

database is more tightly integrated, like Gupta's SQL Windows or Oracle's Power Objects.

"We looked briefly at Delphi and loved the development environment. I'm not sure about the database engine. Also, we've got an investment in Visual Basic code and tools, and it would be hard to make a jump to another language and environment. It may not be the best in every way but you can achieve good results."

Combining Visual Basic and C++

Brian Syme is a software engineer at Conic Systems, producing geographical information systems (GIS) software for the Ordnance Survey and local authorities. "The front-end is Visual Basic, but the GIS engine is in Visual C++. It's a 5Mb VBX! I like the separation between VB which keeps it simple, and hiding the complex stuff in a VBX written in Visual C++." Given this separation, Brian is happy with VB's performance. "A Visual Basic compiler would be a complete and utter waste of time. If you want that kind of performance, use Visual C++."

"We use OLE heavily. OLE automation is how we talk to our code engine. You can't give a VBX 500 properties, so instead we create an OLE object which you can control

from VB. We had to roll our own interface classes. Now that we have OCX controls, it's all a bit out of date. But we don't plan to support OCX yet, maybe in six months."

Given OLE's mixed reputation, is performance a problem? "Excel on an 8Mb PC is always going to be slow; but there are other snags that are not so obvious. For example, the OLE compound file that is provided by default in the OLE DLLs is very slow. So we've created our own file format. In fact, Microsoft themselves have fudged it in Word 6.0 for the same reason."

"I like Visual C++ but in other ways I tolerate it. I started with Microsoft C7 and wasn't much impressed. Borland C++ was much better. But it was MFC that I liked, much better than the Borland library. We tried the Watcom compiler but found a significant advantage in Visual C++. There are problems, for instance with the standard libraries. The memory allocator is hilariously slow. But

Microsoft produces a release of VC++ every three months, and the other vendors can't keep up. It's not that they're anti-competitive, they're just competitive."

Visual C++

Gary Pearson is Development Manager for Tele-Connect Systems, producing a scriptable Windows toolkit for the tele-marketing industry. He uses Visual C++ exclusively. "First, it's the nature of the telephony industry. You have lots of C-level APIs. Second, MFC is the market leader in windowing class libraries. We did evaluate others, Zinc for example. We found that because they deal with several different platforms they implement a lowest common denominator approach. MFC is a thin layer over the Windows API. It's very easy for us to extend it. Others, like Borland's OWL, constrain you into their view of the universe."

"We view OLE 2.0 as key to Microsoft's future. It has pains from a development point of view, with the COM model yet another flavour of the OO paradigm. But once the architecture is in place, it does pay dividends." Gary doesn't think SOM is likely to take off. "We're driven by customer demands, and they tell us it must be Microsoft and OLE." Would he consider Delphi? "There are a glut of C++ programmers in the world, and not many Pascal. And C++ is still the best of the breed."

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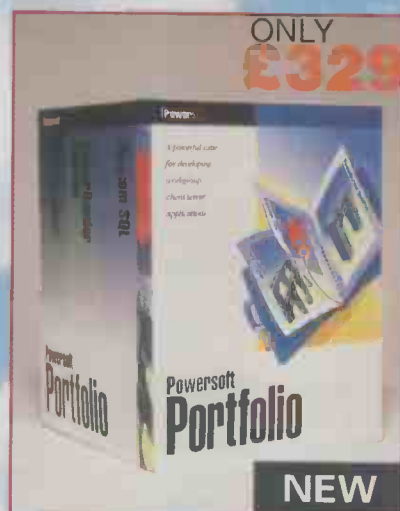


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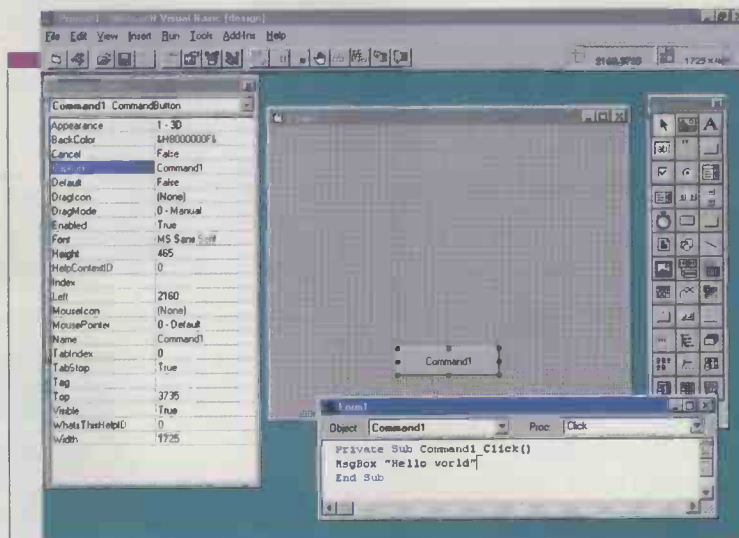
Visual Basic 4.0

Visual Basic is a modern classic. This is the language that brought Windows programming within reach of mortals. This is the tool that created a new market in add-on components. VB is the product that even IBM seems to see as an industry standard, to the point where it is implementing its own equivalent. So Visual Basic has a glorious past; but what of the future? A few months on from the release of Visual Basic 4.0, and amid intense competition, it is not yet clear whether it will maintain its position.

Microsoft has released VB in three separate versions. The Standard is aimed at hobbyists, the Professional for general development, and the Enterprise for implementing client-server databases. The language interpreter is Visual Basic for Applications, the common macro language also found in Excel 5.0 and above, Access 7.0 and Microsoft Project. In due course it will migrate to Word as well. VBA is an excellent general-purpose language, although not fully object-orientated. Version 4.0 does allow you to create class modules that give the benefits of encapsulation, but not inheritance. A common complaint among power users is over the lack of pointers or callback functions; others argue that such would endanger VB's ease of use.

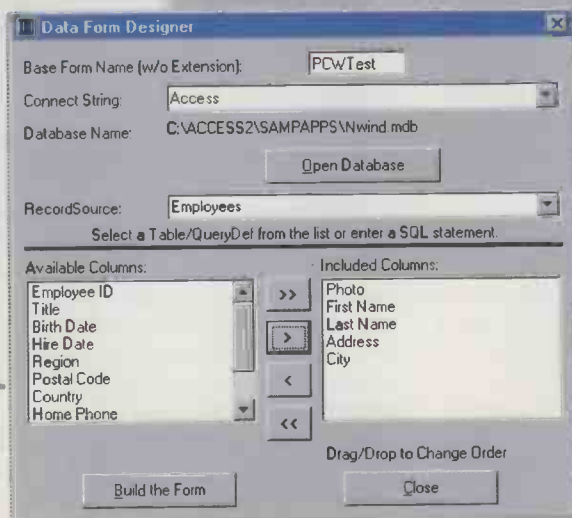
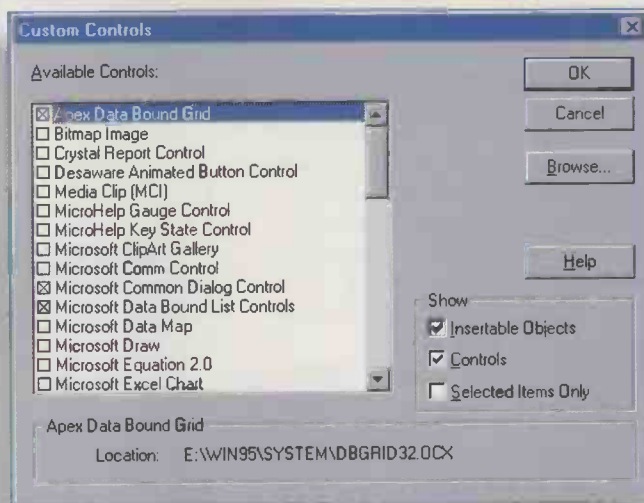
All the standalone VB packages come bundled with the Jet database engine, the same as that used by Access. The professional version comes with additional custom controls and full programmatic database control. Version 4.0 has greatly improved these database features, which are equal to those in Access itself including administration of security, users and groups. Enterprise adds a remote data control for faster access to database servers, and the Visual SourceSafe team development manager. Note that the entry-level Standard version only works on Windows 95 or NT, so to obtain 16-bit Visual Basic 4.0 you need the Professional or Enterprise edition.

The essence of Visual Basic is its simplicity. Drag controls from the toolbox onto a form; set properties; write custom code in Basic; then click run. To distribute an application, it can be compiled into an .EXE file, usually of modest size. The target PC will also need one or more runtime libraries, along with any needed



First steps in Visual Basic

In Visual Basic, any OLE insertable object can be used as a custom control



One route to fast application development with VB is to use the data form designer, an add-in which creates database applications

OLE controls, and there is a setup wizard that automates the creation of installation disks. It sounds delightful; but what if your application is complex? The answer is that Visual Basic is highly extensible. You can call functions in any Windows

dynamic link library, including the Windows API itself. You can use OLE automation to draw on the resources of other applications, although this may not be suitable for applications that need to be distributed. Finally, you can include

OCX components (or VBX in the 16-bit version), add-ons which are generally written in C++ and which fit seamlessly into the Visual Basic programming environment.

Does VB enable code re-use? It sort-of does. Class modules can be designed for re-use. Another option, in the Professional or Enterprise editions, is to compile VB code into an OLE server DLL, where it can be used not only by VB but by any OLE client application. Finally, OLE Controls are a great example of code re-use, and Visual Basic is their prime container even though it cannot create them. Therefore, careful use of Visual Basic alongside other tools can enable you to re-use code. But the counter argument is that VB makes it easy to write sloppy code that is hardly maintainable, let alone re-usable. In the end, it is skilled programming that makes the difference.

VB's split personality

It seems that Visual Basic has three distinct roles. The first is for instant *ad-hoc* applications, a role it fulfils admirably. With the right custom controls and a smattering of Basic knowledge, handy utilities can come together very quickly. All the same, one has a nagging suspicion that Visual Basic 3.0 was just as good for this, with the added convenience of running on just about any PC that runs Windows. VB 4.0 is much more demanding, especially when OCX controls or data access objects are used.

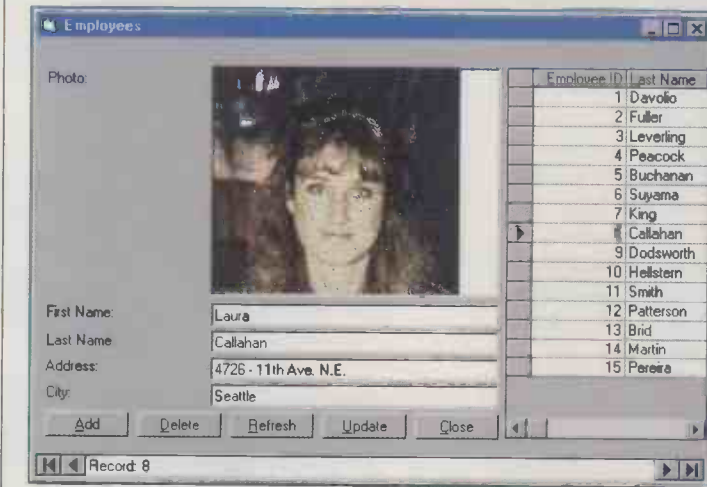
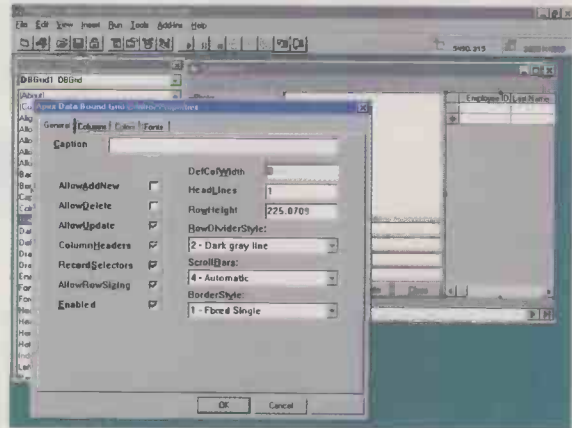
Second, Visual Basic is the macro language of Windows. Here it excels, particularly as more applications emerge with OLE automation support. With VB you can surf Windows, getting data from one application, processing it in another, and sending it to yet another for printing or presentation. The new OLE server capabilities open up still more possibilities, letting you create applications which any client program can easily access. Again, the only worry here is the heavy system demands of this kind of programming. If that is not an issue for you, VB is great.

Third, you can use Visual Basic for serious application development, especially database work. Although it lacks the database-specific language of, say, xBase or PowerBuilder, VB's general-purpose nature brings better flexibility. JET is a good database engine, which, combined with ODBC and the remote data control in the Enterprise version, makes VB a real contender for this kind of work. But if a company is



Above Hmmm. VB has done a fair job, but the photo doesn't seem quite right

Right Back in VB, it only takes a moment to resize the bound OLE control containing the photo field



Left The revised application runs fine, and so far not a line of code has been written. Examples like this make a good demonstration, but real-world database apps are not so easy

investing the professional skills of a programming team in a major project, why use a semi-OO interpreted Basic which will run out of steam when asked to do intensive processing? All too often, large VB projects turn out to be performance slugs since the language is being pressed beyond its natural capability. Microsoft's answer is to use Visual Basic alongside other code written in C or C++, and some do like to work that way. The obvious counter is that if you need to use C++ at all, why not go the whole way and use it exclusively?

The arguments will run and run. Visual Basic is still a good package, but for

many projects no longer the obvious choice.

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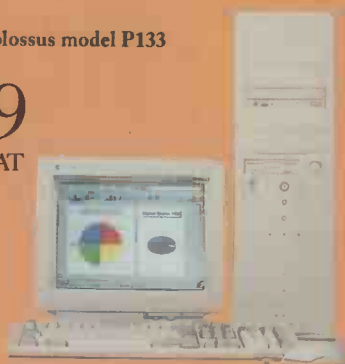
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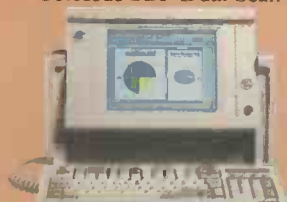
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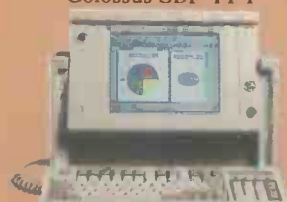
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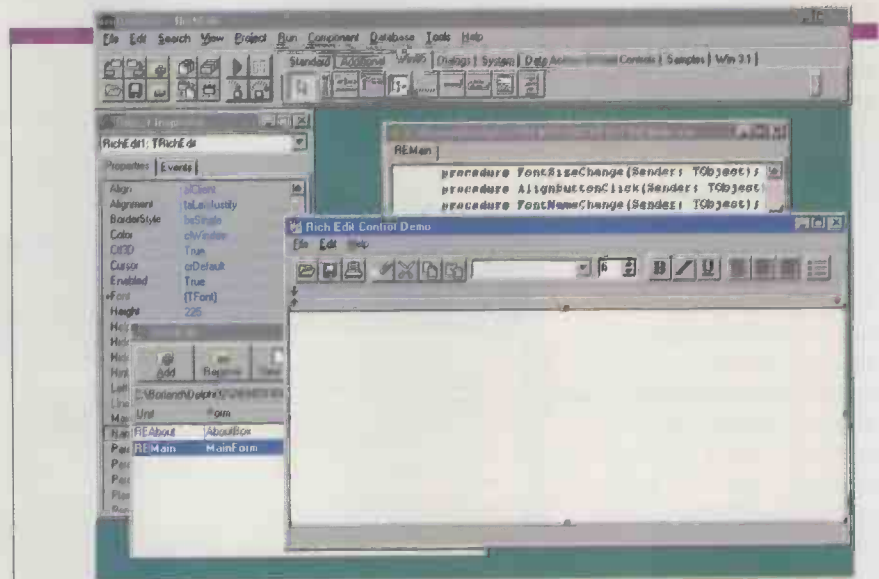
Delphi 2.0

Delphi is a visual programming tool which falls between Visual Basic and the C++ products. A highly innovative product, Delphi combines an Object Pascal compiler with a class library and an integrated development environment including a form designer. A 16-bit version of Delphi has been available for some time, but for this test we used a beta version of the new 32-bit Delphi. Although this adds useful features, it is not radically different in use or in appearance.

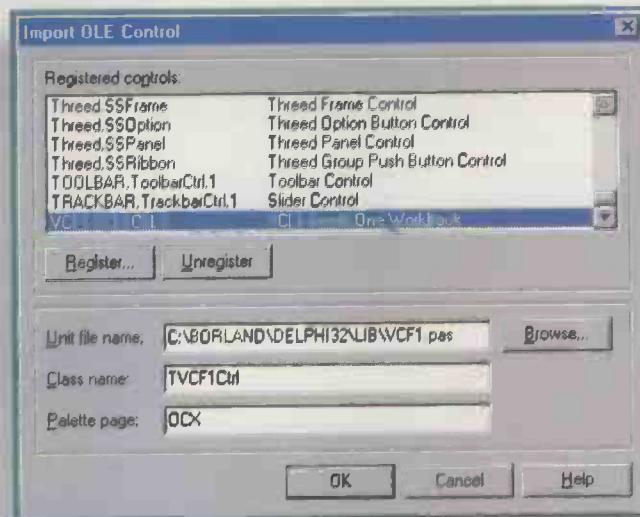
Delphi does visual development through an interface superficially similar to Visual Basic. Components are dropped on forms from a palette, their properties set from a property window, and the application tested by clicking a run button. But internally Delphi works in a different way. There is a direct link between the Object Pascal class library and the components you place on forms, and as you build the interface, Delphi generates object-oriented code. You can seamlessly switch between visual and textual editing, making for quick development. When you run the project, Delphi does not use any runtime interpreter but simply compiles and executes the application. Borland's compiler is much faster than most others, so not too much development time is spent waiting for it to finish.

The language of Delphi is Object Pascal, based on standard Pascal but so much extended and developed by Borland that it is effectively proprietary. Delphi applications are not easily ported to other environments. But Object Pascal is genuinely full-featured, at the low level of pointers and memory allocation as well as the higher level functions more common in rapid application development. It also compiles to native code, bringing lots of performance advantages. The new version of Delphi has eased a source of irritation, by creating a new Pascal string type of unlimited length. This is compatible with the old-style string type, but can also be freely typecast to C-style strings. Borland has also introduced a variant type primarily for use with OLE.

The real benefits of Delphi come over the long term. Because Delphi is written in itself, it is totally open and extensible. You can create your own components, install them on the component palette, and use them in the same way as those

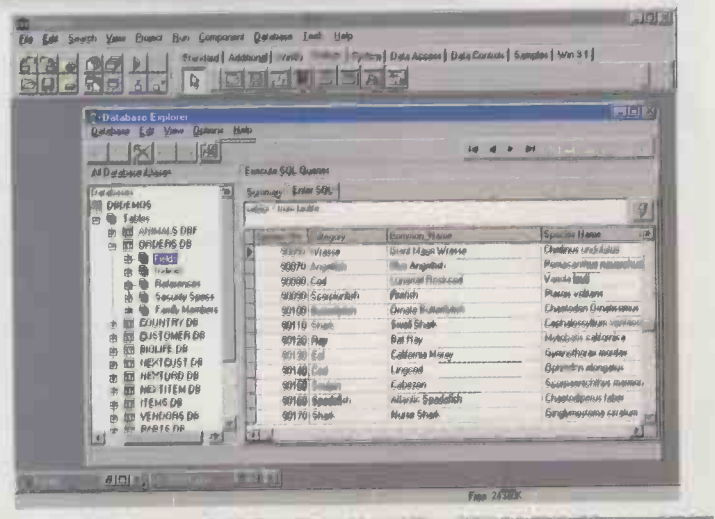


Above The main elements of Delphi are shown here: object inspector, code editor, form designer, project manager, toolbars and menus



Left From this dialogue you can import OCX controls into Delphi

Right The new database explorer lets you browse through available databases, both local and server



originally supplied. These can be modified versions of standard components. Another advantage is that Delphi structures code into units. These

are code modules with a public interface section, for the variables and functions that are available to your application, and a private implementation section to

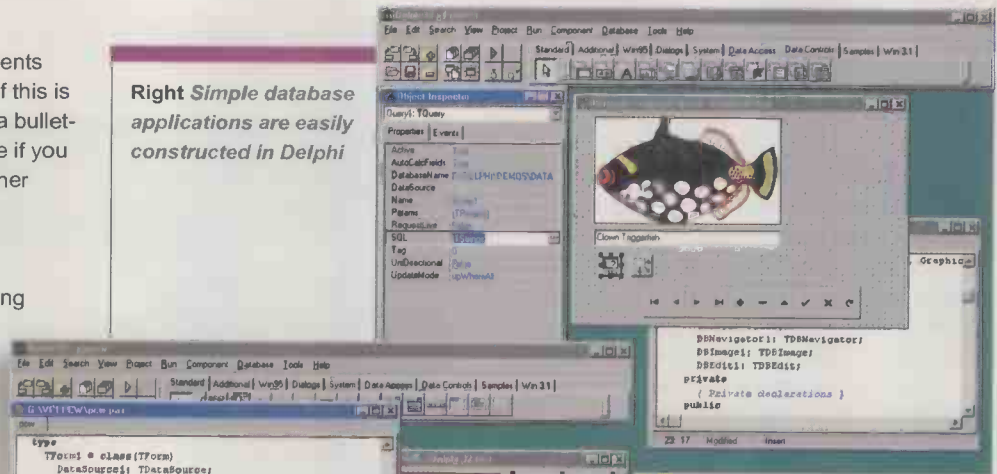
contain code that actually implements those functions. The advantage of this is that it encapsulates your code in a bullet-proof wrapper, especially valuable if you want to use the unit again in another project.

Delphi comes with the Borland Database Engine, and Borland emphasises its potential for creating client-server front-ends. The client-server version comes with drivers for a variety of databases along with a local version of Borland's own Interbase server, now a 32-bit product. The ReportSmith report engine is bundled into the package to make it a complete database solution. In assessing Delphi, it is important to separate these elements. For example, ReportSmith is no better than the widely-used alternative, Crystal Reports. The database engine gives good performance, but it is a large runtime .DLL in the same way as Microsoft's JET engine. In other words, Delphi's language and compiler are ahead of the pack, but its database and reporting elements are more directly comparable to the competition.

Categorising Delphi

Delphi's quality has gained it an instant and enthusiastic following, and the 32-bit version brings it up to date with Windows 95, NT, and OLE. It's a natural choice for those who find Visual Basic too slow or restrictive, but are not ready for the rigours of C++. That said, it's not as easy for beginners as Visual Basic, nor is it as sophisticated and complete as the heavyweight C++ products. For database

Right Simple database applications are easily constructed in Delphi



```

type
  TForm1 = class(TForm)
  DataSource: TDataSource;
  Query1: TQuery;
  DBNavigator1: TDBNavigator;
  DBImage1: TDBImage;
  DBEdit1: TDBEdit;
  Button1: TButton;
  procedure Button1Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;

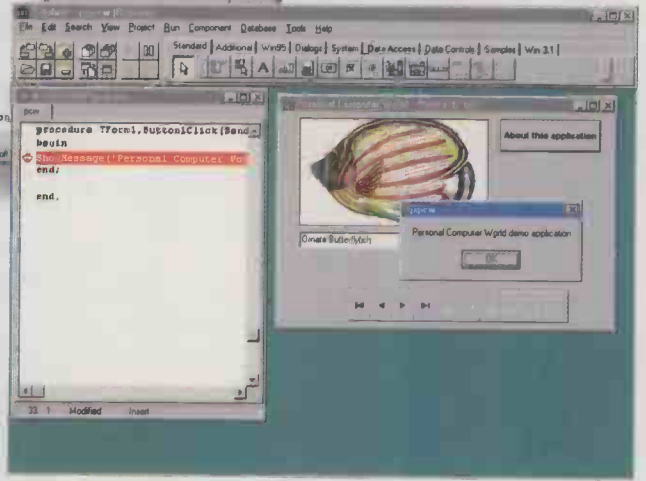
var
  Form1: TForm1;

implementation

{$R *.DPR}

procedure TForm1.Button1Click(Sender: TObject);
begin
  ShowMessage('Personal Computer World demo application');
end;
    
```

Right Delphi's Run button compiles and executes the application



Left Delphi generates code on the fly. Here, a button has been added to the form and double-clicked to open its default event procedure

solutions the new version looks substantially improved, but you should check that the Borland Database Engine will do what you require before adopting a Delphi solution.

A problem is that native Delphi

components, written with the Visual Class Library, are only useful within Delphi, unlike OCX components that are potentially universal. For this reason, third-party support for Delphi components is not extensive. Delphi can use OLE controls, but at the time of writing it is not clear whether Borland will implement an easy way of creating them. Delphi is

already a successful niche product, just as Clipper used to be among DOS database developers, but must integrate fully with OLE and other Windows features to achieve widespread adoption. Another snag is that Delphi is Windows-only, offering no help to those wanting to implement cross-platform applications.

That said, Delphi has unique strengths and is the only rapid application tool that compromises neither performance nor flexibility. It therefore exposes the weaknesses of both higher-level languages like Basic and xBase, and the lower-level C and C++. Delphi is special indeed.

What's new in Delphi 2.0

The beta version of Delphi 2.0 available for this test was not quite feature complete. However, it already implements the following new features:

- 32-bit compiler and database engine. The compiler is now shared with Borland's C++ and creates smaller, faster executables.
- New data types for long strings, wide (unicode-compatible) chars, and variants.
- Support for Windows 95 common controls.
- Include OCX controls in your application.
- Create OLE automation clients and servers.
- Database explorer with interactive SQL.
- Visual form inheritance as with other controls.
- 16-bit projects can be imported and converted to 32-bit.
- Delphi 1.0 and 2.0 can share Pascal and form units, but not project or resource files.
- Multi-error compiler identifies all errors on first compile.

PCW Details

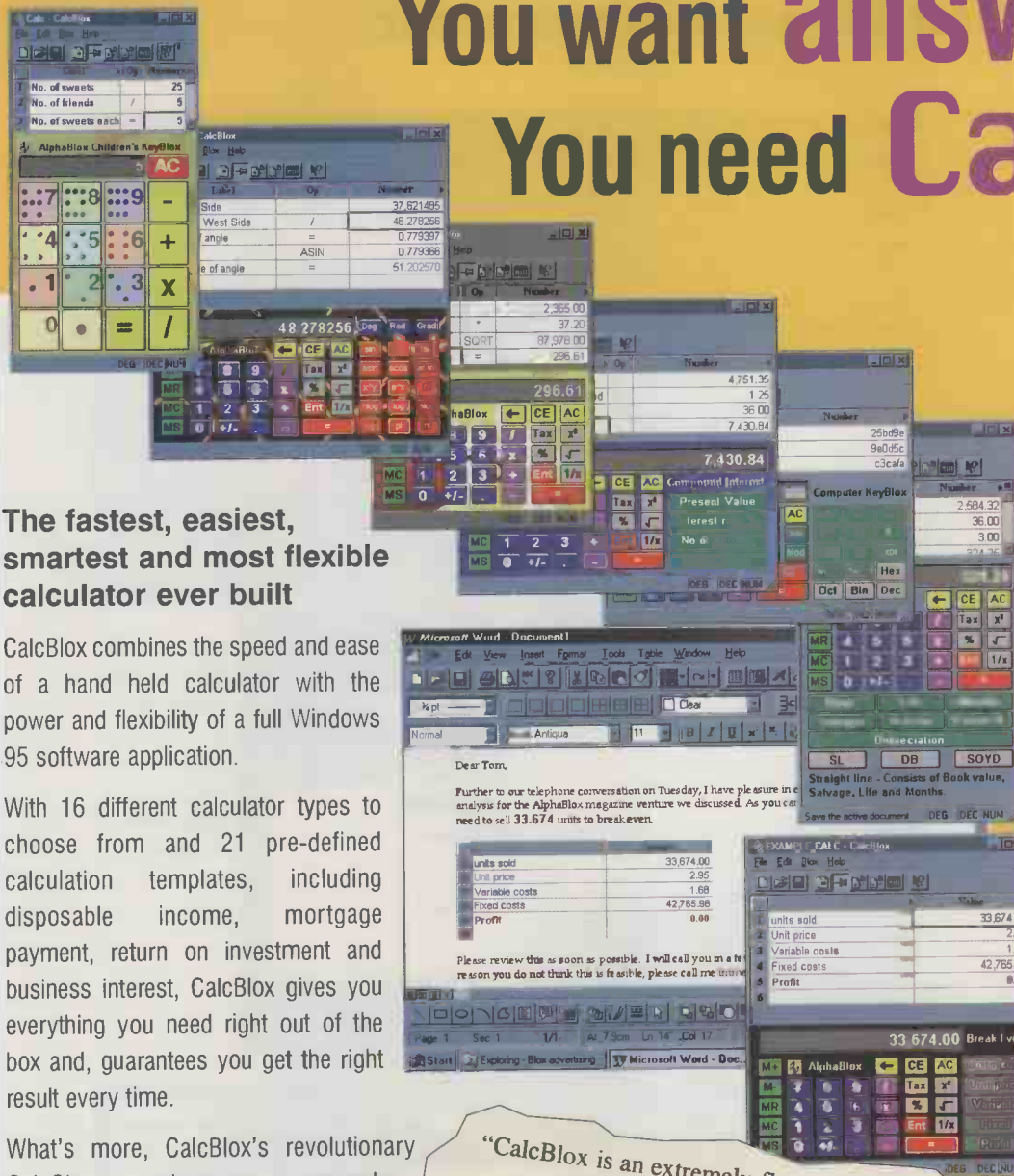
Delphi 2.0
Price Not yet available
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Good Points Fast, slim, OLE support, database connectivity.

Bad Points Pascal can be tiresome.

Conclusion Sets new standards for rapid application development.

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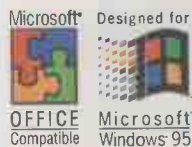


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Watcom C++ and Visual Programmer

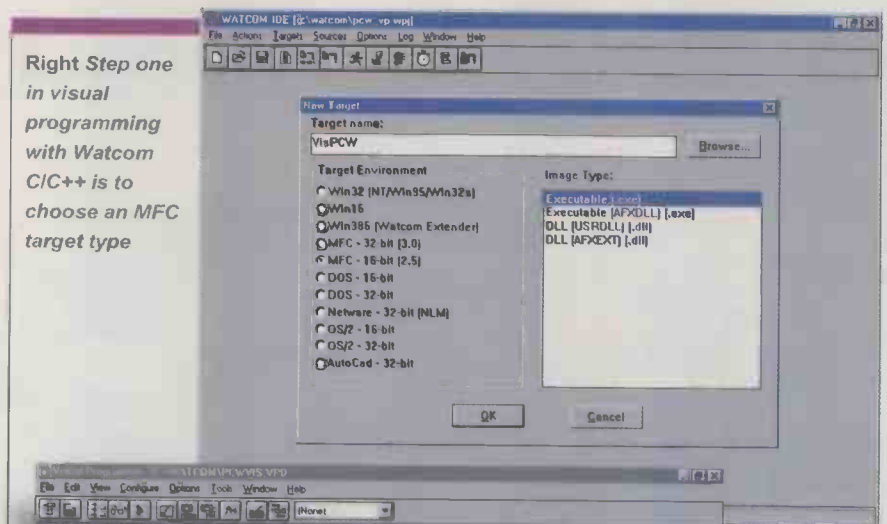
Watcom's compiler technology has always been highly regarded. Originally a Canadian company, Watcom is now part of Powersoft, itself a division of Sybase. The development of Watcom C/C++ has continued, and it is now at version 10.5, with a free upgrade to 10.6 and full Windows 95 compatibility promised to all registered users. In contrast to Microsoft, Watcom's clear focus is on the language and compiler, at the expense of the IDE and tools. Watcom's IDE is crude and hardly integrated at all with its code editor. It is not uncommon for Watcom developers to use their own editor and to compile from the command line. Watcom enthusiasts endure these rigours for the sake of fast executables and very flexible targetting: all varieties of Windows, DOS, OS/2 including Warp, or Novell NLM.

All this is hardly visual programming. But Watcom C/C++ now comes bundled with Blue Sky's Visual Programmer, a cut-down version of the high-end WinMaker Professional. WinMaker Pro costs around £1,200, which makes the Watcom/Visual Programmer bundle good value at about £200. Watcom has licensed MFC from Microsoft, and Visual Programmer generates MFC code, so you have all you need to create Windows executables visually.

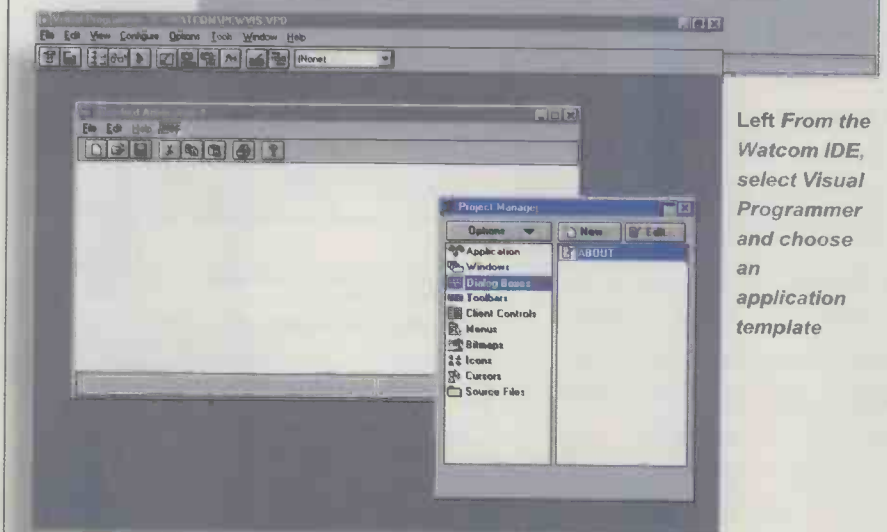
Visual Programmer has some impressive features. One is the Quick Run option, which enables you to test your application without compiling the code. Of course it will only run the parts that are auto-generated, and ignore any user-added code. But this is a great time-saver when creating an interface. Blue Sky has also addressed the problem of maintaining and improving an application after it is first generated. The code generator, called a Switch-it Module, generates its code in base classes and user classes. If you add user code, and then go back into the visual programming environment, the base classes will be updated while the user classes are left unchanged. As long as you are careful not to edit the base classes, it should be possible to continue to use Visual Programmer as your application grows. All the generated code is 16/32-bit portable, simplifying the job of developing for both old and new versions of Windows.

Most Windows development tools have a good dialogue designer, but that

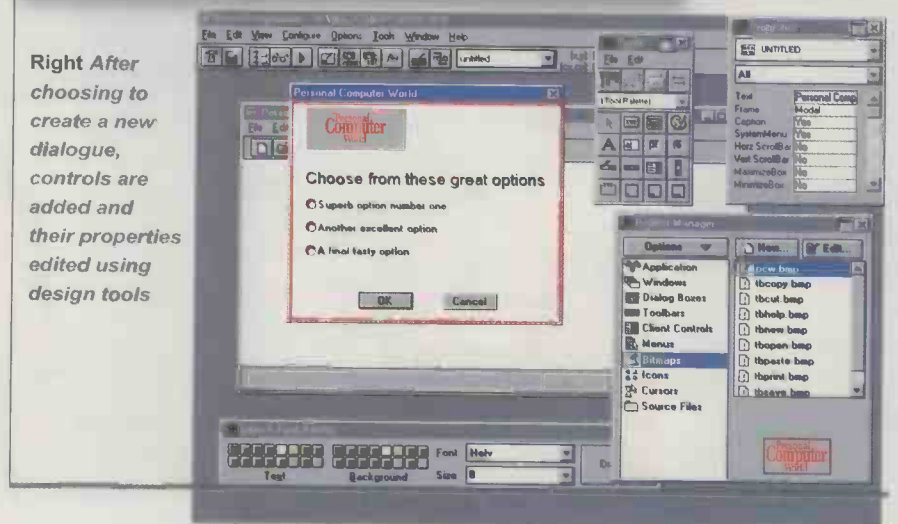
Right Step one in visual programming with Watcom C/C++ is to choose an MFC target type



Left From the Watcom IDE, select Visual Programmer and choose an application template



Right After choosing to create a new dialogue, controls are added and their properties edited using design tools

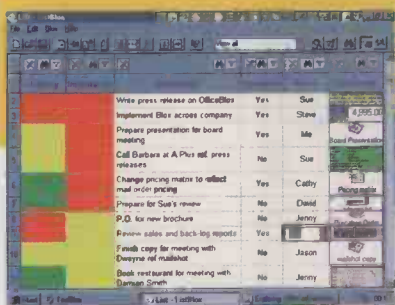


is no help if you decide to draw controls directly in a window's client area. One of the strengths of Visual Basic's form designer is that you can place controls in any kind of window. Visual Programmer finds a compromise solution which comes close to VB's flexibility. When you create a new window, you can choose a "client

area controls" option. A client area control is a borderless dialogue which exactly fills the window's client area, enabling you to place controls anywhere within it. You cannot use client area controls in MDI applications.

Visual Programmer has several additional features to further speed your

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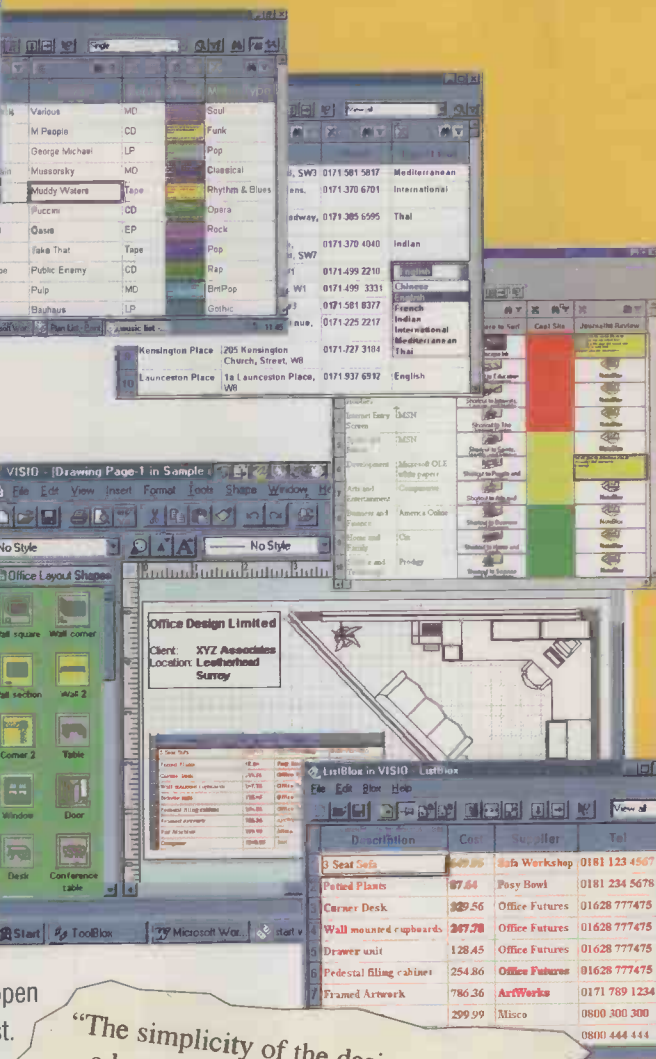


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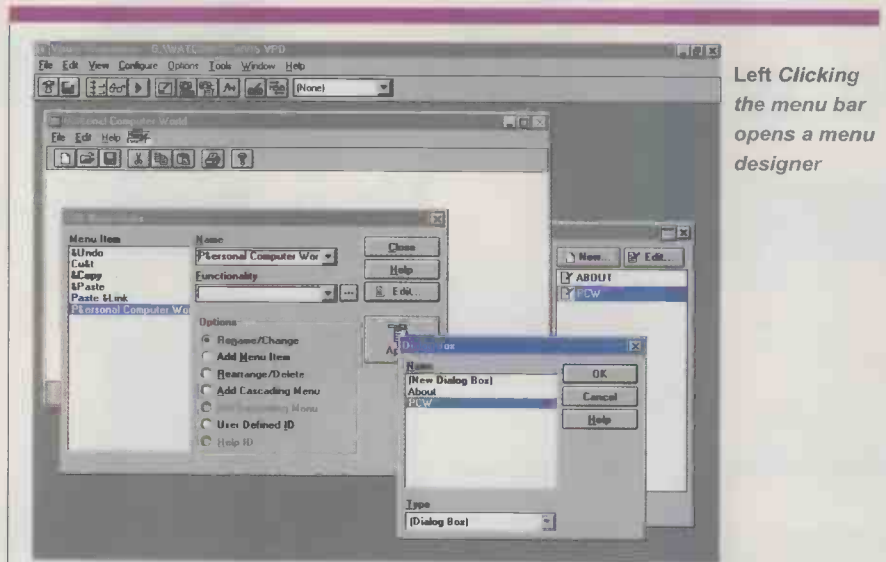
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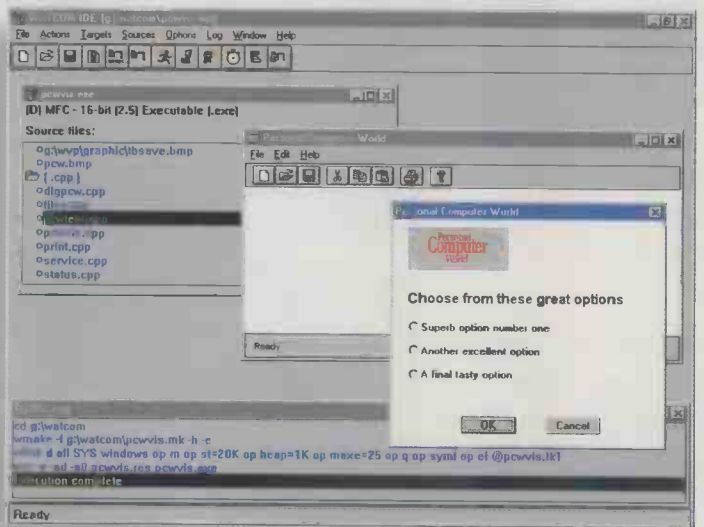
development efforts. One is templates, which can be used at several levels. For example, you can save any application as a template, in which case it can be used as the starting point for further designs. You can also create dialogue box, toolbar and client area control templates. Another possibility is to install Extended Functionality Modules (EFMs). These are extensions to Visual Programmer that generate code for common operations. For example, there are supplied EFMs to handle the Windows common dialogues such as Print and File Open.

There are limitations to Visual Programmer. Some are deliberate, as Blue Sky presumably hopes that some Watcom users will upgrade to the full WinMaker Professional package. WinMaker Pro adds VBX and multimedia support, and generates code not only for MFC but also for Borland's OWL class library and other platforms. Other problems will not be so easily solved. For example, Visual Programmer supports only a basic range of controls, perhaps because of its cross-platform ambitions. If you decided to implement something like a tabbed dialogue box, you would have considerable coding to do, especially with the lack of VBX support in the cut-down version. It is not yet clear whether the 10.6 Watcom release will incorporate the Windows 95 common controls into Visual Programmer or not. To do so would mean replacing MFC 3.0 with MFC 4.0, a major change for a point release. But if not, Watcom can scarcely claim "full support" for Windows 95. And what about OCXs and OLE automation? Another disappointment is that Visual Programmer has no integrated database support, despite the ODBC classes that are part of MFC. That leaves a rather small niche for Visual Programmer, for developers who need an application builder that goes beyond what AppWizard in Visual C++ can do, but who are content with a simple, functional interface. It's frustrating, because there is potential here for something to bridge the gap between Visual Basic's ease of use

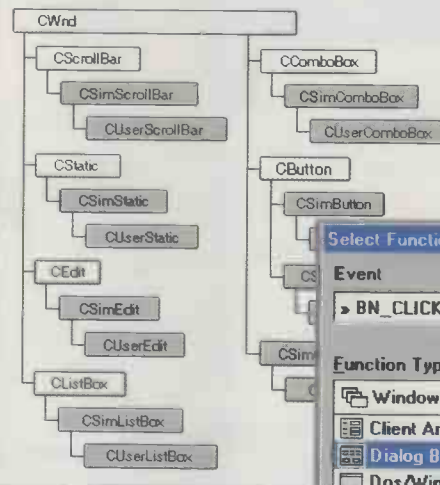


Left Clicking the menu bar opens a menu designer

Right Choosing "Save and Generate Code" in Visual Programmer automatically updates the Watcom project

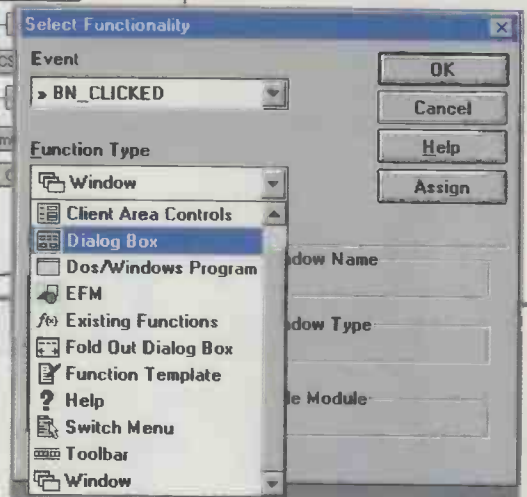


Controls Class Diagram



Left This diagram shows how Visual Programmer achieves separation between generated code and user-defined additions

Below In Visual Programmer, you can automatically add functionality to controls without writing code



and the performance of native compiled code, for those who prefer to code in C++ rather than Delphi's Pascal.

PCW Details

Watcom C++ 10.5
 Price £199
 Contact Powersoft 01494 555555

Good Points Compiles for three platforms; includes Visual Programmer.
Bad Points Crude IDE, Windows features trail Microsoft.
Conclusion Great value but not the best.

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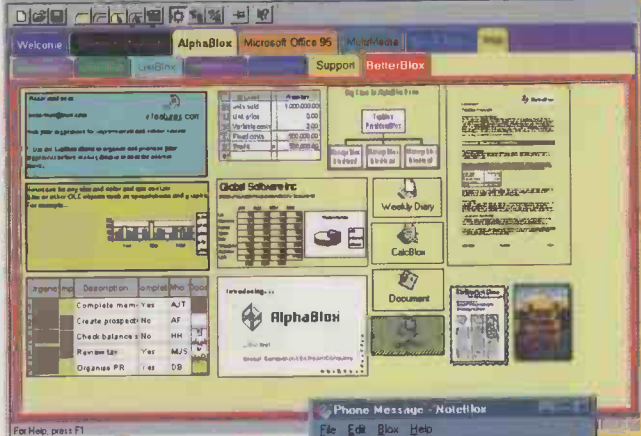
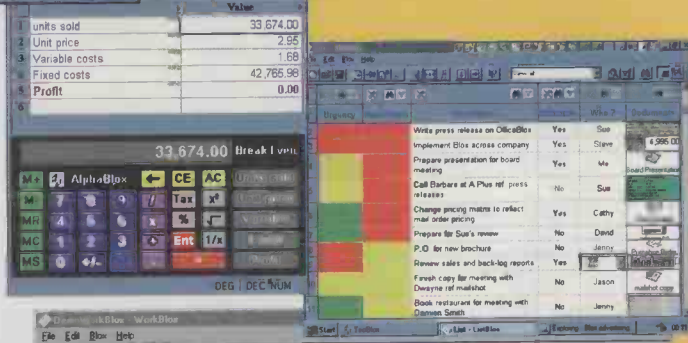
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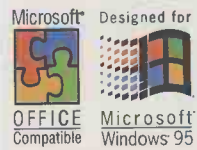
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Visual C++

It's C++ all right, but is it visual? That was the question many asked when the first version of Visual C++ was released. Fortunately for Microsoft, there is no clear definition of what it takes to call a product visual. Even so, Visual Basic coders who thought they should have a dabble with the similarly-titled C++ were in for disappointment. The dialogue editor looks passably like VB's form designer, but that's about where it ends.

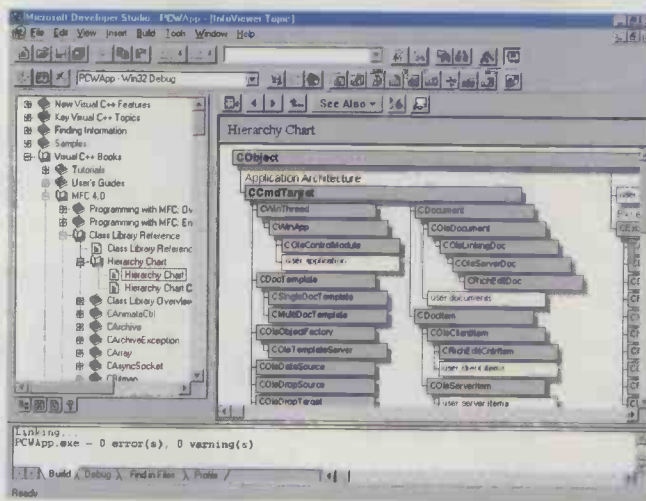
Visual C++ is now in its third major version, called 4.0 to synchronise its number with the Microsoft Foundation Classes (MFC). It is substantially improved from version 1.0, yet many of those same observations still apply. Dialogue editor aside, there is no click-and-drag interface builder as there is in all the other products in this group test. Instead, what distinguishes this product is the use of visual elements to simplify and automate the handling of text-based C++ code.

Here's a brief overview of what you get in Visual C++ 4.0:

- A C++ compiler which is capable although rather slow. Version 4.0 addresses compile speed by adding minimal rebuild and incremental compilation to the existing incremental linking feature. All these attempt to reduce the compilation effort by only redoing what has changed, and in combination they are effective. There are also new language features in this version, including namespaces, run-time type information (RTTI) and support for the Standard Template Library. These changes bring Visual C++ more into line with accepted C++ standards.

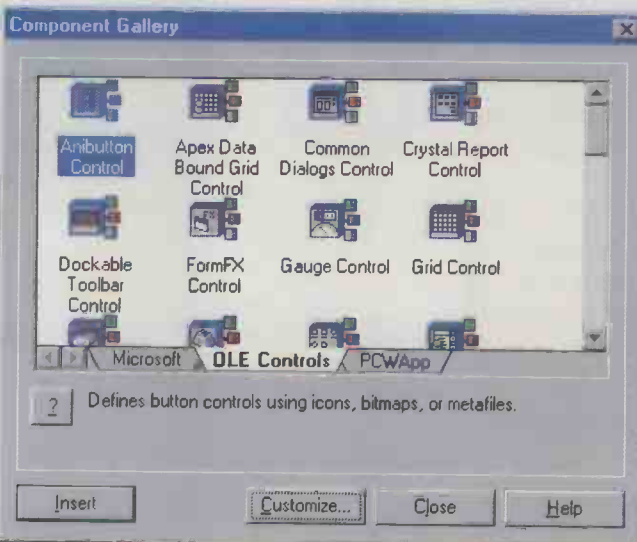
Visual C++ 4.0 compiles only for 32-bit Windows, although this does include the Win 32S extensions to Windows 3.1. It can only be hosted on Windows 95 or NT, and you would be foolish to run with less than 16Mb RAM, or 20Mb for NT.

- The Microsoft Foundation Class Library (MFC). MFC aims to be a thin C++ wrapper over the Windows API, making it efficient although not as elegant as rivals like Borland's Object Windows Library (OWL). MFC is extremely popular, and particularly important when working with OLE in all its guises, which it greatly simplifies. The new versions of MFC and AppWizard make it easy to use OCX controls in your applications, as well as to create new OCXs of your own.
- A new integrated development



Above The Developer Studio splash screen leaves no doubt that this new IDE is intended to handle four separate products

Infoviewer is fully integrated into Developer Studio and allows you to view all the online documentation as well as the Microsoft Developer Network CD, for those who subscribe to this additional service



The Component Gallery is a personal class library which makes it easier to use OCX controls or to re-use your own classes

environment called Developer Studio. This is an MDI application which must be one of the most customisable Windows

programs around. Most windows can be "docked", in which case they behave like overgrown toolbars, left floating, or



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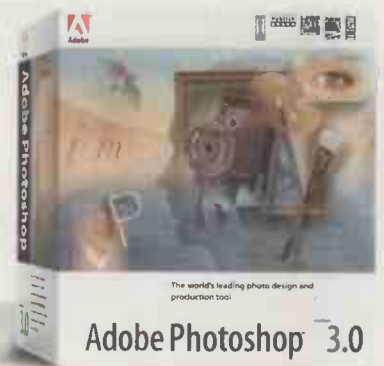
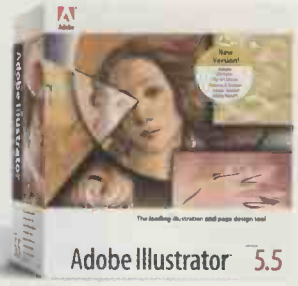
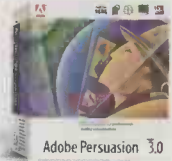
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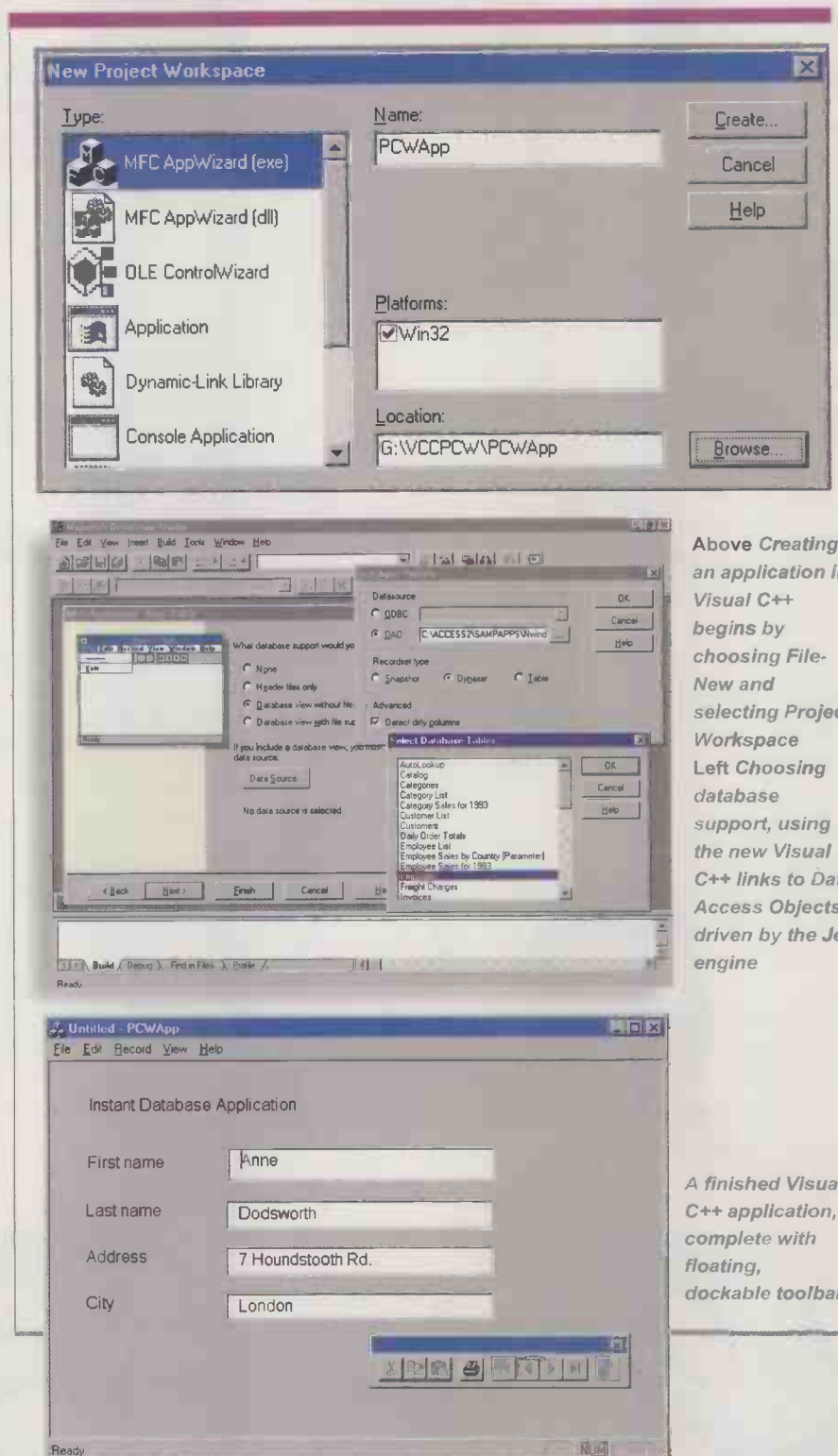
hidden altogether. Toolbars can be positioned anywhere or removed. The right mouse button is used extensively to display properties or activate functions. Editor, document viewer, class browser, debugging and output windows are all integrated, making this a slick and comfortable programming tool. Be warned: a large monitor is strongly recommended.

- A range of tools including AppWizard for generating skeleton applications, Class Wizard to edit class definitions, a resource and dialogue editor, a help workshop for creating Windows help files, InstallShield development kit for setup programs, and more.

- Visual C++ comes with two forms of database connectivity. There is continued support for ODBC. New in version 4.0 is Data Access Objects, a new set of classes which use the Jet database engine for accessing local or remote data. DAO give Visual C++ the same kind of database capability Visual Basic has had since version 3.0.

A lot has changed in version 4.0. One great new feature is the Class View tab in the Project Workspace window. Class View analyses your code (without needing to compile it first) and shows all the classes in a tree view, complete with colour coding and the use of small symbols to show whether member functions and variables are public, private or protected. Right-click is very powerful in class view. You can add functions or variables, set breakpoints, display definitions and references, and display derived or base class graphs. Overall class view makes Visual C++ substantially easier to use.

All those designers and usability testers at Microsoft must be doing *something* with their time, because Visual C++ 4.0 is extraordinarily well presented. It would be easy, but wrong, to assume that because the interface is state-of-the-art, so is the technology. In fact, Visual C++ must be reckoned a conservative product, more so than others such as IBM's VisualAge or even Microsoft's own Visual Basic. Even the new component gallery is not much more than a way to store C++ classes on disk and paste them into projects. One senses some deliberate caution here. A more abstracted class library, or more complete interface builder, would very likely cause more frustration than it saved. Here are all the tools you need to create up-to-date Windows applications, but there is no attempt to insulate you from the realities of programming a huge



Above Creating an application in Visual C++ begins by choosing File-New and selecting Project Workspace Left Choosing database support, using the new Visual C++ links to Data Access Objects driven by the Jet engine

A finished Visual C++ application, complete with floating, dockable toolbar

and complex API with a rather tortuous language. For that, Microsoft will point you towards Visual Basic. Visual C++ is for those who need a more complete and powerful development tool, and in version 4.0 it is better than ever.

PCW Details

Visual C++ 4.0

Price £350 subscription
Contact Microsoft 01734 270001

Good Points Superb IDE; latest Windows features supported.

Bad Points C++ is difficult; MFC can be convoluted.

Conclusion Hard to beat for Windows development.

VisualAge C++

VisualAge began life as a SmallTalk product. SmallTalk has an object-oriented pedigree second to none, but remains a minority taste in software development. All too often, rapid application development under SmallTalk is marred by the less than rapid performance of the resulting executables. Despite these disadvantages, VisualAge SmallTalk has enjoyed some success, particularly under OS/2 (it is also available under Windows). It offers particularly good code reusability combined with a visual development environment that is more than just an interface builder.

Enter VisualAge C++, which combines the visual builder and parts philosophy of the SmallTalk product with the respected compiler technology and class library found in another IBM line, C Set++.

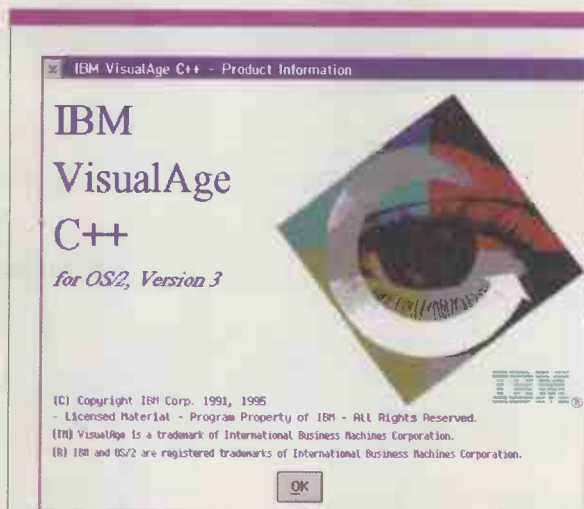
VisualAge C++ is OS/2 only, but with a Windows version just going into beta. Bucking the trend towards online-only documentation, VisualAge comes in a smart box with five manuals. Like other visual development tools, it is really a collection of components:

- Visual Builder for visual application development.
- "Project Smarts" templates for instant skeleton programs.
- Compiler and linker with Direct-to-SOM support for producing SOM objects.
- IBM open class library.
- WorkFrame customisable IDE.
- Editor, browser, debugger and testing tools.

VisualAge C++ is a very competent C++ product which, as you would expect, is fully integrated with OS/2. But the real innovation is in the Visual Builder which enables C++ applications to be created visually. Visual Builder contains components, called parts, which represent C++ classes. A parts interface editor lets you edit three key features of each part:

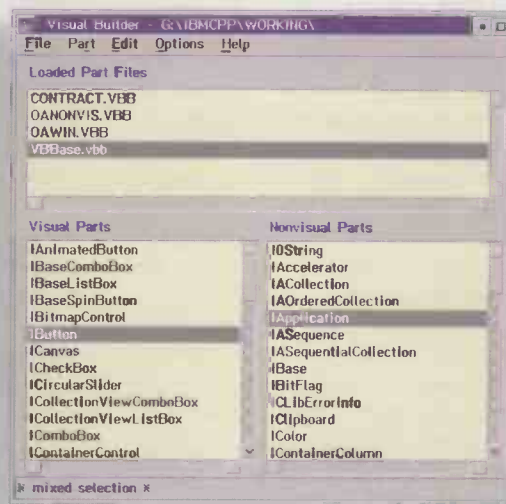
- Attributes, which are the public properties of the part. For example, the text on a pushbutton.
- Actions, which are the functions a part can carry out. Examples might include opening a window or updating a database.
- Events, which are signals that can trigger actions in other parts. For example, pushbuttons have a click event.

When you edit a part's interface, Visual Builder knows how to generate corresponding C++ code. For instance, you might add a text attribute called Surname with functions to get and set its

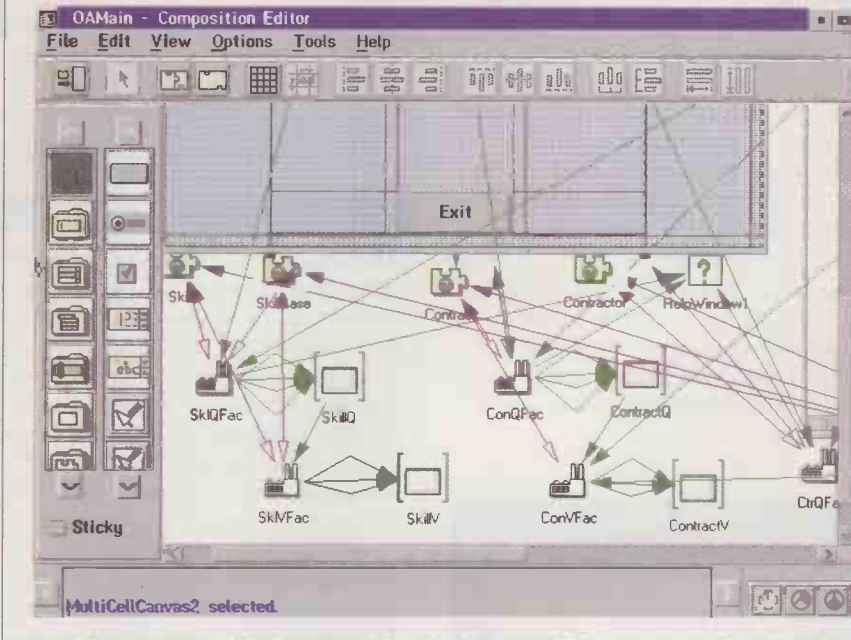


Left Following on from a successful SmallTalk product, VisualAge entered the mainstream with the recent C++ version

Right A .vbb parts file can contain any number of both visual and non-visual parts. The Visual Builder lists the parts and allows them to be edited or included in an application



Below The trouble with visual programming... is that a screen full of lines and arrows can be just as confusing as a long code listing



value. Visual Builder will add a private data member of type IString (part of the Open Class library). It will also add public member functions for GetSurname and SetSurname. This code is added to user

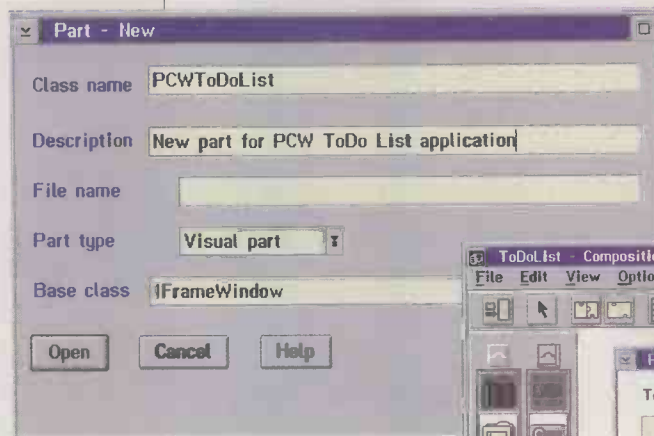
source files that you can further edit without danger of losing code when you next generate the application. But for simple applications, you can leave all the C++ coding to Visual Builder. With Visual

Builder's tools you can design both the interface and the functionality of your program.

Because of the close correspondence between Visual Builder parts and C++ classes, VisualAge avoids the restrictions imposed by classic code generators like the Visual Programmer in Watcom C++. You can even import your own pre-existing classes into Visual Builder so that you can use those classes as parts. Another advantage is that using Visual Builder forces you to use a true object-oriented design and not to slip back into procedural code that is harder to re-use.

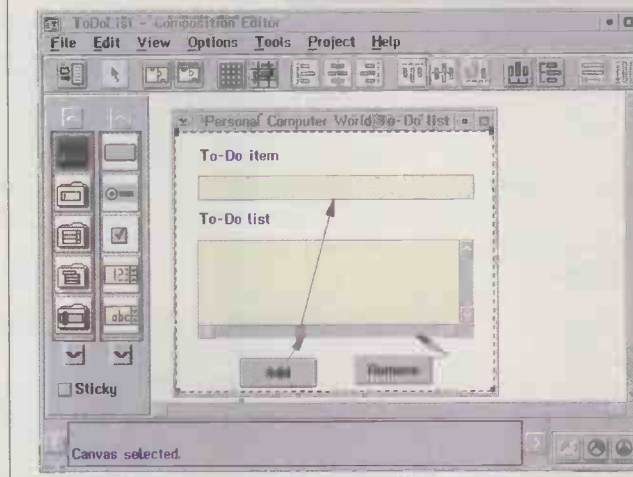
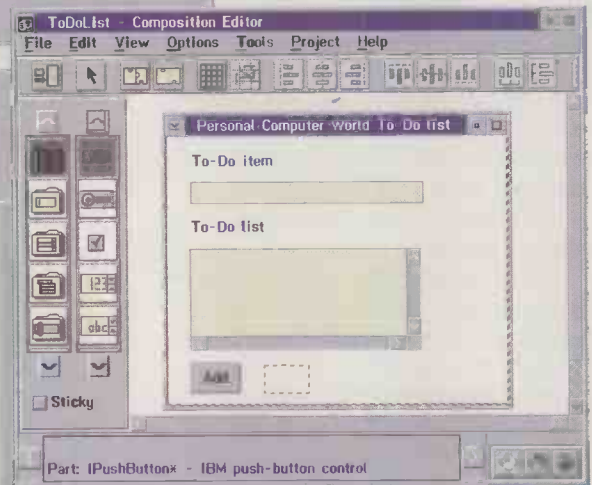
This is real visual programming, integrated with the power of C++ and the performance of native code compilation. All this makes VisualAge C++ much more exciting in concept than, for example, Microsoft's Visual C++, AppWizard, and component gallery.

But there are some problems with VisualAge. First, it has huge system requirements, even more so than Microsoft's offering. IBM suggests a minimum of 24Mb, and even with this Visual Builder loads slowly and performs sluggishly. It is said to be written in SmallTalk, which may explain the poor performance. IBM, how about a rewrite in C++? Second, VisualAge hides its excellent technology behind an interface that lacks the slick ease of use and visual appeal of competing products. Third, VisualAge is IBM technology wedded to OS/2 and SOM (see "Object Wars", page 132). Like it or not, in the immediate future Windows, OLE and OCX are more important to most developers. VisualAge for Windows is now in beta, but a full implementation of these Windows features, alongside continued support for the SOM cause, seems too much to hope for.



Left A Visual Builder project begins with the creation of a new part

Right In the Composition Editor, the new part is built up by selecting controls from a palette, drawing them in the work area and then editing their attributes



Left A complete VisualAge application. The arrowed lines indicate how the controls are connected

IBM's Visual Basic killer

It has been known for some time that IBM is working on a Visual Basic competitor code-named Bart. We asked Skip McGaughey, marketing manager for IBM's VisualAge family, to explain what it is. "If a person is comfortable with Visual Basic, they will be comfortable with Bart," he promised. "But it is significantly different. It is focused around parts interoperability using the underlying architecture of OpenDoc. The language will be Basic with object-orientated extensions. There is a client-server emphasis. It will be a cross-platform product, including support for OS/2, AIX and Windows."

Underlying VisualAge, whether SmallTalk, C++ or Basic, is a complete strategy for re-using code. "You will be able to create parts in one environment and use them in another. You can create parts in VisualAge C++ which, with SOM technology, run plug-and-play in SmallTalk. You can include parts from other vendors. Customers want to choose their language, platform, and vendor. It's an open environment." Another factor is team development. "We have an integration layer called Team Connection, a repository, which will be available soon. Combined with better visual programming and more design tools, it's a powerful and complete environment."

Bart might, just might, be the development tool many OS/2 users are waiting for. Of course it may not deliver, and it may be too late. When will we see Bart? Skip would not be drawn, but the product is apparently already in limited technical beta. Look for availability in mid-1996.

PCW Details

VisualAge C++

Price £375

Contact IBM 01256 341036

Good Points True visual development with C++; parts re-use.

Bad Points Slow Visual Builder; heavy system requirements.

Conclusion Exciting concepts, but needs the Windows version. Great if OpenDoc ever takes off.



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VISUAL PROGRAMMING TOOLS TABLE OF FEATURES

	AM Intelligent Env.	Delphi 2.0	Power Objects 1.0	PowerBuilder 4.0	SQL Windows 5.0	Visual Age C++
Product Supplier	AM Intelligent Environments	Delphi 2.0 Borland	Power Objects 1.0 Oracle	PowerBuilder 4.0 Powersoft	SQL Windows 5.0 Gupta	Visual Age C++ IBM
Telephone	01932 772266	01734 320022	01344 860066	01494 555 555	01628 478333	01256 341036
Price (approx)	£195 AM Builder. £3500 AM Enterprise.	To be announced	£345 standard, £1675 client server	£195 Desktop, £3295 Enterprise	£695 Desktop, £3495 Corporate	£ 375
Language	Hyper Logic	Pascal	Basic	PowerScript	SAL	C++ (Smalltalk also available)
Built-in database	None	IDAPI (Paradox, dBase)	Blaze	Watcom SQL	SQLBase	None
Database connectivity	Native and ODBC	Native, IDAPI and ODBC	Native drivers	Native and ODBC	Native and ODBC	DB/2
Compilation	P-code	Native code	P-code	P-code	P-code with C conversion option	Native code
Platform	OS/2, Win 32	Win 32	Win 3.x, Macintosh	Win 3.x, Win 32, Unix	Windows	OS/2 3.x, Windows in preparation
Component support	AMX	VBX, VCL	OCX, Power Objects	VBX, PowerBuilder Objects	VBX, Quick Objects	Parts, SOM
OLE automation	None	Client and server	None	Client	None	N/A
						
	Visual Basic 4.0	Visual C++ 4.0	Visual dBase 5.5	Visual FoxPro 3.0	Watcom C 10.5	
Product Supplier	Visual Basic 4.0 Microsoft	Visual C++ 4.0 Microsoft	Visual dBase 5.5 Borland	Visual FoxPro 3.0 Microsoft	Watcom C 10.5 with Visual Programmer PowerSoft	
Telephone	01734 270001	01734 270001	01734 320022	01734 270001	01494 555555	
Price (approx)	£69 standard, £329 Professional, £649 Enterprise	£350 subscription	£169	£159 standard, £349 professional	£199	
Language	Basic	C++	xBase	xBase	C++	
Built-in database	JET (Access)	JET (Access)	IDAPI (Paradox, dBase)	FoxPro DBF	None	
Database connectivity	JET and ODBC	JET and ODBC	Native, IDAPI and ODBC	JET and ODBC	ODBC (MFC)	
Compilation	P-code	Native code	P-code	P-code	Native code	
Platform	Win 3.x, Win 95	Win 32	Win 3.x	Win 3.x, Win 32	OS/2, Win 3.x, Win 32	
Component support	VBX, OCX	OCX, C++	VBX, dBase	OCX, FoxPro	VBX, C++	
OLE automation	Client and server	Client and server	Client	Client	None	
						

Editor's Choice

Integration. Reusability. Portability. Object orientation. Connectivity. Standards. These are the key words in real-world visual development tools, to which should be added the old assets of performance and ease of use. Our group test shows that all vendors are trying to implement these concepts, with varying degrees of success. It is also clear that the underlying language used by each product has become less important than these other factors. One product which meets all but one of these objectives is Borland's superb Delphi. Delphi is Windows-only but it is a supreme example of scalability, allowing a newcomer to put together a working application in half a day, but with the low-level language features that developers need for major projects. What brings it all together is the very fast 32-bit compiler which creates native-code executables for

fine performance. Reusable code is achieved through the clean structure of Delphi units, support for OCX controls and OLE automation, and the ability to create Delphi components and install them into the development environment. For rapid development without compromising performance, Delphi is unbeatable.

Also ahead of the pack is Microsoft's Visual C++, which receives equal Editor's Choice alongside Delphi. Objectors may note that Visual C++ is neither as visual nor as easy as other products in this group test. That is true, and those products exist for that reason. But with OLE finally beginning to deliver, Visual C++ 4.0 is the best product to exploit its potential. The IDE is hugely improved; database connectivity is good; and the language itself has been brought into line with industry standards. Quarterly updates will keep subscribers up to date with

new features of Windows. While not really a cross-platform product, there is a Macintosh cross-compilation option, and versions of Visual C++ for other Windows platforms like Alpha and Power PC. For a high-end Windows development tool, look no further.

These two are the best for now, but what of the future? Both Delphi and Visual C++ are fundamentally conservative products, leaving a nagging sense that more can and should be done with visual development. Although it is not yet fully realised, IBM's VisualAge C++ points the way forward. It is built on a far-reaching object-orientated strategy and includes a successful attempt to integrate true visual programming with traditional C++. When the Windows version arrives, and if it gets to support Windows technologies like OCX and OLE, and with the rough edges ironed out of the interface, it promises to be a winner.

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IDE	Fast PCI Enhanced IDE Controller			
RAM	8MB EDO RAM Expandable to 512MB			
Hard Disk	540MB	540MB	1Gb IDE	
Floppy Disk	1.44MB	1.44MB	1.44MB	
Monitor	14" SVGA Colour		15" SVGA Colour	
	Energy Compliant, Low Radiation		Low Rad, NI	
Graphics Accelerator Card	1MB PCI S3 64 bit	1MB PCI S3 64 bit	2MB PCI S3 64 bit	
Keyboard	105-Key Windows 95 UK keyboard			
Mouse	Serial	Serial	Serial	
Case Style	Desktop	Desktop	Desktop	
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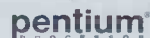
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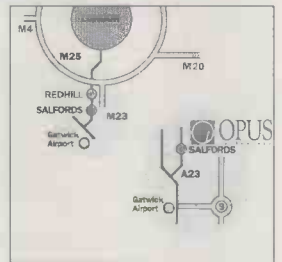


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integrated software suites have become popular during the last few years. The idea of buying a full kit of parts in one box has proved attractive to buyers, with the promise of lower overall purchasing costs and seamless integration between component applications. Microsoft, of course, has led the way with its Office 95 suite.

Micrografx has updated its ABC GraphicsSuite to take advantage of Windows 95 and fully integrate functionality with Microsoft Office 95. As its name implies, the product is aimed at home and small business users who wish to produce smart printed material, quickly and easily — but it's not a package for professional designers and publishers.

The idea behind GraphicsSuite is to use the individual modules to build one or more attractive business documents. For example, you can edit pictures and graphics in Picture Publisher, create a flow chart in Flow Charter and then import all the elements into Designer to complete the job.

The software ships on a CD-ROM and you get two extra CDs stuffed full of high-quality clip-art, giving you a choice of over 30,000 pictures and images. Without doubt this is an exhaustive supply and the average buyer would have their work cut out to use all these up in a hurry.

It's a bit of a surprise to find that the manual is a slim affair which barely covers the breadth of features found in the three packages. What looks like the manual serves as a reference to the images available on the clip-art CD-ROMs!

Help is at hand

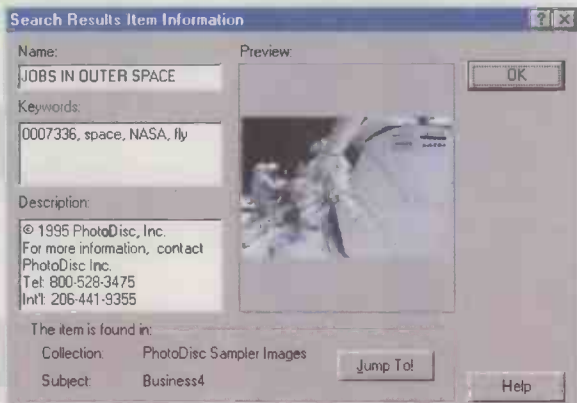
Instead, Micrografx has built an excellent online help system in standard Win95 Help which provides exhaustive help and information. It takes a while to get used to online help systems but, along with CD-ROM, this must be the way to go for future software delivery. It saves packaging, saves weight, saves cost.

The ABC GraphicsSuite, from Micrografx, is great for home and small business use, slurps software gourmet PJ Fisher as he serves you up his ABC-Z assessment of this mid-range integrated package.



Searching & Previewing

*Lost in space?
Confused by clip-art?
Let Media Manager find
the pictures you desire,
complete with preview
and drag-and-drop
capabilities*



images, either on one of the two included CD-ROMs, or on other drives. It provides a floating window through which you can browse clip-art and images before placing them into documents. Like everything else it is fully Win 95 compatible and allows drag-and-drop placement of images into open documents.

Fishy business

Although small, Media Manager is surprisingly sophisticated. Double-clicking on an image in Media Manager brings up a full preview.

You can "add" files to the database but to access them, the original source, such as the CD, must be inserted. If you try to place a graphic without the CD it can cause the program to crash.

The search itself is efficient. Typing in the keyword "fish", for example, Media Manager came up with four results including a picture of the Tsukiji fish market in Japan.

You can choose where to search for pictures on any networked drive or local disk. Using Media Manager in Word for Windows worked but was appreciably slower in operation. Despite this, Media Manager is a highly useful application in its own right.

Picture Publisher

Picture Publisher is the "Photoshop" part of the package, although in no way should it be seen as a competitor. It does have some high-end controls, such as a monitor adjust control, but I doubt many potential users would want to utilise these.

Although entry-level there is a fair deal of learning to do in Picture Publisher. If you are not familiar with terms such as "Masking" it is worth spending some time with the online help so as to familiarise yourself with techniques. But even then, it can be confusing.

The first time I tried to merge two images it took 15 minutes of fiddling with buttons and boxes before it became obvious how to perform the trick. But once learnt, the results were smooth and easily exportable.

The standard tool set provides you with masking, fill, line drawing and text tools in a simple window. Frustration was experienced with the magnification tool, which doesn't stay selected, so you have to keep returning to it to increase magnification on an image. Poor.

Retouching tools are not comprehensive but do provide a finger "smudging" device and airbrushing with



*Work on complex
page layouts with
Micrografx
Designer*



*A large number of image
effects are available in
Picture Publisher, but take a
look at the preview before
you commit yourself*



And with a 32-bit OS behind it, online help is fast, too.

One program promised on the box, Instant 3D, turns out to be an offer only, for which you have to send off a voucher (enclosed). This is a pity, as it looks intriguing but it's a way of getting users to register. Briefly, Instant 3D is an Office 95 compliant package that allows you to create instant 3D text, and to drag and drop over 200 3D objects into any of the Micrografx programs or Office 95.

But enough of the added value. What do you get to load on to your PC? There are three main applications: Picture Publisher, Micrografx Designer and ABC

FlowCharter. The first is an image editing application, while Designer creates page layouts and illustrations, and ABC FlowCharter provides easy creation of flow charts and is a cut-down version of the Micrografx standalone application of the same name.

For all three you are going to need a minimum of 30Mb disk space (45Mb maximum) and 8Mb RAM although 16Mb would be better. The clip-art is best left on the CDs.

There is a fine tool included called ABC Media Manager. This is available to all three main applications (and Office 95) and works as a search engine to source



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Real colour printers

177
PERSONAL COMPUTER WORLD
FEBRUARY 1996

varying thickness. But there is just enough here for the product's intended market who are most likely to bring pictures in, crop them, add effects and then export them.

The filter tools are not really filters but more a way of painting with a pre-defined pattern such as checkerboard or marble option.

Web designers will be pleased to see a GIF facility that automatically makes backgrounds transparent so they image as outlines on Web pages, and can set GIFs to interlace automatically.

The effects browser is a definite highlight. This was not only fast to load but fast in applying effects to bitmap images, too. It was so much fun that there was the danger of getting carried away with manipulating images. It's not in the Photoshop class but there's definitely enough choice and sophistication to create interesting images for your publications and documents. This outstanding feature would be further improved if Micrografx could add some add-on plug-in filters *à la* Photoshop.

There's a scratchpad, as well, which is useful for trying out colours, filters and styles on a blank area before applying them to images.

Those who are into automation will be pleased to see a macro facility which works simply by recording mouse clicks and other movements until you tell it to stop. This worked seamlessly when required to perform single tasks but fell over badly when it tried to run batch macros, where it would otherwise be most useful.

Picture Publisher proved to be an effective and fun way to edit images. It supports all major bitmap file formats (even Macintosh PICT), is mostly well written and has some surprisingly advanced features.

Micrografx Designer

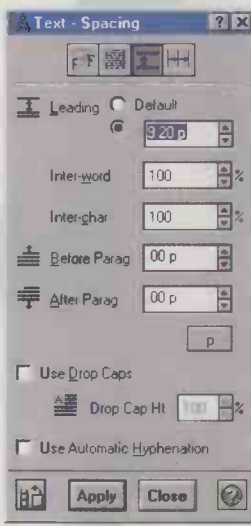
Opening Micrografx Designer proved to be a daunting task. While the object of Picture Publisher was quite straightforward (i.e. to edit bitmapped graphics), Designer confronts you with an array of buttons and options. It is a page layout package with some sophisticated drawing tools built-in (including bezier curve support) and it doubles as a tool for creating slide shows from completed pages.

When looking at any page layout or illustration software, a measure of its sophistication can be taken by looking at its typographic tools; Designer doesn't disappoint. For a package of this type

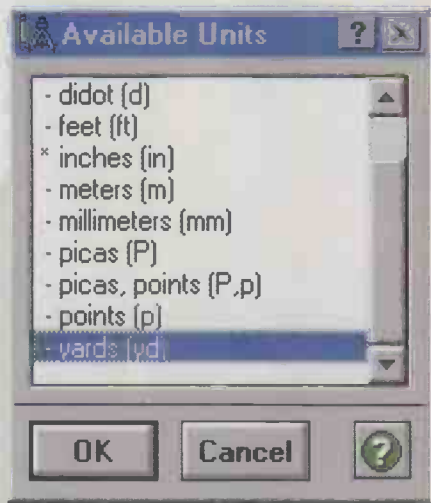
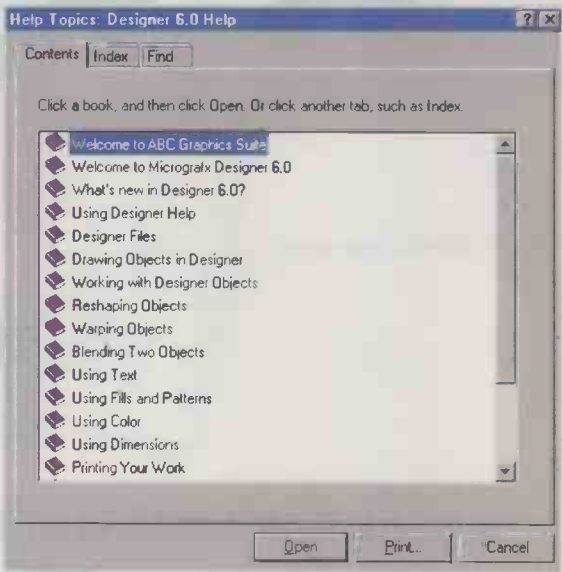
Dialogue Boxes & Palettes

Right *Whose unit is it anyway? ABC GraphicsSuite offers a huge array of units to work in, even yards*

Below *Not as accurate as Quark XPress, but there are still extensive and capable text spacing options*



Right *Minimal paper documentation is made possible by the superb on-line help offered throughout ABC GraphicsSuite*

there is an awesome amount of control here with, for example, page measurements enabled in any unit from Didots to yards — perhaps a little over the top but at least it's there should you need it.

At first look the typographical specifications seem limited, but like many programs Designer hides refined control behind buttons in initial dialogue boxes. Hit Font from the Format menu item and a neat dialogue appears complete with preview box. This immediately applies font, size and style to text but other buttons give kerning, wordspacing and leading controls. Not to 1,000th of an em (*come in, Quark Xpress!*) but to a degree that's fine enough for most people's eyes. There's an instant drop cap control, too.

A minus point for Designer is that there is no way of setting text styles, so

these must be applied each time which could be especially tedious on "ambitious" publications.

On the other hand, if you wish to create complex publications on a regular basis, you might be better off looking at a dedicated DTP package (PageMaker, for example).

Those who have used PageMaker or Quark XPress will be surprised and intrigued at Designer's method of handling text. Once entered, text can be constrained in a bounding box which can be pulled, rotated, stretched and even twisted. This may not be typographically sound but it is an easy way of shaping text blocks. If you make a mistake it can easily be undone with the universal multiple undo feature.

If you want to change the style of the text, simply click into the body text. By combining the text block tools and text

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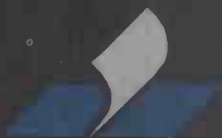
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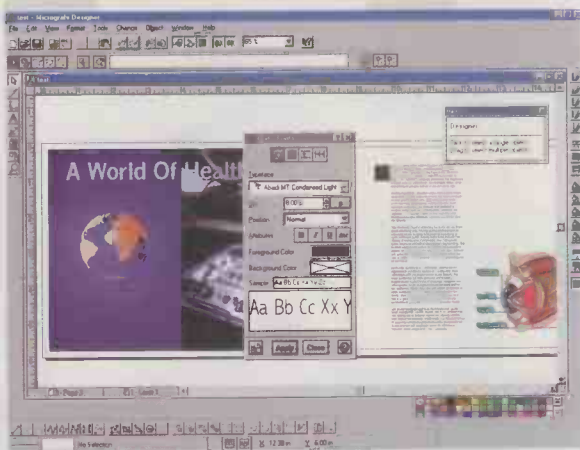
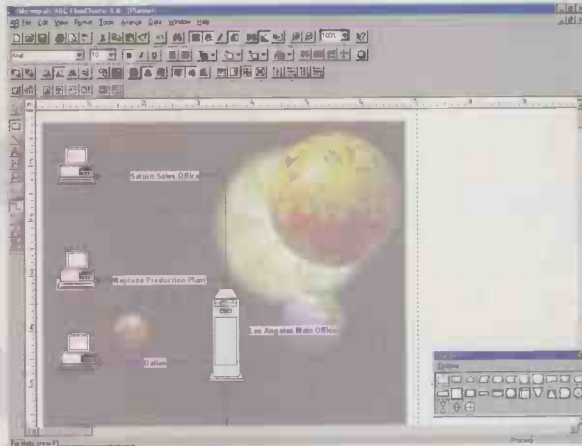


VNU BUSINESS PUBLICATIONS
DATABASE DIVISION



ABC Flowcharter & Designer

ABC Flowcharter is the most basic element in the package. It's a cut-down version of Micrografx' full-blown charting package, but is still good enough for simple diagrams and flowcharts



Designer offers fairly sophisticated page layout facilities, including buttons for everything and even bezier curve tools

tool which mixes a combination of advanced and more mundane tools. The learning curve is not steep and online help and hint boxes help you pick it up quickly. While it cannot compete with high-end packages, it would stand in good stead as a layout and drawing tool for the middle ground.

ABC Flowcharter

After all the excitement of manipulating images and laying out pages, ABC Flowcharter brings you down to earth with a bump. It's a cut-down version of Micrografx' full-blown flowcharting package, so I suppose you should expect basic flowcharting tools — and, in a nutshell, that is exactly what you get.

You can use Flowcharter simply as a way of drawing out problems by manually placing boxes and links between them (no auto linking here). There is a reasonable number of creative tools so you can add shadows and colours to boxes as well as change their shapes. Using the mouse, text and fills are easily applied to boxes.

Finished flowcharts can be imported as a graphic, directly into Page Designer. The screenshot alongside shows an example of what can be achieved. But really, there isn't much more in this adaptation of ABC Flowcharter that you couldn't do in Designer itself.

formatting you can come up with some seriously bad typography.

Text can additionally be edited in a story editor which imports Microsoft's default spell checker; a useful example of how application integration can work.

Although Designer is heavily biased towards single-page document creation, you can add extra pages (individually, or multiple) and a page browser view makes it easy to swap pages around by dragging and dropping.

Page setup is not as comprehensive as with the leading DTP packages but you do get the chance to set custom page sizes, and to use previously setup documents.

Importing text is easy, although there were glitches when importing from Word — a surprise, considering the effort involved in integrating this suite with Office 95. Word files came in with some garbage which had to be removed with the text editor.

Graphic files can be imported to Designer, although EPS files will only display as greyed-out areas. Other supported formats include JPEG, GIF and Illustrator EPS. Double-clicking on

any image should immediately launch Picture Publisher to edit the image but this proved to be flaky in operation and often the whole application would crash. Whether this was a Windows 95 problem, or the application itself, was difficult to divine and nonetheless frustrating.

The drawing tools themselves are, perhaps, over-sophisticated — how many users will really use bezier curves? Perhaps it would have been better to position Designer purely as a page layout program. That said, Designer proved itself adept at creating line drawings using pen and drawing tools and fill objects. If there is one feature which should be singled out for special mention, for being truly unique and downright useful, it's the Print Specified View. Choose this, drag over an area of your document, and that area alone will print out. The area is scaled (magnified) to fit the default printing area of your page. An excellent proofing tool and something that other graphics packages would do well to emulate.

Page Designer, then, is an accomplished drawing and page layout

All in all

Taken as a whole and considering the price (which is likely to be discounted), ABC GraphicsSuite makes for a compelling package. By itself, Micrografx Designer could easily compete against the leading packages in the DTP market. It runs well under Windows 95, takes relatively little hard-disk space and integrates strongly both within its constituent parts and to Office 95.

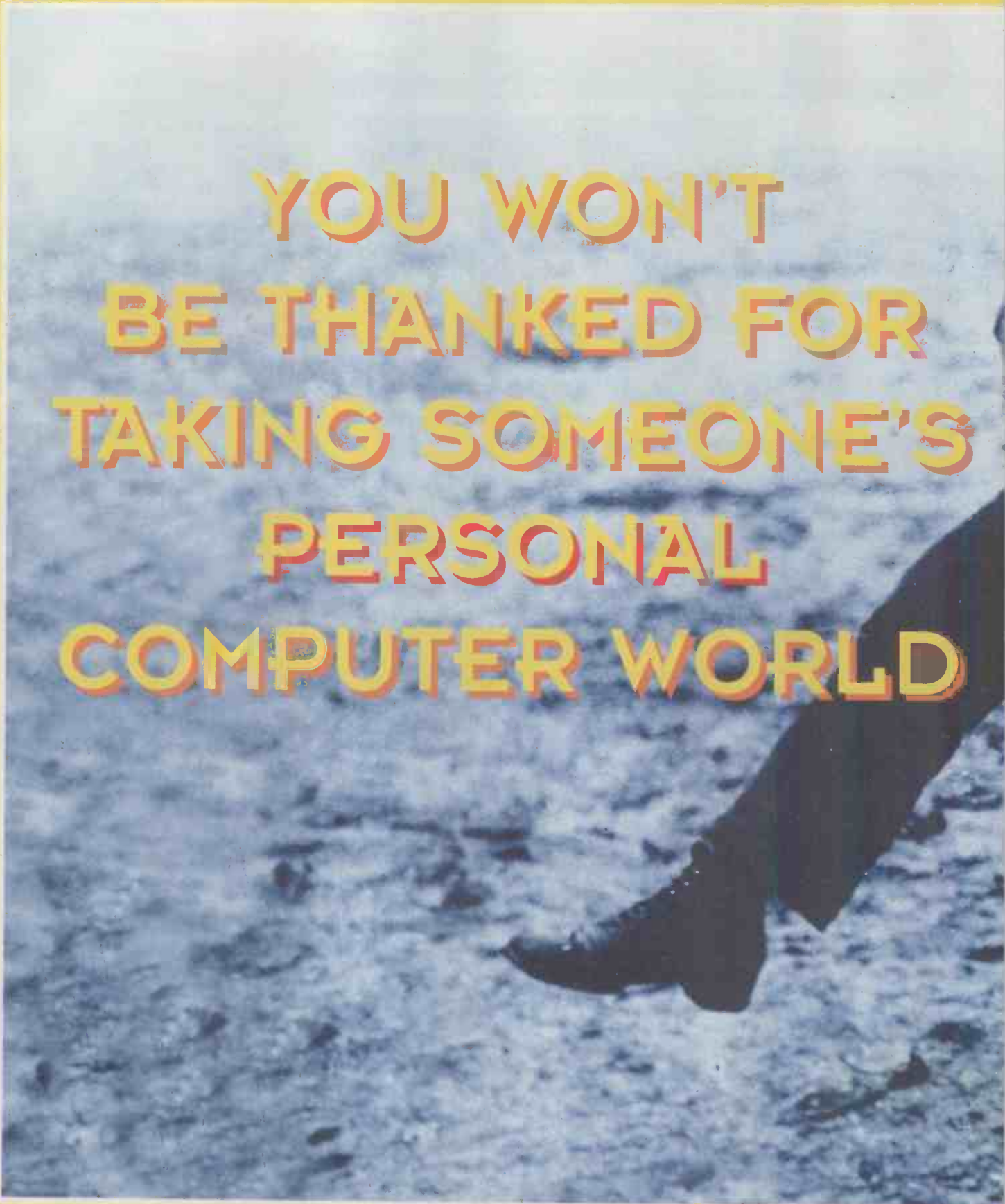
If I were looking for a mid-range graphics package, would I buy Micrografx? Yes. This is an excellent package which contains many strengths, some unique features, and weaknesses that can be ironed out. Altogether it is capable of high-quality results while remaining easy to learn. Add to this the high-quality clip-art on two CDs (plus a free 3D software offer) and you have exceptional value for money. Highly recommended.

PCW Details

Micrografx ABC GraphicsSuite

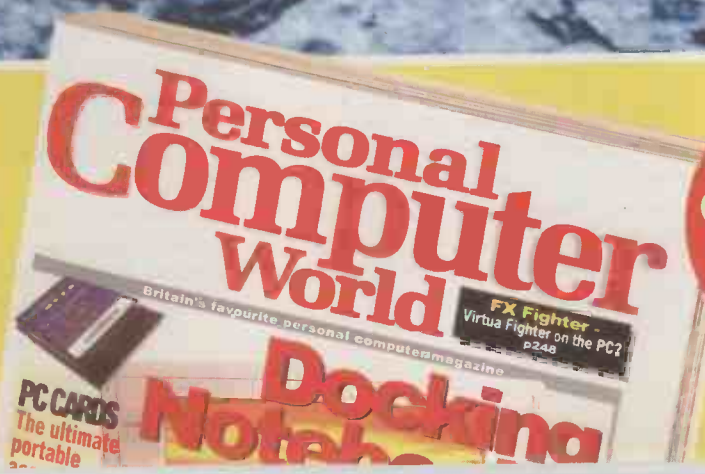
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A photograph showing a person's leg and foot in a dark suit and shoe, stepping on a blue, textured surface. The text is overlaid on the image.

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Access

95

The recent confusion over memory requirements for Access 7.0 was unfortunate because this version has lots to offer. No cosmetic upgrade, this, says Eleanor Turton-Hill as she reviews the package and finds several major improvements; there's something here for all levels of user.



The confusion over memory requirements has made the upgrading process something of a shambles for many users, and this is unfortunate because Access 7.0 has lots to offer. As well as being the first Windows 95 (and full 32-bit) version of the software, there are several important new features and enhancements: this version is more integrated with the Microsoft Office Suite, more accessible to a wider variety of users, and in many other ways a more fully-functioned application.

Starting up

If you know Access well, then it's the Windows 95 "look and feel"-type features you'll notice first. This version of

Access, like Visual dBase, has a

healthy scattering of Windows 95 GUI features such as tab dialogues, option group buttons and the new-style check boxes.

Some of the utilities have been designed so that their functions integrate with features in the operating system. There's a Database Properties dialogue box, for instance, which displays the properties of individual databases, and this makes files easier to locate via the Windows 95 Find File feature.

Access 7.0 supports the more obvious Windows 95 features such as 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

instance, is modelled on the Windows Explorer (Windows 95's alternative to File Manager) allowing you to view files as large icons or small icons, as a list, or with full details.

Improvements for the end-user

Access has always provided excellent features for the end-user; it is this aspect of the product which has made it so successful. Access 7.0, as you might expect, has more than a smattering of new end-user facilities including a variety of intelligent Wizards, each dedicated to a particular aspect of database design and maintenance.

● Pre-designed applications

Databases can be intimidating to novice users; the effort required to set up even the simplest of systems tends to put most people off the idea fairly quickly.

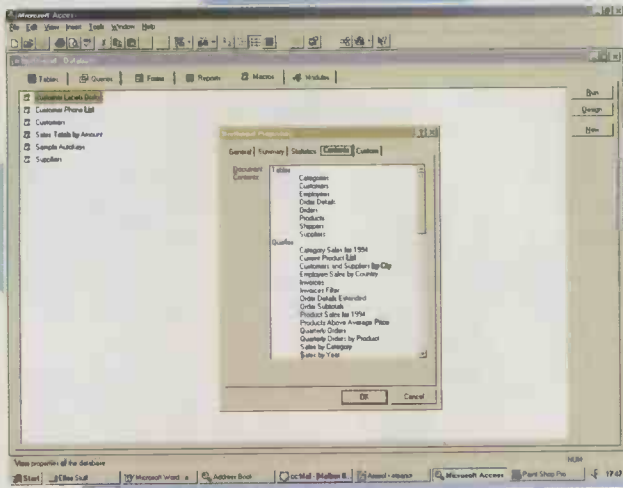
Lotus Approach has got around this problem fairly simply in the past, by supplying a whole selection of pre-prepared databases. To the uninitiated this makes a lot of sense; you simply go into the File menu, choose New, and then choose from a series of sensible titles like "Address Book" or "Recipes".

Access 7.0 offers a similar selection of ready-made solutions. There are systems aimed at the home user with titles such as "Video Collection", "Recipes" and "Wine List", as well as some more sober and sensible offerings like "Expenses", "Order Entry" and "Contact Management". These are the type of simple systems which people create and recreate time and time again, so it makes sense that users should be spared the effort.

Unlike Approach, where a pre-prepared database can be edited after creation, Access provides a Database Wizard which creates the system to your

The first thing to strike you about Microsoft's new version of Access for Windows 95 is its incredible hardware requirements. A typical installation will need a minimum of 12 megabytes of memory and 42 megabytes of hard disk space — the maximum custom installation takes up a stupendous 54 megabytes!

These system requirements caused something of a furore in the press a couple of months ago when Microsoft was forced to admit that Microsoft Access Version 7.0 for Windows 95 will not stand up on 8 megabytes of memory, as originally stated. A £99 refund has been offered to anyone who invested in Microsoft Office Professional during the early stages and now finds themselves with a version of Access they are unable to use.



The central database container is modelled on Windows 95's Explorer with context-sensitive right-click menus



Access 7.0 has a whole selection of ready-made solutions

specification, prompting you with questions and allowing you to pick and choose the fields you want. Pre-designed forms and reports are provided as well as a few records of sample data.

● The Table Analyser

One of the most impressive features of this new version of Access is the Table Analyser, designed to aid the process of converting flat files to relational databases. This has never been an entirely simple task, even for experienced database developers, because files created in spreadsheets lack the data integrity which a relational database enforces. So when it comes to converting spreadsheet files, data has to be thoroughly cleaned and restructured.

wide variety of flat-file formats, intelligently decipher inconsistencies in record entries and split the file into a set of related tables. The Wizard makes recommendations about your data (which you can either accept or reject), explaining the consequences of duplicating data and giving complete guidance at each stage in the process. This renders 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.

● The Performance Analyser

Another intelligent tool included in this version is the Performance Analyser

The Database Properties dialogue box keeps an ongoing record of all the items in your application

Huge spreadsheets built up over years, which have been added to and maintained by a hotch-potch of different people cause the worst kind of problems.

In order to get rid of redundant or duplicated data, the file must be broken up into sensible parts and inconsistent syntax corrected. A geographical area, for example, might be entered as "The North East" by one person, "Nrth East" by another, or simply spelled incorrectly by someone else. To turn the spreadsheet into a relational database, each geographical area would be put into a look-up file and presented to the user as a drop-down list.

The Table Analyser Wizard in Access 7.0 performs this process for you. It's able to look at a

Wizard which examines your database and recommends different ways of improving application performance. In the past, improving the performance of a database has always involved low-level tinkering and 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 changing a data type. These changes can be implemented manually or automatically by the Wizard.

This tool is invaluable for beginners as it allows them not only to speed up badly designed systems, but also find out exactly what it is that may be making their system grind to a halt.

● Briefcase replication

The new replication facility in Access 7.0 is made possible by the Windows 95 Briefcase. When you drag an Access database to the Briefcase, a replica is created which can be moved to a floppy disk or laptop machine, thereby allowing users to continue with the database, away from the office.

For a replication facility to be useful, there must be some way for replicas to communicate: otherwise, they never synchronise; they start to grow independently. When you bring laptop copy back to the office, the Briefcase synchronises changes in replicated data with the master database. It can also replicate modules and forms, which allows developers to propagate design changes made on the master file to all replica files.

This is a really useful tool when it comes to managing remote changes to data, as well as versioning and distributing Access applications. In addition, it's easy to use and highly configurable. There are different ways of replicating and synchronising data, and the necessary arguments can be specified in code. Those users of Windows NT who have no Briefcase functionality still have a replication tool, provided in menu form.

● Changes at the high end

For developers, the most major change is in the programming language, Access Basic, which has now been replaced with Visual Basic for Applications (VBA). This provides a consistent scripting language for building solutions across the whole of Microsoft Office, making it possible for code written in Access to be used in Excel or Visual Basic (VB4).

Another major relief for developers is



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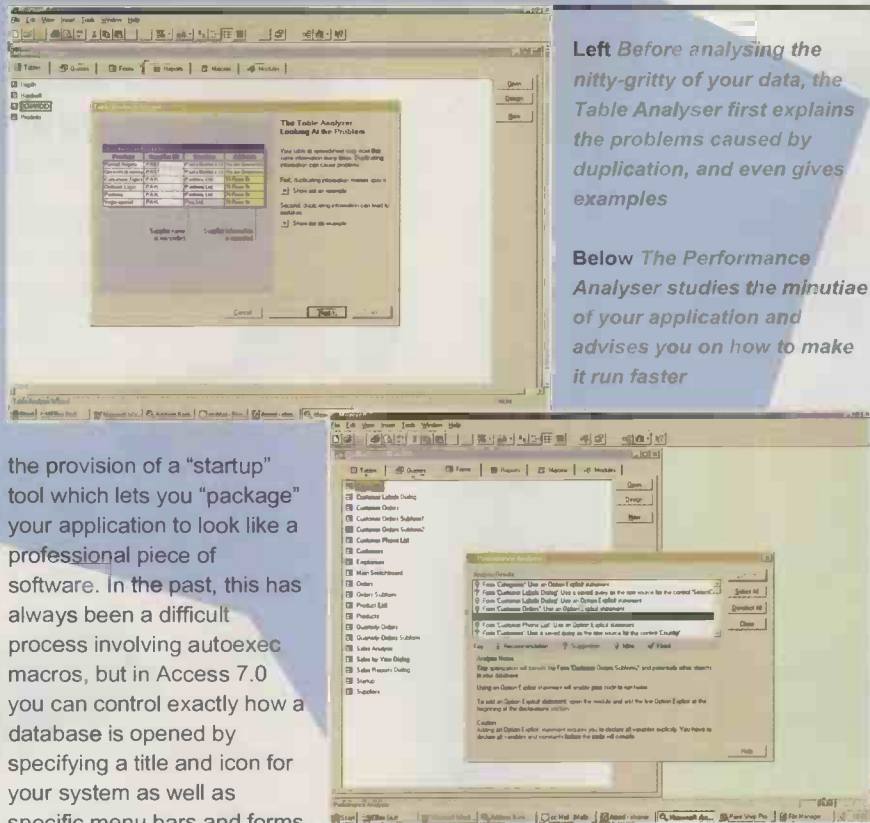
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Left Before analysing the nitty-gritty of your data, the Table Analyser first explains the problems caused by duplication, and even gives examples

Below The Performance Analyser studies the minutiae of your application and advises you on how to make it run faster

the provision of a "startup" tool which lets you "package" your application to look like a professional piece of software. In the past, this has always been a difficult process involving autoexec macros, but in Access 7.0 you can control exactly how a database is opened by specifying a title and icon for your system as well as specific menu bars and forms to use on startup.

OLE (object linking and embedding) automation has been drastically improved in this version, too. Access 2.0 was able to act as an OLE Automation Controller, making it possible to control other applications, but Access 7.0 goes a step further, making itself available as an OLE Automation server. This means the application as a whole can be manipulated by OLE Automation Controllers such as Visual Basic, Visual C++ and Excel.

In summary

Access 7.0 is no cosmetic upgrade; it is 32-bit from top to tail and full of major improvements which boost its functionality for all types of user.

For novice users, Access is now a far more manageable tool. It is possible for total beginners to create professional-looking applications, complete with sensible reporting facilities, without having to get bogged down in all kinds of unfriendly database jargon. For many users, the strengthened integration with the rest of Office 95 will render the upgrade almost automatic.

For businesses, the replication facility will be a big selling point. Many organisations have an increasing number of mobile workers and the need to keep multiple file copies in sync with each other has, for a long time, created difficulties. Access provides a workable

and user-friendly solution which will be welcomed across the board by all sorts of companies.

Access 7.0 runs on Windows 95 and Windows NT 3.51, but not on Windows 3.x. It will run most Access 2.0 files but there are some compatibility restrictions, and once you've converted files to Access 7.0 they won't run in version 2.0.

Stability and resource management in Windows 95

The improvements incorporated with Windows 95 offer several fundamental advantages to application building. Two things from which you will immediately benefit are the improved stability of the system when multitasking and better handling of system resources.

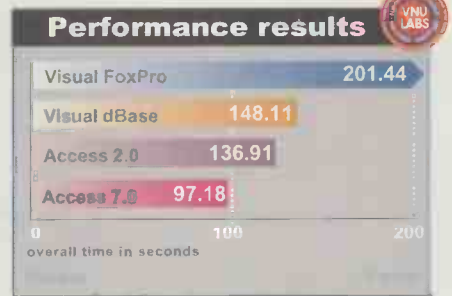
One of the fundamental weaknesses of Windows 3.1 is that all applications, as well as operating system code, share a single address space called the system VM (Virtual Machine). The single address space model is bad news when it comes to system integrity because applications are not protected from each 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 will not jeopardise the OS itself. When an application fails, the effect of the failure

This one-way compatibility can be a major problem, especially when your system is littered with different file formats during the transition process.

The major down side with Access 7.0 is its hardware requirements, and it's easy to see why Microsoft was forced into redefining this. Access will tentatively stand up on 8Mb, but you could hardly describe it as "running". On 12Mb (the current recommended minimum) things work much better, but if your application is reasonably complex and has lots of forms and reports you'll soon start to feel the need to upgrade to 16Mb. This strain on system resources was confirmed in our performance results which reveal a clear generation difference between Access 7.0 and Access 2.0 — let alone the massive disparity with Visual FoxPro.

If you're thinking of upgrading your current application to Access 7.0, you may well find that in addition to a memory upgrade you will need the extra boost of a Pentium processor as well. For many, this would render a move to Access 7.0 out of the question for some time to come.



should be limited to the session in which it is running. Effectively, what VMs do is to 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 and Access exploits its multithreading capabilities by having the Jet engine, Access 7.0, and individual Access programs each running in their own independent threads.

Contacts

Access 7.0 for Windows 95
Contact Microsoft 01734 270000



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Aches mark the spot

Repetitive Strain Injury may sound like a pc (politically correct, not

personal computer) excuse for not doing any work, but for sufferers it's a very real problem. RSI can cause severe discomfort, and even the inability to work. Nicky Glatter looks at what we can do to combat this industrial disease.

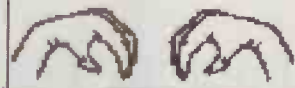
How to reduce the risk of RSI



Extend Up

Stretch - Side of Neck
File Options View Next Repeat Help

Exerciser software (from IHSS) takes the user through a series of stretching exercises which should be performed before sitting down to any keyboarding activity



Extend Down

Stretch - Neck Twist
File Options View Next Repeat Help

File Options View Next Repeat Help

- 1) Sitting straight, slowly tilt head forward.
- 2) On the double beep lift your head and relax the shoulders.



Relax

Stretch

Press the space bar to begin the exercise.

- 1) Sitting straight, slowly tilt head to one side.
- 2) On the double beep straighten your head and slowly tilt to the other side.



Press the space bar to begin the exercise.

- 1) Sitting straight, slowly twist head to one side.
- 2) On the double beep slowly look forward and then slowly twist to the other side.



Press the space bar to begin the exercise.



Relax

Stretch

On 28th October 1993, in the case of Rafiq Mughal vs Reuters, Judge Prosser caused an outcry when he ruled that the condition of RSI (repetitive strain injury) did not exist and that it had no place in medical books.

Mughal, a former editor at the Reuters news agency, was filing damage claims for pain and loss of earnings resulting from computer-related work injuries. Thankfully, the case has not gone down as a legal precedent.

Judge Prosser was a circuit judge, deputising in the High Court, whose other claim to fame was ordering a 15-year-old rapist to pay his victim £500 "for a good holiday"; a judgement subsequently overturned by the Court of Appeal.

Repetitive strain injury, cumulative trauma disorders, work-related upper limb disorders... call it what you will, increasing numbers of computer users are reporting aches and pains attributed to their work environment or computer hardware. It's not a new phenomenon, neither does it affect computer users only. The list of those affected includes musicians, chicken process plant workers, Rubik's Cube addicts and factory workers. Ironically, the workers on computer assembly

lines are as vulnerable as the computer users themselves. Leather beaters in Ancient Egypt are believed to have suffered, and in 1713 "severe writer's cramp" was recorded in Italy. New technology took the rap then as now; in the eighteenth century the introduction of the steel nib was blamed.

But it is the rise of computer-related illness that has caught the public eye. In the early eighties, an epidemic in Australia caused widespread hysteria over what was nicknamed "kangaroo paw". The estimated cost to Australian industry in the years leading up to 1989 was half a billion Australian dollars — roughly £220m.

In the US, a group of children is reportedly gathering arms for an attack on gaming-related injuries, while in the UK the problem was highlighted when it hit the publishing industry; at one point 130 journalists on the Financial Times were found to have been displaying symptoms. The Health and Safety Executive now estimates there are seven million computer users in Britain; the largest number of workers susceptible to a single industrial injury.

Why RSI?

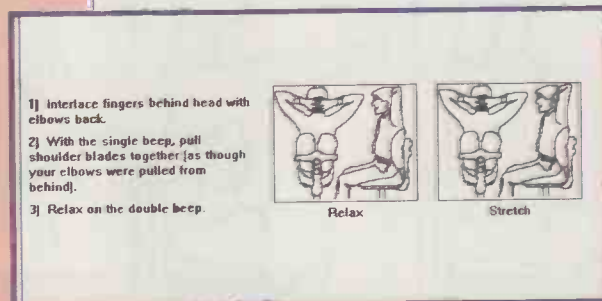
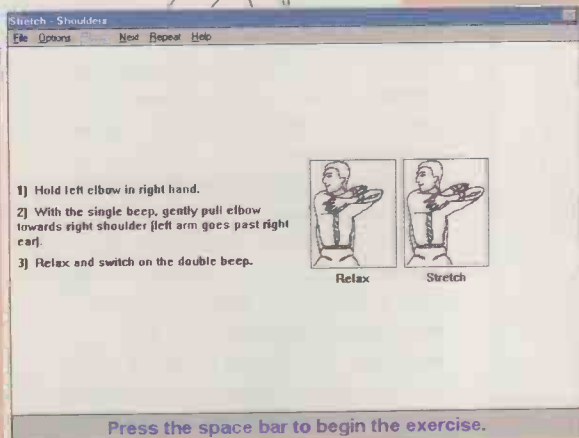
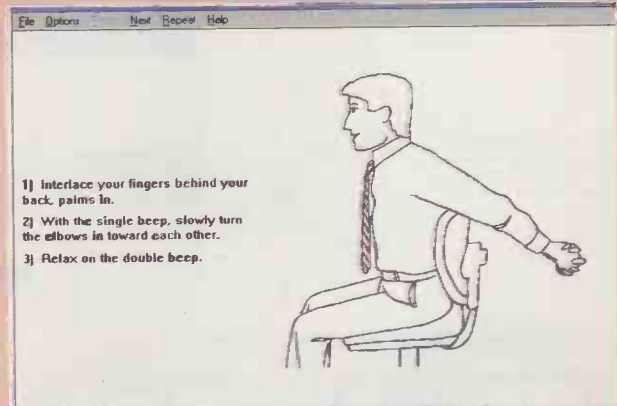
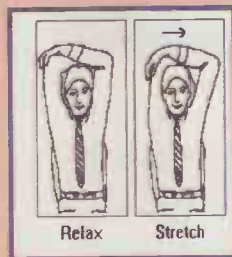
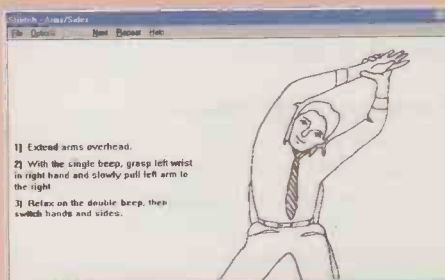
Dr Edward Huskisson, head of rheumatology at St Bartholomew's, describes RSI as: "A condition, usually

occupational, characterised by pain which arises in a particular area, usually the hand and forearm. It is the result of repetitive muscle activity, responding at first to rest but not to treatment appropriate to other types of soft tissue rheumatism such as tenosynovitis, tennis elbow or carpal tunnel syndrome." In other words, there's no obvious part which is damaged.

According to Dr Huskisson, symptoms start with deep burning pain, pins and needles, cramps and fatigue. They are aggravated by work, bad weather and stress. Side-effects include disturbed sleep, headaches, irritability and depression.

The key to any form of RSI (or work-related upper limb disorders as many ergonomists now call it) is the "repetitive" factor; incessant keyboarding or mouse work requires continuous repetition of the same small movements. As any marathon runner will testify, prolonged use of any muscle group will damage the muscles and small tissues surrounding them. Stop using the muscles and the pain will disappear.

Wendy Chalmers-Mill is a consultant physiotherapist and ergonomist with Interact, a pro-active human resource consultancy. She has found that upper limb disorders begin



Press the space bar to begin the exercise.

in the back and upper neck, which refer pain to the lower arm. The single most important factor, in her view, is postural abnormality which overloads the muscles. "Just to sit is more dangerous than to stand or walk," she says. "It allows the spine to become a weight-bearing structure."

With that disadvantage already in place, correct use of your equipment is essential: "If your screen is on the left-hand side of your desk and the mouse on your right, you end up with a shortening of the muscles on the left-hand side and a lengthening of those on your right. This results in overall muscle strain in your upper body." So anyone who regularly uses a keyboard and has their phone cradled between their shoulder and neck, is asking for problems.

The Health and Safety Commission went some way towards addressing the problem when, on 1st January 1993, it introduced six sets of regulations under directives from the European Commission, designed to provide a safe and comfortable environment for employees who "habitually work with display screen equipment" (European Directive 90/270/EEC). The regulations include: adequate workspace and lighting; a clear, low-radiation tiltable screen with a separate keyboard; an adjustable chair; and software suitable

to the task. The regulations apply to any new workstation implemented, while those in place before 1st December 1992 will have to comply by the end of 1996.

But equally important, say the experts, are stress elimination, a positive outlook and a healthy body. The equipment you use is less important than a balanced posture; if your muscles are weak your body has to work that much harder just to sit correctly.

Research at Interact underlines the

importance of stretching exercises before long periods of keyboarding or game playing. It recommends Exerciser software which runs the user through a number of exercises designed to relax the muscles and eyes (see *How to reduce the risk of RSI*).

Game players should be vigilant too. According to Chalmers-Mill, games are generally safer than "work" because the stress factor is removed (although those who come home from work and play Doom until 2am, pounding the Control key, may disagree). However, she considers that proper use of equipment is just as important in games as it is in spreadsheeting. If you're sitting on the floor with your Playstation gamepad, staring up at the TV, you'll be lucky to escape without neckache.

The appliance of science

It's a sad fact, but with every technological breakthrough comes a potential threat to our physical well-being. The celebrated transition from manual typewriter to electronic keyboard no doubt increased efficiency but it eliminated the need to remove the hands from the keyboard for carriage returns, paper changing or even typo correction, rendering keyboarding as a more repetitive task.

While relatively little research has been undertaken into the pointing device, modern thinking fingers the mouse as the villain of the piece. Time was, in DOS days, when you could accomplish every task from the keyboard. Then came Windows, DTP and drawing packages and the mouse took up its station on the desktop. But the device comes with its own set of

Taking the strain: ergonomics

Ergonomics is the study of the relationship between humans and machinery. The manufacturers have to agree on this because it's a dictionary definition. They also speak with one voice on the ideal workstation; a swivel chair on five castors, with your feet flat on the floor and your arms at a 90 degree angle over the keyboard. If the desk is too high, the most simple remedy is a footrest. Any pointing device should be within comfortable reach and a document holder is recommended for touch-typing.

Beware of anyone who attempts to accessorise the Utopian workstation. Opinion is divided on what is the best keyboard/mouse/trackball and there is a frightening number of so-called "ergonomic" products on the market. Sales reps back up claims about their own devices' efficacy with pages of complicated graphs and statistics — there is none higher, they proclaim, as they rattle on about pronation, myoelectric activity and ulnar deviation. Mention the competitors and they give it to you straight; all other ergonomic products are dross. Any ergonomics consultant will insist on putting the individual first. What feels comfortable to one person won't always suit another.

The best advice is to try before you buy. It's like buying a pair of trainers: you should never buy them without jumping around in the shop first. If a mouse feels too clunky, don't let anyone talk you into buying it even if it does come in your favourite colour.

How to reduce the risk of RSI (continued)

Stretch - Side
File Options Stretch Next Previous Help

- 1) Cross one leg over the other.
- 2) With the single beep, twist upper body one way and leg the other.
- 3) Relax on the double beep.
- 4) Switch sides when indicated.

Press the space bar to begin the exercise.

Stretch - Shoulder Stretch
File Options Stretch Help

- 1) On the single beep, raise the shoulders as though trying to touch them to your ears.
- 2) On the double beep, relax them to normal sitting position.

Relax Stretch

Press the space bar to begin the exercise.

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problems: using a standard mouse involves tipping and twisting the hand; putting pressure on the nerves that run through the wrist.

As Chalmers-Mill explains, the further you have to extend and elevate your arm to reach the mouse, the greater the leverage on the complex shoulder joint. If you can use a keyboard without a numeric keypad, the mouse can sit closer to the home keys and the risk is immediately reduced.

There is an alternative; the trackball. The jury is still out on whether or not this is more ergonomically friendly, but Chalmers-Mill would recommend it to users already experiencing problems. Most PC manufacturers bundle a mouse rather than a trackball (probably for reasons of cost), but the advantage of a trackball is that it stays in place — no more scrabbling around to locate a dirt-ridden mouse and then stretching to navigate it around a cluttered desk. Many new designs incorporate a built-in wrist rest, too, and a large ball, designed to keep the wrist flat (in "neutral" position) and to extend the fingers rather than encourage the cramping grip often experienced with a mouse. (See *Taking the Strain*, page 192).

Miniaturisation must also share in the blame. If a standard keyboard cramps the wrists, a notebook keyboard will aggravate the problem. And "laptop" users, often encumbered by bulky overcoats, struggle to keep these small wonders perched on their knees or tiny fold-down tables while travelling, hunching over them to see the screen while cramping their shoulders and upper arms. "Notebooks are a nightmare," says Chalmers-Mill. "It's impossible to sit correctly and see the screen."

Another pitfall is that as notebooks become multi-functional, CD-ROM drives and PCMCIA slots are often fitted beneath the keyboard, exerting further pressure on the wrists as you tilt your hands to reach the keys, which can end up higher than they would otherwise be the case with a standard keyboard.

Doom and gloom?

No-one yet knows exactly why some users are more predisposed to upper limb disorders than others. There is a "Princess and the Pea" side to the story. As a VP of one computer peripherals manufacturer puts it: "It's a

Avoiding RSEye problems

Jonathan Chapple is on a crusade: the otherwise unassuming 55-year old chairman of Equanet, a corporate computer reseller based in Chessington, wants nothing less than to protect the eyesight of every middle-aged computer user in the UK. Many opticians need educating too, he says. They are prescribing expensive, general purpose or "progressive" lenses designed for normal distance vision, which not only fail to meet requirements for computer users, but are tiring and uncomfortable.

Chapple began researching the issue of eyestrain due to computer use because he was getting "very annoyed bumping into people who had bought expensive glasses which simply didn't do what the opticians said they would. I, myself, had previously bought a £200 pair of spectacles, which the optician had recommended for use with computer screens. Not only did they not work, but within weeks I was suffering serious eye-strain, and that led to headaches."

Progressive lenses

As you get older the lenses in your eyes become less flexible. This normal ageing process leads to presbyopia; a condition which means you have difficulty adjusting the eye to near vision. And, as you grow older it gets worse. You will suffer eyestrain unless you get correctly prescribed glasses, because your eyes will be unable to focus properly on your display.

The most popular glasses prescribed for computer users have Progressive lenses. These provide a continuous change in power from distant to near vision, and all the products are adequate for the occasional computer user. But it's a different matter for heavy user of computers: if you are over 40 years old and need spectacles for general use and for work, you will almost certainly need two pairs; one for work and another for leisure.

Progressive lenses are designed either for general or task-specific use. The trouble is, many opticians are prescribing unsuitable general purpose lenses for computer users. "There is no scandal" says Chapple, "just ignorance which needs to be addressed."

General purpose Progressive lenses are properly used for driving, sport and leisure. But typically, the middle distance viewing band is very narrow, which means that the wearer has to tilt his head backwards to bring the computer screen into focus and must turn his head to read across it — all very tiring.

Presbyopic computer users need task-specific glasses because of the way they work. "Remember, the majority of computer users perform a variety of tasks in addition to working at the screen," notes a document published by lens manufacturer American Optical. "Most read print-outs, use the telephone and write notes."

The typical computer workstation also has very specific viewing requirements, according to American Optical: "The centre of the screen is usually located 10-20 degrees below straight-ahead gaze. The desk and keyboard are 25-30 degrees below straight-ahead gaze."

The recommended distance for a monitor is between 22 and 25ins from your eyes. This requires intermediate viewing and is much further away (as far as your eyes are concerned) from hard copy reading material, which is typically around 14 to 16ins away from your eyes. As you get older, it gets more and more difficult for your eyes to automatically adjust to both reading distances and it is a struggle, which causes eyestrain and visual fatigue.

Task-specific lenses

Which leads us to task-specific Progressive lenses. The first product ergonomically designed for computer use is manufactured by American Optical's Truevision Technica. These glasses are distributed in the UK by UK Optical and are available through the Specsavers chain of opticians. Typically, they cost around £100.

The Truevision Technica brings the whole screen into focus with minimal head movement, by relocating both the viewing zones and unwanted astigmatism. It provides for distance viewing and full width vision intermediate and near-viewing zones.

Chapple is a firm fan: "Eureka! They work. This is the only solution which allows the older user to work steadily," he proclaims. "With the head held steady, one should be able to scan the entire screen area, without distortion, using normal eye movements. Looking down, one should be able to read papers on the desk without having to remove one's spectacles." However, the small distance viewing area of the lens makes it unsuitable for general use.

Chapple is so taken with Truevision Technica that he has recommended it in a newsletter sent out to his customers and he is negotiating with a chain of opticians to offer discounts to corporates. "Spectacles are said to be a grudge purchase" he says, "but the need is clearly there. Because there is not much demand for task-specific lenses, they are seldom offered by opticians — few of whom seem to know very much about the issue."

Chapple has no financial interest in Truevision Technica, so why the hullabaloo? "It's simple," he replies. "I want to raise consumer awareness of task-specific Progressive lenses. And I want to promote a healthy working environment by educating companies and their staff to ensure that they know how to minimise eyestrain when using computers."

Drew Cullen

A few of the best accessories

● One product which makes use of your existing peripherals is the Proformix Keyboard System; a result of the Cornell/Honeywell study undertaken in the US. The study makes much of the "neutral" typing low-risk posture. If you allow your hands to fall naturally into your lap; where they land is the ideal typing position. The Proformix system takes the form of a hinged tray attached to the underside of your desk. Whatever your desk height, you can adjust your seat so that your feet are flat on the floor and then move the tray into a comfortable position. The tray accommodates both keyboard and mouse and slopes gently away from the user, avoiding any unnecessary wrist deviation.

● Many "ergonomic" keyboards work according to one principle; angling the two halves of the main keypad to allow the elbows to rest in a more natural position. Apple's Adjustable Keyboard has a wide, gently sloping wrist rest, and splits down the middle, enabling the user to find the most comfortable typing angle. It has a detachable numeric keypad so the user can position the mouse closer to the alphabetic keys. Cherry Electrical sells a similar split keyboard for the PC.

The keyboard which sells in the largest volumes (and is one of the cheapest) is the Microsoft Natural Keyboard. This also separates the keys into two halves and its undulating design is claimed to accommodate the natural curves of the hand.

● The popular Maltron keyboard is a rather curious looking device with two large wells on either side, designed to fit "the shape of hands and the different lengths of fingers, to reduce movement and tension". It is pricey, but the company claims this has knocked RSI on the head for many sufferers.

There are special designs for single-handed use, for data entry, and for single-finger or head/mouth sticks. The company also sells the chunky Sicos Colani mouse, again designed to fit the hand more comfortably. Other mice making claims to be ergonomically acceptable include the Microsoft Ballpoint Mouse and the Logitech.



Left The Maltron keyboard

Below left Microspeed's PC-Trac

Below right The Proformix Keyboard System



If you prefer a trackball to a mouse, Microspeed sells a model with a large trackball and sloping wrist rest, as does Logitech. (Microspeed also sells its own brand of mouse, keyboard and notebook trackball for PC and Macintosh.)

● The trend with notebooks is to follow the acclaimed Apple PowerBook design; a large wrist rest to the front of the keyboard with an embedded trackball. Usually, the smaller the notebook the smaller the keyboard, but IBM's new Butterfly notebook features an extending keyboard which unfolds when the notebook is opened, giving a full-sized typing surface.



bit like smoking; some people who smoke all their lives will end up with lung cancer, while others won't be affected." But ergonomists agree that a healthy workstation and body should keep most people out of danger. Regular breaks are recommended, and if you can eliminate the time you spend at your screen, so much the better. The EEC Council Directive states: "The employer must plan the workers' activities in such a way that daily work on a display screen is periodically interrupted by breaks or changes of activity, reducing the workload at the screen." We all know that's a bit of a pipe dream, but just leaving the office on a coffee run is a start.

If you are unlucky enough to experience symptoms, the first step is to seek help from a doctor or physiotherapist as early as possible. According to the individual complaint, treatment can consist of massage, ice packs, hydrotherapy or stretching exercises, plus a thorough assessment of the sufferer's workstation in order to

prevent a recurrence of the symptoms. Surgery is considered a last resort and painkillers should be used with caution; numbing the body to pain negates its natural capacity to alert you to problems.

As we have seen in the Mughal vs Reuters case, people do lodge compensation claims against employers for work-related injuries, but these are expensive and have been known to cost people their jobs. The RSI Association recommends keeping a diary if you are seriously considering a claim, as well as contacting a lawyer specialising in injuries and obtaining specialist medical assessment.

There are two things to bear in mind: one, computers are safe if properly used; two, the vast majority of cases are treatable. If you want to leave it in the lap of the gods then fine, but if you're just beginning to enjoy Windows 95, a little attention now should guarantee your enjoyment of whatever Bill Gates et al care to throw at you in the future.

PCW Contacts

- Apple** 0181 569 1199
(Apple Adjustable Keyboard £170)
- Chartered Society of Physiotherapists**
0171 242 1941
- Cherry Electrical** 01582 763100
Health and Safety Executive
0171 717 6000
- HMSO** 01142 892345 (EC regulations)
- IBM** 01256 343000 (Butterfly notebook)
- IHSS** 0171 221 7848 (Exerciser software from about £20 for a single copy)
- Interact** 0171 242 2709
- London Hazards Centre**
0171 267 3387 (for books and advice)
- Maltron** 0181 398 3265 (dual-handed keyboards from £375)
- Microsoft** 01734 270000 (Natural Keyboard £69, Ballpoint Mouse £69).
- Microspeed** 00 32 2 716 5007 (PC and Mac trackballs from £51.95, notebook trackballs from £46.95)
- Rowley Ashworth** 0181 543 2277
(law firm with experience of RSI)
- RSI Association** 01895 431134
(for information and advice).
- Sven Christiansen** 01483 302728
(Proformix Keyboard System)

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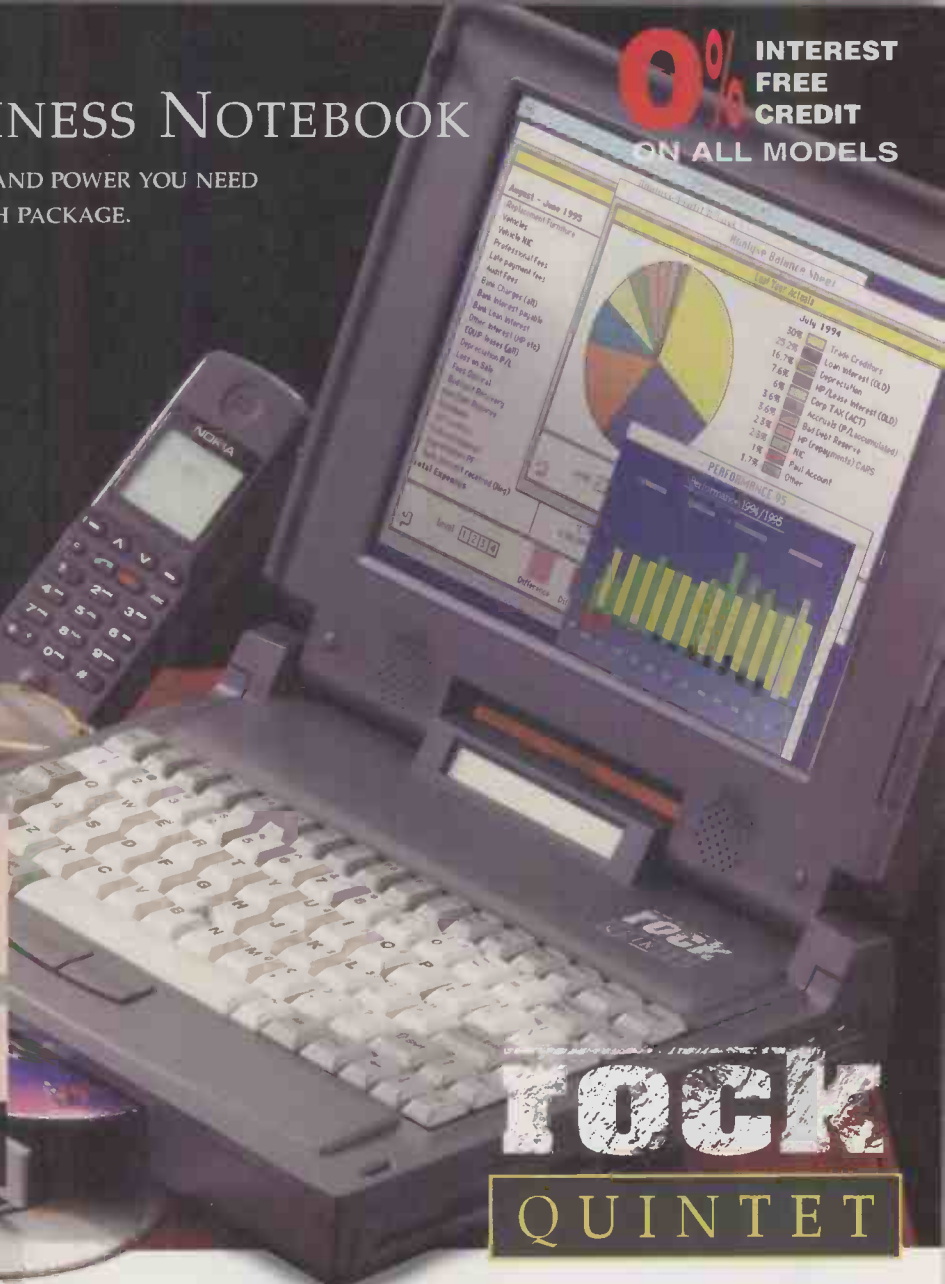
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Modems à la mode

V.34 modems have become good value for money and make the older, V.32bis technology seem passé. Geoff Marshall reviews the 15 V.34s in our group test: giving you the fax, summarising the advantages of fax modems, and providing guidance on whether your PC will be able to cope with the faster speeds.



PCW Modem Photography by David Whyte

Modem prices in the UK have fallen to a reasonable level and the low prices of some of the latest V.34 (28,800bps) modems tested here, make the older V.32bis technology look like poor value for money. Fax functionality at 14,400bps (V.17) is now taken for granted and it's almost impossible these days to find a modem without fax on sale in the shops.

Advantages

Using a modem for fax, rather than a fax machine, has many advantages. You can fax directly from any Windows application and broadcast personalised faxes. If you print out a document and then feed it into a fax machine, you're wasting paper, your own time, and telephone charges — it's inevitable that a fax machine will get blemishes on its scanner mechanism and thus transmit streaks and other unwanted marks.

But because fax transmission standards use special algorithms to compress the image, a perfectly clean image is transmitted in less time than a

MODEMS CONTENTS

201	AT&T Paradyne Comsphere 3810 Plus
201	BT Prologue V.34EX
203	Cray Quattro SM288
203	Dataflex HyperGem
203	Dynalink 1428 VQE Speedcom Pro
203	Orion Speedcom Pro External
203	Electronic Frontier XL
204	Hayes Optima 288 V.34/V.FC + Fax
204	Lasat Safire 288
204	Motorola 3400 Online
208	MultiTech MT2834 ZDX
208	Pace Linnet 34 fx
208	Tricom Tempest 34 Plus
208	US Robotics Sportster 28,800
210	Zoom V34XE
199	Is your PC fast enough for V.34?
210	How We Did the Tests
210	Editor's Choice
213	Glossary
213	Throughput: Table of Results
214	Table of Features

blemished one — thus saving telecom costs.

When receiving faxes, a fax modem saves paper because you may not need

to print out any, or all, faxes. However, if you wish to publish your fax number, you will need to leave your PC switched on all the time for receiving faxes. Many people feel uncomfortable about leaving a PC on permanently, but there really is little need for concern: PCs are now so reliable that leaving them switched on doesn't shorten their lives and the power consumption is less than 30W if you switch off the monitor.

Will there be anything faster? — in terms of speed over the analogue PSTN network (Public Switched Telephone Network) the answer is almost certainly, yes. Although it is becoming increasingly difficult to stretch technology further as theoretical limits get closer, modem designers keep finding ways of squeezing more throughput out of the available bandwidth. Data rates of up to 33,600bps are already available using proprietary extensions to V.34 in the AT&T and Cray modems tested here. The ITU-T is presently considering extensions to V.34 with DCE speeds of 31.2Kb/sec, 33.6Kb/sec.

Is your PC fast enough for V.34?

V.34 data-compressing modems raise issues of whether your PC can communicate with the modem at these new faster data throughput speeds of up to 115,200bps.

The PC's serial port is driven by a Universal Asynchronous Receiver Transmitter (UART). National Semiconductor has made UARTs for use in personal computers ever since the first IBM PC came out.

The first PCs used a UART known as INS8250-B. Although this could receive and transmit data at speeds of up to 56Kb/sec, it had a slow access time which was adequate in the days of 4.77MHz bus speeds and serial printers. When the IBM-AT came along a new UART was required because of the increase in bus speed and the fact that the bus was now 16 bits wide. This new UART was known as INS16450 and its CPU read and write cycles were over five times faster than its 8-bit predecessor.

Overrun error

In an AT/ISA-bus machine, all serial data transfers are handled by the CPU and each byte must pass through the CPU registers to get to memory or disk. This means that access times must be fast enough to avoid read overrun errors and transmission latency at higher bit rates. In fact when the IBM-AT came out, the performance of the INS16450 was adequate because the speed at which data was routinely transmitted through the serial port was not as high as that which is now possible with V.34 modems.

To understand the limitations of the INS 16450, it is necessary to recognise how the serial port interrupts the CPU which has to finish its current task, or service a higher-priority interrupt, before servicing the UART. This delay is the bus latency time associated with servicing the UART interrupt request. If the CPU cannot service the UART before the next data byte is received (by the UART from the serial port), data will be lost.



This condition is known as overrun error. At low bit rates the AT system is fast enough to read each byte from the UART receiver before the next byte is received. The higher the bit rate at the serial port, the higher the strain on the system to transfer each byte from the UART before the next is received. Higher bit rates cause the CPU to spend increasing amounts of time servicing the UART, thus making the whole system run inefficiently.

FIFOs

To attack this problem, National Semiconductor developed the NS16550A UART. This has been used in all IBM Micro-channel Architecture (MCA) PS/2s. The 16550 overcomes the previous problems by including First In First Out (FIFO) buffers on the receiver and transmitter. Each of these FIFOs can store 16 bytes. The 16550 facilitates DMA transfers over the Micro-channel bus by special circuitry, although the FIFOs provide benefits in all architectures.

The size of the receiver FIFO ensures that as many as 16 bytes are ready to transfer when the CPU services the UART receiver interrupt. The receiver can request transfer at FIFO thresholds of one, four, eight, 16 bytes full. This allows software to modify the FIFO threshold according to its current task and ensures that the CPU doesn't continually waste time switching context for only a couple of bytes of data received.

The transmitter FIFO ensures that as many as 16 bytes can be transferred when the CPU services the UART transmit interrupt. This reduces the time lost by the CPU in context switching. However, since a time lag in servicing an asynchronous transmitter usually has no penalty, CPU latency is of no concern when transmitting, although ultimate throughput may suffer.

It's worth pointing out that these FIFOs are not automatically

CONTINUES ON PAGE 201



Little 'uns

The little and large of the Adams range of standard and RAID based servers can now all be found on one page. From our small work-group units right through to our powerful Integrated RAID Server.

Our two RAID machines have proved extremely popular. The Modular offering a "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.

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Accura RAID Server prices

Model	Price	Price
Modular P90	£4899	N/A
Modular P100	£4999	N/A
Dual P90	£7999	£8249
Dual P120	£8149	£8549

Integrated RAID Server



- Intel Pentium® 90/120mhz CPU
- Dual Pentium m/b with Intel Neptune II, 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 pluggable" mounts.
- SCSI CD-ROM drive, 4.4 speed
- 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, 1 parallel port
- 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: Novell Netware (with SMP support), SCO Unix with SMP extns, Windows NT 3.5 (not supplied).



Modular RAID Server

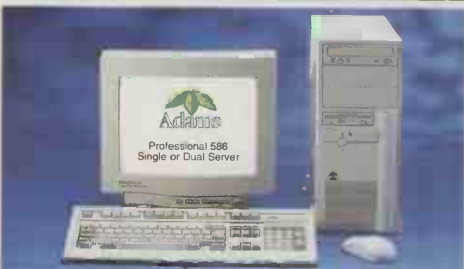


- Intel Pentium® 90/100mhz CPU
- Plug and play compatible with auto configuration (PCI and ISA bus)
- 256k external cache
- 32mb RAM (max 192mb)
- Modular expandable RAID enclosure with redundant PSU's
- 2.0gb addressable RAID level 5 array, with 3 x 1gb fast SCSI-II hard drives
- DPT 2124 PCI 32-bit 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).



Big Guns!

Single/Dual Server



- Intel Pentium® CPU(s)
- Plug and play compatible with auto configuration (PCI and ISA bus, PCI and EISA bus on dual model)
- 256k external cache (512k dual model)
- 16mb RAM (max 192mb)
- 2.0gb 8.5ms fast SCSI-II hard drive with DPT PCI 32-bit bus mastering SCSI controller (caching and RAID upgradeable)
- SCSI CD-ROM drive, 4.4 spd
- 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 10mbps bus mastering ethernet card
- Tower case with 200w PSU, Server case with 300w dual
- 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, (SMP extns may be req) or Windows NT (not supplied).

Model	Price	Price
Single P90	£2399	N/A
Single P100	£2499	N/A
Dual P90	£2799	£3049
Dual P120	£2949	£3299

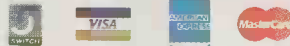
Some Server Options

Single Server main memory upgrades (per 1mb)	£29
Dual Server main memory upgrades (per 1mb)	£35
Single/Dual 2gb → 4gb SCSI-II HDD upgrade	£389
Single/Dual 2gb → 9gb SCSI-II HDD upgrade	£CALL
DPT 2024 → DPT2124 SCSI controller (faster!)	£149
DPT CM4000 cache module (for DPT2024/2124, 0mb)	£349
DPT DM4000 RAID module (for DPT2024/2124)	£349
Modular main memory upgrades (per 1mb)	£29
integrated main memory upgrades per 1mb	£35
Modular RAID upgrade from 2gb → 4gb capacity (2 extra 1gb SCSI-II drives and 2 mount modules)	£879
Modular 4gb → 8gb upgrade (5 x 2gb SCSI-II)	£1399
Modular 4gb → 16gb upgrade (5 x 4gb SCSI-II)	£2460
Integrated RAID upgrade to 5 drives (8gb capacity) (2 extra 2gb W-SCSI drives and 2 alloy mounts)	£1449
Integrated 8gb → 16gb upgrade (5 x 4gb W-SCSI)	£1749
RAID cache upgrades (per 1mb)	£33
4-16gb DDS-2 DAT drive mounted mounted in main server	£749
10mbps PCI ethernet card (combo)	£89
10/100mbps PCI ethernet card (UTP only)	£199
Separate external 2gb Modular RAID box with 2 x PSU's, 3 x m/modules containing 3 x 1gb SCSI-II HDD's	£1649

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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. 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.

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Is your PC fast enough for V.34?

CONTINUED FROM PAGE 199

used. The 16550 is pin-compatible with the 16450 and a direct replacement may be carried out on an existing PC. Therefore the 16550 defaults to emulating a 16450. The FIFOs have to be switched on by software but not all software supports this feature.

Alternative

Replacing the 16450 UARTs in your PC can be difficult if they are soldered rather than socketed. An alternative is the Hayes Enhanced Serial Port (ESP) which occupies a card slot in your PC and provides a 16550 to service an extra serial port.

Hayes ESP implements DMA technology too, providing your software supports it. Basically, ESP offloads the task of servicing the serial ports from the CPU, and provides an additional 1Kb of buffering between the serial port and the bus. If you use Microsoft Windows the issue of software supporting the 16550 UARTs does not arise with the ESP card, as Hayes supplies Windows drivers which work with any Windows comms package.

Do you need a 16550?

How do you know when you need a 16550? Well, in any multitasking

situation such as OS/2 or Windows, you certainly need one to use anything like the potential of V.34.

Using DOS, if the processor is dedicated to a comms task you may not need one unless you're handling highly compressible files and therefore wish to use DTE (data terminal equipment) speeds above 38,400bps.

However, it's not quite that simple. For instance, any file transfer over the serial port is likely to use a protocol like Zmodem which is very processor-intensive because of the CRC checking that it does, so you may encounter problems due to the processor continually being interrupted by the UART and performance will suffer. It is important to be aware that if you get an overrun of the UART buffer you will get errors, even using an error-correcting modem. An error-checking protocol like Zmodem will discover these errors and request re-transmission of the data, resulting in sluggish performance.

Many other factors affecting the load on the CPU may lead to the necessity of fitting a 16550. In one case the presence of two disk controllers, one SCSI and one IDE, on the same bus precipitated serial comms errors until a 16550 was fitted.

AT&T Paradyne Comsphere 3810 Plus

AT&T is the largest telephone company in the US and through its acquisition of the Paradyne Corporation it has become a significant player in the modem marketplace.

The Comsphere is housed in a fairly large grey plastic case with a row of 13 LEDs on the steeply raked front panel. There are some touch buttons on the front panel as well, and an LCD panel for manual configuration — it may also be configured using AT commands via the computer interface. The power supply is in a comparatively large black plastic housing, halfway down the mains cable.

The modem is based on AT&T's own

digital signal processor (DSP) chipset and the Motorola 68302 CPU.

Connectors are provided at the back for a network management interface, a V.24 serial interface, a telephone instrument and the telephone line itself. The 3810 Plus model we tested supports dialled and 2-wire and 4-wire leased lines. There is a rack-mounted version, too, which provides the same functionality for modem nests.

For improving the reliability of analogue cellular data links, AT&T has its own protocol called Enhanced Throughput Cellular (ETC). Naturally this is only effective if supported at both ends of the link, but if you use AT&T PCMCIA modems you will benefit from this technology when calling Comsphere modems at your own base, via analogue cellular services. Remote configuration and various security options are featured as standard.

This modem has proprietary extensions to V.34, allowing DCE speeds of up to 33.6Kb/sec which may yet become ratified by the ITU-T as an extension to V.34. It supports all slower data modulation schemes including AT&T's proprietary V.32terbo, but excepting Rockwell's proprietary V.fast Class. There was no fax functionality in the unit tested but fax is promised for the next Flash firmware upgrade.

BT Prologue V.34EX

Another product based on the Rockwell chipset; it is obviously manufactured to BT's specification by the

Swedish modem manufacturer, Intertex, whose products we have tested before. The standard Intertex specification has been cut down somewhat by the removal of synchronous DTE working, which is rarely required by the average PC user.

This modem offers compatibility with V.fast Class modems but not V.32terbo. All other slower ITU-T modulation standards are supported plus MNP10, Class 1 and Class 2 fax.

The desktop housing is quite small. It has ten LEDs and two push buttons on the front panel and features remote configuration, dial-back and password security. Delrina's fax and data software

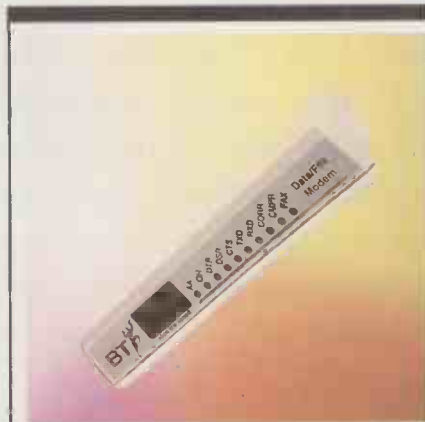
**AT&T Paradyne Comsphere 3810 Plus**

Price £795 (street)

Contact AT&T 01753 515000.

Fax 01753 550011

Verdict A top quality corporate-class data modem with network management and enhanced cellular features.

**BT Prologue V.34EX**

Price £199 (RRP); £175 (street)

Contact BT 01784 421976.

Fax 01784 421910

Verdict A compact fax/data modem at a very reasonable price.

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Cray Quattro SM288

Price £995 (RRP); £595 (street)

Contact Cray 01923 258000.

Fax 01923 210200

Verdict A high-end data modem with network management and security features aimed at the corporate marketplace, but its present lack of fax facilities will limit its wider application.

is bundled.

Cray Quattro SM288

This is the only modem in this group test which uses the Cornell chipset and therefore has a slightly unusual AT command set. It is housed in a very strong-looking light-grey ABS case with eight LEDs and six push-buttons on the front panel. The mains power supply is entirely internal.

There is a separate command port to enable commands to be entered, or calls monitored while the modem is online. It may also be connected to a modem management system to form part of a managed network of modems in a larger company. The Quattro supports all slower ITU-T modem standards but not the proprietary V.32terbo or V.Fast Class.

Although the Cornell chipset supports fax operation, the review sample had no fax facilities but it is expected that these will be added soon. Three levels of security control are provided. Level 1 security requires keys and passwords to be exchanged before a data link is established. Level 2 differs from level 1 only in that it allows external validation of keys and passwords by a central controller card at the central site. Levels 1 and 2 are transparent to the authorised user as they are managed by the modem firmware. Lastly, dial-back security allows the central site modem to verify incoming calls against a list of passwords and then dial the caller back using a telephone number corresponding to the password given. Remote configuration is also supported and is subject to security control.

Dataflex HyperGem

Based on the Rockwell chipset, this



Dataflex HyperGem

Price £249 (RRP); £225 (street)

Contact 0181 543 6417. Fax 0181 543 7027

Verdict A simple-to-use fax/data modem, which performed well in our tests.

modem offers compatibility with V.Fast Class modems but not V.32terbo. All other slower ITU-T modulation standards are supported, together with all EIA fax standards, as well as MNP10 which is particularly good over poor phone lines and cellular links. The Dataflex desktop unit is housed in a black plastic case, with nine LEDs which indicate all the usual functions. One gives a positive indication that fax mode is in use — a useful but uncommon feature of modern modems. There are no manual controls and the mains adaptor is entirely internal. Both Class 1 and Class 2 fax group standards are supported for Group 3 fax communications at up to 14,400bps. Other features include dial-back security, caller validation via a password, and remote configuration.

Dataflex offers a portable version in the well-known Dataflex pocket modem housing, a PC internal card, and a PCMCIA. All versions should perform identically as they are based on the same firmware and chipset. Additionally, Dataflex has a desktop modem with voice functionality known as the Comms Office for customers requiring answering machine functionality as well as data and fax.

Dynalink 1428 VQE Orion Speedcom Pro External

The Dynalink and Orion modems in this review are strikingly similar: the user manuals are the same size, written in the same way with the same

typography and neither has a brand name on it. They have the same row of nine LEDs on their front panels although the plastic cases are slightly different. At first we thought that this was a classic case of badge-engineering, so we expected identical performances. We couldn't have been more wrong.

Both performed well on one-way data traffic, but the Dynalink was severely bottle-necked when data was flowing in both directions simultaneously. The Dynalink simply stopped working during four separate two-way data tests and had to be turned off and then on again. Two of these failures were to do with compressible data, and the other two with incompressible data. This indicates a problem within the modem's CPU in handling large data throughputs. It would be fair to say that this would not affect most users unless the application is LAN bridging, but the Orion is clearly more generously powered on the processor front.

In fact, the modems are totally different inside. The Dynalink is based on the standard Rockwell chipset and includes V.fast Class as well as MNP10, but lacks V.32terbo. The Orion is designed around the AT&T DSP chipset and therefore supports V.32terbo but not V.fast Class.

Dynalink includes with its product a fast 16550 serial port card for optional installation inside your PC, and Delrina software. Orion bundles Cheyenne's software suite which includes voice, fax and data functionality. The Orion product tested did not include voice functionality, but this feature will be available, at extra cost, by the time you read this.



Dynalink 1428 VQE

Price £169 (RRP); £139 (street)

Contact Dynalink 01252 727711.

Fax 01252 727733

Verdict Disappointing performance, yet the same price as the superior Orion product. Not recommended.

Orion Speedcom Pro External

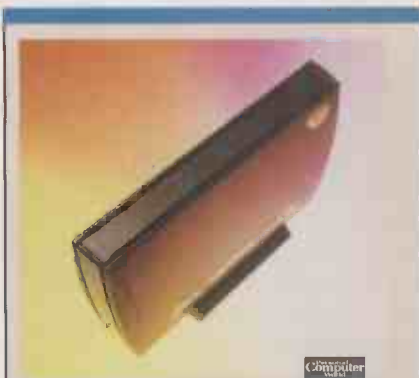
Price £139 (RRP); £139 (street)

Contact Orion Technology

01252 838393.

Fax 01252 834881

Verdict Good performance at an amazingly low price.



Electronic Frontier XL

Price £149 (RRP); £149 (street)

Contact Electronic Frontier 01734 810600.

Fax 01734 811600. Web <http://www.elecfon.com>

Verdict Very good performance combined with an astonishingly low price.



Electronic Frontier XL

Electronic Frontier's modem is presented in a black aluminium housing with a very solid feel to it. It has nine LEDs and is supplied with a stand which allows the modem to be used either horizontally or vertically.

Although based on the standard Rockwell V.34 DSP, it uses its own data pump rather than Rockwell's and this results in excellent throughput figures.

Like other Rockwell-based products it supports V.fast Class but not V.32terbo. Delrina's fax software is bundled, along with Comit data comms software.

Hayes Optima 288 V.34/V.FC + Fax

The Hayes modem is simple to use, with no front panel switches or buttons. It has eight LEDs on the front panel and an on/off switch on the back panel. The case is of a solid-feeling bright aluminium construction. It offers backward compatibility with V.Fast Class

but not V.32terbo, in common with other Rockwell-based V.34 modems. Hayes modems have an unusual feature which is handy for synchronous users: using Hayes proprietary AutoSync mode, the modem can provide buffering between an asynchronous serial port on a PC and a synchronous protocol like SDLC. This can be very useful for applications requiring IBM 3270 and 5250 terminal emulation, such as remote access to IBM AS/400 and mainframe computers. For such synchronous applications it can provide a very economical solution by avoiding the need for a synchronous serial port.

The bundled software includes Hayes Smartcom LE for Windows and Hayes Smartcom Fax for Windows package. For a modem which lacks remote configuration, security features and network management facilities, it is slightly expensive.

Lasat Safire 288

LASAT is a Danish company specialising in modems and ISDN adaptors. Founded in 1982, LASAT has only recently begun marketing outside Denmark and Scandinavia. Its UK office opened in October 1993. The parent company is now 35 percent owned by Olicom (as the result of a deal in October 1994). Although not yet well known in the UK, LASAT ranks 18th in Europe in the high-end modem market, above Andest, Pace, Psion Dacom, and Sonix, according to Dataquest.

LASAT products carry a ten-year warranty. The Safire 288 must be the smallest desktop modem on the market — and it's finished in a most unusual colour; purple. No bigger than a packet of

20 cigarettes, its wedge-shaped casing was designed by Jacob Jensen (who designs for Bang & Olufsen hi-fi). To complete the designer look, the sloping front panel has three tiny red indicator lamps.

The three LEDs are for indicating power on, Data Terminal Ready (DTR), and Data Carrier Detect (DCD). The rear panel is equally simple, with just three connectors: one for power input from an external mains transformer, a second for the serial interface to the computer equipment, and thirdly the telephone line connector.

Motorola 3400 Online

The Motorola modem is housed in an ivory-coloured desktop case with eight LEDs. Designed around the latest Motorola 68356 integrated circuit, which combines DSP and data pump in a single programmable chip, it supports V.34 and all relevant ITU-T standards but not the proprietary V.32terbo or V.fast Class, and has Class 1 fax functionality at up to 14,400bps.

Three levels of security are provided. Firstly, a password may be demanded of the remote user before the data communication proceeds. Secondly, callback security may be added to the simple password request and a maximum of two pre-arranged callback numbers may be stored — each user password may be associated with one or other of these call-back numbers. Thirdly, the highest level of security requires that the password be re-entered following the password-callback sequence to the user, thus guaranteeing that the caller is actually at the designated callback number. A disadvantage of enabling any



Hayes Optima 288 V.34/V.FC + Fax

Price £499 (RRP); £400 (street)

Contact Hayes 01252 775577. Fax 01252 775511. Web eurosales@hayes.com

Verdict An easy to set up fax/data modem which performed well on test.



Lasat Safire 288

Price £299 (RRP); £199 (street)

Contact Lasat 0181 899 1765. Fax 0181 899 1711

Verdict An unusually designed modem; pocket-sized and reliable.



Motorola 3400 Online

Price £170 - £199 street price (RRP n/a)

Contact Motorola 01293 404343. Fax 01293 404372. Web <http://www.mot.com>

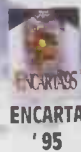
Verdict A full-featured modem with good security features which achieved excellent throughput figures in our tests.

Atlantic Systems



Atlantic Multi-Media Plus2

- Intel 75Mhz Pentium Processor
- 8Mb RAM, 256k cache
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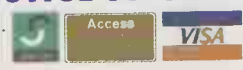
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of these security features is that the fax functionality becomes unavailable for both incoming and outgoing faxes.

There are two versions of the product on sale, simply depending on whether or not Internet software is bundled. We tested the Internet version, called 3400 Online, which comes with Trumpet Winsock, Mosaic World Wide Web browser and a licence to download Vocaltec's Internet Phone software. Instructions are included for getting on to the net immediately by registering online with IBM's Global Network. The version which lacks the Internet software is called 3400 Pro and is about £10 cheaper.

MultiTech MT2834 ZDX

This modem is based on AT&T's digital signal processor (DSP) chipset and supports V.32terbo but not V.fast Class. It supports all other relevant ITU-T standards as well as possessing Class 2 fax capabilities up to 14,400bps. It is housed in slim plastic case with an external mains transformer. Ten LEDs provide comprehensive information on the status of the connection.

Performance was good, although not excellent when compared with some other modems in this feature, for two-way data throughput. This is due to the not-so-generously powered Zilog data pump processor, which is nevertheless adequate for one-way data streams. However, two-way throughput is important only if LAN bridging is required and this modem is not aimed at the LAN market anyway.

MultiTech bundles its own MultiExpress Fax and Data comms software.



MultiTech MT2834 ZDX

Price £299 (RRP); £165 - £199 (street)
Contact MultiTech 01344 891266. Fax 01344 891215. Web <http://www.multitech.com>

Verdict A good, general-purpose fax/data modem.



Pace Linnet 34 fx

Price £299 (RRP); £180 (street)
Contact Pace 01274 532000.
Fax 01274 537029. Web <http://www.cityscape.co.uk/users/et30/pacehome.htm>

Verdict Good value for money for a fax/data modem with additional security features.

Pace Linnet 34 fx

The Linnet is housed in a dark-grey desktop case and the mains power supply is entirely internal. There are six LEDs but no manual controls. Like other modems based on the Rockwell chipset, the Pace offers compatibility with V.fast Class modems but not V.32terbo. All other, slower, ITU-T modulation standards are supported as well as MNP10 and all fax modem standards.

Password and dial-back security are included with a 20-entry dial-back store holding 20 combinations of password and dial-back phone numbers. Password security may be used without dial-back and a password-protected remote configuration facility is provided. Pace additionally offers a pocket modem and a PCMCIA modem, based on the same chipset and firmware.

Tricom Tempest 34 Plus

Tricom markets under its own name in the UK, the products of the US company Microcom which developed the MNP standards for modem error correction and compression.

MNP5 and MNP10 are now commonly licenced to other modem manufacturers by their inclusion in the Rockwell chipsets. MNP10 is optimised for high throughput and reliability over poor telephone lines, including cellular links, and includes MNP5 data compression.

Microcom's own implementation of MNP10, included in this Tricom product, is superior to those versions available in the Rockwell chipsets. In particular, Microcom's MNP10 products overcome one of the difficulties experienced with Rockwell-based modems: that is, the



Tricom Tempest 34 Plus

Price £399 (RRP); £299 (street)
Contact 01494 483951. Fax 01494 485213

Verdict A fast, reliable, modem but its higher price can only be justified if the advantages of the parallel-port interface and its superior performance over poor telephone circuits are important to you.

V.42bis is a better algorithm than MNP5 for compressing highly compressible data, and there is no standard way to automatically negotiate the best compression algorithm for the data. So to get the best throughput with Rockwell chipsets, you have to disable MNP10, thus losing the advantages of operation over poor telephone circuits.

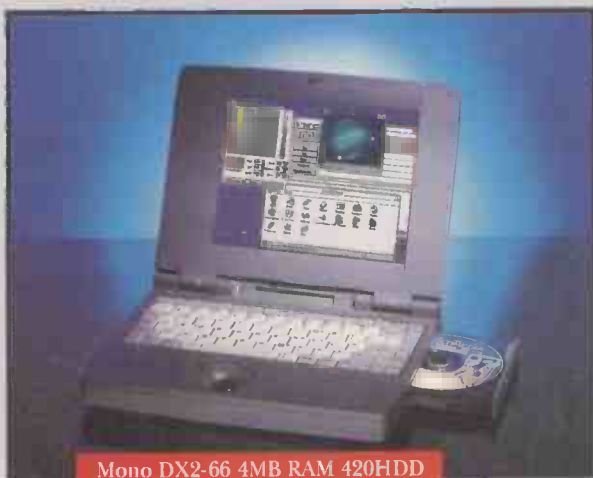
By using a combination of Rockwell and Microcom-proprietary chips, this modem allows MNP10 to use V.42bis compression rather than MNP5, leading to the best of both worlds. The only downside to this is that it only works if the modems at both ends of the link have the Microcom proprietary technology. Even Tricom's cheaper Tempest 34 lacks this feature as it is based on pure Rockwell chipsets. Only the Tempest 34 Plus and the higher-end Tornado and Traveller products from Tricom have this superior MNP10 technology.

Another unique feature of Tricom/Microcom products is the parallel-port interface which allows much higher speeds than would be possible via a serial port. Up to 300,000bps is claimed under Windows but this is not evident in our results because all our tests were carried out under DOS, and there are parallel port drivers for Windows only. In other respects the modem is a fairly standard plastic box with eight LEDs, and the usual Rockwell limitation of lack of support for AT&T's proprietary V.32terbo modulation scheme.

US Robotics Sportster 28,800

The Sportster is housed in a small, white, plastic case with seven LEDs. On the underside of the modem is a list of

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All machines come with free DOS and Windows, power adaptor, technical support, 12 months' return-to-base warranty and free carry case. On-site warranty £49. Delivery £15.

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**US Robotics Sportster 28,800**

Price £199 (RRP and street)

Contact US Robotics 01734 228200. Fax 01734 695555; Web <http://www.usr.com>**Verdict** Good performance from one of the modem industry's top-selling brand names.

all the DIP switch settings which are useful for forcing certain operating conditions. Naturally, these conditions

can also be set using AT commands.

Because US Robotics licensed the V.fast Class protocols from Rockwell, rather than using the Rockwell chipset, this modem supports V.fast Class as well as V.34, but not V.32terbo. The DSP chip is USR's own design manufactured by Texas Instruments. An NEC data pump provides a reasonable amount of processing horsepower.

The documentation is exceptionally good and it was nice to find Macintosh users (as well as PC users) thoroughly catered for in the handbook. The bundled software is Quicklink II fax and data.

Zoom V34XE

The Zoom modem is another Rockwell-based unit. It is well engineered, with attention having been paid to effective screening of its internal components. Its light grey plastic casing displays fifteen LEDs, the more unusual being to distinguish a V.fast Class connection and

**Zoom V34XE**

Price £169 street (RRP n/a)

Contact 01784 421123. Fax 01784 421910. Web; sales@extech.demon.co.uk**Verdict** A quality product at a very attractive price.

to indicate fax operation.

It supports both Class 1 and Class 2 fax standards and MNP10 data protocol. Delrina's fax and data software is included.

How we did the tests

The data functionality was tested using simulated telephone lines via a Telephone Network Simulator to guarantee that the every modem would be tested under exactly the same conditions. For the data throughput and fax tests, we simulated a good quality telephone line with no impairments. —

telephone lines in the UK are now so good that we felt it would be irrelevant to test performance over severely impaired lines.

Delrina's WinFax Pro software was used, running under Windows 3.1, to send and receive a multi-page document using a single example of each modem communicating with a real fax machine (a Canon L-785).



Modems were tested for data throughput in identical pairs using a Dell 486/66MHz machine with two Hayes Enhanced Serial Ports (ESP) installed. Dedicated software was used to automate and time the throughput tests which were done under MSDOS

6.22. This allowed a DTE speed of to 115,200bps to be used for all the throughput tests. All the V.34 products tested supported 115,200bps.

Two file types were used for throughput testing: a bit-mapped graphics file, and a compressed archive file. The first was highly compressible — certainly above 4:1; the second was incompressible. Separate file transfers were timed using one-way and two-way data flows. With a two-way data flow both modems send data at the same time, over the same telephone line.

The results are shown in the table on page 213 with compressible and incompressible file transfer speeds being kept separate. It is interesting to see that some modems appear to be bottle-necked by an underpowered processor when doing two-way data transfers, while others (such as the Motorola) are more generously powered. However, it's fair to say that most modems would not be used for two-way traffic unless used for something like LAN bridging.

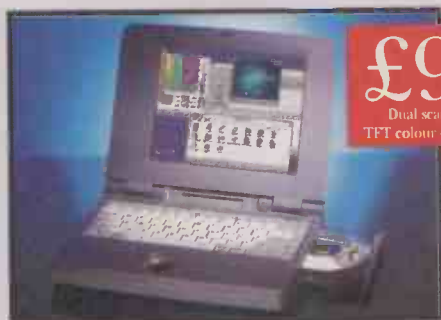
**Editor's Choice**

Value for money plays a big part in deciding which modem you should buy. With modems ranging in street price from £139 up to £795, it is hard to assess value for money because the more expensive modems have many more features that would be attractive to corporate users. Only the user can decide which features are desirable for his application and what he is prepared to pay for them.

The Editor's Choice is the Motorola 3400 Online for delivering a rich set of features, together with excellent performance for a V.34 fax/data modem, and at such a reasonable price. It should be possible to buy the Pro version, without Internet software, for as little as £160 by shopping around.

The Electronic Frontier XL is Highly Commended. It came very close to the Motorola in performance and makes few compromises to achieve its exceptionally low street price of £149.

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The 4023 is one of the smallest and lightest notebook computers available today, yet delivers as much power and functionality as a full-size notebook. It sets new standards for convenience, flexibility and price/performance.

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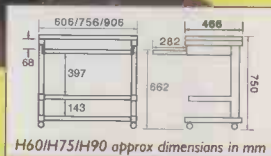
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Mouse Board	MB	£15	£13	£15.28
Overshelf 600	S60	£32	£27	£31.72
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Overshelf 900	S90	£39	£33	£38.77



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Extension	XX	£20	£17	£19.98
Mouse Board	MB	£15	£13	£15.28
Overshelf 600	S60	£32	£27	£31.72
Overshelf 750	S75	£35	£30	£35.25
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Glossary

AT command A de facto standard, started by Hayes Microcomputer, for issuing commands such as auto-dialling etc to modems, via an asynchronous serial port. Unfortunately, little standardisation is apparent regarding commands specific to anything later than V.22bis. This problem includes error correction and data compression commands. It has the disadvantage of being unusable with synchronous protocols where V.25bis is more appropriate.

Autobaud The ability of a serial port on a modem to automatically determine the asynchronous data rate by sampling incoming data from the PC.

AutoSync Provides buffering between an asynchronous serial port on a PC and a synchronous protocol like SDLC or HDLC used by IBM. This saves the additional cost of a synchronous serial card for the PC and allows the use of AT commands to configure the modem.

baud The rate at which data symbols are transmitted. Note that in general a data symbol may consist of more than one bit depending on the modulation scheme used. Often confused with bps (bits per second).

Class 1 fax An EIA standard for fax software compatibility with fax modems which requires the fax software running on the PC to do most of the work of fax image preparation and negotiation with the remote fax machine.

Class 2 fax An EIA standard for fax software compatibility with fax modems which delegates negotiation with the remote fax machine to the fax modem. Fax image preparation is still carried out by the PC.

DCE Data Communications Equipment is the apparatus used to exchange data with the communications network, such as the PSTN or ISDN.

DTE Data Terminal Equipment is the computer system, or a dumb terminal, connected to the DCE for the purpose of sending and receiving data.

EIA/TIA The Electronic Industries Association/Telecommunications Industry Association which sets US national standards which are frequently adopted by other countries. Examples include the Class 1 and 2 fax standards, and the

serial port standard RS-232.

fall-back The ability of a modem to select a slower transmission speed if the telephone line is of poor quality. (See also; fall-forward).

fall-forward The ability of a modem to select a faster transmission speed if the telephone line quality improves during the progress of a data call. (See also; fall-back). ITU-T International Telecommunications Union, formerly known as the Consultative Committee on International Telegraph and Telephone (CCITT). This body sets international standards in telecommunications. Its standards are not mandatory, rather they are recommendations.

LAP-M An error correcting protocol used in V.42.
MNP Microcom Network Protocol has become a de facto standard in error correction and data compression. Important versions are MNP2 to MNP4 which implement error correction by requesting that the data block be re-transmitted. MNP5 has become a de facto standard in data compression using Huffman coding. MNP7 is an improved data compression algorithm which never became a standard, due to the success of V.42bis. MNP10 enhances fall-back negotiation, allowing fall-back from V.32 to V.22 but is proprietary.

PSTN Public Switched Telephone Network is the network we all use every for voice and modem calls.

PTT Postal, Telephone and Telegraphy administration. A generic title for an organisation which provides telecommunications services on a national basis.

UART Universal Asynchronous Receiver Transmitter is an integrated circuit used to interface a computer to an asynchronous serial port.

V.8 An ITU-T standard for the automatic negotiation of the optimum modulation mode for two communicating modems. It also provides a way of distinguishing between voice, fax, and data on incoming calls if the calling device also supports V.8. Modulation modes supported include: V.17, V.21 V.22(bis), V.23, V.26bis, V.26ter, V.27ter, V.29, V.32(bis), V.34, and V.42(bis).

V.17 An ITU-T standard for communication at 14,400bps. Primarily used for fax transmission.

V.24 An ITU-T standard for the hardware interface

of a serial port. It is electrically equivalent to the EIA standard, RS-232-D. It defines which pins of the standard 25-pin D-connector are used, and for what.

V.25 An ITU-T standard for automatic answering of telephone calls. It defines calling tones used to identify incoming telephone calls from modems and fax machines. If the calling device sends V.25 calling tones, auto-answering equipment can determine whether the incoming call is voice, fax, or data and then handle or route the call appropriately.

V.25bis An ITU-T standard for issuing commands for auto-dialling in a similar way to the Hayes AT command set. It is much more limited in scope than the AT commands, but has the advantage of working with synchronous protocols.

V.27ter An ITU-T standard for communication at 4,800bps with a fall-back speed of 2,400bps. Primarily used for fax transmission.

V.29 An ITU-T standard for communication at 9,600bps. Primarily used for fax transmission.

V.32 An ITU-T standard for data communication at 9,600bps, with fall-back speeds of 7,200 and 4,800bps. Uses QAM with trellis coding.

V.32bis As V.32 but offering enhanced speed of 14,400bps with an additional fall-back speed of 12,000bps.

V.32terbo AT&T's proprietary extension to V.32bis offering an enhanced speed of 19,200bps with an additional fall-back speed of 16,800bps.

V.34 An ITU-T standard which allows speeds of up to 28,800bps using new techniques to improve noise immunity. Fall-back speeds are defined in increments of 2,400bps right down to 2,400bps.

V.42 An ITU-T standard for error correction using requests for re-transmission; a method of correction. (Also known as LAP-M).

V.42bis An ITU-T standard for data compression using Lempel-Ziv encoding. More effective than MNP.

V.FC V. Fast Class is a proprietary standard developed by Rockwell for data communications at 28,800bps. V.FC is technically similar to, but incompatible with, V.34.

THROUGHPUT: TABLE OF RESULTS

File Type Manufacturer	Compressible		Incompressible	
	one-way	two-way	one-way	two-way
Zoom	111.69	64.78	33.68	28.93
US Robotics	111.30	86.49	33.72	33.72
Tricom Tempest 34 Plus	114.49	81.63	34.46	30.64
Pace	113.68	91.43	33.68	33.68
Orion	113.57	111.11	34.48	33.86
Multitech ZDX	114.08	75.83	33.61	32.37
Motorola 3400	114.70	114.49	34.17	33.81
Lasat	111.89	64.13	33.68	28.23
Hayes Optima	113.27	111.89	34.48	34.48
Electronic Frontier	114.49	112.48	33.47	33.47
Dynalink	112.08	64.97	33.68	29.01
Dataflex	109.03	62.08	33.68	27.87
Cray	106.49	69.64	32.80	28.85
BT Prologue	112.48	68.16	33.67	29.73
AT&T	114.70	105.61	33.16	33.14

V.34 MODEMS TABLE OF FEATURES

	AT&T	BT	Cray	Dataflex	Dynalink	Electronic Frontier	Hayes	Lasat
Manufacturer Model	AT&T Paradyne Comsphere 3980	BT V.34EX	Cray Quattro SM 288	Dataflex HyperGem (desktop)	Dynalink 1428 VQE	Electronic Frontier XL	Hayes Optima 288 V34/VFC+FAX	Lasat Safire 288
Supplier	AT&T Paradyne	Telecom M'tg & Dist.	Cray	Dataflex	Dynalink	Electronic Frontier	Hayes	LASAT
Telephone	01753 51500	01784 421976	01923 258000	0181 543 6417	01252 727711	01734 810600	01252 775577	0800 136331
Fax	01753 550011	01784 421910	01923 210200	0181 543 7027	01252 727733	01734 811600	01252 775511	0181 899 1711
MNP Level 5	●	●	●	●	●	●	●	●
MNP Level 10	○	●	○	●	●	○	○	●
V.21	●	●	●	●	●	●	●	●
V.22	●	●	●	●	●	●	●	●
V.22bis	●	●	●	●	●	●	●	●
V.23	●	●	●	●	●	●	●	●
V.25bis	●	●	●	○	○	○	○	○
V.25	●	●	●	●	●	○	●	●
V.32	●	●	●	●	●	●	●	●
V.32bis	●	●	●	●	●	●	●	●
V.32terbo	●	○	○	○	○	○	○	○
V.fast class	○	●	○	●	●	●	●	●
V.34	●	●	●	●	●	●	●	●
V.42 error correction	●	●	●	●	●	●	●	●
V.42bis data compression	●	●	●	●	●	●	●	●
Autosync	○	○	○	○	○	●	●	○
Synchronous DTE working	●	○	●	●	●	●	●	●
Max DTE working (bits/sec)	115200	115200	115200	115200	115200	115200	230400	115200
Max DCE speed for data	33600	28800	32000	28800	28800	28800	28800	28800
Remote configuration	●	●	●	○	●	○	○	○
Number of factory default configurations	7	2	12	1	2	1	1	2
No. of user conf.	3	2	4	3	2	2	2	2
No. of Security callback	1	20	30	0	0	4	0	0
No. of user tel. no.s	20	20	30	10	4	4	0	4
V.17	●	●	○	●	●	●	●	●
V.27 ter	●	●	○	●	●	●	●	●
V.29	●	●	○	●	●	●	●	●
TIA/EIA Class 1	●	●	○	●	●	●	●	●
TIA/EIA Class 2	●	●	○	●	●	●	○	●
Chipset	AT&T	Rockwell	Cornell	Rockwell	Rockwell	Rockwell	Rockwell	Rockwell
Which fax S/w supplied?	None	Delrina	None	SuperFax	Delrina	Delrina	Smartcom FAX	Trio
Which data S/w supplied?	None	Delrina	None	SuperFax	Delrina	Comit	Smartcom LE	Trio
Internal speaker	●	●	●	●	●	●	●	●
Power on/off switch	●	●	○	○	●	●	●	○
Phone handset connectors	●	●	○	○	○	○	●	○
Number of indicators	13 plus LCD	10 plus 3 digit display	8	9	9	9	8	3
Firmware in flash memory	●	○	●	○	○	○	○	○
REN	1	1	1	1	1	1	1	1
BABT approved	●	●	●	●	●	●	●	●
Dimensions	56 x 190 x 300	25 x 130 x 180	220 X 225 X 52	50 X 150 X 250	120 x 150 x 28	122 x 175 x 30	43 x 140 x 244	89 x 94 x 23
Weight (grams)	1130	280	1750	1000	280	450	870	125
List price £	795	199	995	249	169	149	499	299
Street price £	795	175	595	225	139	149	399	199



KEY ● Yes ○ No

V.34 MODEMS TABLE OF FEATURES

	Motorola	MultiTech	Orion	Pace	Tricom	US Robotics	Zoom
Manufacturer Model	Motorola 3400 Online	MultiTech MT2834ZDX	Orion Technology SpeedCom Pro	Pace Linnet 34 fx	Tricom Tempest 34 Plus	US Robotics Sportster 28,800	Zoom V34XE
Supplier	Motorola	MultiTech	Orion Technology	Pace	Tricom	US Robotics	Express Technology
Telephone	01293 404343	01344 891266	01252 838393	01274 532 000	01494 483951	01734 228200	01784 421123
Fax	01293 404372	01344 891215	01252 834881	01274 537 029	01494 485213	01734 695555	01784 421910
MNP Level 5	●	●	●	●	●	●	●
MNP Level 10	○	○	○	●	●	○	●
V.21	●	●	●	●	●	●	●
V.22	○	●	●	●	●	●	●
V.22bis	●	●	●	●	●	●	●
V.23	○	●	●	●	●	●	●
V.25bis	●	○	○	○	○	○	○
V.25	○	●	●	●	○	●	○
V.32	●	●	●	●	●	●	●
V.32bis	●	●	●	●	●	●	●
V.32terbo	○	●	○	○	○	○	○
V.fast class	○	○	○	●	●	●	●
V.34	●	●	●	●	●	●	●
V.42 error correction	●	●	●	●	●	●	●
V.42bis data compression	●	●	●	●	●	●	●
Autosync	○	○	●	●	○	○	○
Synchronous DTE working	○	○	●	●	○	○	○
Max DTE working (bits/sec)	115200	115200	115200	115200	115200	115200	115200
Max DCE speed for data	28800	28800	28800	28800	28800	28800	28800
Remote configuration	○	●	●	●	●	○	○
Number of factory default configurations	1	1	1	1	1	2	1
Number of user conf.	2	1	1	2	4	1	1
Number of Security callback	2	0	0	0	40	0	0
Number of user tel. no.s	9	2	0	4	9	4	4
V.17	●	●	●	●	●	●	●
V.27 ter	●	●	●	●	●	●	●
V.29	●	●	●	●	●	●	●
TIA/EIA Class 1	●	○	●	●	●	●	●
TIA/EIA Class 2	○	●	●	●	○	●	●
Chipset	Motorola	AT&T	AT&T	Rockwell	Rockwell/Microcom	USR	Rockwell
Which fax software supplied?	Delrina	Multiexpress fax	BitWare	SuperFax	Delrina	Quicklink II	Delrina
Which data software supplied?	Delrina	Multiexpress Comms	BitWare	SuperFax	Delrina	Quicklink II	Delrina
Internal speaker	●	●	●	●	●	●	●
Power on/off switch	●	●	●	○	●	○	○
Telephone handset connectors	○	○	●	●	●	○	○
Number of indicators	8	10	9	6	7	7	15
Firmware in flash memory	○	○	○	○	●	○	○
REN	1	1	1	1	1.5	1	1
BABT approved	●	●	●	●	●	●	●
Dimensions	163 x 135 x 38	114 x 142 x 25	150 x 110 x 30	160 x 250 x 35	162 x 110 x 25	95 x 165 x 35	157 x 41 x 22
Weight (grams)	300	224	270	805	282	224	350
List price £	No RRP	299	139	299	399	199	No RRP
Street price £	170 to 199	165 to 199	139	180	299	199	139



KEY ● Yes ○ No



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XX SERVER

Promoting new Industry standards

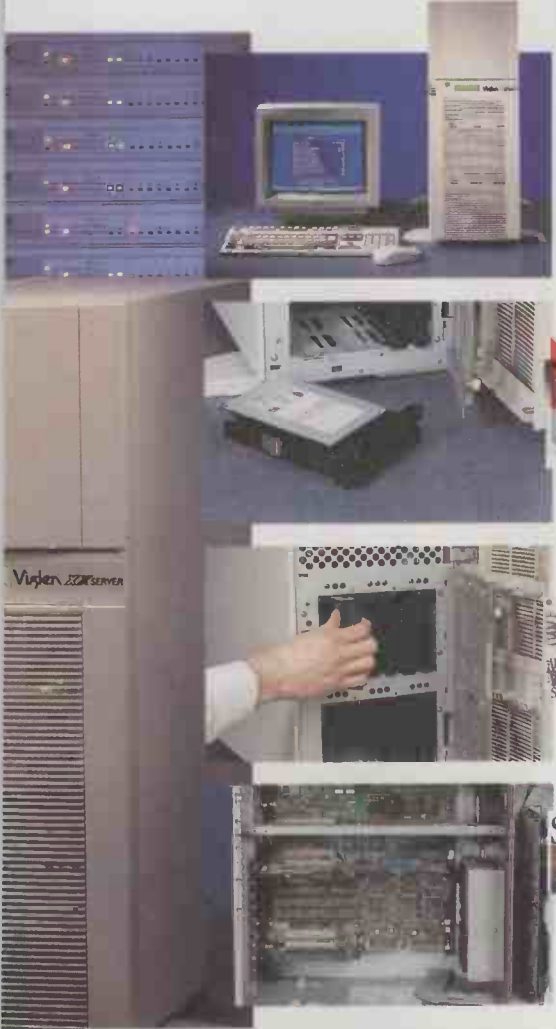
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RAID configurations include 4MB Cache on the SCSI RAID controller card. For improved performance this can be upgraded to a maximum of 32MB. The following are some ready to run server configurations.

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2GB SCSI 2	32MB	£7319	£8109
4GB RAID 5	32MB	£9339	£9649
8GB RAID 5	64MB	£11749	£12049

The XX Network SERVER includes Novell® Netware 4.1 pre-installed with a 25 user licence. To increase the number of users please add £479 for a 50 user licence, £1219 for 100 user licence, £3249 for a 250 user licence, £7849 for 500 user licence and £16319 for 1000 user licence (for SFT III 4.1 please add £599 for 100 users or less and £1494 for more than 100 users).

VIGLEN XX NT SERVER

HARD DISK	RAM	Pentium® processor 100MHz	Dual Pentium® processor 133MHz
2GB SCSI 2	32MB	£6539	£8259
4GB RAID 5	32MB	£8559	£10289
8GB RAID 5	64MB	£10969	£13299

The Viglen XX NT SERVER Includes Microsoft Windows™ NT 3.5 Server. For client licences, please add £29 for single user client and £469 for 20 user clients licences.

VIGLEN XX SCO UNIX SERVER

HARD DISK	RAM	Pentium® processor 100MHz	Dual Pentium® processor 133MHz
2GB SCSI 2	32MB	£6739	£9716
4GB RAID 5	32MB	£8759	£11739
8GB RAID 5	64MB	£11169	£14149

The Viglen XX SCO Unix SERVER Includes SCO OPEN SERVER ENTERPRISE 5 USER CD. Please add £319 for a 10 user licence, £639 for a 25 user licence and £1919 for a 500 user licence.

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Laser lights

Eleanor Turton-Hill puts three low-cost personal laser printers through their paces, cutting through the issues surrounding laser technology and explaining both traditional and GDI designs.

Many technologies have been developed over the years for setting ink to paper, but it is the laser printer which now dominates the PC industry, and there's one undeniable reason for its popularity: value. For around £300, you can now buy yourself a reliable laser printer which will happily churn out gorgeous 300dpi text and graphics at a decent speed of four to six pages per minute (ppm). You'll get consistently good quality output, mechanical reliability, and office tranquillity into the bargain.

As the market for lasers printers has developed, competition between manufacturers has become increasingly fierce, especially at the budget end. Prices have fallen as manufacturers have found new, inventive ways of cutting costs. The most obvious is to use a slower engine, but it is possible to skimp on lots of other elements as well, including memory, PostScript options, network compatibility, and paper handling features. The result is that each model has a slightly different balance of components. For the consumer, this has made the printer market into a minefield of confusing options.

Some manufacturers have chosen to use GDI (Graphical Device Interface)

technology, which further cuts down the cost of production using an innovative printing method which greatly simplifies the design of the printer. Although GDI technology has considerably reduced the price of lasers, it has also served to increase the confusion. Here, I'll be attempting to unravel some of the issues which surround laser technology in its various forms, with particular reference to three new printers on the market: the Canon LBP-460, the Sharp JX-9210 and the Epson EPL-5500.

GDI Design

Canon LBP-460 Sharp JX-9210

Canon's new printer, the LBP-460, and Sharp's JX-9210 both use GDI technology. The printing process works in a different way from traditional methods.

Instead of an application converting a document from its own language to a printer language and the printer then converting this to a bitmap, the document is sent to the printer using Windows' native GDI code. Normally, the printer would have a whole load of complex electronics built into it to process incoming data, but in a GDI printer all this work is done on the PC. One of the major

benefits of this method is an increase in performance gained by cutting out the intermediary translation process, which most printers use.

Printer manufacturers implement GDI technology in different ways, and this has caused a great deal of misunderstanding of the advantages and disadvantages of the GDI approach. The new Sharp JX and Canon LBP use the Microsoft Windows Printing System (WPS), a standard developed by Microsoft to create a universal architecture for GDI printers. Not all GDI printers are developed in collaboration with Microsoft, but as the technique has become more popular, there's been an increasing need for standardisation.

Some GDI printers are designed in such a way that they are heavily dependent on the host processor. The Windows GDI language is converted into a bitmap on the computer and the bitmap is then sent to the printer. In such cases, the speed of a print job depends on the speed of your processor; if you have a fast processor, you will have fast printing. But processor-dependence cuts both ways; if you've got a slow processor, you will have slow printing.

The WPS works differently: it enables Windows' GDI language to be converted to a bitmap while printing. Under this system, the image is actually being rendered during the printing process, which greatly reduces the amount of processing power required from the PC.

Both the Canon and the Sharp are Windows 95 compatible, which means their drivers have been optimised for running under the new operating system.

Printer Photography by David Whyte



Canon LBP-460

Like most GDI printers, both come with bi-directional drivers, which makes installation easy. The two-way communications system automatically configures the PC with the correct settings on installation, and it keeps you informed on the progress of each job while you're printing. Any kind of problem which occurs in the printing process is reported on-screen as well, with an accompanying voice message like "Out of paper" or "Paper jam".

The bi-directional feedback built into the GDI system takes much of the painful

troubleshooting out of the printing process, and generally, both printers gave excellent feedback during testing.

Design-wise, the two printers are very different: the Canon LBP-460 is built like a large breeze block with the input tray carved into the rear and output at the base of the front.

Setting it up is a simple procedure as the whole of the front panel opens out and everything inside is easily accessible, so the printer cartridge slides in with no problems. One drawback is that paper output is directed straight onto

the desk space in front of the printer — if you haven't got much room, this can become highly annoying.

Another niggle with the Canon, which is typical of GDI printers, is that it lacks an on/off switch or even a light to show that the power is on. This is not a major problem, but it helps to know at a glance whether the printer is correctly powered up or not, especially if you're trying to identify a fault.

The Sharp JX-9210 is a much smaller model, with a footprint of 11.8in x 11.9in and a more convenient output tray which stacks finished documents. Again, there's no on/off switch, but there is a light to confirm that the power is on. The design of this Sharp demands a U-shaped paper path, which precludes the use of thick paper and card, so there's an alternative paper path provided via a flap at the bottom of the machine. When this flap is opened, output is automatically diverted to a straight path and documents appear at the front, face up.

Both printers produced excellent quality text and graphics, but in the final analysis the Sharp JX-9210 had the edge on quality due to its far superior 600dpi resolution. Photographic images came out much smoother in comparison with those of the Canon, and blocks of black appeared more solid, too.

Either of these "Windows 95-ready" printers are available for around the £300 mark. Although the quality and performance results from both printers came out well in our tests, there is one restriction you should know about if you want to buy a GDI printer: it will operate only under Windows. You can print from DOS applications but only if they're running in a window, and then only with additional emulation (PCL4 is provided with both printers). Not all DOS applications will run happily under Windows, so bear in mind that you cannot print from DOS native mode.

Traditional Design

Epson EPL-5500

Having used two Windows 95 GDI printers, Epson's new EPL model seemed slightly outmoded at first. The driver is set up using a single install.exe program. There's no automatic configuration or bi-directional messaging, so you have to do your own thinking at each stage. Being a traditional printer, the EPL-5500 has its own internal processor and circuitry, and 1Mb of memory as



Sharp JX-9210

Epson EPL-5500



standard (upgradable to a maximum of 32Mb).

Despite the absence of any bi-directional help on installation, I found this Epson easy to set up and use. Once installed, there is a "bi-di" option in the driver which can be activated but in practice the messaging is highly confusing. When the paper has run out, for instance, a message appears to tell you that the printer is not switched on or that it is offline, and meanwhile a red light flashes on the control panel. If you add more paper, nothing happens until you press the continue button.

As far as design goes, there is a certain solid squareness about it and more than its fair share of straight lines and right angles. Unusually, the input tray juts out of the base of the machine and printed documents stack onto an angular fold-out tray on top.

Where this printer really scores is on its high quality 600dpi output; particularly its crisp text and impressively smooth grey tones on photographic images. These gave it the edge over the JX-9210 from Sharp. However, it falls down on performance — this was noticeable during testing. The formatting and rendering of the image on the print engine using the printer control language (PCL5e) had a noticeable impact on speed, especially for the first page of a print job.

On the plus side, it is possible to print quite happily on the EPL-5500 from DOS applications in native DOS mode. If you're a standalone user and you never use DOS applications, then this is no big deal, but if you're going to be using your printer in a small office with a mixture of old and new technology, it's a good idea to have the choice. The Epson EPL-5500 has an expected street price of around £355, so you're only paying about £55 more than the cost of a GDI printer, for more functionality and superior output quality.

Conclusion

Technically, GDI makes a lot of sense. Windows provides all the software mechanisms required to display text using all manner of different fonts, typestyles, sizes and orientations. Windows also has the added bonus of displaying bitmap and vector graphics.

Because Windows is a graphical operating system, it requires a reasonably powerful PC with a fair amount of memory and hard disk space — exactly those characteristics required of a printer controller. For manufacturers, the great advantage of the GDI printer is that it is less complex — and, more to the point, it's cheap to produce. It uses the sophistication of the machine already on your desk rather than building in intelligence of its own.

Microsoft claims that the Windows Printing System does not require an especially high-end PC. The company

recommends a minimum 386SX/16. It's true that the WPS is not as demanding on your system resources as some other GDI printers, but you will still need enough processing power and memory to carry out the rendering and communications process while continuing to support the user environment. On one hand, the older your system, the more likely it is that you'll want to print from DOS native mode. But on the other hand, your GDI printing system will get faster as a direct consequence of upgrading your computer.

A low-cost laser running on a 486SX (or higher) will create bitmaps from the Windows GDI at a good speed. Technically speaking, it makes sense that changes in software should be dealt with on the computer rather than in the printer. As computers become increasingly powerful, GDI looks like being the printer technology of the future. But I'm not yet convinced that the whole world is ready for GDI, and the mixture of technologies currently on the market shows that the industry is moving very slowly.

Small businesses tend to have motley collections of PCs — some very high end systems and others that are three or four years old, so in this situation you need equipment which can cater for all circumstances. Some users, especially those home users with PCs powerful enough to run the current generation of software, will not need the same kind of flexibility in a printer so a GDI model will probably fulfil their needs. But at this point in time, it is definitely the Epson 5500 which provides the most flexibility, best quality of output and the best overall value for money.

PCW Details

Canon LBP-460

Price WPS £349; Street £300
Contact Canon 0181 773 3173

Sharp JX-9210

Price 300 x 300dpi £429; Street £300
Contact Sharp 0800 262958

Epson EPL-5500

Price PCL5e £479; Street £355
Contact Epson 0800 220546



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TECHNICAL SPECIFICATION:**

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Getting at Data

Delphi was made for databases. In the fourth and final part of his tutorial Tim Anderson tells you how to build a database application, taking an everyday CD collection as his example, and explains how Delphi's data-aware components fit together.

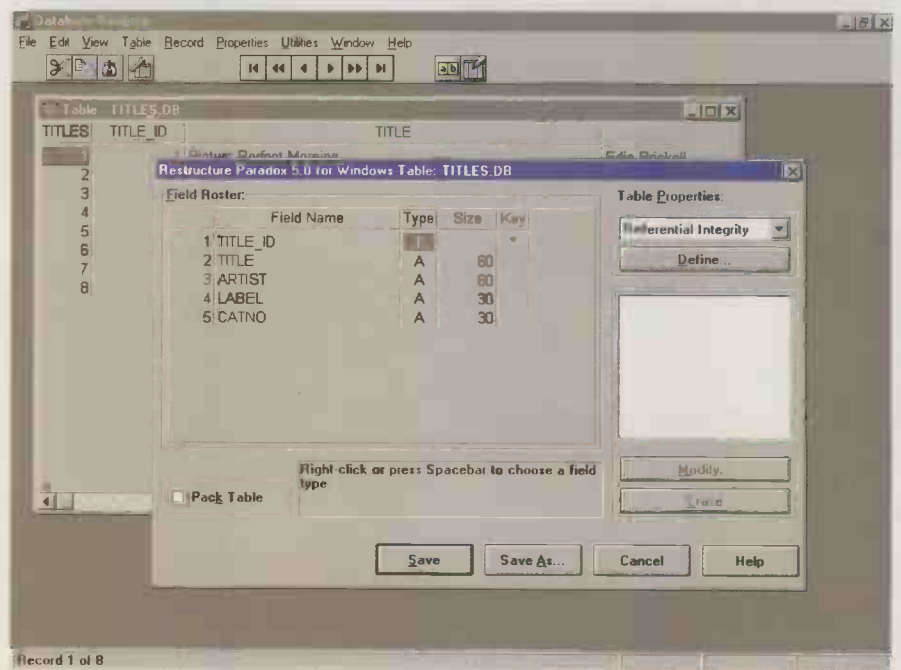
Borland markets Delphi as a database tool, but it's an excellent general-purpose language, too. Database work is handled by the Borland Database Engine (BDE), a set of DLLs which are also used by Visual dBase and Paradox. The BDE can access remote server databases too: via a set of native drivers called SQL Links, or through ODBC (the Windows standard for database connectivity).

The database is well integrated with Delphi, and can normally be treated as part of the language. But it is a separate component that can be configured outside Delphi and used by other, non-Delphi applications.

A first Delphi database

In this tutorial you will build a simple, relational, database application. The example is based on a CD collection, with the data stored in Paradox tables (see Fig 1). You need to create the data before starting to build the application, or take it from the cover CD. Alternatively, you can adapt the example to work with other data.

To begin the application, start a new project: click the Data Access tab on the Component Palette, and place a Table component on the form. Set the DatabaseName property to the directory where the data is stored, for example C:\MUSIC. Next, click the TableName



property and drop down the list of tables in that directory. Choose TITLES.DB.

Now place a DataSource component on the form. The Table component simply encapsulates a database table, but the DataSource is less obvious. It is a link between data components such as tables or queries, and data-aware components which control and display the data. The DataSource has a DataSet property, which should be set to Table1.

Fig 1 The Database Desktop provides all you need to create and edit database tables. To build the tutorial data from scratch, choose File - New Table, and use the Paradox format. Then complete the details in this dialog

Next, click the Data Controls tab, place a DBNavigator on the form, and set its DataSource property to DataSource1. Then, place a DBGrid and set its

DataSource in the same way.

To bring your work to life, select Table1 and double-click its Active property. Delphi will display data in the grid, even at design time. You can test the application by clicking Run to compile and execute it.

The DBNavigator has several useful functions. The first four buttons navigate the data, like video buttons. The next three add, delete or edit records. Two more buttons confirm or cancel changes being made, and the final button refreshes the data. This latter function does nothing in the tutorial database, which is single-user, but is useful for networked databases when the data on view can become out of date as other users change it. You can use the VisibleButtons property to hide this. Another tip is to set the ShowHints property to true, so that tooltips appear, describing the purpose of each button.

Get Related

Working with databases based on a single table is easy but often not very useful. The next step is to build a relational database, capable of showing a master record with one or more related detail records.

A common example is the relationship between a customer and their orders. For this CD collection, the information required is the tracks on each CD.

Each record in the TITLES table has a TITLE_ID field and the TRACKS table uses this to identify which title owns each track.

Here's how to build the application:

1. Place additional data access components on the form: another table, another datasource, and a query.
2. Edit the DatabaseName and TableName properties of Table2 to point to the data directory and the Tracks table.

Change the DataSet property DataSource2 to Table2.

3. Place a second data control below the DBGrid. Change the DataSource

Preparing the data

The tutorial application uses two related tables: TITLES.DB and TRACKS.DB. To create these tables, you can use the Database Desktop.

```
TITLES.DB
TRACK_ID Long Integer Key
TITLE Alpha 60 Secondary index: TITLE_IDX
ARTIST Alpha 60 Secondary index: ARTIST_IDX
LABEL Alpha 30
CATNO Alpha 30

TRACKS.DB
TRACK_ID Long Integer Key
TRACK Alpha 60
TITLE_ID Long Integer

Referential Integrity
TITLE_ID in TITLES (Parent) = TITLE_ID in TRACKS (Child)
```

the DataField to each field in turn. (See Fig 2 for a suggested layout.)

5. Finally, you need to tell Delphi about the relationship between these two tables. Select the Table2 component and set its MasterSource property to DataSource1.

Next, click the MasterFields property to display the Field Link Designer. In the Available Indexes box, choose TITLE_ID.

Next, highlight TITLE_ID in both field lists and click Add.

Click Run to compile and execute the application. If no data appears, make sure the table components have their Active property set to True. As you navigate through the titles, the tracks for each title appear in the grid.

```
procedure TForm1.DBNavigator1Click(Sender: TObject; Button: TNavigateBtn);
var
  BtnName: string;
  lNewID: longint;
begin
  case Button of
    nbInsert :
      begin
        BtnName := 'nbInsert';
        Query1.SQL.Clear;
        Query1.SQL.Add('SELECT MAX(TITLE_ID) FROM TITLES');
        Query1.Active := True;
        lNewID := Query1.Fields[0].AsInteger;
        Query1.Active := False;

        inc(lNewID);
        Table1.FieldByName('TITLE_ID').
        AsInteger := lNewID;

        end; {end nbInsert routine}
      end; {end case}
  end; {end procedure}
```

Fig 6

Making it work

It sort-of works — and without a line of code being written.

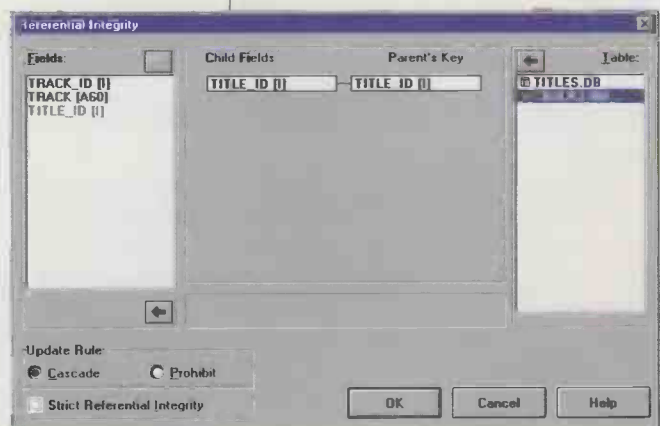
Unfortunately, this code-free application is hopelessly inadequate. When you use the data control to add a

Fig 2 Using the Database Desktop, you can set up referential integrity to prevent orphaned data in your database — for example, tracks with no corresponding title

property of both the DBGrid and the second data control to DataSource2.

If you set Table2's Active property to True, you'll see a list of tracks in the grid. 4. Resize the form as needed and position five DBEdit controls above the grid. These will show the title details.

Set their DataSource to DataSource1 and



title, you have to enter a unique TITLE_ID or it crashes. When you add tracks, Delphi automatically inserts the right TITLE_ID, but you need to dream up your own TRACK_ID.

Another way to crash the application is to start editing a new title, and then add a track before the title has been posted. The challenge of database development is to make applications bullet-proof, so that users cannot casually corrupt the data or crash the program. Here are some suggestions:

● Finding a unique ID

Users should not need to worry about finding ID numbers. A simple, fast technique for finding a unique ID is to discover the highest existing number, and increment it by one. This is done by executing an SQL statement (see "All about SQL" on page 224). The code is in Fig 6 (page 223).

Add this procedure by double-clicking the DBNavigator1 control. When the Insert button is clicked, it first adds a record to TITLES, and then edits the SQL property of a Query component to discover the highest existing TITLE_ID. Finally, it adds one to the ID and enters it into the new record. For additional protection, make the DBEdit control which displays the TITLE_ID read-only, or even hide it completely, to prevent accidental changes.

● Adding new tracks

You can use the same technique to find a new TRACK_ID when adding tracks. A good idea is to make the DBGrid read-only and prompt the user for a new track using the InputQuery function. Here's a fragment of code:

```
if DataSource1.State <> dsInsert then
begin
if InputQuery('Personal Computer World',
'Enter new track',sNewTrack) = True then...
{else cancel the new record}
```

Note how the State property of DataSource1 is checked, to ensure that tracks are not added while a new title is being inserted. You can cancel the new track if necessary, by calling DataSource2.Dataset.Cancel.

● Deleting unwanted tracks

If you give away a CD you might want to delete it from your database. Since referential

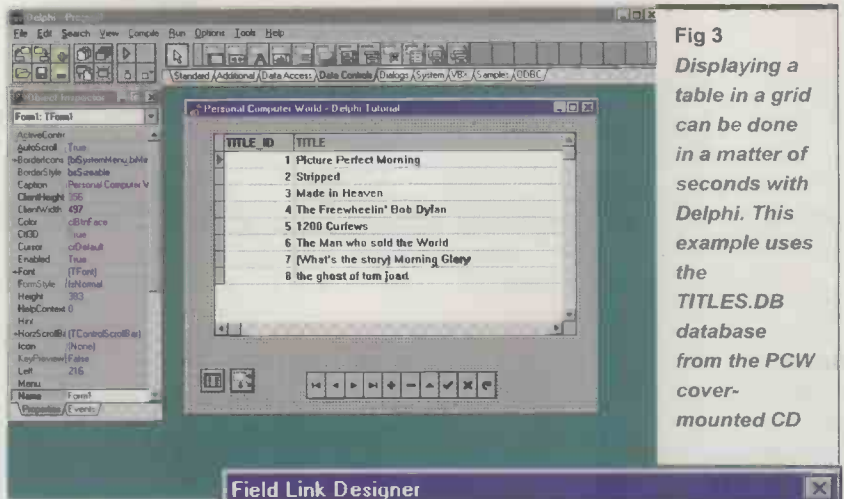


Fig 4 In the Field Link Designer, you tell Delphi how to link two related tables. In this case, the TITLE_ID index in TRACKS is linked to the TITLE_ID field in TITLES

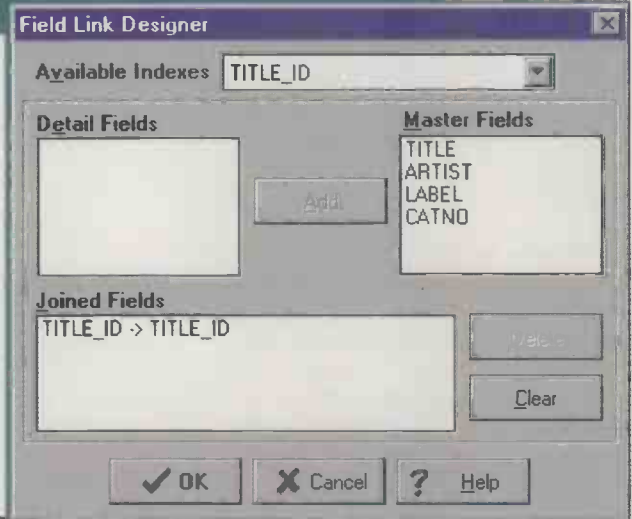
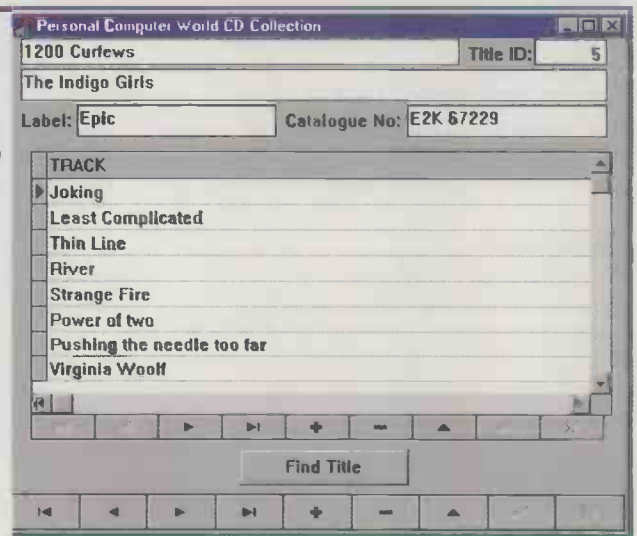


Fig 5 The completed music application, complete with a button for finding a title



integrity is enforced, the BDE will not allow a title to be deleted while tracks

exist for that title. The solution is to use the BeforeDelete event of the

All about SQL

Structured Query Language, or SQL (usually pronounced "sequel") is a specialised programming language for querying and updating databases. It is worth learning, since almost all server databases use it, and now most desktop databases as well. SQL is designed to extract or update small subsets of data from large databases. For example:

```
SELECT * FROM titles WHERE titles.artist =
'The Beatles';
would return all the titles by The Beatles.
```

Not all SQL statements retrieve data. Another type of SQL is designed to be executed, for example, to update or delete records.

SQL is complex and not well documented in general-purpose products like Delphi or Visual Basic. And there are variations between SQL as implemented by different vendors. Fortunately, books are available and one recent publication suitable for beginners is *Instant SQL Programming* by Joe Celko (Wrox Press, £27.99. ISBN 1-874416-50-8).



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Revisiting the Space Monitor

● Thanks to Husein Roncevic and Mark Harrington, both of whom emailed me to point out flaws in the routine which formats the free space for display in a gauge and label. The routine given suppresses leading zeroes after the decimal point.

Husein suggests using the FormatFloat function which is an altogether tidier approach. There is a fixed version on our cover-mounted CD, and here is the corrected section of code. It also uses the technically correct value for a megabyte.

```
{update gauge}
form1.gauges[iDrivesFound].progress := round(100*((lDiskSize
-
lFreeSpace) / lDiskSize));
```

```
sSpace := FormatFloat('#####0.00',lFreeSpace / 1048576) + ' MB';
Form1.Labels[iDrivesFound].Caption := sDrives[iCurrDrive + 1] + ': ' +
sSpace;
```

● Alan D Ryder contacted me with another question. How can the space monitor be adapted to work with removable as well as fixed drives? The starting point is to check for DRIVE_REMOVABLE as well as DRIVE_FIXED at the two points where the Space Monitor calls GetDriveType. But there's more to it than that. Firstly, it is necessary to check that a disk is in the drive to prevent a nasty system dialogue when DiskSize is called. You can do this by calling the API function SetErrorMode. For example:

```
function IsDisk(iDrive: integer): bool;

var
iOldErrorMode: integer;

begin
{Prevent system dialog from appearing}
iOldErrorMode := SetErrorMode(SEM_FAILCRITICALERRORS);

if disksize(iDrive) > 0 then
Result:= True
else
Result:= False;

{Restore old error mode}
SetErrorMode(iOldErrorMode);
end;
```

But even that is not the end of it. It takes a long time to read a floppy drive, and the space-checking function is called repeatedly by a timer. What if the timer calls the function again, before a previous call has finished executing? A good question, and although not a problem in the space monitor as it stands, it could easily become one.

In 16-bit Windows, no system events will fire while an application is executing, unless it specifically yields control. This is not the case in systems with pre-emptive multitasking, such as 32-bit applications in Windows 95 or NT. Furthermore, in a longer 16-bit routine you might include the code:

```
Application.ProcessMessages;
which yields control to the system and would cause the timer to fire again.
```

You can prevent these problems by setting a flag, a variable which will indicate whether a function is already running. Here's an example:

```
procedure TForm1.UpdateForm;
begin
if bRunning = True then
exit; {Exits function without doing anything}
bRunning := True;
{body of function here}
bRunning:=False;
end;
```

Note that for this to work, the bRunning variable must be visible to the whole unit, so that its value will be preserved after the function exits. To do this, declare bRunning either in the interface section, or in the implementation section at the top, outside any c code blocks.

With these three techniques together, you can easily amend the Space Monitor to look at removable drives — if you really want to, that is.

```
procedure TForm1.Table1BeforeDelete(DataSet: TDataset);
var
iTitleID: longint;
begin
iTitleID := Table1.FieldByName('TITLE_ID').AsInteger;
Query1.Close;
Query1.SQL.Clear;
Query1.SQL.Add('Delete from TRACKS where TITLE_ID = ' +
inttostr(iTitleID));
Query1.ExecSQL;
end;
```

Fig 7

Table1 component to do the job for you. The code is in Fig 7.

● Adding search

Data is of no practical use without a search facility. You can add a button to the application and write code to find a title. It is an indexed search, and requires the IndexName property to first be set to the appropriate index. (Fig 8.)

```
procedure TForm1.Button1Click(Sender: TObject);
var
sSearch: string;
sOldIDX: string;
begin
if inputquery('Personal Computer World','Enter first few
letters of title:',sSearch) = True then
begin
sOldIDX := Table1.IndexName;
Table1.IndexName := 'TITLE_IDX';
Table1.SetKey;
Table1.FieldByName('TITLE').AsString := sSearch;
Table1.GoToNearest;
Table1.IndexName := sOldIDX;
end;
```

Fig 8

Making it better

Once you have the CD database working reliably, there are some obvious enhancements you could make. For example, you could select the order of the titles by changing Table1's IndexName property. Another idea would be to store artists in a separate table, linked by an ARTIST_ID field, so that each artist was recorded only once, perhaps with details about dates or musicians.

● This is the last part of the Delphi tutorial, but Delphi programming is covered every month in the Hands On Visual Programming section of PCW.

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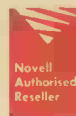
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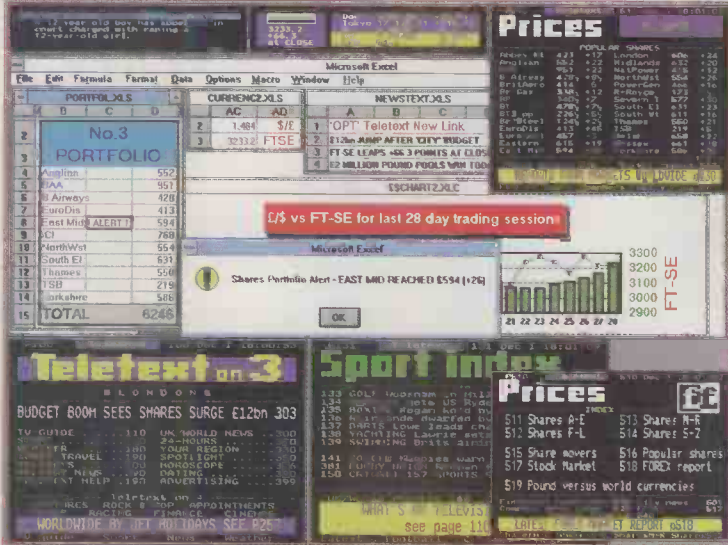
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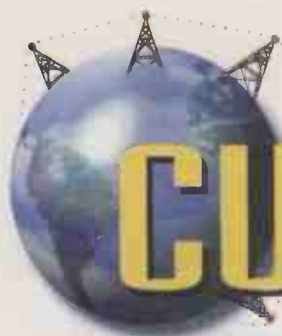
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Welcome to Cutting Edge, the section in *Personal Computer World* that combines our regular reviews of games, books and CD-ROMs with features bringing you the latest news about computing, and consumer technologies and online services.

We now have the most comprehensive coverage of these topics available in a general computing magazine. Stay with us and we'll take the pain out of keeping on the cutting edge.

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- 2 3 2 **Focus** — Sun Microsystems' Hot Java has been credited with bringing true interactivity to networking. Jim Smith spills the beans.
- 2 3 8 **net.answers** — Finding your way round the Internet throws up all sorts of queries. Nigel Whitfield has the solutions.
- 2 4 2 **net.news** — PJ Fisher has news of graphical 3D software for designing Web pages, how students are benefiting from lessons learned on the Net, and how Friends of the Earth fell foul of the ASA over advertising on the Internet.
- 2 4 9 **net.newbies** — How to get online, the easy way.
- 2 5 0 **Focus** — In part two of his HTML tutorial, Nigel Whitfield shows how Web pages can be made more easy to read — and more fun.

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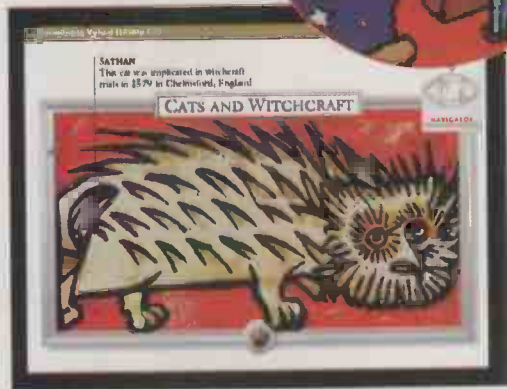


Focus



netsurf

Screenplay



CD-ROMs





All That

A programming language that allows you to pick and choose applets from the Internet, run them and dump them as you would an empty drinks carton — Sun Microsystems' Java has been credited with bringing true interactivity to networking. Jim Smith spills the beans on this hot stuff.

It started out as a project to make toasters smart enough to talk to the microwave next door, but it might just end up influencing the entire course of computing for the next 20 years. It is Java, Sun Microsystems' object-orientated, network-aware, architecture neutral, portable, multithreaded, dynamic language. Phew.

Java is creating an impact because it provides a way of seamlessly integrating small programs called applets into Web pages. Just load up a page containing a Java applet and the program will load and self-execute, and unless you specifically save it, flush itself away when you move on to a new page. Sample applets already on the Web include simple skill games, calculators and information-processing programs such as stock-market prices tickertapes.

The centre of attention

Hijacking the success of the Web was Sun's smart move. For something as prolix as a programming language only four years in development and not even at a full release, to create so much attention is unheard of. It took 15 years for C to even begin to find acceptance in mainstream software development. Sun Internet business development manager Matt Reid says that the move was necessary because it galvanised people's interest and added a much

needed layer of functionality to the Web: "The catalyst was what it did for the Web — providing true interactivity. However, people are now starting to realise that it has potential far beyond the Internet." Indeed, Sun regards the Internet as being simply a staging post for Java, leading on to adoption in any area where network computing power is needed.

Java was never originally

intended as a Web-friendly programming language. Its first incarnation was as Oak, a language-come-operating system for embedded systems — smart cars, toasters, whatever — and for set-top boxes. Sun got as far as demonstrating a PDA based around Oak, the *7 handheld. And it touted its multimedia-savvy technology around the TV companies until realising, or being forced to

realise, that the Interactive Television was as "just around the corner" as when it was first proposed 30 years ago.

Instead, while the Oak team had been working on the proto-Java, another online interactive technology had appeared from virtually nowhere to offer a role for Oak. Rather archly, Sun lists the release of NCSA Mosaic 1.0 in mid-1993 as a key event in

HotJava: NTM Home Page
File Options Navigate Goto Help
Document URL: http://www.ntm.co.jp/java/Demo.html

Document URL: http://www.ntm.co.jp/java/Drums.htm

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Java sites are few at the moment, but this Japanese-flavoured site allows you to play the drums by dragging the mouse over the kit. Just imagine what you could with two mice

Java



CUTTING EDGE

Java's development.

It was at the same time that a trademark search felled Oak as a brand name. Java, however, was okay and so the name was adopted (possibly because of the cute HotJava name Sun could apply to the browser. In case you're still in the dark, Java is synonymous with strong coffee in the US, hence HotJava). There is no significance to the name Java beyond the fact that it was free in a trademark search. Having said that there was little significance to the Oak name either, it just happened to be the first type of tree project leader James Gosling saw when he looked out of the window.

Java is most closely related

to C++, and it relies heavily on the object-orientated programmers' concept of classes. Classes can be predefined (and so can live in the Java engine in your browser) and can be modified easily, creating a sub-class while still inheriting the data and code from the original class (so you don't have to restate the whole of the class).

In fact, Java nearly was C++, as the team that developed it started out by using C++ but decided to develop its own language when it ran into insurmountable problems with memory handling. It's hard enough to manage memory with a single application. When you are trying to manage a network

of smart consumer devices, each loading and quitting dozens of applets many times, the problem becomes many times harder.

The Sun development team wanted a language that would allow them to use the object approach of C++ but with the dynamic memory handling of a language like Lisp. Lisp allocates

memory to itself as it goes, freeing the programmer to concentrate on more vital issues.

Being able to pick and choose from the features of C++ meant getting rid of another C++ bugbear, multiple class inheritance, which complicated variable handling, particularly in a multi-applet, network-orientated application. Java just

```
import java.awt.Graphics;
public class HelloWorld extends java.applet.Applet {
    public void init() {
        resize(150,25);
    }
    public void paint(Graphics g) {
        g.drawString("Hello world!", 50, 25);
    }
}
```

How to see and do Java

To view a Java Web page, you'll need a Java-aware Web browser. Currently, your choice is restricted to two: Sun's HotJava or NetScape Navigator. HotJava is available for 32-bit Windows (e.g. 95 and NT) and Sun Solaris, while Navigator's 2.0 release is currently Java-aware on 32-bit Windows, Solaris, HP-UX, SGI IRIX and SunOS. Mac OS versions are scheduled from both Sun and NetScape shortly, with the NetScape version probably arriving sooner than Sun's. To write Java applets you are currently limited to the development tools provided by Sun itself. The Sun Java compiler works on only Win32 and Solaris platforms. Developers' kits will roll out in the spring of 96 from Metrowerks (largely aimed at the Mac development community) and Borland (focused on the PC

world). Borland's development environment, codenamed Latte, will have the full suite of visual tools needed to make creating Java applets a drag-and-drop process.

Web sites

The chief Web site for Java is Sun's own at java.sun.com, where you can download the HotJava browser, the developer's kit and view sample applets. The other licensees of Java technology can be found at the following:

Metrowerks (<http://www.metrowerks.com/>)
 Netscape (<http://home.netscape.com/>)
 Macromedia (<http://www.macromedia.com/>)
 Borland International (<http://www.borland.com/>)
 Oracle (<http://www.oracle.com/>)

The sites outside Sun with Java applets up and running are:

The Matrix Publishing Network <http://www.mpn.com/>
 BASIS Inc. <http://www.basisinc.com/>
 NTM Shopping <http://www.ntm.co.jp/>
 Cybersight <http://cybersight.com/>
 Embry-Riddle Aeronautical University <http://www.db.erau.edu/index.java.html>
 Spinning Globe <http://www.process.com/Launch/launchpd.htm>
 Sun Home Page <http://www.sun.com:80/index.html>
 Better Bad News <http://www.georgecoates.org/>
 HotWired <http://www.hotwired.com/login/overview.html>
 Dimension X <http://www.dimensionx.com/>
 Nando Times <http://www2.nando.net/newsroom/nt/nando.html>
 Rolling Stones <http://www.stones.com/javaindex.html>

forgets about this inconvenience. It took four years of development, but the end result is something an experienced C++ coder could easily parse. The canonical Hello World applet is on the previous page.

This applet simply calls the relevant library from the internal Java libraries, creates a new class called HelloWorld based on the Java applet class, opens a raster window and displays the messenger Hello World.

What it doesn't do is make the Hello World message appear on a Web browser page. To do that, you need to add the following to your HTML page.

<APPLET

```
CODE="HelloWorld.class"
WIDTH=150 HEIGHT=25>
</APPLET>
```

This forces the browser to look in a subdirectory called Class for the HelloWorld applet and opens a space on its page for the applet to run in.

Browser power

The Internet differs from the set-top box environment in that the Internet is, unless you're lucky enough to sit on a T1 line, a low bandwidth network with a lot of intelligence at the receiving end in the form of personal computers and workstations. Set-top box type networks have relatively high bandwidth with dumb machines at the other end.

Oracle CEO Larry Ellison envisages his company's network machines as having little more than a bootstrap ROM preinstalled. Everything else comes from the network.

But the Web currently behaves as though the Internet was a high bandwidth network with the dumbest of dumb terminals at the other end. Web browsers do little more than display words and pictures. Processing tends to be deferred to the server end in the form of CGIs (Common Gateway Interface).

NetScape and Microsoft are both actively extending what you can do with simple HTML.

NetScape Navigator 2.0 includes client-end image maps, which take a fiddly piece of Web server configuration away, and plug-ins to replace Helper applications, which will allow it to display inline Apple QuickTime video, MacroMedia Director interactive documents or Adobe Acrobat pages, should anybody want to do anything so time-consuming just to look at text in a different font.

Microsoft has extended its interpretation of HTML to include live video and audio by embedding the players in its browsers — a very Microsoft approach — and extending the type of media clip that can be called with the SRC command in the HTML source, but neither of these approaches really extends the browser beyond being a simple player utility. Java leaps over this limitation by being a full

programming language interpreter. A Java-ready browser can do almost all the same things as a program written and compiled into executable object code using the full-blown version of Java.

By being an interpreter, the Java engine can be made cross-platform and Applets need only be written once to work across systems, further devolving intelligence into the end terminal.

Security concerns

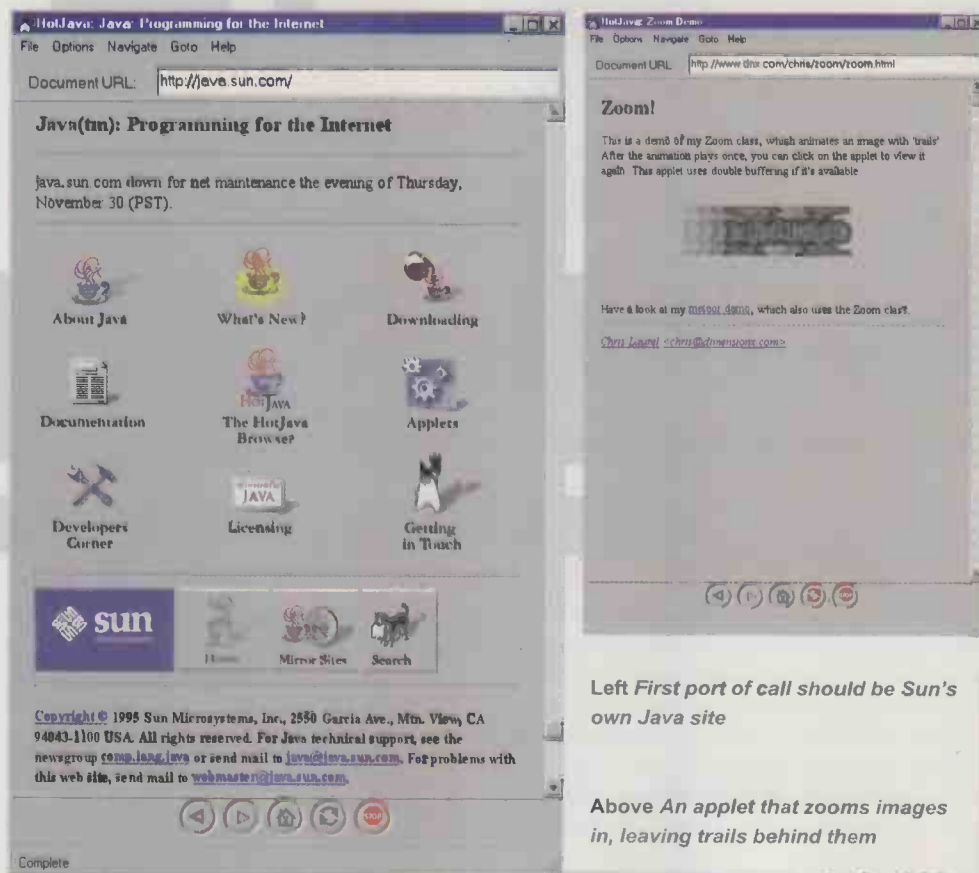
On learning the way Java works, most people ask anxiously how it handles security. After all, the notion of a program that automatically inserts itself into your computer, executes itself and then disappears into the night, sounds a little too like a virus for most people's comfort.

Naturally, the Java development team were aware of the security consideration from the very first: one of the minor problems with C++ was poor security, leaving pointers to variables, such as a credit card number, open to public inspection (Java invokes a special type of variable within subroutines that cannot be inspected from outside).

Java handles security through the Virtual Machine concept. Applets can only have direct access to the resources controlled by the Java engine in the browser, such as memory or hard-disk cache. Any attempt to access the operating system directly is intercepted by the Virtual Machine, which refers the request to the user. Only if the user gives the applet permission can it access a file or write a file to disk.

Put your trust in applets

Of course, in order to know that an applet has no bad intentions, one has to trust it, and trust the service that provided it. All Java-aware browsers automatically check that the applet they have downloaded is kosher by firstly making sure that it has been



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Media Styler (Special Edition) multimedia authoring software	yes	yes	yes	yes
14" High Resolution Colour Monitor	yes	yes	yes	yes
Professional Keyboard & MS Ergonomic Mouse + MS DOS 6.2/ Windows 3.11	yes	yes	yes	yes
Windows based CD recording software (loaded) + Adaptec SCSI card for CD Recorder	yes	yes	yes	yes
Internal CD Revolution - x2 Speed SCSI CD Recorder with x2 playback with 2 blank CDs	yes		yes	yes
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compiled on an official Java compiler (the importance of which will become apparent later), and secondly, by performing a sophisticated version of a checksum routine to make sure that it hasn't been corrupted or tampered with during its Internet travels.

As well as checking that the applet is derived from an official compiler, the Virtual Machine can check that the applet comes from a previously used and trusted programmer. Ironically, although the language includes these and many other sophisticated tools for checking the provenance and integrity of an applet, it has no way of feeding usage information back to the author of the applet, or of tracking usage for billing purposes; both of which will become essential when we start buying our software as applets across the Internet rather than as full applications from traditional channels. Sun's Matt Reid says all that is needed is an enterprising programmer to add another class — "I guess the easy answer is it's a programming language and you can therefore write one" — and presumably earn yourself a small licensing fee on millions of applets too.

This is potentially the most important aspect of Java. Java is the first concrete example most of us will see of the much talked about move to component and distributed computing: one of the reasons that Oracle, home of the Network Computer, is one of the first licensees of the technology.

Sun envisages a new type of software environment in which software is truly task-orientated and usually disposable. You may be working on a document or spreadsheet

detailing your tax expenditure for the year. Instead of writing your own macro to handle depreciation on your computer equipment, you simply log on to the Ernst & Young small business homepage, download the Depreciation applet, pay the \$5 fee in Net-Bucks, run it and trash it.

Let's get radical

This promises a radical shift in the way we view software. At the moment, software is designed to behave almost like a computer itself. WordPerfect, Excel and Photoshop are vast programs which can handle almost anything you can throw at them within their respective fields of text processing, spreadsheeting and graphics.

What the component, distributed model says is all you really need is a way of displaying a document (such as a Web browser) and then you can bolt on functionality as required. In this respect, Java applets are not a million miles from the OpenDoc parts developed by CI Labs, the consortium of Apple, IBM and Novell that is trying to take those companies into the component era.

But where OpenDoc is not intrinsically network aware (rather like inventing the car, but assuming that you'll never have to take it further than the end of the drive) and relies on a rather obscure metaphor, Java obviously is. Because it has piggy-backed onto the Web, it has created a public awareness and market desire that OpenDoc may never achieve.

Matt Reid believes the development of Java will bring a true levelling of the software industry: "You have the same channel to market, whether you're an international corporation with ample resources, or sitting in the attic with an Internet connection and a Web page. Your way of marketing will be the same."

This is a dream that software developers have had for many years. Java and the Internet look like being the first real attempt to tap the can-do spirit of shareware, and turn it into something truly business-like.

It may be intentionally broken but you'll still lose most of the time



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net answers



Nigel Whitfield guides you through the Internet.

Q. We regularly transfer large Dbase III files (2-3Mb after compression) between offices as attached files on CompuServe. We would now like to transfer a similar file to someone who does not have CompuServe but does have Internet access via their local telecomms provider. To date, every attempt to send this file over the Internet as an attachment has failed — no error messages; the person receives the main body of the message but not the dbase file itself. Do you have any advice on how we could transfer these files successfully? We use the CompuServe Internet access package (Spry Mosaic etc) and the other party uses Eudora.

Q. I would like to know how you transfer a MS Word document say, between someone on CompuServe and someone on the Internet. I know it's simple if both ends are the same, so to speak, but I have not been able to do it successfully between the two networks. Is it possible?

A. If you're used to using closed services like CompuServe or CIX that allow you to send binary files to each other, it's very easy to forget that the Internet mail

system wasn't originally designed to handle large binary files, and the people who run conferencing systems haven't shown much interest in making it possible to send files across the Internet via email.

This is partly because it's impossible to know in advance what sort of mail system the person you're contacting will be using, and without that information, you might not be able to attach a file to a message in a way that they can use when it reaches them.

There's another problem with sending files via email — the size. There are still many computers around that will just chop the end off messages when they reach a particular size — sometimes 64K, sometimes more. If you're sending a file that's a couple of megabytes long, there's no guarantee that it'll all arrive in one piece.

In the case of our first

question, there's another minor (but easily surmountable) problem. The shareware version of Eudora has a limit of 32K on the maximum size of a message. Larger messages will be split up into lots of parts in your mailbox and will have to be read separately. Fortunately, you can save all the parts together by highlighting them all and selecting Save As... The commercial version of Eudora doesn't suffer from this kind of problem.

Of course, before your data reaches Eudora you must first attach it to a mail message, and that's where the real fun starts. There are two main ways of sending files via email: UUencoding, and Base64 encoding. Both are simply ways of taking the binary information and turning it into a stream of letters which can safely be sent through most mail systems. Using a decoder at the other end

allows you to rebuild the file.

Of the two types of encoding, Base64 is the more efficient, and more robust — some mail systems will subtly interfere with UUencoded files, making them impossible to decode. Base64 is less widely used, but if you can find a program to do the conversion, it's well worth using.

Once you've encoded your file you can't just send it by email, unless it's fairly small. Instead, you'll have to split it up into chunks of under 64K and send each chunk as a separate email message. Remember to give each one a different subject line, so that they can all be joined together in the right order at the other end and decoded.

If you plan to send a big file, splitting it up by hand is going to be incredibly tedious, but fortunately there are some solutions, including programs that will take a file and perform both splitting and encoding in one operation, leaving you with all the individual portions ready for mailing.

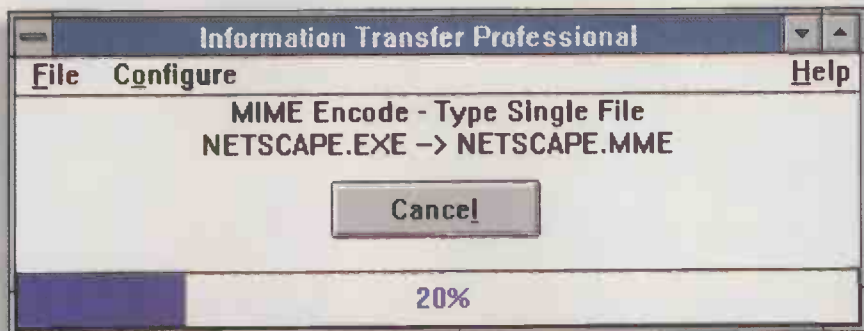
A selection of programs for handling Base64, UU and other types of encoding can be found on src.doc.ic.ac.uk in the packages/simtel-win3/encode directory. Of the programs available, XferPro (pictured opposite, above) is one of the most fully-featured, and is quite capable of handling multi-part messages, and working with the BinHex format used on Macintoshes.

On the Internet, all this can be handled automatically using a system called MIME, which usually uses Base64 encoding and adds extra headers to mail messages so that the attached files can be decoded automatically, even if they're split across lots of messages. In fact, Eudora will correctly

Just the fax, please

Q. I am considering buying a modem. I wish to know whether a modem is capable of sending and receiving faxes? If they are capable, do you need software to send them?

A. Most modern modems provide fax capabilities — look for phrases like "Group 3" or "v29" on the box, both of which are standards for fax transmission. Fax modems are usually described as "Class 1" or "Class 2", which describe the commands used to send faxes with them. You will need special software to send and receive faxes, but many modems are supplied with it, and it's included as part of Windows 95.



decode MIME messages, so if both people use the program, you can just use the Attach File command.

The Ameol program for CIX can automatically UUencode files to be sent outside the system, and Microsoft Network also UUencodes attachments for Internet mail, but with both you'll still run into problems with large files. The real solution would be for providers like CIX, CompuServe and MSN to pull their fingers out and implement MIME so that files can be sent across the Internet as easily as across their own system. Until then, I'm afraid, you're going to have to do it the old-fashioned way.

Q. I understand that when I connect up to the Internet, via Demon, I connect to their server, but where does Demon then connect to?

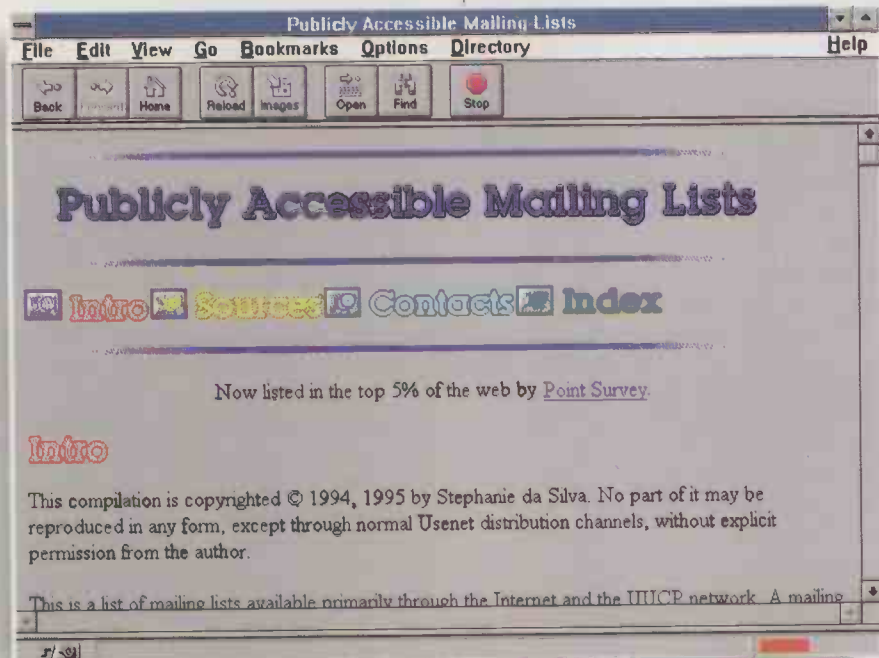
A. The Internet is a network of networks, all linked together at various points. Like all the major Internet suppliers in the UK, Demon has its own links to the US, as well as links to a hub in London called LINX. At LINX,

XferPro: this could be the solution if you need to send files between different systems via Internet email

information from one UK provider that is destined for a computer on the network belonging to another is passed on. The same process happens at connection points in the US — in the case of Demon, those links are made via two companies, called Sprint, and Agis.

To make matters even more complicated than they already are, each connection point has its own set of rules. To connect to LINX and exchange information with other providers, a company must have its own international links. Some connection points are restricted to certain kinds of traffic: some are used only for academic traffic, or else have other restrictions. Smaller providers like Pipex resellers, exchange traffic with the rest of the world under the

If you want to take part in discussion via email, the PAML is the best place to start looking for what you want



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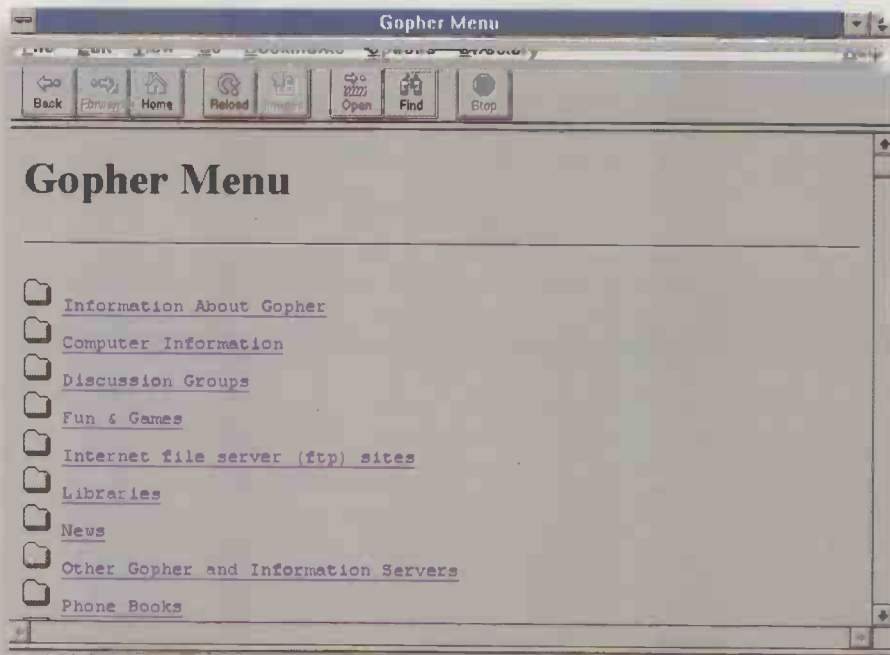
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auspices of the people who provide them with their link. The Internet as a whole is the sum of the links between all the different networks, and now it's often political or commercial considerations which determine which Internet traffic takes which route.

Q. I've heard that there's an Internet mailing list covering a topic in which I'm interested. How do I join it?

A. The exact way you join a mailing list depends on how it's managed — some lists are run by a person who responds to all the requests, while others are run by software that responds to messages automatically. Before you try to join a list, you should find out how it's run — a good way is to look it up in the Publicly Accessible Mailing Lists list (PAML), which can be found on the Web at <http://www.neosoft.com/internet/paml/>

As a rough rule of thumb, if the address for mailing list ends in -request, there's a good chance that it's run by a real person. For instance, the administrative address for one of the lists that I run: campaigns@diversity.org.uk is campaigns-request@diversity.org.uk.

If you see an address of this format, send a politely worded request, rather than a one line "subscribe" message. If it turns out to be a machine, you'll usually receive an automatic response anyway, but at least you don't run the risk of getting off on the wrong foot with a list manager.

There are two main programs for running mailing lists, and you can usually tell which one is being used by looking at the address that you're told to use for

You can access gopher menus using any Web browser, or use a separate program instead

subscriptions. If the address looks like "majordomo@..." then you can join a list by sending a message to majordomo containing a line like:
subscribe listname my_address@my.computer.co.uk

The address is optional — if you leave it out, you'll be added to the list at the address form which you mailed majordomo. The other list management program you're likely to find is ListServ, and its address will usually be "listserv@..." To subscribe to a ListServ mailing list, you use the command:
subscribe listname My Real Name

Messages from the list will always be sent to the address that you mailed from.

Before you subscribe to a list, find out if it's available in digest format, which is a single message containing all the other messages posted. On a busy list, you might find it much easier to deal with the digest than with 60 or more messages each day. If there is a digest version available, you can usually join it by using "listname-digest" in the subscribe command instead of just the name of the list.

Q. I plan to connect two or three computers together in some way so that they can all access shared resources i.e. a printer, a CD-ROM and a modem. I want all the computers to be able to access the Internet but I am unsure how to go about this without setting up separate accounts for each computer.

Data compression

Q. Can one assume that a provider with V.34 modems automatically supports V.42bis data compression — i.e. would it be able to use this to increase effective bandwidth to/from the provider? I refer specifically to Demon.

A. There are two ways of answering your question. Every V.34 modem we've ever seen incorporates data compression, so in that sense it's supported. Most Internet providers do use data compression on their networks, including Demon. In fact, the only network that we know of that doesn't offer data compression is the CompuServe network, though it does use V.42 error correction. However, if you want to use data compression, you should always check with the provider.

Do you know what is the best/cheapest way to connect the computers together with the least amount of hassle?

A. The simplest way to connect the computers together is to use their built-in networking facilities. For PCs, that means Windows for Workgroups or Windows 95; and for Macs, AppleTalk. There are other ways to network everything, but the built-in option will be cheapest.

That's the simple part. Allowing all the computers to access the Internet is somewhat harder. We've covered firewalls and proxies before, and while they could be used to give a small network access, there are a few caveats you should be aware of.

Firstly, to run a proxy Web server you'll need a decent operating system such as Unix or Windows NT. In the case of NT, this is the only proxy server that we know is a commercial product. You can also buy software for Novell networks that will allow all the PCs to connect to the Internet through the server. If you want to go down the low cost route, a PC running Linux would do the job, but you'll need more technical know-how to get it up and running.

Secondly, most standard accounts with Internet providers are for one machine. Your comments about not wanting more than one account suggest that this is what you're using. While it's technically possible to use a system of firewalls and proxies to hide all your computers and make them look like one, it's almost certainly against the terms of the contract you have with your Internet provider, and rather than risk disconnection you should investigate options for a network connection. This will provide what you want, albeit for a higher monthly subscription.

An alternative to using proxies and firewalls, to make your network look like one account, would be to use a shared modem instead with Internet access software installed on each machine. This would remain firmly within the terms laid down by most Internet providers, but would also mean that only one person in the office could access the Internet at a time.

This is probably not the answer you want

to hear, but while it's technically possible to connect a whole network with a single-user type Internet account, it's not the sort of thing that you should consider lightly. If you want to connect a network of machines, you really should pay for a network account.

Q. I've been told that the Information I'm after is on a Gopher server. What's is it and how do I get to it?

A. Gopher is a way of tracking down information on the Internet, and in some ways it's much easier to find things than by using the more common World Wide Web. Gopher presents information in menus, from which you can pick a choice, which will either lead to another menu or to a file that can be displayed or transferred to your computer.

You can access Gopher either by using a dedicated program — there are several available, for Macintosh, PC and Unix — or by using a Web browser, most of which can talk to Gopher servers giving you a menu to pick from, on the screen. A Gopher will usually be quoted as simply the name of the computer on which the server is running, such as gopher.tc.umn.edu. If you don't have a Gopher program, you can turn it into a URL for your Web browser by putting gopher:// in front of it, to give gopher://gopher.tc.umn.edu/.

The address we've quoted is one of the main Gopher servers. By working through the menus, it's possible to reach servers all over the world. Gopher may not be as glamorous as the Web but it's certainly no poor relation.



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, please send them to net.answers@stonewall.demon.co.uk.

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PJ Fisher rounds up the online occurrences.

WEB 3D

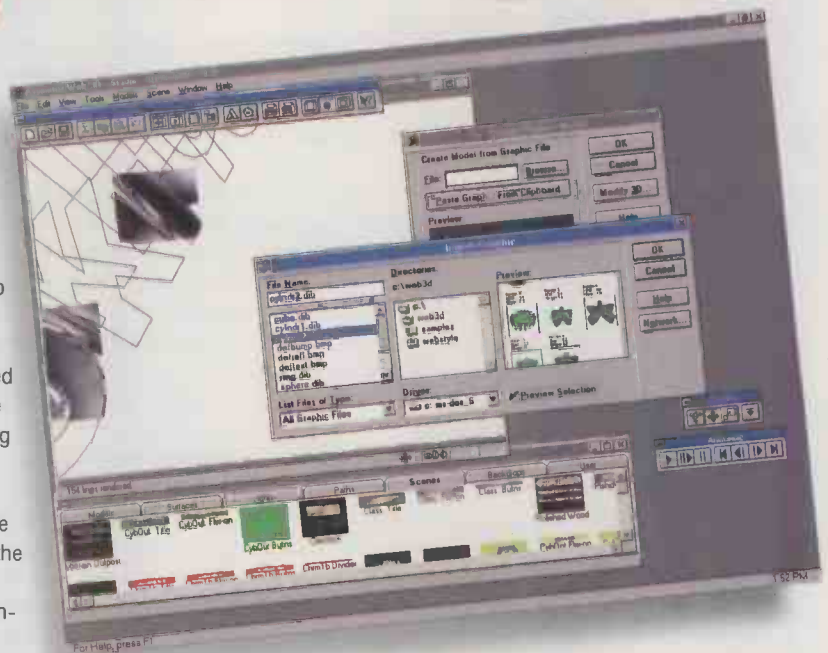
Those wanting to give the graphics on their Web sites and pages a professional map without employing a designer will be heartened to learn of a new easy-to-use Web design package announced at Comdex. This is not another WYSIWYG editor, but graphical 3D software called Web 3D from Asymetrix. Instead of struggling with numerous graphics programs, Asymetrix claims that Web 3D uses drag-and-drop techniques to create instant 3D Web graphics.

A range of preset scene elements and icons are included ready for use. A palette of 3D models can be applied to the scene, as well as 3D text based on TrueType fonts. Lighting and background effects can be added. A preview window displays the graphic as it is being designed. When the process is complete, the package automatically renders the scene, resulting in a 3D graphic ready to be referenced in the page's HTML code.

Other features include a number of sample buttons, banners and windows to drop into Web pages. Existing 3D models created in other packages can also be imported directly into Web 3D for inclusion. An animation feature allows more advanced Web designers to include 3D animations into Web designs. Price: Introductory £129; thereafter £149.

Asymetrix 0800 716957

<http://www.asymetrix.com>



FaxBack k3x3k

Intel spin-off FaxBack plans to make Web pages available to those without Net connections, with an extension of its FaxBack service. FaxBack is currently used by many publishers and companies around the world to add value to pre-printed material.

Now the same concept is coming to the Web. WebWindoW will allow Web site owners to offer faxed versions of Web pages to customers using ordinary phones and faxes. FaxBack will offer a complete hardware and software solution to companies interested in setting up a WebWindoW service. A special WebWindoW number would be given to companies wishing to use the service. Multi-page sites will have a unique phone number assigned to each page.

NetWare wades in to the Web

Novell released more details about its new NetWare Web Server at Comdex. This software allows NetWare 4.1 servers to be used as hosts for HTML documents, which can then be distributed via LANs or out to the Internet. NetWare Web Server is supplied and implemented as a set of NetWare Loadable Modules (NLMs).

Novell claims that the software takes only ten minutes to set up and install. Web Server supports forms, Remote Common Gateway Interface (R-CGI) and PERL script interpreters. Security controls — in the form specified IP address access controls — and NetWare Directory Services are claimed to give control over which documents and machines on a LAN are accessed, either internally or via the Internet.

A copy of Novell WordPerfect Publisher is included to create HTML-based Web documents, although any third party HTML tool is compatible.

Novell 01345 724000

<http://www.novell.com>

Students learn the Internet lesson

For nine months, The Southampton Institute has been pioneering new ways of learning via the Internet for students on its MBA courses. Now a fresh batch of students are about to reap the benefits of lessons learned in the first academic year on the Net.

The Institute claims that studying via the Internet has allowed students far greater flexibility in organising workload and time. They are becoming less tied to fixed class times and physical campus sites. It also believes that online discussion groups have encouraged more participation than traditional face-to-face seminar meetings.

Support systems have now been developed for those who may feel intimidated by the Internet. Those suffering from "fear of publication" are also to be encouraged to participate, although it is claimed that even quieter students are accessing information and responding in their own time. Other improvements will include a new "café" site for the informal exchange of ideas, and photographs of students and tutors to bring a more human feel to the whole process.

Southampton Institute 01703 319822

<http://www.cocomm.co.uk/sibs/sibs.html>

Sonix ISDN price cut

In a bid to drive the market, 3Com Sonix is reducing the price of its Arpeggio ISDN networking products, by a third across the range. The price cuts have been made possible by Sonix's integration by 3Com last year.

Sonix MD Bob Jones hopes that this announcement will further encourage BT to reduce the installation charges

of ISDN services. He believes BT are just tinkering with tariffing structures and that only real price cuts will boost the ISDN market.

Currently, ISDN installations in the UK lag behind other major EU countries. Germany has 850,000 connections, France has 250,000, while the UK has only around 100,000. However, in both France and Germany the market is being driven by subsidised pricing structures from state-owned telecom companies, bringing ISDN connections closer to the cost of normal analogue installations.

Bob Jones also revealed that he believes it will be possible to put the equivalent of the Arpeggio Lite ISDN router onto a single PCMCIA card within 18 months.



Above Bob Jones of Sonix
Left The Arpeggio Lite



Java au Latte

Borland is aiming to get people into Java fast with a set of Delphi-like programming tools using a visual rapid application development (RAD) environment.

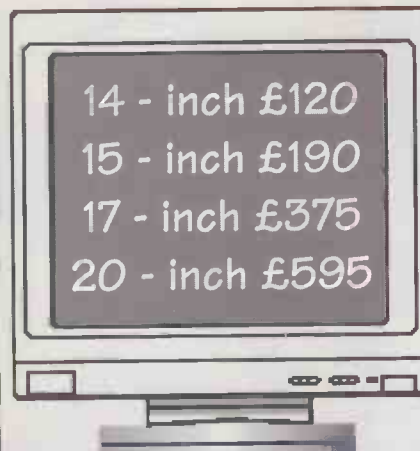
A licensing deal with Java's creator, Sun Microsystems, has enabled development of the package, codenamed Latte. It is scheduled for release in the first half of this year. Latte will focus on developing Internet and Web applications using object-orientated techniques. The compiler is claimed to be one of the fastest in the world.

Java has the potential to change the way applications are developed, both for the Web and via the Internet for distributed enterprise computing. For more on Java see Focus, pp232-7.

Borland International 01734 320022

<http://www.borland.com/Product/java/java.htm>

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CallingAll cards!

CompuServe has announced a new service which allows you to log onto CIS without using a modem or PC. The new CallingAll card system uses a phone card which provides access via a touch-tone phone to various CompuServe services such as email, news and stock quotes.

Users will be able to select email on criteria set by themselves. Priority email, for example, will be sent to a CallingAll email box. A touch-tone phone can be set to preview email which can then be transferred to fax machine or personal pager for retrieval.

Other services will include faxmail, voicemail, weather and news reports. CompuServe hopes to expand voice capabilities in the future so that email will read to users. The CallingAll card will be customisable by users so that information can be customised for individual subscribers. The service will complement existing CIS services so that by logging onto CompuServe, users can check voicemail, email or faxes.

CallingAll is expected to be launched in the first quarter of 1996 in over 40 countries and will be issued free to existing CompuServe members. It will cost around 25 cents per minute to use. Twenty minutes of free access are included in the first month of use.

The service has been developed jointly by CompuServe, and Premiere Communications of Atlanta.

CompuServe 0800 000400

TV times

The latest buzz in Internet circles is Web access via cable and TV sets utilising set-top boxes. Forget modems, ISPs and PCs; all you need is a TV and a set-top box. But will it happen? Some doubts are emerging.

Philips has launched a CD-i player and a modem that provides access to email and news. Oracle is making noises about Web TV, said to be launching later this year.

But according to industry watchers Forrester, the idea of using the family TV as an Internet access point may be a non-starter. TV, says Forrester, tends to be used as a group device, while Internet content is geared to single users. Therefore, Web content will have to change before this could happen.

While not interactive, TV is a multimedia device with sophisticated sound, video and graphics. The Web has a long way to go before it can even begin to match TV. TV's are viewed from a distance; Web content is designed to be read up close on a PC screen.

Forrester cannot see online services such as CompuServe having enough clout to push hardware manufacturers into building Web TV devices while cable companies offering Internet connections have little expertise in writing Web content.

The only hardware manufacturers that can drive the market are too busy successfully selling games platforms to worry about delivering hardware Internet boxes. So it looks like the TV will remain safe for the likes of Jim Davidson for a while yet.

Friends of the Earth puts banned ad on the Web

Friends of the Earth has placed a cinema advert that was banned by the Advertising Standards Authority on its Web site so that people can download it to a PC. The advert in question claimed that 21 murders were a direct result of the mahogany trade in the



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Amazonian rainforests. The ASA said that not enough evidence supported this claim and banned the advert from cinema screens.

By putting the advert onto the World Wide Web, FOE has neatly demonstrated how the Internet can evade national legislation and rulings. The ASA is aware of the situation, and is in discussions with the advertising industry and other regulatory bodies on how best to address growing use of the Web as an advertising medium.

A spokesperson for the ASA said it would not shrink from complaints made about advertising carried on the Internet. An example was for "free" software that actually incurred a delivery charge, contravening the ASA code of conduct. The ASA concedes, however, that Internet advertising that originates abroad would be difficult to regulate.

Friends Of The Earth
<http://www.foe.co.uk>

CompuServe to go ISDN

CompuServe are expected to deliver ISDN connections in the first quarter of 1996. Trials are already taking place in the UK and Germany with 90 access points established in Munich and 60 points in London. If successful, CompuServe subscribers can expect to benefit from enhanced access as plans include bringing ISDN to a further 22 cities in the UK.

Corel Mania

Corel is to launch into the crowding Internet suite market with its Internet Mania package,

specially designed for Windows 95. It includes a number of software tools claimed to make exploring the Internet easier. The WebScan tool scans your favourite Web sites and, whenever they are updated, sends an alert message.

WebSearch uses a Windows 95 front-end to the Lycos database, which can be accessed from Find on the Start menu. Corel aims to make searching newsgroups easier with NewsScan, which puts a new icon into the task bar, alerting users to new messages in their chosen newsgroups.

Also included in Internet Mania are ftp tools, a simple Web server accessible from the Task Bar, and a Wizard that guides users through creating a simple home page. Internet Mania is expected to ship by the second quarter of 1996.

Free BT?

There are rumours that BT will be offering free local calls in 1996. But has anyone thought of the consequences this will have on Internet traffic and online charges? The rush to take

advantage of free calls to the Internet could put ISPs under severe strain as thousands more hook up to the Net.

Meanwhile, the UK telephone market is about to receive a severe shake, as AT&T finally arrives on these shores. For the first time, BT has a global rival in its own backyard. Perhaps if AT&T starts offering ISDN connections at a reduced rate, it might just force BT's reassessing its own ISDN policy.

AT&T is already offering Internet connections to business users, and is selling an ISP service to homes in the US. It could follow suit in the UK.



net.surf

● If you're looking for a quick and easy way to create your own home page, try the WebWizard from Arta Software. It's available for download from <http://www.halcyon.com/artamedia/webwizard/>. This Windows 95-style Wizard guides you through creating a home page without using any HTML. You enter the text, graphics and links when prompted, and the Wizard then creates a HTML file



in the directory of your choice. You can only do it once and you are limited creatively, but you can edit the HTML file at a later date when you become more proficient. For sheer speed and ease-of-use, WebWizard is the best no-brainer Web tool I've seen. Version 2 will add background colours and bitmaps to the process.



● From Canada comes a new rival to Wired in the form of Infobahn, which promises to be "not just another magazine about the Internet" (oh no?). You can get a taster at <http://www.postmodern.com/issue1contents.g3.html> which also gives you the chance to receive a free copy.

● Back in Britain I recently discovered BT's excellent Web site

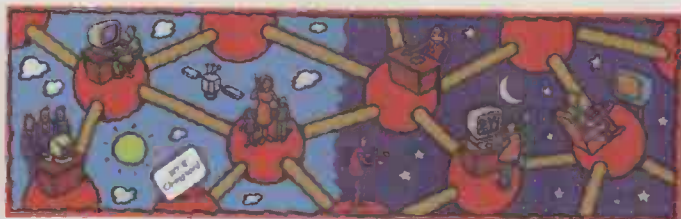
on <http://www.intervid.co.uk/>. Inevitably called Let's Talk, it provides an overview of BT's activities worldwide including partnerships, BT laboratories (including a VRML representation of the lab) and BTNet. This, by the way, is BT's little known Internet access service, an elegant Web site stuffed full of information you should know about.



● Linux is a cool Unix-based OS that is increasing in popularity among hardcore geeks. Why? Because it's cheap, small, fast and runs on 80x86 PCs. If you want to know more about Linux, keep reading Cutting Edge and check out the Linux International site on <http://www.li.org/linux-int/#Introduction>.

● While on the subject of cheap software, you might care to look at the Jumbo site at <http://www.jumbo.com/>. This is a huge resource of shareware that boasts no less than 24,582 programs, all free to download. Whether you use a PC, Mac or Unix box there's bound to be something here to load up. Every piece of software comes with full descriptions and a search engine provides fast access if you can't find what you're looking for.

● Finally, my very own Web site will be finished by the time this issue of PCW hits the stands. Find me on <http://horse.vnu.co.uk>.



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net.newbies

Getting started on the Net

These pages are designed to be an easy-to-use reference guide to the Internet for the novice — or “newbie”, as hardened netters will call you. Here’s an easy-reference guide to the tools which will help you make the most of the Internet.

What is the internet?

The Internet consists of millions of computers interconnected in a global network. The number of users is difficult to measure, but those worldwide who can at least exchange electronic mail messages is estimated to be 30 million and this appears to be doubling each year.

What is the World Wide Web?

It is not the Internet. It is a service on the Internet which uses special software (usually available free) to give users access to pages of information with pictures and multimedia instead of just text. About 15 million people around the world have access to the World Wide Web.

What do I need to get on?

A PC of almost any age can be connected to the Internet as long as you can plug it into a modem. You don’t even need to be able to view graphics on your machine to look around (although it helps).

A modem allows your computer to dial in to another computer with a modem and communicate with it. They come in different speeds, from 2400 baud to more than ten times that. When you are using the Internet, the speed at which things work is more likely to be

limited by the speed of your modem than by that of your computer. Buy the fastest you can afford. An old 2400 baud “V.22bis” model is fast enough to exchange electronic mail messages, but to send and receive files, or use the more exciting services on the Internet, a modem which runs at a speed of at least 14,400 baud “V32.bis” is vital. Fortunately, these have plummeted in price over the past few years and now cost as little as £100. If you have the money, go for a 28,800 baud V.34 modem. Over time, you’ll get back the added cost by reducing your phone bills.

Okay, I’ve got a modem. Now what?

For a modem to bring you information, it has to have a number to dial. This is where a “service provider” comes in — you have to subscribe to one if you want to get online. Whatever kind of connection you have set up, you will have to pay your phone costs on top of any subscription, unless you are lucky enough to get free local calls through a cable company. The bigger service providers will have the numbers you dial, PoPs (points of presence), scattered across the country so you only have to dial a local number.

If there’s no company near to your home which offers Internet access, you may have to pay long-distance phone rates. Once connected, though, it doesn’t matter where the information you are accessing is physically located: you are always charged at the same rate. A list of providers and telephone

numbers is available in the panel below. For more details, have a look at the supplement banded with the January issue of PCW.

Typically, a subscription that only provides electronic mail costs around £5 a month and Delphi offers this. But full Internet access which allows you to use email and Internet services for any amount of time, limited only by the size of your potential phone bill, costs more, currently between £8.50 and £15 per month. There are dozens of companies offering this kind of Internet access, none of them big enough to dominate the market. The basic service being offered is largely the same, although some higher-priced providers may claim to offer a more personal service or a better selection of access software.

Online services: what do they offer?

Major online services like CompuServe or Delphi now offer Internet access and also have a large number of services of their own to which only their subscribers have access. These services include official technical support for hardware and software by electronic mail, online games, vast indexed software libraries and databases of business or consumer information. A monthly subscription tends to cost between £6 and £10 per month, plus a charge per hour if you are online for more than a set number of hours in that month. CompuServe is more expensive than the other Internet providers, but you get what you pay for — it’s pretty foolproof. Demon Internet is the best

known and most popular of the standard Internet operators but doesn’t cater too well for absolute beginners. Perhaps better for the raw newbie is Easynet (although it only has Pops in London and Edinburgh) or UK Online. UK Online is a special case, a cross between an Internet provider and an online service. For £8.50 to £12.75 per month it offers unlimited access to the Internet, partially “censored” to make it safer for children to browse, plus access to online magazines and other services.

Although programs like Windows Terminal can be used to access these services, it is normally easier to use specially-written online software. Any service provider should provide you with at least some of this software when you sign up, and if you want to choose something different, most of it can be acquired online, free of charge.

PCW Contacts

CompuServe 0800 289378
email: 70006.101@csi.

compuserve.com

Delphi 0171 757 7080

email: uk@delphi.com

Demon 0181 371 1000

email: internet@demon.net

email: sales@thenet.co.uk

UK Online 01749 333333

email: sales@ukonline.co.uk

Easynet 0171 209 0990

If you don’t understand what’s written here or have any suggestions, please let us know. Contact

Paul_Fisher@pcw.ccmil.

compuserve.com, or

“snailmail” (Internet-speak

for the post) to the PCW

Editorial address on page 12.



CUTTING EDGE

Part 2: Playing tag

DIY Web pages

In this second part of our series about creating your own Web pages, Nigel Whitfield shows you how to make your pages easier to read and more fun to use. He covers some advanced techniques, too.

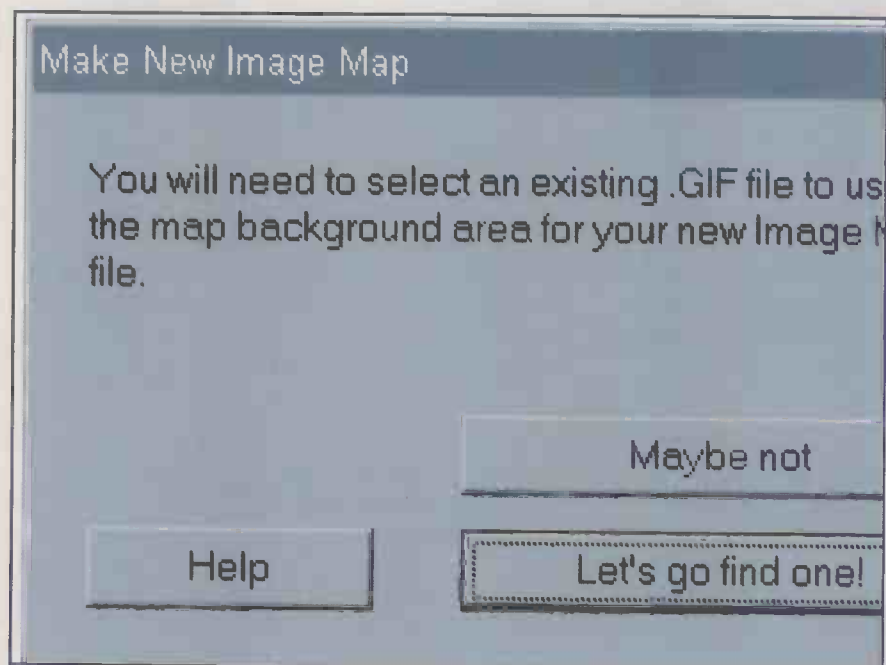
Last month we looked at how to create your own Web pages using basic HTML markup tags, and how to include images, links and headings in your documents. Take a look around the World Wide Web and you'll see there's still a lot more you can do with your pages, such as lists, images, or even forms that people can fill in with information.

This month we'll look at a few other ways in which you can make your pages easier to read and more fun to use, and take a peek at some of the more advanced things you can do if you have access to the right sort of Web server for your documents.

Ready to play

All the tags we've looked at so far have one important thing in common: they're all used to tell the Web browser that reads the page not how it should look, but which style to apply — very similar to a style sheet in a word processor. Change the style sheet, and everything using that style changes automatically.

Sometimes, though, that's exactly what you don't want. For instance, if you're giving detailed instructions to someone, you might want to move on to a new line at a particular place, rather than rely on their Web browser to do the choosing for you. For things like that you can use the `
` tag, just like you'd use the Return key in a word processor.



But what if you want to do something a little more detailed, such as a table of prices and part numbers for a catalogue? There are two ways to do this. One is to use the table feature built into HTML — which we'll look at next month — and the other is to use "pre-formatted text", like this:

```
<pre>
This text
```

This is a simple home page, using only a few basic commands — you don't need to be an HTML wizard to get good results

```
will appear
exactly like this
</pre>
```

Most graphical browsers use a fixed-



made easy



space font (such as Courier) to display pre-formatted text, which means you'll be able to space words out using tabs and be sure that they line up properly. And even though the tag is for "pre-formatted" text, you can still use other tags within it. For example, you can use it to make column headings appear bold. If you wanted a table of prices and products, it could look like the example here:

```
<pre>
<b>
Item      Cost
<b>
Roses    &#163;1.50
Poppies  &#163;0.75
</pre>
```

The `£` is another special code that you can use in your Web pages. It tells the Web browser to display character 163; in this case, it's the £ symbol. You can include other special characters, either by giving their name or by using a special code. For example, `&#lt;` inserts the "less than" symbol, which you can't type directly into your HTML as it starts each tag. The most useful symbols are listed in the panel at the end of the article (page 257).

A little list

Lists are another way of presenting information in an easy way, without having to use tables, which can be complicated to set up (see page 256). Lists are supported by all Web browsers and there are three different types to choose from, depending on whether you want them to be numbered for you, or to contain long definitions.

The simplest type of list that you can put

on your Web page is called an unordered list. It's just that — a straightforward list with no numbers; in no particular order. You could use it, for example, as a list of other cool places to visit, or a table of contents for your own Web site.

If you're using a Web page editor, such as the Internet Assistant for Word for Windows, you can create a list just by typing all the items you want on separate lines,

then highlighting them and clicking on the list button, just like creating an ordinary list in a Word document.

Creating a list by hand isn't much harder, either. An unordered list starts with the `` tag, and each item begins with ``, for "list item." After the list item, just close the list with ``. You'll end up with something like this:

Handy Hints

Turning your words into HTML is the easy part of creating Web pages. Follow these hints to help save time designing your pages and make sure that they're easy for people to read.

- Work out what you want to do first. If you're going to have more than one page with links between them, draw a diagram so you can see which ones should be linked, otherwise you'll end up with a confusing maze of pages.
- Make your first page short and simple. People don't want to have to wait ages to download a large home page. Have a quick summary and some links to other information on more pages.
- Don't overdo the graphics. Pictures are very nice, but they take time and money to download. If you must have lots of them, make them small and make sure you use "alt" text for people who don't download the pictures.
- Don't use too many headings. If you have lots, it'll be hard for people to read the text.
- Try to avoid using special features that rely on people using a particular Web browser. They may not work at all if people use a different program to read your pages.
- If you have a long document, break it up into sections and make a miniature index so that people can jump to anchors at useful points.
- When you give the names of files in links or "img" tags, don't give the full path; just say where they are relative to the file that you're reading, so they'll still work if everything is moved to another drive or directory.
- Always remember to use Unix-style forward slashes "/" in file paths, rather than DOS-style backslashes.
- If you're using Netscape to view pages, you can drag your HTML file into the Netscape window to view it.
- Save HTML files with the ".htm" extension on a Windows system, or with a name that ends in ".html" on a Macintosh — some Web browsers and servers prefer files to have names that end that way.



```
<ul>
<li>This is the first thing on my
  list
<li>And this is the second. List
  items can be as long as you like
<li>Here's the next item
</ul>
```

If you want the things on your list to have numbers, all you have to do is swap the `` tags for ordered list tags — ``. Each item in your list is just like any other piece of HTML code, so it could include a link, or a paragraph, or even another list, which will be indented automatically. Of course, the point of a list is to be easy to read, and if you start to include lots of text, you'll quickly find that it's actually rather difficult to work out what's going on.

To get around this problem, there's a third type of list called a "definition list". Unlike the other two types, there are two parts to each entry of the list, a title and a definition. When the list is displayed, the title of each item will appear, with the definition indented below it. Here's an example:

```
<dl>
<dt>Personal Computer World
<dd>A monthly magazine published by
  VNU. Probably the most popular
  computer magazine in the UK.
<dt>Nigel Whitfield
<dd>A freelance computer journalist,
  who has written for a wide range of
  magazines including <i>Personal
  Computer World</i>.
</dl>
```

By using lists carefully, you can make it easy to find links on your pages, and easier to keep them up to date — it's much simpler to find the link you're looking for when everything is neatly arranged in lists, rather than hidden in the middle of paragraphs.

In fact, if you write your own Web pages using a text editor, it's worth remembering that you can add as much blank space as you like without affecting the way things look, and it will make it easier to keep everything up to date. The only time you'll need to be careful with spaces is in pre-formatted text and around links, where a new line or extra space before the end of an anchor might make some browsers leave an underlined space on the screen.

Imagination

Once you've looked at other pages on the World Wide Web, you'll notice that lots of people use buttons or other images for their links, and choosing the right images can

Walkthrough: Creating a map file with MapThis

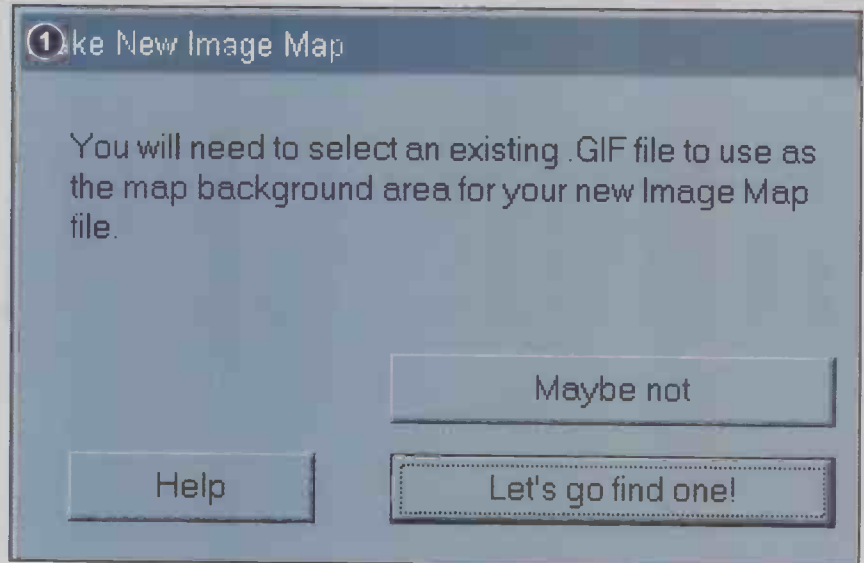


Fig 1 MapThis runs under Win32. To create a new imagemap, just start the program and select File New. When you see this screen, press the button marked "Let's go find one" and open your GIF file

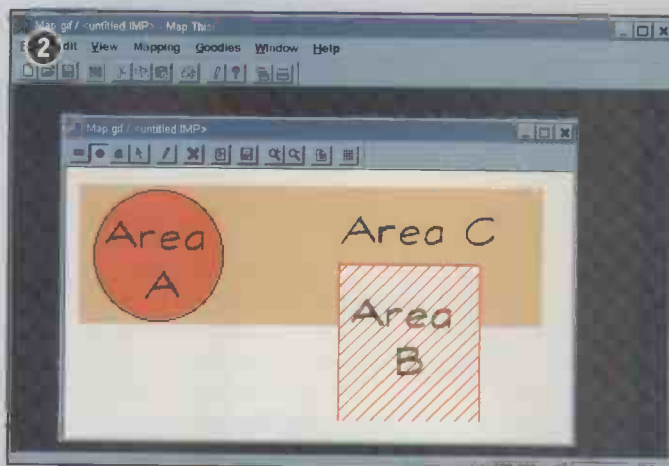
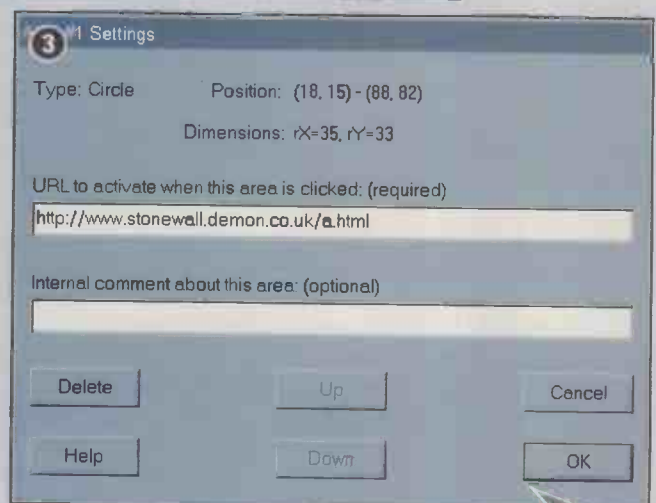


Fig 2 This is our test image, opened in MapThis. You can zoom in by clicking on the appropriate button, or put a grid over the top of the image to make it easier to line up your hotspots

Fig 3 To add a hotspot, just select the type from the button bar, click and drag to create it. When this screen appears, you can fill in the details of what's supposed to happen when people click. To adjust the coordinates, drag the edges of the shapes later



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EDITORIAL



Fig 4 Select the Map Info button and you'll see this dialogue box, which allows you to specify the default action if none of the hotspots are clicked and to say whether you want an imagemap in NCSA or CERN format

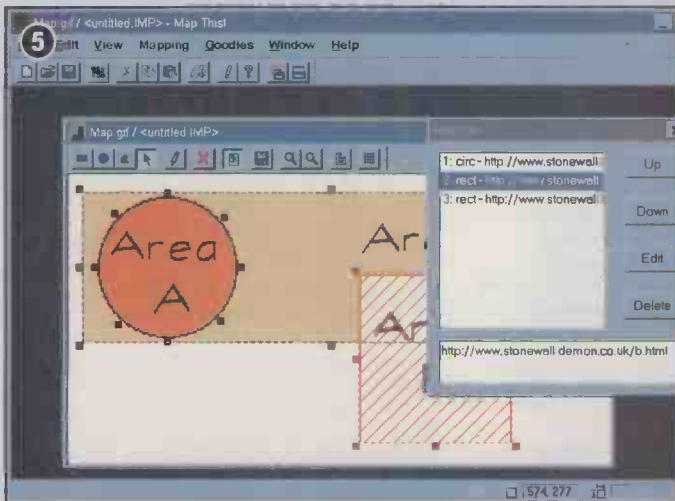
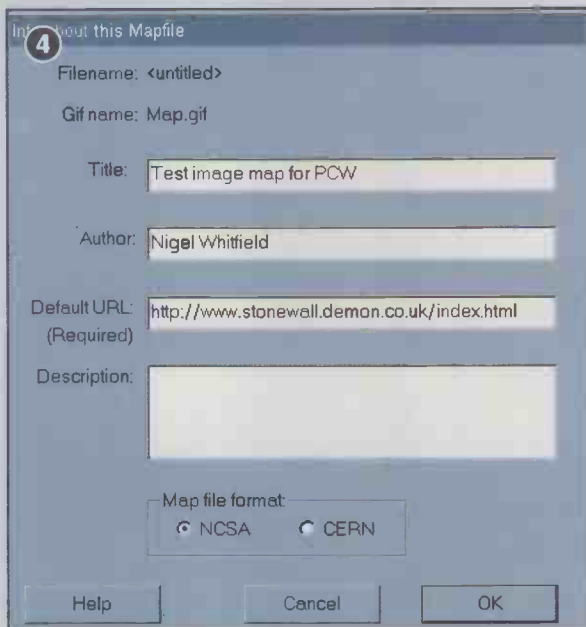


Fig 5 The area list allows you to see which areas you've defined and to move them up and down the list. In our example, area A must come first, otherwise it will be "lost" in area C and readers won't be able to select it

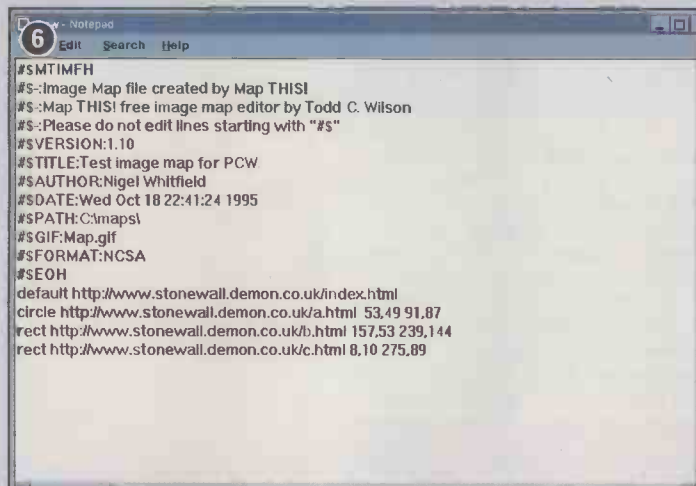


Fig 6 This is the resulting map file, opened with Notepad. All you have to do now is copy it to your Web server

make it much easier for people to find their way around.

As well as individual buttons, another popular way of adding links to a page is by using imagemaps. An imagemap is a picture that appears on the page which can be clicked on. The co-ordinates where you clicked are sent to the Web server, and the appropriate page appears. So, if you want to have a completely graphical Web page, giving you control over how everything looks, you could create a large image with built-in buttons.

Remember that if anyone isn't looking at images, they won't be able to find out anything useful from your page, so it's vitally important that you have ordinary text links underneath the picture — or a clear link to a text-only version of the page.

Also, if you want to pack a lot of information onto the screen, you'll end up creating huge pictures. Another problem is that there's no single way to create an image map — it depends on the sort of Web server you're using.

Image maps can be a good option, but you should think carefully before you decide to use them. For instance, lots of people use image maps to put button bars on their page. If you're tempted by the idea, consider using a series of graphical buttons next to each other instead. You'll have lots of images, but you'll also have a page that can display different text for each button, and will work whether people are using a graphical Web browser or a text-based one.

Script secrets

Sometimes, using a clickable image really is the best way to make your page look smart and simple to use. It's not hard to set up an image map, but it does need a little bit of planning.

First, you need to understand how the Web server handles maps, and different servers work in different ways. Most commercial Web space providers use one of two servers, called the NCSA or CERN http daemons, after the places where they were written. We'll show how to make an imagemap work with both. Even so, things will differ from one server to another, and if you're renting Web space you should check with your provider to find out which type of server you'll be using and exactly how to set things up.

To make a picture into a map, there are

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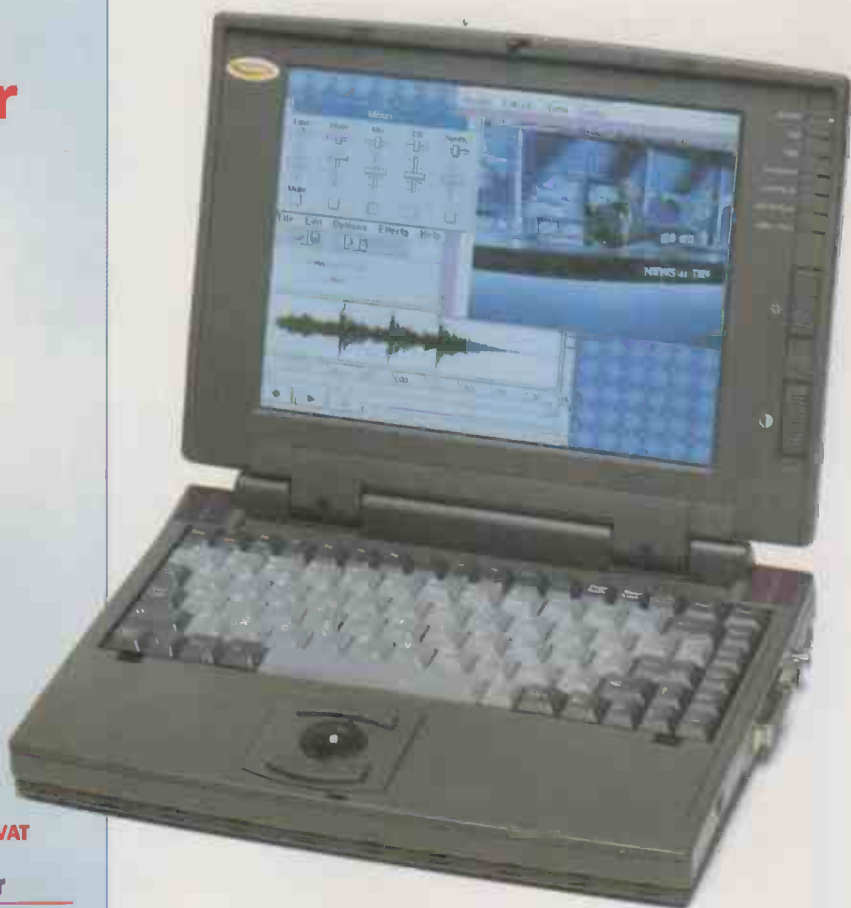
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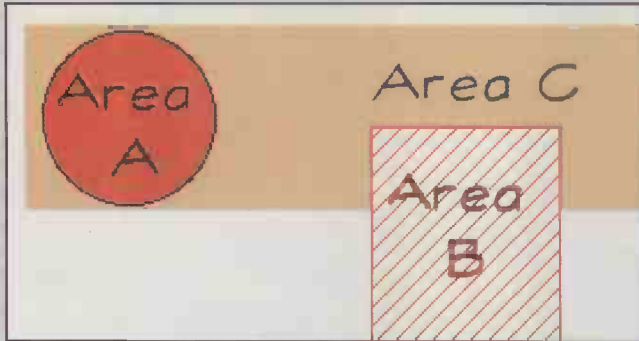
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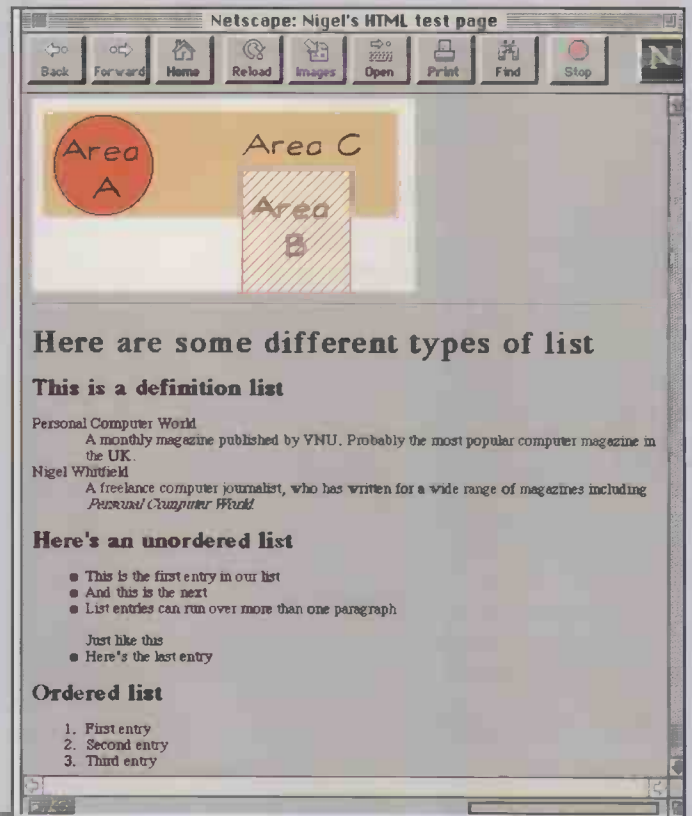


two things you must do. The first is to state that it's a map when you add it to your Web page with an `img` tag, and the second is to make it a link to a script on the Web server. Scripts are one way a Web server can process information and return the results to your browser. They could be used, for example, to search through a database, or to see how much disk space is free on the server.

The imagemap program is a special script that looks at the co-ordinates where you clicked and works out which Web page you should see next. It does this by reading a map file, which is a description of the shapes in the image, and which URL should appear for each shape. If your provider is

Above Fig 7
(see "Mapping it out", page 257)

Right Fig 8 (see
"A little list",
page 251)



using the NCSA Web server, the image mapping program is called `/cgi-bin/imagemap`, and if they're using the CERN server, it's called `/htbin/htimage`.

In next month's article we'll look at how

to use scripts in more detail, but for now we'll just look at how to call the image mapping program, and how to tell it what parts of your image lead to which type of link.

All about imagemaps

Although you can use a program such as MapThis for Windows to create your imagemaps, as with the rest of your HTML pages it helps to understand what's happening when you create a map file, and just how it works.

● There are a couple of important things to remember when you're creating a map. The first is to try and make sure that clickable areas are clearly defined, so that people who look at your pages won't be confused about where to click; and the second is to remember that the order in which your hotspots is defined is important.

When the imagemapping program tries to work out what should happen next, it stops at the first hotspot it finds. That's not a problem if none of them overlap, but on the example page we've shown, there's a circle within a rectangle, and it won't work unless you define the circle first. The rectangle will automatically fit round it.

● It's also worth remembering that, though there are differences between the formats of the map files used by the CERN and NCSA Web servers, you can make it easier to convert between them. The most important thing to remember is that when you define a rectangle, you should always use the top left and bottom right corners as your points. Strictly speaking, you don't have to do that for the CERN Web server, but if you do, you won't have as much work to do should you ever use the NCSA one instead.

● Another point to remember when you work out the co-ordinates is that, unlike an ordinary graph, co-ordinates in an image start with 0,0 in the top left corner, rather than the bottom left. Each co-ordinate is a single pixel, so if you use a graphics package to create the picture, the pixel address will be the same as the co-ordinate.

To make it a little clearer, let's look at a sample image, which is 288 pixels wide and 144 high. We'll assume that there are four options when you click on the image, one for each of the named areas, and a file called "index.html" that will appear if you click on any of the white space around the edge. Here's what the image map file would look like for a Web server using the NCSA daemon:

```
default http://www.stonewall.demon.co.uk/index.html
circle http://www.stonewall.demon.co.uk/a.html 55,50 55,88
rect http://www.stonewall.demon.co.uk/b.html 159,55 239,144
rect http://www.stonewall.demon.co.uk/c.html 9,11 276,90
```

You can use either tab or space characters to separate the different parts of each line. This is what the same definition would look like if you were using a CERN Web server:

```
default http://www.stonewall.demon.co.uk/index.html
circle (55,50) 38 http://www.stonewall.demon.co.uk/a.html
rectangle (159,55) (239,144) http://www.stonewall.demon.co.uk/b.html
rectangle (9,11) (276,90) http://www.stonewall.demon.co.uk/c.html
```



More HTML tags

Here's a summary of the HTML tags and image map commands we've looked at this month:

Tags

<code><pre> ... </pre></code>	Text between these tags will not be formatted. Line breaks will appear as you type them, and a fixed font such as Courier will usually be used to display the content.
<code> ... </code>	Put these around an unordered list (one without numbers).
<code> ... </code>	Put these around an ordered list. Each item will be numbered automatically.
<code></code>	Each item in an ordered or unordered list should begin with this tag.
<code></code>	The ismap keyword denotes that the picture "picname" is a clickable image.

Special characters

These tags must appear in lower case:

<code>&#xxx;</code>	Insert character number xxx from the ISO Latin 1 character set.
<code>&#163;</code>	£
<code>&lt;</code>	<
<code>&gt;</code>	>
<code>&amp;</code>	&
<code>&quot;</code>	"
<code>&copy;</code>	© (not supported by all browsers).
<code>&reg;</code>	® (not supported by all browsers).

Image mapping

All co-ordinates are pixels, relative to the top left corner of your image. URL may be either a complete URL or a relative reference to a document on your server.

Image mapping commands (NCSA)

default URL	Access URL if no other area is clicked.
circle URL x1,y1 x2,y2	Define a circular hotspot, with the centre point at x1,y1 and a point on the circumference at x2,y2. URL will be accessed when the circle is clicked.
rect URL x1,y1 x2,y2	Define a rectangular hotspot, with the top left point at x1,y2 and the top right at x2,y2. URL will be accessed when the circle is clicked.
poly URL x1,y1 x2,y2 ... xn,yn	Define a polygon with corners at positions x1,y1 to xn,yn.
point URL x,y	URL will be accessed if the click is nearest to the point x,y.

Image mapping commands (CERN)

default URL	Access URL if no other area is clicked.
circle (x,y) r URL	Define a circular hotspot with its centre at the point x,y and a radius r.
rectangle (x1,y1) (x2,y2) URL	Define a rectangular hotspot with diagonally opposite corners at points x1,y1 and x2,y2.
polygon (x1,y1) (x2,y2) ... (xn,yn) URL	Define a polygon with corners at positions x1,y1 to xn,yn.

Scripts are called as a special type of URL, giving the name of the script, followed by a slash and the rest of the parameters. In the case of an imagemap, you have to tell the server the name of the file that contains a description of your picture, and your Web browser will add the co-ordinates on the end. Here's an example, for the NCSA Web server:

```
<a href="/
cgi-bin/imagemap/test.map">
</a>
```

In other words, the graphics are in a file called map.gif, and the file test.map describes which areas are clickable. For the CERN server, all you have to do is change the name of the mapping program.

Mapping it out

All well and good, but what's in the map? It's

not as complicated as it seems — there are just a few lines that describe the different shapes in the picture and what happens when you click on them (Fig 7). You can describe circles, rectangles and polygons, and create a default response for when people don't click on one of the hot spots.

The panel opposite, "All about imagemaps", explains how imagemaps work in more detail, but if you want to save time you should download one of the many programs designed to create imagemaps for you, such as WebMap for the Macintosh, or MapThis for Windows. Both programs let you highlight areas in your picture and automatically create an imagemap file for you, without having to worry about how everything works. If you're trying to create a complex map, it's almost certainly

worth using one of these programs rather than trying to build the map yourself by hand.

With a few image maps and lists, it should be possible to produce a very professional-looking Web site.

Next month we'll look at how to create tables, and how to add forms and scripts to your Web pages to make them interactive.

PCW Contacts

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Innovations

One piece suite

As the Internet develops its appeal to Mr & Mrs Average in the home, the PC mass market is evolving different approaches, in parallel. Tim Frost does his homework.

As the Internet soars in popularity, so do attempts to develop its interface on the desktop PC. Companies leapfrog one another in an attempt to come up with the perfect web browser or integrated suite of Internet applications; this year's growth area. All this is to make the Internet more usable for general computer users, many of whom use the Net at work, to explore at someone else's expense.

Adding better user interfaces, pictures, sound and movies to the computer is seen as the holy grail of the online world with a huge number of companies jumping on the home page bandwagon, trying to out-do each other in the fancy appearance of their pages.

Different

But there is a parallel development that takes a fundamentally different view of the way in which the mass market will approach these services. The large set of boxes we know as a computer is perhaps on the way out — at least, in the home.

We've seen the advent of all-in-one PC boxes such as the Compaq Presario, and more recently the Olivetti Envision

approach where the computer looks more like a VCR than a PC and plugs into the TV. But even this is hardly revolutionary. The view of some telecoms and service provider companies is that using computers to access the online world may be a bit of a cul-de-sac; eventually limited

the mass market lays with a much less technical-looking box than a computer

to office work and PC enthusiasts. They believe that the mass market (potentially every household with a telephone and a TV) lays with a much less technical-looking box than a computer.

Diametrically opposed

Infogrammes, better known over here as a games developer, is working on an online system which is diametrically opposed to the world of PCs, ATIPs and HTML. It sees the future for online as products that sit comfortably in Mr & Mrs Average's front room.

Its proposals are for a set-top box, along the lines of a satellite

decoder, that connects to the TV to provide games, shopping and information services. The box has a processor with a fast 28Kb modem inside. It simply connects to the phone and the TV to deliver an interactive function that looks like a cross between a Playstation and super teletext-type service.

The company has already gained experience delivering online services in which the householder is interested, with Minitel in France. Minitel is a mini keyboard and display that connects to the phone socket to send messages and access services.

Ten years ago, France Telecom (FT) supplied the boxes free to thousands of its domestic customers: the increased use of the phone lines quickly paid for the hardware. FT and other companies providing Minitel services have been onto a good little earner ever since.

As a major player in Minitel, and having experimented with interactive games on national TV programs, Infogrammes believes online services are going to merge day-to-day access information services like weather and traffic reports, with entertainment and interactive

gaming. Its system is fast enough to deliver sound, simple animation and slow, frame-rate video and react quickly enough for smooth game-playing against a central computer or online users. All this and (as far as the family is concerned) with not one computer in sight.

Halfway between

Philips is playing with an idea that is halfway between current online ideas and Infogrammes' approach. CD-Online, a Philips-backed organisation, is tapping what it hopes will be a growing market for CD-i owners with an add-on box to access the Internet from your TV and the CD-i's remote control.

The system comes as a combination of modem and CD-i disc. The 14.4Kb modem plugs into the back of the CD-i unit and into the phone socket and links directly into the machine's processor and video output.

The disc contains the Internet interface, which is graphics-orientated and has an animated tutor, called Dave, which guides the user through the different facilities and services available on the Net. The system accesses the Internet through CD-Online's gateway (via Pipex).

The company operates just like any other service-provider. But in CD-Online's case the service is pure Internet, the hardware is pure games/VCR. You might argue against the wisdom of hitching up with CD-i (which has yet to grip the nation) but the real question is; which direction will online take? The huge increase in the number of home PC's will help to promote interest in working online over the next two years.

But after that, will your online hardware move into the telephone and the TV, where it will merge with video and audio on demand, satellite, teletext, cable and home shopping? It could become just another way of accessing the electronic world outside the house.

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Horizons

The future's 3D

The PC needs low-cost graphics acceleration in order to compete with the home consoles market. Ben Tisdall brings news of a chip which should allow every PC to support 3D graphics within a year.

The home market is now the driver for developments in graphics and multimedia. Nearly 30 percent of all PCs sold now end up in the home, and the number is growing by 15 percent a year.

Home PC users are big games players, and for games developers the PC offers several advantages over consoles. Distribution is free, there are no royalties to pay to the console manufacturers and the content of games is not vetted by them. PCs currently account for between 10 and 15 percent of the games markets and the proportion is predicted to grow.

High-quality games require fast 3D graphics. The success of Flight Simulator and, more recently, Doom is largely down to three-dimensionality. 3D in this context doesn't generally mean the stereoscopic effect you get when you wear 3D glasses, but a detailed, rendered 3D world that you can move through.

For the PC to keep up with the new generation of consoles (Sony's Playstation and the Sega Saturn both have 3D graphics acceleration), low-cost 3D acceleration for the PC is needed. That way you get the graphics speed of Doom with the detail of games like Myst. The aim is to close the gap

between the dazzling pictures on the packaging or in the adverts and what you see on your computer screen.

There are three key bits of technology required for 3D acceleration. The first is operating system support. Windows 95 provides the kind of stable, standard, reliable software interface that games developers and hardware designers have been looking for. Before Windows 95, 3D APIs were mainly DOS-based, like the games applications, and produced by third party companies like Argonaut Brender and Rendermorphics RealityLab. Microsoft's acquisition of Rendermorphics has allowed the RealityLab 3D API to be built into Windows 95. This API includes complete scene management and a software geometry engine. But developers who already have their own API can still write straight to the lower level Direct 3D API; this is particularly useful for companies porting existing DOS games to Windows 95.

The second requirement is a geometry engine to do the heavy number-crunching and deliver the framework for a scene. The job of the engine is to process environment descriptions and translate them into 3D polygons. Pentium processors provide geometry engines with the necessary horsepower to rotate and

translate objects in a scene to the user's viewpoint, to decide on the light and shading characteristics of the polygons, and to clip (or remove) polygons that are out of sight from that viewpoint.

The final requirement is a rendering engine, and this is where 3D processors come in. They need to be scalable as new, faster CPUs are introduced.

"High quality games require fast 3D graphics"

They need to be widely accepted by developers and hardware manufacturers, and, above all, cheap enough to compete with console prices.

The job of the rendering engine is to intelligently construct a 2D representation of the 3D geometry — 30 times every second. The process has four main elements: polygon rendering, texture mapping, atmospheric effects and hidden surface removal.

Polygons, usually though not always triangles, can be rendered as flat shading, Gouraud shading or texture mapped. Flat shading is low

quality and looks boxy but many games still resort to it to increase performance. Gouraud shading improves on the boxy look by "interpolating colour from each vertice of each polygon"; in practice, smoothing out the rendering to give a metallic or plastic appearance.

S3's ViRGe 3D accelerator chip, announced at Comdex Fall in Las Vegas, provides the necessary oomph at the right price to bring 3D graphics into the mainstream on the PC. Seventeen hardware manufacturers and 14 games developers have agreed to use the chip, and S3 is already confidently predicting that 3D graphics chips will be the next billion-dollar chip market.

The chip supports some pretty advanced 3D features including texture mapping, true per pixel perspective correction, support for using live video as a texture map, and transparency which allows realistic rendering of water and glass. And it's engineered to keep costs down. It uses a 208-pin package that's compatible with S3's other video chips and will cost under \$40 apiece in volume. S3 expect this to translate into cards costing under \$200. By next Christmas every home PC will probably support 3D graphics and inside quite a lot of them will be an S3 ViRGe 3D processor. ■

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Breaking the Big Barrier

Using the human brain to send electric information to computers shows that true artificial intelligence may be closer than we think. Toby Howard explains.

In just 50 years, the computer has revolutionised our lives, and our futures. But one problem remains: the interface between computer and mind. The Big Barrier is almost as impenetrable today as it was in those early days when we punched paper tape.

Researchers are seeking more expressive ways to communicate with machines. Virtual Reality has gone some way towards allowing machines and humans to share the same conceptual space. But there are drawbacks: the head-mounted displays and datagloves are expensive, often cumbersome and inappropriate for many interaction tasks. Other approaches include natural speech recognition, gaze tracking and gesture recognition, where neural networks interpret hand, body and face gestures. Recently, researchers writing in the prestigious journal *Presence* suggested a "Nose Gesture Interface Device". Such is the climate of today's research that not everyone spotted the joke.

All of these methods, however, are based on the user's muscular movement. The breakthrough will come when we can communicate by *thinking*. And it's beginning to happen.

Controlling machines with our brains isn't a new idea. In

1967, Edmond Dewan described experiments using subjects wired to an electroencephalograph (EEG), which records and graphs the electrical activity of the brain. With practice, the subjects were able to reduce the amplitude of their brain's alpha rhythms, to transmit Morse code to a teleprinter.

Research into the Brain-Computer Interface, or BCI, began in earnest in the early seventies, when the United States Department of Defense saw the promise of fighter pilots using their minds to directly control their planes. The project was unsuccessful, but the groundwork was laid for a field of research now growing rapidly, and over the last decade, great advances have been made.

A successful BCI must be bidirectional. Getting information into the brain is relatively easy through normal sensory channels. But reducing the brain's information to electrical signals is harder. Although leading researcher Jonathan Wolpaw has commented that "in theory, the brain's intentions should be discernible in the spontaneous EEG", the sheer complexity of the brain's measurable activity produces EEG traces which present a huge problem of interpretation. However, by focusing on very

specific areas of brain activity such as motor function, it is possible to analyse EEG data using filters, fourier transforms and neural networks, to extract useful signals from the noise.

Using this technique, workers at the New York State Department of Health have been conducting experiments with "mu rhythm", an 8-12Hz brain rhythm centred on the sensorimotor cortex. With biofeedback training, subjects learned to move a cursor around a screen by modulating their mu waves. At the University of Illinois, researchers have trained subjects to control a "thought typewriter", which displays their chosen letters and words on a screen.

There are even a number of cheap EEG monitoring systems available aimed at the hobbyist, with PC or Mac interfaces. IBVA Technologies' Interactive Brain Wave Analyser, for example, comprises a headband with adhesive electrodes which send data by radio to a Mac interface box. This processes the raw EEG to give data which can be viewed as 3D graphics or converted to MIDI to control a soundcard or synthesiser. One user is Sylvia Pengilly, Professor of Music Theory at Loyola University in New Orleans. "I always wanted to 'think' my music into the computer," says Pengilly. "It's still in the early

stages, but I can control the form of the music according to the moods I set."

Although the principles of EEG-based control sound simple, the extraction of meaningful data from an EEG trace remains at an extremely simplistic level. Motor functions are readily recognisable; "thinking" signals, such as "I'm thinking about blue skies", remain a challenge to decipher.

An alternative to EEG analysis is to implant electrodes into the brain matter itself, and stimulate/monitor groups of brain-cells directly. Electrodes contain toxic metal leads, but researchers at the Max Planck Institute for Biochemistry in Munich have overcome this by creating a "silicon to neuron junction", which can directly stimulate a nerve cell without damaging it. Used in conjunction with existing "neuron transistors" which sense the ionic potential of a nerve cell, this technology paves the way for two-way communication. The dangers of inserting electrodes into brains, of course, still remain.

Although still at an exploratory stage, the implications of recent research results are phenomenally exciting. Perhaps one day, the Big Barrier will disappear altogether. And instead of typing this article on my PC, I will merely have to think it in.

PCW Contacts

Toby Howard is a Lecturer in Computer Graphics at the University of Manchester. A collection of links to information about BCI may be found at <http://www.cs.man.ac.uk/aig/bci>



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Retro

Hit and miss

Sony intended the MSX to become the forerunner of a standard for home PCs. Big names backed it, high street electrical retailers stocked it, and stocked it, but... Simon Rockman fills in the background on why it flopped.

Sony once produced a machine called the HitBit. It was not a hit. In fact, it was part of the miserable failure that was the Sony MSX. Before the PC established itself as a *de-facto* standard, the Japanese conglomerates had a go at it. The idea was that if enough manufacturers produced compatible machines, they could produce a standard which would allow the same software to be used and banish forever the horror of little Johnny not being able to play his Spectrum tapes on his mate's Oric Atmos.

The result was MSX, a machine with a Z80 CPU running at 3.58MHz, a version of Microsoft Basic in ROM, varying amounts of RAM (typically 32 or 64Kb) and the T19918 video chip. Like some predecessors which used the same video chip, the graphics helped kill it.

As a home computer it was designed to be plugged into the family TV and use a cassette recorder for storage. Files were saved at 1200 or 2400 baud.

The sprites are all right

Like the rival Commodore 64, the MSX machines offered Sprite graphics; a technology which PC graphics cards, in the main, still haven't caught up



with ten years later. These were separate characters which could move around independently of other graphics on the screen. Driven by the hardware, sprites are ideal for games applications as bullets and aliens. But the sprites on the T19918 were limited: they were small, about the size of a normal character, and if more than seven appeared on a line they began to disappear.

The graphics speed was limited by the need to write to the screen serially. It was not memory mapped and this meant the MSX was much harder to program than its contemporaries. With hindsight, the machine seemed doomed, but at a time

The ill-fated HitBit, an MSX machine beset by grim graphics and an irritating tune on its only game

when the likes of JVC, Toshiba, Sony and every other big-name manufacturer was backing the technology, there were people who felt it couldn't fail. Some of those were the high street electrical retailers who bought a lot of stock. As this stock continued to gather dust on the shelves years later, the same retailers were loath to stock computers again and a bad taste lingers still in the mouths of some people.

Against this background, the

PCW review of the Sony HB-75 MSX machine seems horribly optimistic. This, in part, may have been due to the usual high build quality of the Sony machine.

Big-name backing

With the emphasis on games it had two joystick ports and took games cartridges. Thanks to CMOS-RAM with a five-year battery back-up, it was possible to save games. With all the big manufacturers backing the format, it seemed likely that there would be a lot of good software for the machine. In practice, there was Antarctic Adventure (a game with a penguin and an irritating tune) and, er, that was it. Some Spectrum games were converted, but nothing of note.

That irritating tune was produced by the AY 3-8910 sound chip (which was very good for its day and found its way into a number of other systems). The sound provided was three channels over eight octaves.

Resisting temptation

The Sony MSX cost between £250 and £320 at a time when most home computers were less than £200, but still the conclusion was: "The Sony HB-75 will be a very tempting purchase for a first-time buyer, particularly if they already own a Sony product. As an MSX machine it carries the benefits of an easy to use and powerful Basic along with a promised glut of software.

"It also expands on the MSX core with the inclusion of RGB and three useful firmware packages which illustrate the potential of the data cartridge. The 3.5in disk drive will be only one of the many peripherals available as hardware manufacturers no doubt jump on the MSX bandwagon."

Despite having only three wheels, no-one noticed that this particular wagon would be somewhat difficult to roll. The computer industry was very much better off as a result. ■



BOOKS

When the hitchiker's guide to the superhighway meets the rough guide to the Net, you know it's time to drag yourself kicking and screaming out of the dark ages and online. Dylan Armbrust and Joanna Scott tell us why. Meanwhile, Janice Murray and Ben Tisdall sort out the distinction between geeks, nerds and propeller-heads once and for all.

Living at Light Speed — Your Survival Guide to Life on the Information Superhighway

Author **Danny Goodman**
Publisher **Arrow Books**
ISBN **0-09-964931-4**
Price **£8.99**
Rating **◆◆◆◆◆**

Warning. If you are tired of reading about the information superhighway, stop reading *right now*. If, however, you are one of the many people out there still trying to understand what the devil the information superhighway is, and what to do about it, read on.

Goodman's *Living at Light Speed* is one of those rare computer-type books that actually explains in plain English what computer technology is, how it affects us, and where it's going. And the real bonus is that it's not a boring read. He takes the reader on a gentle journey into the world of the superhighway, beginning with the origins of communications technology and ending with tips on how to prepare for the future.

Most people today are still afraid of the superhighway and view it as a technocentric endeavour for the select few. Goodman debunks this viewpoint by showing that most people are already connected to the highway but don't realise it. Voicemail, cable TV and even the lowly answering machine are only a few of the devices he links to the development of the superhighway.

Most newcomers don't want

to know where the superhighway came from, but where it is going and what it means to them. This is where *Living at Light Speed* shows its strength. Goodman lists his Ten Myths of the Superhighway (myth 3 — Only the "haves" will have access to the Internet) and refutes these with well reasoned and backed-up arguments which demystify the Internet and make it accessible.

But Goodman doesn't go overboard in lauding the virtues of the superhighway. He clearly states that, contrary to popular belief, the superhighway has a long way to go before giving us that interactive Utopia we've all been expecting. Old telephone technology, PC-based systems and Big Brother are just some of the pitfalls he discusses. The mention of these pitfalls only reinforces the value of *Living at Light Speed*. For those thinking about hopping on to the Internet, this book provides a thoughtful and balanced view of what the road conditions will be like.

The Internet & World Wide Web — The Rough Guide

Author **Angus J Kennedy**
Publisher **Rough Guides**
Pages **320**
Price **£5**
ISBN **1-85828-198-9**
Rating **◆◆◆◆◆**

How many of us truly believe the old "the bigger the better" myth? That's not to say where there's quantity there is

no quality, but when a pocket-sized guide turns up for review amid all the "paving stones" it certainly stands out from the crowd.

The Rough Guide travel books are known for their off-the-beaten-track approach, but this time they have ventured right off it and into cyberspace. As the latest market research proclaims that British households will be joining the Internet at a rate of about 4,000 a week in 1996, Rough Guides have wasted no time in providing us with an authoritative guide on how to get there and what we can do at the world's latest number one destination.

Written by Angus Kennedy of Internet magazine, *The Internet & World Wide Web* -

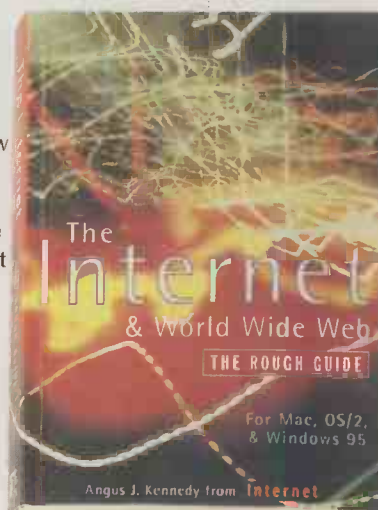
The Rough Guide is informative, straight talking, succinct and thankfully not totally void of humour. Your first startling observation, apart from the electrifying front cover, will be that it stands at less than six inches, but brace yourself for the stunningly cheap £5 price tag — another rare attribute among Internet paper-based publishing.

Although there is an American slant to the book, this is not too intrusive, but do be prepared for the small font size. Limitations on size and budget also mean that colour and graphics are the first to go but, hey, you're a byte-sized backpacker now, so forget the first class treatment. Nevertheless, you will gain first class knowledge of the Internet from basics such as getting connected to useful chapters on email, how to use ftp (File Transfer Protocol), and for the adven-

turous among you, there are step-by-step instructions for your first IRC (Internet Relay Chat) session. Part II of the book is devoted to the World Wide Web with site-by-site coverage to help you locate the winners and avoid the over-rated

time wasters.

The book also takes a glimpse at cutting-edge Internet software, particularly that allowing you to hear realtime sound, download video and of course make those free international phone calls. However, as the author is honest enough to admit that "to go through all these programs in depth is well





COMING EDGE

beyond the scope of this guide, these pages should prove a jumping-off point for the curious or committed", you'll quickly realise that the Internet itself can provide all the guidance for future exploration.

The Osborne Computer Dictionary For Beginners
Author **Anna Claybourne**
Publisher **Osborne**
ISBN **07460 19866**
Price **£5.99**
Rating **→→→→→**

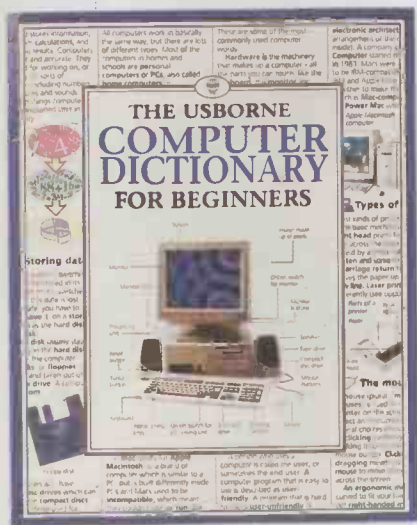
The Osborne Computer Dictionary For Beginners is a slim volume packed with all the jargon, the how's, why's and when's to get you started in the computer age.

On first inspection a 14-page index seems a little extensive for a 50-page paperback, but once you begin to read you'll realise why. Just about every nerdy cyberspeak term is included; from essential basics such as desktop and hard disk to Internet terms such as Gopherspace, Veronica and Jughead (and the cartoon series those last two came from). You can even look up chip numbers and therefore learn the difference between a 386SX and a 68030.

Although it calls itself a dictionary, this isn't set out in the usual dictionary manner. It gives double pages to particular topics, making it more of a textbook or quick-reference guide. Such topics include The History of Computers, Peripherals, How Computers Work, Sound and Music Software and Programming. So much is packed into such a tiny space that you cannot expect an in-depth look into any particular topic. Instead, you get a brief explanation on

each subject before the next is tackled. It will, however, give a brief grounding into all the basics.

Cross-referencing is used well, with key words italicised and starred to a page number reference at the bottom of each page so you can flick from one term to another. The book is jammed full of illustrations and well organised, although the mix of drawings, diagrams and photographs do jar in style a little. At the back (before the



mammoth index) there are useful glossaries of terms not used in the book, and computer slang so you can find out after being engrossed by the book that you've actually turned into a geek, a dweeb, an anorak or (God forbid) a propeller-head.

I would expect most children who use computers at home or at school to be familiar with a lot of the contents of this book. It is, however, an up-to-date and coherently presented textbook for all those who are still longing to know the difference between a Net Judge and a Net Evangelist.

Microserfs
Author **Douglas Coupland**
Publisher **Fleming**
Price **£9.99**
ISBN **0 00 225311 9**
Rating **→→→→→**

Microserfs began as a short story. We printed it in the May 94 issue of *PCW* and it recounted seven days in the lives of the young programmers who drink soda, eat pizza and worship Bill (Gates), and whose "universe consists of home, Microsoft and Costco". Coupland, best known for *Generation X*, has now expanded the book into a novel.

It begins in Microsoft as the main characters write and check code and frantically watch the price of Microsoft stock. Later the action moves south to Silicon Valley as the narrator, Daniel Underwood, joins his roommates in a new startup to write a game called OOP!. The gags come thick and fast, particularly in the first 100 pages. But it's a relentless pace to sustain, and after a while the effect is reminiscent of being stuck in a lift with a wise-cracking American for hours on end.

There's a subtle distinction between a nerd and a geek. Daniel defines it like this: "I think geek implies hireability, whereas nerd doesn't necessarily mean your skills are 100 percent sellable. Geek implies wealth." Well, the geeks who populate this book get harder to like as the



book progresses, as they discover their sexuality (never pleasant where geeks are involved), weather crises, and finally take the product to CES (Consumer Electronics Show) in Las Vegas; all the while speaking in an almost alien language full of face time (time spent communicating without using email), Jeopardy categories, Nerf darts and Star Trek references.

Parts of *Microserfs* are immensely quotable, and this does keep you turning the pages. Nevertheless, by the end of the book, I couldn't care less what happened to any of the characters. Ultimately, Coupland has failed to turn his brilliant short story into a great novel. ■

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Kids'

STUFF

There's a bit of time travel on the agenda this month for Paul Begg and daughter Siobàn. One minute they're kings of the castle, the next they're staying cool in the face of bloodthirsty Vikings, before long they wind up in the court of the Prince of Persia. And without so much as a teabreak.

Castle capers

Exploring Castles is designed for and aimed at older school children and ties in with the National Curriculum Key Stage 2/3. The disc explores an exciting subject and is packed with information, but unfortunately the overall look and feel is lacklustre and uninspiring. The illustrations in Braveheart are sharp and crisp, the colours bright and vibrant, but those in Exploring Castles look like amateur snaps taken on a dull day and come from rather dusty and well-used transparencies. Whoever photographed Tintagel, one of the castles upon which the Camelot legend was based, has



captured none of the drama of the castle's cliff-side location. The picture of Cardiff castle fails to convey the way it still dominates the city centre. What little you can see of Corfe Castle is ridiculous. Also, much of the text is dull white on black. I mention this at length because I feel that an educational package should be visually exciting, spark off your imagination and make you want to discover more about the subject.

When it comes to content, however, Exploring Castles doesn't disappoint. From the opening screen you have five choices: About Castles, Building a Castle, Living in a Castle, Castle Guides and Castle Data. Each section leads to other choices. For example, About Castles

offers Types of Castle, Attacking a Castle, Features of a Castle, and Defending a Castle. Types of Castle takes you into 11 pages on text and illustrations about different ways of building castles, from medieval Motte and Bailey through to Edwardian. Some pages are accompanied by a movie and an expert-guided tour, such as historian Tony Gregory's tour of Orford Castle.

Living in a Castle and Building a Castle are self-explanatory. Castle Guides takes you to Chirk Castle in the March of Wales to just before Christmas 1322. Everybody is busily preparing for the arrival of Lord Fitzalan, Justicar of Wales, and you can discover what life was like by clicking on one of several

Exploring Castles: the illustrations just don't hack it, but the information is good

guides, such as John the Baker. Unhappily, this was a disappointing multimedia experience, because the guides were brief and text-based. A character narration and costume photographs instead of the cheap-looking line drawings would have been a vast improvement.

Castle Data offers a Guide to the 159 Castles of the British Isles (I noted a couple of anomalies such as the inclusion of the remains of the Roman town of



Vikings!: The reconstructions of the Jorvik museum can't replace the real thing, but they're not a bad taster

Read, Listen and Learn: Muppets feature heavily but don't speak. The games are simple and will appeal to young children

Interactive series of software titles being launched in Britain by Iona Software. Although the suggested age group ranges from 3 to 7, it's really best suited for pre-readers. It is designed to equip children with early reading skills and does it through three activities. In Same and Different you have to click on words that sound the same. Letters helps children identify a letter by seeing the shape, hearing its sound and identifying the correct letter shape. Beginning Sounds: Phonics asks children to click on the pictures which start with the same sound.

There are over 60 activities, the accents are English — well, Irish actually — and the overall appearance is good. My only real complaint is that the disc features the Muppets and there's a big picture of Kermit on the box along with the "Jim Henson Interactive" logo. On the disc itself, there seems not a trace of Miss Piggy's dulcet tones, or of Fozzie, Gonzo or Kermit. I think a lot of Muppet fans will feel cheated by this. I know I did. This aside, it's a good program for the little ones and there's enough to do

Wroxeter in Shropshire, yet the much-visited Leeds Castle in Kent is missing. There's a dictionary of terms, student's resources, which offers easy access to pictures and other material for inclusion in project documents, and teachers' resources, comprising worksheets, classroom ideas, and a database of books, videos and useful addresses (a disappointing eight). This disc contains a lot of information but the presentation lets it down.

Vikings!

Vikings!, which ties in with National Curriculum Key Stage Two, is a generally superior CD-ROM, though not easy to navigate. Using material from the Jorvik Viking museum in York, the disc reconstructs an impression of life in Viking times. However, it's disappointingly superficial. For example, quotes are taken from the Anglo-Saxon Chronicle. The CD could easily have incorporated the whole of the Chronicle so that the extract could be seen in the context of surrounding extracts. Instead, the overall impression is that valuable source material has

largely been disregarded. Likewise, a short account of Alfred the Great could have been supported by Asser's Life of Alfred. A little more depth in its treatment of historical sources would have given this CD longer appeal and turned it into a lasting reference.

The deficiencies aside, Vikings! was an enjoyable CD-ROM and a good introduction to the period for young children.

Siobàn's judgement was "cool!", which is high praise indeed.

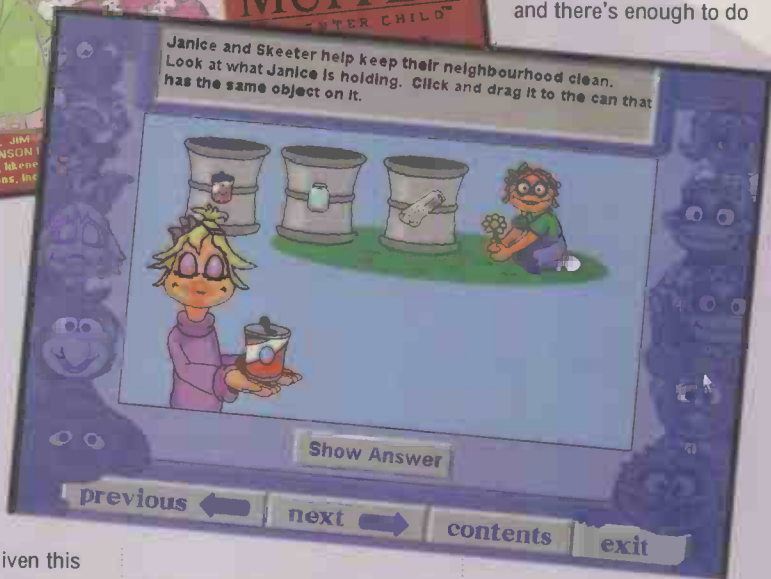
Wot No Muppets?

Read, Listen and Learn is the first in the Brighter Child

here to keep them occupied for hours.

Maths Workshop

Broderbund is probably best known for its Living Books



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series, but I recommend you try and take a look at a new title called *Maths Workshop*. It's as slick as the *Talking Books*, but instead of telling a story, you play a series of games that help develop maths skills. For example, *Bowling For Numbers* is a game in which you are asked to perform simple tasks such as addition, subtraction and multiplication. Below the sum are four boxes, each displaying a number. Click on the right number, then do another sum until enough bowling pins have been set up at the end of the bowling lane, at which point a gorilla bowls a mean strike. The games introduce different real-life applications for basic maths, from *Bowling For Numbers* to the *Rhythm Shop*, which uses fractions to play beats and rhythms. Other games introduce spatial visualisation, pattern recognition, logic, shape recognition, and much more.

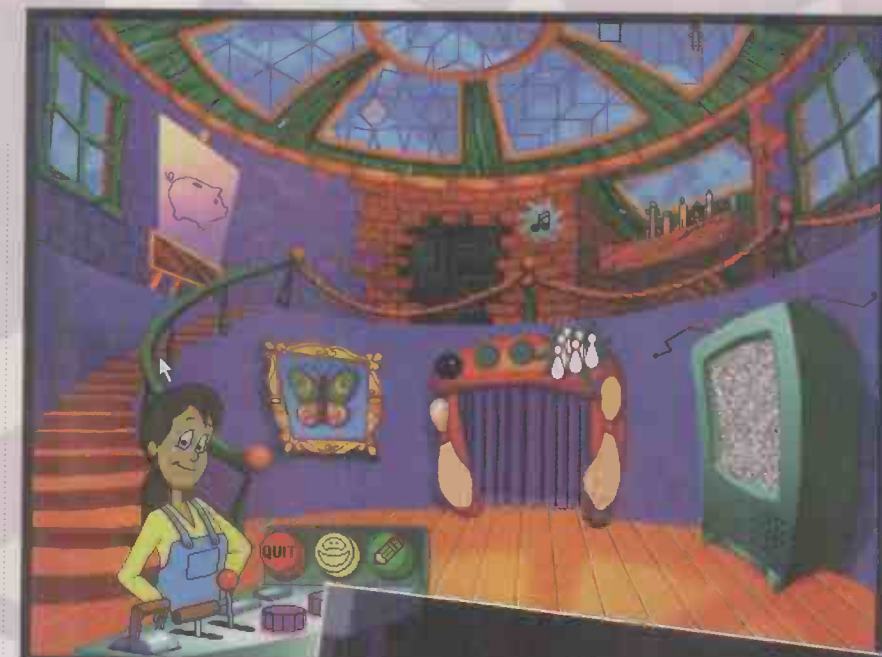
Maths Workshop is as good as any *Living Books* title, though sometimes even with help it's a little difficult to understand exactly what the game does — an adult may have to give help here. A particular bonus to those jaded by transatlantic voiceovers is the fact that the accent is English throughout.

Top marks for maths, but *Broderbund* fall down big time on the spelling. The box describes the owner of the Maths workshop as Polly, but the software and manual spell the name Poly. Maybe it's high time *Broderbund* brought out *Words Workshop*.

Prince of Persia

Finally, we were taken back in time this past month when I glanced at the specifications of a newly reissued game: it runs under DOS, requires no more than a 10MHz 286, wants 640Kb of RAM. Those were the days.

Prince of Persia, a simple scrolling arcade game that won considerable praise a few years ago because the human



Above Polly or Poly may not be much of a speller, but she's a great guide to the maths-learning games



Right and below Prince of Persia: a simple scrolling arcade game, but great fun and with superb graphics



animations behaved like real people. They jumped, knelt down, fenced... did everything just like a real person would. *Prince* became so popular that there was a sequel, *Prince of Persia 2: The Shadow and the Flame*. Siobán and I spent hours playing both games and were pleased to see both reissued by *Broderbund* on a single CD-ROM.

Frankly, they pale in comparison to *Doom*, but if you haven't got either incarnation of *Prince* it's worth taking a look, especially if this Christmas you got a family PC and are trying to wean the kids away from their Sega or Nintendo.

Exploring Castles

Price £39.99
Contact Anglia Multimedia
Tel 01603 615151
Fax 01603 631031
Rating ★★☆☆☆

Vikings!

Price £39.99
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Maths Workshop
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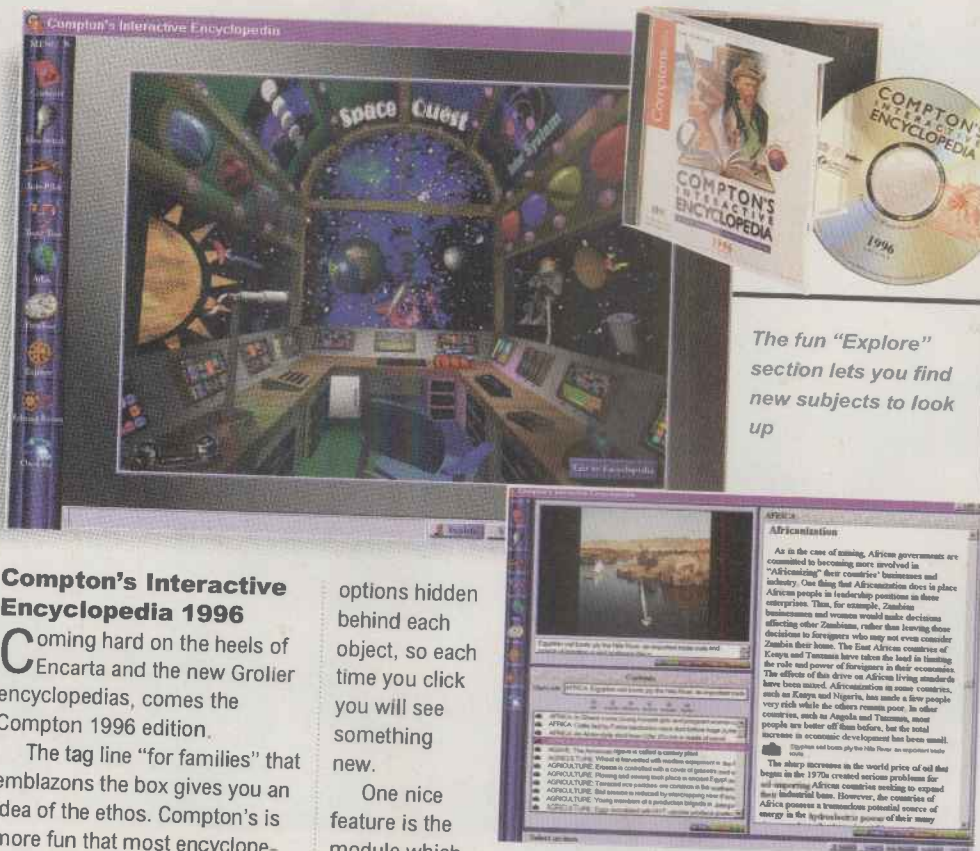
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CD-ROMs

From Bill Gates's business bible to a guide to getting online, CD-ROM titles are focusing more and more on technology, as Adele Dyer and Eleanor Turton-Hill discover. For those disillusioned with the age of machines, there's also something warm and furry to curl up with.



Compton's Interactive Encyclopedia 1996

Coming hard on the heels of Encarta and the new Grolier encyclopedias, comes the Compton 1996 edition.

The tag line "for families" that emblazons the box gives you an idea of the ethos. Compton's is more fun than most encyclopedias. If you are looking for a learning tool rather than just a reference work, especially for a child, this is probably your best bet.

The emphasis on discovery is backed up by an "explore" section. This has such things as "Grandma's Attic", "Compton's Newsroom" and "Wild and Free". You are presented with a room with several objects inside it. You can click on these to see a picture and to go to a related article. There are numerous

options hidden behind each object, so each time you click you will see something new.

One nice feature is the module which lets you build your own multimedia presentations from the contents of the encyclopedia. So if you are interested in, say, space travel, you can piece together articles, pictures, movies and tables. The learning tool becomes a teaching tool, but this is also a nice introduction to multimedia segmenting for those new to the idea.

Like the other new encyclopedias, Compton's has opted to include direct access to an online service with updated

information to add to your encyclopedia. However, despite the multimedia, the actual entries are not as substantive as on the Encarta or Grolier versions. This is not to say the entries are skimpy and uninformative; simply that they are not as in-depth as those of their rivals.

The only real disappointment is the photographs. Many of them are low-resolution scans which look broken up when viewed full-screen. This may simply be the pay-off for having

more photographs on the CD.

Another slight annoyance is the size of the buttons. You need these to navigate and control the encyclopedia, but they are so tiny you will have difficulty actually seeing the commands on them.

Included in the package is a "real picture world atlas", Small Blue Planet, which consists of a number of views of Earth taken from space by satellite. The most interesting are the global relief and history and language globes, the former having close-up satellite photos of such areas of interest as the Mississippi Delta, Naples and Mount Vesuvius.

Compton's Interactive Encyclopedia 1996

Contact Bastion Compton
NewMedia UK 01491 412652

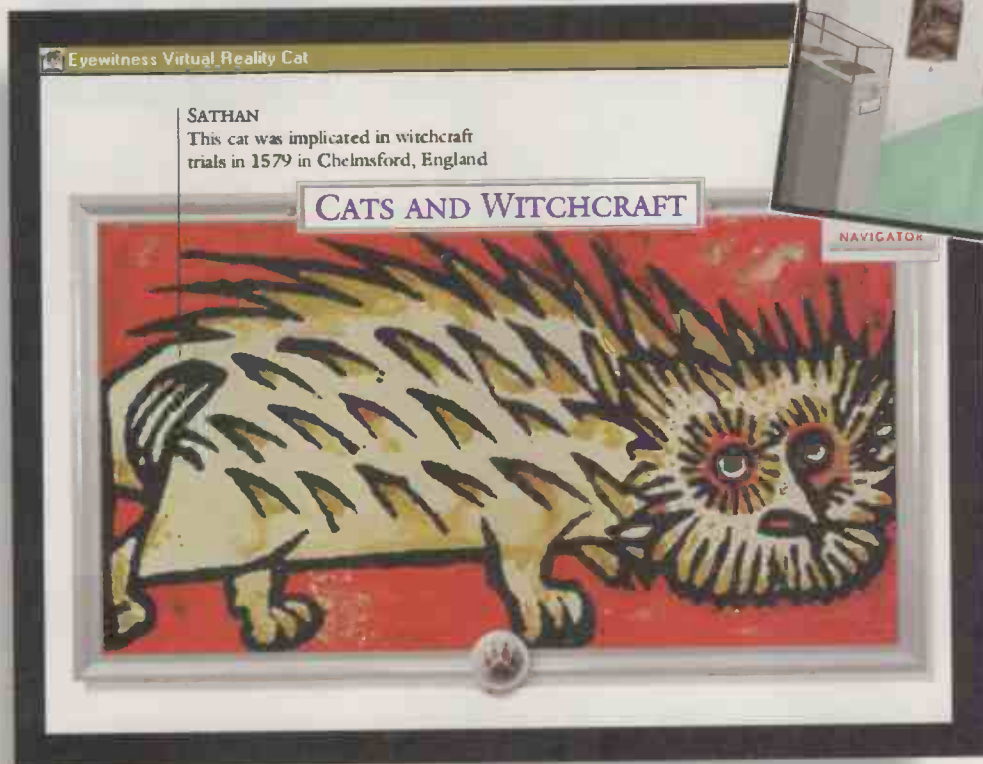
Price £49.99

Rating ●●●●●



Eyewitness Virtual Reality Cat

Eyewitness Virtual Reality Cat is one of a series of CD-ROMs from DK Multimedia. It's an educational package, with video



The viewing tools built into *Virtual Reality Cat* allow you to explore the "virtual" museum, focusing on different objects as you go

snippets created by Dorling Kindersley, and information from the Eyewitness book series as well as a massive supply of pictures, artwork and sound.

Like many "edutainment"-style CD-ROMs, the *Virtual Reality Cat* can be explored in several ways. Once installed, you find yourself in a museum building packed with all kinds of exhibits. Using arrows which appear in your path, you can stroll down corridors and move from room to room clicking on objects which take your fancy. If you get lost, there's a navigator tool in the top right-hand corner which helps you find out where you are with the aid of a schematic map.

All kinds of cats are included in this CD-ROM, from cute domestic pets to larger creatures like lions, cheetahs and leopards. The subject matter is diverse, covering every aspect of the feline world: habitat, physiology, anatomy, lifestyle, and conservation. There's a large section devoted to cats and mythology, explaining such subjects as the history

of the Egyptian sphinx and the association between cats, witchcraft and black magic.

Strolling around a building can be a great way of exploring a specialist encyclopedia, but can be slightly random, especially if you want to find something specific. It's difficult, for example, to locate a picture or object that you were looking at five minutes ago, unless you retrace your steps meticulously. An index utility, located at the entrance of the museum, provides help in the form of a main index, a video index, and a visual catalogue when clicked on.

There's also a selection of short pre-prepared tours, which guide you around the museum, displaying video-clips and images based on certain themes. If you get bored of these, you can use a record function which allows you to create your own tours.

In general, this CD-ROM is intelligently put together, with enough depth and diversity to hold your interest. It will run on Windows 3.x as well as Windows 95 with a minimum

spec of 486SX/25 and 4Mb of RAM. This, combined with a reasonable street price, should attract a wide market.

Eyewitness Virtual Reality Cat

Contact Dorling Kindersley Multimedia 0171 753 3488

Price £29

Rating ●●●●○



• Easy Tutor — Get Connected 96 • Instant Access To... the Internet

The basic premise behind these two products is the same. Most people have heard about the Internet — who can avoid it, as the British media goes into hype overdrive on the subject? — but the logistics of getting connected are still a mystery for many people.

Easy Tutor Get Connected works as a walk-through of the various methods of getting connected and what you can expect to find out there. It talks you through everything, from what is the Internet, to pulling in your modem, to how to run NetScape.

Everything is explained through diagrams and a voiceover commentary, but as nothing is written down, you have to listen to everything. This inevitably entails a passive learning method and a lot of sitting around. Also, it does not allow quick reference if there is one specific thing you want to look up.

The step-through demonstrations of how to connect and use the Internet are simplistic, to say the least. Anyone who has even the skimpiest knowledge of how their computer works will find these sections pointless. The basics are covered, but the problems you may encounter are not. Following your instruction booklets will be of more help to you than this CD.

It does, however, have a major bonus: a library of useful home page addresses. These cover a wide variety of subjects, from the useful to the fun to the downright weird.

Instant Access to ... Internet takes a slightly different

Bill Gates's vision of the future is explored in short films, as well as in an interview with the man himself



education and business in a networked world. There are somewhat twee videos of how the future technology will be put into practice in the real world, complete with brief explanations of each concept.

Bill Gates has made himself a fortune out of Microsoft in the last decade, and just to push home this fact there is a virtual reality guided tour of his new home and the gadgets that will control it. However, his assertion that he is at the forefront of innovation is not borne out by what we see of him here. He comes across as a man who uses other people's ideas and simply has the good business sense to make them available to the general public.

If you are expecting great things from this CD, don't hold your breath. Bill Gates will have to do much better than this if he is to continue to leave his stamp on the technology of the future.

The Road Ahead
 Contact Penguin 0171 416 9000
 Price £14.99
 Rating ●●●○○

approach. Rather than a tutorial, it is more of an introductory scratch and sniff. There are three main parts. Firstly, there is a tour, introducing the basic concepts of the Internet and how the CD operates. The two main parts of the CD are less tangible. There is a large software library of relevant packages and, most important of all, a simulated tour via NetScape.

The multimedia sections of the CD are limited to the initial tour. Here there is copious use of video and sound, as most of the text of the tour is spoken with only bullet points on the screen. This section is much shorter than the initial screen suggests, especially considering much of the information is repeated either in the enclosed video or the sleeve handbook.

You do not need a modem or

The Road Ahead

Bill Gates has (predictably) committed his vision thing to print in *The Road Ahead*, and true to the form of a techno-guru he's backed it up with a CD-ROM.

The CD includes the entire text of the book, annotated with hypertext links, a short video section on Bill's view of the future and an "Ask Bill" segment. There are hyperlink sections to explain references in the book; these are well written and feature audio and video tracks to liven them up. In general, these take the form of the great man uttering words of wisdom, but what else can you expect on a BG CD.

The segments where Bill gives his view of the future are, if anything, a disappointment. The future according to Microsoft covers home,

an account to lose your Net virginity. There are several Web sites on the CD, many of which link to others in the collection. Otherwise, if you have the necessities, you can go online

within the confines of the CD. If you ever get out there and get lost, you can come straight back to the CD.

There are a few offers included in the CD. Not only do

you get a free video and copy of NetScape, you also get an introductory offer to join up to the IBM Internet Connection. This offer is of rather dubious value — it does make it easy for new users to get connected, but it may not be the best deal for you.

This introduction gives a feel for exactly what an Internet connection could bring you before you go to the expense of buying a modem.

Easy Tutor — Get Connected 96
 Contact CRT

EasyTutor Get Connected 96

The Internet

Internetworking



Get Connected explains what the Internet is, while Instant Access... contains an online simulation



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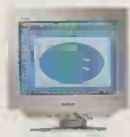
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NEWS

Up, up and away



Better known for video recorders than video games, JVC is set to release a number of new titles for the PC. Already established as a major force on the Japanese games consoles market, the company currently has five projects on the go.

By far the most interesting is Deadly Skies, described as a

"strap yourself in and feel the heat of the after-burners" flight simulator. Casting you in the role of top gun, the game has you battling it out with eight opponents to prove that you're the best. What's more, you get to fly a number of famous aircraft including the classic F-14 Tomcat (as seen in Top Gun), the MiG-29, F16 Fighting Falcon and the F15 Eagle. The game's scenarios have you duelling in the desert, operating over the ocean and hanging about in Hell. Deadly Skies is due for release in January 1996 and will retail at £34.95 on PC CD-ROM only.

JVC 0171 240 3121

It's a kind of magic

Followers of the fantasy role-playing series Wizardry can look forward to the release of the eighth game in this award-winning series. Entitled Wizardry Gold, it's billed as an exciting re-engineering of the classic game, Crusaders of the Dark Savant.

Among the features on offer are SuperVGA graphics, CD-quality music, sound effects and digitised speech, together with a new style of interface. What's more, it's a multi-platform affair with versions for Windows 3.1, Windows NT, Windows 95 and, for the first time, Macintosh on the same CD.

Wizardry Gold will be available from Mindscape in January 1996. Pricing unknown at press time.
Mindscape 01444 246333

Luke out

Origin's Wing Commander III was the game that launched a thousand Pentiums but only ran on a few of them. Now Power Macintosh users can take to the stars, if their hardware is up to scratch. Requiring an 8Mb PowerMac with a Level 2 cache card, Wing Commander III continues the story of the bitter war between the human Confederation and the furry, cat-like aliens known as the Kilrathi. Key features include dogfights and fast-moving 3D texture-mapped graphics.

Wing III was the first

interactive movie to feature actors you might have heard of. Chief among them is your character, Christopher Blair, played by Mark Hamill, otherwise known as Luke Skywalker from the Star Wars trilogy. Joining him is John Rhys-Jones, from the Indiana Jones movies, and eighties porn queen Ginger Lynn Allen.

Destined for success, Wing Commander III: The Heart of the Tiger comes on four CDs and is available from Electronic Arts, price £54.99.

Electronic Arts 01753 549442

Charts



LEVEL ONE

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10	DOT Tentacle — White Label (CD)	Virgin
11	Need For Speed (CD)	EA
12	Mortal Kombat 3 (CD)	GTI
13	SU27 Flanker (CD)	Mindscape
14	WipeOut (CD)	Sony Int
15	Indycar — White Label (CD)	Kixx
16	Essential Sports (CD)	EA
17	Crusader: No Remorse (CD)	EA
18	TFX (CD)	Hit Squad
19	Cinematic 96 (CD)	Microsoft
20	Essential Business (CD)	EA

Mortal Kombat 3



The long-awaited return of Shao Kahn and his evil minions is as graphically gruesome as Chris "Lui Kang" Cain dared to hope. The future of humanity depends on you.

Even if you've been living on the dark side of Milton Keynes, chances are you've heard of Mortal Kombat. To crown all the recent hype, the third game in the series has arrived for the PC.

For the uninitiated, Mortal Kombat is all about the evil demon Shao Kahn and his plan to take over the Earth. Shao lives in another realm, known as Outworld, with henchman Shang Tsung and a variety of strange and sinister creatures. To gain entry to the human realm, Shao and his army must first defeat its champions in ten tournaments of Mortal Kombat. They've managed to knock seven shades out of us nine times, and now only one contest stands between us and eternal darkness.

In Mortal Kombat III Shao has entered the human realm thanks to the resurrection of his dead Queen, Sindel. Between them they've stolen every soul except those of the fiercest warriors and a few of the original cast. You are humanity's last hope.

You can choose from 14 warriors, including Chinese hero Lui Kang, ninja Sub Zero, a New York cop called Stryker, and sorcerer Shang Tsung.

Each character can punch and kick in a standard way, and has his own range of special



attacks. Lui Kang, for example, has a great line in fireballs and high kicks. Sindel screams at her victims, and Shang Tsung has the ability to morph into every character — handy or what?

Mortal Kombat III is simple to pick up, but learning the best combinations of attacks against each opponent takes some time. All the characters have been carefully designed to keep them equal. Bouts are fought on a best-out-of-three basis, and on winning your second round you're urged to finish your opponent. You can do this with a simple punch, or, once you learn how, with a spectacular Fatality move. Fatality moves range from setting people on fire to ripping them apart and pulling their heads off. The gruesome results warrant the game's 15 certificate.

Mortal Kombat III's graphics are close to the original, with fast-moving sprites, fine detail and good colour. Overall

presentation is good, and the PC version has the same number of scrolling layers and speed as the arcade version. Sound is also up to scratch with plenty of digitised screams and slaps. In fact, the game's programmer has declared that this is the best version. There's just one problem. While there's no denying the game plays well, the lack of a standard controller on the PC is likely to cause a few headaches. The arcade version of Mortal Kombat III requires six buttons as well as a joystick to control movement. The nearest controller on the PC is a six-button joypad, but when I tried the popular Phase 9 from Euro-max it failed to work properly. The positioning of the buttons in the arcade also makes the game harder to play than the original.

This aside, Mortal Kombat III is an excellent conversion of a great arcade game, and a must for beat-em-up fans everywhere. Just make sure you've got the right controller, and a friend to tackle in two-player mode.

System Requirements

486/33 or higher, VGA graphics, double-speed CD-ROM, DOS 5.0 or higher, 8Mb RAM, 29Mb hard disk space, SoundBlaster

Price £44.99

Contact GT Interactive

0171 258 3791

Fatal Racing

It's fast, it's furious, it's probably the best racing game in the world. Gordon Laing lowers the chequered flag



Every year, the world's top eight car manufacturers hold a race to prove who has the fastest and strongest car. The winning company can look forward to huge sales over the following year, and the winning driver will enjoy fame and fortune. This annual competition has grown into a violent racing frenzy, with drivers encouraged to knock their opponents off the road in order to take the lead, and fatalities almost commonplace.

The eight international companies herald from six countries. Each company has two circuits near to their main manufacturing plants, including jumps, loops and corkscrews, along with an unusually terrifying array of hairpins and banked corners.

You have the unique privilege of choosing from eight cars, each with its own strengths and weaknesses. One may grip the road like glue but have the speed of a sloth. Now select a track, from a choice of eight. Once you've won at a medium or higher level, another eight circuits become available. Both tracks and cars are shown as rotating 3D models, while the CD-ROM version accompanies each with a brief vocal description.

Fatal Racing can be played by one, two on a split screen, or by up to 16 over a network; in this scenario a 20Mb install must be made on each PC, but only one

CD is required. One of five views may be selected while racing, complete with smoke and flames as the damage grows. In fact, you'd better keep an eye on the damage indicator and make emergency pit stops before you explode altogether.

The graphics menu offers a huge list of detail options. I went for maximum quality at SVGA and reduced the screen size until I got fluid motion on a P90 under Windows 95. Running under DOS is faster, and the normal VGA mode is quick enough for a good 486.

Gameplay is fantastic — the entire PCW office is addicted. Sound effects and music are gripping, while the graphics, particularly in SVGA mode, are excellent, closely matching the best Saturn and PlayStation offerings, so long as — and here's the crux — you have a super-fast PC. If your Pentium 133 has been waiting for a power application to really stretch it, buy Fatal Racing and invite your console-owning pals round who'll say it's acceptable — but at least you can run MS Office, too.

System Requirements

486DX2/66 or faster, 4Mb RAM, MSDOS 5.0 or higher, CD-ROM drive running MSCDEX 2.1 or higher, requires VESA compatibility for SVGA mode
Price £44.99
Contact Gremlin Interactive
 0114 275 3423

Tempest 2000

A classic console shoot-em-up, with a nineties makeover for the pc, Tempest 2000 gets Chris Cain's vote hands down

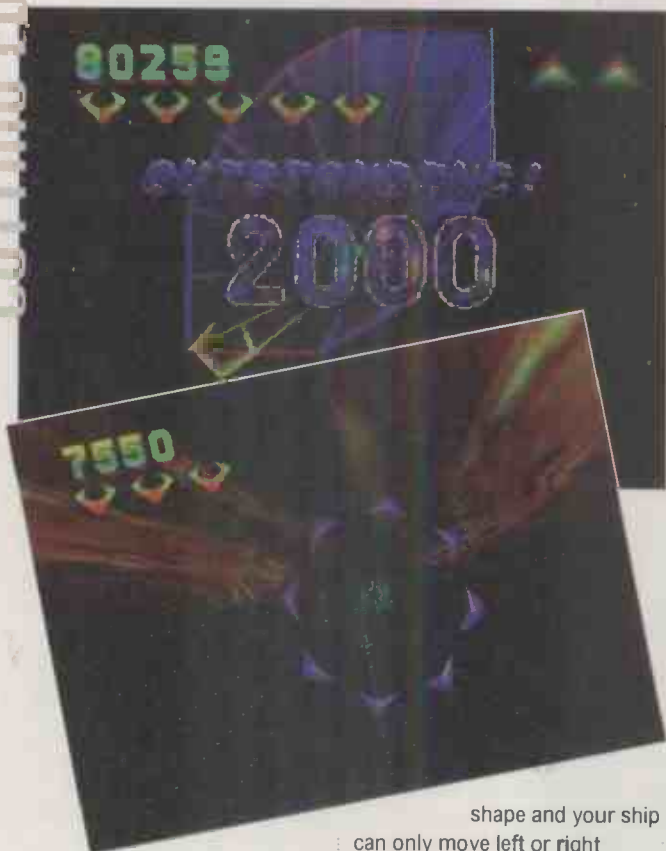
Originally designed for Atari's Jaguar console by veteran games programmer Jeff Minter, Tempest 2000 is an update of the classic arcade hit, Tempest. This shoot-em-up, with its

simple 3D graphics and fast-moving action, took more ten pences than most of today's top titles will ever see.

Tempest 2000 brings the arcade classic into the nineties

with better graphics and improved sound, but the gameplay stays exactly the same. The main part of the screen is a web-like playfield with you at one end and a positive horde of aliens

bent on your destruction at the other. The idea is to destroy them before they shoot or collide with you, then move on to the next level and do it all over again.



To make things more interesting, each level is a different

shape and your ship can only move left or right around the outside edge. If an alien manages to cross over to your side it'll do its best to crash

into your ship and send you hurtling through space. One on its own shouldn't prove too much of a problem, but two or three aliens up your end can be a wee bit painful.

As with most shoot-em-ups, things get progressively harder as you move up through the levels. To even the odds, a bonus object will appear on the web from time to time, and shooting it will give you something useful like a more powerful laser for your ship. By far the best bonus is a drone ship, which doubles your fire power and gives you time to breathe.

Graphically, Tempest 2000 is much better than its predecessor. Although the ships are small but perfectly formed U shapes and the lasers are represented by a couple of flashing pixels, the use of colour and scrolling is outstanding. It would have been nice to see some improvement on the 3D side, considering the current growth in this area, but I can't complain too much.

One major headache about

Tempest 2000 is the the game's memory requirements under DOS. Most users will find themselves having to delve into their Config.sys file to configure things properly. Even under Windows 95, you need to fiddle about to get things going.

As a bonus, Atari has included a conversion of the original version of the game on the CD-ROM. There's also Tempest Plus, a slightly revised blast, and Tempest Dual which gives you and a friend a chance to battle it out together.

Tempest 2000 may not look quite as good as the other games in this month's *Screenplay*, but it's great for PC gamers who want to shoot down memory lane.

System Requirements

386DX40 or higher, 4Mb RAM, DOS 5.0 or higher, VGA, 2Mb hard disk space, SoundBlaster or compatible, CD-ROM

Price £39.99

Contact Atari 01753 533344

Leisure Lines

Brainteasers courtesy of JJ Clessa.

Quickie

No prizes, no answers. Arrange four 50p pieces, four 20p pieces, four 10p pieces, and four pennies, into a 4 x 4 grid, so that no row, column, or main diagonal, contains more than one coin of the same denomination. Easy, eh?

This Month's Prize Puzzle

I think this month's problem is fairly tough — but who knows? Someone's bound to come up with an easier solution than I did by mere number-crunching.

It's about consecutive whole numbers — positive integers, to be precise. There are three ways in which a total of 15 can be obtained by summing two or more consecutive numbers — viz,

$$15 = 1 + 2 + 3 + 4 + 5$$

$$15 = 4 + 5 + 6$$

$$15 = 7 + 8$$

A total of 45 can be obtained in five different ways:

$$45 = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9$$

$$45 = 5 + 6 + 7 + 8 + 9 + 10$$

$$45 = 7 + 8 + 9 + 10 + 11$$

$$45 = 14 + 15 + 16$$

$$45 = 22 + 23$$

and so on.

Using the positive numbers from 1 to 999, can you find the two values which can be obtained in the greatest number of ways?

Then write down on a postcard, or the back of a sealed envelope, the two numbers, together with the number of ways in which they can be obtained, and send them to: PCW Prize Puzzle, P.O. Box 99, Harrogate, N. Yorks HG2 0XJ, to arrive not later than 20th February 1996. Good Luck!

Winner of November 1995 Prize Puzzle

The November puzzle was tough. It must have been, since apart from there only being 26 entries (all correct, by the way) there were no signs of the usual "Easy, easy!" cards. The problem was to find your way through the grid and obtain the hidden message, which was: **You need to compute the sum of all the primes which contain exactly two digits**

and so, the answer to the problem was 1043.

The odds were shorter than usual and since all the regulars were present, we fully expected a two-time winner to emerge. But, t'was not to be: our ERNIE drew out the card from Mr PH Tanner, of Glasgow — who, so far as our records go (and that's right back to the start in 1981), has not won before. Congratulations, Mr Tanner — your prize will be with you shortly.

This month's Prize Puzzle is just as difficult, so to all the also-rans — the odds could be shorter.



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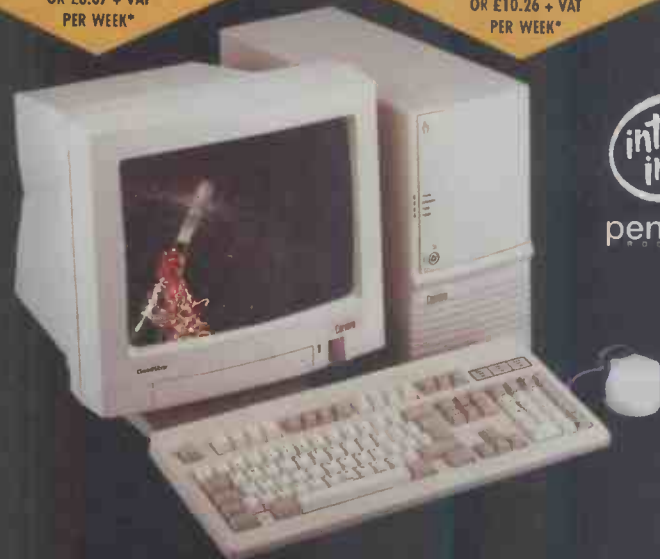
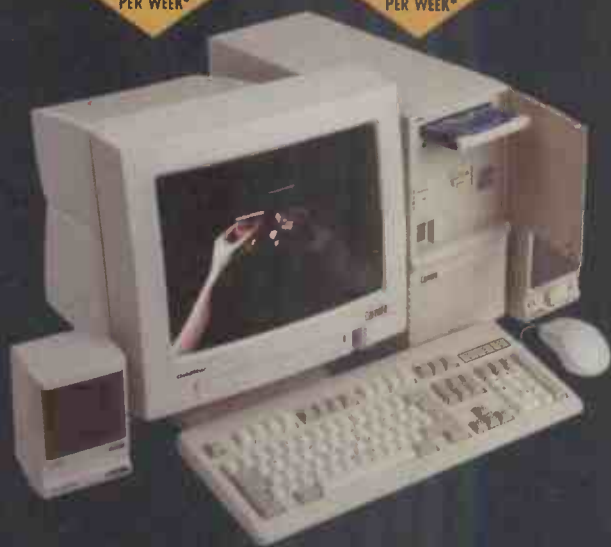
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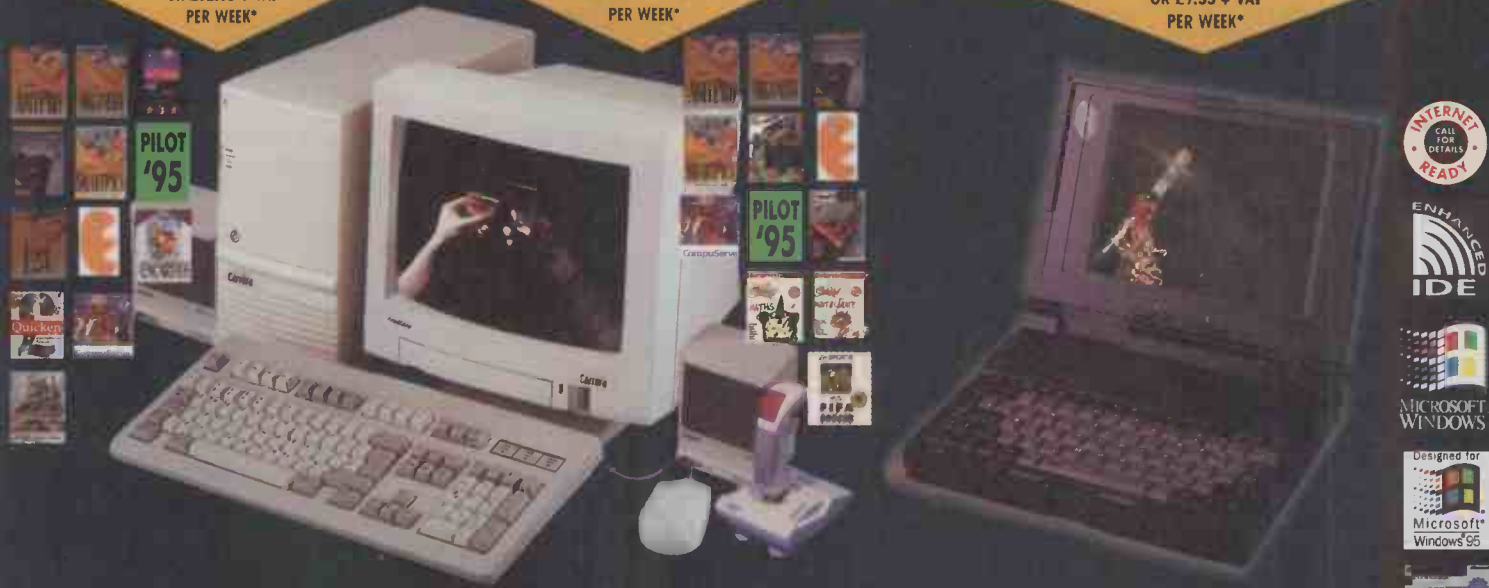
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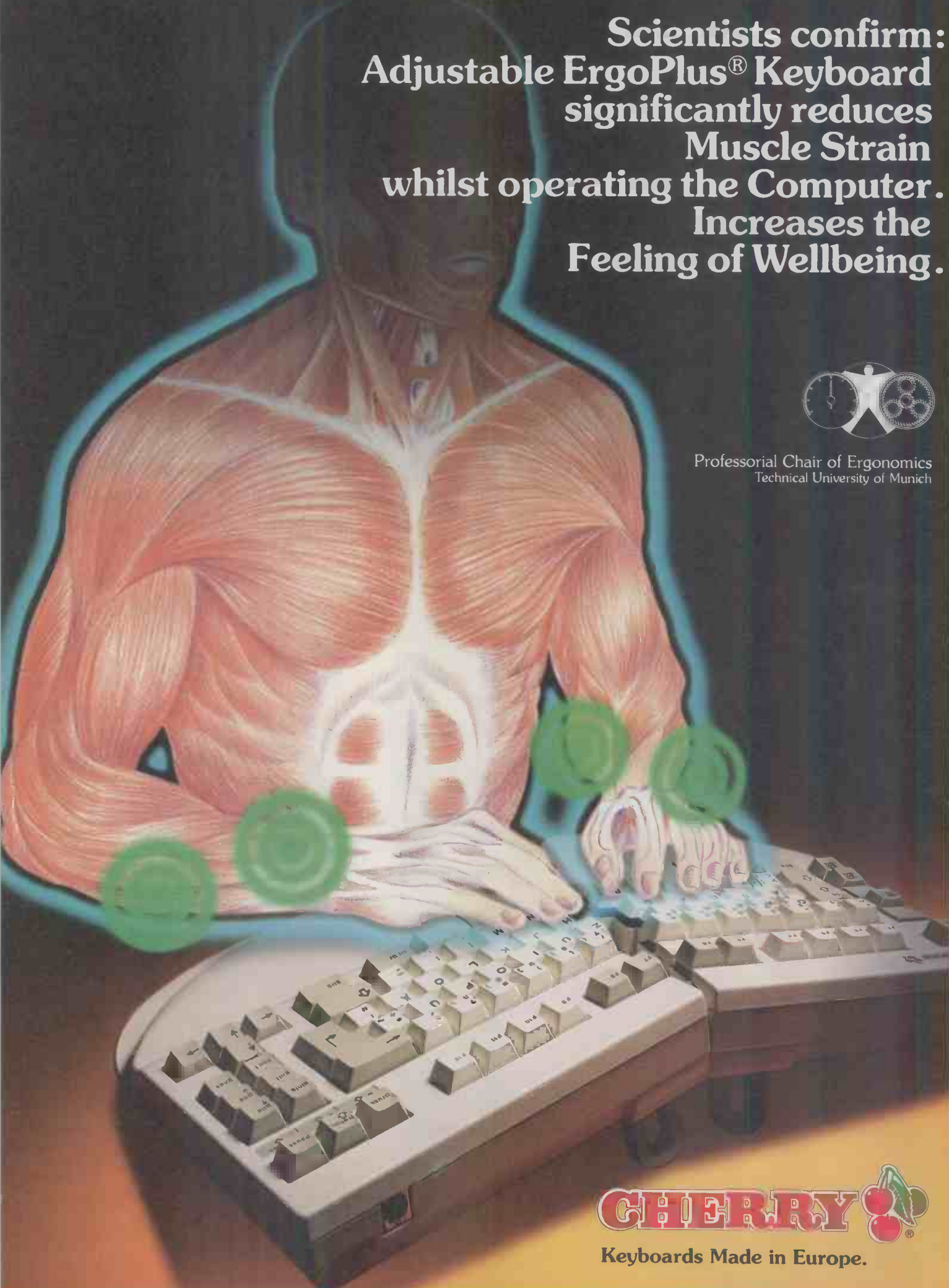
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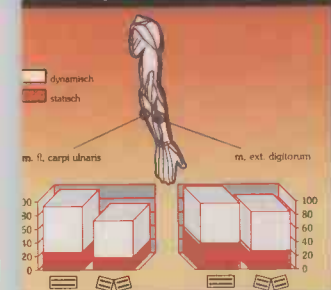
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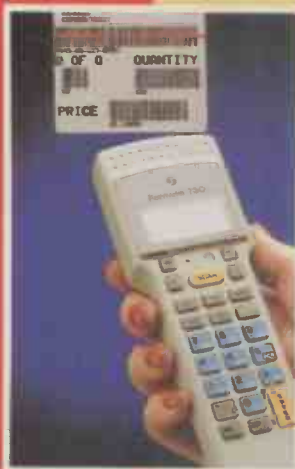
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How long is a



THEN

Brian looks at the goods just delivered, he knows the routine, log on to the computer Goods-In screen and check the delivered goods against the purchase order. OK, the suppliers name is on the packaging, the advice note shows order number and quantity shipped, just check the goods as received, simple.

Then HE runs in; "Brian rush job! Get these put on the computer and through to the warehouse so that sales can produce the documentation and complete the order. We're already two weeks overdue and penalties are threatened", and HE's gone.

HE's always doing it, just when Brian's getting on top of the backlog, HE demands short cuts. Priorities. Urgent orders. Always trying to shorten the time it takes to get stock in. Why can't HE realise how long....

NOW

Brian looks at the goods just delivered, he knows the routine, pick up the Systel F730 hand-held computer and read the bar code on the pre-delivery slip supplied by purchasing. The single handed operation of the F730 makes it easy to enter the quantity while unpacking the goods. Place the hand-held back in the cradle, it starts beeping and confirms the data is transferred to the computer, simple.

Then HE runs in; "Brian rush job! Get these put on the computer and through to the warehouse so that sales can produce the documentation and complete the order. We're already two weeks overdue and penalties are threatened", and HE's gone.

"Done", Brian turns, a satisfied grin spreads across his face as he remembers the days before the



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A		H		S	
Altek Instruments	301	Harper Collins	299/301	Shareware Paradise	345
B		HCCS Associates	313	Shine Computers	295
Birdguides Ltd	299	K		Soho Soundhouse	327
C		Komputer Knowledge	241	Super Money Savers	307
Cafe Net	241	L		Strangeways BBS	345
Clove Technology	295	Lasermoon Ltd	301	System Insight	297
D		M		SystemStar SoftTools Ltd	334
Dakota	343	Monitorman/Keyboard Co.	243	The Legend BBS	345
Digital Multimedia Ltd	323	Mega Download	240	Tech-Mate (UK)	327
E		Microcosm Limited	309	Telesystems Ltd	237
EQ Consultants	329	O		V	
G		One Stop Software	299	Vectorjet Ltd	339
Graham Jacobs Associates	309	Online Now	245	W	
Graphic Type Ltd	321			Worthington Data Solutions	305
Greenman Toner Service Co Ltd	309				

Hands On Contents

OPERATING SYSTEMS



Windows 95 292

Tim Nott rejoices in the register, and turns his recycle bin into a fish called Brenda. Whatever turns you on...



Windows 3.1 296

To clip, and how not to clip. Tim Nott sings the praise of an underrated Windows utility.



OS/2 298

Terence Green brings news of Classic Games for Warp, and performs installation surgery.



32-Bit 300

Chris Bidmead on Caldera's preview releases, and a spot of fire and brimstone on Emacs.



DOS 303

Simon Collin celebrates seven little gems you can't afford to be without.



APPLICATIONS

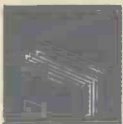
Word Processing 304

Small is beautiful — Tim Phillips studies the latest batch of handhelds.



Spreadsheets 308

Stephen Wells hits the bottle to demonstrate using Excel for process improvement.



Databases 312

Mark Whitehorn reckons database users could do with some speed.



Graphics & DTP 316

Cross-platform graphics has always been a headache. Gordon Laing soothes it better.



Multimedia 322

Panicos Georghiades and Gabriel Jacobs bring news of a NetScape-friendly multimedia package.



Sound 326

Steven Helstrip reviews Steinberg's new audio-editing package, WaveLabs, and goes a bit loopy.

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:
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PROGRAMMING



Visual Programming 330

Tim Anderson on why common controls such as Rich Text and Tree View can make life so much easier.



Numbers Count 337

Mike Mudge on blind, boxing barpersons and other thorny problems.



AND THE REST...

Networks 338

Stephen Rodda on what scuzzies can do for NT, and why Good Times may be bad news.



Comms 344

Stephen Cobb weighs up the verdicts on WinCIM. Plus, news of security on the Net.



Macintosh 348

Chris Cain takes Mac novices through their paces. Plus, Apple's new 3D accelerator card.



Computer Answers 351

Frank Leonhardt upsets everyone, from IBM to the echelons of academia, with his solutions to your computer problems.



Beginners 353

Don't be afraid of the big, bad LAN — you've probably already used one. Eleanor Turton-Hill breaks you in gently.



A fish called Brenda

View options, folder settings, save settings, and more, available to you only via the registry editor. Tim Nott tells you how to get at 'em, at the same time introduces you to his new friend, Brenda. He adds on some top tips, too.

How does it do that? Since last month, when we looked at some of the tricks you can use when opening and closing folders, I've been trying to make sense of how Windows keeps track of folder settings — if at all.

You've probably found it an equally frustrating experience; how on earth do you get it, say, to turn the toolbar on by default, or show items in a particular view and order? Why does Windows insist on re-opening any folders you had open when you close and restart? And given that you can close a folder and all its ancestors with Shift+close, why can't you do the converse; close a folder and all its descendants? And while we're at it, how can you close all open folders on the desktop?

Putting a new command on a folder's right-click menu

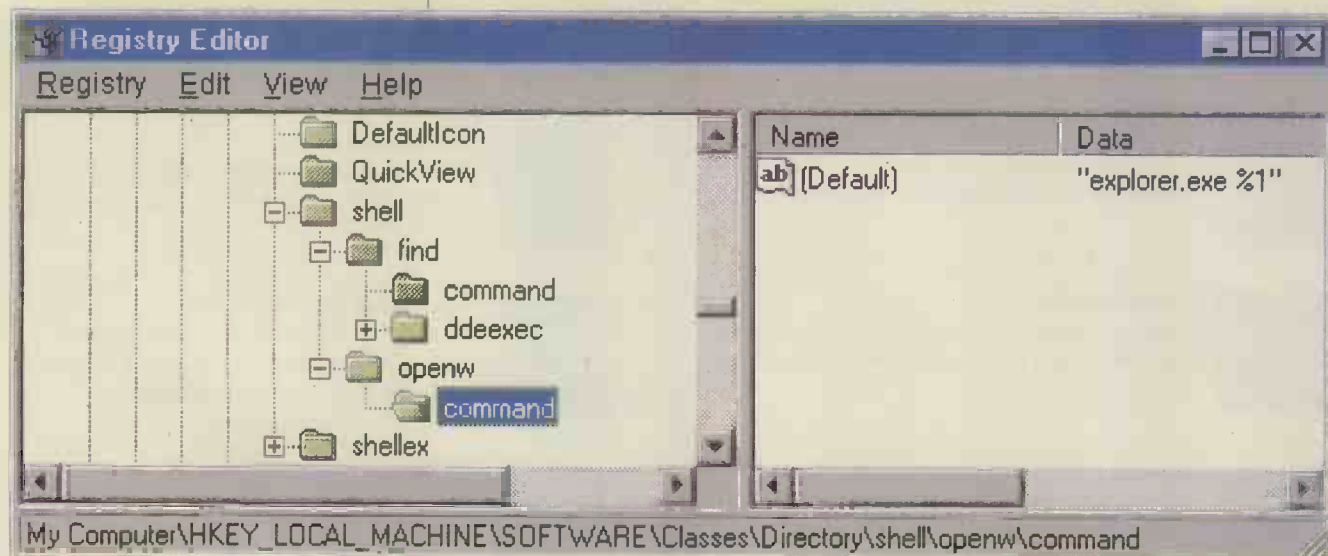
Well, I must confess I haven't a clue about the last two, although if it's any consolation you can minimise everything on the desktop from a right click on the Taskbar. I have made some progress on the rest, though, even if at times it didn't seem like it.

It's considerate of Microsoft to offer us various views of a folder, with large or small icons, list, or details. However, the differences between small icon and list view are subtle to the point of making you wonder why they bothered; the only notable difference I've found is that you can rearrange small icons, but not list items. Similarly you can have a toolbar, status bar, or not.

Once you've experimented with these options, it becomes evident that one size does not fit all. For folders that only contain other folders, I prefer to view large icons, and there's little point in having the toolbar

and status bar. For folders that contain data files, I want to see the size and modification date of each one, and have the toolbar and status bar to hand. And for the "My Computer" folder I want big icons and no toolbar, but I *do* want the status bar as it tells me how much space is left on a drive. You may have other preferences, but the important thing is getting it to work in the way you want.

If you are viewing folders using a single window, then each new folder will inherit the settings of the preceding one. This works upwards and downwards, so if you double-click on a nested folder, resize the window or change the view, then backspace up, the parent will have changed. If you go to the "View/Options" menu, choose the "Folders" tab, and select "Browse folders using a separate window..." you'll find that any changes you make to a folder's appearance will be



saved. Thereafter, as long as you open that folder in a separate window, the view, tool and status bars, and sort order, should be the same. Even if you have "Browse in a single window..." as the default, remember last month's tip that holding down Control as you open a folder forces a new window (as does opening a folder or shortcut from the desktop) and this new window will have its "private" settings if they exist. (For another way of spawning a new window, see the *Top Tips* panel.)

The first thing, therefore, is to decide on a global preference, and having set the view option to single-window, open the "My Computer" folder and tweak it until it is the way you want your default view. Then change to multiple-view, and tweak all the folders you want to keep as exceptions to the rule, including "My Computer", if you want.

That at least is the theory. But it doesn't always seem to work that way and in the gloom of the practically non-existent documentation, it can still be hard to get things the way you want. In particular, the width of a folder window appears to depend on the quantity of the contents, which might make sense in icon view but is plain daft in details view when you want it to be constant. Column width in detail view also seems to be a law unto itself.

So they all rolled over...

According to an unofficial Microsoft source, Windows can retain 50 folder settings. But I can only seem to manage 29. It will continue to save new arrangements, but will discard the settings for the folder least recently accessed. And this brings us to a further problem: open a folder, resize or change the view, and Windows will obligingly save the settings whether or not you want it to, thereby bumping something else at the end of the list of which you might have been quite fond.

To stop your saved settings dropping into oblivion you need to edit the registry. You may like to read the rest of this month's column before you do this, but the section to make for is:

```
HKEY_CURRENT_USER\Software\
Microsoft\Windows\CurrentVersion\
Policies\Explorer
```

You'll see an entry in the right-hand pane entitled "NoSaveSettings" with a value of "00 00 00 00". Double-click on the entry, and change it to "01 00 00 00". Close Regedit.

You've now frozen the saved settings. And, you'll find you've stopped the behaviour mentioned in the first paragraph — Windows will no longer insist on

Top Tips

Okay, you've backed it up in a variety of different ways, so lets HIT that Registry!

- Zoom** If you find the "animation" annoying when you minimise or restore a window, you can remove it. Go to HKEY_CURRENT_USER\Control Panel\Desktop\WindowMetrics, double-click on "MinAnimate" and set the value to zero.
- Menu speed** Going up a level to HKEY_CURRENT_USER\ControlPanel\Desktop, create a new string value called MenuShowDelay. Double click on it and give it a value in milliseconds. This controls the speed at which the start menu sub-menus open; the default is around 400. It's worth experimenting; too fast can be distracting as unwanted menus flash up. Set it to a very high value, and the menus won't cascade until you press the mouse button. You need to restart Windows for this to take effect, so...
- Restarting your computer** If you select the "Restart..." option in the shut down dialogue, then hold down shift as you press "Yes", you will restart Windows rather than reboot from scratch.
- Desktop icons (1)** There's a lot you can do here, but let's start with the Recycle Bin. Find it at HKEY_CLASSES_ROOT\CLSID\{645FF040-5081-101B-9F08-00AA002F954E}. More simply, do a search for "Recycle". Open the "DefaultIcon" key and you'll see three entries — double-click to change the icon for each. You need to specify the path and filename of the new icon, and add a number, as some files contain several icons. For a standalone .ICO file the number should be zero; e.g. "C:\myicons\fish.ico,0"
- Desktop icons (2)** While you're in the vicinity, click up a level to the "645FF..." key and double-click the "default" entry in the right-hand pane. You can then rename the Recycle Bin to something less silly. Mine is now a fish named Brenda, but I'm not sure why.
- Opening folders** Another way to open a new window when "Browse single..." is the default. Go to HKEY_LOCAL_MACHINE\SOFTWARE\Classes\Directory\Shell. Create a new key with the name "openw". Double-click on its "default" in the right-hand pane and type in "Open New". Create another new key under "openw" called "command". Give this a default value of "explorer.exe %1". Don't include any of the quotes; regedit supplies its own when needed. Close the Registry, and you'll now find that right-clicking on a folder icon offers an "Open New" option.

re-opening the folders that were open when you last shut down.

Editing Reg

Despite, in many respects, having far more user control from the Control Panel — changing menu and icon fonts, for example — there are still many options that can only be accessed by editing the Registry, or by getting a utility to do it for you. We've already dealt with "Save settings" and I've mentioned a few others in past columns.

Last month I mentioned the trick of showing icons for .BMP files as miniatures of the file, and in last September's issue covered the trick to creating your own "Tip of the Day". So perhaps it's about time we took a look at the Registry and its editor in more detail.

The Registry, while in theory replacing all the old .INI files, is not a text file. It consists of two large binary files,

USER.DAT and SYSTEM.DAT, which can only be accessed via the Registry Editor. Depending on your setup, you may not have this installed on the start menu but it should be in the main Windows 95 folder as REGEDIT.EXE

Safe hex

The important thing to remember is that if you thought editing the Windows 3.1 .INI files was a perilous business, then you ain't seen nothin' yet — you can really, truly, madly, deeply screw up your entire system by editing the Registry.

Fortunately, there are a few safeguards. Every time Windows 95 loads successfully, it makes backups of USER and SYSTEM.DAT with the .DA0 extension (that's a zero, not a letter "O"). Should Windows refuse to load, or report a corrupt registry, then restart the machine in DOS mode by holding down F8 at boot time or booting from the emergency

startup disk you made when you installed Windows 95. (You didn't? Well put this magazine down immediately and proceed to Control Panel/Add-Remove Programs/Startup Disk.)

The following sequence of DOS commands will restore the registry from the backups:

```
attrib -h -r -s system.dat
attrib -h -r -s system.da0
copy system.da0 system.dat
attrib -h -r -s user.dat
attrib -h -r -s user.da0
copy user.da0 user.dat
```

A rather more organised way to safeguard the Registry is to use the Configuration Backup utility, located on the CD-ROM only at Other\Misc\Cfgback. With this you can keep up to nine Registry backups in compressed form. These are saved by default in the Windows folder but you can move or copy them elsewhere for safekeeping. You can only restore them from the Windows folder, however, and you have to be running Windows to do so. Furthermore, it won't back up multiple user configurations.

If you want to save all or part of the Registry in text-readable form, then choose "Export Registry File..." from the "Registry" menu. Give a file name, and choose whether you want to export the entire Registry or just the current branch. If

you don't specify an extension, then it will be saved with the .REG extension. The advantage of this is that you can restore the registry from a .REG file from DOS, using the version of Regedit on the Start-up disk.

There are additional reasons not to do this. Double-click on a .REG file, and it will attempt to re-import into the registry, which could be a disaster if you've been tampering with it. It's better to save it as a .TXT file, then a double-click (or right-click/open) will load it into Notepad (if smaller than 64Kb) or WordPad if larger. You can then examine the file without risk of damaging the "real thing".

A useful aid to keen Registry detectives who want to know where certain settings are kept is to export the Registry to "BEFORE.TXT", close Regedit, make a change with Control Panel or an application's "Options", then re-open the Registry and export it to "AFTER.TXT". You can then use the file compare from a DOS box. Make sure you're "in" the folder where you exported the Registry files, then type

```
FC BEFORE.TXT AFTER.TXT >
CHANGES.TXT
```

without the quotes. CHANGES.TXT will list all the differences between the two files.

Finally, there is nothing to stop you

backing up the registry files in the traditional way by copying SYSTEM.DAT and USER.DAT. As you can give them long file names, such as "I am just going to tinker with HKEY_CurrentUser... I may be some time" this may well be more helpful than using the Configuration Backup utility, which only gives you 31 letters of description.

Play with Powertoys

If the above scares the living daylights out of you anyway, I don't blame you. Even with copious backups and clean underwear, editing the Registry is somewhat challenging. This is where getting someone or something else to do it for you comes in handy.

Enter Powertoys, which you should find on this month's CD-ROM cover disc. Failing that, it's available from the Microsoft Network, the Microsoft Web site at <http://www.microsoft.com/windows/software/PowerToy.htm>, the Windows 95 conference on CIX, and various other sources.

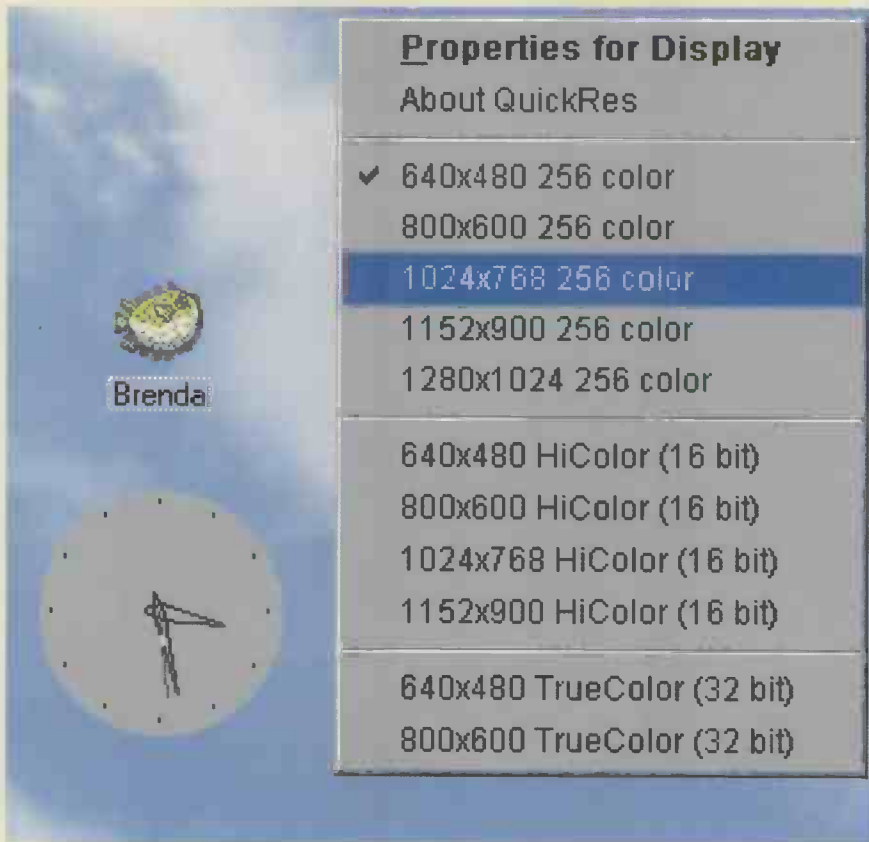
Powertoys is a collection of goodies produced by the Windows 95 Shell team, and released without charge or official support. Some are just showing off — the tired old Windows 3 clock makes a comeback but this time it's round. No borders, no title bar, just a circular window. Others might drive you mad; my particular loathing was Xmouse, which makes the focus follow the mouse pointer without clicking, in the X Windows style. Most, however, are absolutely brilliant and provoke the righteous shout of "Why isn't this a standard part of Windows?"

Switch on to Quickres

Quickres will, if your display card and drivers permit, let you switch resolution and colour depth without having to restart Windows.

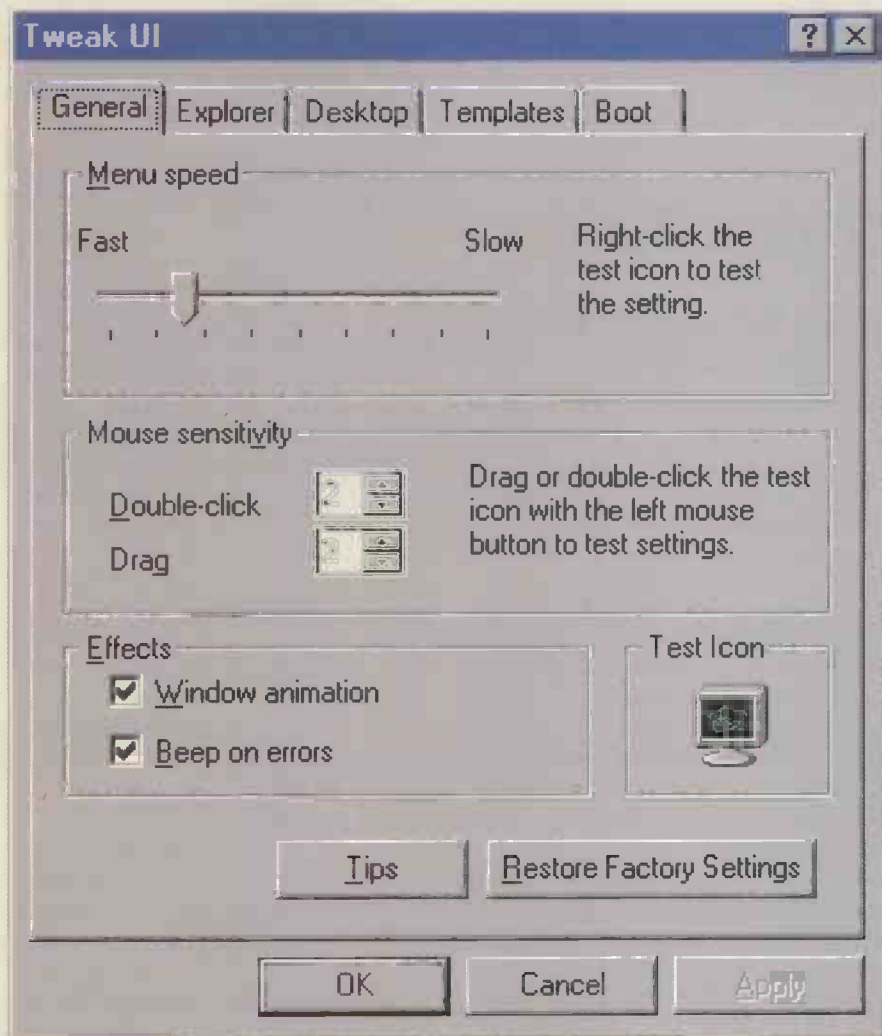
This is something that's been so high on my wish list, and for so long, that I can only melt with gratitude. Stick it in your Startup folder and it puts a little icon in the taskbar "notification area" by the clock. Click on this, and a list of possibilities appears. Click on one, and everything goes black and staggers around for a few seconds then, hey presto! you're in the new resolution.

Cabview lets you peer into Microsoft



A round clock, instant resolution or colour depth changing, and a fish called Brenda

CLASSIFIED



CAB files (the compressed wads of installation files) and extract individual items. There's an enhanced CD player, a "Send to..." add-on to despatch files to any destination, and more.

Oh my, it's TweakUI

Star of the show is TweakUI. This is a Control Panel add-on to reach parts of the Registry only previously accessible with Regedit.

You can disable the "Save settings" that I wittered on about, just by checking a box. You can remove the little arrows from shortcuts if that is your desire. You can remove the seemingly unshiftable items from your desktop and you can change the speed of menu pop-ups. All in all, these people are trying to do honest Windows 95 detectives, such as your humble correspondent, out of a job.

As these are unofficial, they are not supported by Microsoft and the readme files are full of disclaimers: "The entire risk arising out of the use or performance of such products and documentation remains with you. In no event shall

Reach beyond Control Panel without editing the Registry

Microsoft or its suppliers be liable for any damages whatsoever.

In particular, check out the TweakUI help file which is refreshingly candid about the bugs. Interestingly though, there's a disclaimer to the disclaimers, which states: "Because some states/jurisdictions do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitation may not apply to you."

So if this does stuff your PC and you do succeed in taking Microsoft to the cleaners, please let me know.

PCW Contacts

Tim Nott can be contacted by post via PCW or by email at timn@cix.compulink.co.uk

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It's a fair clip

You can really put the clipboard through its paces; even frequent users may not appreciate its versatility. Tim Nott waxes lyrical on ways to use it in Windows and in DOS.

*What a wonderful thing is the clipboard,
Though not made of plywood or
chipboard,
It can keep anything,
From a textual string
To a pic of Madonna's top lip stored.*

More prosaically, the clipboard is one of the most useful features of Windows, and is astonishingly versatile. You probably know the keyboard shortcuts for clipboard operations — Control + C copies the selection leaving the original, Control + X copies and deletes the selection, and Control + V pastes in the contents of the clipboard.

What you may not know is that there is another set of keystrokes that does the same thing. Control + Insert (copy), Shift + Delete (cut) and Shift + Insert (paste) are a legacy from Windows 3.0 and earlier, but are particularly convenient for left-handers. Note that when you paste, it doesn't empty the clipboard; you can carry on pasting the same data into the same, or different, applications. However, the clipboard can only hold one piece of data at a time, so if you Copy or Cut a new selection, the old clipboard content is lost.

The clipboard isn't really a single item; rather, it's a collection of related functions, and the way it behaves depends on the nature of the data being copied. Which brings us to the clipboard viewer. Windows for Workgroups comes with a deluxe version called the Clipbook, with multiple pages, a

toolbar, and the facility to share pages with other users on the network, but we'll keep it simple with the standalone version.

Try opening notepad and the clipboard viewer. Type some text into the former, select and copy it; you should see it appear in the viewer. Now go to the viewer Display menu, and you should find three entries: Auto is the default, which means the viewer has chosen the most likely format; plain ANSI text, as seen in notepad or cardfile and shown as Text on the menu; and there's an option to display as OEM text. This latter uses a fixed-pitch font and supports the box-drawing characters used under DOS. While we're on the subject, you can copy and paste in DOS sessions too, but the procedure is slightly different.

Open a DOS box and you should see the usual boxed instructions starting Type EXIT and press ENTER... Click on the system menu button, top left, or press Alt + Enter, and select Edit from the menu, then Mark. Drag the mouse over the area you want to copy (in this case, the box) and the colours will invert. Press ENTER

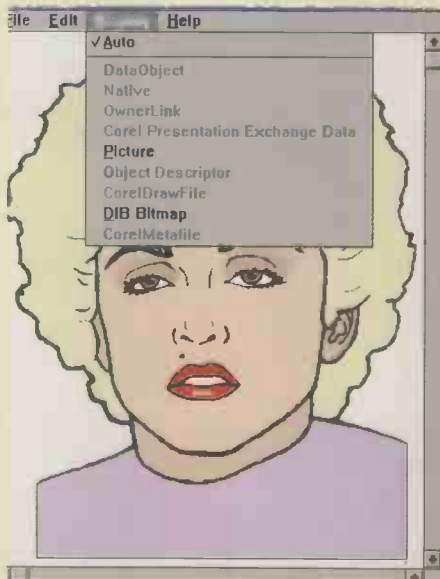
to copy; you'll see the text appear in the clipboard viewer. If you have the display set to auto or text, the box characters and spacing will be garbled. Switch to OEM and you should see the original DOS characters.

You can also paste to a DOS box, but once again the keyboard shortcuts aren't the same; type Control + V on the screen and you'll just see ^V. Try typing Dir followed by ENTER into Notepad and copy it. Then switch to the DOS box and select Edit/Paste from the system menu. You should get the same result as typing Dir then ENTER at the prompt.

Copying text from Write you'll see a third format in the viewer's Display menu, Owner Display, which will show the font and size. Unlike most clipboard data, which survives closing the originating application, this option reverts to the plain-text pumpkin when the Write document is closed. This happens because Write, rather than the clipboard viewer, is doing the real work here, and the formatting can only be pasted back into the same, or a simultaneous, instance of Write.

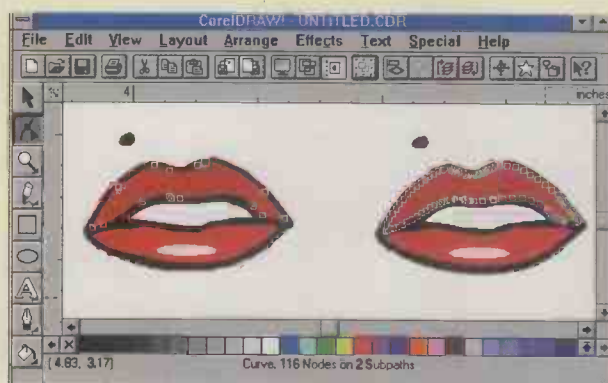
In the picture

Things get more complicated with pictures. Try copying part of a Paintbrush image to the clipboard and you'll see the display menu now includes Bitmap, Picture, Palette and three other greyed-out options. So what is actually on the clipboard? All of these things, and possibly more. If you save the contents of the clipboard as a .CLP file, you'll see that it is many times the size of the original data. The clipboard supports a substantial range of its own formats. In the case of paintbrush files, a Windows Picture, a device-independent bitmap, the colour palette used in 16 and 256-colour pictures and a



Left The clipboard can hold data in a number of formats simultaneously

Below The lips are Corel objects. Copying and pasting in Windows native WMF format changes 15 Bézier curves to over 100 straight lines



Paintbrush "object" are all available.

The native clipboard formats have their limitations however, particularly with vector drawing objects. If you have a copy of CorelDraw (or most other drawing applications), try copying part of a drawing, then Paste Special... into Write. You'll get a choice of pasting a CorelDraw object, or a Picture. Paste the picture, then copy it and paste back into Draw. The two shapes might look much the same but the Picture will have been changed to the Clipboard's own WMF format.

Luckily, the technology of OLE (Object Linking and Embedding) means that you're not limited to the Clipboard native formats. Applications can "register" themselves with Windows as OLE servers, and preserve their native formats as OLE "objects". Hence, in the previous example, if you paste the CorelDraw Object instead of the picture, you can close CorelDraw, copy the object elsewhere, restart CorelDraw and paste it back; it will retain its integrity as a Corel Object.

Guessing game

So what about the client, the application into which you're pasting the data? How does it know what to help itself to from all this richness? Like the Clipboard Viewer's Auto format, the client takes a look at what's on the clipboard and guesses at the most appropriate format. Word for Windows, for example, will default to choosing RTF if it's on offer. Failing that, it will go for plain text if, say, the clipboard contents originate in Write or Notepad.

With applications that are OLE clients (that is, they can accept embedded objects from OLE servers) you get a choice. The Edit menu will contain a Paste Special... option. The choice of formats available at any one time on the clipboard depends on the host application. If you use Microsoft Word, you can see a rather bizarre implementation of this. Select and copy some text from a Word document, then look at the Clipboard Viewer display options. As well as plain and OEM text, plus a load of greyed-out options, you'll see Picture.

Normally, with text from Write or Notepad on the clipboard, Paintbrush will prompt you to select the text tool and position the cursor — you'll then paste in the raw text using Paintbrush's current font

settings. Text from Word, however, pastes straight into Paintbrush as a bitmap, just as if you'd captured the screen with Alt+Print Screen. You can also Paste Special... back into Word as a scalable picture. This may sound sublimely useless, but it does have its good points; you can scale a whole page by copying, then paste a picture of it into a frame.

A clipboard Picture can thus perform as both a bitmap and a vector image. Generally, when faced with a Paste Special... choice between Picture, Bitmap and Object, the first will be the most economical in terms of file size. Pasting as an Object retains the original format, as illustrated in the CorelDraw example. Another advantage is that double-clicking



Every picture tells a story: Word text pasted straight into Paint as a picture

on the object will load it into the originating application for editing. With OLE 2, this can happen "in place": instead of the application starting up in its own window, the toolbars and menus of the container's application will change to suit.

Objects embedded in this way substantially increase file size, but you can opt to link, rather than embed, the object; thus, the linked data remains in a separate file and only the details of the link are retained in the container. It makes life more awkward as the container file is no longer self-sufficient, but it's particularly useful for including multiple copies of a graphic in the same, or different, documents.

As we've seen, the memory occupied by the contents of the clipboard (particularly with pictures or OLE objects) can be very large, but there's no universal way of clearing the clipboard to free that memory. The Viewer is the only Windows component with a built-in Delete command, and few third-party applications (PaintShop Pro being an exception) have a "clear clipboard" command. A quick-and-dirty way around this is to copy something small, say a letter or two of text, which will displace the previous contents.

PCW Contacts

Tim Nott can be contacted either by post c/o PCW or by email on timn@cix.compulink.co.uk

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Classic Games, japes, and high jinx

A new batch of OS/2 games, how to pick up the pieces after a dodgy installation, and why you should use Warp for Internet access. Terence Green brings you the rundown.

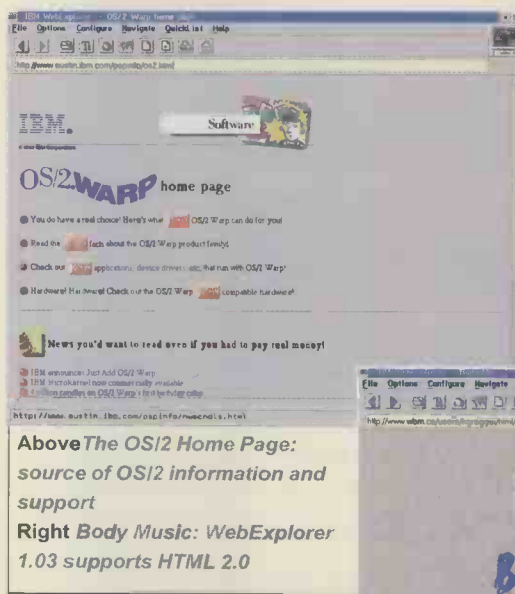
In last month's column I promised news of betas of Warp Server, SystemView and Lotus OS/2 products. I should have known better. SystemView for OS/2 was announced on 7th November for an end-1995 release, Warp Server will have gone to manufacturing by the time you read this and will become generally available in early 1996, and the Lotus SmartSuite Betas haven't turned up yet.

In the meantime, OS/2 has been repositioned again. Or rather, it hasn't. During the summer it might have appeared to some that OS/2 was going downmarket and becoming a Windows 95 competitor in the home market. Not so. Despite press releases trumpeting Warp's take-up among home users, OS/2 Warp is still the same safe client/server operating system for large companies that it was before IBM marketeers felt a sudden rush of blood to the head.

Meanwhile, IBM has sent out review copies of Classic Games for OS/2 Warp, SimCity Classic for OS/2, a bunch of card games, some puzzles and block games and a few role-playing shoot-em-ups.

Classic Games for OS/2 is essentially the UK version of the USA's FunPak for OS/2 with many of the really interesting bits removed. What remains is installed into the X:\FUNPAK directory, taking up 17Mb. The US-only FunPak includes gems such as a Windows Paint program for kids, a dictionary and a child development guide. And it runs in any Warp version.

Having installed Classic Games for OS/2 on Warp Connect and not being big on computer games, I pointed a 13-year-old I keep handy for just such occasions at it. She liked the puzzles and word games but trying to run SimCity crashed the system. Perusing the SimCity readme had led me to update a sound driver following installation. I went back and replaced it with the original, which helped,



Above The OS/2 Home Page:
source of OS/2 information and support
Right Body Music: WebExplorer 1.03 supports HTML 2.0

but the system was still unstable so I backed out of the whole Classic Games installation using the Archive function.

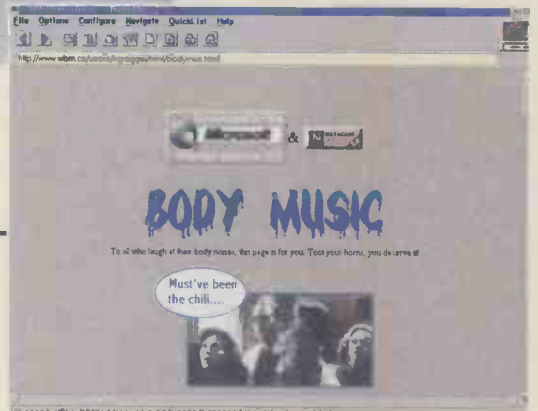
The single life

While mucking about with Classic Games, I noticed that it seemed to work better when I wasn't running any Windows applications. In fact, if you don't need to run any DOS or Windows applications you can make OS/2 more reliable by removing DOS and Windows support using Selective Uninstall. Also, check the CONFIG.SYS to see that PROTECTONLY=YES and IOPL=NO. These changes will make OS/2 more reliable by reducing the amount of direct interaction with the hardware.

Then you only need to worry about buggy OS/2 applications, the quality of the OS/2 video and peripheral drivers you're using and the dreaded "single message queue". The biggest problem with OS/2 once you have the underlying hardware

sorted out, is when a program hangs on input. Because OS/2 has a synchronous message queue, no other process can accept input via the WorkPlace shell (WPS) until the program that has hung while holding the input queue gets going again or terminates.

It is possible to recover gracefully from the lock-up, but it requires a little patience. The message queue handler is much improved with Warp but the problem isn't going to go away until Warp for the PowerPC is ported to Intel, and this is not likely to happen until late in 1996 at the earliest. Warp for the PowerPC has to ship first, around mid-1996. There



will, however, be a further partial fix when Warp II on Intel ships in spring 1996.

In the meantime, the best thing to do once you're sure that OS/2 has frozen is to press Ctrl-L-ESC and wait. If you're extraordinarily lucky the Windows List will pop up and you can close down the offending program from there. More usually, nothing will happen and then it's best to wait a while. A dialogue box should pop up naming the program that has stopped accepting input and offering to terminate it. Due to my problems with Classic Games, I found it useful to close down and restart the Windows session as one of the symptoms was a failure to paint the screen properly over any open Windows windows.

If Ctrl-ESC doesn't work you'll have to reboot Warp, but before you do this, try to

CLASSIFIED

Recovering from a flaky installation

To do this you need to store an archive of your Warp installation before you make any upgrade to the system. Bear in mind that the archive system is no substitute for a full backup of any data you couldn't bear to lose. Archive saves OS/2 initialisation and configuration files, which it backs up in a .KEY file. The files saved include the OS/2 INI files, CONFIG.SYS and AUTOEXEC.BAT and the desktop configuration. Restoring from an archive sets your OS/2 system back to what it was when the archive was saved.

Archives can be restored at boot time. To bring up the System Recovery menu which allows you to select an archived configuration, hit ALT-F1 when OS/2 is booting and the block cursor is shown in the left-hand top corner of the screen with "OS/2" next to it.

Archive isn't enabled by default, and it only saves three configuration changes, dropping the oldest in turn. For this reason it needs to be used carefully. Enable it from the Desktop Settings Notebook (right-click on desktop, choose settings) once you have your system running smoothly. Each time you reboot, a fresh archive will be saved. Each archive shouldn't need more than a megabyte; you can set the save location if you like.

Once you have saved three archives with the system running smoothly, go back into desktop settings and switch off archiving. You need three good archives because some OS/2 installs, the networking ones especially, reboot the system twice. In future, each time you make a sizeable change to the system, wait until you're sure it works fine and set the archive on again to update the three saved configurations.

reboot via the keyboard with a Ctrl-Alt-Delete which will cause OS/2 to flush its cache buffers to disk before shutting down.

How they are related

It's possible that the problem with the Classic Games Pack was somehow related to my running the Ameol Offline Reader for Windows because of the screen painting symptoms. I use Ameol to access the CIX conferencing system and for email, but unfortunately there's no OS/2 version. The upside is that Ameol occasionally misbehaves under Windows for Workgroups too, and it's far easier with Warp to just close down the Windows session and restart it, leaving all other applications unaffected, than it is to reboot DOS and restart Windows.

I'm still using Ameol to access the CIX conferencing system, but now that CIX has started offering an Internet access service which is fast, inexpensive and reliable, I've mostly moved over to running OS/2 Internet applications. The IBM Web Explorer 1.03 (it only runs on Warp, not on OS/2 2.xx) is still a bit clunky, but it supports most of the new HTML 2.0 features including forms, tables and inline graphics.

A good reason to be on the Internet with Warp is for access to the latest fixes, patches, and technical information. IBM's OS/2 Home Page is the starting point for most of these explorations and it's where you can find answers to support questions after your 60 days free support runs out — handy if you don't want to pay £45 annually to extend it. Be careful, though: I recently spent an hour downloading about 10Mb of an OS/2 FixPack which was still an unsupported pre-release version. Cost-

wise, it's not a killer. An hour-long cheap rate local call costs under a pound and CIX Internet access costs me £15 per month for 25 hours of use. The problem was that I downloaded FixPack v12 which was still in beta when I found it on the Hobbes ftp site. *Don't* do this.

Officially-sanctioned FixPacks are placed on ftp://service.boulder.ibm.com and ftp://ftp.pcco.ibm.com sites. FixPacks which appear elsewhere with higher version numbers are pre-release versions, uploaded by benevolent souls who have been sent the fix by IBM for a specific problem. You can soon tell, when you see the IBM warning in the README.1ST file on the first FixPack disk, that this is a "not for redistribution" issue. Check the two sites mentioned to ascertain the latest FixPack release number.

The most recent official FixPack, v10, is generally available, and is recommended if you're having problems. If you're not, leave well alone. Despite the number, it's the second cumulative public release of Warp fixes and it came out at the end of September 1995. It's a 7.5Mb download and you will need another one-time 1.5Mb download of "kicker" disks (WKICKR.ZIP) in order to install any FixPack. A subset of FixPack v10 files, WFWIN10.ZIP, contains driver fixes and updates for installation.

PCW Contacts

Terence Green can be contacted either by post c/o PCW, or by email to tgreen@cix.compulink.co.uk. Updates and fixes other than FixPacks are also to be found on CompuServe (OS2SUPPO), <ftp://ftp.software.ibm.com> and <http://www.ibm.com>

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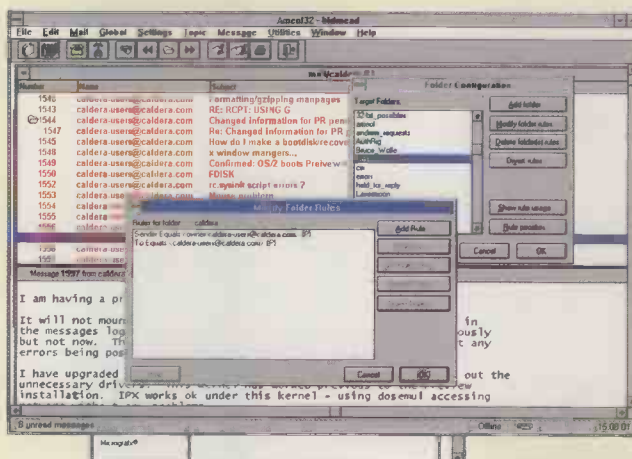
Chris Bidmead looks at ways of bug-bashing via a mailing list on Caldera Preview, stands his ground on Emacs evangelism, and defies the old adage: "Time waits for no man".

As you might expect from the name, the Caldera Preview releases have had their share of minor bugs. Pest control is being carried out through a mailing list which is a kind of electronic conference that works through your regular email box. The mail server at the far end ensures that whenever you address a message to a particular recipient, in this case caldera-users@caldera.com, your missive is automatically re-sent to all the subscribers to the mail group.

This is a simple, elegant and downright Unixy way of running a private conference, but it does have one snag. If your mail-reading app is too simple-minded, it won't offer any way of separating the mail list messages from the rest of your mail traffic. The mail reader I use, Ameol (A Most Excellent Offline reader) doesn't know how to sort mail, so on signing up to the hyperactive Caldera list, my regular daily correspondence quickly disappeared into a blizzard of chat about Caldera.

I'm currently running the 32-bit version of Ameol under Windows NT. Ameol is primarily designed as a front-end to the CIX conferencing system, but CIX also handles my mail and uploads it to me automatically whenever I go on line. Yes, I suppose I ought to be exploring purer Unix-based mail systems, and sendmail is definitely on my agenda. But Ameol and CIX have been my faithful postmen for several years now, and I'm loath to fix 'em when they ain't broke.

The mailing list problem, however, was on the point of driving me to settle down with the O'Reilly "Sendmail" book, when I came across an Ameol add-on, written by Martyn Lovell. Called Mailsort, it's an electronic filtering system that checks incoming mail and categorises it according



The 32-bit version of Ameol, running on Windows NT

to rules that you program into it. The particularly nice thing about Mailsort for me is that like Ameol itself, it comes in 16-bit and 32-bit flavours, so I can run it on my OS/2 system as well as under NT.

A hitch for Portage

I've recently written in this column about the Consensus product, Portage, which bolts on to Windows NT and gives it most of the functionality of Unix System V right down to kernel level. Unfortunately, Windows NT 3.51 breaks Portage, throwing up a segmentation fault error when it loads the Portage kernel at boot time. I'd come to depend on Portage as a bridge between Windows NT and my other Unix systems. But the new version of Windows NT now fits much more comfortably onto my 16Mb DX2 machine, so it's Portage that gets the elbow, and I've promised myself to seek out interesting non-Unixy things to do with the operating system.

What finally set the seal on Portage for me was the discovery that despite the promises of the Consensus brochures, the

company will not after all be coming out with an X Windows System to accompany the product. One of my hopes for Portage was that it would eventually fulfil my ambition to unify Windows NT and Linux on a single

desktop under X, but I'm now going to have to come to that via a different route. Pity, because judging from the email that flooded in when I first wrote about Portage, it's clearly a product that fills a gap. And as a core Unix-on-NT product it continues to work fine if you don't mind sticking with the older version of Windows NT.

I expect I'll be coming back to Portage when the compatibility problem is fixed, but I think Consensus would probably be wise to skip this present version and wait for Windows NT to settle down first. I gather that version 3.51 was originally intended to be distributed with the Windows 95-like interface, but the final build of that didn't arrive in time for shipment. Hopefully, by the time you read this Windows NT will be in sync with Windows 95 and the updated version of Portage will be winging its way to me.

Beating the clock

In common with many laptops, my faithful Tonto has a suspend mode that shuts down the system when you close the lid, then restores everything next time you open up the machine again. This seems to

I stand by Emacs evangelism!

A few people have wagged fingers at me over the evangelism for the good ol' char-based interface I was parading last month. I retract nothing, but perhaps I should put this into context. Last month I was rediscovering Emacs. It was a joy to be able to get on with the job of writing without the burden of function and screen furniture that a modern word processor like Microsoft Word for Windows heaps on you. More about Emacs in a moment. My hearty endorsement of the character-based screen was, in retrospect, perhaps one of those "necessity is the mother of invention" things. As I think I said, I'd taken Linux (and Emacs) away on holiday and was stuck with a portable on which I couldn't get X to run.

Since then, a good deal of twiddling and the indispensable help of a new version of Caldera (Preview II, which includes the latest XFree86 version 3.1.2) has changed the picture. XFree86 3.1.2 now properly supports the Western Digital WD90C24 video chip used in a lot of portables, and at last I've been able to equip Tonto with a very handsome 640 x 480 x 256 X-based screen. In Caldera, the Motif-like GNU fwm (feeble virtual window manager) goes on top of X, and on top of that the distribution runs a proprietary desktop manager called Looking Glass (note: unlike the rest of Linux, *not* for free distribution). It's in this environment that I'm currently running Emacs, writing this column in a salmon-coloured, blue-bordered window; one of several I can have up at the same time.

For and against

Okay, arguments against using X and Emacs; really only one. Emacs is already pretty huge, if you include all the macros, extensive documentation and tutorials that come with it (well, I suppose 9Mb is pretty modest by current word processor standards). X adds a whole clump more code to your hard disk and puts paid to the idea of running anything serious in less than 8Mb of RAM.

Arguments for; lots. Most importantly, you don't dispense with any of the simple goodness I was raving about last month. Entering and navigating text remains as fast as you could wish. Admittedly, the screen starts to look a little more complicated — when Emacs detects X, it puts on its party clothes in the shape of a menu bar at the top of the window. You can pull down sub-menus with the mouse in the usual way, and pop up menus directly from within the windows with commands like the Control key and Left mouse button combo (which gives you a choice of different screen fonts). I prefer the versatile keystroke combinations for the basic stuff. I find the X Windows presentation easier on the eye than a raw char screen, considering that you can set your choice of background colour and font.

Finger-flickin' good

Flicking between Emacs windows ("frames") is handy too in the X version. The char-based Emacs supports this as well, although you don't get to slip and slide the frames with a mouse, just switch over between virtual screens. I've found it best not to use the mouse for this, anyway. The fwm display can be arranged to have a virtual size that's bigger than the physical screen can show — the actual ratio depends on how much video RAM you have. I've fixed up Tonto to work with four virtual 640 x 480 screens, and the quickest way to navigate between them is by using the cursor keys with the Control key. Fwm provides you with a tiny map of the full virtual display — you can see it by the top right corner of the Emacs screen just below the desktop clock. Rodent fanciers can jump screens by clicking on any of the four quadrants of this mini-map, but I find the Control/cursor key combo a lot faster. You can even move diagonally by combining the North-West or South-East keys.

work no matter which operating system you're running, and it's perfect for Linux. If you're set up with multiple files on the Caldera desktop and have several other projects in progress across the various virtual terminals, the last thing you want to do when it's time to get off the train is close all those down gracefully and have to start them up again when you get home. With Tonto you just close the lid. There's just one wee snaggette. Tonto's desktop is set up to display a clock, so I can keep an eye on the time as I write. This is updated by Linux's own system clock, but when you go into suspend mode, the clock does too.

So when you next open the lid, on Friday morning, Linux still thinks it's Thursday evening. I decided to live with this, and apart from the clock falling drastically behind, everything worked fine and I let a week go by without rebooting the system.

When I finally rebooted, I happened to notice a system startup message which claimed to be "setting the clock", and once up and running I noticed that I was indeed back on time.

Get a grep on it

The machine's hardware clock, which stores its data in CMOS, was obviously

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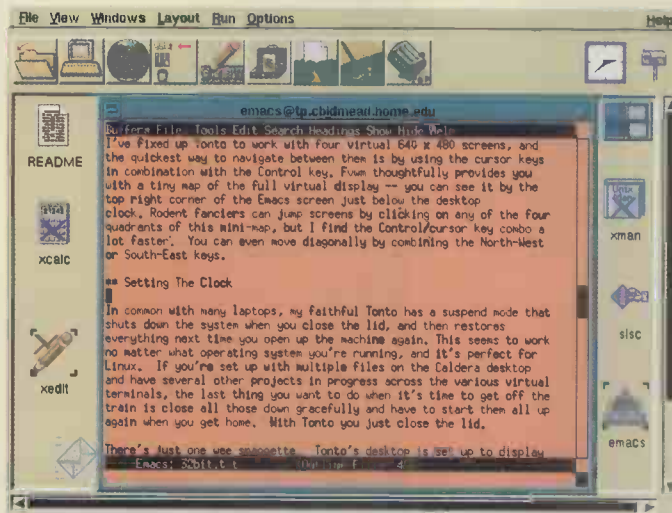
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THIS POEM THREW IT I'M SHORE YOUR PLEASED



unaffected by suspend mode. Only the Linux system clock was losing time, and on bootup something was synchronising them back again. The lesson I've learnt from Unix in general and Linux in particular is that you can usually find out how things work by snooping around, and the place to start when you're looking at initialisations is the `etc/rc.d` directory. This contains the shell scripts that are run every time the system powers up, and you can track down which does what by grepping through them, looking for the relevant string you saw on screen during the initialisation process.

In one of the main files, `rc.sysint`, I discovered the string I was looking for and found it was associated with a command called "clock". Running "man clock" returned a definition of the programming function `clock()` which wasn't what I wanted. If you're looking for a user command that happens to have the same name as a programming function, you have to explicitly mention the manual volume you're looking for, or use `man` with the `-a` parameter, which will show you entries in all the sections.

I happened to know that user commands are in the eighth volume of the manual, so I re-entered the request as "man 8 clock" and got the following description:

```
Clock manipulates the CMOS clock in
variaous (sic) ways, allowing it to be
read or written, and allowing
synchronization between the CMOS
clock and the kernel's version of the
system time.
```

It turns out that the `-s` option updates the Linux system clock from the CMOS clock, so all I had to do was just run this manually every time I returned from Suspend mode. But in fact there's a better way. Why not just run "clock -s" regularly to make sure the two stay in sync?

Tonto and Emacs, sitting on the Caldera desktop with Xclock at last showing the right time

You can do this by taking advantage of a long-standing Unix institution, the cron daemon, one of several "hidden helpers" which chug away in the background

getting things done for you. Cron keeps an eye on the clock, and runs tasks at a particular time of day, or on a particular day of the month, or whatever. You set these tasks up in a somewhat cryptic text file that lives in the directory `/var/spool/cron/crontabs/` and is named after your particular account.

The system also keeps another crontab file in the directory `/etc` which is the responsibility of root. This system crontab takes care of things like cleaning out temporary files regularly and running scheduled updates on various files. For example, the root cron is typically set up to update the "what is" database on a regular basis (see later).

I decided that the clock update dodge I was about to install wasn't really a core system responsibility, so didn't belong in the main `/etc/crontab` file. (A decision somewhat influenced by the fact that this file has a slightly different format from the user crontabs, and I didn't want to risk screwing up anything critical.) But on the other hand, the clock update shouldn't just be associated with the Emacs user on my system, called "elbid". Tonto only gets used by me, but in various capacities.

Who should I be today?

After working with a Unix system for a while you get used to dividing yourself up into a gang of different users, depending on what you happen to want to do with the machine. Root takes care of system admin, `elbid` writes this column, `bidmead` issues invoices, and so on. This kind of applied schizophrenia turns out to be very useful. I solved the dilemma by logging in as root and editing root's personal crontab file, stored with the others in the `/var/spool/cron/crontabs/` directory.

You are not encouraged to edit the cron file directly; instead there's a combined editor/viewer utility called `crontab` that

evokes `vi` and makes sure the revised file is presented back to cron for processing. The line I added to my crontab was:

```
*/* * * * * /sbin/clock -s
```

The man pages for `crontab` will fill you in on the fine detail; essentially the line is divided into two fields. The first, comprised here mostly of stars, defines when and how often the action has to take place, and the second field defines the action.

So now when I open the lid, the clock on the screen is still wildly out, just for the first minute or so. Then the cron command kicks in, momentarily blanks the screen (for some reason I'm calling this "a feature") and updates the clock.

Hello, handsome

The AIX box has finally arrived, just as I was putting this column together. It's a very handsome PowerPC 604 machine, and I'll tell you all about it next month.

Unices are getting more and more similar, but AIX has its little peculiarities. The standard way of getting up to speed on a new system is to use the man pages, and more particularly the `apropos` command. Type something like "apropos disk" on the shell command line and you'll get a short summary of every command in the man pages relevant to the word "disk".

`Apropos` works through an index database file called "whatis", which on Linux systems is assembled from the man pages by running "makewhatis". (Other Unices work similarly, but may use different commands.) On the new AIX box, `apropos` kept returning "Cannot find matching entry", a firm indication that the `whatis` database hadn't been compiled.

Only when I got stuck into finding out how to do that, did I discover there weren't any man pages on the system to index. I went to install CD and fished about in there for about half an hour and turned up nothing. Eventually I contacted IBM, and we had the following exchange:

Bidmead: "So where are the man pages, then?"

IBM: "They're part of our general system information package, InfoExplorer."

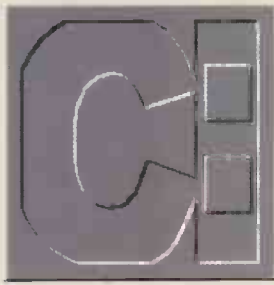
Bidmead: "Ah. So where's InfoExplorer?"

IBM: "InfoExplorer is a cost option, available for £310."

Bidmead: Collapses open-mouthed in astonishment.

PCW Contacts

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The magnificent seven

There are some neat tricks you can work with DOS. Simon Collin knows the wrinkles and has selected seven of the craftiest.

The advance of Windows has taken its toll. Since DOS is now merely a part of Windows rather than an operating system in its own right, it makes sense to merge any DOS questions into the *Hands On Windows* column and this will take effect from the next issue.

So to give you a final dose of DOS advice, I have selected some of the neatest tips and tricks from the past couple of years and condensed them into this single page.

This is no mean feat, since we have covered just about every aspect of DOS: from Novell DOS to networking, batch files to hidden commands; it's all covered somewhere in your back issues.

Here then, are my top tips and neat tricks for DOS.

1. Multiple commands

One of the most annoying aspects of batch files is their inability to run multiple commands using wildcards.

For example, if you want to view the contents of all the files with a TXT extension, you'll have to use the TYPE command umpteen times.

Here are three ways of getting around this. The standard method would be to use the FOR command:

```
FOR %F IN (*.TXT) DO TYPE %F
```

This is rather rigid, so you could replace the TXT and TYPE words with user-definable parameters:

```
FOR %%F IN (%2) DO %1 %%F
```

However, it's even better to use the COMMAND/C command to run any DOS command for you:

```
FOR %%F IN (%2) DO COMMAND/C %1 %%F
```

Save this in a batch file called MULTI.BAT and you can type in MULTI TYPE *.TXT to view all your text files.

2. Key press utility

Trying to get a batch file to respond to a key press is pretty hard work. Here's a neat little utility that will return the value of any key that's been pressed as an error level. It returns the character's ASCII value less 48, so that: 1 is 1 rather than its ASCII value of 49; 2 is 2 rather than its ASCII value of 50 and so on.

```
N KEYIN.COM
E 0100 31 C0 CD 16 2C 30 B4 4C
E 0108 CD 21
```

```
RCX
```

```
A
```

```
W
```

```
Q
```

3. Undocumented DOS features

Microsoft has left a few undocumented features within DOS — some are worthless, but a couple are useful. This one lets you view all the files in a directory, including all hidden files.

Just type in 'DIR,.'. The comma will also work with the ATTRIB command and will reset all the attributes of all the files in the current directory.

The comma is great with the DIR command, but be careful when using it with the ATTRIB command, since it can mess up your backup strategy and will remove any share or read-only attributes.

4. Basic debugging

When testing a batch file, life would be so much easier if you could run it through a debugger to catch all the typos and errors.

DOS doesn't provide quite this level of service, but it does let you step through the batch file one line at a time to check that the program is working correctly. To create your own basic debugging tool, use

the COMMAND command. If you want to step through a batch file called TEST.BAT, enter the following command:

```
COMMAND /Y /C TEST.BAT
```

DOS will load a second copy of the command interpreter and will step through each line in the batch file asking you, with a '[Y/N]' message, if you want to execute this particular line. Once all the lines of the batch file have been executed, this new, second, command interpreter is unloaded.

5. Environment variable

Tailor your version of DOS and speed up searches using some of the internal DOS variables: to see which are currently being used, just type in the command 'SET'.

However, there's one nice little environment variable that's not often mentioned: DIRCMD. Whenever you issue a DIR command, DOS first checks to see whether the DIRCMD variable has been set. If so, DOS will use this as its default and list the contents of the directory. For example, if you often want to check the contents of the \FILES\LETTERS\COPIES\SENT subdirectory, set this into the DIRCMD variable and you'll get a listing of this directory if you enter just DIR with no parameters.

To set an environment variable, use the SET command again:

```
C:\>SET DIRCMD \FILES\LETTERS\COPIES\SENT
```

6. Making the most of batch files

You can really make the most of a batch file by using the environment variables that your PC stores. If you have Novell DOS, you can access environment variables to display user name, network details and so on. For MS-DOS users, there's a particularly useful tip to let you append a new directory to the PATH variable:

```
PATH=%PATH%;C:\NEW_DIR
```

7. Keeping track of time

Want to keep track of the time within DOS? Here's a DOS Prompt command that uses ANSI sequence codes to display the current time at the top of the screen.

You'll need to load ANSI.SYS in your CONFIG.SYS file for this to work:

```
PROMPT $E[s$E[H$E[K$Dat$T$E[u$P$G
```

● I hope you have found this column useful and that it has helped you to make the most of DOS.

PCW Contacts

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CompuServe 72241,601



Let's get personal

Tim Phillips looks at the latest crop of notebooks, brings dispatches from the frontline at Dr Solomon's, and some more mighty macros.

I've taken a break from the nasty headaches of big, bruising word processors this month to enjoy the more understated charms of this year's new crop of PDAs. My predecessor in the Hands On WP hotseat got his biggest postbag ever when he investigated some of the functions of the Psion 3a's word processing. I've been looking at the Psion's competitors: the excellent new HP OmniGo 100, Sharp's ZR-5000, and the Trekkie's favourite, the Newton MessagePad. The first two look and feel like the Psion; the last, as you are probably aware, is quite different.

The OmniGo concentrates on financial applications, and it's an excellent scientific calculator, but that's not why we are here. It also has excellent pen input, something that the Psion lacks. HP uses Graffiti, a pen input system that relies on the user to write letters in a certain way. So the letter "A" is written as a '^', like a teepee. This speeds up handwriting recognition, is quick to learn and very accurate.

The main problem is a 63mm-square screen that taxes your pen input capability, and a lack of transfer functions.

Sharp's ZR-5000 is excellent if you want to write short memos. It has a screen the size

of the Psion 3a and decent handwriting recognition, but more importantly, it has the best little keyboard around. Pen input is best as a way of dragging text around to edit your notes. Recommended, but at £400 compared to £250 for the Psion and the HP, it's not cheap. There's also a capacity to exchange documents with a desktop.

Finally the Newton, which has just been launched with version 2.0 of its operating system. At about £700, this is both too big and too expensive to be an organiser for casual use. It does have several interesting improvements for word processor fans though.

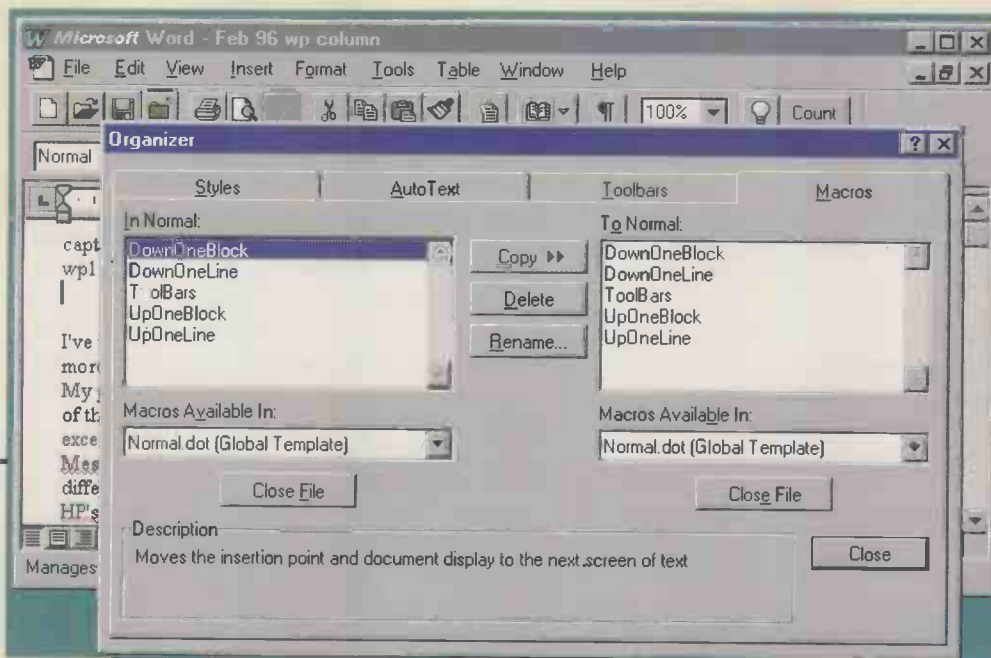
First, it has a keyboard option which plugs into the serial port so you can type, rather than just write with a stylus. Sec-

ond, it is now much easier to use a serial cable to swap information with your PC or Mac — a basic requirement which surprisingly has taken Apple two years to accept. Finally, the handwriting recognition is now excellent, although slow. It looks as if the days when you can write your document instead of typing it are still some way off. The Newton has some great features now, and you can also get Graffiti on a PC Card for it — but its note taker is still not a word processor.

Virus vengeance

Viruses are back in the news, with Dr Solomon's accusing its competitors of not being aware of the dangers of Word for Windows viruses. If you recall, we wrote about the Concept virus (Microsoft called it

If you are flummoxed by the "Colors" stealth virus, you can go looking for the rogue macros using File, Templates, Organizer to get this dialogue box



Finding the right words

Firstly, three problems on Ami Pro 3.1. You know how it is, you wait all month for one then three come along at once.

● James Ball from Swindon has two of them. He wants to know whether he can start up Ami Pro without the "untitled" document opening as well.

The answer is no — but you can record a macro which closes that document, and set the macro to autorun when you start Ami Pro. If the idea is to save time on Ami's exhaustive startup routine, then this makes the problem worse, not better.

If the problem is just that you don't want a spare document hanging around, then this isn't so bad — as the untitled document vapourises as soon as you open an existing file.

His other question also involves opening documents. "How do I display more than one document format at once? I use text and Ami Pro documents and switching between them wastes hours."

Again, there's no straightforward solution, as Lotus informs me that the one-type open box is hard coded and unchangeable. Instead it recommends recording a macro to open a certain file format, and putting it on the icon bar. You could have one for text and one for Ami Pro — which also short-circuits the tedium when Ami Pro resets its target directory each time you change the file format you look for.

● Our virgin WordPro question from Eric LaPlace of Liverpool, who asks whether he will need to do bulk conversion of files when he switches to WordPro from Ami Pro.

The answer is yes if you want WordPro format, but no if you are happy to leave the files as Ami Pro files, which Word Pro will open transparently. If you do want to convert, WordPro has an Import function on its file menu which allows you to select multiple files, and saves the converted file in the same location alongside the old version.

● A man called Jeff mailed me from South Africa, where I hear Archbishop Desmond Tutu and Springbok captain Francois Pienaar are both confirmed readers of the column and macro club contributors, to ask why you have to wait until your Word 6 document was finished to add numbered or bulleted indents.

The lucky answer is that you don't. If you're a user, try it now. Type a list, but before each item type an asterisk followed by a space. After the first item, the list reformats and you have automatically indented bullet points. Now do the same thing, but type a dash (minus sign) at the beginning of each line instead. You get a different sort of bullet. Now do this using the numbers 1, 2, 3. Again the formatting changes to make a

CONTINUED ON NEXT PAGE

a "Prank Macro") a couple of months ago, and as predicted, a few copycat viruses have made their way into circulation.

The virus anoraks at Dr Solomon's have been telling me about the two most significant, Nuclear and Colors.

Nuclear adds the message: "And finally I would like to say: STOP ALL FRENCH NUCLEAR TESTING IN THE PACIFIC!" to the end of your document when you print it, if the system clock is between 55 and 59 seconds. This thoroughly admirable sentiment is one of several payloads in the macro; the other two, which were meant to produce a normal virus and also to delete system files on 5 April, are thankfully bugged and don't work.

You'll find Nuclear by looking under Tools, Macro and checking to see if nine extra macros have been added to normal.dot. One is called "Payload".

Colors is more significant. Although its payload simply changes the Windows colour settings regularly, it is a stealth virus: look for its macros under Tools,

Macro and the macros hide themselves. Instead, look under File, Templates, Organizer, Macros to see if illicit macros have been added.

There are several more new viruses detected like this; I recommend you buy an anti-virus product that will spot them. Currently Dr Solomon's will, and McAfee and Norton don't. This may have changed by the time you read this column.

What's certain is that document viruses are getting more sophisticated. More people share documents than the executable files that traditionally carry viruses, so take precautions if you're on the Internet or a large network.

Yet more exciting news for WP users — Novell is selling WordPerfect. This means problems for WordPerfect users: no matter who buys it, there will certainly be a delay in the next release, if indeed the commitment is there to continue development. If WordPerfect were not a major headache for Novell, with development costs outstripping revenues in the midst

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Finding the right words (continued)

numbered list as you type, and if you change the order of the items, the numbering changes to fit.

The tricky bit is ending the list — type enter, followed by backspace to go back to normal paragraph formatting.

● Gary Martin writes from Reading. He's another WordStar user who wants a bit more flexibility. The answer to these WordStar for DOS problems is usually buried in WSCHANGE — which is the utility for controlling default settings — but it's such an involved process to find the right information, I don't blame him for giving up. I can help him because I found someone else with a similar problem who had contacted WordStar tech support online.

Like a lot of the *Hands On* readers who mail me, Gary writes a lot of academic papers and needs to enter simple formulas. The trouble is that Wordstar will wrap his formulas when he enters the hyphen at the end of a line, so a simple line like 3-2=1 might get broken after the minus sign.

There are three solutions to the problem. Either enter a hard return immediately before the formula so it begins a line, which may look funny if the document is justified or if you subsequently reformat. The second is to turn off the word wrap, using the commands ".aw off" before the line and ".aw on" immediately after the line. This doesn't solve the justification problem. The final option is to make the hyphen one of the characters which don't induce a word wrap. In WSCHANGE, find the section which controls word wrapping, and enter the hyphen as a new character to avoid. This

will mean that you can't automatically wrap a word where you want it, but it does have the advantage that your justified text will stay justified.

● Finally, to show all you Mac users that we care, WordPerfect for Macintosh 3.0 (not my favourite program) has given Janet Erid, of Norwich, a problem. She is trying to convert her documents to PC format, and the smart quotes refuse to translate into quotes — either smart or stupid — in a WordPerfect 6.0 equivalent. Instead, she gets blobs. However, when she opens the document in WP 5.1, the quotes are still there.

Luckily, this one was known to Novell. In WordPerfect 6.0, the smart quotes are not recognised and converted to TrueType characters unless you install the Typographic fonts which include smart quotes. Install that font and the problem is solved.

Smart quotes are a constant source of trouble for users, which is a shame as they do look professional in a document. Mac users started the trend, and you can follow their email across the internet, as it's littered with funny characters instead of quotation marks. My general advice is that if you are going to be making documents for either Internet consumption or printing, then leave them turned on. If you are going to convert a document, or are going to use the word processor to type email, or if you are printing on anything except a laser printer, turn them off or check very carefully that they will convert sensibly. I keep my smart quotes turned off, and nobody has complained — yet.

of Microsoft's onslaught, it wouldn't be up for sale. As my postbag has become almost 100 percent Microsoft-based, I can believe WordPerfect's buyer will have lots of ground to make up, at least among PCW readers.

Win'95 freebie

Now for some good news if you are one of the dwindling band of Windows 95 users who haven't invested in Microsoft Office yet. The Word for Windows viewer is now available for Windows 95.

Hold on to your hats there, because it really is jolly useful. It automatically configures itself as a

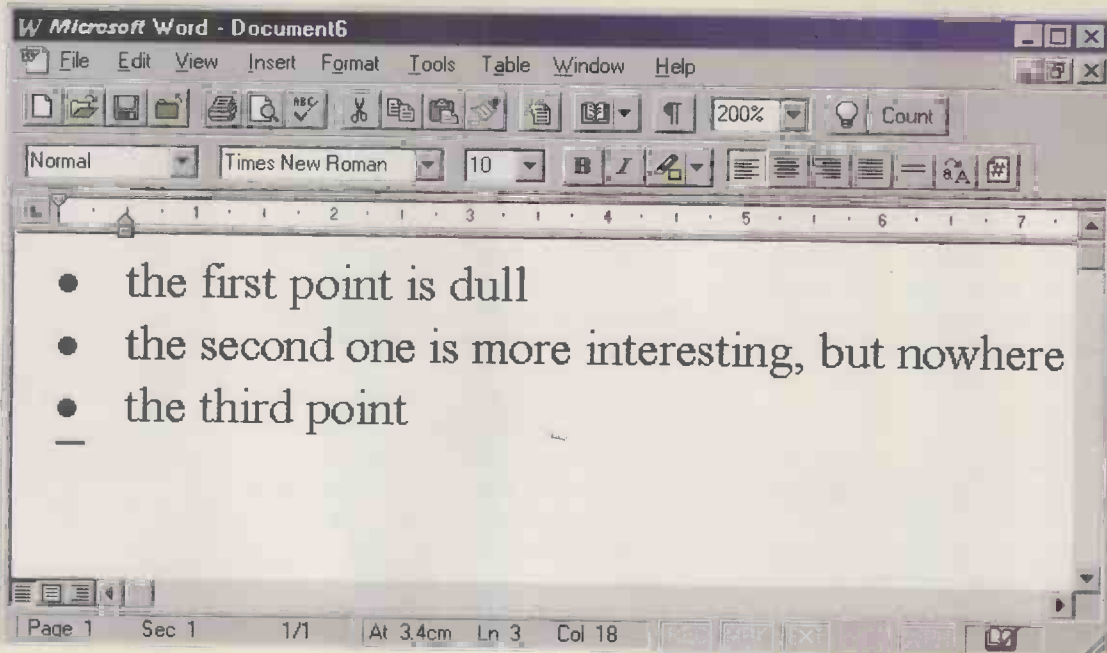
helper app for Web browsers — even Netscape, which shows a commendable sense of fairness for Microsoft. It will view files — although it will not allow you to edit them — created in Word version 1.0 and later, or 4.0 and later if it's Word for the Mac. You get all the page layout, including headers and footers, and you can print too.

This might seem underwhelming, but there are two important applications. The

first is for business users on a network, where some workstations need access to documentation but don't need a full Word Processor. The second is for Internet browsing. Using the Word Viewer, you can enclose hyperlinks in a document, and a browser like Netscape can follow them.

You get your free copy of the viewer either by visiting "Free stuff" at www.microsoft.com, or from the MSWORD forum on the Microsoft Net-

Enter a list of bullet points in Word using the asterisk, and it automatically reformats them in a list



work, or by ordering it from Microsoft on 0345 0020000, where you get charged postage.

Tim's macro club

My macro club members have been keeping their heads down recently with Christmas shopping and so on, but I am indebted to a couple of postal correspondents for the following:

Andrew Rowland of Barnsley adds to our body of knowledge on transposing characters. He points out — rightly — that the macros we have used so far all clear the clipboard, which can be irritating if you want to cut and paste large amounts of text. He suggests an alternative form, "Which just goes to show that the best answer is not always the one a recorded macro may suggest, and a foray into macro programming can be well worth the edit."

```
Sub MAIN                               Sub MAIN
CharLeft 1                             If ToolbarState("Formatting") = 0 Then
a$ = Selection$()                       ViewToolbars .Toolbar = "Formatting", .Show
EditClear                               Else
CharRight 1                             ViewToolbars .Toolbar = "Formatting", .Hide
Insert a$                                End If
End Sub                                  End Sub
```

Anyone got any other macros

which are an improvement on anything you could get by recording keystrokes? Prizes for the best.

Roger Musson of Kirkham has an excellent macro for label printing in Word. I happen to know from experience that this is a continuing source of disappointment and frustration for users, and I'm glad I don't have to do it very often.

Use the Tools/Envelopes and labels menu option to define then insert a page of blank labels. The document now contains an empty table with the number of rows and columns, height and width appropriate to the sheet of labels being used. Go to the first cell in the table and design one label...when the design is complete use the following macro to replicate the contents through the table.

A simple idea that works very well. It means that you can also add images, artwork or fancy fonts using WordArt to your label, and the macro handles them as well.

```
Sub MAIN
EditGoTo .Destination = "\Cell"
CharLeft 1,1
EditCopy
While NextCell() <> 0
EditPaste
Wend
End Sub
```

An easy macro but very useful. Two points to make: first, make sure you set up

your page of labels properly. Word offers all the standard size and make sure you pick the right one — a couple of millimetres error in setting your label size will be disastrous by the bottom of the page. Second, make sure your printer can handle label printing. As Mr Musson points out, if you can print on card, this is a cheap way to make your own business cards.

Another neat trick for Word users, this time from Peter McGarvey at dial.pipex.com. "I find that the two toolbars at the top, plus my toolbar at the bottom can sometimes make the document window a tad small: this helps.

It's a simple macro to toggle the formatting toolbar (the bottom one). Make it into a button on the top toolbar, and it will turn the formatting bar on and off. If you replace the word "Formatting" with any of the other toolbar names that you find in

View, Toolbars, then it will toggle that particular toolbar too." (See above.)

Apologies: please, oh please stop emailing me to say that there's an easier way to skip from cell to cell in a table than the macro provided by Lee Curtis of Idle. As I should have noticed at the time, you use Ctrl-Tab for that. It's what Ctrl-Tab is designed for. There's no excuse. I am most terribly sorry. Now leave my mailbox alone.

Finally, yet another challenge to tax the brightest minds of our generation from Phil Stanton, who asks: "Is there a way of incorporating some kind of counter in a Word 6 macro? I use Word to produce my invoices, and currently I have to look at the most recent invoice to find out what the next invoice number should be. I would like to have some kind of permanently stored counter, so that when I open a new document based on my invoice template, and the AutoNew macro runs (which currently just inserts the date), it puts in the correct invoice number."

Prizes for elegant solutions, as ever.

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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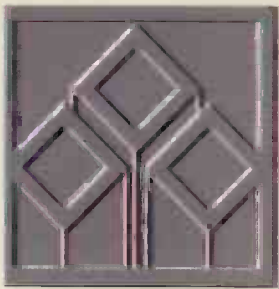
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Ten green bottles

Stephen Wells picks up tips for using Excel to improve industrial processes, and tries to decipher the growing jargon of spreadsheet publishers.

Melvyn Perry, from North Yorkshire, is a process improvement specialist who takes advantage of the flexible graphing features of Excel.

He tells me that process improvement work frequently uses statistical data analysis. It might be for measuring things like the volume of liquid in bottles. A specification for a bottled liquid product will obviously demand that the volume remains consistent.

When the bottles are filled by machines with multiple filling heads, you have to see that each filling pump provides the same output as all the others.

The average pump output is calculated, as is the standard deviation of the error in the sampling method. This error is deployed to calculate what is known as the least significant interval (LSI) and is used to compare the average pump outputs.

The LSI is the uncertainty in the value of the average output. If two averages are further apart than the maximum and minimum least significant values for the respective averages, then those averages are considered to be statistically different.

Melvyn says that the quickest way of identifying any filling pumps that differ from the rest, is to graph the pump averages with the LSI

bars shown. Then, any pumps with overlapping LSI bars are operating at the same average. The LSI bars are essentially the same as error bars.

He has collected data for each of ten pumps for his example. The averages, and the lower and upper least significant values, are shown in *Table 1*.

He selects this data and makes a line graph, then reformats the chart with high/low lines. By selecting Patterns and deleting the joining lines (where appropri-

ate), and changing the data markers to a dash for the end of the "error bars", he arrives at an attractive chart that shows which pumps need adjusting. *Fig 1* shows that pumps seven and eight on the multiple-head bottle-filling machine are under-filling.

Melvyn sent me a disk of the tables, with example charts which I first duplicated with Excel 4, then tried it in Excel 7. The results are the same but the charting procedure and formatting is so much easier, partly because of the multi-tabbed dialogue boxes which first appeared in version 5, and partly because of the context-sensitive mini-menus offered with right clicks on the mouse in the Windows 95 version.

To create a graphical summary of data sets, Melvyn uses the Box and Whisker plot. This reflects the median, minimum, maximum and inter-quartile values. The inter-quartile range is a measure of the dispersion of the data — its spread. The lower and upper quartiles are the values at the 25 percent and 75 percent rankings of the data. The median is the 50 percent point.

To demonstrate the value of the Box and Whisker plot, he used the data from the filling head example and worked with pumps 1, 7 and 8.

The data is shown in *Table 2*. Using Excel 4, he made the chart (shown adja-

Figs 1 & 2 Performance of the multiple-head bottle-filling machine

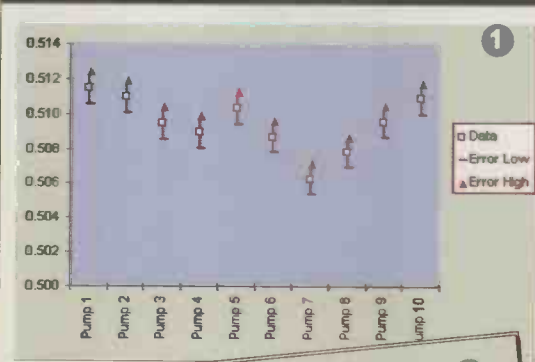


Table 1: Error Bars

Item	Data	Error Low	Error High
Pump 1	0.512	0.511	0.512
Pump 2	0.511	0.510	0.512
Pump 3	0.510	0.509	0.510
Pump 4	0.509	0.508	0.510
Pump 5	0.510	0.509	0.511
Pump 6	0.509	0.508	0.510
Pump 7	0.506	0.505	0.507
Pump 8	0.508	0.507	0.509
Pump 9	0.510	0.509	0.510
Pump 10	0.511	0.510	0.512

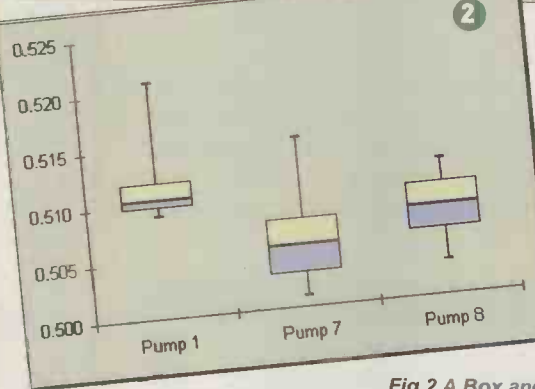


Table 2: Box and Whisker plot

	Pump 1	Pump 7	Pump 8
Lower quartile	0.510	0.503	0.506
Minimum	0.509	0.501	0.503
Median	0.511	0.506	0.508
Upper quartile	0.512	0.508	0.510
Maximum	0.521	0.515	0.512
Median	0.511	0.506	0.508

Fig 1 A hi-lo chart made from Table 1. It shows that pumps seven and eight are under-filling

Fig 2 A Box and Whisker plot from Table 2, showing the median, minimum, maximum and the inter-quartile values of pumps one, seven and eight



cent to Table 2) like this:

Select the complete data block (e.g. I4:L10), choose the Chart Wizard and extend the square to chart size. At Step 1, choose Next. At Step 2, choose Line, Next. With Step 3, take Line chart Type 7. At Step 4, change Data series to Rows; and accept 1st Row for Labels and 1st Column for Legend. At Step 5, choose your option for having a data legend or not.

Now double-click the chart so that the menu bar changes and choose Chart, Add Overlay. Choose Format, Main Chart, Hi-Lo lines and Up/Down bars. Set Gap Width at 100%: this formats the main chart. Format the overlay in the same way. Excel 7 doesn't use the term "overlay"; instead you Format Groups 1 and 2.

Double-click on a horizontal line in the graph. In the resulting Patterns dialogue box choose: Line, None; Marker, Custom; Style a dash; Foreground black; Background, white. Then check the Apply to All box. Double-click on a marker and choose those same options again, and that's it.

The box and whisker plot illuminates three points. Firstly, the data may not be symmetrical — particularly for pump one. Secondly, pumps seven and eight are similar in that the median of pump eight falls inside the median to upper quartile value of pump seven. Thirdly, pump one has a higher output than pumps seven and eight, as seen with the LSI comparison.

The box and whisker plot is very powerful and is often used in statistics. Melvyn says: "It is a shame that this plot cannot be made more quickly in Excel." Ironically, Excel 4 did have a spare square in the choice of chart types box, but Excel 5 filled it with a doughnut-type chart.

Fig 3 If you sign up for the Microsoft Network, you can click on a Help option in Excel 7 to instantly connect to all these resources

Why do I pass on such an obscure use for a spreadsheet? It's my experience that applications, or chart variations which are new to me, frequently strike a chord with readers. I've had quite a bit of response to my recent column dealing with golf handicapping, as well as my article about calculating nurses' shift hours.

Going through the changes

I remember when a shop was a shop. Then it became a retailer, expanded to a retail outlet and finally, a traditional retail distribution channel.

The hyperbole used by spreadsheet publishers has grown in the same way. Particularly Microsoft with Excel. We used to have macros, templates and add-ins. Then it was Wizards. Then Auto this and Auto that. And now it's enhanced IntelliSense technology.

Interchangeably called "Excel 7" and "Microsoft Excel for Windows 95", the latest incarnation is like one of those massive cinema organs with every conceivable feature and accessory known to man.

Microsoft's admirable intent was to move to a task-orientated approach. So instead of thinking about functions and formats on worksheets, you'd think about budget reviews, contact lists, and financial analysis. Pete Higgins, Group VP Applications and Content, says: "You've told us that your primary focus is on getting your work done, not learning our products."

The inference is that all these ease-of-

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use accessories will cut the time taken to learn the software. A laudable objective. But computer software is only a tool and the user always has to familiarise himself with it. The more complex the tool, the longer it takes, initially.

To take a simple example, the information you would obtain by running the macro, CHECKUP.XLM in the Excel 4\Library\Checkup directory, you can now find in the Excel 7 menu bar. But would you find it under (a) File, Properties, Statistics? Or (b) Tools, Options, General? Or (c) Help, About, System Info?*

One way or another, the new Excel in combination with Windows 95 offers more kinds of help than has ever been seen on a spreadsheet.

Cleverly, to save memory the Help file only adds subjects as they're needed. The VBA (Visual Basic for Applications) library, for instance, doesn't load until you run or edit a VBA macro.

The menu bar Help offers you a choice between a Contents, an Index, Find, or the Answer Wizard.

The Contents offers drop-down chapter heads and the Index offers a complete alphabetical listing. Both of these are like an on-screen manual. Find is like a database search: type in a word, choose from numerous options for searching, then pick a topic.

The Answer Wizard lets you type a question like "How do I change colours in a block?" then offers a choice of subjects.

You can also reach this main Help file by clicking on the desktop and pressing F1. Often, the resulting Help screens will contain buttons to take you to a branch, show you an example, or even start a macro. These are called Shortcut buttons.

Another form of Help is the question mark in the title bar of every dialogue box. Click the What's This? button, then an item, and a clarification statement appears.

The constantly running Tip Wizard makes helpful suggestions as you go along. If it's suggesting that you use an icon for something like creating a note, it displays a working icon whether regularly visible on a toolbar or not.

There is the context-sensitive mouse right-click menu, too: you might be looking at a list of files to open and you can choose a Quick View of the file, or examine its properties.

You can find out what any button does just by pointing at it. You can view any helpful note which you've attached to any cell (or play any warning sound) just by pausing the mouse cursor on the cell. These are now called Cell Tips.

Top Tips for Lotus 1-2-3 Release 4 for Windows

● You can put text in a cell outside your printed page area and have it appear in the header or footer. If you were to enter it in cell Z1, for example, you just put Z1 in the left, centre or right box of the header or footer section in Page Set-up.

● Here's an easy way to multiply or divide by a constant. Let's say you have a series of currency amounts in the range A1 to A12. You want column B to carry the same amount plus VAT at 17.5 percent. Just enter 1.175 in, say, cell F1. Then choose Range, Analyse, Multiply Matrix. In the dialogue box put A1:A12 in the First matrix slot, F1 for the Second matrix and B1 for the Resulting matrix.

● A simple formula for calculating the first day of each month is:

```
+D1+32-@DAY(D1+31)
```

This assumes column D is in a date format. You enter any date in cell D1. Enter the formula in D2. Mark the block D2 down as far as you like. Choose Edit, Copy Down.

● To access a comprehensive list of all @Functions with descriptions, choose Help, the Search option, and then the Search button. Type @Functions. Pick @Function Categories and click the Display button and the Go To button (marked >>). To go to each succeeding group of @Functions, repeat clicks of the Go To Button.

● To add notes to formulas, just separate them with a semi-colon. To add one to a label, enter it like this:

```
+ "Jan 8 '96";Marsha's birthday
```

The date will appear in the cell. Both the date and the note will appear on the Edit line.

● If you're getting an ERROR message in, say, cell A12 caused by a division by zero in cell B5, then you can suppress it like this. If the current formula is

```
@SUM(A3..A11)/B5
```

change it to:

```
@IF(B5,@SUM(A3..A11)/B5,"")
```

If you'd rather be advised about the problem with a more specific message, enter instead:

```
@IF(B5,@SUM(A3..A11)/B5,"B5 has a zero")
```

I also think it's helpful to be able to view an instant total for any block of cells you mark. The answer appears in the status bar. This feature is called AutoCalculate. And more than just a SUM, you can right-click on the figure and instantly change it to an average, a cell count, or the maximum of a range and so on.

Finally, there is always the latest Help from the horse's mouth. Assuming you've joined the MSN Network, you can go straight to the screen shown in Fig 3 (page 309), from Excel. Just choose Help, The Microsoft Network, Microsoft Excel 95 Forum, Connect.

If you choose an item to download, it goes into the C:\Program Files\The Microsoft Network\Transferred Files folder. Then you can view it or print it at your leisure.

Loose ends

I'm grateful to Shane Devenshire, of Walnut Creek, California, for the panel of tips for Lotus 1-2-3 (page 308).

Speaking of post from overseas, among the hundreds of requests I've received for the financial analysis templates (described in this column over the past year) have been a number from regular readers of PCW in places as far away as Colorado and South Australia. Most

know the drill for foreign correspondence; others enquire how to pay for the return postage.

Wherever you are in the world you can buy Coupon-Response International coupons at your local post office. You just send these with a formatted 3.5in disk and a return address envelope to the usual address. And I'm going to spell that out because I receive so many creative interpretations of that phrase: Stephen Wells, Personal Computer World, Editorial Dept, VNU House, 32-34 Broadwick Street, London W1A 2HG.

* The answer to the question about how to run the info macro is (c).

PCW Contacts

Stephen Wells welcomes comments on spreadsheets and solutions to be shared. Send them to PCW Editorial at the usual address or at Stephen_Wells@msn.com.

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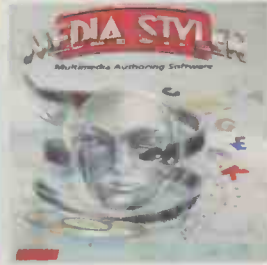


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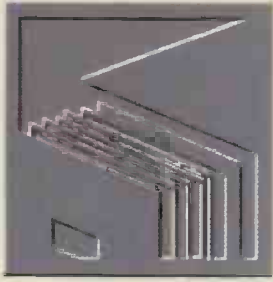
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Speed is of the essence

If database users need indices to keep speed up, Mark Whitehorn asks why 70 percent of databases don't maintain an index? Plus Query optimisation, and using the Count function

WordArt

Microsoft WordArt is a nice little add-in that lets you embed nifty font attributes into your programs. If you own any Microsoft products, you probably have this program on your computer.

To insert a WordArt object:

1. Choose Edit, Insert Object in Access (or click the Object Frame Tool on the Toolbox toolbar).
2. Depending on your version, choose Create New and select Microsoft WordArt2 (or if you only have 1.0, choose that, and click OK).
3. Type your text. Note the toolbar and menu is Word Art's.
4. Click the first dropdown list, "Plain Text", and choose the flow you would like your text to have. (You probably can see the effect of this in the background as you work.)
5. Choose Format, Stretch To Frame (or use the 7th tool from the right) so that the text will fit in its frame if you resize it back in your program.
6. Choose Format, Shadow and pick a shadow style and colour if you want one (or click the second button from the right).
7. Choose Format, Border or click the first button on the right to choose a border colour and thickness for the text.
8. To rotate or stretch the text, choose Format, Rotation And Effect or click the fourth button on the right. With this option you can increase or decrease the amount of stretch, as well as rotate your text.
9. If you want to colour your text or add a pattern to it, choose Format, Shading or click the third button from the right.
10. To return to your program, simply click out of WordArt.

11. To edit the WordArt object, just double click it and you will be back in Word Art.

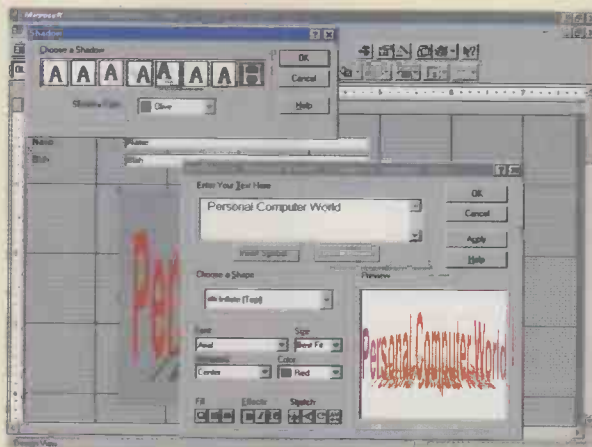
Paradox pause

The fastest way to get out of an operation in Paradox is to press Ctrl+Break (Ctrl+Pause). Fast it may be, but it's also very dangerous. In most cases in Paradox, pressing Ctrl+Break will end a task and return you to the main menu, but nothing you were doing will be saved. Here are some of the places you can use

not at the end of the report, it brings you to the end of the current page; the second time you press it, you go to the end of the report; the third time, you return to the report writer. If you mistakenly think you're not at the end of the report and press Ctrl+Break twice, you will exit the output screen and then the report writer without saving any changes. Take heed.

The need for speed

Microsoft recently looked at a whole collection of databases "from the wild" — databases that real users were running in a cross-section of real companies, not just from the



Left Using WordArt to create a text object for use in Access

Below The WordArt object embedded in the form. Restrained and dignified, I hope you'll agree

this command: to exit the edit mode without saving changes; to exit the sort screen without executing a sort; to exit the Modify Restructure screen without saving changes; and to exit the Create mode without saving your work.

Ctrl+Break is particularly dangerous in the Report Writer. When you are in the Output to screen mode, the result of pressing Ctrl+Break depends upon where you are



Fortune 500. One surprising fact that emerged was that about 70 percent of those databases had no indexing whatsoever (presumably apart from the Primary keys). Since indices are a vital component in keeping a database running rapidly, this may well account for users' frequent complaints about the tardiness of their databases.

Access 95 now boasts the ability to create indices for you automatically (as do some other RDBMSs), and this is to be applauded. However, it is still worth knowing why an index should make such a difference to data retrieval speed. Back in the December issue I promised to cover the general topic of speed, so here we go.

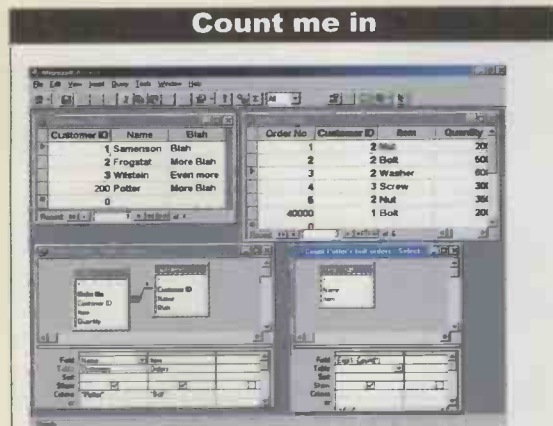
Speed is one of a range of factors (including usability, data integrity and scalability) which are all-important when choosing an RDBMS. Speed isn't the be-all-and-end-all, but it *is* pretty important. Speed is influenced by a very large number of factors which include (not in order of priority):

- hardware (speed of processor, amount of memory, etc.);
- disposition of data across the hardware;
- query optimisation;
- size of tables;
- number of tables;
- disposition of data within tables; and
- indexing

I don't intend to digress into a hardware discussion here, but the most common advice I hear is: "Buy more memory". The disposition of data across hardware platforms is all bound up with the machines themselves.

Query optimisation

Query optimisation is more germane, since it is under software control. It is important in consideration of speed, because not all requests for the same information are identical. It is possible to express several requests for



Using nested queries to ensure that Access can count right down to zero. The two tables are shown at the top of the screen. The query on the left counts the number of times Potter has bought bolts (zero). The query on the right counts the number of records produced by the first query (zero as well). The result of this second query will display properly on a form

Well, I asked for tips and tricks, and here is one in the form of a question from Stuart Elliot, which he rapidly followed with the solution.

"I am trying to use the Count() function to return the number of records that match the selection Criteria in a selection Query. The function normally returns the correct number, when at least one record matches the Query's selection Criteria. However, when no records match this Criteria, the function returns an #Error code. The Count function is being used in a "text box" on a sub-report, based on the aforementioned Query. Is there any way I can get the Count function to return a zero (i.e. "0") when no records match the Query's selection Criteria?" Before I could answer this, the following arrived:

"I now have an admission to make. I found the answer to my problem, and in the MS Access User Guide at that [he says, embarrassed. No shame in that: how many of us actually read all the manuals? — MW] The information is on page 130 of the User Guide for Access v1.1.

The answer is to create a second query that contains the first query. Here are the steps:

1. Create a new selection query.
2. "Add" the first query to the second (instead of a table).
3. In the second query's first "Field" cell, enter "Count(*)" without the quotes.
4. Select "Save As" for the second query and give it a meaningful name.

How it works: The first query selects a record set according to its selection criteria. The second query generates a total of the number of records returned/selected by the first query. The * in the Count function means count ALL records in the record set (returned by the first query, in this instance), even those with Null fields."

I love problems that solve themselves.

exactly the same data in a variety of different ways. Despite the fact that the

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The two tables used in the discussion on optimisation

Fig 1 Nuts and bolts

Customer ID	Name	Blah
1	Samenson	Blah
2	Frogstat	More Blah
3	Wilstein	Even More
200	Potter	More Blah

and their orders which number 40,000:

Order No	Customer ID	Item	Quantity
1	2	Nut	200
2	200	Bolt	500
3	2	Washer	600
4	3	Screw	300
5	2	Nut	350
40000	1	Bolt	200

answer table will be the same in all cases, the queries can take wildly different times to run.

If this sounds impossible, consider the example in Fig 1 (page 314). Suppose you have a table of 200 customers (you'll have to imagine the missing 196 and 39994 records respectively).

Assume that we only sell four items — nuts, bolts, washers and screws — and that they all sell equally well.

Suppose you were performing the search manually and wanted to find all of the orders which have been placed by Potter for Bolts. There are several strategies you could adopt:

You might look through the 40,000 records in the ORDER table and extract every record which shows a sale of bolts — approximately $40,000 / 4 = 10,000$ records. Then you could search through the CUSTOMER table, and find out that Potter has [Customer ID] 7. Finally, you could extract from your table of 10,000 records all those which have [Customer ID] = 7; perhaps 500 records.

But, of course, you wouldn't really do

this. You would search through the CUSTOMER table, and find out that Potter has [Customer ID] 7, and then you would look through the 40,000 records in the ORDER table and extract every record which had [Item] = "Bolt" and [Customer ID] = 7.

Why would you do it that way? Because the first strategy searches through a total of 50,200 records, the second only 40,200; so the second should be (simplistically) about 20 percent faster.

This is a simple example of optimisation, and most RDBMSs would handle it without any trouble. Many queries of multi-table databases are much more complex than this, in particular those which involve queries which are nested to several levels. For example:

"Of the employees who have dealt with client X within the last six months and sold her item Y, how many have sold product Z in the last three months to clients in countries with a GNP greater than that of country A, and who have a bad credit rating with more than two of our credit sources?"

An optimiser should be able to arrange for this request to be processed efficiently. However, the optimiser has to do more than simply decide the order in which the tables are processed. For example, in a multi-user system, an optimiser might receive several queries at about the same time, which require a specific table to be queried in the same way. Clearly it is more efficient to simply query this table once and "share" the resulting answer between the incoming queries.

Query optimisers are complex entities, and you are unlikely to want to write your own, so you might wonder why I have included them in a list of factors which you can look at to improve performance. The crucial point is that not all optimisers are equally efficient; so the choice of optimiser can have a significant effect on speed.

What it is to be normal

The size and number of tables and the way the data is spread among them, can clearly have a marked effect upon performance. However, the interaction of these effects can be complex.

Consider a badly designed database where little or no attempt is made to normalise the data. It contains a small number of tables, each stuffed full of duplicated data; result — a glue-like response. Now consider a properly normalised database. Lots of small, neat tables, no duplicated data; result — a glue-like response.

What? They can't both be bad, can they?. Let's consider why each of these (admittedly extreme) examples might be slow.

In the first, non-normalised example, the tables are "artificially" large because of all the repeated data, so the RDBMS has to look at huge numbers of records in order to find the ones you seek.

In the second example, the tables don't suffer from duplicated data, but there are so many tables that the RDBMS spends an inordinate amount of time opening and closing them, checking the data dictionary for join information, maintaining referential and data integrity, that it has little time left for the users and their queries.

This is not to say normalisation is a waste of time. In general it's wonderful, and should certainly be regarded as the default choice. Like all tools though, it doesn't have to be used blindly.

Two's company

In a database which is used by several users, some entering data and some querying the database, those who are querying it are generally managers, trying to see the historical trends within the data. The problem is that the "management" queries are large and complex, and interact badly with the inputting work. Essentially there are two databases needed here — one which accepts data input, and the other which is a data pool or "data warehouse". Once we make that momentous decision, we should also be able to see that the need for normalisation differs between the two.

More on this, and indexing, next issue.

PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. He's on m.whitehorn@dundee.ac.uk

Where other databases leave you with questions...

At the security company:
What other equipment have these cowboys sold us?

At the recruitment agency:
How long will it take us to see who we've got with experience in VB, security and comms?

In the research section:
You mean we can't just look for everything in the database that mentions it?

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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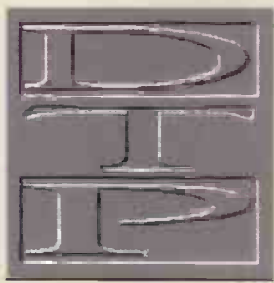
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Crossing the great divide

Gordon Laing, PCW's very own good-times guru, has long wanted his PC and Mac to make beautiful music together, or failing that, at least open each other's graphics documents. Not quite plain sailing, but cool.

It's the new year; a time when our thoughts turn to everybody sharing our world in peace and harmony. With this in mind, I thought it was about time my Mac and PC got on well enough to seamlessly open documents created on each other. Well, it might work.

This is not a time for lack of optimism however, and it certainly seems I'm not alone in the attempts to share across the platforms, judging by the amount of requests we hear on the subject at PCW, so here goes. It's worth bearing in mind, as we attempt to exchange complex graphic documents, that half the Internet-equipped world continually struggles to exchange what is basically plain text. You may or may not be surprised to learn that simply opening the text files sent by the various contributors to PCW is a huge translation job in itself; but back to the plot.

The best intentions

I'm not attempting anything too clever, like opening PageMaker layouts in Quark XPress or Illustrator files in FreeHand. My intention is to take three of the most common Macintosh graphics applications which coexist on the PC, and see how easy it is to exchange documents.

Despite the fact that many earlier versions of one application could open, perhaps by chance, its cross-platform counterpart, I'm only going to be looking at the same version numbers which actually claim compatibility. The three apps are, not entirely surprisingly: Quark XPress 3.31, Adobe Photoshop 3.04, and Macromedia FreeHand 5.0.

XPress proved tricky at first thanks to Quark preferring to work with version 3.31

for cross-compatibility, but Windows 95 refused to co-operate until I updated to revision 5. I downloaded this update from the official Quark website, and everything was fine.

The first major problem to overcome on every type conversion — PC to Macintosh or vice versa — is the filename. Macintosh filenames are limited to 31 characters, but can use upper and lower case, spaces, or in fact any symbol you'd like. DOS and Windows 3.x are limited to the 8.3 file system — that is, an eight-character description followed by a three-character file type. Sadly there is a limited choice of characters, with no case differentiation or spaces.

What's in a long filename?

Windows 95 is a huge improvement over Windows 3.x, offering long filenames of up to 256 characters complete with case and spaces. There are some peculiarities with the banning of several characters, and the option to display or hide the old DOS three-letter file extension. Under DOS, Windows 3.x and Novell NetWare (without the OS/2 long filename support) the first descriptive portion of a long Windows 95 filename is truncated to eight characters, followed by the three-letter file extension, which was there all along.

The file extension is Microsoft's way of identifying the file type. Word knows to look out for DOCs. A paint package knows that TIF, GIF, BMP and PCXs are all bitmaps with known properties. By retaining, but hiding the extension in Windows 95, Microsoft has ensured a certain degree of backward compatibility with DOS and Windows 3.x.

When confronted with a DOS/Windows filename, the Macintosh just sees it as a bunch of characters. The fact that they are arranged as eight, followed by three with a dot in the middle, is of no consequence. However, many Macintosh applications look out for header information, or have been warned in advance of the PC file extensions and recognise them correctly. All three of the apps discussed here recognise and understand the file format from the PC extension.

Dot's the way to do it

When the PC platform is faced with a Macintosh filename, it is unable to identify the file type without an extension. A quick and easy solution is for Macintosh users to bung in a dot, followed by the appropriate file extension for their unfortunate PC friends; but it's a tough habit to get into — and why should they?

One reason is that a Windows application immediately looks for its native file format in the open dialogue box. Quark XPress for Windows, by default, looks for anything with a QXD extension. Photoshop seeks TIFs, GIFs, BMPs and the like. The only way a Windows open dialogue box will see unmarked files is to go for a totally wildcard search by typing *.*.

Consequently, opening a Macintosh file under Windows is a multi-problematic affair. Firstly, unless the Mac user has ended the filename with a dot and the correct file extension, Windows will not see it; and even when you force it to, you'll have to know what kind of file it is. Secondly, once you've searched for *.* , you'll only see the first eight characters which may not sufficiently identify the desired file.

Opening PC documents on the Macintosh



Okay okay, I'll use any excuse to get my picture in PCW, even twice on a single page!

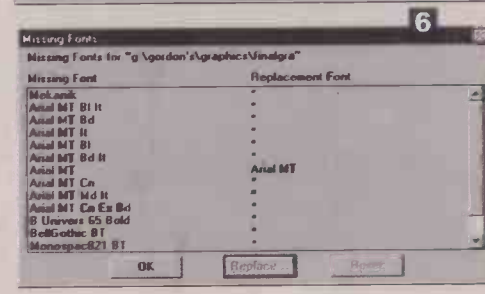
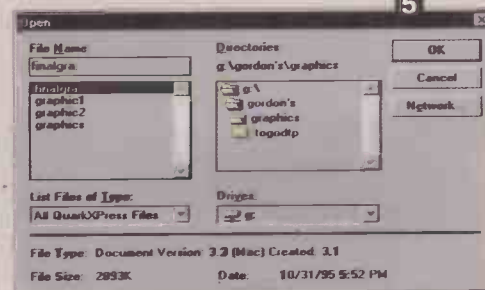
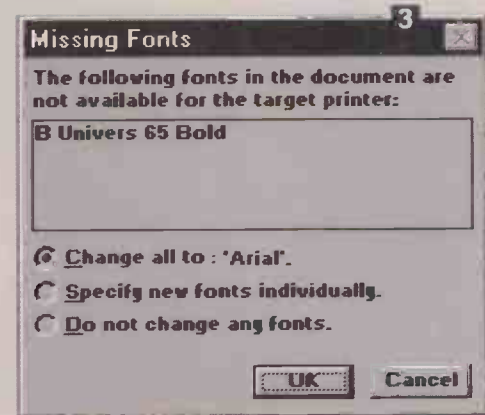
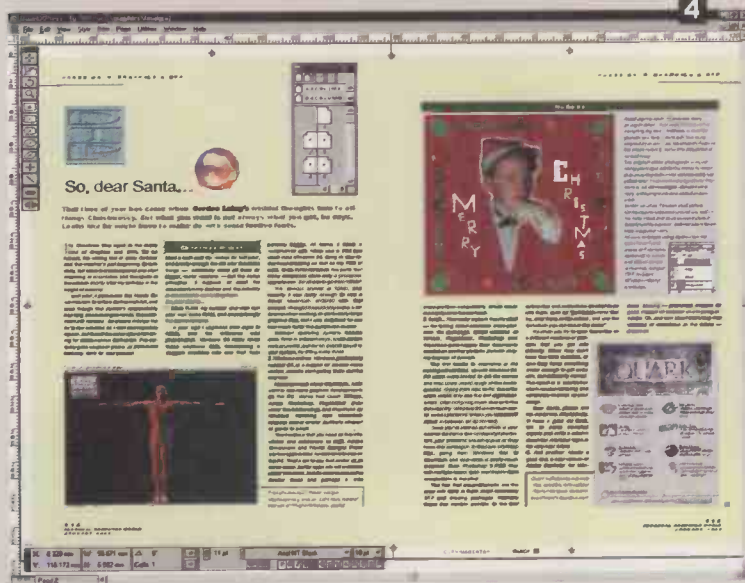
(1) Adobe Photoshop 3.04 for Windows, having opened the layered document I created for last month's column. Eagle-eyed readers may have spotted that the type layer has been removed (2) MacroMedia FreeHand 5 for Windows, opening a FreeHand for Macintosh document. (Illustration by Jon Mason.)

(3) Notice the missing fonts alert box. This could be solved by installing the correct fonts on the PC, or by converting all type to curves. However, once converted to curves, type loses any character attributes and can only be edited as a shape

(4) Quark XPress 3.31 for Windows, after opening the layout for last month's column with, er, me on it again

(5) There were a few problems however. The open dialogue box had to search for *.* before seeing the documents, although XPress did identify their Mac origins

(6) The ubiquitous missing fonts alert box, and there's a fair few of them...



Opening PC documents on the Macintosh



1



2



3

Infuriatingly, Windows 95 cannot interpret and display Macintosh long filenames.

Once each platform has seen and identified the desired file, one final hurdle remains: it may just not be able to translate that particular format. Show a Macintosh pict file to many PC painting applications and they'll freak; even some of those claiming support for the suitable PCT extension. Similarly, the Windows Metafile, WMF, and even occasionally PCXs or BMPs, leave the Macintosh none the wiser.

Adobe Photoshop is a good all-rounder at opening a variety of different bitmapped files, and indeed just about the only PC application to deal with Macintosh pict files. This won't be an issue here, however, since we're dealing with three applications which should certainly be able to open documents created on their respective cross-platform counterparts.

Starting with the easiest first: Adobe

Opening Windows files on a Macintosh is considerably easier than opening Mac files under Windows.

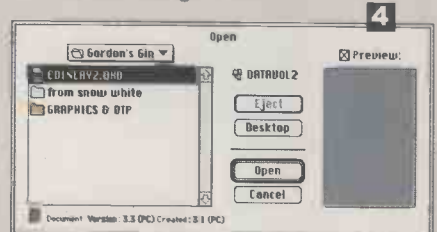
(1) Adobe Photoshop 3.04 for the Macintosh, having opened a Windows PSD file, complete with layer information.

To be fair, Photoshop for Windows has no difficulty opening layered Mac documents (see previous page)

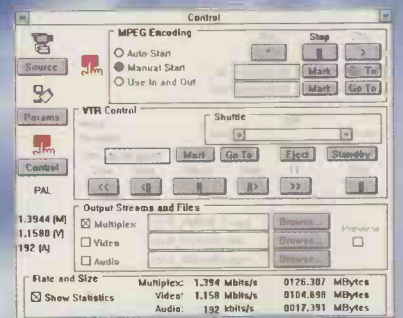
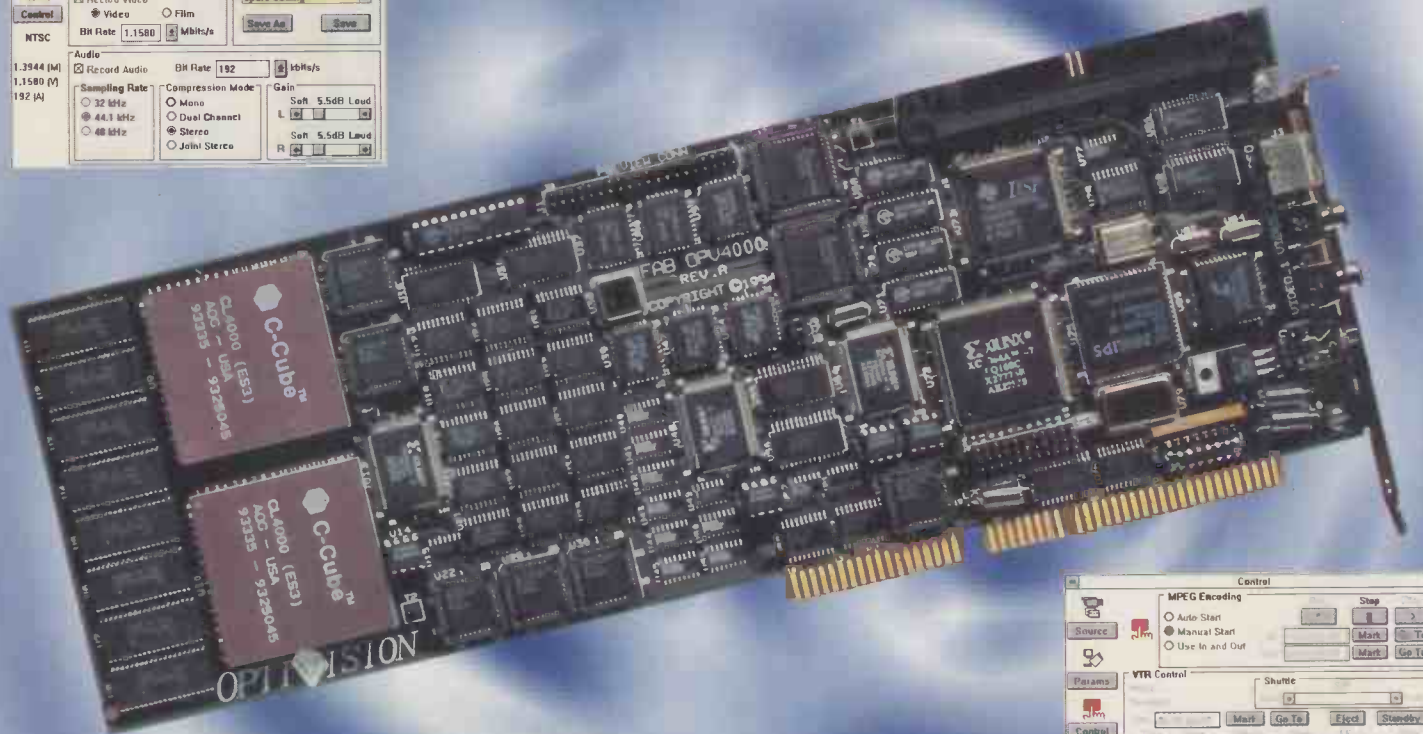
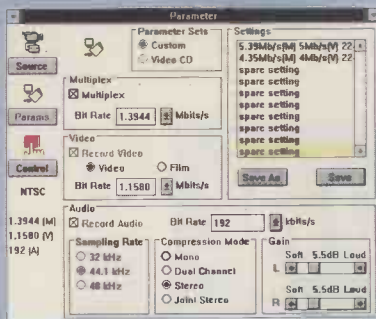
(2) Macromedia FreeHand 5 for Macintosh having opened a FreeHand for Windows file. To make life a little more interesting, I got FreeHand for Windows to open a CorelDraw file (the famous eye) and convert it into a FreeHand FH5 file. Once on the Macintosh the image was totally editable, even after two conversions

(3) Quark XPress 3.31 for Macintosh, after opening an XPress for Windows document. The type on the original Windows document was exclusively Helvetica. Since Helvetica was installed on the Macintosh (indeed, on almost every Macintosh in the world) the file opened without reflow or complaints of missing fonts

(4) The Macintosh XPress open dialogue box, having recognised the Windows source of the original



4



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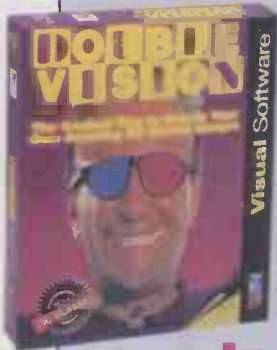
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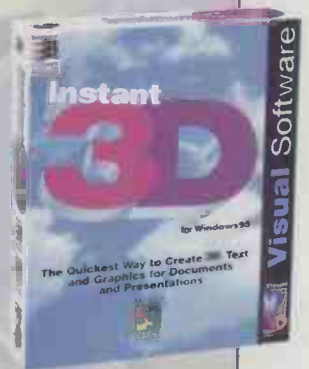
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Font of the Month

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ABCDEFGHIJKLMN O PQRSTU VWXYZ

Y [skull symbols]

Photoshop 3.04. Although Photoshop has long been able to open vector EPS files by rasterising them, it is undoubtedly first and foremost a manipulator of bitmaps.

Photoshop handles bitmap files just about transparently across platforms. Sometimes you may have to give it a hand by "opening as" when it's not certain of the file format, but otherwise you'll experience few problems. Photoshop's native format (PSD extension on the PC) opens transparently across platforms, complete with any layer or channel information. "Opening as" may crash under Win95 unless you are running v3.04.

XPress and FreeHand, along with any other application which may deal with text, have one big problem in common: fonts. When you open a document on a machine, even on the same platform which does not have the same fonts installed, you're in trouble. The machine lacking the correct fonts has to substitute something else, causing reflow and no end of worries. In the old days, applications would commonly substitute Courier, partly due to it being a common font on all systems, and also rarely used and hence spotted straight away as a substitution. Not much help though.

Newer applications will list the fonts missing and allow you to make your own closest match substitutions. The process can even be automated using the Panose font matching system, which finds its own closest matches. Unfortunately Panose is not used on any of the three apps discussed here, and despite being a good idea, does not work that well.

The best bet, if you want it to work perfectly, is to buy the same fonts from the same source. The only format I have found for this to work with any degree of success is PostScript Type-1, but be

aware that every foundry has its own slightly different versions of popular fonts. These may not look that different until you have a page of text, at which point the different kerning tables and letter spacing becomes apparent.

This aside, XPress and FreeHand documents appear to cross the platforms without any other difficulties. Even when you do have the same set of fonts on each platform however, you should check all text elements for reflow or incorrect substitution. The situation is better than it was a few years back, but not totally without grief.

Font of the month

Yet another gem from FontWork's FUSE (issue number 13, Spring 1995, entitled Superstition), is Santa Domingo by Pablo Rovalo Flores, born 1969 in Mexico City. Along with much TV design work, Pablo designed the Mexican Yellow Pages in 1995. Santa Domingo's lower case characters have different baselines, giving a jumbled effect, while the upper case stay on the same straight. There are four variations of the font, the fourth being a neat set of skull symbols. Those of a superstitious nature should call FontShop for a copy.

PCW Contacts

Anyone got any happy cross-platform kiss-and-make-up stories? Write to me at the PCW address on Broadwick Street or email me as gordon_laing@pcw.ccmail.com compuserve.com

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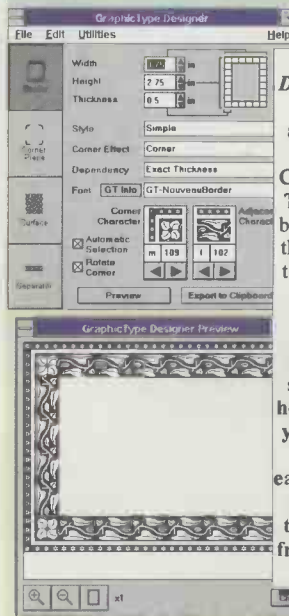
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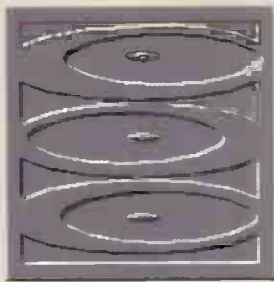


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Caught in a shower

Panicos Georghiades and Gabriel Jacobs make their selection from the glut of new multimedia products flooding the market. Plus they ask, what will Intel's Indeo Video Interactive do for developers?

Multimedia moves so rapidly that it's a job to keep up with the shower of new products which regularly drench the market. They're nearly all interesting, though most are hardly earth-shattering. However, apart from Intel's new release of Indeo (about which lots more to come), three other new products of some significance have caught our eye this month.

The first is a piece of software which allows multimedia applications to be published easily on the World Wide Web. It comes from Asymetrix, producer of Multimedia Toolbook and 3D/FX. Asymetrix has just announced that it will support the recently announced NeScape (Web browser) inline plug-in API in all future Internet versions of its products.

We don't know how many NeScape users there are out there, but it must run into millions throughout the world. Not surprising, then, that a major multimedia company has decided to make itself NeScape compatible. Even the most short-sighted industry watcher knows that the future of the Internet must lie in full multimedia capability, and NeScape seems to be establishing itself as the standard.

The second product is for the Mac, which many believe is (as ever) struggling for its existence, despite the fact that until very recently it was so obviously a superior machine to the PC, especially for multimedia, and still is the machine of choice for developers. It's perhaps for this reason that the next version (4.2) of Adobe Premiere, the digital video editing program, has first been released for the Mac.

This new version includes Adobe's new CD-ROM Movie Maker plug-in, and adds QuickTime 2.1 and Adobe Type Manager version 3.8.3. Adobe also claims that it



*Cool storage?
Sony's new
CD-ROM
jukebox for
mass storage
applications*

improves performance on a PowerMac with its native Sound Manager 3.1.

The CD-ROM comes with Specular LogoMotion, a program for creating animated 3D logos using QuickTime and still-image files.

The final new product is what we would guess to be the biggest CD-ROM drive in the world — Sony's first CD-ROM jukebox, the CDZ-R360 (pictured above), aimed mostly at library applications in the educational, scientific, medical, service and engineering markets.

It consists of two CD-ROM drives and offers a storage capacity of up to 234Gb. That's more than we can imagine — you too, probably. Anyway, to put this in a way which most of us *can* imagine, it holds up to 360 CD-ROMs. The two drives can read all standard CD-ROM formats: CD-DA, CD-ROM, CD-ROM XA, CD-i and Photo-CD (including multisession). The robotics design is said to be very reliable (it's based on Sony's pretty-well proven audio CD jukeboxes) and is maintenance free.

The system comes with a SCSI-2 interface for data transfer and robotic control, and, for compatibility with older software, an RS232 interface for robotic control only. Included are drivers for Windows, Mac, and Novell NetWare.

The price? A cool £7,500. Not everyone's first priority, therefore, but as demand for CD-ROM jukeboxes inevitably increases, so prices will fall.

Do you need 200-odd gigabytes of storage? Well, we're old enough to remember a time when a 600Kb floppy disk on a Sirius 1 was considered far more storage space than anyone could ever imagine needing in the foreseeable future. Times, they are still a-changin'.

Intel Indeo Video Interactive: IVI — what will it do for developers?

One of the most important and exciting recent developments in the world of multimedia has to be Intel's release of a new Indeo digital video standard. Just when

you thought the dust was beginning to settle, and that MPEG-1 would be the digital video standard of the future (on computer equipment as well as domestic video), Intel makes available its new digital video format: Indeo Video Interactive (IVI). It includes features which put it technologically ahead, and therefore make it very attractive. Its key features are simply not available in other formats, and so it has to be counted as an exciting new development in the world of multimedia.

Now, care... we're not saying that IVI is about to replace MPEG, and certainly not in the domestic market. But anyone developing multimedia applications (PC or Mac) would do well to consider IVI. It's based on a compression method called Wavelet (see Ben Tisdall's article on page 251 of the December 1995 issue of *PCW*). And, as its name indicates, one of its most important features is interactivity.

Talk of interactivity in video usually brings to mind the impression of having the freedom to navigate from one point in a storyline to another, or even to make up a story by choosing one of a number of outcomes. The idea is based on that of branching: as you work your way down a tree structure, you can choose to take one road instead of another.

IVI certainly has this. However, there can be more than that to video interactivity, and IVI has that much more, such as allowing you to alter in real time image characteristics like brightness, contrast and saturation. Such functions give programmers far greater flexibility than ever before. For instance, it will now be easier to fade out a video segment at any point in real time, without having to incorporate the fade in the video clip.

There's interactive support for transparency effects, too. With this, video or graphics objects of arbitrary shape can be overlaid onto either a video or graphics, and interactively controlled during run-time via a joystick, keystroke or mouse. This means you can create video where the user can select, say, the background for a talking head.

And that's far from all. With IVI you get something called local window decode, which means you can create an independent playback window within a larger video display. Of what use is that? Well, developers can give users a view of just those portions of a video to which they decide to pan.

You also get random keyframe access. A similar facility was only last year implemented in some top-end MPEG encoders,

Question & Answers

We get fairly inundated every month with queries, mostly via the Internet rather than snail mail. We're glad to receive email messages, but if we were to reply to each one of them personally, we'd be running a full-time BBS; so we have to stick (mostly) to answering queries in the magazine. And for that we pick out those we think will interest other readers.

Image problem

How can I import a JPEG image file in Multimedia Toolbook? Although JPEG is one of the options available in the Import Graphics option in the File menu, when I try to import a JPEG file I get an error of an invalid file format. I know that my JPEG files are OK. I can import them into other applications such as PhotoShop and PaintShop Pro. I have examined the "asym.ini" file and the JPEG driver is listed in there.

John Bushby, London

The JPEG file format is extremely useful if your multimedia application has a great deal of images. Unfortunately, Multimedia Toolbook doesn't come with a JPEG import driver, so the driver you have has been put there by some other Asymetrix product — probably 3DIFX. You can get an updated JPEG driver by dialling the Asymetrix bulletin board on 00 33 1 476 29667 (France). However, you can still import JPEG files by using the Clips option and selecting a Video File. You'll have to create a stage object to display this. (At the moment, this solution works only under Windows 3.x.)

TravelMate upgrade

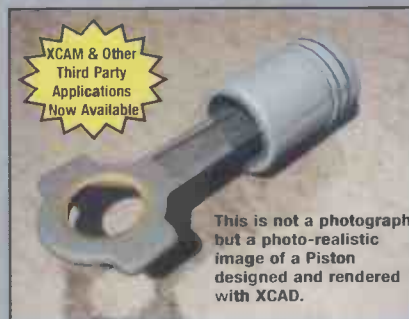
I would greatly appreciate your advice concerning upgrading my TI TravelMate 4000M portable. I would like to add CD-ROM capabilities as well as allowing further expansion. I know you (*PCW*) really like the portable docking station available for my computer, but frankly £399 + VAT for a two-speed CD-ROM drive, some speakers and a battery doesn't sound like good value, no matter how nice it looks. At present the best plan seems to be to

Continued page 325

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Networking N I

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WINDOWS NT

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Remote User/System Manager



Lexmark Optra R+

1200dpi printer.
25MHz RISC processor.
2MB RAM (expandable to 64MB). Automatic switching between PostScript Level 2 and enhanced PCL5.
16ppm at 600dpi, or 8ppm at 1200dpi.

HP OmniBook 5000

90MHz Intel Pentium processor. Up to 64MB RAM. Running HP Remote Assistant server management software.



Grey Cell Systems Gold-3 Multi-Function PC Card

Integrates simultaneous operation for V34 fax/modem communication and fast 16-bit networking.



The advantages of Windows NT are immense, quite apart from the speed and security aspects. In the following pages we demonstrate how this new full 32-bit operating system with native software brings advantages to all computer users, whatever their networking environment.

Microsoft Windows NT has also addressed the increased importance of today's mobile computing users. One aspect being remote users accessing any part of the NT network from a home or client site.

Compact powerful notebooks, like the HP OmniBook 5000, link up via a Grey Cell Systems Gold-3 Multi-Function PC Card. This provides the user with a full speed V34 28.8Kbps modem, which will operate over a standard BT phone line, allowing the user to maintain all the benefits of NT from a remote site.

The system manager using Gold-3 in conjunction with the HP notebook can also remotely manage a network of multi-vendor devices, thanks to HP's industry leading OpenView network management platform.

HP OpenView incorporates SNMP-based device management, featuring tools which monitor the network for bottlenecks and provide easy to use manager applications.

Mission Critical Server/Back Office

The hardware demands of Microsoft Windows NT are less than may be supposed, but for mission critical operations in the back office, a top-line server remains a must.

The HP NetServer LS, running Microsoft Windows NT Server, provides a scalable, fast, fully fault-tolerant environment for such an important part of the network. Designed to deliver high levels of manageability, availability and performance, the HP NetServer LS incorporates HP NetServer Navigator, a suite of advanced setup and management tools on a bootable CD-ROM.

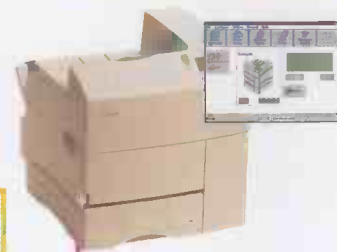
Complementing the speed of the HP NetServer LS, HP's AdvanceStack Hub-15 offers easily upgradeable access for local PCs. This hub is the first multiport repeater of its kind to be compatible with 100VG-AnyLAN, the new IEEE 802.12 standard for 100Mbps networking. 100VG's high throughput means that virtually all available bandwidth is usable.

Serving this equipment are printers from Lexmark's award-winning Optra range, which take advantage of the unique MarkVision printer management software. Lexmark Optra+ printers offer 1200dpi quality with enhanced PCL5e and PostScript Level 2 emulations as standard. All models in the range operate at 16ppm in 600dpi, even the entry-level Optra R+.

FDDI Backbone

Lexmark Optra LXI

1200dpi printer, 16ppm, second level caching. Running Lexmark MarkVision management software.



HP J2410A 100VG

AdvanceStack Hub-15. Fitted with HP J2606A Fiber-Optic Transceiver.



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PC



PC

acting as a
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Microsoft Windows NT Server



HP NetServer LS

Scalable fault-tolerant server for business critical applications. Dual 100MHz and 133MHz quad processor model expandable to 768MB, cache to cache access, CD ROM standard. Dual SCSI controllers for easy disk duplexing.

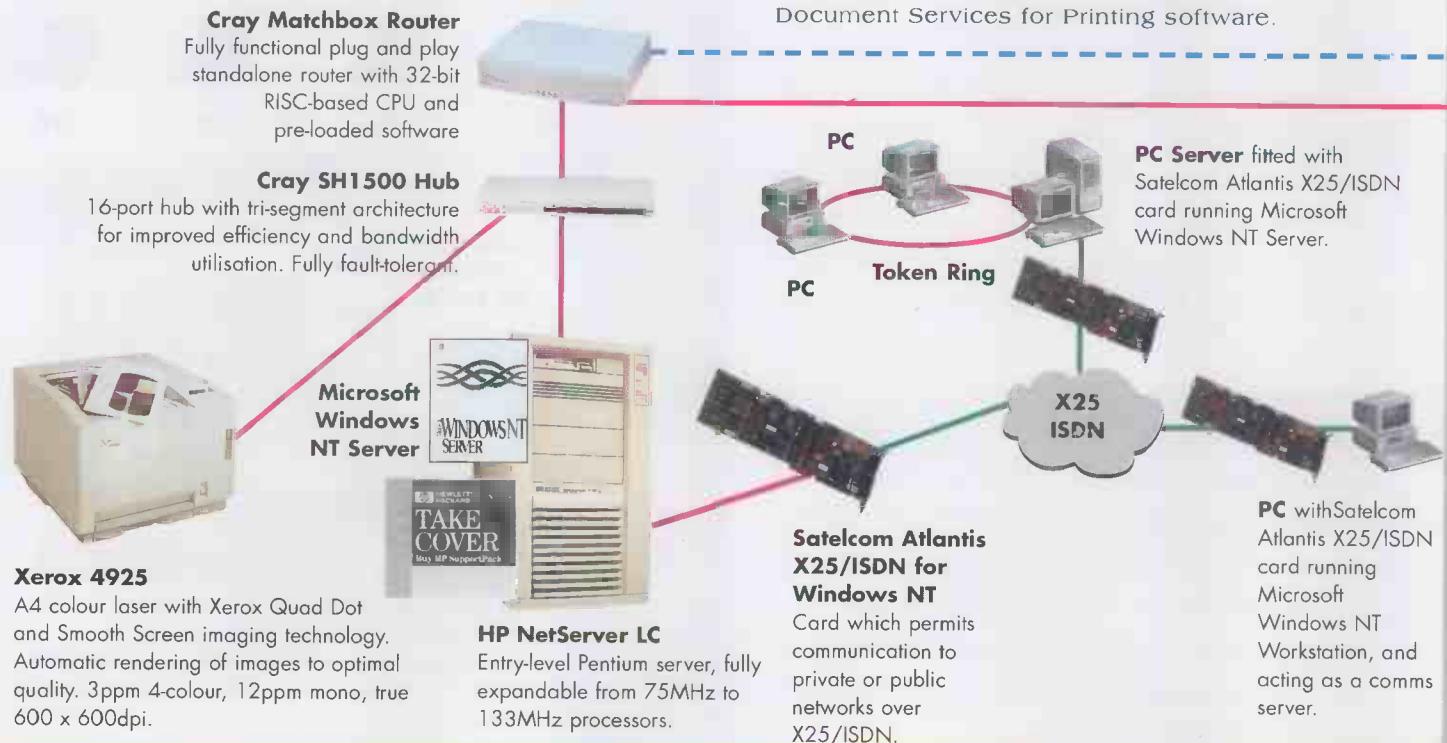
Branch Office

FDDI Backbone

All companies have a basic need for their branch offices to communicate, share data and have access to the corporate network. The fault-tolerant Cray Matchbox Router provides that access over KiloStream or ISDN as a backup or primary option. Teleworkers can access the branch office at local rate through the X25 or ISDN link.

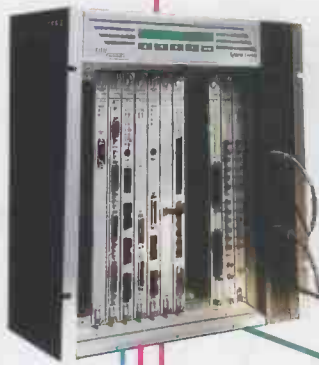
Making all this happen is Satelcom Atlantis XLAN-IP for Windows software on an Atlantis X25/ISDN board. The software ensures data transport between LANs over a public or private X25 network, and from the LAN to a single user.

The Xerox 4925 printer features an internal 340MB collation disk, enabling users to 'RIP once, print many times', along with Xerox' own Document Services for Printing software.



Database and Application Server

FDDI Backbone



Cray System Centre
Total communications solution with planned migration to HSSN (High Speed Switching and Networking). 17 fully usable slots support a full complement of networking cards.

KiloStream

ISDN

Microsoft SQL Server



HP SureStore 6000i
5.25-inch half-height 8GB
DAT internal tape drive.



Microsoft Windows NT Server

Gupta SQL Windows



HP NetServer LH
Fast 100MHz and 133MHz dual Pentium server with dual SCSI-2 controllers. PCI-to-PCI bridge doubles the number of PCI devices which may be connected.

Connection link to Management Offices, Page 9

**X25
ISDN**

Arguably the centre of every network, as everyone needs access to the corporate database and application server.

High performance client-server applications and stock systems can be created using Gupta SQL Windows, without any specific programming knowledge. The software's Data Source and QuickObjects tools provide easy and consistent access to local and networked data.

At the heart of the network is the Cray System Centre, a fully upgradeable total comms solution. The most scalable hub for concentrator modules on the market, Cray's System Centre's unique features include Redundant Link Management, RMON support to reduce transmission costs and port access control. Compared to standard WAN connectivity via a router, it's the perfect futureproof choice.

Distributing servers throughout the network, rather than relying on one single server, is essential for a fault-tolerant network.

The Cray System Centre provides access to the application server, in this case an HP NetServer LH running Microsoft SQL Server, with backup capability via an HP SureStore DAT drive.

Workgroup Solution - Graphics

FDDI Backbone

Those who use graphics in their work are really going to benefit from the speed and convenience offered by Microsoft Windows NT.

Graphics invariably mean large files which need to be displayed on large screen high-resolution monitors, often to CAD/CAM standard, moved and processed at high speed, printed out at near-photographic quality, and accessible from a server with an appropriately fast Pentium processor. That's what we've emulated here.

Large complex files and power hungry applications speed across the network at 100Mbps from the network server, in this case an HP NetServer LF. The flexible growth path of this particular server provides powerful processing and file storage for each graphics workstation, and is reflected in the amount of specialist 32-bit hardware accessing through a high-speed 100VG multiport repeater.

An important part of any network is support. A full range of HP Support Packs are available, with response rates ranging from 4 to 24 hours. In addition, there is also a Network Phone-in Support where NPS engineers can answer complex questions on, or problems with, HP and non-HP products in client-server LAN environments.



FDDI Backbone



Mitsubishi S6600

Full A3 dye-sublimation printer. 300dpi, 24-bit continuous tone colour output in near-photographic quality. 24MB RAM.

Jet direct link



100Mbps

Microsoft
Windows 95



100Mbps

Microsoft
Windows
NT Server



Mitsubishi Diamond Pro 21 TX on HP Vectra XM Pentium

1600 x 1280 high refresh resolution, 0.31mm stripe pitch, DBF precise edge definition, anti-glare and anti-static coating, on-screen set-up display.



HP NetServer LF

Fast general purpose file and application server, with flexible growth path. 66MHz Pentium processor.

This particular graphics scenario demonstrates how Microsoft Windows NT will support all graphics activities, right up to pre-press output using Mitsubishi's latest A3 dye-sub colour printer. A Xerox 4520 provides fast A3/A4 text and graphics in mono, at up to 20ppm.

The Mitsubishi printers have been chosen for their versatility and speed. The PCP, a lightweight thermal wax A4 machine, produces one page a minute of high quality colour onto plain paper or transparency – perfect for proofing.

The new Mitsubishi S6600, with a high resolution dye-sublimation print engine, produces superb A3 and A4 pre-press results in full 24-bit colour. A built-in hard disk for job spooling and a standard 24MB of RAM means that the S6600 will handle the most complex print jobs.

To be able to view and work on high-end graphics, a suitable 21-inch monitor is a must. The Mitsubishi Diamond Pro 21 TX offers state of the art screen technology, using the Mitsubishi Diamondtron™ tube which gives high refresh resolution and precise edge definition, plus anti-glare and anti-static properties built-in to a compact cabinet design.

Workgroup Solution – Management

No company can function without PCs, and their consequent effect on productivity in the workplace – and away from it.

The modern manager is often on the move, and with this in mind Digital produced the HiNote Ultra. Couple this high performance notebook to the powerful Grey Cell Systems Gold-3 Multi-Function PC card to allow the user's notebook to join the Windows 95 workgroup without any speed or application penalty.

Gold-3 is designed to be a rugged PC card to travel with the mobile user as an integral part of the notebook communication fax/V34 modem or office-based fast Ethernet solution. Gold-3 communication technology allows the notebook user to function with increased flexibility to meet today's working demands, regardless of space or location.

For printing over the management network, a Lexmark Optra C provides the highest quality colour laser output on the market today and a cost-effective, modern A4 colour solution, particularly as it comes installed with Lexmark's MarkVision printer management software. This provides the most comprehensive printer



Lexmark MarkVision
Printer management software.

10Mbps

Lexmark Optra C

Cost-effective A4 colour printer, 600dpi, continuous tone and adjustable gloss levels achieve photographic quality.

Microsoft Windows 95



10M

Digital HiNote Ultra

486 notebook PC. Intel 75MHz processor, up to 24MB RAM, and a choice of hard disk options. Microsoft Windows for Workgroups and Lotus Organizer pre-installed.

Grey Cell Systems Gold-3 Multi-Function PC Card

Integrates simultaneous operation for V34 fax/modem communication and fast 16-bit networking.

Microsoft Windows 95



100 Mbps

Digital Celebris XL

90 or 100MHz dual processor for enhanced performance, built-in SCSI controller connected to PCI local bus.

100 Mbps

**HP J2980A 10/100
16-Port LAN Switch**
16 Ethernet 10Mbit/s
ports and 2 high speed
modules for
100VG-AnyLAN.

**Satelcom
Atlantis X25 for
Windows NT**
Card which permits
communication to
private or public
networks over
X25/ISDN.

100 Mbps

**Microsoft
Windows
NT Server**

**Digital Prioris XL
Server**

High performance 90MHz
Pentium server ideal for
between 5 and 25 users.
Has a wide range of
network options, SCSI-2 Fast
and Wide controller, and
dual-speed CD ROM drive.
Easy upgrade path.

**Microsoft
SNA Server**

providing access and
emulation to IBM host.

Connection link from Database and
Application Server, Page 5

management functions including all elements of remote printer support and problem determination, remote operator panel setting and control and job statistics.

Providing the support to management PCs is a Digital Prioris XL server running Microsoft SNA Server, offering reliable, productive and secure access to IBM hosts and legacy systems.

Specially designed for Microsoft Back Office, the Atlantis WANOffice solution for Windows NT, from Satelcom UK, adds powerful WAN internetworking capabilities to Microsoft RAS and outstanding WAN host connectivity extensions to Microsoft SNA Server, for both Windows NT servers and workstations.

Leading the European PC market for X.25 access boards, the Satelcom Atlantis product range offers global SNA/APPN host connectivity and APPC solutions, through X.25/QLLC, X.25/PSH, SDLC and ISDN connections.

Fully integrated with Windows NT architecture, the Satelcom Atlantis WANOffice solution is based on smart communication PC boards being selected according to the WAN link - X.25, SDLC or ISDN - and drivers for SNA Server.

Existing Workgroup Solution

100Mbps

Xerox 4520

600dpi mono networked office printer. Handles A4, A3 and ledger (17 x 11 inch) Resident Ethernet card. Optimum price/performance for workgroups of 15 to 25 users; up to 20ppm. Monthly duty cycle of 50,000 pages.



If you're already using another proprietary networking system, moving across to a future-proof Microsoft Windows NT environment need not be as expensive as you may think.

By using your existing PC servers and clustering them in a Windows NT environment, an updating path is made much easier, and forced software migrations are avoided.

Digital's Clusters for Windows NT lets you implement mission critical applications on a client-server LAN, reducing downtime and non-productivity to a minimum.

A cluster is a group of systems addressed and managed as a single system to provide very high levels of availability through redundant CPUs, storage and data paths. Clusters are highly scalable, so hardware components and system software can be added incrementally for efficient capacity growth.

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Clustered servers can be either Intel or RISC-based, or a mixture of the two. In the situation demonstrated here, a Digital Prioris HX 5100MP rack system server with multiple Pentium processors, running the Gupta SQL Windows client-server development system, is clustered with a Digital Prioris XL server feeding up to 25 users running applications on several platforms.

Networked to the servers is a Xerox 4520 600dpi mono printer, ideal for workgroups of up to 25 users. The Xerox 4520 features advanced paper handling, a 3-bin paper choice with optional enlarged paper capacity, and Xerox's Document Services for Printing (DSP) software.

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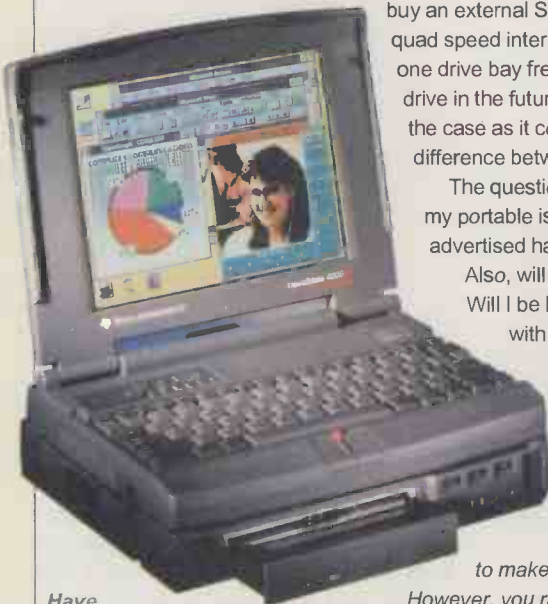


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Questions & Answers (continued)



Have CD, will travel... but at what cost to upgrade the TI TravelMate 4000M?

buy an external SCSI case to hold two 5.25in drives, a quad speed internal drive to put in it, and then leave one drive bay free for maybe another hard disk or zip drive in the future. I would actually save money buying the case as it costs £60, much less than the difference between an internal and external drive.

The question is: will this work? The adaptor on my portable is SCSI-2, but the cases I've seen advertised have just been described as "SCSI".

Also, will the 60W power supply be enough? Will I be limited to expensive types of hard disk with this idea? Basically, do you think it's sound?

James Purbrick, Nottingham

We didn't write the article you refer to (Docking Notebooks — October 1995 issue), and we don't know your particular portable well enough to make any definite pronouncements about it.

However, you raise the important issue of adding CD-ROM (and therefore multimedia) capabilities to portables, and that of associated cost.

There's no reason why a DIY job shouldn't work provided you sort out the connections and make sure that all the electrical characteristics of the individual components you're planning to install agree with each other. When most people refer to SCSI they usually mean SCSI-2, so there shouldn't be any problem there (but check with the suppliers and get the specs in print).

A power supply of 60W may or may not be enough. Most hard disks and CD-ROM drives consume about 13 to 17W, so you should have no problem with fitting three devices. But we're sceptical about whether you can fit all four?

Finally, if price is the main problem — and it seems to be — consider that the £399 price is an RRP. The street price can be nearer £300.

And while we're at it, we should also add that the docking station includes more than you say. What about the 16-bit sound card and the microphone? What about the speakers which have a wide/narrow stereo field capability? If you shop around, the docking station may actually be better value.

but it looks as if it's set to become the norm, and IVI already offers it as standard.

What is it? First you have to be aware of one of the solutions to the problems of compressed digital video. This is that a great deal of space is saved by not compressing every individual frame of a video segment, but only the differences between one frame and the subsequent frames.

But the problem with video compression which works in this way (as MPEG does) is that when there's a sea-change between two consecutive frames (in the worst cases, cuts from one scene to another), the first frame of the new sequence is radically different from its predecessor, and the video quality plummets.

The only solution is to make the frame which starts a new sequence, into a so-called keyframe — in other words, the full frame is stored rather than the differences between it and the previous frame, thus

refreshing image quality. This has not been possible so far with standard codecs (COmpressor/DECompressors) which store keyframes at constant pre-determined intervals. IVI lets you place keyframes anywhere in a video stream, so image quality can be rapidly bumped up during playback.

Further enhancements to quality include a scaleable quality feature. Earlier versions of Indeo video allowed the frame rate (frames per second — about 25 are required for a really seamless motion effect) and image size to be varied, within limits, in order to take into account differing computer performance.

IVI goes a stage further than its predecessors. It's now possible for video quality to scale automatically between different quality "bands". What this means in practice is that you can offer video in a window on lower-level machines, while

also allowing full-screen smooth-motion video to play back on higher-level machines like Pentiums. The idea isn't new — in fact, it's the way certain things are done on the Internet — but here it is built into a video compression system. Furthermore, the quality achievable with this system when you use higher-level machines is quite exceptional. IVI will play back at full screen — in software alone, of course — with near-VHS quality when run on a 90MHz Pentium PC or above.

Something special

Special techniques have also been applied to that other problem endemic to digital video: that of data transfer rate from CD-ROM drives which typically don't squirt the data fast enough for full-screen seamless motion video. IVI can manage such video on a Pentium PC, with excellent picture quality, equipped with a standard double-speed CD-ROM drive.

You get other goodies with IVI, too. One notable feature is password protection: developers, for instance, can assign passwords to keyframes to protect individual video clips from being altered.

A Software Developers' Kit which includes the IVI PC drivers, programming tools, and documentation is available free, says Intel, to developers. Apple QuickTime 2.01 and 2.1 drivers should be available by the time you read this.

Many firms will be offering a variety of third-party software add-ons, development tools, compression services and realtime capture cards designed to work with IVI: Adobe (for Adobe Premiere), Asymetrix (for Digital Video Producer), and Digital Video Arts (for its WakeBoard high-performance PCI Bus IVI capture and compression card). And Intel claims that many others have plans to do so, too; something we can well believe.

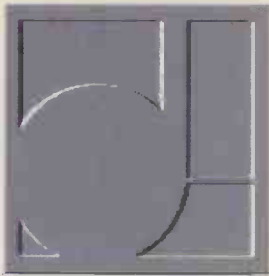
For more information on IVI, go to Intel's World Wide Web site at <http://www.intel.com> (multimedia and game developer information area), or to the Intel Forum on CompuServe (IntelA, then the multimedia library).

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

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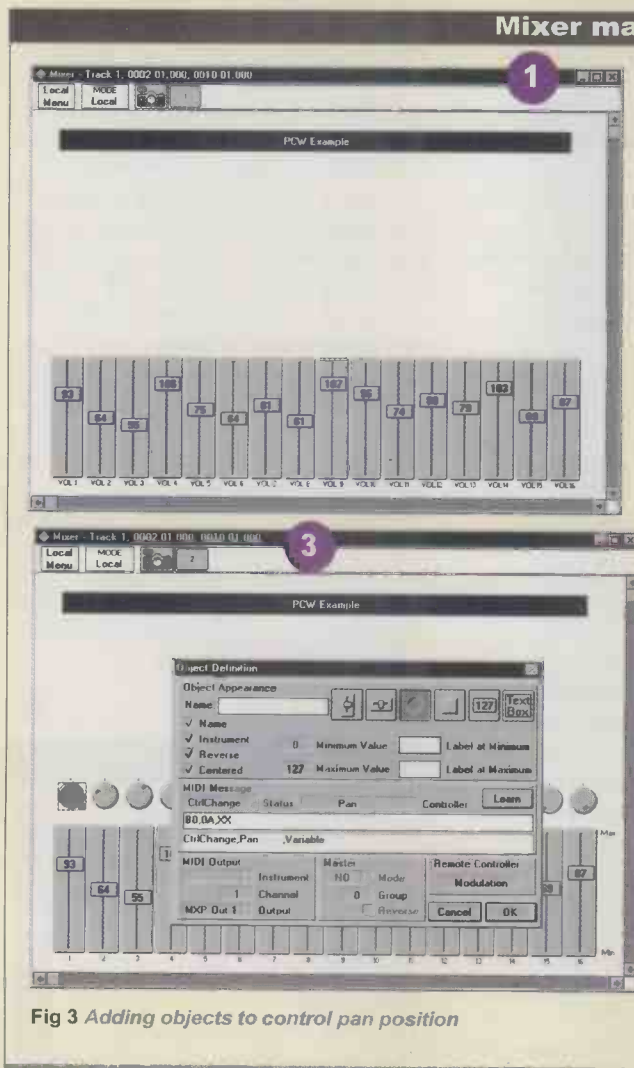
Loop the loop

Steven Helstrip looks at Steinberg's new audio editing package designed to run under Windows 95 and NT, shows you how to create a Mixer Map, and recommends the best loop collection yet.

Last month we looked at ways to add delay, or echo, to synth parts using MIDI information instead of a dedicated

delay unit. Not only does this save you from buying an effects unit in the short term, it provides greater flexibility —

assuming, of course, that your synth has enough polyphony. Delays, and particularly stereo delays, can help to "bring out" parts within a mix. Over the next few months we'll be looking at other ways to enhance your tracks, without necessarily having to buy expensive studio equipment. First, though, some interesting developments for Windows 95 and NT users.



Mixer maps made easy

Fig 1 Faders to control main volume for each of the 16 MIDI channels

Fig 2 The object editor looks pretty scary, but it doesn't take long to get to grips with it

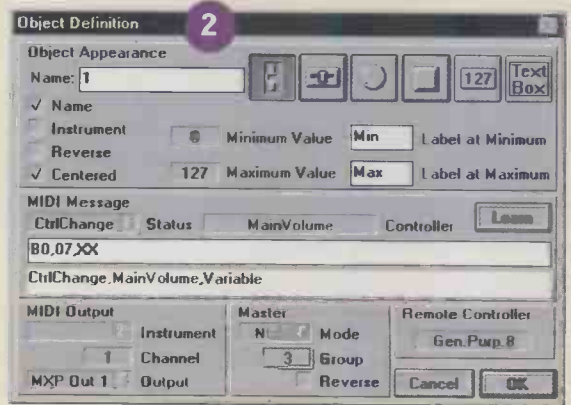


Fig 4 The finished mixer map. Looks good, doesn't it?

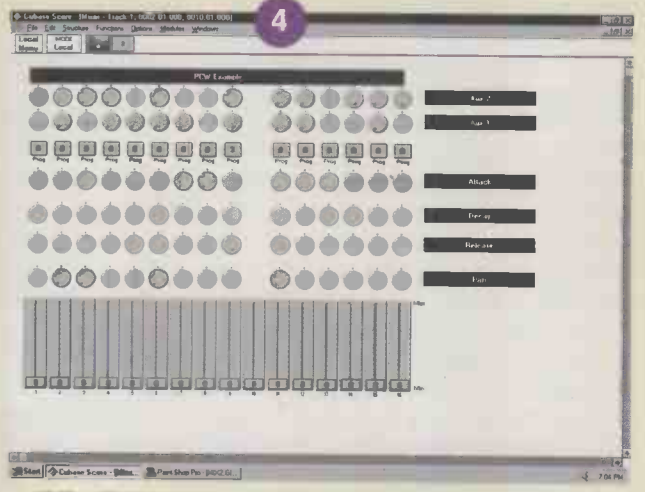


Fig 3 Adding objects to control pan position

WaveLabs

Just before Christmas, Steinberg released details of its new 32-bit wave editor, WaveLabs. This is the first pro-audio application to run under Windows 95 and NT and is, according to Steinberg, the fastest editor to be available to date.

WaveLabs has been developed for pro-studio use and integrates features such as time stretching, pitch correction, harmoniser, parametric EQ and sample conversion. The package supports .WAV and .AIFF formats, and has unlimited zoom and undo. WaveLabs is expected to be available by February, although no prices are available as I write.

Tapeless tape, high-speed applications and automated mixing are welcomed with open arms by today's musicians, but for the recording studios it's not such good news. Not because it's expensive to keep up to date, but because the time needed to mix a track gets shorter and shorter as new technologies appear.

Take for example the introduction of hard-disk recording, which, among other benefits, provides instant random access to any part of a track. Time taken up with fiddly things like rewinding tape on a traditional 24-track is cut right down. Over a five-day session, it amounts to a saving of around half a day.

An album can now be edited on one PC, cutting in half the time it took two years ago. The studios are losing out.

Using Continuous Controllers

Most synthesisers, including sound cards, allow you to control many settings, or parameters, of its instruments via MIDI. Such parameters include the attack, decay and release times; cut-off frequency, resonance and modulation settings. By adjusting these settings, new sounds can be created. More to the point, it is easier to simulate "live" instruments more accurately, making for a better final product.

In most cases these parameters can be controlled using Continuous Controllers (CCs). A common example is a CC to set the volume of an instrument at the beginning of a song. To do this you would insert a CC event (Continuous Controller 7) with a parameter between 0 and 127 where 0 equals off and 127 is maximum.

It is possible to control these parameters in real time with most sequencers. Cubase lets you do this in several ways. Firstly, you can map Modulation to any CC from the MIDI setup dialogue box. This will allow you, for example, to control the

Important Controller Numbers

00	Bank Select
01	Modulation Wheel
05	Portamento Time
07	Main Volume
10	Pan Position
65	Portamento On/Off (0=off 127=on)
91	Reverb Level
93	Chorus Level

reverb level for a single instrument by moving the modulation wheel on your master keyboard. The most flexible way to manage controllers, though, is to create a Mixer Map. Mixer Maps allow you to assign sliders, dials and buttons to Controllers, providing an intuitive and graphical environment to play around with and record CCs in real time.

Creating Mixer Maps in Cubase


Although setting up a mixer map requires some knowledge of the workings of MIDI, don't let this put you off — we'll cover all the main elements in this column. To create a mixer map you need first to set up a mix track. To turn a track into a mix track, pull down the Track Class menu (the C column) and select Mix Track. Next, create a part by double-clicking between the left and right locators.

The track info column will display "Untitled" in the instrument column and the default mixer map will be loaded. This is a generic mixer that allows you to control program change, volume and pan for each of the 16 channels. To create a new mixer map, however, double click the "Untitled" box and select empty.

When you double-click on the new part which was created earlier, the "empty" mixer will be opened. In this first example we will create faders to control the main volume of each one of the 16 channels.

When the right mouse button is clicked, a toolbox is displayed. Select the "new" tool and click with the right mouse button. This creates a new object and opens the object editor. You can choose from six objects — horizontal and vertical faders, dial, on/off switch, numerical display, and text boxes. Select the vertical fader and choose control change in the MIDI message box. Next, select main volume from the controller box (CC7). Once you have selected your MIDI output and MIDI channel one, you're ready to try it out.

Press OK, then select the play tool (the pointing finger icon) and move the slider up and down. All being well, this should control the volume on MIDI channel one. The quickest way to create the remaining 15 faders is to duplicate the first. This is




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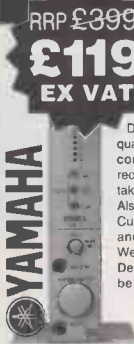
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Driving test

LESSON 4:

thinking outside the box.



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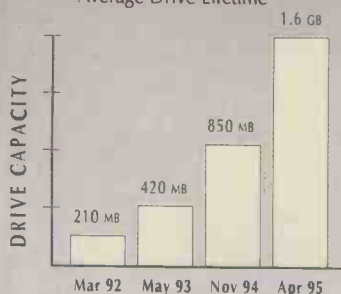
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done by holding down the Alt key while dragging the fader to a new position. When you let go of the mouse button, the object dialogue is reopened. Select channel two for the output and click OK. Do this for all 16 channels. If you want to give names to each object, or fader, enter this in the name field of the object editor. Double-clicking on any object will reopen the editor.

No mixer is complete without panpots, so the next job is to create pan dials for each channel. This is done in exactly the same way, only you need to select continuous controller ten. You can also add program change buttons to your mixer.

Creating objects to control instrument parameters

This can be done in exactly the same way as before, but first you need to do a little research. Because there are few standards in the MIDI specification, there isn't a standard CC to control, for example, the release time of an instrument. Some synths enable you to set a CC number manually, but when it comes to sound cards, you need to check its MIDI implementation chart. This can be found towards the end of the card's manual.

In Fig 4 (page 326) I have added three sets of dials to control attack, decay and release times for each of the 16 channels. The synth they were set up to control was a Roland U220. From its setup pages you can map any parameter to a Continuous Controller; therefore, I assigned attack to CC 60, decay to 61 and release to 62. When I created the dials for the mixer map

Here we go round again: Loopisms 6

This is Dzone's latest, and by far its best collection of loops yet. There are 24 loops altogether, each repeated 20-odd times, and one-shot samples taken from the Vintage Keys sound module for added value. There's a CD-ROM partition on this disc, with each sample stored as .WAV files, and fully-working demos of Cubasis and Software Audio Workshop. Oh, there's also the shareware version of Doom, should you not already have a copy.

The majority of loops fit into the house/garage genre, with rhythms reminiscent of Joe T Vanelli, Frankie Knuckles and David Morales. You'll also find three jungle-esque loops in this collection. They don't quite fit in here, but they're there for good measure.

The quality of these loops is consistently high, with tempos ranging from 64bpm right up to 165 — obviously one of the jungle loops. For just £12, this is yet another bargain from Dzone. Don't bother with the Vintage Keys samples, though. As they've only been sampled at middle C, they're just about useless.



I followed the same steps as before, only entering different CC numbers.

Fig 3 shows two rows of dials which have been set to control auxiliary send levels — in this case, reverb and chorus. Thankfully, there are standard controller numbers for these, which are shown in the table (page 327).

These examples have been set up to control very simple parameters, but almost any parameter can be accessed. If they cannot be accessed using CC messages, they can be controlled using system exclusive messages. We'll look at system

exclusive events next month, and at more creative ways to use the mixer maps.

PCW Contacts

Readers' contributions to the Sound column are music to our ears. If you have any hints or tips, any MIDI-related items or general comments, send them in to the usual PCW address, or to steven_helstrip@pcw.ccmail.compuserve.com

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The common touch

Got a nice little Windows 95 or NT application under development? Including a few common controls can make all the difference, you know, and at very little cost. Plus, launching DOS programs from Delphi. With Tim Anderson.

It's always nice to get something for nothing. If you are developing for Windows 95 or Windows NT, there are a host of new features you can include in your applications for very little cost, since they are integrated into the operating system. These are the Windows 95 common controls, and you can expect to find them in most 32-bit Windows development languages including Visual Basic 4.0, Visual C++ 4.0 and the forthcoming 32-bit Delphi.

Most of the new common controls are similar to items previously available as third-party VBXs, which is bad news for VBX vendors who now have to think up new gizmos. It also presents developers with a choice: either stick with the old solutions, or adapt applications to work with the new, common equivalent.

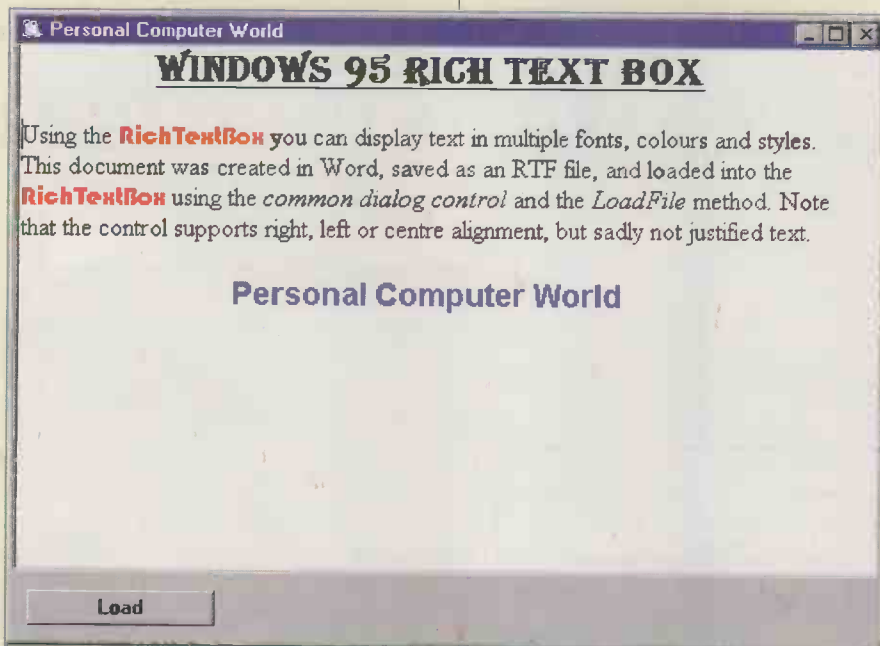
Right Rich Text Format in its raw form — not a pretty sight

Below The RichTextBox supports a reasonable range of formatting options, but cannot display justified text

```

{\rtf1\ansi
\deff4\deflang1033{\fonttbl{\f4\froman\charset0\frq2
Times New Roman;}{\f5\fwiss\charset0\frq2
Arial;}{\f11\fmmodern\charset0\frq1 Courier
New;}}{\colortbl;\red0\green0\blue0;\red0\green0\blue255;
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red192\green192\blue192;}{\stylesheet{\widctlpar
\f4\lang2057 \snext0
Normal;}{\s1\sb240\sa60\keepn\widctlpar
\b\f5\fs28\lang2057\kerning28 \sbasedon0\snext0
heading 1;}{\s2\sb240\sa60\keepn\widctlpar
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2;}{\s3\sb240\sa60\keepn\widctlpar \b\f4\lang2057
\sbasedon0\snext0 heading 3;}{\*\cs10 \additive
Default Paragraph Font;}{\s15\sb120\widctlpar

```



A good example is the rich text control. Once you needed HighEdit, AllText or Visual Writer to include rich text support, but now it comes as standard with VB. The add-on vendors will argue that their controls offer more features, making it possible to migrate smoothly from 16 to 32 bits by plugging in a code-compatible OCX. True; but common controls slim down your application, and as a shared resource make more efficient use of Windows. They also give your program the same look as other mainstream applications, usually considered a benefit. All this assumes that you no longer need to support 16-bit Windows.

Access to the common controls from Visual Basic 4.0 is via two OCXs. Most of the controls are in COMCTL32.OCX, while the rich text box is in RICHTX32.OCX. To show some of the possibilities, here's a look at using two of the most significant: the TreeView and RichText controls.

Windows 95 Common Controls

The following controls are supported by Windows 95 and NT 3.51 or higher, but are not available in 16-bit Windows:

ImageList

Like the earlier PicClip control, ImageList is a way of storing images (bitmaps or icons) so that they can be used by an application without loading them individually from disk at runtime. ImageList is much easier to use than PicClip.

ListView

If you've used Explorer, you know what to expect in ListView. Like Explorer's right-hand panel, ListView enables a list of items to be displayed as large or small icons, or as a detailed list. A fourth mode, Report, allows additional text to be displayed for each item.

ProgressBar

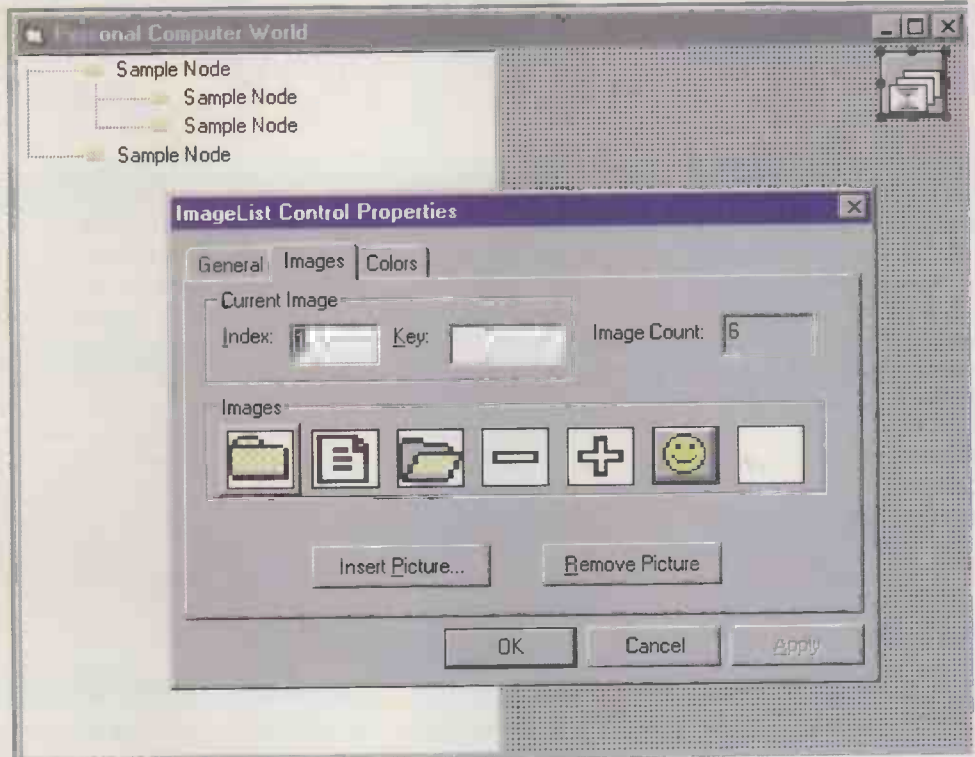
A chunky gauge control to keep the user amused during those long operations.

Slider

As its name implies, Slider lets the user set a value with the mouse by dragging a sliding bar.

StatusBar

Your application can have a pre-built status bar divided into panels. You can write text to the panels in code, or automatically set them to display standard information such as date, time or insert/overwrite status.



The ImageList control lets you store bitmaps or icons in an application for use by other controls. In this example, the ImageList supplies bitmaps for a TreeView control

TabStrip

You can create tabbed dialogues using the TabStrip control. Because tabbed dialogues have become such an important part of many Windows interfaces, an alternative is supplied in both 16-bit and 32-bit form; the SStab control.

BOX CONTINUES ON NEXT PAGE

Branching into TreeView

You should think of the TreeView control as a collection of nodes. Each node is a branch of the tree. To set up a TreeView, you use the Add method of the Nodes collection, the syntax for which is:

```
Nodesobject.Add(relative,
relationship, key, text, image,
selectedimage)
```

This intimidating parameter list is not really so bad: it tells the TreeView control where the new node fits in the hierarchy, provides a unique identifying key and,

optionally, an image to display by the node. For instance, you might use TreeView to construct a multimedia viewer: the book title is the root of the tree; chapters are the next branches down; sections are below each chapter.

Fig 1 shows a parameter list in which the image parameters are unused. When included, they refer to the index of an ImageList control with the selected image parameter, making it possible to change the image when the node is selected.

Once the tree is set up, the chances

are you will want something to happen as the user navigates through the tree. The most useful event is NodeClick, which provides the current Node object. For example, the following will place the text of the current node into a RichTextBox:

```
Private Sub TreeView1_NodeClick
(ByVal Node As Node)
RichTextBox1.Text = Node.Text
End Sub
```

To develop the idea further, one approach would be to store rich text documents in an Access database. The Key for each node could identify a record in the database, and in the NodeClick event you could write code to display the text, and hey presto! a multimedia document and viewer for the price of very little code.

Fig 1 Parameter list

```
Dim nodeObj As Node
Set nodeObj = TreeView1.Nodes.Add(, , "Root", "The life of the BumbleBee")
Set nodeObj = TreeView1.Nodes.Add("Root", tvwChild, "Chap1", "Habitat")
Set nodeObj = TreeView1.Nodes.Add("Chap1", tvwChild, "1_1", "In the North")
Set nodeObj = TreeView1.Nodes.Add("Root", tvwChild, "Chap2", "Varieties of BumbleBee")
Set nodeObj = TreeView1.Nodes.Add("Root", tvwChild, "Chap3", "How the BumbleBee Flies")
```

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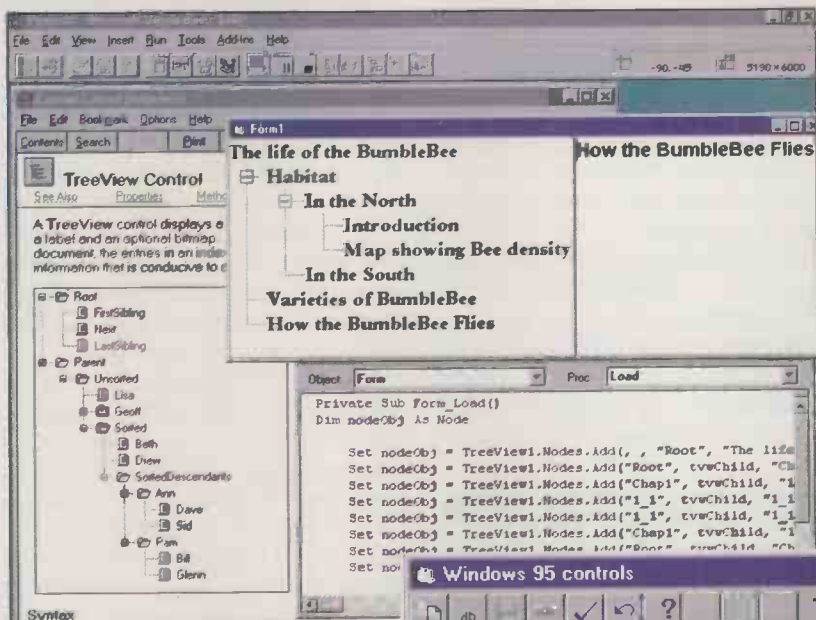
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More Windows 95 Common Controls



RichTextBox

This is the heavyweight among Windows 95 controls and is the basis of the WordPad accessory applet. Basic word processor functionality is built in, including the handling of multiple fonts and styles. For applications that require the display of formatted text it is indispensable, particularly if you want the user to be able to edit, cut and paste.

Left TreeView: just the thing for family trees, multimedia books or boring old directory viewing

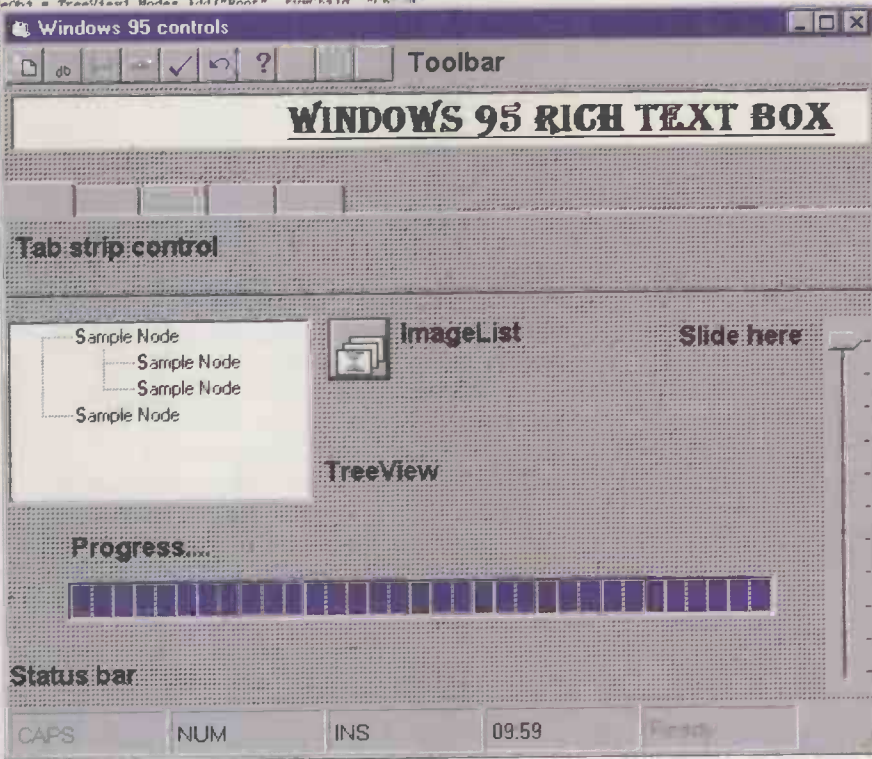
Below Windows 95 Common Controls are the most efficient way to jazz up a VB 4.0 application

Toolbar

Microsoft's off-the-peg toolbar control is a panel object with a buttons collection, and can be linked to an ImageList control to obtain appropriate icons. You can define tooltips and align the bar top, bottom, left or right. Sadly, it cannot be made to float, or re-aligned via drag-and-drop. The toolbar control in Visual FoxPro is much better: why can't those people at Microsoft work together?

TreeView

One of the most powerful controls is the TreeView, a hierarchical list. If ListView is demonstrated in the right-hand pane of Explorer, TreeView is the left-hand pane. Microsoft must like tree views, since the Microsoft Network online service uses them to the point of frustration. But in the right context, a tree view is ideal.



Get RichText quick

The RichTextBox is a superset of the standard edit control. You should never use a Rich Text control where the standard item will do, since it consumes more resources. With a standard text box, properties like FontName and FontSize affect all the text in the control. The RichTextBox has SelFontName and SelFontSize properties instead and these alter either any selected text, or the next characters typed if no text is selected. That makes it easy to format text in code, or from a toolbar or menu.

You can load and save files with the RichTextBox either in plain text or RTF

format. Clipboard support is automatic. There's also a Find method which searches for a given character string. Printing is carried out using the SelPrint method. SelPrint will output selected text, or the whole contents of the control if no text is selected. It does not print directly but needs a handle to a device context. The simplest approach is to use the VB Printer object which has an hDC property. Note that this is not valid until something has been printed, so you need to print an empty string before calling SelPrint, with code like this:

```
Printer.Print ""
RichTextBox1.SelPrint (Printer.hDC)
```

The RichTextBox is data-aware. Simply binding it to a memo field gives you the basics of a book viewer or document management system as it automatically reads and writes RTF documents to the database. Overall, this is an excellent control, although as it lacks the ability to justify text, display pictures or include OLE objects, there is still space for third-party rivals.

Zippping into Delphi

One of the most enduring DOS programs must be PKZIP. Adam H writes:

"I'm brand new to Delphi but getting along (I think). I have one question that is

really bugging me. Can you launch other applications from an app created with Delphi, and if so, how?

I wish to create a simple application with two buttons on — BACKUP and RESTORE. When a button is pressed, it will run the PKZIP program and compress a directory onto a floppy, or vice versa.

Also, can you trap the messages issued by the PKZIP program and place them into the Delphi app?"

You can launch applications from Delphi using the API functions WinExec or LoadModule. For example, the following runs the Windows calculator:

```
WinExec('CALC.EXE', SW_SHOW);
```

In Visual Basic you can do the same

thing with the Shell command, but this does not achieve what Alan requires. PKZIP is a DOS program, so to run it in Windows will open a DOS window, execute the program, and leave the window on the screen. You can improve on that, for example by creating a .PIF file for PKZIP, specifying that the DOS window closes on termination, and using the SW_HIDE parameter:

```
winExec('PKZIP.PIF A:\BACKUP.ZIP C:\DOCS\*.DOC', SW_HIDE);
```

That works well if there are no problems, but what about error handling? What if PKZIP produces one of its "y/n" prompts and waits forever in a hidden window for an answer? At this point, things get nasty.

Alan wants to trap PKZIP's messages, but even if he uses DOS functions to redirect PKZIP's output to a file for parsing later, there will still be difficulties with prompts that need a user response. We are back to the untidy DOS window solution. Another problem is that WinExec is asynchronous: the Delphi or VB application will continue to execute at the same time PKZIP is running. The program would need to enter a loop, calling the API function GetModuleUsage with the instanceID returned by WinExec, until it returns zero to indicate that the program has terminated.

You can do a better job of running DOS programs from Windows by writing a Virtual Device Driver (VxD) to intercept DOS stdout and stderr — not exactly visual programming. The easier solution in this case is to use a compression library designed to be integrated into applications. There are several to choose from, including Microhelp's Compression Plus and PkWare's Data Compression Library.

What is Rich Text Format?

Rich Text Format (RTF) is Microsoft's format for transferring formatted text between programs. It includes codes to identify fonts and styles. RTF uses the backslash to begin control words, and brace characters to identify groups of text. For example, the code "b" means "bold", and "b0" means "turn bold off". Therefore, you can embolden a word in an RTF document like this:

```
Here is a \b bold \b0 word in RTF
```

Because an RTF file generally uses only plain text, it is easy to transfer between different applications, or across different platforms like PC to Apple Macintosh. Usually it is more reliable than using conversion routines that work on word processor formats like those used by Word, WordPerfect or Ami Pro. RTF is particularly important in Windows, since it is the standard clipboard format for transferring formatted text.

The RTF standard has caught on well and every self-respecting word processor or DTP application supports it. The snag is that Microsoft controls the format and tends to add zillions of new control words with every new version of Word. This has caused problems for the industry. An example of this is the Windows help compiler which is meant to work with RTF documents from any source, but has a mysterious preference for those produced by Word. For most other purposes, though, older subsets of the full RTF standard are quite adequate. RTF is documented by Microsoft, and its description, together with code for a simple RTF reader, can be found on the Developer Network CD.

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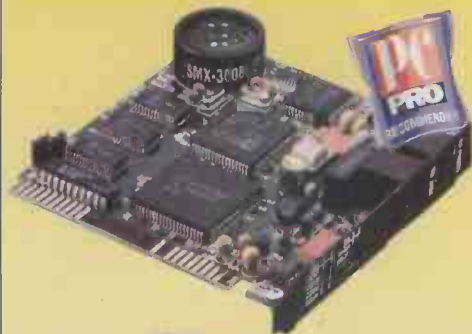
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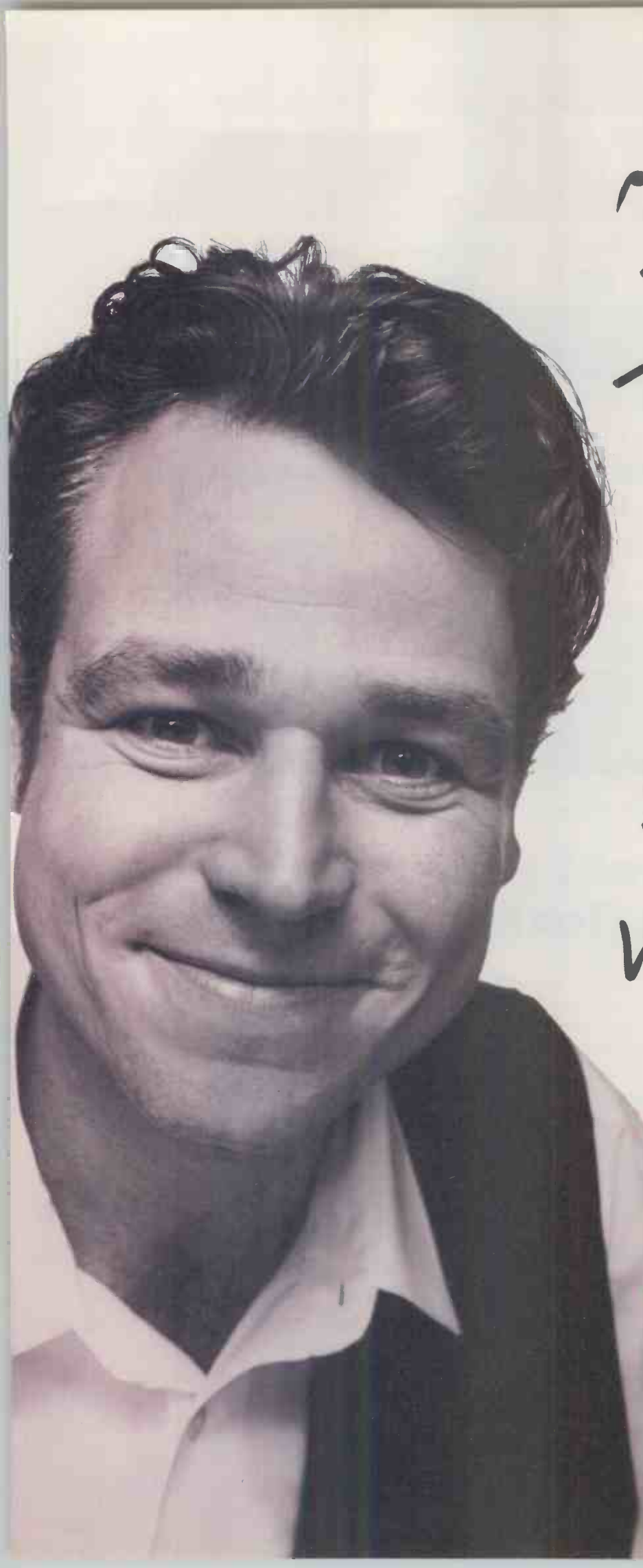
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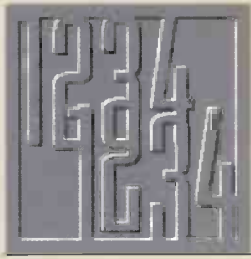


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INFORMATION TECHNOLOGY



Boxing clever

Should Blind Barpersons wear Boxing Gloves? Mike Mudge does some ducking and diving.

The major investigation this week has been suggested by Nigel Hodges of Cheltenham, following upon the work of Richard Ehrenborg and Chris Skinner, *Journal of Combinatorial Theory*, May 1995, pp249-266, and the earlier treatment by Martin Gardner, *Scientific American*, Feb/March 1979.

Statement of Basic Problem. Four glasses are arranged symmetrically on a circular tray. The barperson selects two positions, the tray is then rotated by his

glass problem can still be solved in seven moves; while the problem of 2^n glasses can be solved in $(2^{2^n-1})-1$ moves with the requirement that the barperson has at least 2^{n-1} hands and further that this solution is optimal.

Problem NH. Simulate the BLIND BARPERSON PROBLEM, with/without boxing gloves; either in an interactive mode or with built-in (random) choice, and collect data for various numbers of glasses and various configurations of

barperson (i.e. number of hands variable). Using the result of such simulation or otherwise, solve the n glass problem.

Note: The theoretical results appear to

depend upon sophisticated algebra of finite groups.

A Quest from Teck-Sing Tie in Sarawak:

Problem TST (I). Is the general factorisation problem an NP-complete problem? i.e. Has factorisation of an arbitrarily large composite number been proven to be equivalent to an NP-complete problem?

Problem YSY (II). Can we prove that the difference between a prime, p_n , and the next prime, p_{n+1} , can never exceed $\lceil (1n(p_n))1n(1n(p_n)) \rceil^2$?

Further, can we prove that there is at least one prime between p_n and p_n plus the above logarithmic expression, and that this is the smallest possible gap? Some empirical investigation may disprove this!

Problem MH. José Castillo has conjectured that the (Smarandache Expression) $x^y + y^x$ where x, y are co-prime integers greater than or equal to 2 generates only a finite number of prime values.

Mario Hernandez at Univixq (whatever that is?) would like an analysis of prime occurrences. viz

$$3^2 + 2^3 = 17$$

$$4^5 + 5^4 = 1649 = 17.97$$

News Flash. At October 9th 1995 Harvey Dubner used his Dubner Cruncher

(details from Harvey Dubner

<951017164327_70372.1170

JHD102-1@CompuServe.COM>)

to find after a ONE DAY search a record twin prime pair:

$$P = 190116*3003*10^{5120}$$

and

$$Q = P + 2$$

each has 5129 digits.

Any investigations of 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 May 1996. All material received will be judged using suitable subjective criteria and a prize in the form of a £25 book token or equivalent overseas voucher will be awarded, by Mike Mudge, to the "best" solution arriving by the closing date. Such contributions should contain a brief description of the hardware used, details of coding, run times and a summary of results obtained. Additionally, any comments upon the specific problem areas covered this month, together with any references to any published, or unpublished, work in these areas, would be greatly appreciated.

Please note that material can only be returned if a suitable stamped addressed envelope is provided.

Prizewinner, Numbers Count -147- July 1995

This month's prize goes to George Sassoon, of Ben Buie Lodge, Lochbuie, Isle of Mull, Argyll PA62 6AA, for his efforts in the factorisation of large numbers and in inspiring co-operation between computer users to attack (in an effective manner) a major task.

PCW Contributions welcome

Mike Mudge welcomes readers' correspondence on any subject within the areas of number theory and computational mathematics, together with suggested subject areas and/or specific problems for future Numbers Count articles.

Fig 1 Five moves for the Barperson Problem

1) Select either diagonal and turn both glasses up.	u	.
	.	u
2) Select any side and turn both glasses up.	u	u
	.	u
Given no win, the configuration is given by:	u	u
	d	u
3) Select a diagonal. If it displays u-d invert d to win, otherwise invert one of the u to yield:	u	u
	d	d
4) Select a side. If it is u-u or d-d invert both to win, otherwise invert both to yield:	d	u
	u	d
5) Invert either diagonal to win.		

opponent. The barperson can then touch the glasses which have just occupied the chosen positions and is permitted to invert zero, one or both of them. The process is repeated and the object is to end up with all the glasses pointing the same way.

Now this can always be achieved in five moves, as shown in Fig 1.

Extension to the Basic Problem

Generalise the number of glasses from four to n and ask:

- What is the minimum number of "hands" needed by the barperson?
- What is the maximum number of moves needed to guarantee a win?

Now to the boxing gloves... In this extension, the barperson is not only blind but unable to tell which way up the glasses are! It is claimed that the four-



Up, up and away

Stephen Rodda was well pleased with his new SCSI adaptor; under NT it made his machine fly... Under Windows '95 it barely cleared the runway. Plus, why you shouldn't let the good times roll.

I'm a fan of SCSI peripherals, as opposed to IDE and EIDE. I recently installed an Adaptec 2940 PCI SCSI adaptor, which allows the direct addressing of the drives through the PCI bus: I expected a speed increase, but at first sight, the results were rather peculiar.

Having installed the drivers under NT before removing the drives from the old card, I turned the machine off and installed the card in my machine. I replaced the SCSI drive cable from the Adaptec 1542 onto the PCI card and switched the machine back on. I thought I'd see how the card behaved under Windows 95, so I selected that on the initial boot screen.

Windows 95 took a moment or two to recognise the card but then, bingo; the card was installed and running. I had expected a significant speed increase; but I noticed nothing.

"Well, let's see what happens under NT," I thought. So I rebooted the machine into NT and even on the blue startup screen I noticed that things were going to be different; my computer positively flew.

Apart from upgrading processors and RAM in large quantities, I have seen nothing which breathed life into an installation in quite the way this card did. A couple of months ago I mentioned that NT was definitely faster than Windows 95 and now it's come up trumps.

Why should this happen; that Windows 95 scarcely shows a difference whereas the acceleration under NT is so noticeable? I put it down to the fact that although Windows 95 is certainly better-protected than Windows 3.x, its drivers aren't quite as intelligently-multitasking as the NT's.

Installation of the card, by the way, wasn't quite as straightforward as it might

have been, although I ascribe this to the fact that my machine has a few other adaptors cluttering it up. I ended up by assigning an interrupt (14 seemed as good as any other, since I don't use the built-in IDE controller) to the PCI board myself, whereas it should have done that all by itself.

Having worked out that this was the problem, I found everything else working just as it should be. Note that in the screenshot below, the IDE adaptor is shown as conflicting and therefore unavailable, and this is because I used IRQ 14.

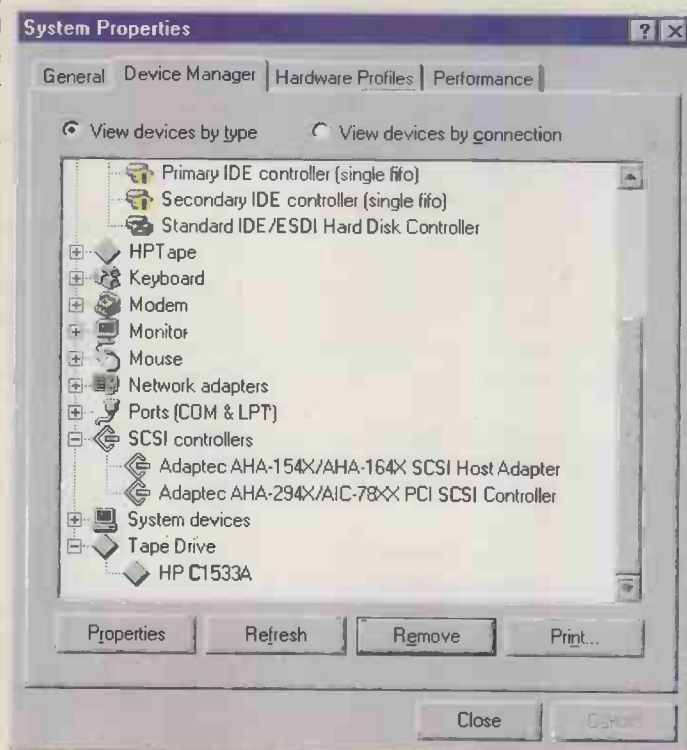
Remember, unless you're going to be running your machine under DOS or Unix, the chances are you won't need to buy the Adaptec EZ-SCSI any longer, since most operating systems (OS/2, Windows 95, NetWare and NT included) come with drivers for almost every SCSI adaptor card available.

Windows 95, showing the Adaptec adaptor installed

Good times, bad times

For those of you with an Email network connected to the outside, it seems that the pseudo-virus called "Good Times" is doing the rounds again. This is probably because educational establishments have gained a new intake of students who have become just about literate enough on the Internet to propagate messages which they think are real, honest-to-goodness warnings for their fellow man.

Most of us have been there before. The most famous is the Christmas Tree virus which propagated over the Internet automatically, taking advantage of a small security hole in the SENDMAIL command,





where it read the address books of the addressees and forwarded itself to the next set of unwitting recipients. Now that hole has been plugged, these sort of scams rely on public-spirited people to reproduce. Hence their reproduction is all up to the addressees.

The big bad three

There are three basic species. One is the "Send postcards to this boy in hospital suffering from terminal cancer" (if you're reading this, Craig, I'm glad you've been better for quite some time now).

Then there is the "I was ripped off by a cookie shop which charged me \$250 for a copy of its cookie recipe, please give all your friends copies of the recipe for free." Now I was born, bred and dragged up in a hotel and I know a bit about cooking; it's a simple shortbread recipe and not worth bandying about on the Internet.

The other variety, "Look out for this mail message entitled 'Good Times' because it'll format your hard disk", keeps rearing its ugly head.

It is probably worthwhile putting these three in an introductory mail message to new subscribers, telling them that they are all hoaxes which only slow down the Internet (or your local LAN).

The "Good Times" pseudo-virus seems

to have taken many people unawares. This is simply because it's written in good, easily-understood, non-technical language which those in ultimate authority (who may know little about computers) can disseminate throughout a corporate structure.

Unfortunately (or fortunately, really) it is just so much totally inaccurate drivel — it's virtually impossible for a mail message to format your hard disk. And it certainly isn't in a non-existent mail message with the heading of "Good Times".

A trojan task

The best defence against this would be to remove ANSI.SYS from the CONFIG.SYS file. Such hard-disk trojans work simply by issuing the correct ANSI commands to program (perhaps) a function key and then to issue the ANSI command which equates to this keystroke. Without ANSI.SYS, the command cannot work.

If you do need ANSI.SYS, then the other method of defence is to make sure that all versions of DOS which you run are 3.3 or above, and to give each hard disk a label. With a label on the hard disk, when the FORMAT C: command is issued, you have to specify the correct label for the hard disk before the formatting operation can commence.

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Messages received and understood

PC link-up

I need some advice on linking two PCs together. At home we have two Mitac 486DX/2 50MHz PCs with 8Mb RAM and 250Mb hard drives; one machine (which I use) has a double-speed CD-ROM and the other (which my father uses) has a modem.

We are considering linking the two machines together because I would like to use the modem while my father does his work, and he would like to access the CD-ROM drive (as some of the data and software for his work comes in on CD-ROM). My father will be getting a 1Gb hard drive, and I would like access to that, too.

We have access to Windows for Workgroups and a cable to link the computers up, but I am unsure as to whether this would work, or even if it would be worthwhile. Could you advise me?

Elliot, Kuwait

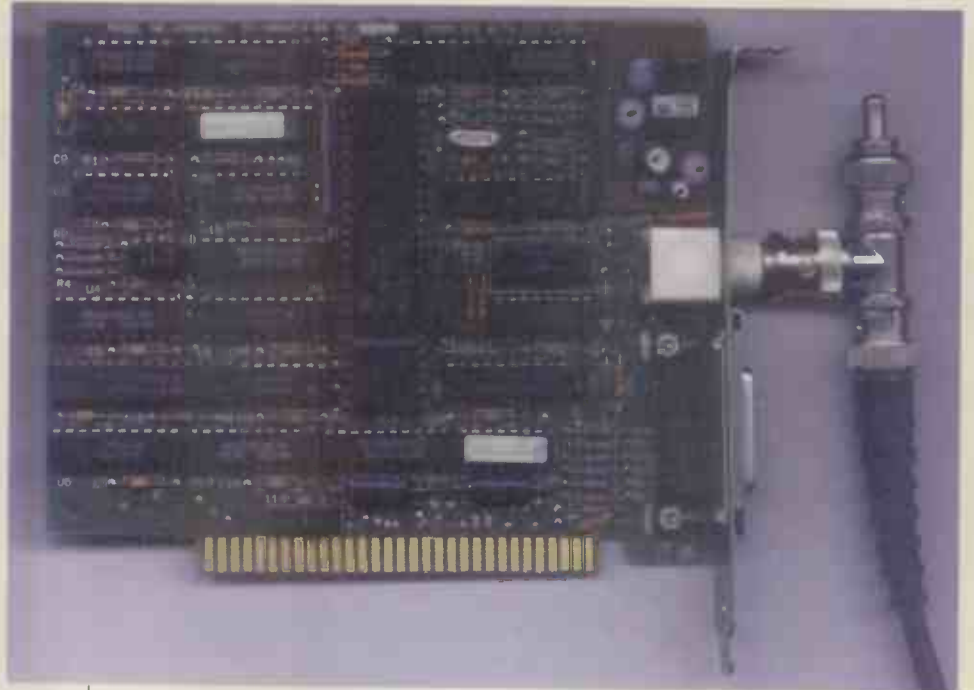
You don't specify, Elliot, whether your cable for linking the machines together is a network cable or a null-modem cable. Let's assume it's a null-modem cable. Don't worry about what I'm going to say about the cable, though.

Windows for Workgroups doesn't support null-modem links as a means of networking, although Windows 95 does. The disadvantage in any case would be that the speed of the network link would, in all probability, be unacceptably slow.

I suggest you get hold of a couple of NE2000 clone boards with a length of Ethernet cable, a couple of "T" pieces (sometimes included with the adaptors) and two terminators.

The photograph above is of an 8-bit card with "T" piece, cable and terminator, but since I get many queries about this arrangement I have included the picture for you and for others to see how the end card of a network is connected. Of course, if you were to add a machine between the two machines, then instead of a terminator you would have another cable attached.

A network is not expensive to set up. You should be able to get hold of a pair of network cards, cable, "T" pieces and terminators for around £50. At these prices, since you already have Windows for Workgroups, the price of a \$25 network which would allow you to network using the serial ports (£25 in the UK) is not really



Network card with terminator, cable and "T" piece

worth considering.

Now all you have to do is to install Windows for Workgroups to take account of the new hardware and of the network. Start Windows Setup (in Windows, not in DOS) and you can install and configure your

"A network is not expensive to set up ... you can get [the components] for around £50"

network adaptor card driver.

As far as sharing the modem is concerned, you make no mention of whether the modem is internal or external. If it's an external modem, you can, of course, change the wiring of the null-modem cable to an ordinary modem cable and use a switch box. If it's an internal modem, you'll have to use a modem-sharing package.

You don't say exactly what you want to use the modem for. If it is intended for use as a fax modem, then Windows for Workgroups allows fax sharing through Microsoft Mail. If it's merely to be a general-purpose modem (perhaps for surfing the Net) then it's probably cheaper to buy another (perhaps faster) modem for yourself than to buy a modem-sharing package

which, at around £100, is pretty near the price of a new, fast, modem.

New name

Is it possible to rename our Novell Server (3.12)? If so, how can I do it and what are the implications?

mn@cix

Look in Autoexec.ncf and you'll find the old server name there. The possible implications are that if some machine or other has a shell setting for the preferred server it may not find it. But if there's only the one server then it's likely there's no problem lurking around the corner.

Another point worth considering is that Windows-type clients remember their connections by using the //servername/directory notation in the WIN.INI file, so the connection paths on any such machines will have to be changed and re-remembered.

Something you might find it useful to look for is a full path reference to the machine name in the login script. It's a good plan to refer to the server name in the mapping procedure of a login script so that if, and when, a new server is added to the network, your users will still have the same mappings defined. They can then have other machines expressly added to the script, too.

Of course, in a multi-server setup there may well be problems (other than those detailed above) in changing the server's name, which you could well do without. These will include the login script problem

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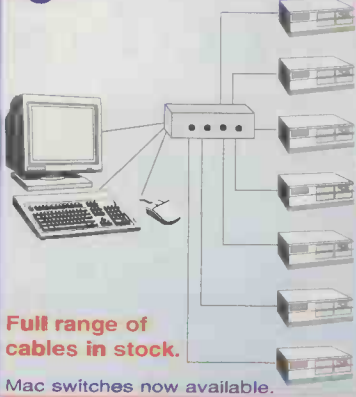


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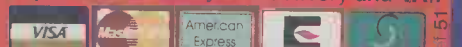
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This year, I'm going to...

Now that the seemingly endless round of Yuletide and New Year parties is over and one's liver is at least part way back up the steep hill from cirrhosis, we should look at some New Year computer resolutions.

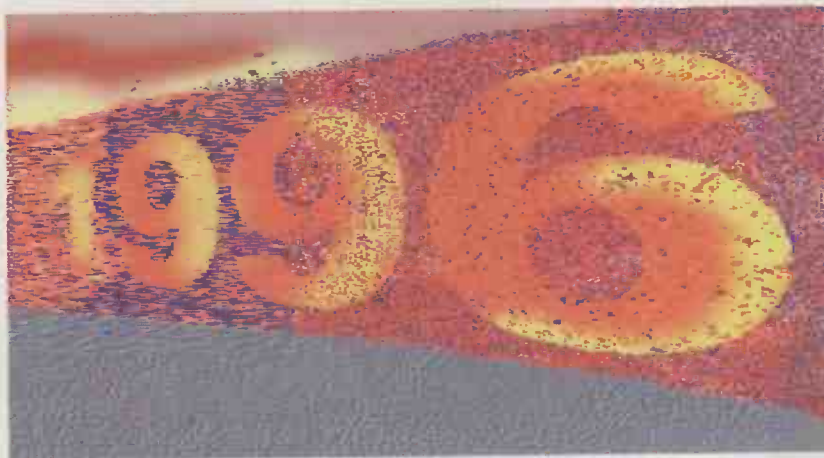
How about slimming? No, I don't mean going to a gymnasium to get rid of the excess Yule goose; I mean hard-disk purging. During the course of normal use a network can accumulate a good deal of "shrapnel". This is the term I use for those temporary files we all create on the spur of the moment when we save what we think is a nifty macro, for our own use as a separate file. Once it's been merged with our current templates we no longer need it, yet somehow it's remained, just sitting there on the hard disk eating up space.

Backup files, too, are terrible culprits, as are intermediate files produced, say, when scanning a page ready for an OCR or DTP package (the resultant file may be long gone, but the intermediate files still take up their megabyte of space each). I know I keep on about backup, but it can't be repeated too often. Perhaps it's time to look at your backup tapes. Do some of them need to be retired?

Have you been good recently and cleaned your tape heads? With some drives, by the time they warn that they need cleaning, it may already be too late!

If you haven't backed up at all (*and you know who you are!*) please back up now. If you haven't got a backup system, whatever you do, don't turn your machine on again until you've installed one.

Next month I'll be looking at Arcada Backup Exec for NetWare 3 and 4, which has just landed on my desk.



mentioned above and the possibility of wrong ATTACH commands appearing in the login script. Personally, I would not change a server's name unless the old name was rude.

The glorious 12

I've got a 12Mb machine and I want to run NT Workstation on it. Will this work? I don't really want to spend money on lots of memory at the moment.

Mb@cix

Yes, it will. It won't break any records for speed, and I'd suggest you really should consider putting in another 4Mb as a minimum (or better still, 8Mb).

The machine will run NT Workstation — in fact, I've run Server on 12Mb, but wouldn't want to again — and, I suppose, at a reasonable rate; it just won't fly.

At your service

I've just bought NT Workstation 3.51, and I've read about the service packs available for it. Surely I don't have to add these to a new product?

AS@cix

Yes, you do. Microsoft supplies the NT CD in precisely the same state as when it was first released. You should use Service Pack 2 (which includes Service Pack 1) right away. This is available from all the usual places: Microsoft Network, ftp.microsoft.com, CompuServe and CIX.

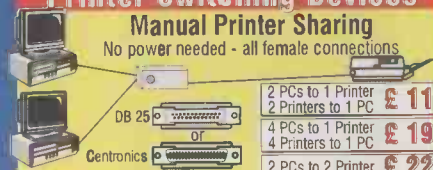
PCW Contacts

Stephen Rodda is an independent computer consultant specialising in DTP and networking. He can be contacted at the_bear@cix.compulink.co.uk

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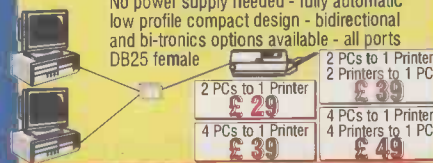
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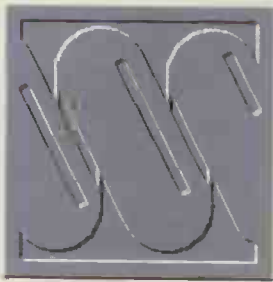
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A winner or a wince?

WinCIM 2.0 is here at last. There are some new features, but some niggles too. "Was WinCIM 2.0 worth the wait?" asks Stephen Cobb. Plus, the latest buzz on security from Internet World '95.

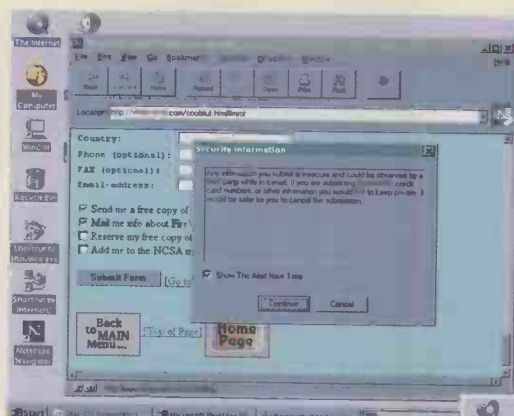
Users of Windows and CompuServe may be pleased to know that Version 2.0 should now be available. I say *should* because although you can ask for a copy to be delivered through the post (using GO ORDER), and a copy may be distributed on a forthcoming CompuServe CD, there is no word yet on a version for downloading. In fact, the new version appeared in the US some time before the UK release was ready, but I had a chance to install and use the new version just

buttons look different but the menu structure is practically identical to version 1.4. The real changes are deeper within the code, the biggest technical innovation being the integration of CompuServe Information Service (CIS) and the World Wide Web. This means that buttons and menu items within CompuServe can now take you directly to the Web. You can even enter a Uniform Resource Locator (URL) such as <http://www.compuserve.com>, directly into the GO field in WinCIM to get

to an Internet site. For example, to reach the Compaq forum on CompuServe you enter GO COMPAQ. To reach Compaq's Web site, you enter www.compaq.com. Furthermore, if Compaq's Web master decides to implement the right code you will be able to link from the Web back into CompuServe. Unfortunately, I couldn't get this to work, despite several hours of playing with different settings and reading numerous message threads in the WinCIM support forum.

In order to accomplish this wizardry, WinCIM 2.0 comes with the CompuServe Mosaic Internet browser which, I can report, is a significantly improved version of the Spry Air Mosaic browser that CompuServe has previously distributed. Once you have established a Winsock-enabled CompuServe connection you can access CompuServe and the Web simultaneously. You could do this before 2.0, but now you can launch into the Web from within WinCIM and you don't have to use the CompuServe Mosaic browser if you already have a browser preference.

By default, WinCIM 2.0 automatically installs and configures the new CompuServe Mosaic browser, which has been upgraded to include features such as backgrounds and centering of text and images. But even if you decide to use NetScape or another non-CompuServe browser with WinCIM, you will still be able to follow the links back



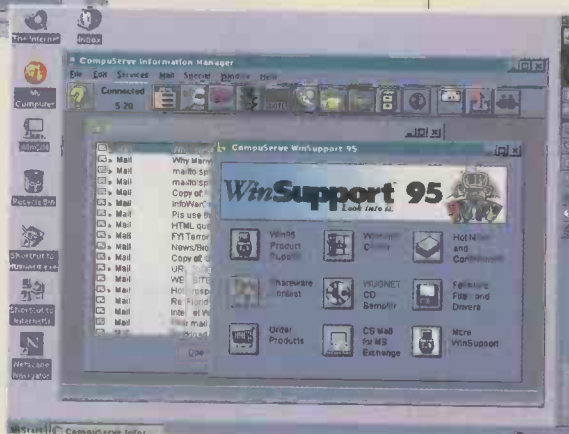
Left Netscape lets you know when data travels "in the clear", but the risk of lost connections is much greater

Below WinCIM 2.0 works under Windows 95 and offers hyperlinks between CIS and the Web, although configuring Internet connections and browsers can be tricky

before the deadline for this column.

I can report that it does exist and that it does perform the basic email and forum browsing just like the previous version (1.4). Unfortunately, some of the newer features are more problematic. By next month, I should be able to report in depth on performance since I have taken a chance and installed it on my "real" computer.

As far as appearances are concerned, WinCIM 2.0 looks pretty much the same as the previous version. A few of the



The view from Internet World '95

The big picture

Last month I went to the Internet World '95 show, in Boston. The place buzzed with excitement. You could sense the unstoppable logic of using one enormous network for everything from banking, to shopping and paying taxes. Back in 1983 a lot of people felt the same way about everyone getting their own PC. Of course, at that stage in the game it was unclear what those computers would look like, or even what operating system or application software they would run (CP/M was still a strong contender for business systems and Apple had not yet sued Franklin Computer for making clones of the Apple II). You just felt that everyone getting their own computer was just around the corner.

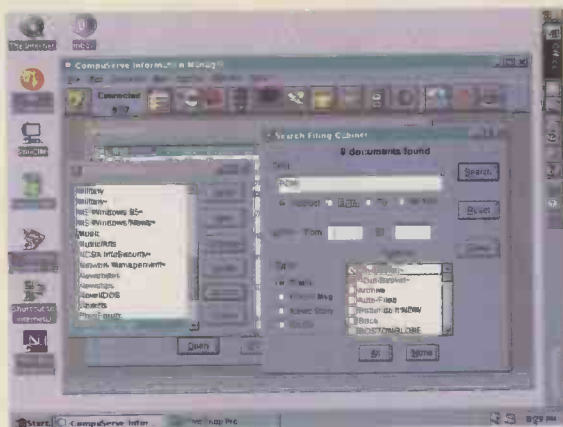
The same is true of the Internet. Everyone knows it's the right idea, we just don't know exactly how it will take shape. Before we get there we will see any number of false starts, dead ends and surprising comebacks. One thing we can do to ease the transition to a truly networked world is to learn from past mistakes. Remember that like all great advances in technology, ubiquitous personal computing only became a reality many years after the leading edge was first discerned. The same proved to be true of networked computing. And by the time these technologies became commonplace they exhibited another classic techno-trait; fallibility. Every technology has its down side and the sooner we accept that fact and work to minimise it, rather than pretend we have found the first truly riskless technology, the better will be our chances of success.

Are we there yet?

A lot of the people I talked to at Internet World wanted to know when the Internet would be secure enough for commerce? When would the World Wide Web be safe enough for banking or filing tax returns? These were not vague speculations; recent figures suggest that the number of commercial Web sites is growing at a rate of 27,000 per month. The question about taxes came from a senior revenue service official.

My response to such questions is to point to my notebook computer. I explain that I have had it for about a year so it is not quite state of the art, but that I am intimately familiar with its operation. Then I say, in all honesty: "I never know when it is going to crash next. I do not back it up as often as I should. I have to run a virus scanner over every disk I put in it. Many of the applications I use have annoying bugs, but I dare not upgrade them in case that makes things worse.

(Continued on page 345)



At last! You can search the contents of your WinCIM filing cabinet in the new 2.0 release. But does it have to take so long?

files may be necessary since CompuServe installs its own version — this can conflict with previous versions if you have already been browsing the Web through a non-CompuServe connection.

into CompuServe. Unfortunately, the process for customising WinCIM to do this is not a menu item. You actually have to edit the CIS.INI file as well as edit the "helper application" section of your browser (I can understand the folks at CompuServe wanting everyone to use their browser, but automating the CIS.INI part of this configuration process would have been more considerate).

Next month I will report on how this all works; if I can make it work. At first glance it looks like some fiddling with winsock.dll

For people who can make a local PPP Internet call cheaper than dialling into the nearest high-speed CompuServe number, configuration of WinCIM 2.0 can get decidedly complicated.

One new feature that should make the diagnostics a little easier is a Help option in the failed connection dialogue box. But some of the advice is indicative of how far we have to go before software is as easy to use as it should be. Consider this for instance: "Increase the HMI Time-Out value in WinCIM. Choose Session

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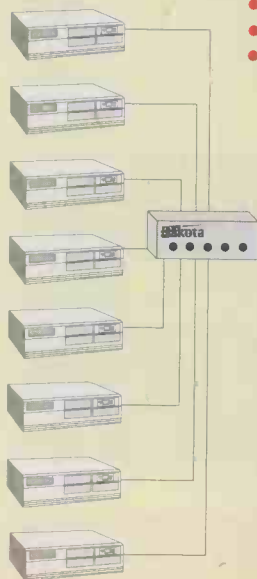
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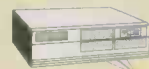
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Internet World '95 (contd)

live in fear that someone will steal it. And you expect me to use it for banking?"

Of course, some people think the answer to this hangup is just to buy a newer, better computer, or to be a better user but this leaves much to be desired. Consider what happened to a friend of mine who was on a business trip to Argentina. In front of two hundred people, who had paid for him to be there, his brand new Toshiba Pentium notebook running Windows 95 froze up just two slides in to a Microsoft PowerPoint presentation: not just Ctrl+Alt+Del crashed; not just turn it off and start over crashed; but because Windows 95 was in control of the power management system when the crash occurred, he had to take out the battery pack and then wait for the backup battery to drain before he could even reboot. And this is no neophyte but a surgeon, pilot, programmer, and former head of a software company (who wrote a lot of the program code himself).

What has this got to do with telecommunications? Consider what happens if we start banking on the Web any time soon. Mr Smith wants to transfer some money from one account to another: he clicks on the home banking icon, the modem dials and a connection is made. He types the details of the transaction, clicks the send button, and... crash. The general protection fault dialogue box appears with that ridiculous choice between Close and Ignore (we all know they mean the same thing). At this point, Mr Smith may think that his biggest problem is figuring out whether or not the transaction was completed. But the really big problem is who to blame. Here are some choices: the PC maker, the operating system publisher, the shop that sold the system, the modem maker, the Web browser vendor, the phone company, the local Internet service provider, the regional backbone supplier, the bank's Internet service provider, the company that makes the system that runs the bank's Web server.

In other words, the lack of universal secure transaction protocols is not the main obstacle to commerce on the Internet. Before we worry about people stealing credit card numbers off the Internet we have to deal with basic hardware and software reliability. According to Simba Information (a market-research firm based in Connecticut), about \$20m traded hands on the Internet in 1994, although numbers for 1995 were not yet available — they are bound to be higher than 1994 but I doubt whether they will be spectacular. While there may be 24 million people with Internet access in the US alone, very few of them are ready to rely on the current technology for serious commercial activity.

Settings from the Special menu, select the More button in the Setup Session Settings dialogue and then increase the value in the box beside HMI Time-Out. A reasonable value is 120." I'm sorry, but if 120 is a reasonable value why is the default setting 30?

Looking for your mail?

Last Friday, I left the office a little early and didn't check my email until Monday; there were over 20 messages in my WinCIM in-basket. So as far as I am concerned the most hoped-for improvement in version 2.0 is the Search option in the WinCIM Filing Cabinet. You access this through the Filing Cabinet command (Ctrl+F is the shortcut). As you may know, a variety of objects such as mail messages, forum messages, articles, and news stories can be stored in the filing cabinet. The problem has been getting back to the items filed long ago (several of my folders contain several megabytes of information and I had taken to using a generic Windows search tool to find things).

Now you can find any object by date or date range, subject, sender or contributor. You can even perform a text search based on any text string in the body of the

message. You can search folders, In-Basket, Out-Basket, or a combination of all three. But you'd better not be in a hurry.

Apparently, WinCIM does no internal database-style indexing of your filing cabinet contents, so the search process itself is no faster than using an external search program such as Outside/In (which allows you to start reading target files before the search is completed — something you cannot do with the WinCIM search command).

All of this suggests that CompuServe still hasn't grasped just how much mail serious users receive, or how much they come to rely on their mail program to organise it for them. More immediately helpful for email buffs is the simplified addressing of non-CompuServe mail users such as Internet and cc:Mail. This is handled via a list box for address types in the address book dialogue box (no more typing INTERNET: in front of Internet addresses).

There are some nice additions in other areas, too. For example, a preference has been added for both Forum Conferencing and CB Simulator to automatically update the "Who's Here" list every so many seconds (you can select the setting). You

will find this very handy if you use these areas of CompuServe.

Was it worth it?

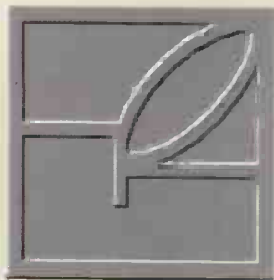
Unfortunately I couldn't find one of the new features that had been announced; the ability to view a wider range of documents. The README file says that a new View button works like this: "If the file to be viewed has a Windows file association defined, the appropriate application will be used to view the file." But I couldn't find a button that worked like that, which is a pity because this feature is tied to another area of enhancement; the ability to send binary files to enhance conferences. These can be still motion video clips from a video feed; that is, graphic images sent at regular intervals, closed captioned text, charts, sound, or pictures. The moderator can send any combination of files and file types to conference participants.

Network users of WinCIM will be pleased to know that secure logins are built-in to version 2.0, so that your password is not transmitted across the network in a readable format. A General Preference has been added to control window handling with Keep Windows Maximised as the default setting (when a window is maximised, subsequent windows will also be maximised until you restore the size). International icons have been added throughout the product to accommodate the global CompuServe Membership. Lastly, for the iconically-defective such as myself, the mouse now displays hints as to the purpose of any icon at which you point — if you are one of those people who instinctively recognises the meaning of any icon you can turn this feature off.

So was WinCIM 2.0 worth the wait? I am inclined to think not, but I am unsure as to what the alternative is. I suspect that I will eventually figure out how to get it working properly, but I seriously resent the effort involved. The search feature sounds good, but unless I am missing something really obvious it is not a big improvement on my existing methods of coping with email. I have been told that the problem of filing cabinet breakdowns has been fixed, but there should be more to cheer about in a 2.0 upgrade than "it doesn't break any more".

PCW Contacts

Stephen Cobb can be reached on CompuServe as 72662,546 or the net as cobb@iu.net



Mac to Basics

If you're sitting looking at that shiny new Mac you got for Christmas, wondering what's behind the smooth exterior, Chris Cain unearths its revealing features. Plus, the alliance that could be Wintel's undoing, and news of Apple's QuickDraw 3D accelerator card.

Happy New Year! I know this is the February issue, but through the power of magazine logic this is the first *Hands On Macintosh* column of 1996. This month, along with the news and views, I'll be taking a closer look at Apple's innovative QuickDraw 3D, a piece of software that could have as much impact in the graphics world as QuickTime has had on the multimedia market.

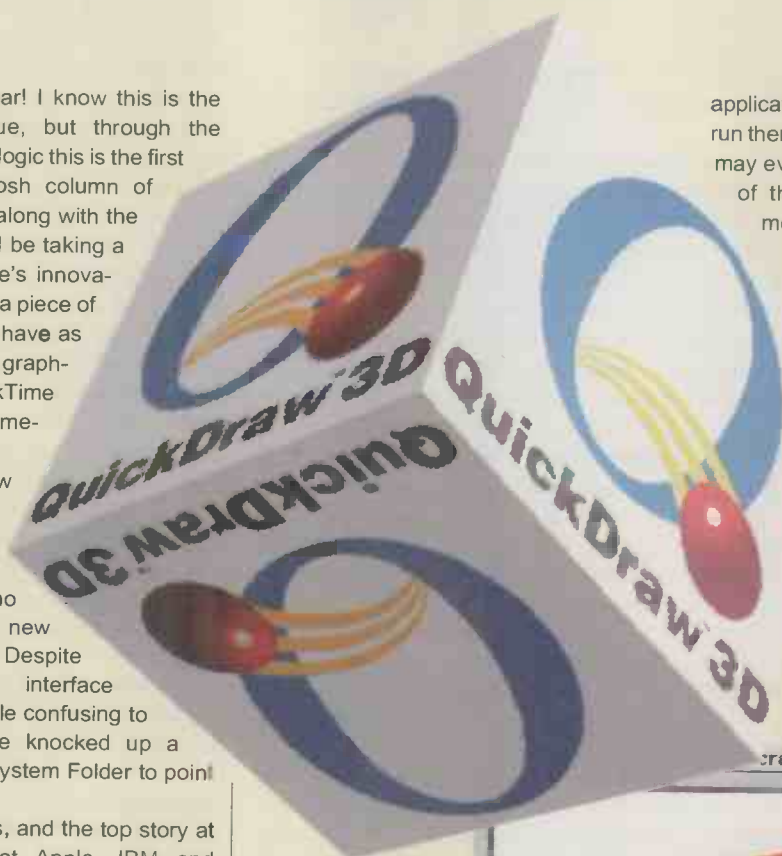
As it's the new year, I'll also be going back to basics briefly for all those people who received a lovely new Mac for Christmas. Despite its easy-to-use interface MacOS can be a little confusing to newcomers, so I've knocked up a quick guide to the System Folder to point out what's what.

But first the news, and the top story at the moment is that Apple, IBM and Motorola have finally published the specifications for a new, open, unified personal computer architecture. Originally known as the Common Hardware Reference Platform (CHRP), the specs are now formally entitled the PowerPC Microprocessor Common Hardware Reference Platform. What a mouthful.

In lay terms, what this will hopefully give us is a new PowerPC-based platform that will run MacOS, Windows NT, OS/2 and just about anything else you might want to throw at it. In theory, you'll be able to take all your existing software

applications over to the new machines and run them as if they were on a PowerMac. It may even mean the beginning of the end of the dreaded WinTel alliance. For more detailed information and a full report on new CHRP developments, see this month's *Newsprint*.

Apple was making a few noises at the 1995 Apple Expo just before Christmas. The show itself was jam-packed with distributors, dealers and software houses, but it was Apple itself drawing large crowds with some great demonstrations of its new technologies. Among the more impressive were QuickDraw 3D, Copland, and a brilliant introduction to



With QuickDraw 3D installed, you can cut and paste 3D data as easily as 2D pictures and store them in the Scrapbook. The small boxes at the bottom of the screen are standard tools for rotating, zooming and moving the image



Beating the System

If you've just got a Mac for Christmas, chances are you're having great fun but don't know exactly what's going on inside. Just for you, here's a quick guide to the all-important System Folder and its contents under System 7.5.

System Folder



The System Folder contains all the software your Mac needs to start up. When you switch on your machine, it looks for this on its internal hard disk, but you can also boot from floppy, CD or an external drive. Once it's found a working System Folder, up pops the picture of the smiling Mac. The average size of this folder can range from a single megabyte to 50Mb or more — it depends on what you have installed.

Extensions



Data inside the System Folder is split into a number of sub-folders, and one of the most important is called Extensions. Extensions are software plug-ins that add functionality to your Mac and, in most cases, are loaded into memory on startup. To add a new extension to your system, you drop it into this folder, and to remove one you take it out. This approach makes it easy to keep track of exactly what software there is on your Mac. Apple provides a horde of useful extensions with the system software, including AppleScript, AppleGuide and QuickTime. Popular third-party extensions include RAM Doubler and Speed Doubler from Connectix. The more Extensions you have, the more memory your system software will use, and the less you'll have to run applications. You can boot the Mac without loading any Extensions by holding down the Shift key on startup.

Control Panels



Control Panels are a bit like Extensions in that they add functionality to your Mac, but they also offer a level of user interactivity. Double-clicking a Control Panel will normally bring up a small window allowing you to change some system setting or other. Typical windows include Desktop Patterns, which lets you change the look of your desktop; Mouse, for setting the speed of the mouse cursor; and Extensions Manager, used to turn Extensions on and off without the need to remove them from their folder. While most Control Panels are useful, many of them can be turned off as they are either not needed for day-to-day computing, or they are completely useless — a bug in Apple's

System Software Installer can put things on your system you don't actually need. If you have a desktop machine, you can remove any Control Panels related to PowerBooks, such as PowerBook, AutoRemounter, PowerBook Display, PowerBook Setup and Trackpad.

Fonts



The Fonts folder is easy to understand — this is where all the fonts your system uses for its screen display and printing are stored.

Apple Menu Items



Extremely handy, this one. Anything placed in this folder appears as an item on the Apple Menu in the top left-hand corner of the screen, making it easy to access whatever application you're using. It's just the place to put aliases of your favourite applications, utilities or Control Panels.

Preferences



This is where Control Panels and applications store data about their current user preference settings. It's good practice to examine the contents occasionally, removing any preferences files for applications you no longer use.

Launcher Items



Items in here are aliases that appear as large icon buttons when you run Launcher. To custom your own setup, just add or remove them.

Startup Items and Shutdown Items



Again, nice and easy to understand. Any program placed in these folders will run automatically as soon as the System has finished loading, or on Shutdown.

System file, Enablers, Finder, Clipboard



These files are essential for your Mac to operate, so don't mess with them unless you know what you're doing. As you can see, the System Folder and its contents aren't that mysterious after all. Other things you may find inside include the contents of Note Pad and Mac Scrapbook.

QuickTime VR courtesy of Apple UK's Technical and Services Consultant, Peter Lunn.

The QuickDraw 3D acceleration card (as mentioned in last month's *Newsprint*) is a 7in PCI adapter that plugs into any PowerSurge Mac, and can improve its 3D performance by up to a factor of twelve. And at a price of £299, it fits nicely into both the business and mass consumer markets. I'll be looking at this card as soon as Apple can get me one.

Quick on the draw

QuickDraw 3D is Apple's attempt to implement a standard for the storage and manipulation of 3D data on the Macintosh. It's software-based and consists of

four main parts: a common file format known as 3DM, a common user interface, a geometry engine and a rendering architecture.

The file format for QuickDraw 3D is 3DMF, a cross-platform system that supports both traditional 3D data such as geometric shapes, and all the information that represents a particular view of a scene, including textures. Its aim is to allow 3D information to be shared easily between applications in much the same way as .PICT files are today. With this installed, users will be able to cut, copy and paste objects between programs as easily as 2D images.

Another step towards making 3D easier to use is to provide a common user

interface for dealing with the data. Currently, being proficient in one 3D application doesn't necessarily mean you'll be able to pick another up quickly, because the tools used are often completely different. QuickDraw 3D provides a standard set of tools that allow you to rotate, move, resize and generally manipulate objects which will be available in any application that implements it. Users will be able to move from one package to another without the need to learn a whole new interface. In many ways, it's like the QuickTime control strip which appears at the bottom of the window whenever you work with movies.

The other two main ingredients in QuickDraw 3D are the geometry engine

and the rendering architecture. The former handles the generation of basic geometric shapes such as squares, triangles, circles and polygons, while the rendering architecture deals with rendering the images on screen complete with shading and texture maps. It supports the popular OpenGL standard, and accepts plug-in third-party shading engines. This is another area where acceleration cards really get put through their paces.

QuickDraw 3D is currently only available for PowerMacs, can be downloaded from Apple's Internet support sites, and comes with some of the new PCI Macs. It's also smarter than the average system extension as it only loads into memory when required. When it does load, however, it adds around 3Mb to the memory your system software takes up.

A version for Intel Pentium machines running Windows is



currently being planned, which will help drive this forward as a standard.

If QuickDraw 3D takes off, as I expect it will, we will see a whole new approach to graphics on the Mac. Be prepared for a new version of MacOS with a 3D front-end, new applications, and games that are out of this world. For more on 3D, see this month's *Horizons*, page 261

Picking up Descent

Mac gamers on the Internet will be interested to hear that a demo of Interplay's top action game, *Descent*, is available for downloading. Located in the demo area of the MacPlay website, it's a 7Mb intro-

The February Utility of the Month award goes to Mac OS Purge, a Freeware program I recently downloaded from eWorld. It's simple, effective, runs in seconds and could save you from a nasty system crash.

Mac OS Purge works by literally purging any data left behind in your system memory when you quit an application. It's especially useful on machines with tight memory conditions, such as those running with 4Mb, where stale data can build up and eventually cause all sorts of problems. For example, if you load and then quit an application that uses QuickTime, the extension will load but may not clear itself after the application is shut down. The next program you run then has less memory to use, and if you load a few "leaky" programs, a system crash can occur.

By rights, this kind of thing is something the OS should sort out by itself. Until it does, Mac OS Purge will come in handy. It's currently on version 1.0.1, and the author, Kenji Takeuchi, can be contacted at atttak@midway.uchicago.edu.

Utility of the Month



Mac OS Purge helps clear the unused code out of your system file

Descent brings fast blasting action with the smoothest graphics ever

duction to the PowerMac version of one of the bestselling PC games of last year.

Descent is a 3D shooting affair set in a similar style to *Doom*, but this time you play the pilot of a small space-mining vessel. The idea is to rescue humans left stranded in space mines that have been overrun by hostile forces. Your average everyday space cadet sort of thing.

What makes *Descent* stand out from other games of this type, apart from the addictive gameplay and a network option,

is the quality and smoothness of its graphical engine. Not only is it fast and fluid, but for the first time in a 3D Mac game, the texture mapping doesn't tear at the seams when the detail gets complex. The game will run full screen at 320 x 200 with pixel doubling, for a PC style display, or a sharper 640 x 480 on high-end machines. And I do mean high-end — while it runs well on a 9500, my 7500 doesn't cut it in high res. I have heard that a new version may be appearing, complete with QuickDraw 3D support, but I don't have any information at time of writing.

PCW Contacts

Chris Cain loves to hear from PCW's Mac-using readers. He can be contacted via email as

Chris_Cain@PCW.CCMAIL.COM

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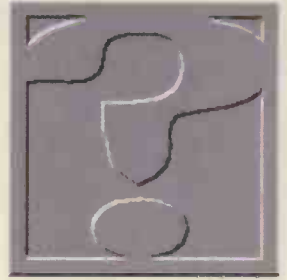
Chris@CIX.COMPULINK.CO.UK or as Cain@eworld.com

Apple Computers 0181 569 1199

Quark <http://www.quark.com>

QuickDraw 3D can be downloaded from <http://www.info.apple.com/qd3d/QD3D.HTML>

The MacPlay Demos website is at <http://www.macplay.com/website/demos/demos.html>



Any questions?

If you've got a PC problem, or think you could help out other readers, contact Frank Leonhardt who this month manages to upset IBM, Intel, Microsoft, most computer dealers and the entire academic establishment, in just two pages.



Q My computer takes about two minutes to start up Windows 95. I don't think this is correct. I have a 486 DX250 VLB 128Kb cache with 8Mb RAM. I would be grateful for any advice. I enclose copies of my AUTOEXEC and CONFIG files.

Julie Musk

Windows 95 does take ages to start up on what Microsoft thinks of as a low-end machine. There is nothing wrong with your CONFIG.SYS or AUTOEXEC.BAT files, but you might be able to tune your BIOS setting to make the machine run faster. My solution to the slow startup was to put Windows 3.11 back onto my 486 with 8Mb RAM.

Spot the difference

With the release of Win95, I have decided to upgrade my PC. What are the differences between the Intel range of motherboards, e.g. Triton, Zappa, Endeavour? Also, it seems that to use Win95 efficiently you should use 16Mb of RAM. Should I go for Windows NT instead, as it's a true 32-bit OS?

Mark Antony Smith

Triton is the codename for Intel's current Pentium support chipset. Older boards would have used sets like Neptune, which are not as efficient. The Endeavour is Intel's latest motherboard and it's rather good. It has built-in SoundBlaster-compatible hardware, and a version with integrated Diamond Stealth-like graphics is promised for spring '96. Endeavours can also be fitted with a 256Kb or 512Kb pipe-burst cache option which will allow the Pentium to run significantly faster than a standard cache. It has four ISA and PCI slots, although only seven cards in total can be fitted.

The Intel Zappa also has a Triton chipset with a standard cache option, one less PCI, one extra ISA slot and no integrated sound hardware. It is cheaper than the Endeavour.

Intel isn't the only company to make Pentium motherboards, however. The Triton chipset is available to third-party manufacturers whose products are noticeably cheaper than Intel's. For example, you can buy a non-Intel Triton board for 20 percent less than a Zappa or a board with pipe-burst cache for 13 percent less than an Endeavour. Not having a Triton chipset saves only about £15. The word on the street is that the non-Intel boards are just as fast, other things being equal.

As to the Windows 95 vs Windows NT question, I'm afraid you don't have the choice you were expecting. Windows 95 will run in 8Mb but prefers 16Mb, while Windows NT runs in 16Mb but prefers 32Mb. Windows NT doesn't have the compromised functionality from which Windows 95 suffers, but you have to pay

the price in RAM. Personally, I'd go for Windows NT if I weren't stuck with an 8Mb 486SX/25.

Real programmers do it themselves

As a student, I have been using computers to write essays for a few years now. I would really like to go a step further and learn to program properly (not in BBC Basic, as I did for Computer Studies GCSE). However, I can only find full-time degree or HND courses, or those aimed at the professional market costing upwards of £500.

Could you suggest somewhere that might do a course suited to learning programming at the hobby level? I did try a correspondence course once, but due to disorganisation and staff rudeness I didn't get very far. Any ideas?

Chris Liddell, York

There is no simple answer to this question — it depends a lot on what you have in mind by programming "properly". BBC Basic is actually a very capable programming language supporting block structuring, local data and indirection, and there is no reason why you can't apply proper programming techniques while using it. But for backward compatibility with earlier Basics, it does accept monolithic and unstructured code if that is what you choose to give it. I fear that a typical GCSE course does not have the time to explore the differences between the two coding styles to any useful level, as good style only comes into its own in larger projects.

If, by "proper programming", you have

SIMMs and the art of PC purchasing

The best way to wind up your friendly local PC dealer is to wander into his shop and try to order a machine to an exact specification. The chances are you will specify at least one item which has been discontinued or is incompatible with something else on your list. Back up your demands with an insistence that you read good reviews for all the bits you're after, and you'll have them ranting down the phone to me about how journalists in general cause them untold grief.

They do have a point. Just because a particular video board is the fastest in a group test, it does not mean that it is compatible with all motherboards past, present and future. An obscure sound board might sound great, but if there are no Windows 95 drives for it and the manufacturer has gone out of business, then that's that.

In the circumstances, you have two choices: you can either be guided by the experts, and if they are building several machines a week they probably have some idea about what works and what doesn't; or you can proceed by trial and error yourself. A dealer isn't going to be interested in building you a Frankenstein's monster because he suspects, quite rightly, that you'll be back a day later complaining that it doesn't work and probably blaming it all on him.

If the dealer is friendly, he may supply you with the bits on the basis that he'll exchange what doesn't work.

However, from time to time a few things crop up which you should be asking about. This month it's SIMMs. A Pentium processor board normally has four SIMM slots for memory. These slots have to be filled in pairs. SIMMs come in 2Mb, 4Mb, 8Mb, 16Mb and 32Mb sizes at present, but 2Mb SIMMs cost rather a lot per megabyte. The 8Mb SIMMs have always been a bit cheaper per megabyte than the 4Mb ones.

If you ordered a machine with 8Mb in it you would probably receive two 4Mb SIMMs, leaving two slots free. A 16Mb machine would have two 8Mb SIMMs and two free slots for expansion. However, 8Mb SIMMs have just gone up in price (not a lot) but it is now cheaper for dealers to fit four 4Mb SIMMs to get the 16Mb, which leaves you with no free slots for expansion. This is one question you really should raise with your dealer.

something in mind which would be commercially useful, then BBC Basic does not impress when entered on a CV unless accompanied by something mainstream. Real programmers use Assembler, or these days C and C++. However, an awful lot of application programming is carried out in Visual Basic or Delphi, and database application languages like Oracle and dBase. Although such packages are used for large projects, they are not, in my opinion, particularly well suited for the purpose as they don't encourage, or even allow for, a maintainable programming style. Such languages are popular because you do not need highly skilled programmers to get results. They do, however, yield rapid results so they are a good choice for trivial applications and quick hacks.

In the mainframe world, languages like Cobol, PL1 and RPG still rule the roost and show little sign of being displaced.

There is a tendency for degree-type courses to concentrate on the academically pure languages like Pascal, Modula, Simula and a truckload of experimental application-specific systems of which no-one else has even heard. There are probably good reasons for doing this, but the fact remains that degree students generally require a year

or three after graduation to learn C properly before they can earn their keep in the real world.

So what should you learn? Visual Basic is nice and easy and does have a commercial application. C is the obvious choice if you want to get at the inner workings of the system, though not for seekers of instant algorithmic gratification.

There are plenty of books, videos and courses available for teaching yourself either of these languages. Books about C, in particular, tend to go into the art of program design as well as teaching the language. I can personally recommend "The C++ Programming Language" by Bjarne Stroustrup, as it has plenty of examples on how to use the language rather than just explaining how it works. It isn't intended for complete beginners, however. "The Design of the Unix Operating System" by Maurice J Bach should be considered required reading as well. It isn't a programming tutorial but explains how Unix was designed and written, with just the right level of detail necessary to understand the techniques used. Even if you never program Unix, the algorithms described can be applied to many types of programming problem.

By reading and practising, there is no reason why you can't learn to program to

any level you choose — many microcomputer programmers are entirely self-taught. Doing a course wouldn't hurt either because of the group support available while trying to get your mind around a tricky concept. Many local councils run evening classes in computer programming and these are probably worth a look. The course content might only be to GCSE level, but the access to like-minded individuals and knowledgeable tutors could be much more important to you.

There are local computer clubs and societies too, which you might consider joining. Some are obviously better than others, so it's worth looking in on more than one.

Give us a C

I have just bought a copy of Borland Turbo Assembler for the PC. Are there any good books to help me learn? I have been programming in C for a number of years now and need to write some fast routines

Paul Taggart

Osborne/McGraw-Hill publish a good selection of reference books for microprocessors and "The 8086 Book" by Rector and Alexy starts from the ground up. "Mastering Turbo Assembler" by Tom Swan (published by Hayden) covers the 80x86 series up to the 386, and also has chapters on working with C and Pascal alongside Assembler.

The extra 486/Pentium/IP6 instructions aren't necessary for a tutorial and once you've cracked programming the 386, all you will need is the latest Intel data book for the relatively minor additions.

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.

The C++ Programming Language:
Bjarne Stroustrup,
ISBN 0-201-12078-X
Addison-Wesley 01734 794000
The Design of the Unix Operating System. Maurice J Bach,
ISBN 0-13-201757-1
Prentice-Hall 01442 881900
Intel 01793 403000
Simply Computers 0181 523 4020



LAN of action

Networks often seem baffling to the uninitiated, but Local Area Networks are simply a common way for computers to share resources. Eleanor Turton-Hill takes the ghost out of the machines.

Most areas of computing are shrouded in some form of technical jargon which they've developed over the years, and networks are no exception. They seem to have accumulated an air of mystique which makes them intimidating even to the most knowledgeable in the computer industry.

But as we all know, there's no such thing as "black art" in computers — just a list of nasty acronyms, a few underlying concepts and a vast amount of trivial information you acquire over time. The type of network you're most likely to have used is a LAN (Local Area Network), as this is the most popular network model. Here I'll give a brief overview of the LAN, as well as explaining some of the terms used in network technology.

A cunning LAN

Computers are connected together into networks so that resources can be shared between groups of users in the most efficient way. They enable users to access and exchange information within a single office, as well as sharing programs and expensive devices such as laser printers. Without a network, each PC in an office is an island and the only way to pass files from one machine to another is by floppy disk.

The typical LAN setup has one central fileserver which holds all shared applications and data. The fileserver is usually a powerful PC with plenty of hard disk space to service client machines with limited storage capacity. Each PC attached to the network acts as a client, requesting services from the server. All the PCs on the network can see the server,

but none of them can see each other. Most LANs only have a few clients, but some are able to handle hundreds.

The fileserver holds the network operating system which controls all network operations. It manages users' access to the network's shared resources. For example, if two users request use of the printer at the same time, the network operating system will control the order in which the print jobs are processed. It also contains facilities which enable the network administrator to maintain security, and utilities such as electronic mail. Some LANs have more than one server, each dedicated to a certain function such as handling a database, controlling print functions or managing communications.

On the buses or in the ring

Networks can be arranged in three different configurations or topologies. The simplest type of network is a "bus" network, where all network nodes are strung together in a line. This structure has some fairly fundamental drawbacks, the

most obvious one being that if the cable is broken in the middle, the network is split into two.

Another type of configuration, known as the "Star" network, is arranged with all nodes connected to a central hub or switching box forming a star shape. In effect, each node has an independent connection to the network, so that if one cable breaks, none of the other nodes has to be affected.

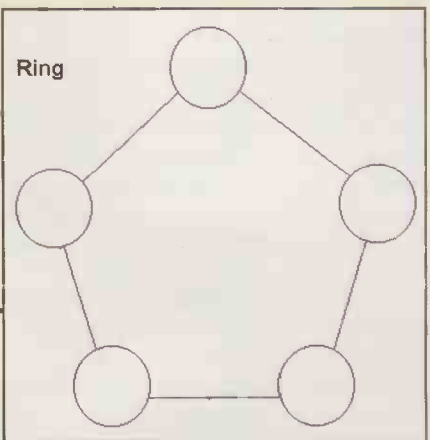
The third type of configuration is the "Ring" network. Here, the nodes are connected to each other along a single, circular path. This structure is very much like a bus, only there's no end to the line. The last node on the line is connected to the first node, forming an endless loop.

All members of a local area network must normally be positioned within 800 to 1,000 feet of each other, because the strength of the transmission signal decreases as it travels. Short distances therefore enable the signal to be received more clearly. Multiple LANs can be joined together in various ways, and LANs using different protocols can be connected by "bridges". "Gateways" connect different types of networks to each other, for example a PC LAN to a mainframe network, and "routers" are used to link together LANs with compatible protocols.

Making contact

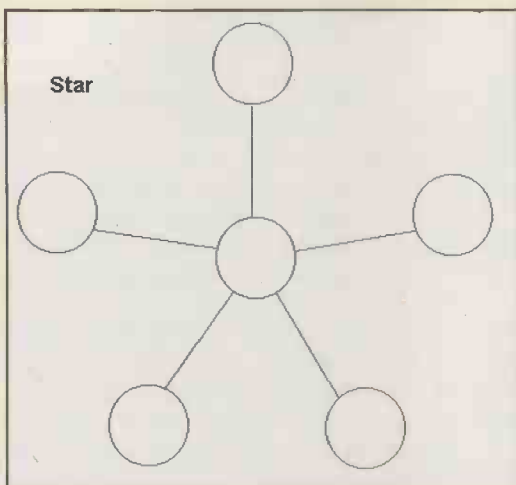
In order to connect a PC to the network, you must first install a network adapter or interface card. This goes inside the PC and controls the physical transmission of data over the LAN. The network cable is

Right and Below: Ring and Bus Networks are both decentralised network topologies. Each workstation can access the network independently



Bus





In a Star topology, all the nodes are operated from a central server. With this type of configuration, a defective workstation won't bring down the entire network

attached to the interface card at the back of each PC. Some network cards provide two or three different types of connector, so that you have the choice of different cabling methods. The most common network adapters are Ethernet, Token Ring and ARCnet. The Ethernet variety can be cabled together directly, using "T" connectors which fit to the jack at the back of the adapter. All computers can then be connected by joining "T" connectors to each other.

Different network adapters access the network in different ways, and their raw data transmission speed varies. Token ring, for example, waits for a special signal known as a "token" before transmitting, whereas Ethernet adapters just wait until the network is clear. With Ethernet adapters, two packets of data will periodically collide, and both adapters will time out for a random period.

An Ether world

The vast majority of LANs use Ethernet. Essentially, Ethernet is just a standardised way of connecting computers together to create a network. It specifies what kind of cables to use, how long the cables can be, how they should be connected together and how computers transmit data to one another using the cables. One of the reasons for its popularity is the fact that Ethernet is remarkably cheap compared to ARCnet.

Ethernet defines the infrastructure upon which the network is built: it does not define the type of network operating system. All commonly-used network operating systems can work on an Ethernet network, and if the network is built using a solid Ethernet base, then the operating system can always be changed later.

Ethernet is often referred to by network administrators as 802.3, because that's

the definitive standard set up by the Institute of Electrical and Electronics Engineers (IEEE). The standards are designed to ensure compatibility between different bits of equipment made by different manufacturers. Without using this standard, it would be impossible to

mix and match Ethernet components from different sources.

As well as defining the practical building blocks for LANs, Ethernet also specifies the techniques used to control the flow of information over the network cables. The technique Ethernet uses is called CSMA/CD (a memorable little acronym) which stands for "carrier sense multiple access with collision detection". Because several devices may try to communicate at any given time, access methods need to be established. Using CSMA/CD, a device first checks to see if the cable is free from other carriers. It then transmits while continuing to monitor the cable. If a collision is detected, the device stops transmitting and tries again later. On a CSMA network with collision detection, all stations can sense traffic on the network so that individually, they can identify the right moment to transmit. Without collision detection it is possible for two stations to transmit simultaneously.

Client-server, at your service

Client-server is one of those trendy computer terms which means slightly different things to different people. Strictly speaking, client-server is an architecture in which processes running independently of each other, send requests, and provide each other with services. The roles of *client* and *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 a client *and* a server — it may be both a service provider and a service requester.

If you don't agree with this definition, it's because the meaning of the term has shifted over the past couple of years to mean 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 the server process to sit on the same machine as the client. Client-server software usually shields the user from knowing the physical location of the server by redirecting service calls appropriately, and an individual program can be a client, a server, or both.

The basic idea behind client-server is to distribute the processing power and storage space required to run a given application. This is not a new idea by any means; 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 (Structured Query Language) commands, and the results of these requests are returned over the network. Code residing on the fileserver 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 fileserver model described above, 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.

PCW Contacts

Eleanor Turton-Hill welcomes any feedback and suggestions from readers. She is on ellie@pcw.ccmil.compuserve.com

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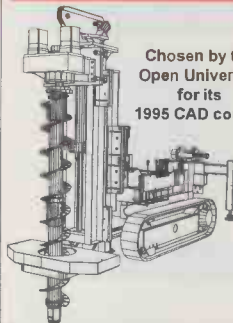
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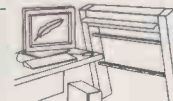
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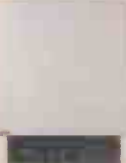
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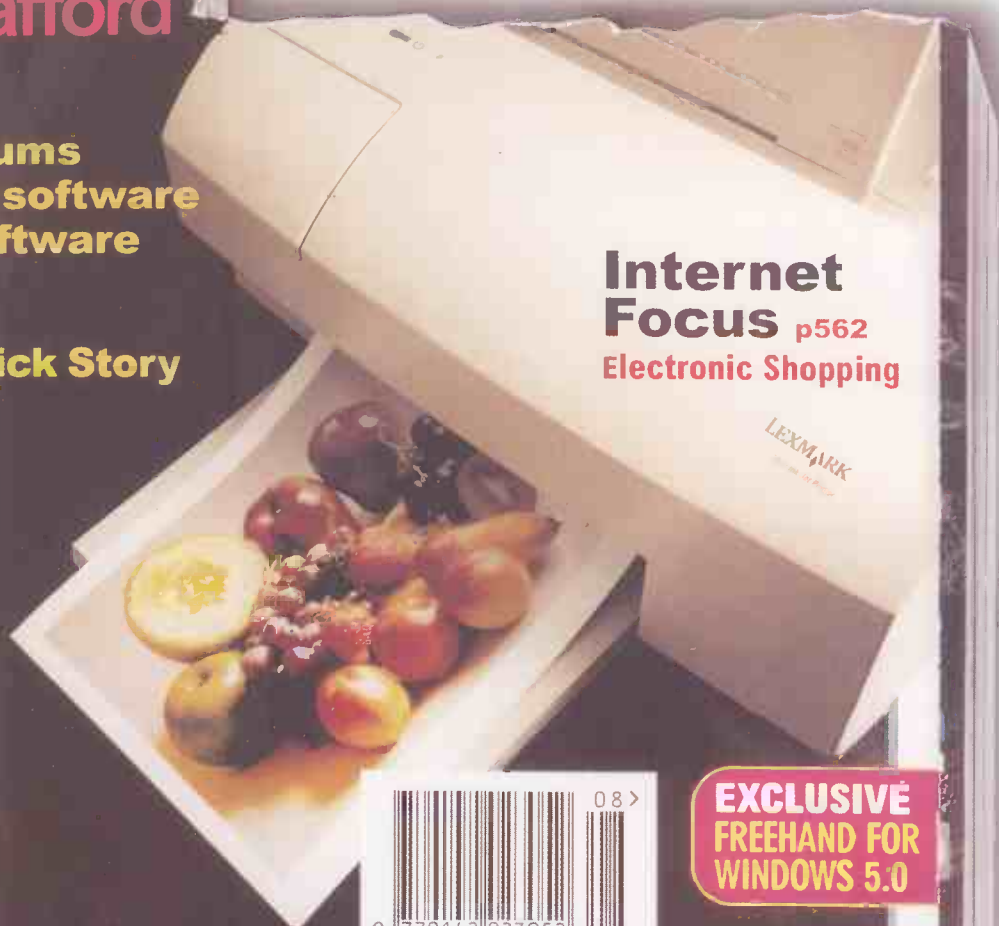
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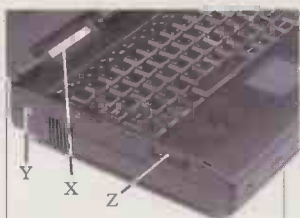
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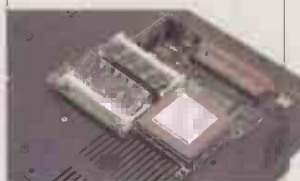
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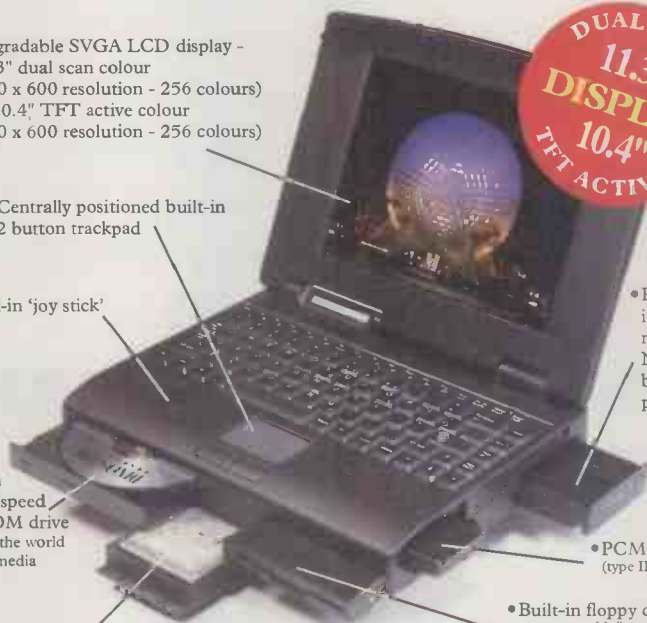
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- ➔ 1xType III or 2xType II PCMCIA Slots
- ➔ 3.5" (1.44Mb) Floppy Disk Drive
- ➔ Upgradeable Dual Scan (10.4"), TFT (10.4") Screen options
- ➔ External Keyboard Port and SVGA Monitor Port

- ➔ 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 Support plan

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. (Available for Showman Notebook) - £299.

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. (Available for Showman Notebook) - £149.

Includes 510Mb Hard Disk, 4Mb Ram & CD ROM

Processor	Dual Scan	TFT
486DX4-100Mhz	£1399	£1749
Pentium-75Mhz	£1489	£1839
Pentium-90Mhz	£1549	£1899
Pentium-100Mhz	£1799	£2099
Pentium-120Mhz	£1999	£2299

ACCESSORIES AND UPGRADES

Upgrade per 4Mb RAM	£160
Upgrade to 16Mb Ram	£450
Lotus Smartsuite V.3	£349
Upgrade to 810Mb Hard Disk	£179
Upgrade to 1Gb Hard Disk	£399



XITTEC

The **Future**
TOGETHER

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Please Note: All prices exclude VAT at 17.5% & delivery prices. Specifications are subject to change without notice. E & OE.

PLEASE CALL - TELEPHONE: 0181 287 4000 FACSIMILE: 0181 287 4242

ELITE PRO



ELITEPRO SPECIFICATIONS:

- 486 Upgradeable Processor Socket
- V.2 PCMCIA Slot
- Removeable 510Mb 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
- External SVGA Monitor & Keyboard Port
- Simultaneous Display (excl. Dual Scan)
- Three Year Support Plan



Includes 510Mb HDD & 4Mb Ram

Processor	Mono	Dual Scan	TFT
486DX2-66	£729	£1029	£1329

Upgrade Options

Ram per 4Mb	£160
Upgrade to 810Mb Hard Disk	£179

SHOWMAN D SPECIFICATIONS:

- TFT OHP screen and tablet
- 4Mb Ram expandable to 32Mb
- Built-In sound card, speakers & Microphone, 128K Flash Rom.
- 3.5" (1.44Mb) floppy disk drive
- 32 bit Vesa Local Bus, 1Mb graphics
- Built-In Trackball

- Serial and Parallel ports
- 2 x Type II PCMCIA or 1 x Type III
- 510Mb Hard disk drive - removeable
- External keyboard port & SVGA port
- Auto-Switching mains battery charger
- Carry briefcase with accessory pockets
- Full three year support plan
- Fan and stand, MS DOS 6.22, Windows 3.11 and Lotus SmartSuite preloaded.

SHOWMAN D

In-Built Overhead Projector Tablet



Includes 510Mb HDD & 4Mb Ram

Processor	TFT
486DX4-100MHz	£1799

The Showman D-Series will give you all the power of portability with the ability to project images through an overhead projector. Enhancing your presentations while expanding your mobility.

EXPLORA™



INTEGRATED ALL-IN-ONE MULTI-MEDIA TV COMPUTER

Offering the space and installation advantages of a one-piece computer

EXPLORA SPECIFICATIONS:

- Intel Pentium 75, 90 or 120Mhz processor
- 8Mb Ram upgradeable to 128Mb
- 256K Cache, supports EDO memory
- 3.5" (1.44Mb) Internal Floppy Disk Drive
- 64 Bit PCI graphics card, 1Mb/2Mb
- Built-In 15" non-interlaced SVGA monitor
- EIDE 800Mb upgradeable hard disk

- PCI enhanced architecture
- Built-In 5.25" quad speed CD Rom
- 2 x serial ports, 1 x ESP-EPP parallel port
- 1 x midi game port, earphone socket
- 16 Bit Built-In sound card, speakers
- Dimensions only 14.2" x 14.8" x 16.9"
- EPA power management
- Mouse and keyboard
- Microsoft Windows 95
- Three year support plan

8MB RAM & 800MB HDD

Pentium 75MHz	£1259
Pentium 90MHz	£1349
Pentium 100MHz	£1399
Pentium 120MHz	£1479

ACCESSORIES AND UPGRADES

TV Tuner & TV remote Software	£189
MPEG Controller card	£149
28:800 internal Fax/Modem	£159
Hi-Fi software drivers	£19
Dos 6.22 & Win 3.11	£65
Ram per 4Mb	£80

Call for other specifications & software bundles

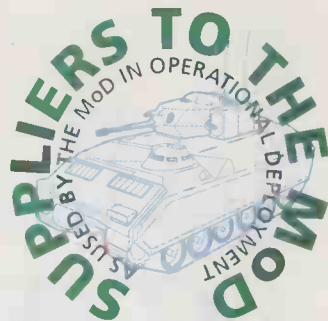


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PRESENTATION

PCMCIA & portable options



MAXIMISE THE POTENTIAL OF YOUR NOTEBOOK

OHP TABLET

640x480 Overhead projector tablet for professional group presentations.

Perfect for projecting your company's corporate image.



OHP PROJECTOR

The 3M 9800 high lumen series will make your presentations come alive with greater colour saturation and unsurpassed image definition for all presentations that demand brilliant performance.



EMP 3000 SERIES

Multi-media LCD projector combining portability, remote control and video data input that projects exceptionally high contrast images.

PCMCIA DUAL SPEED CD ROM

This portable dual speed CD Rom will allow you to join the multi-media revolution and to access new games, CDs and educational software.



FAX/MODEM 14:400

Enhance your portable with the PCMCIA fax communication solution. Send and receive faxes and access the Web (Internet).



CELLULAR TELEPHONE

The Nokia cellular data card gives you the opportunity to keep in touch with E-Mail and fax messages - Your office on the road.

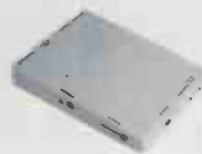
PORTABLE SCANNER

A portable colour scanner that requires no power, the perfect notebook accessory.



POINTING DEVICE

A state-of-the-art remote pointing system for the presenter and educator.



NOTEBOOK PC-TV ADAPTOR

Full feature computer to TV signal conversion box for the notebook to television.

PCMCIA

➔ Dual speed CD Rom	£189
➔ Quad speed CD Rom	£299
➔ Six speed CD Rom	£399
➔ 14:400 fax/modem	£149
➔ SCSI card	£185
➔ Ethernet, network card	£119
➔ Ethernet Combo card	£149
➔ Cellular Nokia card	£429
➔ Join the Internet	£20

PRESENTATION

➔ 3M OHP 640:480 Tablet	£1999
➔ ASK OHP 640:480 Tablet	£2299
➔ EMP 3000 LCD projector	£6999
➔ Overhead projector 3M 9800	£749
➔ Pointing device	£69
➔ Overhead Projector screen	£129
➔ External keyboard	£25
➔ Portable colour scanner	£299
➔ External 14" monitor	£155

ACCESSORIES

➔ Notebooks 4Mb Ram upgrade	£160
➔ Additional 510Mb hard disk	£199
➔ External speakers	£25
➔ Card Wizard	£75
➔ Cannon BJ30	£139
➔ PC-TV adaptor	£159
➔ Encarta '96	£45
➔ Additional carry case	£29
➔ 14:400 fax/modem with voice	£95



A British Company

UNIT 7, PRINCESS MEWS,
HORACE ROAD,
KINGSTON, SURREY KT1 2SZ



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All the figures you expect to see and a couple you don't.

INTEL 75MHZ PENTIUM PROCESSOR 4MB VIDEO MEMORY

EXPANDABLE 3 ISA AND 4 PCI SLOTS 8MB RAM ENHANCED IDE

256MB CACHE INTEGRATED PCI LOCAL BUS ARCHITECTURE

14" COLOUR SVGA MONITOR 16-BIT STEREO SOUND CARD WITH SPEAKERS QUAD SPEED CD-ROM

MULTIMEDIA

MICROSOFT WINDOWS 95



With Multimedia
£949
Without Multimedia: £849

DX4-100 option with Multimedia
£699
Without Multimedia: £599

DX4-100 option - as above except 4MB RAM, 850MB hard disk, 32 bit VESA local bus architecture, expandable 4 ISA and 3 VESA slots.

All machines come with free Windows '95 or DOS- Windows, mouse, technical support, a free selection of software, CD titles*, and 12 months return-to-base warranty. On-site warranty £49.

With features and options you'd normally associate with much more expensive PCs, Mitac offers a complete system of unequalled price/performance.

Mitac products are also supported by a network of sales, service and customer care staff, based at the European manufacturing and service centre in Telford.



All prices exclude VAT and delivery and are subject to change without notice E & OE.

Call Actinet Computers Limited now on 01952 606151.
Order line open 9am-5.30pm Mon-Fri, 9am-1.00pm Saturdays.

MITAC 
The Quiet Giant.

*Multimedia option only.

SVGA, WAVE, 11.8", MPEG, CD-V!

What on earth is all this? All these letters is our way of telling you that the Accura Portable+ Notebook has lots and lots of features, enough to make it the most comprehensively appointed notebook on the market.

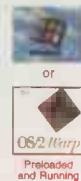
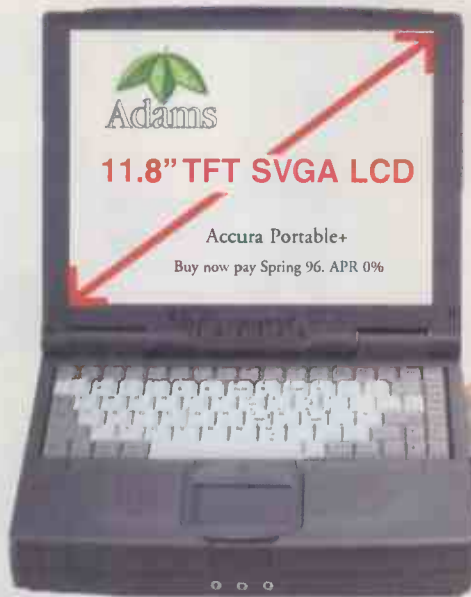
Whereas the 486 version is not quite as all singing and dancing, the Pentium version has the largest TFT LCD panel currently available at 11.8" and with SVGA 800 x 600 resolution. Being able to display 65,000 colours, your corporate multimedia presentation never looked better.

A full 30fps CD-Video presentation can be made using the optional in built CD-ROM with glorious stereo sound using the software MPEG capabilities of the Pentium Portable+. Now that will impress your customer! No more flicking through colour transparencies, let your Accura Portable+ do the work for you.

Save! Our pre-Christmas sale has been a huge success, however when you read this there may be a few portables left. If your ready for a New Year bargain, call sales quickly to find out.

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



Intuitive trackpad pointing device and microphone, audio out and headphone out jacks.

Optional secondary battery fits in FDD slot

Optional CD-ROM installed

Quick removable hard drive.

PC Card type IV slot.

Port replicator allows permanent connection of peripheral devices.

Accura Portable+

Pricing and personal finance

Buy now and pay in 6 months time!

Model	Deal Scan SVGA 11.3"	TFT Active SVGA 11.8"	TFT Active SVGA 11.3"
486DX2-66	£1399	£1699	N/A
486DX4-100	£1449	£1749	N/A
Pentium® 75	£1899	N/A	£2399
Pentium® 100	£2049	N/A	£2549

Finance example

Pentium 75, 11.3 SVGA DSTN
Cash price £1899 + Carr £12 + VAT
Total price inc VAT £2245.43
Deposit 15%, £336, pay the balance of £1909.43 in six months time.
Subject to status, written details available.

Initialled!

Accura Portable+

Pentium® features

- Pentium® 75 or 100MHz CPU's, with 256k level 2 cache
- PCI local bus with 64 bit memory addressing
- 8mb standard memory upgradeable to 32mb
- Quick removable 520mb 2.5" enhanced IDE PCI local bus hard drive upgradeable to 1.2gb
- 11.3" SVGA DSTN LCD, and 11.8" TFT VGA LCD (65,000 colours) both with with 800 x 600 resolution
- PCI 64 bit local bus graphics accelerator giving notebook resolution of 800 x 600 and external CRT up to 1024 x 768, with software MPEG-1 playback.
- 1.44mb removable FDD built in
- 16 bit stereo wavetable sound card with built in speakers
- Optional CD-ROM or secondary battery
- BIOS controlled dual level power management facility
- Built in LED status indicators
- Intuitive front mounted trackpad pointing device
- Type IV PC Card slot (Takes 1 x type III and 1 x type II)
- 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 DOS 6.22/Win FWG 3.11 or Win OS/2 v3 preloaded and running
- 14 day money back guarantee of satisfaction

Accura Portable+

486 features

- 486DX2-66 or DX4-100 CPU's
- 4mb standard memory upgradeable to 32mb
- Quick removable 340mb 2.5" enhanced IDE VESA local bus hard drive upgradeable to 1.2gb
- 11.3" SVGA DSTN LCD, and 10.4" TFT VGA LCD (65,000 colours) both with with 800 x 600 resolution
- VESA local bus graphics accelerator 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 with built in speakers
- Optional CD-ROM or secondary battery
- BIOS controlled dual level power management facility
- Built in LED status indicators
- Intuitive front mounted trackpad pointing device
- Type IV PC Card slot (Takes 1 x type III and 1 x type II)
- 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 DOS 6.22/Win FWG 3.11 or Win OS/2 v3 preloaded and running
- 14 day money back guarantee of satisfaction

Accura Portable+

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, Switch, Mastercard and American Express, or on a cheque with order basis. We charge £12 for carriage on all portables. A 14 day money back guarantee* is offered on all portables.

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.

Sales 0161 877 8822



Adams' are the official computer supplier to Williams Renault for 1995/1996

0161 877 8822

Accura Portable+

Some options and accessories

Memory upgrade to 8mb (486)	£159
Memory upgrade to 16mb (486)	£420
Memory upgrade to 20mb (486)	£595
Memory upgrade to 32mb (486)	£980
Memory upgrade to 16mb (Pentium)	£299
Memory Upgrade to 24mb (Pentium)	£595
Memory upgrade to 32mb (Pentium)	£821

HDD upgrade from 340mb to 520mb	£99
HDD upgrade from 520mb to 810mb	£139
HDD upgrade from 520mb to 1.2gb	£299
Internal x4 speed CD-ROM	£199
Internal MPEG-1 card (for 486)	£229
Additional primary battery or secondary battery	£79
Docking Station	£349
Port replicator	£55

Adams

Advanced Computer Technology

ADAMS TECHNOLOGY LTD, CITY POINT, CHESTER RD, OLD TRAFFORD, MANCHESTER M32 0RW UK. Fax: 0161 877 8884

*Money back guarantee (not available with finance purchases) and warranty subject to Adams Technology's terms and conditions

Question?

Well, what is the question? Having been asked many times why we have two ranges of systems with similar specifications we thought we'd better clear up why we do it, and at the same time answer a question. Will an Adams Premium or Professional system fit your bill best?

Our Premiums give you the quality and value for money that you come to expect these days from us and many other vendors in the big wide market place. Perfectly fitting for the requirements of business and home, loaded with software and ready to work.



The Professionals are, well, for the professionals amongst you. Award winning machines with similar looks but different components designed for performance and outright flexibility. They suit admirably the business workgroups, the developers, the publishers and the professional power hungry person. We will always make sure that the latest, fastest components are fitted; for instance, how about an 8 speed CD-ROM with a 1200k/sec data transfer rate?

With so many companies now needing a means to show and edit video presentations, we launch

Accura Premium

Premium 586

P75	£1249
P90	£1349

- Intel® Pentium® 75/100mhz CPU
- PCI local bus
- 256k level 2 cache
- 8mb RAM
- 850mb 11ms IDE hard drive with PCI 32-bit EIDE controller
- 3.5" 1.44mb floppy drive
- Ultra fast PCI graphics card with 1mb RAM
- 16 bit sound card and speakers
- Quad speed, multi session ATAPI CD-ROM drive
- 14" Accuscan energy saving, MPR-II monitor, NI, max res 1024 x 768
- 2 serial, 1 parallel port
- Desktop case with 200w PSU
- Windows 95 UK keyboard
- Ergonomic 2 button 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 Microsoft Works

Premium 586 Work Station

P100	£1449
P120	£1549

- Intel® Pentium® 100/120mhz CPU
- PCI local bus
- 256k level 2 cache
- 8mb EDO RAM
- 850mb sub 11ms IDE hard drive with PCI 32-bit EIDE controller
- 3.5" 1.44mb floppy drive
- #9 Fx Vision 330 graphics card with 2mb DRAM
- Quad speed, multi session ATAPI CD-ROM drive
- 15" Accuscan energy saving, MPR-II monitor, NI, max res 1280 x 1024
- 2 serial, 1 parallel port
- Desktop case with 200w PSU
- Windows 95 UK keyboard
- Ergonomic 2 button 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

To be, or

this month 2 new machines. One for MPEG and AVI presentation and another for video editing and MPEG creation. Both have 30fps playback and both have a PAL overlay for ultimate quality. Both units will either playback on a computer monitor, TV or professional projection/TV distribution system. Not for the faint hearted but a package to get your corporate presentations moving!

Remember our little barrage of software:



Don't forget that we include Novell Perfect Office with many of our PC's. Win OS/2 Warp V3 is available as an alternative to Windows 95, this time we load Lotus Smartsuite for OS/2.

Our 3 year warranty remains unchanged, with on site service during the first year. For those wishing to spread the financial burden, we can now offer you a "Buy now pay in Summer 1996" credit option. Of course at 0% APR*

Find out answers to your questions by calling Adams sales on 0161 877 8822,

PS: Adams make many systems that are not listed here, please call with your specifications and we'll work out a configuration just for you!

Accura Professional Powered by MICRONICS

Professional 586 WS

P100	£2099
P120	£2199
P133	£2249

- Intel Pentium® 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
- Six 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 (w/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 Perfect Office Professional

Professional 586 MM

P100	£2699
P120	£2799
P133	£2949

- Intel Pentium® 100/120/133 mhz CPU
- Intel Triton® chipset with 256k synchronous SRAM
- Plug and play compatible with auto configuration
- 16mb EDO RAM (max 128mb)
- 1.2gb sub 10ms IDE hard drive with PCI 32 bit mode 4 enhanced IDE controller
- Eight (x8) speed multi session ATAPI CD-ROM drive
- Soundblaster AWE32 and Yamaha M10 speakers
- 3.5" 1.44mb floppy drive
- Matrox Millennium 2mb WRAM graphics card (w/g to 8mb)
- 17" Iiyama Vison Master Pro, max res, 0.25 DP, DiamondTron, 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 Workstation Plus

P100 £1799

P120 £1899 P133 £2049

- Intel® Pentium® 100/120/133mhz CPU
- PCI local bus with 256k level 2 cache
- 16mb 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
- Soundblaster® Pro16 and speakers
- 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
- Windows 95 UK keyboard
- Ergonomic 2 button 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 Perfect Office Standard



Premium 586 Multi Media

P100 £2049

P120 £2199 P133 £2349

- Intel® Pentium® 100/120/133mhz CPU
- PCI local bus with 256k level 2 burst 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® Pro16 and speakers
- 3.5" 1.44mb floppy drive
- #9 FX Motion 771 64 bit PCI graphics card with 2mb VRAM (w/g to 4mb)
- 17" Accuscan MPR-II monitor, NI, max res 1280 x 1024
- 2 serial, 1 parallel port
- Desktop case with 200W PSU
- Windows 95 UK keyboard
- Ergonomic 2 button 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 Perfect Office Standard

Accura options

850mb IDE → 1gb 10ms IDE HDD	£45
1gb IDE → 1.2gb 10ms IDE HDD	£35
Std memory upgrades per 1mb	£29
EDO memory upgrades per 1mb	£32
Ultra fast PCI graphics 1mb → #9 Fx Vision 330 with 2mb DRAM	£55
#9 Fx Vision 330 with 2mb DRAM → #9 FX Motion 771 2mb VRAM	£99
VRAM upgrades 2mb → 4mb	£150
14" → 15" Accuscan Monitor 1280 x 1024, MPR-II	£85
15" → 17" Accuscan Monitor 1280 x1024, MPR-II	£219
17" Accuscan Monitor 17" → 17" Iiyama Vision Master	£109
NE2000 compatible ethernet card	£35

1gb IDE → 1.6gb IDE hard drive	£75
1.2gb IDE → 2.0gb fast SCSI-II with DPT 2024 controller	£659
6 speed → 8 speed ATAPI CD-ROM	£89
4gb AV SCSI → 9gb AV SCSI hard drive	£CALL
DPT 2024 → DPT2124 SCSI controller	£135
DPT CM4000 cache module (0 mb)	£349
Memory for CM4000 (per 1mb)	£32
Matrox Millennium 2mb → Matrox Millennium with 4mb WRAM	£150
Matrox Millennium 4mb → 8mb WRAM w/g	£270
17" Iiyama Vision Master → 17" Vision Master Pro DiamondTron	£99
17" Iiyama Vision Master Pro → 21" Iiyama MF-9121 DiamondTron Pro	£849

PLEASE CALL FOR MANY MORE OPTIONS

not to be?

no compromises for power users



Professional 586 Video Player

P100 £4499

- Intel Pentium® 100 mhz CPU
- 256k synchronous cache
- 16mb EDO RAM (max 128mb)
- 4.0gb 9.5ms fast SCSI-II AV hard drive with DPT 2024 PCI 32-bit bus mastering SCSI controller
- 8 speed IDE ATAPI CD-ROM
- 3.5" 1.44mb floppy drive
- Matrox Millennium graphics card with 6mb WRAM
- Fast Electronics FPS-60, digital video card with M-JPEG (AVI) and MPEG extension. Full screen overlay up to 1280 x 1024.
- Orchid NuSound PNP with 3D spatialiser & Yamaha M10 speakers
- Iiyama Vision Master Pro 17, DiamondTron 0.25mm, 1600 x 1200 up to 100hz 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)
- MS-DOS 6.22 and Windows FWG 3.11
- Adobe Premier 4 LE



Professional 586 Video Editor

P133 £7239

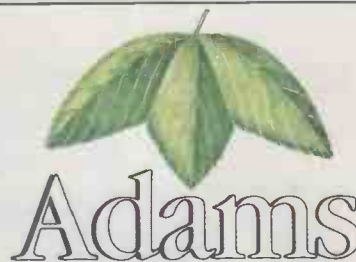
- Intel Pentium® 133 mhz CPU
- 256k synchronous cache
- 64mb EDO RAM (max 128mb)
- 4.0gb 9.5ms fast SCSI-II AV hard drive with DPT 2024 PCI 32-bit bus mastering SCSI controller
- Dual/Quad Speed internal CD-ROM recorder/player
- 3.5" 1.44mb floppy drive
- Matrox Millennium graphics card with 6mb WRAM
- Fast Electronics Movie Machine II, digital video card editing card with M-JPEG (AVI) and MPEG extensions. Full screen overlay up to 1280 x 1024.
- Studio quality 4:2:2 digitisation
- Orchid NuSound PNP sound card with 3D spatialiser & Yamaha M10 speakers
- Iiyama Vision Master Pro 17, DiamondTron 0.25mm, 1600 x 1200 up to 100hz refresh
- 2 serial (16550), 1 parallel port (EPP/ECP)
- Desktop or Tower case with 200w PSU
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- MS-DOS 6.22 and Windows FWG 3.11
- Adobe Premier4 LE, mixing and digital effects software

ordering

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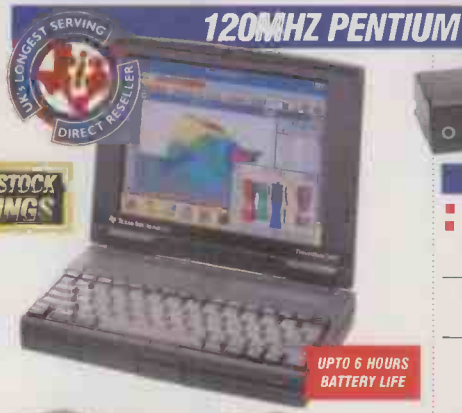
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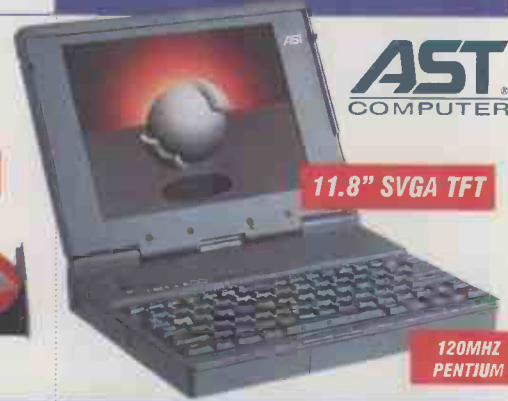
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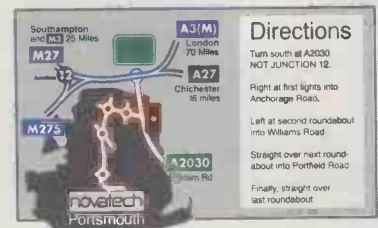
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Designed for Windows 95

WHAT PC?

Designed for Windows 95



Mesh Elite Pro 75

File Edit View Help

- ◆ Pentium P75 Processor
- ◆ Intel Triton chipset Motherboard
- ◆ Upgradeable to 180MHz Pentium & P6
- ◆ 256Kb Pipeline Burst Mode cache
- ◆ Full Windows 95 plug & play support
- ◆ 16 Mbyte EDO RAM (max 256Mb)
- ◆ Fast PCI Enhanced IDE controller
- ◆ 1.08 Gb Fast IDE hard disk drive
- ◆ Quad Speed CD ROM drive
- ◆ MESH Multimedia Kit 1 (see bottom of page)
- ◆ 2 fast serial UART 16550 & 1 bi-directional parallel ports
- ◆ 2 Mbyte VRAM Stealth PCI Accelerator with Software MPEG Decode
- ◆ 15" SVGA NI Monitor (non-interlaced to 1024x768, low radiation, 0.28 pitch, Energy Star)
- ◆ 1.44 Mbyte 3.5" Floppy Drive
- ◆ 102 Key Keyboard
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- ◆ Windows 95 c/w disks & manuals
- ◆ Lotus SmartSuite 3.1 (CD version)
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Mesh Elite Pro 90

File Edit View Help

- ◆ Pentium P90 Processor
- ◆ Intel Triton chipset Motherboard
- ◆ Upgradeable to 180MHz Pentium & P6
- ◆ 256Kb Pipeline Burst Mode cache
- ◆ Full Windows 95 plug & play support
- ◆ 16 Mbyte EDO RAM (max 256Mb)
- ◆ Fast PCI Enhanced IDE controller
- ◆ 1.08 Gb Fast IDE hard disk drive
- ◆ Quad Speed CD ROM drive
- ◆ MESH Multimedia Kit 1 (see bottom of page)
- ◆ 2 fast serial UART 16550 & 1 bi-directional parallel ports
- ◆ 2 Mbyte VRAM Stealth PCI Accelerator with Software MPEG Decode
- ◆ 15" SVGA NI Monitor (non-interlaced to 1024x768, low radiation, 0.28 pitch, Energy Star)
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Mesh Elite Pro 100

File Edit View Help

- ◆ Pentium P100 Processor
- ◆ Intel Triton chipset Motherboard
- ◆ Upgradeable to 180MHz Pentium & P6
- ◆ 256Kb Pipeline Burst Mode cache
- ◆ Full Windows 95 plug & play
- ◆ 16 Mbyte EDO RAM (max 256Mb)
- ◆ Fast PCI Enhanced IDE controller
- ◆ 1.08 Gb Fast IDE hard disk drive
- ◆ Quad Speed CD ROM drive
- ◆ MESH Multimedia Kit 1 (see bottom of page)
- ◆ 2 fast serial UART 16550 & 1 bi-directional parallel ports
- ◆ 2 Mbyte VRAM Stealth PCI Accelerator with Software MPEG Decode
- ◆ 15" SVGA NI Monitor (non-interlaced to 1024x768, low radiation, 0.28 pitch, Energy Star)
- ◆ 1.44 Mbyte 3.5" Floppy Drive
- ◆ 102 Key Keyboard
- ◆ Microsoft Original Mouse
- ◆ Windows 95 c/w disks & manuals
- ◆ Lotus SmartSuite 3.1 (CD version)
- ◆ Accent Express multilingual word processor
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Upgrade Monitor	17" ADI SVGA £195	17" Idek SVGA £299
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- Soundblaster Vibra 16 Sound Card
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- 6 CD ROMs (see below for details)

All Mesh Elite⁹⁵ Pro PCs are supplied with Quad Speed CD ROM drive as standard. To upgrade to 6 speed IDE CD ROM drive add £95.



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NOVELL

Windows 95

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MESH Elite Pro 133

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MESH NT WorkStation

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Mesh Elite Pro 120

File Edit View Help

- ◆ Pentium P120 Processor
- ◆ Intel Triton chipset Motherboard
- ◆ Upgradeable to 180MHz Pentium & P6
- ◆ 256Kb Pipeline Burst Mode cache
- ◆ Full Windows 95 plug & play
- ◆ 16 Mbyte EDO RAM (max 256Mb)
- ◆ Mode 5 PCI Enhanced IDE controller
- ◆ 1.08 Gb Fast IDE hard disk drive
- ◆ 6 Speed CD ROM drive
- ◆ MESH Multimedia Kit 2 (see bottom of page)
- ◆ 2 fast serial UART 16550 & 1 bi-directional parallel ports
- ◆ 2 Mbyte VRAM Stealth PCI Accelerator or 2Mb Matrox Millennium WRAM PCI
- ◆ 17" Idek Iiyama Visionmaster monitor
- ◆ 1.44 Mbyte 3.5" Floppy Drive
- ◆ 102 Key Keyboard
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- ◆ Windows 95 c/w disks & manuals
- ◆ Lotus SmartSuite 3.1 (CD version)
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- ◆ Desktop/Tower case c/w TUV approved 200W PSU
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Mesh Elite Pro 133

File Edit View Help

- ◆ Pentium P133 Processor
- ◆ Intel Triton chipset Motherboard
- ◆ Upgradeable to 180MHz Pentium & P6
- ◆ 256Kb Pipeline Burst Mode cache
- ◆ Full Windows 95 plug & play
- ◆ 16 Mbyte EDO RAM (max 256Mb)
- ◆ Mode 5 PCI Enhanced IDE controller
- ◆ 1.08 Gb Fast IDE hard disk drive
- ◆ 6 Speed CD ROM drive
- ◆ MESH Multimedia Kit 2 (see bottom of page)
- ◆ 2 fast serial UART 16550 & 1 bi-directional parallel ports
- ◆ 2 Mbyte VRAM Stealth PCI Accelerator or 2Mb Matrox Millennium WRAM PCI
- ◆ 17" Idek Iiyama Visionmaster monitor
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- ◆ 102 Key Keyboard
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- ◆ Windows 95 c/w disks & manuals
- ◆ Lotus SmartSuite 3.1 (CD version)
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- ◆ Desktop/Tower case c/w TUV approved 200W PSU
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NT WorkStation

File Edit View Help

- ◆ Pentium P90 Processor (P100, P120, P133 and P150 add P.O.A.)
- ◆ Intel Triton chipset Motherboard
- ◆ 256Kb Pipeline Burst Mode cache
- ◆ Full Windows 95 & NT Support
- ◆ 32 Mbyte EDO RAM (max 256Mb)
- ◆ DPT 2420 SCSI-II Controller with 4Mbyte Caching Module
- ◆ 2Gbyte SCSI-II Drive
- ◆ 6 Speed SCSI CD ROM drive
- ◆ 2 Mbyte VRAM Stealth PCI Accelerator with Software MPEG Decode
- ◆ 21" IDEK Iiyama Monitor
- ◆ US Robotics Sportster Fax/Modem
- ◆ 2 fast serial UART 16550 & 1 bi-directional parallel ports
- ◆ 1.44 Mbyte 3.5" Floppy Drive
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Upgrade Hard disk	1Gb SCSI* £295	2Gb SCSI* £495
Upgrade Monitor	20" Hitachi SVGA £495	21" Idek SVGA £895
Upgrade Graphics	4Mb VRAM/WRAM £110	

* Includes Adaptec 2940 PCI controller (2Gb, 4Gb & 9Gb options available)

Upgrade RAM	32Mb £460	64Mb £1200
Upgrade Hard disk	1Gb SCSI* £295	2Gb SCSI* £495
Upgrade Monitor	20" Hitachi SVGA £495	21" Idek SVGA £895
Upgrade Graphics	4Mb VRAM/WRAM £110	

* Includes Adaptec 2940 PCI controller (2Gb, 4Gb & 9Gb options available)

Upgrade RAM	32Mb £460	64Mb £1200
Upgrade Hard disk	1Gb SCSI* £295	2Gb SCSI* £495
Upgrade Monitor	20" Hitachi SVGA £495	21" Idek SVGA £895
Upgrade Graphics	4Mb VRAM/WRAM £110	

* Includes Adaptec 2940 PCI controller (2Gb, 4Gb & 9Gb options available)

MULTIMEDIA KIT 2

- AWE32 Wavetable (value pack) Sound Card
- Power Speakers
- 6 CD ROMs (see below for details)

All Mesh Elite⁹⁵ Elite Pro PCs are supplied with Quad Speed CD ROM drive as standard. To upgrade to 6 speed IDE CD ROM drive add £95.

Kits 1 & 2 include Microsoft Encarta, Dangerous Creatures, Works for Windows, Money, Golf, CD Sampler, Entertainment Pack & Scenes. Plus CD Power: over 400 additional programmes & files.

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MESH Elite⁹⁵ PCs - the



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Model shown with optional Family Pack



Model shown with optional Family Pack



Model shown with optional Family Pack

"From the moment you unpack the **MESH Elite⁹⁵ 75**, there is a reassuring feel to the system... It arrives fully configured... and won't have a problem with expansion. The pricing is extremely competitive making this our favoured system in the review"

Computer Shopper "Best Buy" - September '95

"A low cost Pentium system with the latest Triton chipset motherboard, large capacity hard disk, offering good performance and complemented by a 15" monitor. **Good value**"

Computer Buyer "Recommended" - June '95

"We felt that the **MESH Elite⁹⁵ 100** offered the most overall and clearly deserved the Best Buy... As Intel introduces more and more powerful Pentium chips, even 100Mhz power is within the means of a much wider range of buyers" **What PC? "Best Buy"** - September '95

- Pentium P75 Processor
- Intel Triton chipset Motherboard
- **256Kb Pipeline Burst Mode cache** (System runs 15-20% faster than standard Pentium PCs)
- Full Windows 95 plug & play support
- **8 Mbyte RAM (max 256Mb)**
- Fast PCI Enhanced IDE controller
- **850 Mbyte Fast IDE hard disk drive**
- **Quad Speed CD Rom drive** (see MESH Multimedia for upgrade options)
- 2 fast serial UART 16550 & 1 bi-directional parallel ports
- **1 Mbyte Stealth PCI Accelerator with Software MPEG Decode**
- 14" SVGA Non-interlaced Monitor
- 1.44 Mbyte 3.5" Floppy Drive
- 102 Key Keyboard, Microsoft Original Mouse
- See below for Operating System options
- Lotus SmartSuite 3.1 CD version
- Accent Express multilingual word processor CD version
- Desktop case/Mini tower c/w TUV approved 200W PSU
- Comprehensive 1st year parts & labour Warranty
- Free Lifetime Technical Support



- Pentium P90 Processor
- Intel Triton chipset Motherboard
- **256Kb Pipeline Burst Mode cache** (System runs 15-20% faster than standard Pentium PCs)
- Full Windows 95 plug & play support
- **8 Mbyte EDO RAM (max 256Mb)**
- Fast PCI Enhanced IDE controller
- **850 Mbyte Fast IDE hard disk drive**
- **Quad Speed CD Rom drive** (see MESH Multimedia for upgrade options)
- 2 fast serial UART 16550 & 1 bi-directional parallel ports
- **1 Mbyte Stealth PCI Accelerator with Software MPEG Decode**
- 15" SVGA NI Monitor (non-interlaced to 1024x768, low radiation, 0.28 pitch, Energy Star)
- 1.44 Mbyte 3.5" Floppy Drive
- 102 Key Keyboard, Microsoft Original Mouse
- See below for Operating System options
- Lotus SmartSuite 3.1 CD version
- Accent Express multilingual word processor CD version
- Desktop case/Mini tower c/w TUV approved 200W PSU
- Comprehensive 1st year parts & labour Warranty
- Free Lifetime Technical Support



- Pentium P100 Processor
- Intel Triton chipset Motherboard
- **256Kb Pipeline Burst Mode cache** (System runs 15-20% faster than standard Pentium PCs)
- Full Windows 95 plug & play
- **8 Mbyte EDO RAM (max 256Mb)**
- Fast PCI Enhanced IDE controller
- **850 Mbyte Fast IDE hard disk drive**
- **Quad Speed CD Rom drive** (see MESH Multimedia for upgrade options)
- 2 fast serial UART 16550 & 1 bi-directional parallel ports
- **1 Mbyte Stealth PCI Accelerator with Software MPEG Decode**
- 15" SVGA NI Monitor (non-interlaced to 1024x768, low radiation, 0.28 pitch, Energy Star)
- 1.44 Mbyte 3.5" Floppy Drive
- 102 Key Keyboard, Microsoft Original Mouse
- See below for Operating System options
- Lotus SmartSuite 3.1 CD version
- Accent Express multilingual word processor CD version
- Tower/desktop case c/w TUV approved 200W PSU
- Comprehensive 1st year parts & labour Warranty
- Free Lifetime Technical Support



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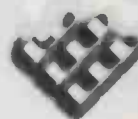
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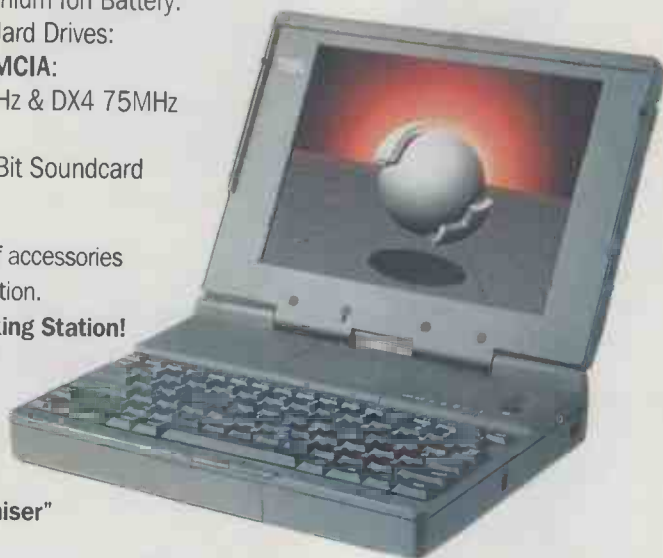


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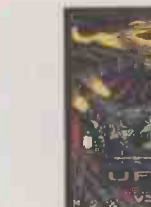
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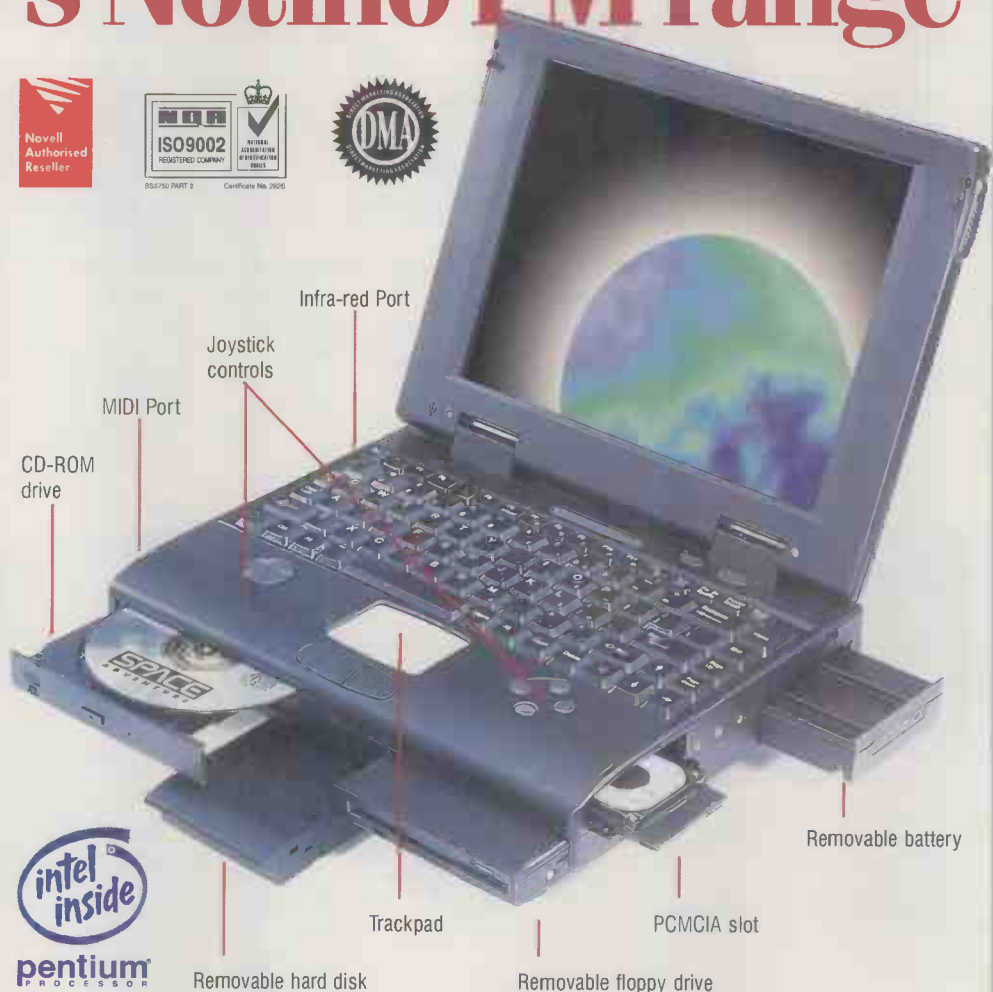
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Instead of a mouse the Notino has a trackpad. This, located at the front, is a miniature touch-control screen. Because it has no moving parts it is less delicate than a mouse, which can easily be affected by dirt.

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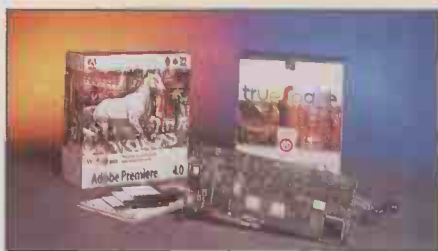


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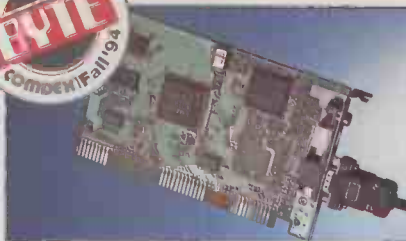
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Toshiba notebooks are unbeatable in terms of quality, advanced features, performance and ease of use. Do not consider a low quality clone-buy the best. The following common features are standard with all models:-

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 95 or WFWG 3.11 are pre-loaded, except on T2110 model. 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 486DX4-75



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 mouseport and overlay numeric keypad
- Standard ports
- 11.8" x 8.9" x 1.9" with 3.0Kg (6.6lb) weight
- Built-in autosensing AC adaptor
- NiH2 removable battery. Up to 4 hours usage

Options

4Mb RAM (PA2026U)	£165
8Mb RAM (PA2027U)	£299
16Mb RAM (PA2028U)	£575
NiH2 Battery (PA2428UR)	£34

£845

TFT COLOUR DX4-75



T2130CS

Brilliant notebook, offers greater memory than the T2110CS. 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
- 8Mb RAM expandable to 28Mb
- 520Mi.b hard disk upgradeable
- Internal 3.5" 1.44Mb floppy drive
- VGA/SVGA (640 x 480 pixel resolution) STN 10.4" diagonal display
- 84 key keyboard and mouseport 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 (PA2026U)	£165
8Mb RAM (PA2027U)	£299
16Mb RAM (PA2028U)	£575
24Mb RAM (PA2029U)	£830
Battery (PA2437U)	£30
Battery charger (PA2436U)	£146

£1359

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/SVGA (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 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

OPTION

8Mb EDO RAM (PA2031U)	£420
16Mb EDO RAM (PA2032U)	£804
32Mb EDO RAM (PA2034U)	Call
Quad speed CD-ROM (PA2653U)	£255
Li Ion battery 4hrs use (PA2487UR)	£166
Battery charger (PA2488U)	£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/SVGA (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 (PA2031U)	£420
16Mb EDO RAM (PA2032U)	£804
32Mb EDO RAM (PA2034U)	Call
Li Ion battery 4hrs use (PA2487UR)	£166
Battery charger (PA2488U)	£16

£3139

TFT COLOUR DX4-75

LIMITED QUANTITY AT VERY SPECIAL PRICE



T4850CT

This DX4-75 with its high capacity 810Mb hard disk, has all the power and performance needed on the move. Just connect to the optional deskstation IV for further expandability

- Intel DX4-75 processor
- 8Mb RAM expandable to 40Mb
- 810Mi.b hard disk
- Internal 3.5" 1.44Mb floppy drive
- VGA/SVGA (640x480 pixel resolution) TFT 10.4" diagonal display
- 84 full size keys with overlay numeric keypad, 12 function keys
- Standard ports
- PCMCIA Rel 2.0 one Type II and one Type III
- 11.7" x 8.3" x 2.2" with 3.2kg (6.9 lb) weight
- NiH2 removable battery 3.5 hours use
- MS DOS 6.2 and MS Windows for workgroups 3.11

Options

4Mb RAM (PA2012U)	£170
8Mb RAM (PA2013U)	£298
16Mb RAM (PA2014U)	£745
NiH2 battery (PA2428UR)	£34
DeskStation IV	£374

£2295

TOSHIBA



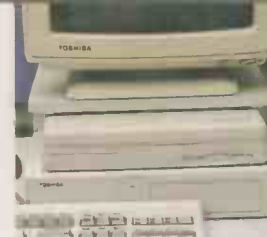
Two PCMCIA slots on all models provide ultimate expansion. Intel fax/data modem at an incredible £99 (except T3600)



Built-in Microsoft Sound System on T4850, and T4900



With Soundblaster Pro compatible sound system on T2150, Portégé and Satellite Pro



Add a deskstation to turn your notebook into an expandable desktop system

TFT COLOUR DX4-75

COLOUR DX4-75 CD ROM

TFT COLOUR SUBNOTE



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
- 520Mb hard disk upgradeable
- Internal 3.5" 1.44Mb floppy drive
- VGA/VSVA (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 (PA2026U)£185
- 8Mb RAM (PA2027U)£299
- 16Mb RAM (PA2028U)£575
- 24Mb RAM (PA2029U)£930
- Battery (PA2437U)£80
- Battery charger (PA2438U)£149

£1779



T2150CDS

The DX4-75 notebook offers spectacular performance using a 520Mib hard disk and STN colour LCD 10.4" screen. The T2150CDT model comes with TFT screen.

- Intel DX4-75 processor
- 4Mb RAM expandable to 32Mb
- 8Mb on T2150CDT model
- 520Mi.b hard disk
- Dual Spin Internal 5.25" CD-ROM
- External 3.5" 1.44Mb floppy drive
- VGA/SVGA (640x480 pixel resolution) STN 10.4" diagonal display, TFT on T2150CDT model
- 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

T2150CDT 620/8Mb£2379

Options

- 4Mb RAM (PA2026U)£187
- 8Mb RAM (PA2027U)£340
- 16Mb RAM (PA2028U)£745
- Port Replicator (PA2708U)£128
- Battery (PA2437U)£95
- Battery charger (PA2438U)£149

£1865



Portégé 610CT

The world's first 90MHz Pentium ultra notebook and the most powerful Toshiba portable. It offers very high performance in a lightweight ultra notebook package.

- Intel Pentium®90MHz processor
- 8Mb EDO RAM expandable to 40Mb
- 720Mi.b hard disk
- External 3.5" 1.44Mb floppy drive
- VGA/VSVA (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 (PA2489UR)£166
- Battery charger (PA2482U)£166

£3019

TFT COLOUR PENTIUM®

TFT COLOUR 120MHz PENTIUM®

TOSHIBA OPTIONS

THIRD PARTY OPTIONS



T4900CT

The T4900CT is the first notebook to have Intel 3.3volt 75MHz Pentium processor. Offering unsurpassed performance for all power-hungry applications.

- Intel 75MHz Pentium® processor
- 8Mb RAM expandable to 40Mb
- 810Mi.b hard disk
- Internal 3.5" 1.44Mb floppy drive
- VGA/VSVA (640 x 480 pixel resolution) TFT 10.4" diagonal display
- 84 key keyboard with mouse point
- Standard ports
- PCMCIA Rel.2.0 one Type II and one Type III
- 11.7" x 8.3" x 2.2" with 3.1Kg (6.8 lb) weight
- Soundblaster Pro compatible sound system
- Built in speakers and microphone
- NIH2 removable battery 3 hours use
- MS DOS 6.2 and MS Windows for workgroups 3.11

Options

- 8Mb EDO RAM (PA2031U)£420
- 16Mb EDO RAM (PA2032U)£804
- 32Mb EDO RAM (PA2034U)£Call
- Li Ion battery 4hrs use (PA2489UR)£166
- Battery charger (PA2482U)£166

£2719



Tecra 700CT

The ultimate in mobile multimedia, the Tecra 700CT offers full stereo sound and quad speed CD-ROM capability to complement its high performance 120MHz processor and PCI bus architecture.

- Intel® 120MHz Pentium® processor
- 1210Mi.b hard disk
- 16Mb synchronous DRAM, expandable to 48Mb
- Swappable internal/external 3.5" 1.44Mb floppy drive
- Quad speed CD-ROM
- 11.3" diagonal display size 800x600 pixel resolution
- PCI local bus support
- rechargeable, removable Li-Ion battery
- Dimensions 297 x 230 x 59mm
- Weight - 3.2Kg with FDD module fitted, 3.4Kg with optional CD-ROM module fitted
- 84 full size keys with integrated mousepoint
- Autosensing 100-240V AC adaptor
- Interfaces / Expansion Slots - ECP parallel port Serial infra-red port (IrDA) SVGA monitor port
- PCMCIA Rel. 2.0 slots 2 x type II or 1 type III
- Toshiba internal memory expansion slot
- PS/2 keyboard port
- PS/2 mouse port
- Microphone and speaker
- External FDD port
- MS-DOS 6.22 with Toshiba enhancements.
- MS Windows for workgroups 3.11 or Windows 95

Options

- 8Mb RAM PA2035U£420
- 16Mb RAM PA2036U£805
- 32Mb RAM PA2037U£1269
- Lithium ion battery PA2489UR£165
- Battery charger PA2486UY£165
- PCMCIA v.34 modem TPCV34FLUK£195
- Deskstation V PA2712EY£909
- Executive carry case T202L£34
- CD-ROM£215

£4245

- External Battery Charger:**
- T3400/T3600 (2482U)£166
 - T2100£149
 - Others (PA2422U-E)£107

- ExtraUniversal AC Adaptor:**
- T1910, T4700CT, T4800 (PA2478U)£56
 - T2400 (PA2430U)£48
 - T4600 (PA2411U)£48
 - T3400, T3600 (PA2426U-E)£48

- Toshiba PCMCIAcards:**
- PCMCIA ethernet adaptor (PCE-10BC)£125
 - PCMCIA V34 modem£195

- Other Options:**
- Carry case others£34
 - Deskstation IV£374
 - T4600 (PA2411U)£48
 - T3400, T3600 (PA2426U-E)£48

Call for options on older models

- PCMCIA Options**
- Intel 2496 fax/data modem£49
 - New media Bus Toaster SCSI adaptor£173
 - New Media Visual SCSI adaptor£149
 - New Media 16-bit sound card£196
 - New Media Combo ethernet card£125

- Parallel Port Devices**
- Backpack DS CD-ROM drive£299
 - Logitech Scanman Easytouch scanner£142
 - Trakker 250Mb tape back-up£208

- Keyboards & Mice**
- External COL 130 key keyboard (needs PS/2 adaptor)£29
 - PS/2 to DIN keyboard adaptor£9
 - Microsoft Natural keyboard£69
 - IMSI PC Stylus PS/2£29
 - IMSI Mini Thumball£24
 - Logitech Trackman portable£32

- Portable Printers**
- HP DeskJet 320£169
 - Canon BJ30£193

- Other Options:**
- Universal third party car adaptor£99
 - Laplink XL & serial cable£39
 - Laplink Pro vs for Win£74
 - Time external speakers£18

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. E&OE.



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 SALES LINES OPEN : Monday - Friday 9.00am - 6.00pm
 FAX No : (01282) 77 06 08
 Networking/Volume enquires Telephone 01282 77 00 99

TDRTOB2A



Multimedia CD-ROM docking station for the 4000m series



Built-in CD-ROM and sound card in Extensa 550CD models



The T5000/5100 provides two lithium ion batteries without sacrificing size, weight or eliminating the floppy drives.

TEXAS INSTRUMENTS RANGE

4000M DX2-50 340 DS COLOUR

4000M DX4-75 525 TFT

The new range of high performance colour notebooks from Texas Instruments offer exceptional quality and features at truly remarkable prices.

The 4000M range provides fast 486DX2 or 486DX4 models with superb dual scan or TFT colour screens, built-in sound and the option of adding the portable CD-ROM dock for full-feature multimedia.

The new Extensa notebooks feature the new easy to use touchpad and are available in 2 ranges. The attractively priced 486 range (Extensa 450) does not include multimedia and features a 486DX4-75 processor with large dual scan or TFT colour screens. The Pentium® range (Extensa 550CD) is based on the Intel® 75Mhz Pentium® processor with 8Mb RAM, 525Mb hard disk and includes full-feature multimedia with built-in sound, CD-ROM drive, speakers and microphone. The 550 model is also available without soundcard and CD-ROM for just £1899

The top of the range 5000 models come with 75 or 90MHz Pentium® processors, advanced docking options, exceptional battery life, built-in sound & infra-red comms and hard disks upto 1.2Gb.



The UK's best value dual scan multimedia notebook. Attach a CD-ROM for just £399

- 486DX2-50 processor
- 4Mb RAM, 20Mb max
- 8Kb internal cache
- 340Mb hard disk
- 1.44Mb 3.5" floppy drive
- 9.5" dual scan colour display
- 640 x 480 resolution
- 1Mb video RAM
- Interfaces: parallel, serial, keyboard/mouse, audio-in, audio out, fast SCSI II, microphone and 16-bit MIDI with game port
- Sound capabilities: 16-bit media vision jazz 16 sound card, thunderboard, CD multisession photo, CD audio and pro audio 16, internal microphone, internal speaker and bi-directional MIDI interface
- NiMH battery (3-5 Hours)
- Integral pointing device with Microsoft® drivers
- MS DOS, MS Windows® for Workgroups, Adaptec EZ-SCSI, Windows sound software and real time video with indeo video
- 2.9Kg weight, 21.6 x 27.9 x 5.1cm
- Free upgrade to Windows® 95

DX2-50 340Mb DS 9.5" colour.....£1099

- Other Options**
- 4Mb RAM£199
 - 16Mb RAM£945
 - NiMH battery£85
 - AC adaptor£85
 - Carry case (for main unit and accessories).....£39
 - CD-ROM dock£399

£1099



Full feature TFT colour multimedia notebook. Attach a CD-ROM for just £399

- DX4-75 processor
- 4Mb or 8Mb RAM, 20Mb maximum
- 8Kb internal cache
- 525Mb hard disk
- 1.44Mb 3.5" floppy drive
- 10.4" TFT colour display resolution
- 1Mb video RAM
- Interfaces: parallel, serial, keyboard / mouse, audio-in, audio out, Fast SCSI II, microphone and 16-bit MIDI with game port
- Sound capabilities: 16-bit media vision jazz 16 sound card, thunderboard, CD multisession photo, CD audio and pro audio 16, internal microphone, internal speaker and bi-directional MIDI interface
- NiMH battery (3-5 hours)
- Integral pointing device with Microsoft® drivers
- MS DOS, MS Windows® for Workgroups, Adapter EZ-SCSI, Windows sound software and real time video with indeo video
- 2.9Kg weight, 21.6 x 27.9 x 5.1cm
- Free upgrade to Windows® 95

DX4-75 525/4Mb 10.4" TFT£1499

- Other Options**
- 4Mb RAM£199
 - 16Mb RAM£945
 - NiMH battery£85
 - AC adaptor£85
 - Carry case (for main unit and accessories).....£39
 - CD-ROM dock£399

£1499

Extensa 550 P75 Dual Scan

Extensa 550 CD P75 Dual Scan

Extensa 550CDT P75 TFT



The Extensa 550 series has a 10.4" dual scan screen, 75MHz Pentium® processor, 8Mb RAM, 524Mb removable hard disk and removable floppy drive which is interchangeable with an extra lithium ion battery or CD-ROM module (both are optional).

- 75MHz Pentium® processor
- 8Mb RAM, 40Mb max
- 524Mb hard disk
- 1.44Mb 3.5" floppy drive
- 10.4" dual scan colour display
- 640 x 480 resolution at 256 colours
- 1Mb video RAM
- Interfaces: EPP/ECP parallel; 16550 serial; external VGA port; PS/2 keypad / keyboard / mouse port; PCMCIA type III slot; audio in/out, microphone in; serial infrared port for wireless connection; external PCI expansion bus
- Primary NiMH battery
- 100-240v AC adapter
- Built in touchpad pointing device
- Windows® 95
- 6.2lbs with primary battery
- One year limited warranty

Extensa 550 P75/8Mb dual scan.....£1899

- Options**
- Lithium ion battery£159
 - PCMCIA cards£Call
 - Numeric keypad£60
 - External battery charger£149
 - Additional AC adapter£77
 - Auto adapter£99
 - Port replicator£85
 - Carrying case£50
 - CD-ROM module£299
 - 8Mb module£349
 - 16Mb module£799

£1899



Full feature multimedia Pentium® notebook with built-in CD-ROM drive, sound card, microphone, power and portability, the Extensa 550CD multimedia notebook has the power of the Pentium® with CD-ROM drive and 10.4" dual scan colour screen

- 75MHz Pentium® processor
- 8Mb RAM, 40Mb max
- 524Mb hard disk
- 1.44Mb 3.5" floppy drive
- 10.4" dual scan colour display
- 640 x 480 resolution at 256 colours
- 1Mb video RAM
- Interchangeable CD-ROM (2x)
- Interfaces: EPP/ECP parallel; 16550 serial; external VGA port; PS/2 keypad / keyboard / mouse port; PCMCIA type III slot; audio in/out, microphone in; serial infrared port for wireless connection; external PCI expansion bus
- 16-bit sound
- Primary NiMH battery
- 100-240v AC adapter
- Built in touchpad pointing device
- Windows® 95
- 6.4lbs with primary battery
- One year limited warranty

Extensa 550CD P75/8Mb dual scan.....£2299

- Options**
- Lithium ion battery£159
 - PCMCIA cards£Call
 - Numeric keypad£60
 - External battery charger£149
 - Additional AC adapter£77
 - Auto adapter£99
 - Port replicator£85
 - Carrying case£50
 - 8Mb module£349
 - 16Mb module£799

£2299



The Extensa 550CDT multimedia notebook comes with all the other features of the Extensa 550CD range. Includes CD-ROM and 10.4" TFT colour screen, yet another example of Texas Instruments value.

- 75MHz Pentium® processor
- 8Mb RAM, 40Mb max
- 524Mb hard disk
- CD-ROM drive
- 1.44Mb 3.5" floppy drive
- 10.4" dual scan colour display
- 640 x 480 resolution at 256 colours
- 1Mb video RAM
- Interchangeable CD-ROM (2x)
- Interfaces: EPP/ECP parallel; 16550 serial; external VGA port; PS/2 keypad / keyboard / mouse port; PCMCIA type III slot; audio in/out, microphone in; serial infrared port for wireless connection; external PCI expansion bus
- 16-bit sound
- Primary NiMH battery
- 100-240v AC adapter
- Built in touchpad pointing device
- Windows® 95
- 6.4lbs with primary battery
- One year limited warranty

Extensa 550CDT P75/8Mb TFT£2699

- Options**
- Lithium ion battery£159
 - PCMCIA cards£Call
 - Numeric keypad£60
 - External battery charger£149
 - Additional AC adapter£77
 - Auto adapter£99
 - Port replicator£85
 - Carrying case£50
 - 8Mb module£349
 - 16Mb module£799

£2699



Notebooks



There are two docking stations available, the EZ Dock for the T5000 and the Dock Mate for the T5100 both offering greater connectivity



The Extensa Range features an easy to use touch pad pointing device with spacious palm rest and full size keyboard.



The Extensa 550 includes a serial infrared port for cable free printing.

4000M DX4-100 525 TFT



Full feature TFT colour multimedia notebook. Attach a CD-ROM for just £399

- DX4-100 processor
- 4Mb or 8Mb RAM, 20Mb maximum
- 8Kb internal cache
- 525Mb hard disk
- 1.44Mb 3.5" floppy drive
- Large TFT colour display
- 640 x 480 resolution
- 1Mb video RAM
- Interfaces: parallel, serial, keyboard / mouse, audio-in, audio out, Fast SCSI II, microphone and 16-bit MIDI with game port
- Sound capabilities: 16-bit media vision jazz 16 sound card, thunderboard,
- CD multisession photo, CD audio and pro audio 16, internal microphone, internal speaker and bi-directional MIDI interface.
- NiMH battery (3-5 hours)
- Integral pointing device with Microsoft® drivers
- MS DOS, MS Windows® for Workgroups, Adapter EZ-SCSI, Windows sound software and real time video with indeo video
- 2.9Kg weight, 21.6 x 27.9 x 5.1cm
- Free upgrade to Windows® 95

486DX4-100 525Mb 4Mb£1699

- Other Options
- 4Mb RAM£199
 - 16Mb RAM£945
 - NiMH battery£85
 - AC adaptor£85
 - Carry case (for main unit and accessories)£39

£1699

Extensa 450 Dual Scan



The new Extensa 450 notebook gives you power, flexibility and above all, value for money. Comes with 10.4" dual scan screen, Intel® DX4-75 processor, 340Mb hard disk and 4Mb RAM.

- Intel® DX4-75 processor
- 4Mb RAM, 32Mb max
- 340Mb hard disk
- 1.44mb 3.5" floppy drive
- 10.4" dual scan colour display
- 640 x 480 resolution at 256 colours
- 512Kb video RAM
- Interfaces: EPP/ECP parallel; 16550 serial; external VGA port; PS/2 keypad / keyboard / mouse port; PCMCIA type II slot; serial infrared port
- Primary NiMH battery
- 100-240v AC adapter
- Built in touchpad pointing device
- Windows® 95
- 5.0lbs (2.27kg) with primary battery
- One year limited warranty

Extensa 450 DX4-75 4Mb dual scan£1199

- Options
- Lithium ion battery£159
 - PCMCIA fax modem£249
 - External battery charger£149
 - Additional AC adapter£77
 - Port replicator£85
 - Carrying case£50
 - 4Mb RAM module£185
 - 8Mb RAM module£375
 - 16Mb RAM module£849

£1199

Extensa 450T TFT



The new Extensa 450T notebook gives you power, flexibility and above all, value for money. Comes with 9.4" TFT colour screen, Intel® DX4-75 processor, 340Mb hard disk and 4Mb RAM.

- Intel® DX4-75 processor
- 4Mb RAM, 32Mb max
- 340Mb hard disk
- 1.44mb 3.5" floppy drive
- 9.4" active matrix colour screen
- 640 x 480 resolution at 256 colours
- 512Kb video RAM
- Interfaces: EPP/ECP parallel; 16550 serial; external VGA port; PS/2 keypad / keyboard / mouse port; PCMCIA type II slot; serial infrared port
- Primary NiMH battery
- 100-240v AC adapter
- Built in touchpad pointing device
- Windows® 95
- 5.0lbs (2.27kg) with primary battery
- One year limited warranty

Extensa 450T DX4-75 4Mb TFT£1599

- Options
- Lithium ion battery£159
 - PCMCIA Fax modem£249
 - External battery charger£149
 - Additional AC adapter£77
 - Port replicator£85
 - Carrying case£50
 - 4Mb RAM module£185
 - 8Mb RAM module£375
 - 16Mb RAM module£849

£1599

5000 SERIES P75/P90



The TravelMate 5000 series combines notebook mobility and connectivity with the performance of a pentium desktop PC. With TI integrated PCI bus architecture and wireless connectivity through a serial infrared port. Plus intergated multimedia that includes 16-bit sound

- 75MHz Pentium® TCP processor, 3.3volts
- PCI bus architecture
- 8Mb RAM expandable to 32Mb
- 10.4" Active Matrix colour display or 10.5" DS colour on 5100 model
- 722Mb hard disk on 5000 TFT model, 500Mb on 5000 DS model, 1.2Gb on 5100 TFT and 5200 TFT models
- 1.44Mb 3.5" floppy drive
- EPP/ECP parallel 16550 serial interfaces
- 16-bit Media Vision Jazz 16 sound card, internal dual mode microphone, internal speaker, line in and out with mixer
- Intelligent battery system with two lithium ion battery packs
- 4mm travel keyboard, The point pointing device with Microsoft® drivers
- MS DOS and Windows® for workgroups
- Weight 6.7lbs. (2.9kg) with two battery packs
- Size 8.7" x 11" x 2.2" (22.1 x 27.9 x 5.6cm)

- Models
- TM5000 75MHz Pentium® processor dual scan 8Mb 500Mb£2199
 - TM5000 75MHz Pentium® processor TFT 8Mb 772Mb£2699
 - TM5100 90MHz Pentium® processor TFT 8Mb 1.2Gb£3399
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£2199

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- Optional SCSI II bay

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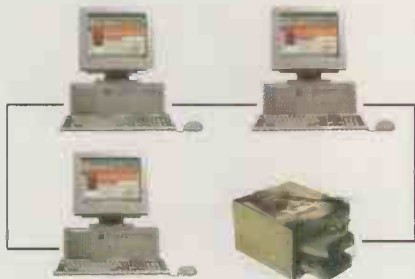
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- Parallel, 2 serial & keyboard ports
- Expandable desktopcase
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- 102 enhanced keyboard
- Mouse optional (from £9)
- Select required operating system

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- Expandable desktop case
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- 102 enhanced keyboard
- Mouse optional (from £9)
- Select required operating system

Models

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£739

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- Intel 100MHz Pentium® processor
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- Parallel, 2 fast serial & keyboard ports
- 14" SVGA colour screen
- PCI bus 64-bit s3 graphics with 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)
- Select required operating system

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- Microsoft compatible mouse

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- 256K external SRAM Cache
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- PCI Enhanced IDE hard and floppy controller
- 1Mb 64-bit PCI local bus graphics with Windows accelerator
- 15" SVGA NI colour screen
- Parallel, 2 serial & keyboard ports
- Expandable desktop case with 7 drive bays
- 102 enhanced keyboard
- Microsoft compatible mouse

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Advanced 32-bit VESA local bus graphics card with 1Mb video RAM and Windows® accelerator
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9.4" STN VGA mono screen, 10.4" dual scan colour or 9.4" TFT colour screens with 256 vivid colours. Modular design allow the screen to be upgraded

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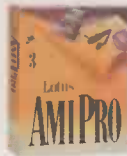
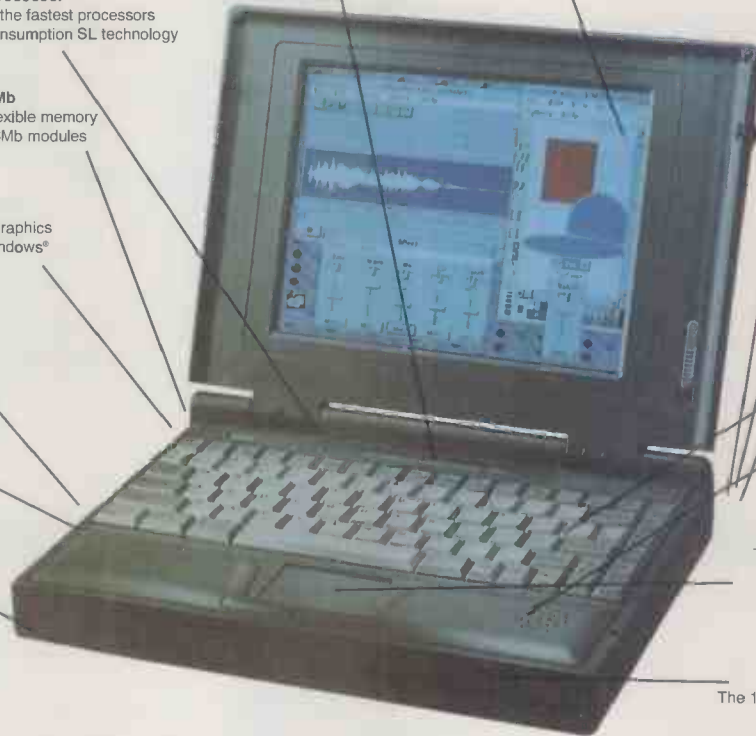
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RAM upgrade per 4Mb	£140
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Sound card	£80
Carry case	£25
Port replicator	£95

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1.2Gb model	£480
Sound card	£80
Carry case	£25
Port replicator	£95

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Novell Network 4.1 10-user.....	£937
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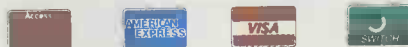
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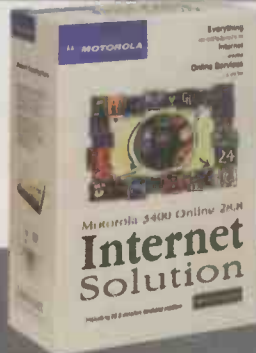
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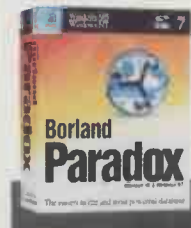
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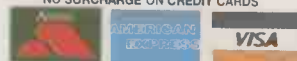
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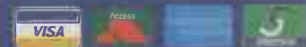
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T.I. 4000M TFT

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- PCMCIA Type III Slot
- Serial Infrared Port
- 3-5 Hour NiMH Battery
- Weighs 6.5lbs, 2.9Kg
- 1 Year Warranty

- Intel 75MHz DX4 Processor
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- Internal 3.5" 1.44Mb FDD
- 10.4" Dual Scan/TFT Colour Display Options
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- Primary NiMH Battery
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- 1 Year Warranty

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£1479

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T.I. 5000M

T.I. 5100M

Extensa 550 & 550CD



- Intel 75MHz Pentium™ Processor
- 8Mb RAM Upgradeable to 32Mb
- 16Bit Sound Card
- PCI Bus architecture
- 500Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 10.4" Dual Scan / TFT Col Display
- PCMCIA Rel. 2.0 Type II/III Slots
- 2Mb VRAM
- 16Bit Sound Card
- 84 key Keyboard
- MS DOS 6.22, MS Windows 3.11
- 2 x Lithium ION Battery Packs
- Weighs 2.9Kg
- 1 Year Warranty



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- 2 x Lithium ION Battery Packs
- Weighs 2.9Kg
- 1 Year Warranty



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- 2 x Lithium ION Battery Packs
- Weighs 2.9Kg
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- Integrated CD-ROM (CD Version)

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- 2Mb VRAM
- 16Bit Sound Card
- 84 key Keyboard
- MS DOS 6.22, MS Windows 3.11
- 2 x Lithium ION Battery Packs
- Weighs 2.9Kg
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- 1.2Gb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 10.4" VGA Type II/III Slots
- 2Mb VRAM
- 16Bit Sound Card
- 84 key Keyboard
- MS DOS 6.22, MS Windows 3.11
- 2 x Lithium ION Battery Packs
- Weighs 2.9Kg
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Model shown Compaq LTE 5000 Model 810 CSTN 800 x 600

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The first modular notebook from Toshiba

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SATELLITE PRO 400CDT 810
£3099



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- Swapable 4X CD-ROM Drive
- Swapable 3.5" 1.44Mb FDD
- 10.4" VGA TFT Colour Display
- PCMCIA Rel. 2.0 Type II/III Slots
- Port Replicator Interface
- 84 key Keyboard
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- Weighs 3.1Kg • 3 Year Warranty

STOP PRESS Satellite Pro 400CDS **£2399**

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- 350Mib Hard Disk
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- Port Replicator Interface
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- Up to 4. Hours Battery Life
- 1 Year Warranty

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- 486 DX4/75MHz Notebook Computer
- 8Mb RAM (exp to 32 MB)
- 520Mib Hard Disk
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- PCMCIA • 84 key Keyboard
- Port Replicator Interface
- MS DOS 6.22, MS Windows 3.11
- Up to 4. Hours Battery Life
- 1 Year Warranty

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T2130CT

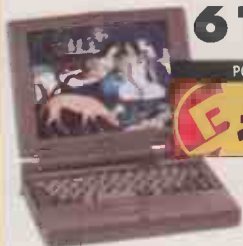
- 486 DX4/75MHz Notebook Computer
- 8Mb RAM (exp to 32 MB)
- 520Mib Hard Disk
- 10.4" TFT Colour Display
- PCMCIA
- 84 key Keyboard
- MS DOS 6.22, MS Windows 3.11
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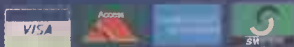


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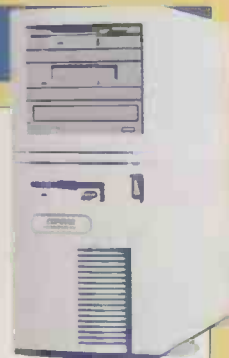
5 User Peer to Peer

- 5 x Compaq Prolinea P75
- Compaq 14" SVGA Monitors
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- Hypertec Combo Cards
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- Intel Pentium 75MHz
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- PCI Graphics
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- 4 Expansion Slots
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- Compaq Keyboard
- DOS 6 & Windows 3.1



*Compaq Prolinea 575MHz 420/w

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- 4ppm Print Speed • 2 Button Control Panel
- Built in A4 Sheet Feeder
- Suitable for Printing on Paper, Postcards or Envelopes



HP DESKJET 660C
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- Quiet operation



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Canon LBP-460

- 600 x 600dpi Laser Printing
- 4ppm Print Speed
- Small, space saving design
- Designed for Windows users



CANON LBP 460
£279

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EPSON STYLUS 2
£269

Epson Stylus 820

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OKI OL600ex

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Lexmark 1020

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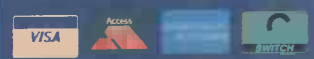
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High Quality AT Bus 4-Port Serial Communications Card. Shown above. Supplied with 16550 UARTs for baud rates to 115kpbs

- ▼ Port address 100H - 3F8H
- ▼ Interrupts IRQ2-7, 10-12, 15
- ▼ Transmit & Receive LEDs
- ▼ Compatible with Arnet 4-Port Card
- ▼ Can be used for adding 4 ports to Windows and SCO Unix
- ▼ Also supports RS422/RS485
- ▼ Supplied with 4-way cable set

£129

16550 Serial Card

Ideal for hardware requiring high speed communications. Highly recommended for Windows.

- ▼ Two 16550 serial ports COM1-COM4, IRQ2-5
- ▼ Bi-directional Parallel Port LPT1-LPT3, IRQ5,7
- ▼ Optional games port
- ▼ Enable/disable any port

£45

AT bus Serial Card

The most flexible 2-Port Serial Card on the market. Supports any port address and high interrupts. Perfect for COM1-COM4 under windows.

- ▼ 2 RS232 serial ports
- ▼ Interrupts IRQ2-7, 10-12, 14-15
- ▼ Port address 100H-3F8H
- ▼ 16 bit AT bus

£75

Add £20 for 16550 option

Dual RS422/RS485 Card

Offering 2 high speed serial ports for transmissions up to 4000 feet

- ▼ 2 RS422/RS485 serial ports
- ▼ Supplied with 16550 UARTs
- ▼ Up to 115K baud
- ▼ Port address 200H-3F8H
- ▼ IRQ2-7, 10-12, 15
- ▼ 16 bit AT bus

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Also Isolated RS422/RS485 Card £109

DigiBoard Serial Cards

The Best Engineered Multi-Channel Boards on the market today. The DigiCHANNEL PC/X is ideal for use in multi-user environments, most operating systems are supported with drivers available for DOS, XENIX, UNIX, OS/2, and many more.

PC/4	4-Port RS232 Card	£295
PC/8	8-Port RS232 Card	£395
PC/16	16-port RS232 Card	£750
PC/4s	4-Port with 16550	£325
PC/8s	8-Port with 16550	£450
PC/16s	16-Port with 16550	£850

DigiBoard PC/Xe Cards

The DigiCHANNEL PC/Xe range are intelligent multi-port RS232 high speed communication boards with on-board 80186 processor and 64K memory for increased throughput. Drivers available for DOS, Windows NT, Windows, OS/2, Xenix and UNIX.

PC/2e	2-Port Intelligent Card	£189
PC/4e	4-port Intelligent Card	£395
PC/8e	8-Port Intelligent Card	£495

DigiBoard PC/Xem System

An Intelligent Modular System offering 16 to 64 high speed serial channels. The system comprises one host adapter with on-board 20MHz RISC processor and 1 to 4 external concentrators each providing 16 serial ports. Data rates of 115kpbs can be achieved on 32 ports. Drivers for DOS, SCO UNIX, OS/2, Netware Connect and Windows NT.

PC/Xem Host Adapter	£395
Ports/16em Connector Box	£600

Isolated RS232 and Current-Loop Card

Providing 2 Isolated RS-232 or current loop serial ports with baud rates up to 56Kbps.

- ▼ Supplied with 16550 UARTs
- ▼ Provides 500VDC isolation
- ▼ Port address 200H - 3F8H
- ▼ Interrupts IRQ2-7, 10-12, 15
- ▼ 16-Bit AT bus

£119

Synchronous Serial Card

Single channel, multi-protocol communications adapter which uses an AMD 85C30-10 serial communications controller (SCC) as standard.

- ▼ RS232 interface
- ▼ Synchronous mode to 1.23M baud
- ▼ IRQ2-7, 10-12, 14-15
- ▼ DMA Channels 1 - 3

£220

Also Synchronous RS422/RS485 £220

Remote Data Acquisition Modules for RS485 Network

ADAM Modules (shown below) are compact intelligent sensor-to-computer interface units designed specifically for reliable operation in harsh environments. Their built-in microprocessors, encased in rugged industrial grade plastic packages provide analog I/O, digital I/O, thermocouple measurement and data display. Each module has a built-in RS485 serial interface for data transfer with the host computer.



Isolated RS232/RS485 Converter

ADAM modules need only 2 wires to communicate with their controlling host computer over a multidrop RS-485 network. ADAM modules also accept any power source between 10V and 30V and are protected against power reversal.

- ▼ Automatic control of data flow
- ▼ Input RS232 (4-wire)
- ▼ 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

£135

ADAM Modules

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ADAM Analog Output Module	£135
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ADAM IP66 Industrial Enclosure	£85
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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

£89

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High Density mixed digital I/O Card for industrial monitoring & control.

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- ▼ Interrupt handling
- ▼ Output status readback

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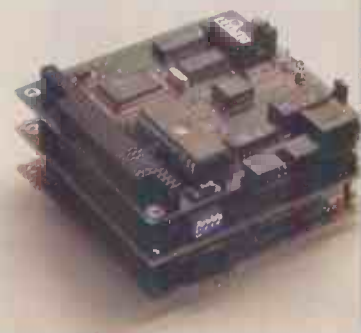
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Wiring Terminal Board	£35
Industrial Wiring Kit	£30
Isolated Digital input board 16ch	£99
Isolated Digital input board 24ch	£109
Relay Board 16ch, 120V 1A	£115
Relay Board 24ch, 120V 1A	£135
Relay Board 16ch, 250V 5A	£130
Relay Board 24ch, 250V 5A	£165
SSR Module Carrier Board 8ch	£70
SSR Module Carrier Board 16ch	£80
SSR Module 280V AC 3A	£9
SSR Module 60V DC 3A	£9

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PC-104 Modules (shown below) simply stack together to form a compact modular PC-based system which has very low power consumption.

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PC-104 Ethernet Module	£109
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PC-104 PCMCIA Memory Module	£250
PC-104 RS422/RS485 Module	£199
PC-104 Digital I/O Module	£129
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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
- ▼ 16 digital inputs
- ▼ 16 digital outputs
- ▼ Pacer Clock
- ▼ Timer/Counter
- ▼ DMA and Interrupt
- ▼ Wiring Terminal Board

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The complete and cost-effective solution for your PC based automation needs.

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- ▼ 1 D/A Output
- ▼ 16 digital inputs
- ▼ 16 digital outputs
- ▼ Pacer Clock
- ▼ Timer/counter
- ▼ DMA and Interrupt
- ▼ Wiring Terminal Board

£375

Relay Output and Isolated Digital Input Card

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.

- ▼ 8 on-board SPDT relays
- ▼ LED indicators to show activated relays
- ▼ 8 opto-isolated digital input channels
- ▼ Easy to use and program

£109

Industrial I/O Cards

D/A Output Card 2ch.	£155
D/A Output Card 6ch.	£285
D/A Output Card 12ch.	£399
24 bit Digital I/O Card	£60
48 bit Digital I/O Card	£80
32 ch Isolated Digital I/O Card	£105
32 ch Isolated A/D Card	£275
4 1/2 Digit Voltmeter Card	£295

Industrial Workstation with 14" Colour CRT

Rugged heavy duty workstation for 19" rack or panel mounting.

- ▼ Highly integrated PC Workstation
- ▼ 1024 x 768 Colour CRT Monitor
- ▼ 27-key membrane keypad
- ▼ IP56/IP52 sealed hardened front panel
- ▼ Heavy duty aluminium and steel chassis
- ▼ 250-watt power supply
- ▼ 8 ISA slots

£1600

Industrial Workstation with 9.4" LCD Display

Rugged heavy duty workstation with flat-panel LCD display and 80-key membrane keypad.

- ▼ Highly integrated PC Workstation
- ▼ 640 x 480 colour TFT display
- ▼ 19" rack/panel mount
- ▼ IP56/IP52 front panel
- ▼ 200-watt power supply
- ▼ 8 ISA slots

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Robust 19" Industrial Chassis fitted with Intel Motherboard P100. Ideally suited for heavy duty use in professions requiring Pentium processor power in a rugged industrial grade format.

- ▼ 19" Industrial Chassis 250W
- ▼ Intel Motherboard P100
- ▼ 4 ISA slots, 3 PCI slots
- ▼ 2 serial ports, 1 parallel
- ▼ 8Mb RAM, 256K cache
- ▼ 540Mb IDE Hard Drive
- ▼ 1.44Mb Floppy Drive
- ▼ PCI S3 Display Card

£1475

Options: P120 add £125, P133 add £300.
16Mb RAM add £250, 1Gb Drive add £70.
For other configurations, please call.

Disk Drives & Controllers

Only supplied as part of a system.

Adaptec ISA SCSI Master Kit	£220
Adaptec ISA SCSI Board only	£170
Adaptec PCI SCSI Master Kit	£220
IDE Hard Drive 420Mb	£140
IDE Hard Drive 540Mb	£150
IDE Hard Drive 1Gb	£220
SCSI Hard Drive 1Gb	£350
SCSI Hard Drive 2Gb	£700

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SIMM 4Mb 72pin parity	£140
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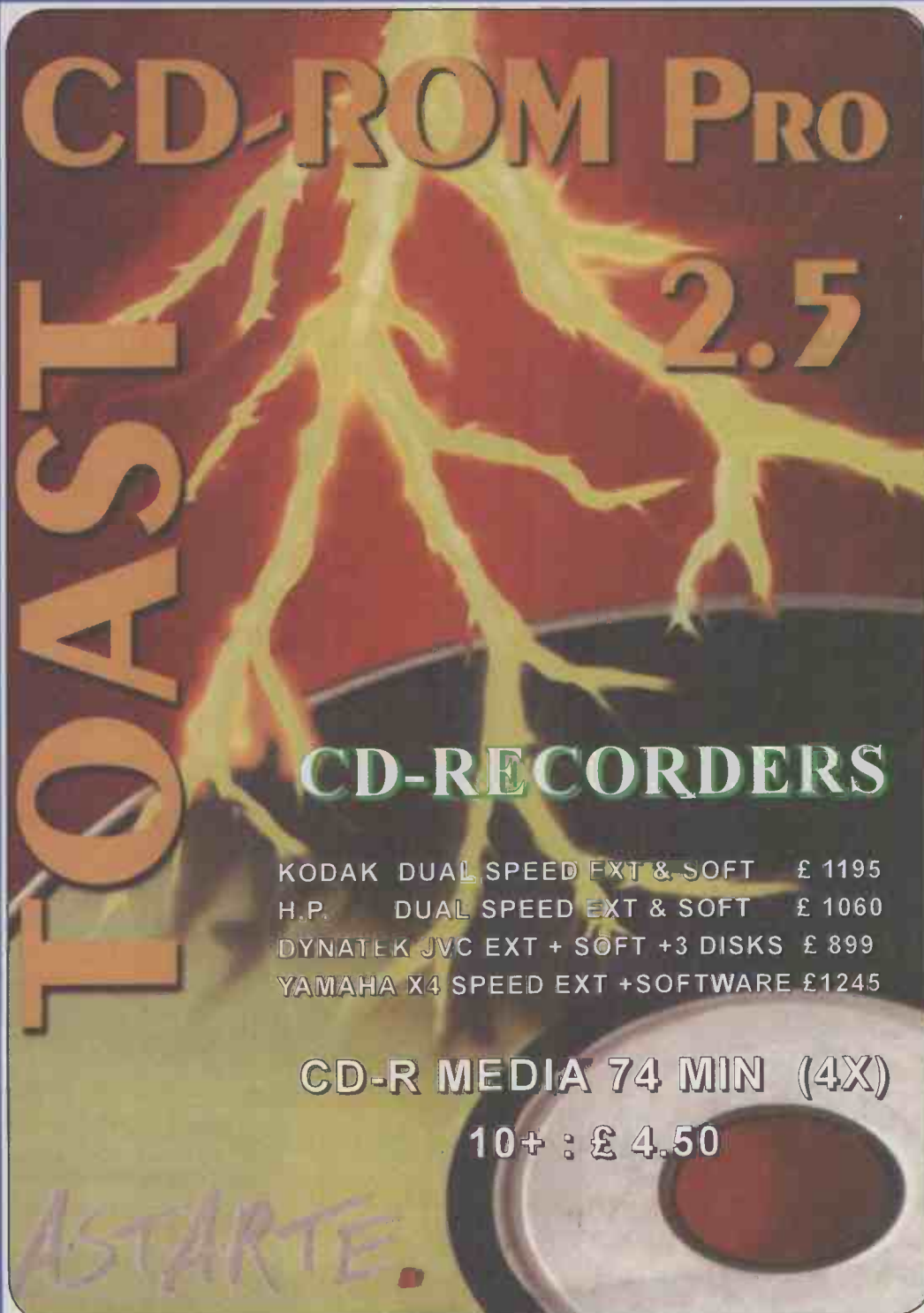
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HP 1536	2GB	8GB	11MB	16MB	£550
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WANGDAT 3400DX	4GB	16GB	21MB	30MB	£675
CONNER 4386	4GB	16GB	30MB	45MB	£675
HP C1533A	4GB	16GB	30MB	45MB	£650
HP C1553A	24GB	96GB	30MB	45MB	£1500
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SEAGATE 31270A	1.2GB	IDE	2MB	11MS	£185
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MAXTOR	1.6GB	IDE	2MB	12MS	£250
WEST DIG 31600	1.6GB	IDE	2MB	10MS	£250
CONNER CFP1080S	1.0GB	F-SCSI	4MB	9MS	£200
FUJITSU M1606SA	1.0GB	F-SCSI	4MB	9MS	£210
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HP 3724S	1.2MB	F-SCSI	4MB	9MS	£275
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SEAGATE 31230N	1.0GB	F-SCSI	4MB	9ms	£265
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CONNER 2107	2.1GB	F-SCSI	6MB	9MS	£490
HP 3725	2.0GB	F-SCSI	5MB	9MS	£450
QUANTUM ATLAS	2.1GB	F-SCSI	7MB	8ms	£550
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FUJITSU M2932	2.1GB	F-SCSI	5MB	9MS	£475
SEAGATE 32430N	2.1GB	F-SCSI	6MB	8ms	£550
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CONNER 2107W	2.0GB	WIDE	7MB	9ms	£625
SEAGATE 32550N	2.1GB	F-SCSI	7MB	8ms	£600
SEAGATE 32550W	2.1GB	WIDE	7MB	8ms	£700
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MICROP 3243AV	4.0GB	F-SCSI	6MB	9ms	£775
SEAGATE 15230N	4.0GB	F-SCSI	6MB	9ms	£725
CONNER 4207W	4.1GB	WIDE	7MB	9ms	£850
QUANTUM ATLAS	4.0GB	F-SCSI	7MB	8ms	£995
QUANTUM ATLAS	4.0GB	WIDE	8MB	8ms	£1095
SEAGATE 15150N	4.1GB	F-SCSI	7MB	8ms	£975
SEAGATE 15150W	4.1GB	WIDE	7MB	8ms	£1150
IBM ULTRASTAR	4.1GB	F-SCSI	7MB	8ms	£1050
IBM ULTRASTAR	5.1GB	F-SCSI	7MB	8ms	£1250
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Prosignia 500 Server



£15495*

Excluding Installation

- Intel® 120MHz Pentium® Processor
- 16MB RAM Upgradable to 208MB
- 2.1GB Hard Disk Drive
- Local Bus Graphics, 1MB VRAM
- Triflex/PCI Architecture
- Ethernet Controller
- Novell NetWare 4.1 10 User License (Compaq SmartStart) with room for further expansion
- Ethernet Cabling for up to 10m per System Unit
- CareFREE 3 Years On-site Warranty (Hardware only)
- 8 x Prolinea 5/75 Pentium® M630W
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- Ethernet Controller
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5/90 M720W	£1195
5/90 M1080W	£1255
5/100 M630W	£1295
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COMPAQ ProSignia



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pentium
PROCESSOR

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pentium
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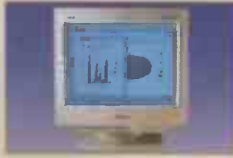
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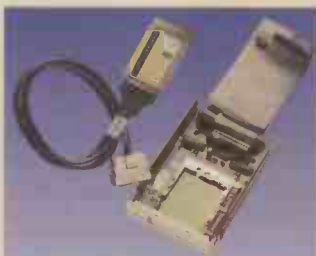
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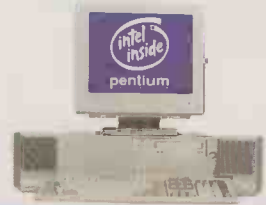
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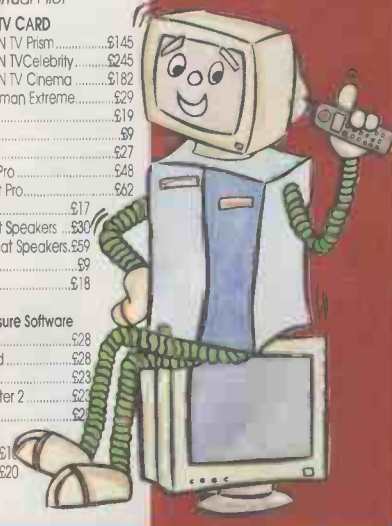
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Multimedia Kit A.....£99

Double speed multimedia bundle

- Double speed IDE CD-ROM drive
- Connects directly to your IDE hard drive cable
- Audio cable included
- 16-bit high performance soundcard
- Multimedia software
- Dual stereo speakers
- PC joystick
- WinTutor 95 CD
- World Atlas CD

Multimedia Kit B.....£159

Quad speed multimedia bundle

- Quad speed IDE CD-ROM drive
- Connects directly to your IDE hard drive cable
- Audio cable included
- 16-bit high performance soundcard
- Multimedia software
- Dual stereo speakers
- PC joystick
- WinTutor 95 CD
- Infopedia CD
- World Atlas CD

Multimedia Kit C.....£209

Six speed multimedia bundle

- Six speed IDE CD-ROM drive
- Connects directly to your IDE hard drive cable
- Audio cable included
- 16-bit high performance soundcard
- Multimedia software
- Dual stereo speakers
- PC joystick
- WinTutor 95 CD
- Infopedia CD
- World Atlas CD

£65



Virtual Pilot TV CARD

Hauppauge WIN TV Prism	£145
Hauppauge WIN TV Celebrity	£245
Hauppauge WIN TV Cinema	£182
Logitech Wingman Extreme	£29
PC Joystick	£19
Joystick Card	£9
CH Flightstick	£27
CH Flightstick Pro	£48
CH Virtual Pilot Pro	£62
Speakers	£17
15W Quickshot Speakers	£30
70W Screenbeat Speakers	£59
Microphone	£9
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5. MS Office 4.2 Upg£149
6. CA Simply Business£39
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8. Quicken v4£28
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12. MS Excel 95 Upg£82
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15. WinFax Pro Upg£32
16. MS Encarta '95 CD£55
17. Lotus SmartPics£84
18. MS Office Pro 95 Upg £245
19. Visio v3£89

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Mr PC SOFTWARE



PageMaker Classic 3.5" disk media unless specified
Asymetrix MediaBlitz
Quattro Pro for Windows v5
Paradox v5
IBM OS/2v3 + Lotus SmartSuite

ASYMETRIX

- Asymetrix MediaBlitz Win£49

AUTODESK

- Autosketch for Windows£139
Generic CAD v6.1 DOS£345
AutoCAD LT R2£379

BORLAND

- Visual dBase Win 5.5£209
Delphi CD£152
Paradox 5.0 Win£219
Paradox 4.5 Dos£315
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dBASE 5.0 Dos£315
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CorelDraw 4£99 £84
CorelDraw 5£174
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Get Connected£25

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History of the World£31
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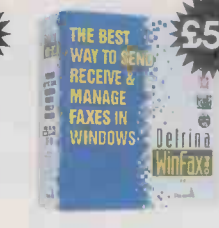
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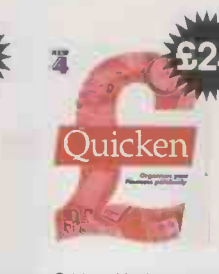
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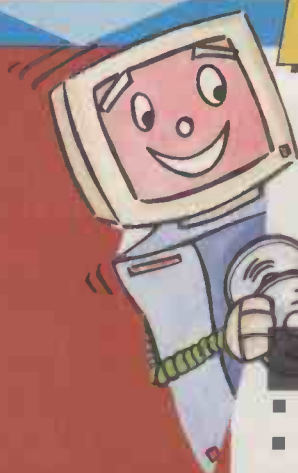


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These powerful full-feature multimedia systems come with IBM's superb operating system free of charge and include Lotus SmartSuite and other business and leisure applications. Windows 3.1 option is also available. These systems are very popular because of the low prices and are ideal for home use.

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- 486DX2-66 processor with internal cache
- 850Mb enhanced IDE hard disk with 256K cache
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- 102 keyboard
- Double speed IDE CD-ROM drive
- 16-bit high quality sound card
- 16-bit SVGA graphics
- Mouse optional extra
- PC DOS 7 & IBM OS/2 Warp v3 (Windows® 3.1 is optional extra)
- Lotus SmartSuite for OS/2 with the following superb programs
 - Lotus 1-2-3 spread sheet
 - Lotus Ami Pro word processor
 - Lotus Freelance Graphics
- Leisure & Educational Software
- Zool 2 multimedia CD
- Select required speakers, mouse & screen

£449 + VAT

With 14" .28 NI screen & stereo 4W speakers£619

MrPC Multimedia 2

486DX4-100 8 850 MM

- 486DX4-100 processor with internal cache
- 850Mb enhanced IDE hard disk with 256K cache
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- 1.44Mb 3.5" floppy drive
- Mini-tower case
- 102 keyboard
- Double speed IDE CD-ROM drive
- 16-bit high quality sound card
- 16-bit SVGA graphics
- Mouse optional extra
- PC DOS 7 & IBM OS/2 Warp v3 (Windows® 3.1 is optional extra)
- Lotus SmartSuite for OS/2 with the following superb programs
 - Lotus 1-2-3 spread sheet
 - Lotus Ami Pro word processor
 - Lotus Freelance Graphics
- Leisure & educational software
- Zool 2 Multimedia CD
- Select required speakers, mouse & screen

£589 + VAT

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P75 8 850 MM

- Intel® 75MHz Pentium® processor
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- 8Mb RAM
- 1.44Mb 3.5" floppy drive
- Mini-tower case
- 102 keyboard
- Double speed IDE CD-ROM drive
- 16-bit high quality sound card
- 64-bit SVGA PCI graphics
- Mouse optional extra
- PC DOS 7 & IBM OS/2 Warp v3 (Windows® 3.1 is optional extra)
- Lotus SmartSuite for OS/2 with the following superb programs
 - Lotus 1-2-3 spread sheet
 - Lotus Ami Pro word processor
 - Lotus Freelance Graphics
- Leisure & educational software
- Zool 2 multimedia CD
- Select required speakers, mouse & screen

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MrPC multimedia 4: 75MHz Pentium® desktop model with quad speed CD-ROM£60 extra



MrPC Windows® 95 Based Multimedia Systems

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MrPC Multimedia 6

486DX4-100 8 850 Win95 MM

- 486DX4-100 processor with internal cache
- 850Mb enhanced IDE hard disk with 256K cache
- 8Mb RAM
- 1.44Mb 3.5" floppy drive
- Desktop case
- 102 keyboard and mouse
- Double speed IDE CD-ROM drive
- 16-bit high quality sound card
- 32-bit SVGA graphics
- Microsoft® Windows® 95
- Lotus software suite with Lotus 1-2-3 v5, Ami Pro, Organizer & Approach v3 pre-loaded
- CA Simply Business Suite with 5 leading packages
 - CA Complete spread sheet
 - CA Textor word processor
 - CA Simply Accounts
 - CA Up-to-Date Organizer
 - CA Present graphics pack
- Zool 2 multimedia CD
- Select required speakers & screen

£699 + VAT

With 14" .28 NI screen & stereo 4W speakers£869

MrPC multimedia 5: 486DX2-66 model£50 less

MrPC Multimedia 7

P75 8 850 Win95 MM

- Intel® 75MHz Pentium® processor
- 850Mb enhanced IDE hard disk with 256K cache
- 8Mb RAM
- 1.44Mb 3.5" floppy drive
- Desktop case
- 102 keyboard and mouse
- Double speed IDE CD-ROM drive
- 16-bit high quality sound card
- 64-bit PCI SVGA graphics
- Microsoft® Windows® 95
- Lotus software suite with Lotus 1-2-3 v5, Ami Pro, Organizer & Approach v3 pre-loaded
- CA Simply Business Suite with 5 leading packages
 - CA Complete spread sheet
 - CA Textor word processor
 - CA Simply Accounts
 - CA UptoDate Organizer
 - CA Present graphics pack
- Zool 2 multimedia CD
- Select required speakers & screen

£759 + VAT

With 14" .28 NI screen & stereo 4W speakers£929

MrPC Multimedia 8

P75 8 850 Fax Win95 MM

- Intel® 75MHz Pentium® processor
- 850Mb enhanced IDE hard disk with 256K cache
- 8Mb RAM
- 1.44Mb 3.5" floppy drive
- Desktop case
- 102 keyboard and mouse
- Quad speed IDE CD-ROM drive
- 14.4 BABT approved fax/data modem
- 16-bit high quality sound card
- 64-bit PCI SVGA graphics
- Microsoft® Windows® 95
- Lotus software suite with Lotus 1-2-3 v5, Ami Pro, Organizer & Approach v3 pre-loaded
- CA Simply Business Suite with 5 leading packages
 - CA Complete spread sheet
 - CA Textor word processor
 - CA Simply Accounts
 - CA UptoDate Organizer
 - CA Present graphics pack
- Zool 2 multimedia CD
- Select required speakers & screen

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All bases include 1.44Mb floppy drive, processor, 4Mb or 8Mb RAM, SVGA graphics, IDE controller, standard ports and keyboard.

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75MHz Pentium*, 8Mb MT	£469
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486DX4-100 4Mb DT	£309
75MHz Pentium*, 8Mb DT	£479
100MHz Pentium*, 8Mb DT	£579
120MHz Pentium*, 8Mb DT	£629
133MHz Pentium*, 8Mb DT	£779

2. Select the Enhanced IDE Hard Disk

850Mb	£130
1.08Gb	£180
1.6Gb	£280

3. Select the Screen. All Screens are SVGA Colour.

14" SVGA .28dp	£160
15" SVGA .28dp	£230
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4. Select the CD/Multimedia Options

Double speed CD-ROM	£40
Quad speed CD-ROM	£100
Six speed CD-ROM	£150
Double CD-ROM, 16-bit sound card & speakers	£80
Quad CD-ROM, 16-bit sound card & speakers	£140
Six CD-ROM, 16-bit sound card & speakers	£190

5. Additional Options

Windows* 3.1	£49
MS DOS 6.22 & Windows* 3.11 for Workgroups	£call
Windows* 95	£call
RAM upgrade per 4Mb	£100
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14.4 fax/data modem	£80
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- Intel* 75MHz Pentium* processor
- 850Mb EIDE hard disk
- 256K hard disk cache
- 8Mb RAM
- 1.44Mb 3.5" floppy drive
- Desktop case with keyboard & mouse
- Quad speed IDE CD-ROM drive
- 14.4 BABT approved fax/data modem
- 16-bit high quality sound card
- 64-bit PCI SVGA graphics
- Microsoft* Windows* 95
- Lotus software suite
- CA Simply Business suite
- Zool 2 multimedia CD
- Select required speakers and screen

£879 + VAT

With 14" .28 NI screen, stereo 4W speakers & PC joystick £1059

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Take a look at my 'Best Buy' Windows* 95 based P75 multimedia system which includes a fast Intel* 75MHz Pentium* processor, 14.4 BABT approved fax/data/Internet modem, quad speed CD-ROM drive, large 850Mb hard disk and superb software bundle including Lotus software suite and CA Simply Business software. All this at an amazing £1049 with crisp sharp 14" .28dp NI screen, and stereo speakers.

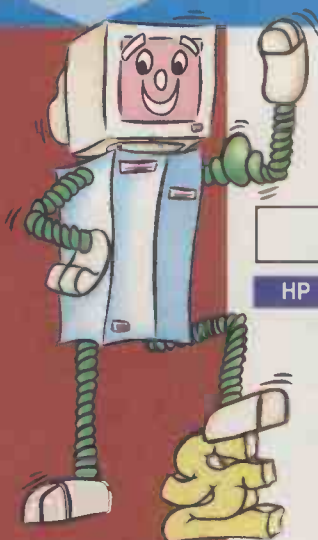
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HP LASERJET 5L

- ◆ Entry level with 26 scalable fonts
- ◆ Prints upto 4ppm
- ◆ 300 dpi
- ◆ 1Mb RAM
- ◆ Max 8000 page per month



£344

HP DESKJET

HP DESKJET 340

- ◆ Superb portable with optional auto sheet feed & colour kit
- ◆ Prints up to 3ppm
- ◆ 600 x 600 dpi
- ◆ 6 built-in fonts
- ◆ Built-in sheet feeder



£167

- Options
- ◆ Colour kit£38

HP LASERJET 5P

- ◆ Entry level with 45 scalable fonts
- ◆ Prints upto 4ppm
- ◆ 600dpi
- ◆ 2Mb RAM

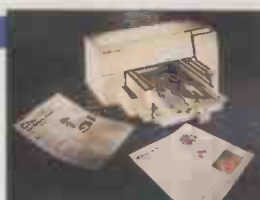


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- HP LASERJET 5MP
- ◆ As above with Postscript & 6Mb RAM £694

HP DESKJET 600

- ◆ Standard DeskJet for affordable, high quality business printing
- ◆ 14 scalable fonts
- ◆ 16Kb buffer
- ◆ Prints up to 3ppm
- ◆ 600 x 600 dpi
- ◆ Built-in sheet feeder
- ◆ 3 year warranty



£182

HP LASERJET 4 +

- ◆ Ideal for business with 35 scalable fonts
- ◆ Prints upto 12ppm
- ◆ 600 dpi
- ◆ 2Mb RAM



£962

- HP LASERJET 4M PLUS
- ◆ As above with Postscript & 6Mb RAM£1294

HP DESKJET 660C

- ◆ Colour DeskJet with simple operation and exceptional quality output
- ◆ 80Kb buffer
- ◆ Prints up to 4ppm
- ◆ 600 x 300 dpi
- ◆ 6 built-in typefaces
- ◆ Built-in sheet feeder
- ◆ 3 year warranty



£239

HP DeskJet 850C.....£325

HP LASERJET 4V

- ◆ The new network printer that offers A4/A3 paper size printing
- ◆ Prints upto 16ppm
- ◆ 600 dpi
- ◆ 4Mb RAM



£1357

- HP LASERJET 4MV
- ◆ As above with built-in network interface..£1963

OFFICEJET LX

The OfficeJet combines printer, fax, PC fax, copier and scanner in one neat stylish package which is absolutely ideal for the small business or home office.



£459

- HP DeskJet 1600C£814
HP DeskJet 1600CPS.....£1218

HP LASERJET 4Si

New LaserJet 5Si now available

- ◆ High speed with 45 scalable fonts
- ◆ Prints up to 16ppm
- ◆ 600 dpi
- ◆ 4Mb RAM
- ◆ Network printer



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- HP LASERJET 5Si MX
- ◆ As above with PostScript and 12Mb RAM£2899

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- ◆ 3 year on-site maintenance
- ◆ Removes the trouble of arranging repairs
- ◆ Makes service support a fixed, known cost
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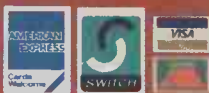
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- 3 HP DeskJet 340.....£167
- 4 HP DeskJet 1600C.....£814
- 5 HP LaserJet 4+.....£962
- 6 HP LaserJet 5MP.....£694
- 7 HP LaserJet 4M+ ..£1282
- 8 HP LaserJet 5Si.....£1979

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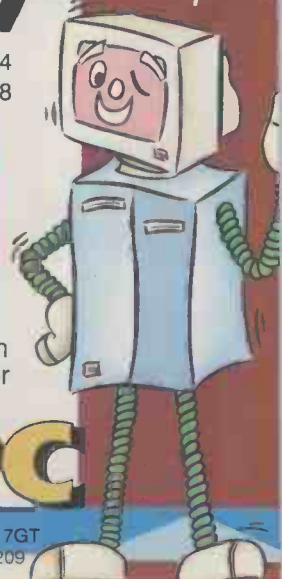
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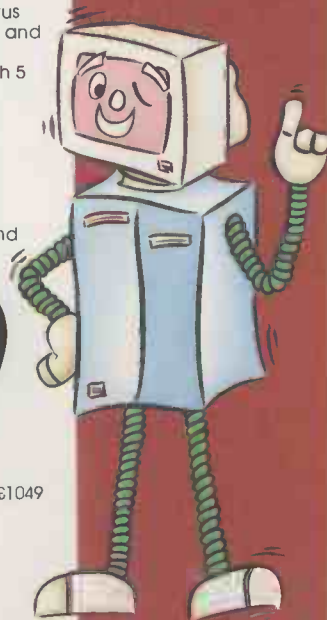
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by using this
5 stage
process:

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(Includes 1.44Mb floppy,
4Mb or 8Mb RAM,
local bus graphics,
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standard ports,
Desktop 4 bay case
and keyboard)

Desktop
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pentium* 75 8Mb DT . . . £479
pentium* 100 8Mb DT . . . £579
pentium* 120 8Mb DT . . . £629
pentium* 133 8Mb DT . . . £779

Select the IDE Hard
Disk.
50Mb £130
108Gb £180
1.6Gb £280

Select the Colour
Screen.
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14" SVGA NI .28 £160
15" SVGA NI £230
17" SVGA NI £440

Select the CD /
Multimedia Options.
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drive alone £40
Double speed CD-ROM
drive plus 16-bit sound card &
speakers £80
Quad speed CD-ROM
drive alone £100
Quad speed CD-ROM
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 - CA Compete spreadsheet
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- Microsoft Windows 95
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- 16-bit high quality sound card
- 64-bit PCI SVGA graphics
- Microsoft Windows 95
- Lotus software suite with Lotus 1-2-3 v5, Ami Pro, Organizer and Approach v3 pre-loaded
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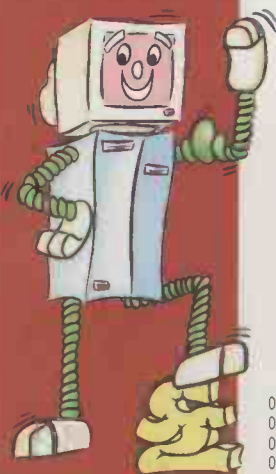
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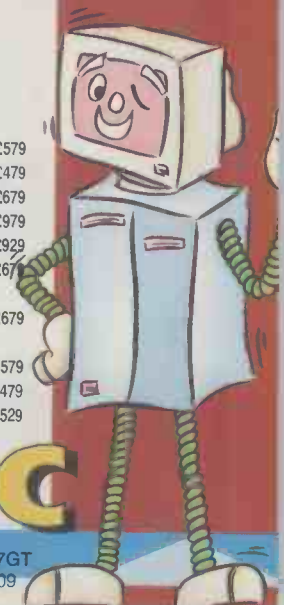
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- PCL5e and Windows GDI emulations

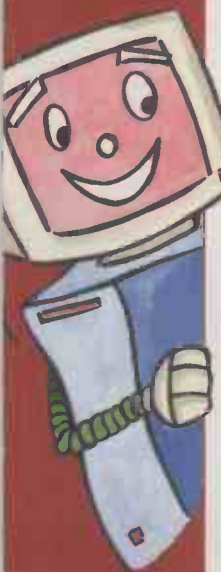
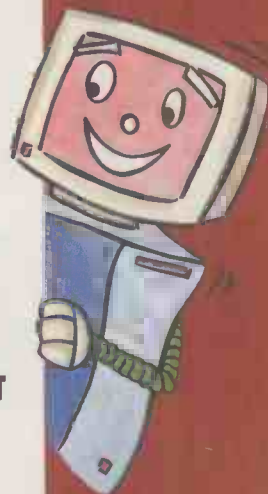
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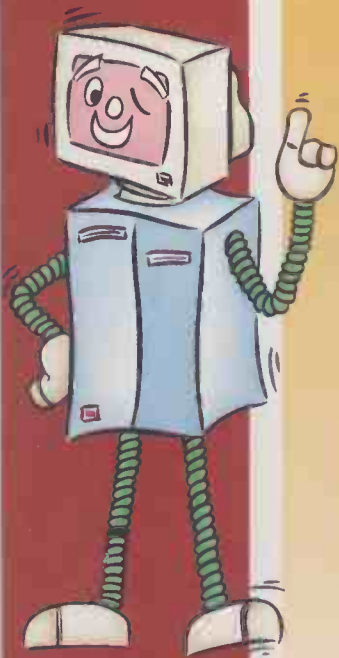
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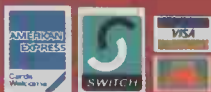
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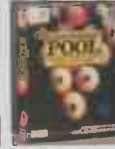
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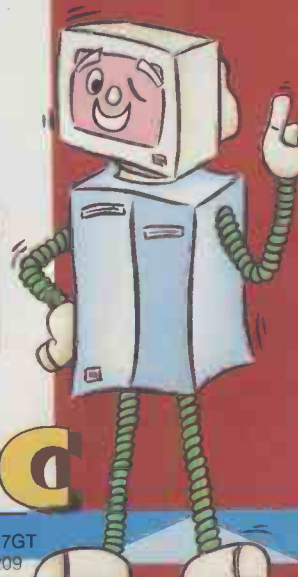
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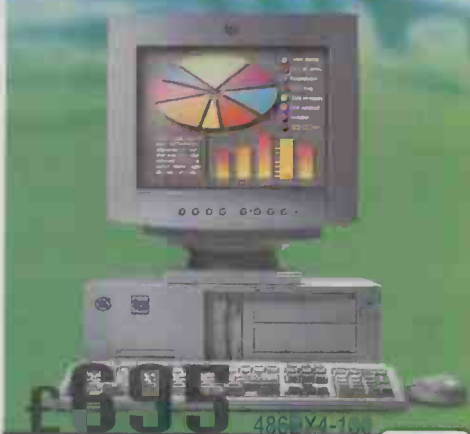
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- 850Mb 11ms enhanced IDE hard drive
- Diamond Stealth 1Mb PCI graphics accelerator card
- 1 parallel port, 2 serial (16650 UART) ports
- 14" 28DP NI MPR-II colour SVGA display
- Quad speed internal CD-ROM drive
- Sound Pro 16 sound card (Creative Labs chip set)
- Yamaha YST-M5 powered Hi-Fi speakers
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- Enhanced keyboard & MS compatible mouse
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- **FREE microphones & earphones PLUS FREE 26 CD bundle (worth £300)** see panel for details

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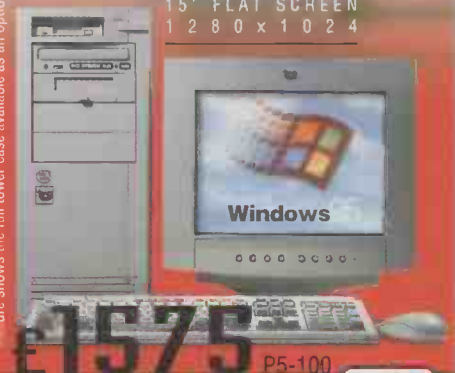
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- External SVGA monitor port
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- Optional Port Replicator
- DOS 6.2 and Windows 3.1/W95
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- External SVGA monitor port
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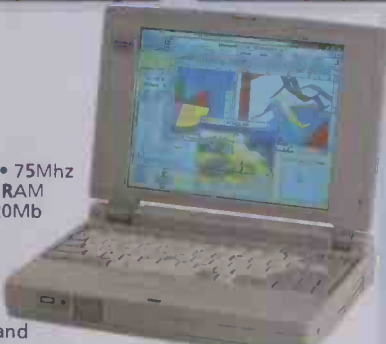
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T2150CD



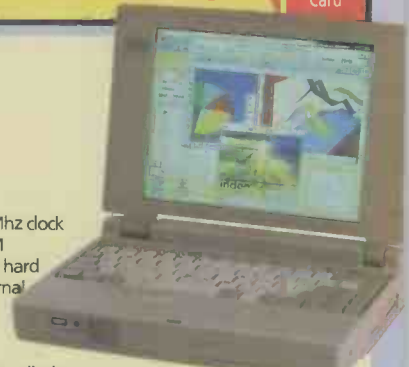
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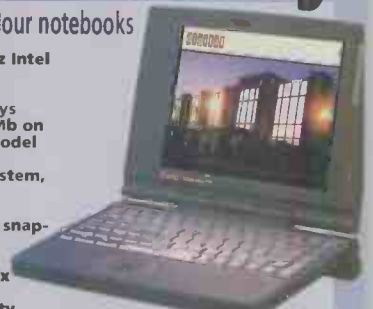
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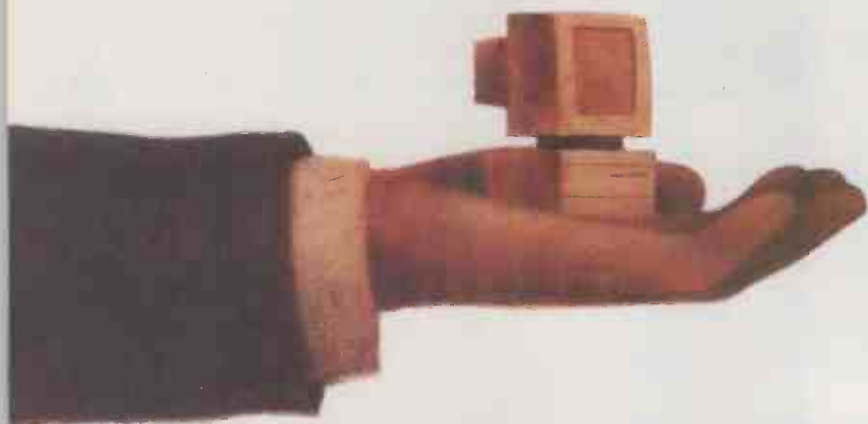
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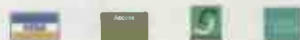
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 - ✓ Display: dual scan STN mono, up to 64 grey scales, (640 x 480 pixels), 9.5" diagonal display
 - ✓ Floppy Drive: Internal 3.5" 1.44MB
 - ✓ PCMCIA Expansion: 1 x R2.0 III or 2 x R2.0 II
 - ✓ Ports: ECP parallel; RS-232C serial (16550 UART); port replicator; SVGA monitor; PS/2 keyboard.
 - ✓ Battery: Battery NiH₂ with up to 4 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: 3.2Kg (7lbs)
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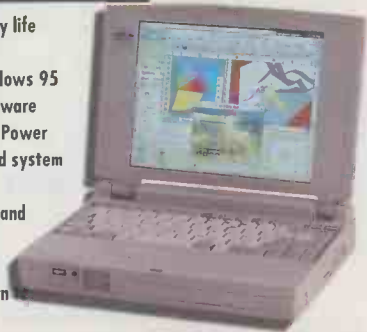
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T2110CS	486DX4/75	4MB	350MB	stn COL	78-39-0E	£1335	T4900CT	Pentium/75	8MB	810MB	TFT COL	76-57-0E	£2699
T2130CS	486DX4/75	4MB	520MB	stn COL	78-39-1E	£1349	Satellite Pro 400CS	Pentium/75	8MB	810MB	STN COL	78-40-3E	£2399
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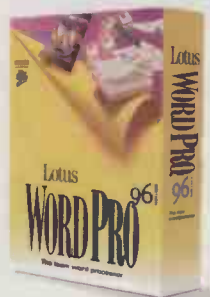
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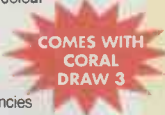
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- Photo CD compatible
- Audio sockets for headphones and line out
- Small lightweight enclosure for fast and easy mobility
- Motorised tray loading
- Easy to use and install software driver
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PSDAT subsystems are supplied with Arcsolo backup s/w, parallel port device driver s/w, DAT tape, parallel cable, mains cable, manual and one year warranty.



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- Photo CD compatible
- Small, lightweight, attractive and extremely portable drive
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- Supports 'Hot-Swapping' to allow disconnection and reconnection without re-booting
- Compatible with DOS, Windows, Windows 95 and OS2
- Motorised tray loading
- Easy to use and install software driver
- Supplied complete and ready to 'plug in and go'

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- Supports EPP & IEEE 1284 ports
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- Supplied complete and ready to 'plug in and go'
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- Data transfer rate of up to 300Kb/s
- MPC II compatible
- Photo CD compatible
- Audio sockets for headphones and line out
- Very small and stylish lightweight unit
- Connects to PCMCIA Type II or III slots
- Compatible with DOS, Windows and Windows 95
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- Supplied complete and ready to 'plug in and go'

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Hard Disk Drive: Removable 2.5" 540MB
Hard Disk Drive
Floppy Disk Drive: Built-in 3.5" 1.2MB/1.44MB
Floppy Disk Drive
Colour Display: Compatible IBM VGA mode; 32Bit PCI BUS controller; 1MB Display Memory (exp. to 2MB); Support OSTN/TFT LCD panel 640x480x64K or 800x600x256 colours up to SVGA mode; TFT up to

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Display: VGA 32-bit VESA Local Bus architecture; 1MB Video Display RAM; Windows Accelerator functions; 9.4" or 10.3" screen, 256 colours
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1024x768 in 256 colours
Audio System: Built-in speaker and microphone; built-in audio card
PCMCIA Interface: PCMCIA 2.0 standard compliant; 2xType II or 1xType III slots
I/O Interfaces: 1xStandard Parallel Port; 1x16C550 compatible Serial Port; 1x15-pin External CRT Monitor connector; 1xExternal Keyboard connector; 1x200-pin VESA/SCSI Bus Docking Station connector
Keyboard: 86-key, multi-nation key legends; inverted "T" cursor arrangement; integrated numeric keypad
Pointing Device: Built-in 19mm Trackball
Power System: AC adapter with 2-hour fast charge; NiCad battery pack for up to 3 hours use

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Floppy Disk Drive: Built-in 3.5" 1.44MB Micro Floppy Disk Drive
Display: VGA 32-bit VESA LB architecture; 1MB Video RAM; 9.4" screen, 256 colours
Audio System: Built-in speaker/mic.
PCMCIA Interface: PCMCIA 2.0 standard compliant; 1xType III, 1xType II slots

I/O Interfaces: 1xEPP/ECP compliant Parallel Port; 1x16C550 compliant Serial Port; 1x15-pin External Monitor connector; 1xExternal Keyboard connector; 1x200-pin VESA Bus Docking Station connector
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Pointing Device: Built-in 25mm Trackball
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HP CX/LX Inkjet Paper (200)	14.95	Canon BN22/32 (BJ1101)	4.25	Epson Stylus Colour II/820	14.95	22.95	IBM 4079 Plus (CYMK)(6's)	14.95	19.95
Canon Glossy Paper (50)	22.95	Canon BJ10/20 (BC01)	13.95	Epson Stylus 800/1000 (2's)	15.50	TWIN PK.	Olivetti JP.150 Mono Black	17.95	19.95
Canon Coated Paper (200)	19.95	Canon BJ200 (BC02)	15.95	EPSON STYLUS 800 / 1000			Olivetti Printhead +4Ink	34.95	
Epson Stylus Glossy (30)	42.50	Canon BJ130 (BJ1481)	10.95	3 + Twin Packs @ £14.95			Xerox 4020 / Pack of 2's	8.50	8.50
Epson Stylus 720Dpi (100)	10.95	Canon BJ300/330 (BJ1642)	10.95	HP Deskjet Portable					
Epson Stylus 360Dpi (100)	9.95	Canon BJ30/70 PRINTHEAD	25.95	HP Deskjet 500 Series					
Esselte Inkjet Colour Printing (250)	16.95	Canon BJ30/70 TANKS 3's	10.75	HP Deskjet 600 Series					
Esselte Inkjet Mono Printing (250)	6.95	Canon BJ70 PRINTHEAD	29.95	HP Deskjet 850C					
IBM Execjet II Coated Paper (250)	25.95	Canon BJ70 TANKS 3's	8.95	HP Deskjet 1600C					
PlusJet Inkjet For Mono Printing (500)	6.95	Canon BJ70 TANKS 3's	8.95	HP Deskjet 1200C					
				HP Paintjet XL					
				HP Paintjet XL300					
				Kodak Diconix 150/330					
				HP Deskjet 600 Series					
				HP Deskjet 850C					
				HP Deskjet 1600C					
				HP Deskjet 1200C					
				HP Paintjet XL					
				HP Paintjet XL300					
				Kodak Diconix 150/330					

DATA STORAGE CARTRIDGES

DDS TAPES

MAGNATO OPTICAL

3M Data Cartridges	1's	5's	3M Travan Cartridges	1's	5's	Digital Data Storage	1's	10's	3M Formatted Magnato Optical		
DC 2120	7.75	£36	TR1 Travan 400Mb	20.95	£99	3M D4-90 4mm 90M	6.95	£65	5 x 3.5" 230Mb for £99		
DC 2120 (QIC-80 Formatted)	7.95	£39	TR2 Travan 800Mb	24.95	£118	3M D4-60 4mm 60M	6.50	£60	Magnato Optical		
DC 2120XLxi (Formatted)	12.75	£59	TR3 Travan 1600Mb	25.95	£125	3M D8-112 8mm 112M	6.25	£58	1's		
MC 3000	17.95	£84	TR4 Travan 4000Mb	TBA	TBA	3M D4/90 Digital Data Tapes			5's		
MC 3000XL	19.50	£92	3M Travan (Comp. HP-DT1000)			10 x 4mm/90m for £65			3M 3.5" 128Mb	15.95	£75
MC 3000XL (PIMAT)	19.95	£95	10 x TR1 (400Mb) £185			Sony 4mm 120M	15.95	£155	3M 3.5" 128Mb (Formatted)	17.95	£85
MC 3000XL (TAUMAT)	22.50	£105	SONY Qic-Wide Carts. 1's 5's			HP 4mm 120M (922300A)	14.95	£145	3M 3.5" 230Mb	19.95	£95
3M Data Cartridges	1's	5's	QW5122F 240Mb	16.95	£78	HP 4mm 90M (92283B)	8.50	£81	3M 3.5" 230Mb (Formatted)	20.95	£99
DC 6150 150Mb	8.95	£43	QW3010XLF 850Mb	20.50	£98	HP 4mm 60M (92283A)	8.75	£83	TDK 3.5" 230Mb	19.95	£95
DC 6250 250Mb	12.95	£62	QW3020XLF 1700Mb	21.50	£102	HP Cleaning Tape 2's (92283K)	21.00		3M 5.25" 600Mb 512 Bytes	53.50	£250
DC 6320 320Mb	14.25	£69	QW3080XLF 4.0Gb	23.50	£109	Maxell 4mm/8mm Cleaning Tape	10.95		3M 5.25" 650Mb 1024 Bytes	53.50	£250
DC 6525 525Mb	14.95	£72							3M 5.25" 1.2Gb 512 Bytes	62.95	£295
									3M 5.25" 1.3Gb 1024 Bytes	62.95	£295

3 1/2" DS/HD DISKS

BRANDED DS/HD DISKS

CD-RECORDABLE

SYQUEST • IOMEGA

UNBRANDED FORMATTED	3 1/2" DS/HD	100 Disks £28	Branded	Unformatted Formatted	TDK CDR-74	SYQUEST EZ-135
			3M	£45	£45	5 x Cartridges for £70
			TDK	£42	£43	Syquest SQ3135 3.5" 135Mb EZ
			MAXELL	£43	£44	Syquest SQ3105 3.5" 105Mb
50 HD Disks	£15.00		SONY • SONY FORMATTED		50 CD-ROM	Syquest SQ3270 3.5" 270Mb
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MICE • KEYBOARDS

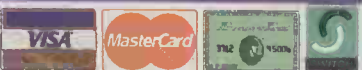
CABLES

DATA SWITCHES

ACCESSORIES

Logitech Pilot II Mouse Serial	£19.00	Parallel Cable Moulded 2m	£3.95	2 Way Manual (Parallel / Serial)	£9.95	3.5" 100 Capacity Disk Box	3.95
Logic 3 Mouse Serial	£12.00	Parallel Cable Moulded 3m	£5.95	3 Way Manual (Parallel / Serial)	£14.95	3.5" 240 Capacity Disk Drawer	12.95
Imsi Mouse PS/2	£14.95	Parallel Cable Moulded 5m	£6.95	4 Way Manual (Parallel / Serial)	£18.95	Glass VDU Screen Filter 14"	7.95
Mitsumi Keyboard 102 Keys	£14.95	25M-25M D-Sub Moulded 3m	£5.95	2 Way Crossover (Parallel/Serial)	£22.95	Removable / Lockable HDD Racks	
		36M-36M Cen. Moulded 3m	£7.95	AutoSwitch 2 PC to 1 Printer	£19.95	3.5" Hard Disk Rack - IDE	19.95
		Serial / Null Modem Cables 2m	£9.95	AutoSwitch 4 PC to 1 Printer	£29.95	3.5" Hard Disk Rack - SCSI	24.95

Cherry Keyboard (Genuine) 102 Key £25.95



Carriage	Standard	Next Day	TERMS & CONDITIONS
UK Mainland +	£3.50	£5.00	TRADING HOURS: 9:00 A.M. - 5:30 P.M. (MON - SAT)
Outside UK Mainland +	P.O.A.	P.O.A.	PAYMENT MUST ACCOMPANY ALL ORDERS. TELEPHONE CREDIT CARD ORDERS ARE NORMALLY DESPATCHED SAME DAY. PLEASE ALLOW 5 WORKING DAYS FOR CHEQUES TO CLEAR.
Hardware +	£8.00	£12.00	WE ACCEPT VISA, MASTERCARD, ACCESS, DELTA & SWITCH. NO CREDIT CARD SURCHARGE. PRICES & SPECIFICATION MAY CHANGE WITHOUT NOTICE. (ALL TRADEMARKS ACKNOWLEDGED) GOODS OFFERED SUBJECT TO AVAILABILITY. ALL PRICES EXCLUDE DELIVERY & V.A.T. (E & O.E.)

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THE BROTHER of INVENTION



THE
brother

Solo

COMPACT

Only 10% larger than a 15" monitor

ERGONOMIC

Front mounted controls, unique tilt & swivel base

POWERFUL

Choice of Intel Pentium® Processors, PCI local bus

FLEXIBLE

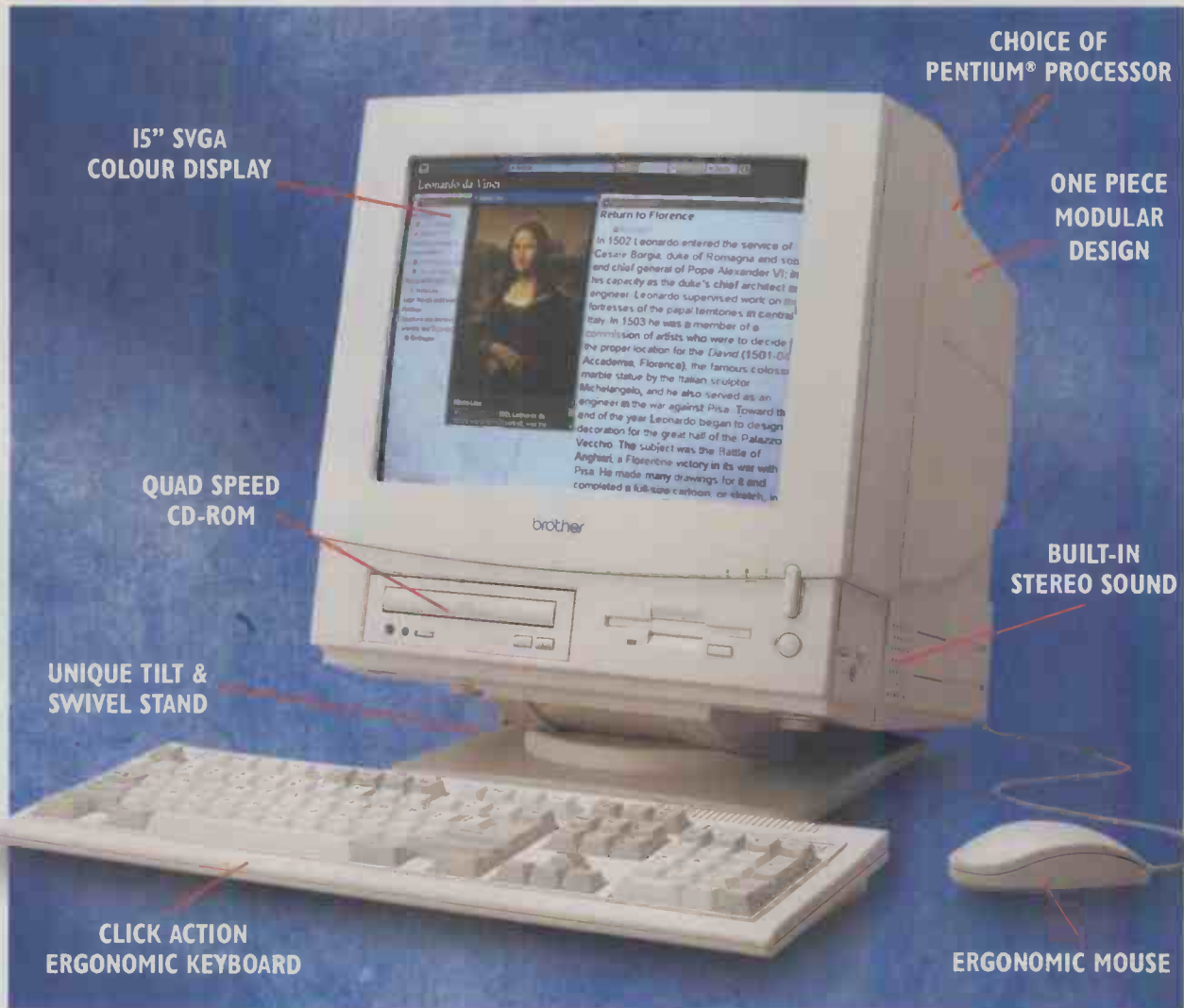
Fully expandable design 4 drive bays, 5 expansion slots.

VERSATILE

'Split and Swing Open' mechanism for easy reconfiguration and service

Solo

All you want All-in-One



COMPACT

Only 10% larger than a 15" monitor, the smallest integrated monitor/PC of its kind, the compact Brother Solo transforms the smallest of areas into a high-productivity workspace.



POWERFUL

You can select from a variety of features to maximise performance. Choose from the family of Intel's powerful Pentium® Processors, double-sided RAM banks support a total of 128Mb. And the Solo offers PCI slots for powerful expansion.



ERGONOMIC

Conveniently front-mounted controls, combined with the practical Tilt & Swivel feature, allow you to customise display settings. Innovative features such as the full screen, mute, and suspend switches give you complete control over the computing environment. In traditionally designed PC's, frequently used controls and jacks are found on the rear panel of PCs. This makes access rather awkward. On the Solo all these controls are easily accessible from the front panel.



VERSATILE

A spare drive bay allows for a second hard drive and six expansion slots provide the capacity for personalised configurations. The optional AV pedestal, with its 5W detachable speakers and hi-fi sub-woofer, is a must for the music connoisseur. Optional TV Tuner and MPEG cards allow you to optimise the full screen display.

EASE OF SERVICE

The rear panel of the Solo swings open to a full 60° angle revealing vertically placed expansion slots on the main board. This patented Split & Swing feature makes servicing and upgrading the Solo both quick and simple.



Solo The All-in-One MultiMedia Solution

Solo for the Office

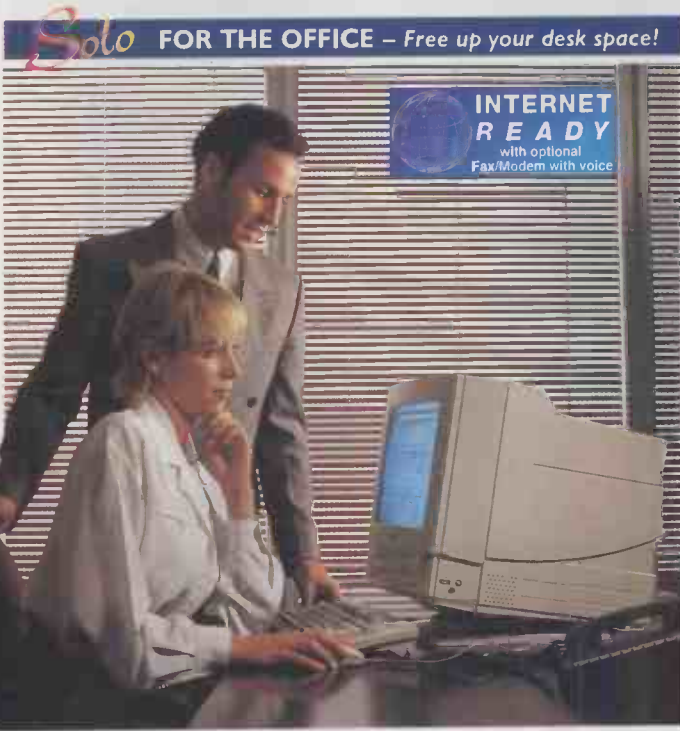
Free up your desk space! The Solo is only 10% larger than a 15" monitor and the smallest integrated monitor/PC of its kind. Yet, behind the compact design, the Solo makes no compromises on performance or powerful features. Pentium® processor, PCI bus architecture, 15" display and the unique "Split and Swing Open" mechanism for easy reconfiguration and service, make sure the Solo will satisfy the most demanding office PC user. Pre-installed Microsoft Works software has word processing, spreadsheet and database modules to get you productive from the moment you power up.

Solo for the Home

No need to make special cabling connections, configure hardware or install software. The Solo is ready to use straight out of the box. With all the latest MultiMedia features built-in, the Solo is ready for the next generation of PC users. Place the Dangerous Creatures CD into the quad speed CD drive and bring the sights and sounds of the jungle to your home. Or for some light relief, enjoy a leisurely game of Multimedia Golf. The Solo also comes with Microsoft Money to help sort out the home finances.

Solo for Education

Understanding and using new technology is crucial to our children's education. And the Brother Solo represents the perfect PC solution for educational use. In the classroom the compact design, fewer cables and easy servicing, together with all MultiMedia features built-in make the Solo an ideal choice. The Microsoft Family CD's, including the Encarta encyclopaedia, help children explore the exciting world of MultiMedia computing like never before.



BROTHER SOLO SPECIFICATION

- Intel Pentium® Processor: 75MHz, 90MHz, 100MHz or 120MHz
- PCI Bus Motherboard
- 8Mb RAM expandable to 128Mb
- 540Mb fast IDE Hard Disk (1Gb option)
- 256K Cache RAM
- PCI 1Mb Graphics Card
- Quad speed CD-ROM
- 16-bit Soundcard and built-in Stereo Speakers
- 15" SVGA LR NI 0.28 Colour Display
- EPA EnergyStar Compliant
- 3.5" 1.44MB floppy drive
- Serial, Parallel and games port
- Spare hard drive bay
- 4 x 16-bit ISA/2 x 32-bit PCI expansion slots
- 102 key keyboard and mouse
- Tilt & Swivel design
- 'Split and Swing Open' mechanism for easy reconfiguration and service
- Windows 95 or Windows 3.11 and MS-DOS 6.22
- Microsoft Family CD Bundle (see below)
- Dimensions: 360 x 375 x 430mm
- 2 year warranty (1st year on-site)

Microsoft Family CD Pack

FREE with the Brother Solo MultiMedia



Worth over £400 (RRP)

- MS Encarta 1995 Encyclopaedia CD
- MS Works for Windows Integrated Package CD
- MS Dangerous Creatures Wildlife CD
- MS Money Home Finances CD
- MS MultiMedia Golf Entertainment CD
- MS Scenes Backgrounds (3.5" disks)

Documentation included on CD. Works and Money supplied on 1 CD

Upgrade to the Solo SuperMax

- Fax/Modem with Voice
- Joystick
- SuperMax Software Package including:
 - Business Lotus Smartsuite v4.0:
 - Lotus 123
 - Lotus WordPro
 - Lotus Approach
 - Freelance Graphics
 - Lotus Organiser
 - Entertainment (Top 10 Games)
 - Dragon Lore
 - MegaRace
 - Theme Park
 - FIFA
 - Communications
 - Connection to CompuServe & Internet (Free for limited period)
 - Supersave Comms Software
 - Education
 - Grolier's MultiMedia
 - MultiMedia Typing Tutor
 - Utilities
 - Pilot MultiMedia
 - Training for Lotus Smartsuite
 - Interlude and Get Organised
 - Professor MultiMedia
 - Professor Windows

Plus The Microsoft CD Pack

Solo FOR THE HOME



Solo FOR EDUCATION



Compact, powerful and easy to customise, the Brother Solo PC is truly all you want - All-in-One

Brother Solo P75 MultiMedia		Brother Solo P75 SuperMax		OPTIONS	
£1399	PERSONAL CREDIT £58.87 inc VAT per month APR 26.8%	£1549	PERSONAL CREDIT £65.09 inc VAT per month APR 26.8%	Upgrade Hard Disk from 540Mb to 1.275Gb	£110
P90 90MHz	£1499	P90 90MHz	£1649	8Mb RAM to 16Mb	£218
P100 100MHz	£1579	P100 100MHz	£1729	AV Pedestal with Hi-Fi Sub Woofer & External Speakers	£79
P120 120MHz	£1629	P120 120MHz	£1779	MPEG Card	£POA
				TV Tuner Card	£POA
				Fax/Modem 14,400 with voice	£90
				Upgrade warranty to 2nd year on-site	£29

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ALL PRICES EXCLUDE VAT

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

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.

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.

Rapier ELS P75 Best Buy

- Intel Triton Chipset
- Intel Pentium Processor
Running at 75MHz
- 8Mb RAM
- 850Mb EIDE Hard Disk Drive
- 1Mb 64 Bit DRAM PCI Video Adapter
- 14" MPR2 NI (800 x 600) 0.28dp
- 256Kb W/B Cache Memory
- Free Slots: 2 PCI & 1 PCI
or ISA & 4 ISA
- 1.44Mb Floppy Disk Drive
- 1 Parallel & 2 Fast Serial Ports
- Desktop or Mini Tower Case w/200W PSU
- 102 Key Keyboard • Serial Mouse
- Windows for Workgroups 3.11
& MS DOS 6.22



Hot!
£759



Rapier ELS P75..... **£759**

Rapier ELS P100 Best Buy

- Intel Triton Chipset
- Intel Pentium Processor
Running at 100MHz
- 8Mb RAM
- 850Mb EIDE Hard Disk Drive
- 1Mb 64 Bit DRAM PCI Video Adapter
- 15" MPR2 NI (1280 x 1024) 0.28dp
- 256Kb W/B Cache Memory
- Free Slots: 2 PCI & 1 PCI or ISA & 4 ISA
- 1.44Mb Floppy Disk Drive
- 1 Parallel & 2 Fast Serial Ports
- Desktop or Mini Tower Case w/200W PSU
- 102 Key Keyboard
- Serial Mouse
- Windows for Workgroups 3.11
& MS DOS 6.22



Hot!
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the processor
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Designing the perfect PC for your needs is easy with Express Micro. First choose the processor option of your choice and then pick the extras you require. Simple.

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Friendly advice is always available if you need help making a decision.

And once you've decided which PC is right for you, our engineers will build, test, pre-configure your software (if required) and ship your system to you in less than five days. Now that is hot!



Express Micro

Standard System Spec.

- Intel Triton Chipset
- 75-133MHz Intel Pentium Processor
- 8Mb RAM
- 850Mb EIDE Hard Disk Drive
- 1Mb 64 Bit DRAM PCI Video Adapter
- 14" MPR2 NI (800 x 600) 0.28dp
- 256Kb W/B Cache Memory
- Free Slots: 2 PCI & 1 PCI
or ISA & 4 ISA
- 1.44Mb Floppy Disk Drive
- 1 Parallel & 2 Fast Serial Ports
- Desktop or Mini Tower Case
w/200W PSU
- Serial Mouse
- 102 Key Keyboard
- Windows WFW 3.11 & MS DOS 6.22

Pentium TM 75MHz	£759
Pentium TM 90MHz	£829
Pentium TM 100MHz	£859
Pentium TM 120MHz	£929
Pentium TM 133MHz	£1,019

Hard Disk Upgrades

850Mb to 1.2Gb EIDE Hard Disk Drive	£59
850Mb to 1.6Gb EIDE Hard Disk Drive	£99

Memory Upgrades

Change from:	
8Mb Standard RAM to 8Mb EDO RAM	£25
8Mb Standard RAM to 16Mb Standard RAM	£189
8Mb EDO RAM to 16Mb EDO RAM	£249
16Mb Standard RAM to 32Mb Standard RAM	£319
16Mb EDO RAM to 32Mb EDO RAM	£419

Monitor & Video Upgrades

All monitors come with 2 years warranty. The 1st year is advance replacement followed by 1 year RTB.

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15" NI (1280 x 1024) MPR2 0.28dp	£99
17" NI (1280 x 1024) MPR2 0.28dp	£289
Extra 1Mb DRAM Upgrade for Video Card	£49

Input Devices

Upgraded 102 Key UK Keyboard	£5
Tactile 102 Key UK Keyboard	£10
Fujitsu Full Size Tactile Keyboard	£25
Logitech Pilot Mouse	£9
Microsoft Ergonomic Mouse	£15

All prices are plus VAT & Delivery. Please note: Specifications are liable to change without prior notice. All prices subject to change. E&OE.

Rapier P100 Multimedia

- Intel Triton Chipset
- Intel Pentium 100MHz Processor
- 8Mb RAM
- 1.2Gb EIDE Hard Disk Drive
- 1Mb 64 Bit DRAM PCI Video Adapter
- 16 Bit Sound Card
- Quad Speed IDE CD-ROM Drive
- 15" MPR2 NI (1280 x 1024) 0.28dp
- 256Kb W/B Cache Memory
- Free Slots: 2 PCI & 1 PCI or ISA & 4 ISA
- Desktop or Mini Tower Case w/200W PSU
- 102 Key UK Keyboard • Serial Mouse
- 1.44Mb Floppy Disk Drive
- 1 Parallel & 2 Fast Serial Ports
- Windows F.W. 3.11 & MS DOS 6.22
- Amplified Stereo Speakers



Rapier Pentium 100 Multimedia **£1,149**

Rapier Pro P120 Multimedia

- Intel Triton Chipset
- Intel Pentium Processor Running at 120MHz
- 16Mb EDO RAM • 1.6Gb EIDE Hard Disk Drive
- 2Mb 64 Bit DRAM PCI Video Adapter
- 16 Bit Sound Card
- Quad Speed IDE CD-ROM Drive
- 15" MPR2 NI (1280 x 1024) 0.28dp
- 256Kb Pipeline Burst Cache Memory
- Free Slots: 2 PCI & 1 PCI or ISA & 4 ISA
- 1.44Mb Floppy Disk Drive
- 1 Parallel & 2 Fast Serial Ports
- Desktop or Mini Tower Case w/200W PSU
- Fujitsu Full Size Tactile Keyboard
- Microsoft Ergonomic Mouse
- Windows 95
- Amplified Stereo Speakers



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Express Micro

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- Lotus SmartSuite**£99**

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All above warranties cover both parts & labour. Carriage both ways is included on the collect & repair warranties.

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 Speakers **ONLY £149**

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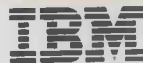
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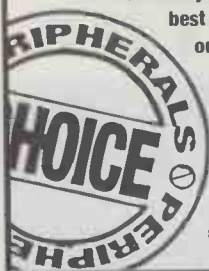
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CONNER



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our fast delivery service,
excellent technical support
and friendly sales team
you know you've come to
the right place. And don't
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cheaper - call us, we will
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CONTROLLERS

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IC90 ISA Super I/O 2FDD/2HDD/2S, 1P, 1G	£8
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IC65 Vesa Super I/O (Mode 3) 4HDD/2FDD/2S, 1P, 1G E-IDE	£12
IC55 Vesa Super I/O (Mode 3,4,5) 4HDD/2FDD/2S, 1P	£25
IC60 Vesa Super I/O (Mode 3) 4HDD/2FDD/2x16550/1ECP/EPP	£15
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C20 Cyrix 386DX-25 to 486DX-50MHz	£145
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ME10 4Mb x 9 3 chip	£85
72 PIN SIMMS	
ME15 4Mb (1 x 32) 72 Pin SIMM	£82
ME17 4Mb (1 x 36) 72 Pin SIMM	£95
ME20 8Mb (2 x 32) 72 Pin SIMM	£163
ME22 8Mb (2 x 36) 72 Pin SIMM	£189
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ME27 16Mb (4 x 36) 72 Pin SIMM	£345
ME30 32Mb (8 x 32) 72 Pin SIMM	£625
ME35 32Mb (8 x 36) 72 Pin SIMM	£689
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ME18 4Mb 72 Pin EDO SIMM	£95
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M35 486 DX/SX, 4x30 & 2x72 PIN SIMM W/Back Cache, Zif	£40
M37 486 DX/SX, 4x30 & 2x72 PIN SIMM 256K Cache, Zif	£59
486 PCI BUS	
M40 486 DX/SX, PCI Green 256K Cache	£69
M43 VIP 486DX/SX, W/B Cache, Zif	£52
M45 VIP 486DX/SX, 256K Cache, Zif	£71

Pentium Motherboard Intel Triton Chipset (Optional Cache Memory)

• Supports Intel PENTIUM P54 & P55, 75-200MHz CPUs
• Socket 7 ZIF Socket • Intel Triton Chipset
• L2 Synchronous Cache RAM Module
Socket for adding an extra 256K of Asynchronous SRAM Cache or 256K of Pipeline Burst Cache • Voltage Regular Module • Plug and Play BIOS
• Supports both Fast Page Mode and EDO RAM modules • 4x16 bit slots & all 3 PCI slots support Master Mode
• 2x Bus Master IDE Sockets (up to Mode 4) • 1x Parallel Port (ECP/EPP), 2x Seriel Port (16550 UART), FDD & PCI IDE interfaces

M31 Motherboard Triton Chipset with Cache Module	£109
M91 256K SRAM Module	£39
CM2 256K Pipeline Burst Cache	£69

PENTIUM PCI BUS	
M91 Intel Triton Chipset Pentium 75/90/100/120/133, 256K Cache On-board support for EDO RAM	£129
M95 Intel Triton Chipset Pentium, 75/90/100/120/133, 512K Cache On-board support for EDO RAM	£169
M92 Intel Triton Chipset, 256K Pipeline burst Cache, support for EDO RAM, VRM Socket giving support for the next wave of Pentium Chips This board is simply the quickest & best board on the market today!	£175

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MC5 387SX & 487SLC Co-Pros (16Mhz-40Mhz)	£19
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HS5 Heat sink for 486	£3
HS10 Heat sink and fan for 486	£4
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AC80 Box of 10 Formatted 3.5" Diskettes 1.44 MB OEM	£4
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AC65 VGA/SVGA Monitor Extension Cable	£5
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K5 Metal Base 102 Key UK Keyboard	£9
K6 Mitsumi 102 Key UK Keyboard	£10
K10 Click Action 102 Key UK Keyboard	£14
K20 Fujitsu 4870 Click Keyboard	£18
K25 Fujitsu 4700 Click Keyboard	£26

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• Unique contoured design - encourages a balanced, more natural hand and wrist position
• 104 key design - extra function keys
• Intellitype software - a Windows based utility for customising the way you work

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AC45 PS/2 Keyboard Adapter	£5
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M11 Logitech Pilot Mouse	£15
M12 Mitsumi High Quality Serial Mouse	£6.50
M15 Microsoft Ergonomic Mouse 2.0	£19

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DT10 Trust 12 x 12 Digitising Tablet 4 Button Pack, Light Pen, Templates for Autocad, etc	£99
DT5 Trust 18 x 12 Digitising Tablet 6 Button Pack, Light Pen, Windows 3x drivers, Templates for Autocad, etc	£165

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Now you can do high-precision drafting in many Windows applications
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£165

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CONNER	
HD45-C CFP1060 1GB SCSI	£249
HD55-C CFP21055 2.1GB SCSI	£499
HD60-C CFP42075 4.2GB SCSI	£749
SEAGATE	
HD45-S ST31230 1GB SCSI	£289
HD55-S ST32430 2.1GB SCSI	£599
HD60-S ST15230 2.1GB SCSI	£799
MICROPOLIS	
HD55-MS MIC4221 2GB SCSI	£579
HD55-MSAV MIC4221AV 2.1GB SCSI AUDIO VISUAL	£599
HD60-MS MIC3243 4.35GB SCSI	£759
HD60-MSAV MIC3243AV 4.35GB SCSI AUDIO VISUAL	£799
HD65-MS MIC1991 9.1GB SCSI	£1,425

OPTICAL DRIVES

OP5 Fujitsu 230MB 3.5" Internal Optical Drive	£389
OP15 Fujitsu 230MB 3.5" Parallel Port Optical Drive	£575

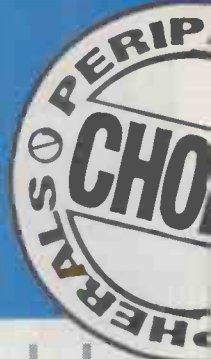
FLOPPY DISK DRIVES

FD5 Mitsumi Floppy Drive 3.5"	£16
FD5-S Sony Floppy Drive 3.5"	£19
FD10 Mitsumi 5.25" Drive	£31

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- 15" Non-Glare FST Screen • 0.28 Dot Pitch
- Microprocessor Control On-Screen Display
- Non-interlaced to 1280x1024 resolution
- MPR-II
- Scan Frequency: 30KHz-65KHz
- Display Size: 260x195mm
- 2 year on-site warranty



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£239

Smile CA 1516-CL

- 15" Non-Glare FST Screen • 0.26 Dot Pitch
- Microprocessor Control LCD Display
- Non-interlaced to 1280x1024 resolution
- MPR-II
- Scan Frequency: 30KHz-65KHz
- Display Size: 260x195mm
- 2 year on-site warranty



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£249

Smile CA 1716-SL

- 17" Non-Glare FST Screen • 0.28 Dot Pitch
- Microprocessor Control On-Screen Display
- Non-interlaced to 1280x1024 resolution
- MPR-II
- Scan Frequency: 30KHz-65KHz
- Display Size: 310x230mm
- 2 year on-site warranty



SMILE 17" MONITOR
£397

Smile CA 1716-CL

- 17" Non-Glare FST Screen • 0.26 Dot Pitch
- Microprocessor Control LCD Display
- Non-interlaced to 1280x1024 resolution
- MPR-II
- Scan Frequency: 30KHz-65KHz
- Display Size: 310x230mm
- 2 year on-site warranty



SMILE 17" MONITOR
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M032	Smile CA 1516-SL 15" (NI 1280x1024) MPR2 On-Screen Display FST Processor Control 0.28dp	£239
M041	Smile CA 1516-CL 15" (NI 1280x1024) MPR2 LCD Display FST Processor Control 0.26dp	£249
M045	Smile CA 1716-SL 17" (NI 1280x1024) MPR2 On-Screen Display FST	

M050	Smile CA 1716-CL 17" (NI 1280x1024) MPR2 LCD Display FST Processor Control 0.26dp	£439
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M070	21" V21 MPR2 (NI 1600x1200)	£1329
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M095	20" GDM2038 MPR2 (NI 1600x1200)	£1380
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MAXTOR 850MB E-IDE HD
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T85	DITTO 800 External Tape Drive	£199
COLORADO		
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T13	Jumbo 700MB Tape Drive	£125
T16	Trakker 350 External Tape Drive	£145
T17	Trakker 700 External Tape Drive	£199
T65	T1000 800MB Travan Tape Drive	£115
CONNER		
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T61	Tape-Stor Travan 800 External Tape Drive	£239
T53	2GB Turbo DAT Drive	£525
T54	4GB Turbo DAT Drive	£599
EXABYTE		
T55	4200 SCSI DAT Drive	£525
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T40	DC2120 Formatted Tape	£8.50
T42	QIC-WIDE 420MB Tape	£14
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ND40-H	DK211A-51 540MB	£199
ND45-H	Hitachi 1GB	£CALL
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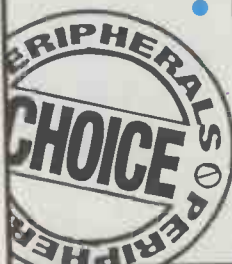


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F20 Internal 28800 VFast Card V34 £87

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PR25 Hewlett Packard LaserJet 4/5L £365

PR32 Colour Upgrade for DeskJet 600 £28

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PR56 BubbleJet Printer BJ200E £160

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PR66 BubbleJet Printer BJC4000 £239

PR70 Colour Printer BJC4000 £222

PR75 Colour InkJet BJ600E £319

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- Wavetable Upgradeable • Up to 44.1KHz Sampling Rate
- ESFM Enhanced FM Synthesiser • 11 pieces of Software
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S035	Trust Sound Wave 32 (Wave Table Card) with 4 CD interfaces & IDE	£129
S031	Orchid "Nu-Sound" Wave 32 Sound Card	£129

Orchid "Nu Sound" Plug & Play 3D Sound Card with Wavetable Synthesis

- PC Review, PC Zone & PCX Recommended
- IDE & Panasonic Interface with 343 Sounds
- Many, Many Software Features • 20 Voice FM Synthesiser
- 3D Sound for Extra Depth • Up to 32 Simultaneous Voice

S050	Creative Labs Sound Blaster Sound Cards	£53
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S054	Sound Blaster 16 Pro	£115
S055	Sound Blaster 16 Pro ADSP	£95
S056	Sound Blaster 16 MCD	£109
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S075	Creative Labs Multimedia	£169
S076	Video Blaster SE100	£267
S097	300 Blaster Game Player	£155

Sound Blaster AWE 32 Full Version

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- 32 Voice Synthesiser
- Reverb, Chorus & Qsound
- Upgradeable Memory
- Includes Comprehensive Software Package
- 128 Instruments & 6 Drum Kits

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S100	Trust PCTV Video Master - Plays TV in Windows	£149
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SP20	Trust Soundwave 20 25W Speakers with stands	£35
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SP24	Trust Soundwave 240 240W Speakers	£36
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SP30	Yamaha M10 10W High Quality Speakers	£75
SP35	Yamaha MSW10 25W Sub Woofer System	£25
SP40	Active 80W Active Speakers	£35
SP42	Active 120W Active Speakers	£35
SP45	Trust 3D Sound Dimension 300W Speakers with 3D Sound Capability	£59

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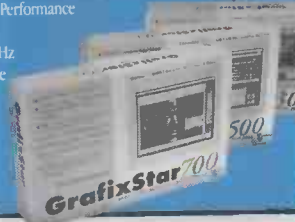
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- 25 watts high power output • Automatic power switch

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V15	ISA 512k SVGA Card	£39
V25	Trident 8900D ISA Video Card 1Mb	£52
V26	VESA Local Bus	£59
V32	VESA Trident 1Mb 9440 Windows Accelerator	£45
V45	VEVA S3 805 ChipSet Window Accelerator Card 1Mb	£48
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VideoLogic Grafix Star 700

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CD09	NEC Quad Speed IDE	£106
CD10	Veritos Quad Speed IDE Sony Optics	£95
CD11	Generic 6 Speed CD-ROM	£109
CD12	Trust Carousel Quad Speed w/Free CD	£105
CD13	Pioneer DR-AU24X-5 Quad Speed IDE	£109
CD14	Microsolutions BackPack Quad Speed External	£245

CD15	SCSI CD-ROM DRIVES	£215
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CD17	Toshiba XM5301B SCSI Quad Speed	£295
CD18	Toshiba XM3601B External Quad Speed (4X)	£195
CD19	Pioneer DR-U124X-4 Internal Quad Speed (4x4x)	£469
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PCI NE2000 Card (BNC/RJ45)	£65
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PCMCIA NE2000 (BNC/RJ45)	£79
Trust Novell Print Server	£169
NE2000 BOOT ROM	£5

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3COM Etherlink III 3C509 ISA BNC 5 Pack	£295
3COM Etherlink III 3C509 ISA RJ45 5 Pack	£295
3COM Etherlink III 3C509 ISA Combi 5 Pack	£340
3COM Etherlink III 3C579 EISA BNC	£129
3COM Etherlink III 3C579 EISA RJ45	£129

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Trust 8 Port Smart Hub	£92
Trust 16 Port Smart Hub	£173
Trust 2 Port Ethernet Repeater	£104
Trust 4 Port Ethernet Repeater	£219

Trust 16 Port Smart Hub

- 16 UTP port concentrator with fault isolation
- 5-step LED metre for changing and collision rate
- 10 Mbit per sec • Processes all ethernet packages

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UTP 3MTR Drop Connector Cable - Cat 5	£3
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SOFTWARE

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- Designed to run with Windows 95 • PC Pro 5 Star Rating
- Noteblox for Notepad • Clacblox very versatile calculating software
- Toolblox extremely useful utility with drag & drop
- Workblox organises documents • Recommended by "Micro Mart"
- Listblox for listmaking • Issued for free trial with many magazines

Office Blox 95 £59

SOFTWARE

Microsoft Family Bundle OEM Version

Includes • MS Encarta 95 • MS Works • MS Dangerous Creatures • MS Sampler CD • MS "Best of" Entertainment 3.5" Floppy • MS Golf

MS Family Bundle £49

GENERAL OEM

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Microsoft Golf	£19
MS Dangerous Creatures	£19
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Upgrade your PC with Microsoft's latest and greatest version of their operating system. Windows 95 is the most important Windows upgrade ever! It replaces Windows 3.1, Windows for Workgroups 3.11 and all versions of MS-DOS. With it's new 32-bit architecture, it's faster, easier and more enjoyable to work with. Windows 95 has an easier-to-use interface that lets you use long file names and gives you one-click access to all of your documents and programmes via the Start button. It's also ready for the new Plug & Play technology, automatically connecting with compatible disk drives, sound cards and other peripherals.

- 32-Bit Architecture
- Faster and easier to work with
- One click access to all documents
- Plug & Play compatible working with a large range of drives and cards
- Multi Tasking
- Large number of titles available to suit
- Upgrades Windows 3.1, Windows 3.11 & MS DOS

MS Windows 3.x to Windows 95 on CD £59
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Rockfire Keypad Keyboard Emulator	£17
Rockfire Infra-Red Joypad Single Pad	£17
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MS Access for Windows 95 CCP Upgrade on 3.5"	£107
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MS PowerPoint for Windows 95 Competitive Upgrade on 3.5"	£107
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- Digitising overlay with pen

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Pico has been involved in PCMCIA technology for over 5 years, sitting on the technical committee of the standards association. This has given us a unique insight into the companies and products involved in this technology. The result is that we have selected the best products in the marketplace offering you the user quality and performance at the most competitive prices. And we guarantee it!



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- HP Financial Calculator
- 40 hours on 2 x AA alkaline batteries

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Mac Cable	£18.95	PC Adaptor	£28.95
Connectivity Pack	£89.95	ALSO SEE PCMCIA MEMORY CARDS	



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£399
INC. Windows Connection Kit

Nokia 2110 Phone
£199
+ CONNECTION

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The Newton MessagePad 120 puts easy-to-use communications, productivity, and desktop connectivity solutions in the palm of your hand so you can work away from your office.

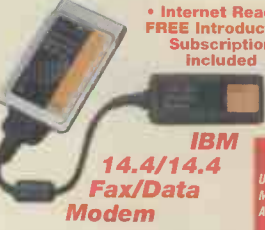
- Can turn printed or cursive handwriting into typed text.
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8MB RAM
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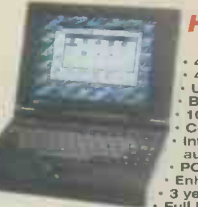
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- Comes with external 3.5" Floppy disk drive
- Infra red data transfer
- 3 year warranty
- Up to 4 hours battery life
- 1.72kg (3.81lb) weight

MODEL	PROCESSOR	HARD DISK	RAM	SCREEN	PRICE
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260	486 DX4/75	260MB	8MB	8.5 DSTN	£1799
260	486 DX4/75	260MB	8MB	8.5 TFT	£2049



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- Infra-red port, serial, parallel, audio
- PCMCIA Type II Slot
- Enhanced Port Replicator
- 3 year warranty
- Full PC functionalities

- Modularity & flexibility
- Connectivity convenience
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5000	590	1GB	16MB	10.4TFT	£4199
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520	486 DX2/50	520MB	8MB	10.4 TFT	£1599
340	486 DX2/50	340MB	8MB	10.4 TFT	£1729
520	486 DX2/50	520MB	8MB	10.4 TFT	£1799
340	486 DX4/100	340MB	8MB	10.3 DSTN	£1999
520	486 DX4/100	520MB	8MB	10.3 DSTN	£1999
340	486 DX4/100	340MB	8MB	10.4 TFT	£1999
520	486 DX4/100	520MB	8MB	10.4 TFT	£2149
520	486 DX4/100	810MB	8MB	10.4 TFT	£2269

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- Uses only one PCMCIA type II slot
- DOS, Novell, Windows, Windows 95, Windows NT, OS/2 fully supported
- Unrivalled ruggedness, no external boxes
- Direct connection to phone socket & network



Xircor Combo - Fax/Data/ Ethernet

- Simultaneous Ethernet/803.2 LAN plus 19,200bps data and 14,400bps send/receive fax modem operation in one slot
- Includes terminal & fax software for Windows
- Supports advanced PCMCIA features including HotSwap, Suspend/Resume and Integrated Power Management



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- CD-ROM, 16-bit sound, speakers & Microphone
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- LCD Status and Power LED

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IBM/PICO Ethernet Adaptor Cards

- 10Base-T and 10Base2 Ethernet. LAN cards for portable computing applications.
- PCMCIA Version 2.
- MS Windows compatible.
- Novell certified.
- MS Windows for Work Group certified

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PreMax Combo Card

The PE-200C from Premax, a Netware compatible 10BASE-T Ethernet Local Area Network (LAN) adaptor card, provides PC Card network connectivity with Novell's Netware, IBM's LAN Server, Banyan's VINES, and Microsoft's Windows for Workgroups.

- Easy installation
- 10BASE-T, Model PE-200T
- 10BASE-T, 10BASE-2 connectors, PE-200C
- 16 bit bus
- 16KB data buffer
- No external power required for operation
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- 1 Year warranty

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IBM/PICO Token-Ring I/O Card

Provides attachment to Token-Ring LANs operating at either 16Mbps or 4Mbps.

- PCMCIA Version 2.
- Operates with DOS 5.0, PC LAN Program (PCLP) v.1.34 and Novell Netware v.3.11.
- Driver support includes NDIS and ODI.
- Complies with IEEE 802.5 and 802.2.

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IBM/PICO RS-232 Serial Card

Complete RS-232 connectivity in the hands of mobile business professionals. The card allows quick and easy expansion to add peripherals like modems, serial printers, scanners and mouse devices at rates of up to 115.2Kbaud.

- Operation with or without Card and Socket services.
- Support for multiple PCMCIA RS-232 cards.
- Query facility for card status.
- Complete with installation and diagnostic utilities.
- Compatible with virtually all of today's operating systems.

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PCMCIA CD-ROM Drive

This PCMCIA unit requires NO EXTERNAL POWER, making it the ideal choice for taking multimedia on the road.

- Single 5V operation, Low power consumption; 120mA (sleep), 250mA (standby), 800mA (peak)
- Double speed data transfer rate; 307.2 Kbytes/sec
- Data capacity; 635MB
- Average access time; 350ms (1/3 stroke)
- 64KB memory buffer
- Motorized tray loading, no caddy required
- MSCDEX compatible
- Supports CD-DA, CD-ROM mode 1 and 2, CD-XA, Multi-session Photo CD and CD-I
- 16bit, 44.1kHz sampling Audio output with front volume control
- Data integrity 1 error in 10¹⁸ bits

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IBM/Pico 16-bit Audio Adaptor

For high definition, 16-bit stereo sound for presentations, text to speech, Voice Command Navigation, videogames and MIDI applications.

- PCM recording and playback either standalone or through multi-media functions in Windows or OS/2.
- Basic Voice Command Navigation allowing the user to give verbal commands to Operating Systems or applications (Extended Audio Interface Module only).
- Text-to-speech translation.
- Sound Blaster emulation.

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IBM/PICO SCSI Adaptor Card

For medium speed, low power SCSI bus peripherals such as optical and tape drives.

- PCMCIA Version 2.
- Hot insertion and removal.
- MS Windows compatible.
- Multimedia PC (MPC) compatible.
- DMA emulation for high performance.
- >500KB/s average sustained transfer rate.
- Low power - 180mA active & 40mA standby

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Card Readers

Allows you to operate all of your PC cards - LANs, Fax/Modems, type III ATA hard drives and memory cards on your desktop. Internal and external as well as one, two or four slots available.



- Package includes: driver software and CardTalk control panel GUI.
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- Self-installing software.

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512KB SRAM	£84.95
1MB SRAM	£95.95
2MB SRAM	£129.95
512KB PLUS (1MB Data Storage)	£110.95
1MB PLUS (2MB Data Storage)	£195.95
2MB PLUS (4MB Data Storage)	£295.95
5MB ATA Flash Card	£229.95
10MB ATA Flash Card	£279.95
20MB ATA Flash Card	£499.95
30MB ATA Flash Card	£699.95
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DRAM expansion cards allow you to increase the resident RAM storage in your mobile computer without physically modifying the computer. Increasing RAM greatly improves program operation and efficiency.

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Creative Labs Soundblaster 32 PnP	95
Quad Speed IDE CD ROM Drive	99
12w Speakers	14
25w Speakers	21
80w Speakers	35

HARDWARE OPTIONS ADD

420Mb Internal Tape Streamer	85
800Mb Travan Internal Tape Streamer	112
Microsoft Natural Keyboard	50
250VA UPS (single PC)	90
USR Sportster Vi 14k4 Internet Kit	89
USR Sportster 28k8 Internet Kit	155

PENTIUM OPTIONS ADD

16Mb EDO RAM instead of 8Mb	180
32Mb EDO RAM instead of 8Mb	540
256k Synchronous Pipeline Burst Cache RAM	60
Extra 1Mb DRAM on Video card	30
Full Tower	10

486 OPTIONS ADD

16Mb instead of 8Mb	162
Extra 1Mb DRAM on Video card	30
Full Tower	10
Adaptec 1542CF and to change from IDE to SCSI HD	150

MONITOR UPGRADE OPTIONS ADD

15" LR NI, MPR-II	80
20" LR NI, MPR-II	900
21" LR NI, MPR-II	1000
Sony CPD-15SF 15" Trinitron	150
17" Iiyama MF-8617E 17"	395

These prices only available with systems

DABS PCI SYSTEMS

- PCI Motherboard with Triton compatible chipset (Pentium only) and ZIF socket for easy upgradeability
- EDO RAM (486 contains standard RAM)
- Onboard Mode 4 Enhanced IDE controller
- Enhanced IDE Hard Disc
- 1Mb PCI 64 Bit Accelerated video card
- 14" Non-Interlaced monitor
- 1.44Mb Floppy drive
- Onboard 2 fast serial and ECP parallel ports
- 256k 15ns Secondary Cache RAM (Pentium 120 & 133 have 256k Pipelined burst)
- 4 PCI and 3 ISA expansion slots (486 has 3 PCI & 3 ISA)
- Cherry high quality Win 95 105 key keyboard
- Original Microsoft Serial Mouse
- MS Windows 95
- 5 Year Warranty*

HD	486DX4-100 8Mb	Pent 75 8Mb	Pent 90 8Mb	Pent 100 8Mb	Pent 120 16Mb	Pent 133 16Mb
850Mb	785	895	960	1005	1150	1375
1.2Gb	860	970	1035	1080	1225	1450
1.6Gb	995	1105	1170	1215	1360	1585

DABS MULTIMEDIA SYSTEMS

- Multimedia Systems include the standard components mentioned above with the addition of:
- 1Mb PCI 64 Bit Accelerated video card with MPEG software playback
 - Creative Labs 16 bit Sound Card
 - Quad speed IDE CD ROM drive
 - 12w Mains Powered Active Speakers
 - MS Works v4, MS Encarta, Corel PrintHouse, Corel All Movie Guide

HD	486DX4-100 8Mb	Pent 75 8Mb	Pent 90 8Mb	Pent 100 8Mb	Pent 120 16Mb	Pent 133 16Mb
850Mb	995	1105	1170	1215	1360	1585
1.2Gb	1070	1180	1245	1290	1435	1660
1.6Gb	1205	1315	1380	1425	1570	1795

Multimedia systems include



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Patterson Institute
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CD-ROM DRIVES

Table listing various CD-ROM drives including AZTECH, CREATIVE LABS, DIAMOND, GOLDSTAR, MITSUMI, NEC, PANASONIC, PIONEER, TOSHIBA, and prices.

MONITORS

More than Just a Monitor... ADI All ADI Monitors Feature... Hitachi A Touch Easier CM1711. Includes specifications for AAO, AOC, GOLDSTAR, HITACHI, IIVAMA, MICROVITEC, and NOKIA.

MOTHERBOARDS

Table listing motherboard models like 486/P24C, INTEL, and PROCESSORS with their respective prices.

STREAMERS

Table listing streamer models from COLORADO and CONNER with specifications and prices.

Multimedia Kit 2000
Everything you need to create your own affordable entertainment centre.
Features: Quad speed CDROM, 600kb/s access time, WAVetable upgradable Diamond sound card, Pair of stereo speakers.

The New VisionMaster family from iiyama
Includes specifications for MF-8115, MF-8617E, MT-9017E, MT-9217E, and MT-9021E monitors.

SIMM MEMORY

Table listing SIMM memory modules (30pin, 72pin) and prices.

INTERFACE CARDS

Table listing IDE DRIVE CONTROLLERS, ADAPTEC SCSI CONTROLLERS, and DISPLAY ADAPTERS.

Colorado Trakker 350, Colorado T1000. Includes descriptions of backup systems and prices.

CD RECORDING

Table listing CD recording devices from HEWLETT PACKARD, PHILIPS, SONY, and YAMAHA.

iiyama Valuegraph 447V090
17" FST, Antistatic, Built-in Stereo Speakers, Max resolution 1024x768, 0.28mm dot pitch.

PRINTER SERVERS

Table listing printer servers from EMULEX, HP, and INTEL.

UPS
Includes APC BackUPS, SMARTONLINE, and UPSONIC models with specifications.

IDE HARD DISCS

Table listing IDE hard discs from CONNER, QUANTUM, SAMSUNG, SEAGATE, and WESTERN DIGITAL.

TERMINALS
WYSE, DEC, SPEAKERS. Includes specifications for WYSE terminals and various speaker models.

CIRRUS LOGIC

Table listing Cirrus Logic graphics cards like 5422 1Mb ISA, 5434 1Mb PCI, etc.

APC BackUPS
List of various UPS models and prices.

CREATIVE

Table listing Creative graphics cards like 300 Blaster, VideoBlaster SE100, etc.

UPSONIC
Comprehensive power protection, whatever the application.

DIAMOND

Table listing Diamond graphics cards like Stealth SE 1Mb, Stealth 64 2120 1Mb, etc.

HAUPPAUGE

Table listing Hauppauge graphics cards like WinTV Prisma, WinTV Cinema 95, etc.

SCSI HARD DISCS

Table listing SCSI hard discs from CONNER, MICROPOLIS, QUANTUM, and SEAGATE.

CASES

Table listing computer cases including Desktop, Mini Tower, and Full Tower models.



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REMOVABLE DRIVES

Table with 2 columns: Drive Name and Price. Includes D2-SYQUEST DRIVES, IOMEGA, PANASONIC, and SOUND CARDS.

SOUND CARDS

Table with 2 columns: Sound Card Name and Price. Includes AZTECH, CREATIVE LABS, and MIRO.

NETWORK CARDS

Table with 2 columns: Network Card Name and Price. Includes 3COM, DLINK, GENIUS, and KINGSTON.

PORTABLES

Table with 2 columns: Portable Name and Price. Includes COMPAQ CONTURA, HP OMNIBOOK, PANASONIC, and TOSHIBA.

GRAPHICS TABLETS

Table with 2 columns: Graphics Tablet Name and Price. Includes CALCOMP, SUMMAGRAPHICS, WACOM TABLETS, and Wacom Graphics Tablet.

Advertisement for Wacom Graphics Tablet showing the product and price (£26).

HANDHELD

Table with 2 columns: Handheld Name and Price. Includes HEWLETT PACKARD and PSION SERIES 3.

MICE/KEYBOARDS

Table with 2 columns: Mouse/Keyboard Name and Price. Includes CHERRY, MICROSOFT, and LOGITECH.

HUBS

Table with 2 columns: Hub Name and Price. Includes 3COM LINKBUILDER, DLINK, and HP ADVANCESTACK.

PLOTTERS

Table with 2 columns: Plotter Name and Price. Includes HEWLETT PACKARD, ROLAND, and SUMMAGRAPHICS SUMMAJET.

BRANDED PC'S

Table with 2 columns: PC Name and Price. Includes COMPAQ PRESARIO, COMPAQ PROLINEA SLIMLINE, COMPAQ PROLINEA STANDARD, and COMPAQ PROLINEA MINI TOWER.

MODEMS

Table with 2 columns: Modem Name and Price. Includes ANDEST, U.S. ROBOTICS, and MOTOROLA.

MODEMS

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CREATIVE LABS

Table with 2 columns: Creative Labs Product Name and Price. Includes DFI, HAYES, and LASAT.

MULTITECH

MOTOROLA

SUPRA

PACE

PSION DACOM

TRICOM

SAMSUNG

SHARP

HEWLETT PACKARD

AVRO PACIFIC

BROTHER

HEWLETT PACKARD

SAMSUNG

SHARP

HEWLETT PACKARD

AVRO PACIFIC

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AVRO PACIFIC

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SHARP

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AVRO PACIFIC

BROTHER

Advertisement for Data/Fax Modem 28.8.

Advertisement for Avro Pacific Fax Friend.

Advertisement for Motorola Internet Solution.

Advertisement for Prologue V34 EX.

Advertisement for BT Prologue V34 EX.

Advertisement for Supra Fax Modem 28.8.

Advertisement for FaxWorks Pro Lan.

Advertisement for FaxWorks Pro Lan.

Advertisement for FaxWorks Pro Lan.

Advertisement for Courier Standard V.34 Fax.

Advertisement for US Robotics Courier.

Advertisement for US Robotics Fax Modem.

Advertisement for Sportster V.34 Fax.

Advertisement for Sportster Internet Pack.

Advertisement for Safire 288 V.34 external data fax modem.

Advertisement for DABS PC SYSTEMS NETWORK BUNDLE.

Advertisement for Windows NT Network.

Advertisement for Microsoft Network.

Advertisement for Windows NT Server.

Advertisement for Microsoft Windows 95.

Advertisement for Microsoft Network bundle.

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SOFTWARE

BUSINESS ACCOUNTING

Table with columns: Software Name, Price, Features. Includes Quicken 6 DOS, Quicken Deluxe Home, QuickBooks 3 Win, Sage DOS, Sage Win, etc.

CAD

Table with columns: Software Name, Price, Features. Includes AutoCAD LT 2, Autodesk 3 DOS, Generic CADD 6.1

COMMUNICATIONS

Table with columns: Software Name, Price, Features. Includes Carbon Copy, Crosstalk Win, Delrina Comms Suite, EZ Internet Starter Pack, Laplink v6 Win/Win95, PC Anywhere HxR, ProComm 2 Win, WinFax Pro 7, WinComm Pro

DATABASES

Table with columns: Software Name, Price, Features. Includes Approach 96 Win 95, Access 2, Database 5 DOS, dBase 5.5 Win, dBase 5.5 Upgrade, FoxPro 3, FoxPro Pro 3 Win, Notes Starter 2u, Paradox 5 Win, Acrobot 2 Win, PageMaker 6 Win95, PagePlus Lite Win, Pressworks P/Pack, MS Publisher 2 Win

GRAPHICS

CorelDraw 5 and Ray Dream 3D Designer £209

Table with columns: Software Name, Price, Features. Includes Claris imDraw, Corel Draw 3 CD, Corel Draw 4 CD, Corel Draw 5 CD, Corel Draw 3/4 - 6 CD, CorelXARA, CorelDRAW 3, Corel 3-5 Upp CD, Corel 4-5 Upp CD, Corel Art Show 4, Corel Gallery 2, Chansima, Designworks 3, Freelance 2, Illustrator 5.5

Visio TTP CAD mode simple. Converts AutoCAD DWG files to SmartShapes. Preserves attribute and extended entity data. Produces Bill of Materials. Office and SmartSuite compatible. Existing Visio users upgrade for £109. New Users £270.

CorelDRAW 6 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, 3D rendering and animation. £280.

BUSINESS GRAPHICS continued

Table with columns: Software Name, Price, Features. Includes Persuasion 3, Powerpoint 4, Toolbook 3, Visio 4 Win 95 vWin3, CorelDraw 5 and Ray Dream 3D Designer

INTEGRATED PACKAGES

Table with columns: Software Name, Price, Features. Includes ClarisWorks 3, ClarisWorks 4 Upp, Harvard Portfolio, Perfect Office 3, Perfect Office Upg, Smartsuite 96 Win 95, MS Office 4.2 Win, MS Office 4.2 CU, MS Office Pro 4.3 CCP, MS Office Pro 4.3 CU265

NETWORKING

Table with columns: Software Name, Price, Features. Includes Personal Network, Network 4.1 5u, Network 4.1 25u

OCR

Table with columns: Software Name, Price, Features. Includes Catchword Pro, Omnigage Pro 3, TextBridge 3, Wordscan Plus 4

OPERATING SYSTEMS

Table with columns: Software Name, Price, Features. Includes OS/2 3 Warp CD, Win NT 3.51 Server, OS/2 3 Warp FD, Win NT 3.51 Workst

PROGRAMMING

Table with columns: Software Name, Price, Features. Includes Assembler 6.1, Delphi, Turbo C++ 4.5 Win, Turbo Pascal Win 1.5, Visual Basic Pro 4 Win, Visual C++

PROJECT MANAGEMENT

Table with columns: Software Name, Price, Features. Includes Project 4 DOS, Superproject DOS, Project 4 Win, Superproject Win

ROUTING

Table with columns: Software Name, Price, Features. Includes ARoute Exp UK+Irl FD, ARoute Exp Europe FD, ARoute UK+Irl DOS, ARoute UK+Irl Win

SPREADSHEETS

Table with columns: Software Name, Price, Features. Includes 1-2-3 5.0 Win, Quattro Pro 6

UTILITIES

Table with columns: Software Name, Price, Features. Includes AfterDark 95, ACT! 2 Win, Conner Backup, CP AntiVirus, Dashboard 95, FirstAid Win 95, WinRubble Win 95, Anti-Virus Win95, Norton Backup Win, Norton Backup Win, Norton Utilities Win 95, Norton Navigator Win95, Anti-Virus Trade-up, Lotus Organiser 2, PC Tools 2 Win, QEMM 7.5, QEMM Win 95, Sidekick 95, Softram Win 95, Stacker 4.1 Win 95, Web Author, XTree Gold DOS

WORD PROCESSING

Table with columns: Software Name, Price, Features. Includes Ami Pro 3.1, Word 6.0 Win, WordPerfect 6 DOS, WordStar Win

AutoCAD LT v2 AMAZING VALUE £353. LT Drafting Packs (Electrical, Architectural or Engineering) £99 each. AutoCAD LT

Adobe PageMaker £385. The world's leading professional page layout software. Adobe PageMaker is the professional, cross-platform desktop publishing program that makes it easy for you to design and produce sophisticated publications. PageMaker combines text and graphics from a wide range of software applications for printed or electronic delivery. Adobe

Microsoft Windows 95 products. Includes Windows 3.x to Win 95 Upgrade 3.5", Windows 3.x to Win 95 Upgrade CD, Windows 3.x to Win 95 Upgrade 1uMLP, MS-DOS to Win 95 Upgrade 3.5", MS-DOS to Win 95 Upgrade 1u MLP, Plus! Pack add-on 3.5", Plus! Pack add-on CD, Plus! Pack add-on 1u MLP. Prices range from £53 to £70.

More Windows 95 products. Includes Visio 4, Corel Draw 6, Visual Basic 4, Visual Basic Pro 4, Visual Basic Enterprise 4, Visual C++ 4, Money 4, Sidekick 95, Dashboard 95, SoftRam 95, FirstAid 95, Norton Utilities 95, Norton AntiVirus 95, Norton Navigator 95, Intelpoint Mouse, Natural Keyboard, SideWinder Joystick, SideWinder 3D Pro Joystick, Fury 3 + SideWinder Pro. Prices range from £36 to £230.

REACHOUT 5.0 Stac. ReachOut 5.0 is the fastest way to remotely access your office PC. Update spreadsheets, transfer files, print documents, and access on-line services or e-mail from anywhere. £80.

CLARIS £80 FILEMAKER PRO. Computer's introductory membership. Includes Backus Junior, FileMaker Pro Application CDROM, Claris T-Shirt.

TextBridge Pro. Free upgrade to Windows 95 version offer valid till 31.12.95. Award winning accuracy on normal, faxed and dot matrix text. Exclusive DocuRTM technology reconstructs cell tables allowing edits. Instant Access OCR™ from Windows app. Post recognition editing within your wrap. OLE 2.0, drag and drop support. 11 European languages and more... £270. COMPETITIVE UPGRADE at £129.

ENTERTAINMENT Win95 in red TOP ENTERTAINMENT. Includes 11th Hour, Ascendancy, Alone in the Dark 3, Battle Beast, Buried in Time, Disc World, EP2000, Fade to Black, FIFA 96, Indy Car II, Micro Machine 2, Myst, Phantarmagonia, Psycho Pinball, Red Shift 2, Sin City 2000, Star Trek:Omnipedia, The Dig, Trans Lycoon/Theme Park, Adventures with Edison, Arcade Mania, Blue Tortoise, NN'n N Toy-makers, Wild Board Games, Actual Soccer, All Unsler racing, Basic Bridge, Demolition Derby, Descant, Dungeon Master 2, En to Morph, FIFA/PGA 486/FIGP, Harpoon Multimedia, Magic Carpet 2, Mortal Coil, Need for Speed 3, Premier Manager 3, Raven Project, Screamer, Star Trek: A Final Unity, Terminal Velocity, The Pit, Wipe Out, All Movie Guide, Marilyn, Nikola's Trains, Red Rino, Wild Cards. Prices range from £15 to £24.

DABS DIRECT WINTER BARGAIN SOFTWARE CLEARANCE LINES. Includes 1-2-3 V3.1+ Win 5 user, Adobe Streamline Win, APT Fingers Win, Autoroute 5 Dbase Editor, Borland Progen for C++, CE Prokey Win, Facilit for Wperfect DOSTO, GST Designworks 2 Win, Intel IANDesk 1.5 Server, Learn to Type 5.25, Lotus CC-Mail DDB 4.0, Lotus Improv V2.0, MS-DOS 6.0 Uppd 5.25, MS Office V4.0 (Incl 4.2) Ed 75, MS Win 3.11 MLP NM, PFS PowerMill, Sage PC Planner Ref 3, SPC Harvard Part 2, Stac Stacker VZ-V3 Uppd, Visio Exp Smartsuite, Xerox Rooms for Windows 10. Prices range from £10 to £500.

ENTERTAINMENT CONTINUED MICROSOFT HOME TITLES. Includes 3D MovieMaker, Ancient Lands, Cinemania 96, Cooking, C/Writer + Artist, Dinosaurs, Encarta 96, Fine Artist, Fl Sim Paris add-on, Fury 3, Golf 2, Magic Bus-Human Body, Mozart, Musical Instruments, Schubert, Sound System 2, Strauss, Wine Guide. Prices range from £19 to £39.

EDUCATION LANGUAGE TRANSLATION. Includes Accent Express, EZ Language - French, EZ Language - Italian, EZ Language - Russian, EZ Language Suite, GlobalLink PowerTrans, Fun Sc Dreamland 4-7, Fun School - Spelling, Fun School Time 6-11, FunSchool-ParlsCreate, Eyewitness Science, Ultimate Sex Disc, VR Cat, Arthur's Birthday, Dr Seuss's ABC, New Kid on the Block, Arthur's Teacher Trouble, Just Grandma & Me, Lets Explore: Airport, Madeline, Putt Putt Goes to Moon, FBeer BDay Surprise. Prices range from £17 to £33.

EUROPRESS SOFTWARE. Includes Fun School In Dreamland, Fun School In Space, Fun School In Time, Fun School 4 Under 5's, Fun School 5-7's, Fun School 7-11's, Fun School Spell, Fun School Maths, Fun School Paint & Create, Fun School Young Scientist, BBC Gardeners World 3D Interior Designer, Granada House Style 3D Interior Designer, Alice's Adventure In Wonderland, Gone Fishing, Driving Instructor, Treasure Island, Klik & Play 3.5, Mini Office, Flying Fingers. Prices range from £19 to £29.

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FURY 3

MUSIC CENTRAL 96

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Table with 4 columns: DISCS, CD RECORDABLE, CABLES, ADAPTORS & CONNECTORS. Lists various hardware items like 360k DSDD, 720k DSDD, IBM Parallel Printer, etc.

Table with 4 columns: CONSUMABLES, ORIGINAL TONERS, PAPER, DOT MATRIX PRINTERS. Lists items like Brother HL630, Epson EPL400, Canon A4 Gloss paper, etc.

Table with 4 columns: LASERS, LASERS CONTINUED, MANNESSMAN TALLY. Lists laser printer models like Brother HL630 GDI, HP LaserJet 4/4M+, etc.

Advertisement for Panasonic KX-P6100 Laser Printer. Includes image of the printer and text: 'Laser Printer Designed for Windows', 'Power & Toner Save Mode', £265.

Table with 4 columns: SCANNERS. Lists various scanner models like AGFA StudioScan IISI Lite, DEXXA Colour Media, EPSON GTx-5000 Parallel, etc.

Table with 4 columns: DATA CARTRIDGES. Lists cartridge models like DC2120 Formatted, MC3000XL 340/680Mb, etc.

Table with 4 columns: CITIZEN, EPSON, MANNESSMAN TALLY. Lists printer models like Citizen 92 ABC Mono, Epson LX-1050, etc.

Table with 4 columns: OKI. Lists printer models like OL400w LED Page Printer, OL600ex LED Page Printer, etc.

Advertisement for OKI Laser Printers. Includes images of three printer models and text: 'OKI people to people technology', '£263', '£299', '£379'.

Table with 4 columns: UMAX. Lists scanner models like Vista T630, Vista S8 Pro, UC1260 FE, etc.

Table with 4 columns: SYQUEST & IOMEGA CARTRIDGES. Lists cartridge models like 44Mb, 105Mb, 200Mb, etc.

Table with 4 columns: OKI. Lists printer models like ML280, ML321, ML385, etc.

Advertisement for Kyocera FS-400 Laser Printer. Includes image of the printer and text: 'KYOCERA', 'FS-400', '£359'.

Advertisement for Kyocera FS-1550 Laser Printer. Includes image of the printer and text: 'KYOCERA', 'FS-1550', '£855'.

Advertisement for Visioneer Paper port scanner. Includes image of the scanner and text: 'Visioneer Paper port', 'Average scan time - 6 seconds', '£199'.

Table with 4 columns: ORIGINAL INKJET CARTRIDGES. Lists cartridge models like Canon BJ10e/ex/sx, Canon BJ300/330, etc.

Table with 4 columns: PANASONIC, STAR. Lists printer models like KX-P1150, KX-P2124, LC90, etc.

Advertisement for Visioneer Paper port scanner. Includes image of the scanner and text: 'Visioneer Paper port', 'Average scan time - 6 seconds', '£199'.

Advertisement for UMAX Scanners. Includes image of a scanner and text: 'UMAX SCANNERS', 'Powerlook II Pro', '£2299'.

Table with 4 columns: UMAX. Lists scanner models like Vista T630, Vista S8 Pro, UC1260 FE, etc.

Table with 4 columns: ORIGINAL RIBBONS. Lists ribbon models like Citizen 1200/Swift 9, Citizen Swift 24x, etc.

Table with 4 columns: CANON, CITIZEN, EPSON. Lists printer models like Canon BJ-30, Citizen 298, Epson Stylus 820, etc.

Advertisement for Visioneer Paper port scanner. Includes image of the scanner and text: 'Visioneer Paper port', 'Average scan time - 6 seconds', '£199'.

Advertisement for UMAX Scanners. Includes image of a scanner and text: 'UMAX SCANNERS', 'Powerlook II Pro', '£2299'.

Table with 4 columns: UMAX. Lists scanner models like Vista T630, Vista S8 Pro, UC1260 FE, etc.

Table with 4 columns: HEWLETT PACKARD, MANNESSMAN TALLY. Lists printer models like DeskJet 340, DeskJet 600, T7010, etc.

Advertisement for Hewlett-Packard Flatbed scanner. Includes image of the scanner and text: 'HEWLETT PACKARD', 'DeskSCAN Flatbed', '£299'.

Advertisement for ColourMobile Office scanner. Includes image of the scanner and text: 'ColourMobile Office', 'DeskSCAN Flatbed', '£299'.

Advertisement for Handscanner 256 scanner. Includes image of the scanner and text: 'Handscanner 256', '£42'.

Table with 4 columns: UMAX. Lists scanner models like Vista T630, Vista S8 Pro, UC1260 FE, etc.

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PCL 5 Printing
PCL 5 emulation
Enhanced Memory management

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We're happy to remain anonymous.

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HL630
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GDI Printing
PCL 4 emulation
Enhanced Memory management

MultiSpin 4x4c CD-ROM Drive

Quad speed internal IDE 4 Disk CD-ROM Changer.
This internal product uses 1 standard drive bay and offers the user the flexibility of a stacker system for the price of a standard drive CD.

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SuperScript 610 Plus Printer

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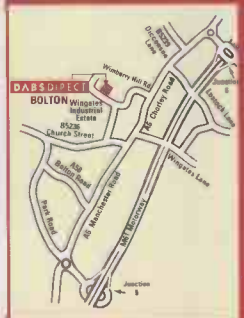
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Standard UK 1-3 working day Delivery	£4.00
Next working day Delivery	£6.50
Call for quotes on other areas/times	
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High-quality InkJet Printing
600 x 300 dpi with RET ensures crisp text and eye-catching graphics

Plain-paper Fax Output
No more curly, waxy thermal paper! With the HP OfficeJet LX you can enjoy all the benefits of plain paper

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Send your faxes directly from your Windows applications. Receive incoming messages into your PC and select which should be printed.

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Just one product to setup and use! Just one print cartridge to change.

Plug and Play
The HP OfficeJet LX is as easy to use and install as standalone devices.

Space Saving
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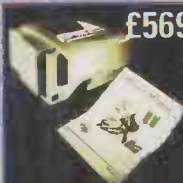
Print and fax your images and pictures with the HP OfficeJet LX



£469

HP Support Pack Guide

HP Part No.	Products Covered	Standard Warranty	HP Support Pack	Price
H5461A	HP DeskJet/Writer Mono	3 Year Unit Exchange	3 Year on-site - next day/exchange	£40
H5463A	HP DeskJet Portable	1 Year Return	3 Year on-site - next day/exchange	£40
H5464A	HP Displays, Monitors, Terminals, HP200LX Palm Top	1 Year Return	3 Year on-site - next day/exchange	£42
H5465A	HP ScanJet 4S	1 Year Unit Exchange	3 Year on-site - next day	£66
H5466A	HP DeskJets/Writers (Colour)	3 Year Unit Exchange	3 Year on-site - next day	£65
H5467A	HP Fax-300, HP Fax-950	1 Year Unit Exchange	3 Year on-site - next day/exchange	£75
H5468A	HP ScanJets (Mono)	1 Year Return	3 Year on-site - next day	£85
H5470A	HP OfficeJet	1 Year Unit Exchange	3 Year on-site - next day	£102
H5473A	HP LaserJet 4L, 4ML, HP DeskJet 1200C/PS, 1600C/CM	or 1 Year Return	3 Year on-site - next day	£105
H5475A	HP ScanJets (Colour)	1 Year Return	3 Year on-site - next day	£140
H5476A	HP LaserJet 5P, 5MP	1 Year Return	3 Year on-site - next day	£152
H5479A	HP LaserJet 4 Plus, 4M Plus	1 Year Return	3 Year on-site - next day	£181
H5480A	HP Vectra_PC	1 Year on-site, 2 Year Return	3 Year on-site - next day	£129
H5481A	HP SureStore, HP JetStore	3 Year on-site - next day	3 Year on-site - 4 hour response	£289
H5482A	HP LaserJet 4V, 4MV	1 Year Return	3 Year on-site - next day	£239
H5489A	HP DesignJet 230, 250C, 600 & 650C	3 Year on-site - next day	3 Year on-site - 4 hour response	£426
H5492A	HP LaserJet 4Si/4SiMX	1 Year on-site - next day	3 Year on-site	£530
H5500A	HP LaserJet 5L	1 Year Return	3 Year on-site - next day	£111
H5505A	HP Colour LaserJet	Year on-site	3 Year on-site - next day	£128
H5728A	HP DesignJet 750, 755	1 Year on-site - next day	3 Year on-site - next day	£77



£569

HP LaserJet 5P Printer

- True 600dpi laser printing
- HP's Microfine toner and Resolution Enhancement technology
- Offient levels of greyscale and halftones
- 6 page-per-minute engine, 20MHz processor, instant-on fuser and HP's enhanced PCL 5
- 2 paper trays and Economode draft printing and Power-save mode



£325

HP DeskJet 850c Printer

- High quality 600x600 dpi black with new pigment ink
- New colour inks for more brilliant colours
- HP's Resolution Enhancement technology
- 26 built in scalable typefaces
- Single, manual and automatic sheet feed
- Multiple paper types and sizes, envelopes, labels
- Dual I/O (PC or Macintosh)

Excellent Quality • Superior Service • Unbeatable Value

MEMORY

**Technical Sales
Order Lines**
**0181-
956 7000**
(100 lines)

**Educational Sales
Order Lines**
**0181-
956 7890**



**40
pages!**

CONTENTS

Memory.....2-8

Processor Upgrades....8-10

Mass Storage.....11-14

Multimedia.....15-21

Monitors.....22-24

Modems.....25-31

Networking.....31-32

Scanners.....33

Printers.....34-35

Software.....35-40

Windows 95.....37-38

**QUALITY!
QUALITY!
QUALITY!**

Being the largest direct memory supplier means we buy memory direct from world class manufacturers.

Memory Bank only supply factory original memory.

MEMORY LANE

Do you remember...?

- ... Friars Balsam
- ... Lucozade bottles with sellophane wrapping
- ... Vespas, Foftails and Parkas

WELCOME TO MEMORY BANK - Part 14



I'm passionate about my company and I feel that it is important that you know about the culture and ethos of the organisation that you are dealing with.

Mark Simon

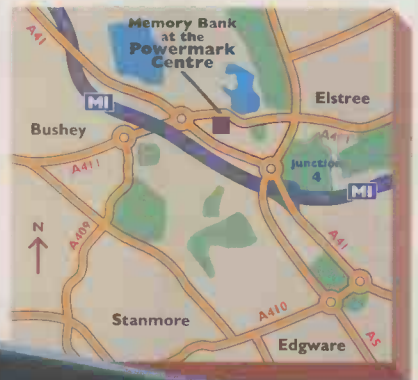
Mark Simon
Chairman, Powermark plc

Here are just some of the things that make Memory Bank so different:

- We are sponsoring a member of staff to complete an MBA at Cranfield. No other company in our sector would invest so much in one individual
- There are recreational, leisure and social facilities for all our staff at our new headquarters

We've moved!

Memory Bank has moved to new, 28,000 sq.ft. purpose designed headquarters. The Powermark Centre is easy to get to and there is plenty of parking for personal callers.



Memory Bank, The Powermark Centre, The Waterfront, Elstree Road, Elstree, Hertfordshire WD6 3RP

A great new way to buy from Memory Bank... **The POWERMARK GOLD CARD**

The only credit card that offers you these benefits:

- **Powermark Points** - every time you buy you earn Powermark Points. Accumulate Powermark Points for savings against future purchases
- **Two easy ways to pay** - settle your monthly account in full by the date shown on your statement and get up to 56 days interest free credit
or
settle by Direct Debit (£10 minimum payment or 5% of your statement balance if higher) and take advantage of our competitive interest rate of only 20.9% APR

Once only card fee of £10 includes a free CD ROM and a £5 rebate after your first purchase over £99 (plus VAT and carriage).

With all these benefits and competitive interest rates too

...you know it makes sense!

Call our Gold Card hotline on 0181 956 7654 today and ask for an application form.

Powermark plc is a licensed credit broker. Cards are issued subject to status and are available only to persons aged 18 or over. Written quotations available.



- **Huge discounts** on Powermark branded products
- **Exclusive offers** too!
- **Free subscription to The Upgrader**
Our 400 page colour catalogue packed with upgrades of all types
- **Save on the Upgrade Drive Thru** - take advantage of the Upgrade Drive Thru and get any second peripheral installation absolutely free



BANK

New Products every month!



THE LARGEST DIRECT MEMORY

Every month Memory Bank supply thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the United Kingdom.

Lower Prices!
on most regular SIMMs

Technical Sales Order Lines

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(100 lines)

Educational Sales Order Lines
0181-956 7890

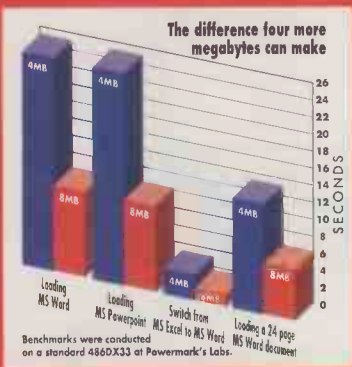
MEMORY

"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...



"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

"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

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.

From our listings on the following pages, just select the upgrade kit for your PC. They cost a little more but you get:

- full installation instructions
- anti-static wrist strap
- dedicated support hotline
- our famous double guarantee - full lifetime warranty and 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.

UPGRADING IS EASY

- With most memory upgrades it's just a case of:
- switching off PC
 - removing lid
 - locating SIMM sockets
 - installing SIMMs
 - closing lid
 - switching back on

HANDLING MEMORY

Static can degrade a DRAM, shortening its life. That's why we include an anti-static wrist strap in every **Matched Memory SIMM Kit**. If you're buying loose SIMMs then do ask for an anti-static wrist strap. For multiple installations we can supply complete ESD (Electro Static Device) protection equipment.



PRICE INSTABILITY!
CALL FOR LATEST OFFERS ON MEMORY BEFORE ORDERING

REGULAR SIMMS

30 PIN SIMMS

• 5 year warranty on all SIMMs listed here

Type	Capacity	Speed	
256K x 9	256K	100ns	£11
256K x 9	256K	80ns	£11
256K x 16	256K	70ns	£20
1M x 9	1MB	80ns	£30
1M x 9 (SIP)	1MB	70ns	£36
1M x 9	1MB	70ns	£30
1M x 9 (3cs)	1MB	70ns	£30
1M x 9 (3cs)	1MB	60ns	£30
4M x 9 (3cs)	4MB	70ns	£109
4M x 9	4MB	70ns	£118
4M x 9	4MB	60ns	£119
16M x 9	16MB	70ns	£549
16M x 9	16MB	60ns	£559

GOLD EDGED SIMMS

• Specified by many PC manufacturers

- Longer MTBF

1M x 9	1MB	70ns	£33
1M x 9	1MB	60ns	£43

72 PIN SIMMS

• 10 year warranty on all SIMMs listed here

Type	Capacity	Speed	
256K x 36	1MB	80ns	£57
256K x 36	1MB	70ns	£57
512K x 36	2MB	80ns	£74
1M x 32	4MB	70ns	£106
1M x 32	4MB	60ns	£107
1M x 36	4MB	80ns	£115
1M x 36	4MB	70ns	£114
1M x 36	4MB	60ns	£116
2M x 32	8MB	60ns	£199
2M x 32	8MB	70ns	£195
2M x 36	8MB	80ns	£238
2M x 36	8MB	70ns	£238
2M x 36	8MB	60ns	£249
4M x 32	16MB	70ns	£355
4M x 36	16MB	70ns	£399
4M x 36	16MB	60ns	£409
4M x 32	16MB	60ns	£375
8M x 32	32MB	60ns	£799
8M x 32	32MB	70ns	£839
8M x 36	32MB	70ns	£849
8M x 36	32MB	60ns	£899
16M x 36	64MB	60ns	£2001

72 PIN EDO SIMMS

• Call for full details

1M x 32 EDO	4MB	-	£119
2M x 32 EDO	8MB	-	£229
4M x 32 EDO	16MB	60ns	£449

72 PIN DIMMS

1M x 32	4MB	70ns	£159
2M x 32	8MB	70ns	£279
4M x 32	16MB	70ns	£499

HUGE STOCKS
Guaranteed next working day delivery 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
Memory Bank is the direct division of Powermark plc which 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.

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 Memory Bank carry manufacturers' warranties and full Powermark plc guarantees.

PERSONAL CALLERS VERY WELCOME
Save on delivery charges - there's plenty of parking too! 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.

Memory Bank
The Powermark Centre,
The Waterfront, Elstree Road,
Elstree, Hertfordshire WD6 3RP

Technical Sales
Fax 0181-956 7100
Email membank@powermark.com

Educational Sales
Fax 0181-956 7744
Email edsales@powermark.com

Customer Service
Tel 0181-956 7700
Fax 0181-956 7477

After Sales Technical Support
Tel 0181-956 7711
Fax 0181-956 7478

HOW MUCH MEMORY DO YOU NEED?

	Minimum Requirement	Comfort Level	Optimum Performance
Windows 3.1	4	8	16
Windows 95	8	12	20
Windows NT	12	16	32
Windows AS	16	32	48
OS/2 Warp	4	12	20
Apple System 7.5	8	12	16

Numbers indicate Megabytes of memory required

Source: manufacturers' figures



Public Sector customers can purchase through HMSO by calling 01603 694153.



ISO9002 (Formerly 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.

MEMORY



MATCHED MEMORY UPGRADES FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Memory Bank supply thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the United Kingdom.

**Technical Sales
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956 7000**
(100 lines)

**Educational Sales
Order Lines**
**0181-
956 7890**



**Upgrade
DRIVE THRU**

*Unsure
about upgrading?*
Upgrading is easy but if you would like us to upgrade your computer then our **UPGRADE DRIVE THRU** is for you. It's fast, it's simple and it's convenient.

Just drive into our visitors' car park and your computer will go directly to our on-site labs for instant upgrading by our fully qualified engineers. For upgrades that take a little while we'll even hand you a Pager enabling you to visit the nearby shopping centre. You'll be paged the minute your computer is ready.

In most cases you need only bring your base unit along, but do call first to discuss your requirements and to confirm our stock position on the upgrades you require.

DESKTOP MENU
(Call for notebook menu)
Memory £34
Hard Disk £47
Processor £31
Tape Backup £34
Sound or Modem Card £29
Graphics or Video Card £29
Multimedia Kit £47

**Save £££s with
combo orders!**

MATCHED MEMORY UPGRADES FOR HP

• Authorised HP dealer
HP VECTRA 386/25 PC, 486 PC, 486s/20
4MB Kit £131
8MB Kit £260
HP VECTRA VL3
S/75/90/100, VE SERIES
8MB Module £259
16MB Module £429

NEW! **HP VECTRA XU**
S/75/90/100 VE SERIES

4MB Kit £139
8MB Kit £260

HP NETSERVER 486 SERIES
8MB Kit £259
16MB Kit £459

HP95, HP100, HP200
1MB Card £149
2MB Card £245

HP OMNIBOOK 530, 630C SERIES
4MB Module £209
8MB Module £399

NEW! **HP OMNIBOOK 4000 SERIES**
8MB Kit £299
16MB Kit £579



“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.”**

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 £129
8MB Kit £279

M290
2MB Kit **POWERCUT!** £74
4MB Kit **POWERCUT!** £149

M486/CP486
2MB Kit £99
4MB Kit £168

PCS 11, 33
2MB Kit **POWERCUT!** £66
8MB Kit £259

M300-30
4MB Kit £139
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 £279
16MB Kit £575

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 £279
16MB Kit £499

PC433M, 450M, 466M
4MB Kit £129
8MB Kit £279
16MB Kit £469

LT386SX/P
2MB Kit £64
4MB Kit £135

PC-500 SERIES, PC-560M
8MB Module **POWERCUT!** £279
16MB Module **POWERCUT!** £479

ELONEX 560F EISA
8MB Kit £329
16MB Kit £499

PC 575M/I, PC5120M/I, PC5133M/I
8MB Kit £329
16MB Kit £499



**PRICE
INSTABILITY!**
**CALL FOR LATEST
OFFERS ON
MEMORY BEFORE
ORDERING**

MATCHED MEMORY UPGRADES FOR AMSTRAD

**PC1286/PC1386/PC3286/
PC3386/PC5286**
1MB → 4MB £129

ALT286/386SX
1MB → 4MB £129
1MB → 4MB (Zero-wait state) £139

PC7286, 7386
2MB **POWERCUT!** £62
4MB £129

PC7486 SLC
4MB Kit £139
16MB Kit **POWERCUT!** £459

PC9486
4MB Kit £139
16MB Kit £485

ANB386SX
4MB Module **POWERCUT!** £169

386SX25 MEGA PC
4MB Kit £129
8MB Kit £239

NEW! **PC9555i**
8MB Kit £279
16MB Kit £489

**LIFETIME
WARRANTY ON
ALL MATCHED
MEMORY**

BEWARE
Beware of low grade 5 volt notebook memory that reduces battery life by up to 40%. Memory Bank only supplies 3.3 volt devices from market leaders with manufacturers' approvals.

MATCHED MEMORY UPGRADES FOR TOSHIBA

T1000/E/XE/LE, T1800, T1850C, T2000SX, T2000SXF, T2200SX
2MB Card £85
4MB Card £159
8MB Card £289

T3300SL
2MB £66

T1600/T5100
2MB Card £75

T2100, T2100CS
4MB Card £149
8MB Card £292

T2105CS, T2130CS, CT, T2150 CDT
16MB Card £575

T2400CS, T2450, T2400CT, T3600
4MB Module £165
8MB Module £299

T3100SX
2MB Card £85
4MB Card £159

T3200SX/C
4MB Module £159
8MB Module £299

T3200
3MB Card £159

T4400, T6400 SX/C, DX/C
4MB Card £171
8MB Card £319

T1900, T1910, T1950CT, T1960, T3400CT, T4500, T4600, T4700CT, T4800CT,

4MB Module £159
8MB Module £295
16MB Module £549

T4850/4900
8MB £299

T5200/C & T8500/6400/6600
2MB Module £89
8MB Module £329
16MB Module £569

DYNAPAD T100X
6MB Card £259

DYNAPAD T200, T200CS
4MB Module £159

PROTEGE 610CT, T2130CS
8MB Module £425
16MB Module £799

SATELLITE PRO 400 SERIES
8MB Module £399



BANK

at Powermark



MATCHED MEMORY UPGRADES FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Memory Bank 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 55SX, 60, 65SX/57SX/M57	
4MB	£134
PS/2 70, Portable 70/75	
4MB	£149
8MB	£279
PS/2 80	
4MB	£149
PS/2 140SX, N335SX, NSL	
4MB Card	POWERCUT! £149
8MB Card	£289

PS/2 90, 95, 95A	
4MB Kit	£139
8MB Kit	£269

PS/2 95 ARRAY PENTIUM	
8MB Kit	£259
16MB Kit	£699

VALUEPOINT 6381, 6382	
4MB	£139
8MB	£429

VALUEPOINT 6384 RANGE	
4MB Kit	£139
8MB Kit	£269

PENTIUM VALUEPOINT PERFORMANCE SERIES	
4MB Kit	£139
8MB Kit	POWERCUT! £299
16MB Kit	£549

THINKPAD 350, 350C	
4MB Kit	£149
8MB Kit	£289

THINKPAD 355C, 355CS, 360, 360C, 360CS, 730T	
4MB Kit	£159
8MB Kit	£299

THINKPAD 500, 510	
4MB Kit	£179
8MB Kit	£335

THINKPAD 700, 720	
4MB Kit	£159
8MB Kit	£329

THINKPAD 710	
4MB Kit	£159
8MB Kit	£289

THINKPAD 750, 750C, 755C, 755CDV	
8MB Kit	£319
16MB Kit	£619

NEW! THINKPAD 760	
8MB Kit	£461

PC466DX2, 100DX4	
8MB Module	£265

TREKKA	
2MB	£89

HURDLA, SPRINTA	
4MB Kit	£139
16MB Kit	£469

PS/1 - PRO 486	
4MB	POWERCUT! £139
8MB	£269

CONSULTANT, ESSENTIAL, WILLOW, EXPERT SERIES	
4MB	£149
8MB	£289

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	ITT	CYRIX
80387 SX (16 MHz → 20MHz)	£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



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 our 14 day 'no-quibble' money back guarantee

MATCHED MEMORY UPGRADES FOR IBM

NEW! APTIVA SERIES

4MB Module	£129
8MB Module	£259
16MB Module	£439

PENTIUM APTIVA

16MB Kit	£449
PC 300 SERIES	
4MB Module	£129
PC 700 SERIES	
8MB Module	£259

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

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	£129
8MB Kit	£269

VIG III/25, III/33	
4MB Kit	£129
8MB Kit	£269
16MB Kit	£469

NEW! PENTIUM	
75/90/100/135MHz	
8MB EDO Kit	£299
16MB EDO Kit	£549

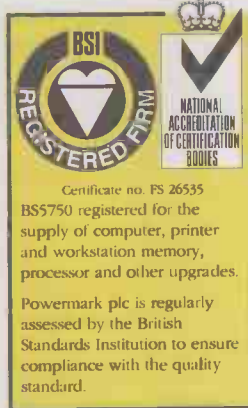
EX 4DX33/50	
4MB	£129
8MB	£269

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	£269
16MB Module	£469



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! £69
4MB Kit	POWERCUT! £139

LEGEND 605, 900	
4MB Kit	£139
8MB Kit	POWERCUT! £279

486 VLB, EXECUTIVE, ELITE RANGE	
4MB Module	£139
16MB Module	£449

FORCE RANGE	
4MB Kit	£139
16MB Kit	£449

MULTIMEDIA 486/586 RANGE	
8MB Kit	£279
16MB Kit	£519

MATCHED MEMORY UPGRADES FOR APPLE

Complete range stocked

Authorised Reseller



BEWARE

Beware of third party, low grade memory. Memory Bank only supply factory original memory.

Technical Sales Order Lines

0181-956 7000
(100 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 Memory Bank, The Powermark Centre, The Waterfront, Elstree Road, Elstree, Herts WD6 3RP or fax him on 0181 956 7100. 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!

Memory Bank
The Powermark Centre,
The Waterfront, Elstree Road,
Elstree, Hertfordshire WD6 3RP

Technical Sales
Fax 0181-956 7100
Email membank@powermark.com

Educational Sales
Fax 0181-956 7744
Email edsales@powermark.com



Public Sector customers can purchase through HMSO by calling 01603 694153.



Certificate no. FS 26535

ISO9002 (Formerly BS5750) registered for the supply of computer, printer and workstation memory, processor and other upgrades.

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MEMORY



MATCHED MEMORY UPGRADE FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Memory Bank supply thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the United Kingdom.

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Educational Sales
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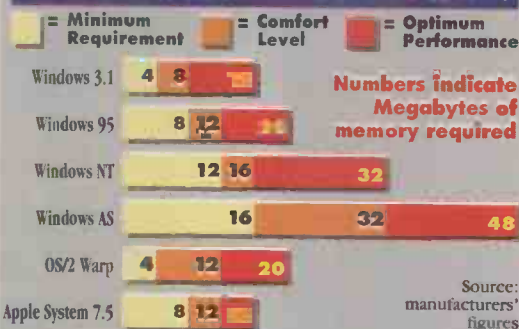
**0181-
956 7890**

VISA

MasterCard



HOW MUCH MEMORY DO YOU NEED?



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	£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	70ns	£5.77
256K x 16	70ns SOJ	£25
1M x 1	80ns	£4.99
1M x 1	70ns	£5.20

VRAMS

256K x 8	70ns SOJ	£20
----------	----------	-----

SRAMS

32K x 8	15ns SRAM	£11
32K x 9	20ns SRAM	£12
128K x 8	20ns SRAM	£28
8K x 8	15ns SRAM	£8

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 95LX & 100LX

1MB	£129
-----	------

“ 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 AST

ACENTIA 900N, 910N

4MB Module	£179
8MB Module	£339

BRAVO LCII, III

4MB Module	£139
8MB Module	£249

PREMIUM, POWER

8MB Kit	£319
---------	------

POWER EXEC 4/25/33

4MB Module	£189
16MB Module	£579

BRAVO NOTEBOOK SERIES

4MB Kit	£159
16MB Kit	£599

BRAVO MS P/75,

PREMMIA GX /P90/P100

8MB Kit	£259
16MB Kit	£499



FREE Baseball Cap
worth £4.95

With every order over £500
When ordering, ask for your FREE baseball cap as it is not shipped automatically.

MATCHED MEMORY FOR NOTEBOOKS & PALMTOPS

COMMODORE LT286/386

4MB Kit	£169
---------	------

SANYO 17NB, 18NB

2MB	£79
4MB	£165

SHARP PC 7700

4MB	£169
-----	------

SHARP PC 6891

4MB	£179
-----	------

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. Memory Bank only supply factory original memory.

... and here's what some of our customers have said ...

... your company is a credit to the industry generally and I have seldom dealt with such courteous and efficient personnel. I shall most certainly be doing further business with Powermark in the future.

J V B Robinson
Composite Solutions Ltd
Avon

Having dealt with your company (a gentleman called Kwang) for the first time this week, I was amazed to be able to call you up on Monday afternoon, place an order and have the software installed on my machine by lunch-time Tuesday. You need to be congratulated 100 per cent. Well done!!

A reliable supplier - what a God send.

N Mapletoft
Nimis Information Services
Newcastle upon Tyne

**QUALITY!
QUALITY!
QUALITY!**

Being the largest direct supplier means we buy memory direct from world class manufacturers. Memory Bank only supply factory original memory.

MEMORY UPGRADES FOR TANDON

POSITIVE 386SX25,
386DX40, 486SX25,
486DX33

4MB Kit	£129
16MB Kit	£499

LIFETIME WARRANTY ON ALL MATCHED MEMORY

MATCHED MEMORY UPGRADES FOR DAN

DAN VANTAGE,
WINDOWS NT SERIES

4MB Kit	£129
16MB Kit	£479

PREMIUM, DANTUM,
ULTIMATE

8MB Kit	£269
16MB Kit	£499
32MB Kit	£899

**PRICE INSTABILITY!
CALL FOR LATEST OFFERS ON MEMORY BEFORE ORDERING**



5

Credit cards are not debited until despatch VAT at 17.5% will be added to all prices



DELIVERY CHARGES
See page 9

EARLY BIRD Order Bonus
See page 31



Everyone at Memory Bank passes through the Powermark Academy

BANK

at
Powermark



MATCHED MEMORY UPGRADE FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Memory Bank 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	£99
8MB Module	£294
32MB Module	£1199
SYSTEMPRO XL 486/50, PENTIUM	
256MB Board with 16MB	£549
256MB Board with 32MB	£1099
DESKPRO 386N, 386S/20	
2MB Module	£75
4MB Module	£139
DESKPRO XL 5/60/75/90	
8MB Kit	£289
16MB Kit	£519
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	£255
DESKPRO 5/90	
8MB Module	£289
16MB Kit	£519
PROLINEA 4/25S, 4/33, 4/50, 4/66, NET 1, MT	
4MB	£127
8MB	£259
PROLINEA 5/75/90MX RANGE	
4MB Kit	£139
8MB Kit	£269
PROLIANT 1000, 2000, 4000, PROLIANT PENTIUM	
4MB	£159
8MB	£289
16MB	£509
PROSIGNIA VS SERIES	
8MB Kit	£289
16MB Kit	£509
32MB Kit	£899
SLT386	
2MB	£109
4MB	£169
LTE LITE 386, 386s/20	
4MB Card	£169
LTE LITE 4120/25/25C/25E	
4MB Card	£159
8MB Card	£289
16MB Card	£499
NEW! LTE 5000, 5100	
8MB Card	£375
16MB Card	£649
32MB Card	£1149
LTE ELITE SERIES	
4MB Card	£165
8MB Card	£324
CONTURA 400 C/CX, 4100, 410C/CX	
4MB Module	£155
8MB Module	£299
16MB Module	£675
CONTURA 3/25/20/25C, 4/25	
4MB Card	£155
8MB Card	£275
CONCERTO 4/25, 4/33	
8MB	£335
16MB	£599

MATCHED MEMORY UPGRADES FOR COMPAQ

AERO 4/25/33	
4MB	£139
NEW! PRESARIO CDS 510, 720, 972, 982, 990, 992	
4MB Kit	£139
8MB Kit	£259
16MB Kit	£449
NEW! PRESARIO 425, 633, 833, 850, 866, 800 SERIES	
4MB	£129
8MB	£259
PRESARIO 700/900	
16MB Module	£449
PROSIGNIA 500	
8MB Kit	£279
16MB Kit	£519

All our Matched Memory Kits come with our famous double guarantee - full lifetime warranty and 14 day money back guarantee

MEMORY TOOLS

- Complete range of anti-static products available
- ANTI-STATIC WRIST STRAP
- Essential when handling electrostatic devices £8
- IC EXTRACTOR TOOL £9
- SIMM TESTER £779
- WRIST STRAP TESTER £99

MEMORY EXPANSION BOARDS

KINGSTON ATA BOARD	
16MB Board with 4MB	£239
16MB Board with 8MB	£349
16MB Board with 16MB	£649

MATCHED MEMORY UPGRADES FOR ZENITH

TURBOSPORT 386E	
4MB Kit	£159
Z-NOTE 420/25/33	
4MB Module	£160
Z-SERVER/STATION/425/433/450	
8MB Module	£289
Z-SPORT 420/425	
4MB Kit	£169
Z-SELECT SERIES	
8MB Module	£259
Z-SERVER LT P60E, EX 450/E RANGE	
8MB Kit	£329
16MB Kit	£639
Z-NOTEFLEX 486DX 33/50/66/100	
8MB Module	£269
16MB Module	£499
Z-STATION 510/33/50/66/100	
8MB Kit	£259
16MB Kit	£459



MATCHED MEMORY UPGRADES FOR GRAPHICS CARDS

Diamond Stealth 64	
1MB DRAM all versions	
1MB Upgrade Kit	£49
Diamond Stealth 64	
2MB VRAM PCI and VLB	
1MB Upgrade Kit	£49
Orchid Kelvin 1MB DRAM ISA and VLB versions	
1MB Upgrade Kit	£49
Taxan GTS Winboost 1MB DRAM PCI, VLB, ISA versions	
1MB Upgrade Kit	£49

Call for video card upgrades 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

MATCHED MEMORY SIMM KITS

- Include:
- full installation instructions
 - anti-static wrist strap
 - dedicated support hotline
 - our famous double guarantee - full lifetime warranty and our 14 day 'no-quibble' money back guarantee



BEWARE

Beware of economy memory modules that use ASIC parity generation. Memory Bank only supply SIMMs with genuine parity DRAMS.

PRICE INSTABILITY!
CALL FOR LATEST OFFERS ON MEMORY BEFORE ORDERING

WE ALSO SUPPLY UPGRADES FOR...

Acorn, ALR, AST, Austin, Canon, Commodore, Goldstar, Hyundai, MJN, NEC, NeXT, Opus, Philips, QMS, Tandy, TI, Unisys, Wyse and all Pentium and multimedia systems.

Technical Sales Order Lines

0181-956 7000
(100 lines)

Educational Sales Order Lines

0181-956 7890

MEMORY

HUGE STOCKS
Guaranteed next working day delivery 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
Memory Bank is the direct division of Powermark plc which 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.

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 Memory Bank carry manufacturers' warranties and full Powermark plc guarantees.

PERSONAL CALLERS VERY WELCOME
Save on delivery charges - there's plenty of parking too! 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.

Memory Bank
The Powermark Centre,
The Waterfront, Elstree Road,
Elstree, Hertfordshire WD6 3RP

Technical Sales
Fax 0181-956 7100
Email membank@powermark.com

Educational Sales
Fax 0181-956 7744
Email edsales@powermark.com

Customer Service
Tel 0181-956 7700
Fax 0181-956 7477

After Sales Technical Support
Tel 0181-956 7711
Fax 0181-956 7478

HMSO
Public Sector customers can purchase through HMSO by calling 01603 694153.



ISO9002 (Formerly 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.

MEMORY



MATCHED MEMORY UPGRADE FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Memory Bank supply thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the United Kingdom.

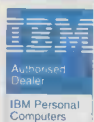
Technical Sales Order Lines

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(100 lines)

Educational Sales Order Lines
0181-956 7890



MATCHED MEMORY UPGRADES FOR IBM PRINTERS



IBM 4019 & 4019E	
3MB	£140
IBM 4029	
2MB	£79
IBM 4039 & 4040 POWERCUT!	
4MB	£139
8MB	£249
LEXMARK OPTRA LX/L/R/RX	
4MB	£139
WINWRITER 200/400/600	
2MB	£79



FREE Baseball Cap worth £4.95

With every order over £500

When ordering just ask for your FREE baseball cap as it is not shipped automatically.

MEMORY QUIZ

???????

"Your starter for 10MB"

1. Which company invented the joystick?
2. In what game did Mario make his debut?
3. What year was Powermark formed?

Answers on fax form page

MATCHED LASERPRINTER MEMORY

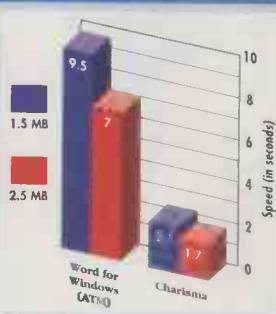
• Price instability - check latest offers on laser printer memory before ordering

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 660, 1260	
2MB	POWERCUT! £79
4MB	POWERCUT! £119
BROTHER HLS/E/V, HL10, DPS	
2MB	£109
CANON NOTEJET 486, BN22/BJC-880	
4MB Module	£149
CANON LBP4, 4+, LITE, SX	
2MB Board	£125
CANON LBP8II	
2MB	£95
CANON LBP8IV	
4MB	POWERCUT! £119
CANON LBP 860, 1260	
4MB	£129
16MB	£499
COMPAQ PAGEMARQ 15/20	
8MB	£269
16MB	£579
EPSON EPL4000/4100/4300/8100	
2MB	£99
EPSON EPL7000	
3MB	£125
EPSON ACTION LASER 1600/1100	
4MB	£135
FUJITSU VM4, VM8	
4MB Module	£149
KYOCERA F800	
2MB	£109
KYOCERA FS400, 410, 1500, 1550	
2MB	£85
4MB	£139
NEC SILENT WRITER 95/95FX/97/97FX	
2MB	£85
OKI LASER 400, 410E	
2MB	£105
OKI 800/820	
2MB	£109
OKI LASER 830/840/850	
2MB	£97
PANASONIC 4420, 4450I	
2MB	£95
PANASONIC 5410, 4440	
2MB	£109
TEXAS MICROLASER PS, MICROWRITER	
1MB	£69

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
PostScript with duplexing	4MB		

MATCHED MEMORY UPGRADES FOR HP PRINTERS



AUTHORISED RESELLER

LASERJET II, IID	
2MB	£99
4MB	£159
LASERJET IIP, III, IIID, IIP	
2MB	POWERCUT! £85
4MB	£165
LASERJET 5P, 5MP	
4MB	POWERCUT! £129
8MB Module	£259
LASERJET IIIsl, 4, 4M, 4si, 4MV, 4MP, 4P, 4V	
4MB	POWERCUT! £129
LASERJET 4L	
1MB	£59
DESKJET 500, 500c, 550	
256K	£39
DESKJET 520, 540, 560C	
256K Kit	£39
DESKJET 660C/PS	
4MB	£129
8MB	£259
DESKJET 1200 C/PS/1200, 1600C	
2MB	£85
4MB	£129
8MB	£255

NETSERVER SERIES

32MB Module	£1399
-------------	-------

DESIGNJET 600/650

4MB	£129
-----	------

PAINTJET XL300

HP COLOUR LASERJET	£Call
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4MB Module

8MB Module	£129
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8MB Module

8MB Module

8MB Module

8MB Module

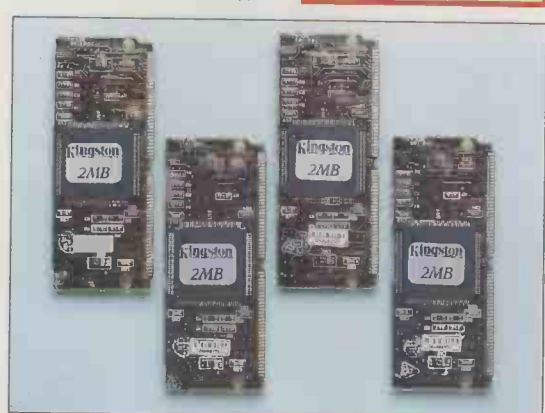
8MB Module

8MB Module

MATCHED MEMORY UPGRADES FOR DEC Workstations

• Call for models not listed here

MICROVAX 3100 MODEL 30 & 40	
8MB Kit	£386
DEC-SYSTEM 5100	
8MB Kit	£386
32MB Kit	£1986
ALPHASTATION 200/400 SERIES	
16MB Kit	£575
32MB Kit	£1099



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/POWERSERVER 200	
8MB Kit	£298
X STATION	
6MB Kit	£228

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 STATION LX	
32MB Kit	£1199
SPARC 330, 370 & 390	
32MB Kit	£1802
SPARCSERVER 630MP, 670, 690	
64MB Kit	£2812
SPARCSTATION 10/20	
16MB	£699

QUALITY! QUALITY! QUALITY!
Being the largest direct supplier means we buy memory direct from world class manufacturers. Memory Bank only supply factory original memory.

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

All our Matched Memory Kits come with our famous double warranty - full lifetime warranty and 14 day money back guarantee

Credit cards are not debited until despatch VAT at 17.5% will be added to all prices

DELIVERY CHARGES
See page 9

EARLY BIRD Order Bonus
See page 31



Everyone at Memory Bank passes through the Powermark Academy

BANK

at Powermark



MATCHED MEMORY UPGRADE FEATURE

THE LARGEST DIRECT MEMORY SUPPLIER

Every month Memory Bank 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

325/D/P, 333/D/P	
2MB → 6MB	£129
2MB → 10MB	£289
POWERLINE	
WORKSTATION SERIES	
4MB Kit	£154
8MB Kit	£255
16MB Kit	POWERCUT! £499
POWER DESKTOP SERIES	
4MB Module	POWERCUT! £139
POWEREDGE SP/XE SERIES	
8MB Kit	£255
16MB Kit	£489
NL20, NL25	
2MB Module	£109
320SLi	
2MB	£99
DIMENSION 'I'	
4MB	£139
16MB	£479

MATCHED MEMORY UPGRADES FOR DELL

DIMENSION XPS,	
P100C, 133C	
NEW! 8MB EDO Kit	£249
NEW! 16MB EDO Kit	£499
NEW! 32MB EDO Kit	£819
OMNIPLEX 466/50ME	
8MB Module	£259
16MB Module	£499
OMNIPLEX PENTIUM RANGE	
8MB	£261
16MB	£519
OPTIPLEX	
XL/XM/XMT 5/75/90/100	
16MB Module	£499
LATITUDE M SERIES	
4MB	£149
8MB	£305
LATITUDE XP SERIES	
8MB	£289
16MB	£599
NETPLEX SERIES	
4MB Module	£125
8MB Module	£259
16MB Module	£439
PERFORMANCE 4/33/50/66	
4MB	£129
8MB	£259

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! £949
PC 4DX2-66P/V	
4MB Module	£129
8MB Module	£299
16MB Module	£475
32MB Module	£1099
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	£1099
PS-120/133 ELITE,	
P90 PREMIUM SERIES	
NEW! 8MB EDO Kit	£299
NEW! 16MB EDO Kit	£499
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	£475
P90/100PCI	
8MB Kit	£269
16MB Kit	£529



BEWARE!

Beware of economy memory modules that use ASIC parity generation. Memory Bank only supply SIMMs with genuine parity DRAMs.

30 Memory Specialists ready to take your call

CYRIX FEATURE

CYRIX 386 TO 486 PROCESSOR UPGRADE



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.

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

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.



See page 3 for details

EVEN LOWER PRICES!

386DX	
DX 16MHz → 486 32MHz	£128
DX 20MHz → 486 40MHz	£128
DX 25MHz → 486 50MHz	£139
DX 33MHz → 486 66MHz	£149
386SX	
SX 16MHz → 486 32MHz	£139
SX 20MHz → 486 40MHz	£139
SX 25MHz → 486 50MHz	£139

Technical Sales Order Lines

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(100 lines)

Educational Sales Order Lines
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MEMORY & PROCESSOR UPGRADES

HUGE STOCKS
Guaranteed next working day delivery 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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TECHNICAL SUPPORT
Dedicated after sales technical support teams on line to help with installation.

CORPORATE & PUBLIC SECTOR
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FULL MANUFACTURERS' WARRANTIES
All products supplied by Memory Bank carry manufacturers' warranties and full Powermark plc guarantees.

PERSONAL CALLERS VERY WELCOME
Save on delivery charges - there's plenty of parking too! 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.

Memory Bank
The Powermark Centre,
The Waterfront, Elstree Road,
Elstree, Hertfordshire WD6 3RP

Technical Sales
Fax 0181-956 7100
Email membank@powermark.com

Educational Sales
Fax 0181-956 7744
Email edsales@powermark.com

Customer Service
Tel 0181-956 7700
Fax 0181-956 7477

After Sales Technical Support
Tel 0181-956 7711
Fax 0181-956 7478



Public Sector customers can purchase through HMSO by calling 01603 694153.



Certificate no. FS 26535

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MEMORY

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956 7000**
(100 lines)

Educational Sales
Order Lines

**0181-
956 7890**

VISA

MasterCard

POWERMARK
Gold
Card

SWITCH

DELIVERY
CHARGES

UK MAINLAND

Next
working day
courier
delivery to
your door

SMALL ITEMS

Examples: memory,
sound/video cards,
CD ROM titles, small
software packages

UPTO 3 ITEMS
£6.95 total

4 ITEMS OR MORE

£1.95 for each
additional item

LARGE ITEMS

Examples: CD ROM
drives, multimedia
kits, software suites

1ST ITEM
£8.95

EACH ADDITIONAL ITEM
£4.95

VERY LARGE ITEMS

£Call

Call for rates outside
UK mainland



**FREE
Baseball Cap**
worth £4.95

With every order
over £500

When ordering just ask for
your FREE baseball cap as it
is not shipped automatically.

INTEL OVERDRIVE® PROCESSOR FEATURE



In the world of personal computing things never stop changing. Today you can do things on your PC that you could only dream of just a few years ago. Multimedia computing is now a reality, with audio, video and sophisticated graphics, now as much a part of your PC as a mouse and a keyboard. This new

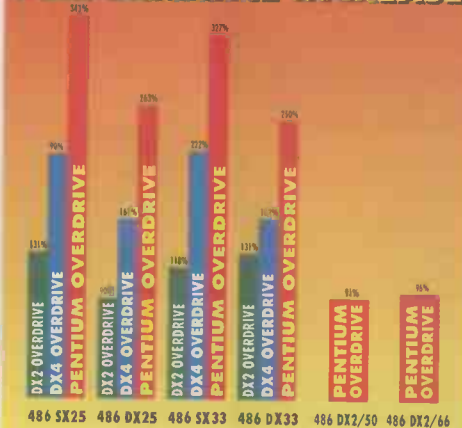
intel®

world of multimedia has resulted in users craving for more processing power. Intel has the answer with its new range of Pentium® OverDrive® processors.

Intel have the solution to suit everyone's performance and pocket requirements. To boost your overall system performance your best option is to purchase a Pentium

Overdrive processor. If your budget cannot stretch then the IntelDX2 and IntelDX4 OverDrives will allow you to run applications more smoothly and quickly. You will notice an immediate and dramatic increase in system performance gaining higher quality video and animation playback as well as the ability to view video and animation in larger windows sizes on your monitor.

TYPICAL OVERALL PERFORMANCE INCREASE



Save time. Increase productivity.

Intel OverDrive processors save you time. Not just the odd microsecond, but real time in every operation you perform. You can load, edit, cut and paste fluently without waiting for your computer to catch up. Databases can be accessed and selections made instantly. Complex CAD graphics or DTP documents can be loaded and edited faster. Less time spent in processing information increases the efficiency of your work. The net result is increased productivity and time savings resulting in cost saving for the business and home user.

More power means more Fun!

Simply by upgrading with a Pentium OverDrive processor games take on a whole new dimension. Keyboard and control responsiveness improves, graphics and textures are enhanced in many popular games. In **US Navy Fighters** you gain sky, ocean and land. shadows, reflections and sky in **Magic Carpet**, smoke and skids in **NASCAR Racing**. Overall Intel's OverDrive processors provide an affordable upgrade solution for today's and tomorrow's home software needs.

Installation couldn't be simpler.

All Intel OverDrive processors come supplied with clear instructions so that the novice user can install one with ease. Installation takes seconds.



Credit cards are not debited until despatch
VAT at 17.5% will be added to all prices



DELIVERY CHARGES
See page 9

**EARLY BIRD
Order Bonus**
See page 31



POWERMARK
ACADEMY

Everyone at
Memory Bank
passes through the
Powermark
Academy

BANK

at
Powermark

INTEL OVERDRIVE®

LOWER PRICES!



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

Intel OverDrive Processor



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 25MHz - 75MHz £99
Order codes
Single socket PC DX4/2550DX
Dual socket PC DX4/2575SX

INTEL DX4 33MHz - 100MHz £129
Order codes
Single socket PC DX4/33100DX
Dual socket PC DX4/33100SX



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
Order codes
Single socket PC DX2/2550DX
Dual socket PC DX2/2550SX

INTEL DX2 33MHz - 66MHz £91
Order codes
Single socket PC DX2/3366DX1
Dual socket PC DX2/3366DX2

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

Amazing performance! architecture, 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 DX5/P24T63 £135

OS/2 and UNIX. Simply install the Intel OverDrive® processor into your existing system and

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.

LIFETIME WARRANTY ON ALL INTEL OVERDRIVE® PROCESSORS



All can be installed in seconds by anyone



INTEL P24T 83MHz DX5/P24T83 £189

PROCESSOR UPGRADES

Technical Sales Order Lines

0181-956 7000
(100 lines)

Educational Sales Order Lines
0181-956 7890

HUGE STOCKS
Guaranteed next working day delivery on virtually all stock items. Far 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
Memory Bank is the direct division of Powermark plc which 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.

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 Memory Bank carry manufacturers' warranties and full Powermark plc guarantees.

PERSONAL CALLERS VERY WELCOME
Save on delivery charges - there's plenty of parking too! 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: 9.30am to 4.00pm. Technical Support and Customer Service from 10.00am to 2.00pm.

Memory Bank
The Powermark Centre,
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Elstree, Hertfordshire WD6 3RP

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Email edsales@powermark.com

Customer Service
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Fax 0181-956 7477

After Sales Technical Support
Tel 0181-956 7711
Fax 0181-956 7478



Public Sector customers can purchase through HMSO by calling 01603 694153.



Certificate no. EN 20135

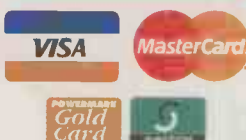
IS9002 (Formerly BS5750) registered for the supply of computer, printer and workstation memory, processor and other upgrades.

Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.

MEMORY

**Technical Sales
Order Lines**
**0181-
956 7000**
(100 lines)

**Educational Sales
Order Lines**
**0181-
956 7890**



DATA CARTRIDGES

	Each 10 Pack	
DC6150	£12	£109
DC6250	£15	£139
DC6525	£17	£169
DC9100Magnus	£27	£249

All QIC tapes are preformatted

QIC	Capacity	Each	10 Pack
DC2120	120-250MB	£13	£119
DC2120XL	350MB	£15	£139
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	£9	£89
4GB	120m	£15	£145
Head Cleaner		£26	

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	£15	£139
MC 3000 XL	£15	£139
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

CONNER FEATURE

CONNER

The Storage Answer

IDE DRIVES

CFS635A	HDC635	635MB	12ms	£129
CFS850A	HDC850	850MB	14ms	£138
CFS1275A	HDC106/1	1.275GB	14ms	£177

SCSI DRIVES

CFP1080	HDC1080	1.08GB	10ms	£229
CFP2107	HDC2107	2.1GB	9ms	£575
CFP2105	HDC2105	2.1GB	11ms	£549
CFP4207				
Caymen	HDC425	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



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 CONTRAV800/I £149

TAPE-STOR 800MB

EXTERNAL CONTRAV800/E £225

TAPE-STOR 800MB

CARTRIDGE DC8001 £22

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 CONTRS420/I £89

TAPE-STOR CARTRIDGE DS122 £14

**HARD DISK EXPERTS AVAILABLE FOR
SPECIALIST ADVICE**

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 only to Maxtor customers
- "No quibble" Maxtor service and warranty

MAXTOR IDE DRIVE KITS

K127850A	HDM850	850MB Kit	12ms	£159
K1271080A	HDM1A	1.0GB Kit	12ms	£205
K1271260A	HDM1.2A	1.2GB Kit	12ms	£229
K1271620A	HDM1.6	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!**

Credit cards are not debited until despatch VAT at 17.5% will be added to all prices

DELIVERY CHARGES
See page 9

**EARLY BIRD
Order Bonus**
See page 31



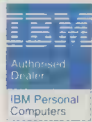
**POWERMARK
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Everyone at Memory Bank passes through the Powermark Academy

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Powermark

HARD DISK DRIVE FEATURE



Calluna
TECHNOLOGY

Seagate

Quantum

WESTERN DIGITAL



Maxtor

FUJITSU

MICROPOLIS

CONNER
The Storage Answer

TOSHIBA PARTNERS

IDE HARD DISK DRIVES

Conner	CFS635A	635MB	12ms	£129
Western Digital	AC2635	639MB	10ms	£119
Maxtor	7850AV	850MB	12ms	£135
Conner	CFS850A	850MB	14ms	£138
Western Digital	AC2850	853MB	10ms	£144
Western Digital	AC31000	1.0GB	10ms	POWERCUT! £175
IBM	Pegasus	1.05GB	9ms (mode 4)	£259
Seagate	ST31220A	1.08GB	12ms	£169

Fujitsu	M1606T	1.09GB	10ms	£162
IBM	Deskstar	1.2GB	9ms (mode 4)	£299
Maxtor	71260AT	1.26GB	12ms	£209
Conner	CFS1275A	1.275GB	14ms	POWERCUT! £177
Western Digital	AC31200	1.28GB	10ms	POWERCUT! £209
Western Digital	AC31600	1.62GB	10ms	POWERCUT! £279
Maxtor	71626AP	1.63GB	12ms	£342

SCSI HARD DISK DRIVES

Quantum	L1730S	730MB	12ms	£167
Fujitsu	M1606SA	1.0GB	10ms	£229
IBM	Deckstar	1.05GB	9ms	£229
Seagate	ST31230N Hawk-2	1.05GB	9ms	£283
Conner	CP1080	1.08GB	10ms	£229
Quantum	Fireball	1.08GB	10ms	£279
Micropolis	4221	2.05GB	8.5ms	£819
Conner	CFP2107	2.1GB	9ms	£575
Conner	CFP2105	2.1GB	11ms	£549
IBM	Ultrastar	2.1GB	8ms	£958
Seagate	ST32430N Hawk-2	2.1GB	9ms	£575
Seagate	ST32550N Barracuda	2.1GB	8ms	£899
	Fast SCSI 2			
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	4.3GB	8ms	£1379
	Fast SCSI 2			
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	Grand Prix XP3430S	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
Ministor		260MB	12ms	£379

2.5" HARD DISK DRIVES

2.5" IDE

Hitachi	DK212A/34	340MB	12ms	£139
Hitachi	DK212A/54	540MB	12ms	£229
Hitachi	DK212A/81	810MB	12ms	£349
Hitachi	DK212A/10	1.0GB	12ms	£449
Seagate	ST9240AG	210MB	16ms	£149
Toshiba	MK1924FC	543MB	12ms	£239
Toshiba	MK2628FC	810MB	12ms	£389
IBM	85G3627	1.2GB	12ms	£595
Toshiba	MK2720FC	1.35GB	13ms	£599

HARD DISK DRIVE ACCESSORIES

EXTERNAL CASES

SDCASE1/3	Single external device case (Half/Full height)	£89
SDCASE1/3-FW	Single external fast and wide device case	£129
SDCASE2/3	Dual external device case (Half/Full height)	£125
SDCASE4/3	Quad external device case (Half/Full height)	£228
SDCASE4/5-10	Quad external hot pluggable device case	£1099

CABLES CONNECTORS AND CONVERTERS

SCSIC1	Single device internal SCSI cable	£7
SCSIC3	3 way internal SCSI cable	£13
SCSICB/FW	Fast and Wide internal SCSI cable	£99
SCSITERM/A	SCSI active terminator	£27
SCSITERM/P	SCSI passive terminator	£12
IDE/BL	Dual device internal IDE cable	£7
CONK/PAR	Parallel to SCSI converter (Centronics)	£109
CONK/PAR MD	Parallel to SCSI converter (Micro D)	£119
SIM/SCSIPCM	PCMCIA SCSI converter/controller	£109

SCSI CONTROLLER CARDS

FUTURE DOMAIN			
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

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

Adaptec - page 10

IDE CONTROLLER CARDS

FUTURE DOMAIN			
NEW! 32-Bit E-IDE	IDE Software and cables	£49	
E-IDE	IDE Software and cables	£39	



HMSO

Public Sector customers can purchase through HMSO by calling 01603 694153.



Certificate no. FS 26559

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Order Lines
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STORAGE

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Save on delivery charges - there's plenty of parking too! 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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After Sales Technical Support
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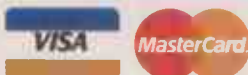
MEMORY

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(100 lines)

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956 7890**



DATA CARTRIDGES

	Each 10 Pack	
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DC6250	£15	£139
DC6525	£17	£169
DC9100Magnus	£27	£249

All QIC tapes are preformatted

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1.3GB	60m	£6	£58
2GB	90m	£9	£89
4GB	120m	£15	£145
Head Cleaner			£26

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	£15	£139
MC 3000 XL	£15	£139
4mm 60m	£6	£58
4mm 90m	£6	£58
8mm 112m	£6	£58

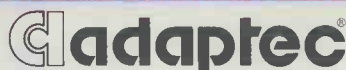
BLANK CDS

CD-R 74 Min	£10
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OPTICAL DISKS

3.5" 128MB	£17
3.5" 230MB	£22
5.25" 600MB	£45
5.25" 1.3GB	£57

ADAPTEC ADAPTER FEATURE



I/O. NOW MORE IMPORTANT THAN EVER.™

AIRPORT AHA9320

These products are designed to connect to the serial port of a PC and/or portable and enables wireless file transfers. The kits include Tranxist Software for Infra-Red transfers.



- IrDA compliant
 - Serial port connection
 - Up to 2 metre range
 - High speed file transfer
- | | |
|----------------------------------|------|
| AIRPORT 1000 PORTABLE CONNECTION | £59 |
| AIRPORT 2000 DESKTOP CONNECTION | £69 |
| AIRPORT 2500 COMBO KIT | £115 |

SLIMSCSI AHA1460

The SlimSCSI adapter delivers high performance peripheral connections to your PCMCIA portable PC.



- Type II, III & Toshiba IV compatible
 - Adaptec EZ-SCSI Software
 - Card & Socket software
 - 10Mb/Sec data transfer
- | | |
|----------------------------|------|
| SLIMSCSI PCMCIA CONNECTION | £149 |
|----------------------------|------|

SCSI MASTER AHA1542CP



- The industry standard, high performance ISA solution
- | | |
|---------------------------|------|
| SCSI MASTER AHA1542CP KIT | £169 |
|---------------------------|------|

PCI SCSI MASTER FAMILY

High performance, intelligent host adapters support advanced SCSI features for demanding desktop and Network applications.

- | | |
|------------------------------|------|
| PCI SCSI MASTER AHA2940 KIT | £179 |
| PCI SCSI MASTER AHA2940W KIT | £239 |
| PCI SCSI MASTER AHA3940 KIT | £289 |



- Multichannel Fast SCSI
 - Up to 14 device support on two SCSI channels
- PCI ULTRA WIDE SCSI HOST ADAPTER AHA2940UW KIT** £229
- Increase data transfer to up to 40Mb/s, with 15 peripheral devices supported
- ADAPTEC 3985 PCI (FAST RAID)** £Call

VALUE AND PERFORMANCE ADAPTERS

TOTAL CD AVA1505 KIT	£39	SCSI DIRECTION AHA1522 KIT	£109	EISA SCSI MASTER AHA2742AT KIT	£239
TOTAL CONNECT AVA1515 KIT	£62	• Like the Total CD this kit offers affordable connection with the added bonus of boot device connectivity		• 14 device support	
				MINISCSI PLUS	£65
				MINISCSI EPP	£119
				• Plugs into parallel port	
				• SCSI-Works software	

AMACOM MASS STORAGE FEATURE

AMACOM PCMCIA EZCD CARD

- 6 SPEED CD ROM**
- MPC II and Photo CD
 - Connects to PCMCIA Type II & III
- | | |
|------------------------------|------|
| SIX SPEED CD ROM | £379 |
| DUAL SPEED CD ROM | £199 |
| QUAD SPEED CD ROM | £289 |
| DUAL SPEED CD ROM WITH AUDIO | £229 |

AMACOM PARALLEL EZCD

- PARALLEL PORT CD ROM**
- Easy connection to parallel port.
 - Ideal for notebooks
 - Printer port for concurrent printing
 - Built in power supply
- | | |
|-----------|------|
| EZCD DUAL | £169 |
| EZCD QUAD | £239 |

Mass storage experts available for specialist advice



EZCD QUAD



AMACOM EZ DISK

- EXTERNAL 3.5" PARALLEL PORT HARD DRIVE**
- Easy connection to parallel port
- | | |
|---------------|------|
| EZ DISK 420MB | £239 |
| EZ DISK 850MB | £279 |
| EZ DISK 1.2GB | £329 |

DISKLITE

AMACOM DISKLITE

- EXTERNAL 2.5" PARALLEL PORT HARD DRIVE**
- Easy connection to parallel port
 - Data transfer up to 900Kb/sec
 - Printer port for concurrent printing
 - Carry case included for mobility
- | | |
|----------------|------|
| DISKLITE 170MB | £165 |
| DISKLITE 340MB | £269 |
| DISKLITE 540MB | £339 |
| DISKLITE 810MB | £469 |
| DISKLITE 1.2GB | £699 |

AMACOM EZ PARASCSI

- CONNECTS ANY SCSI DEVICE TO PC PARALLEL PORT**
- Transfer rate - up to 800Kb/sec
 - Supports DAT, CD ROM, hard disk, optical and many more interfaces
- | | |
|-------------|-----|
| EZ PARASCSI | £99 |
|-------------|-----|



BANK

at
Powermark

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

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
- HP SureStore Tape 2000 Int** HPSS2000/I £579
HP SureStore Tape 2000
ISA Kit HPSS2000/KIT £859
HP SureStore Tape 5000 Int HPSS5000/I £665
HP SureStore Tape 5000
ISA Kit HPSS5000/KIT £1699
HP SureStore Tape 6000 Int HPSS6000/I £799
HP SureStore Tape 6000
ISA Kit HPSS6000/KIT £1899
- NEW!** **HP SureStore Tape 12000 Int** HPSS12000 £799
NEW! **HP SureStore Tape 12000 ISA Kit** HPSS12000/KIT £1899
- ISA Kit includes cable, cartridge, head cleaner & full software

HP COLORADO T1000

- New, advanced TRAVAN technology
- 800MB capacity (with compression)
- Up to 9.5MB/min backup speed
- Fits into 3.5" or 5.25" drive bay

HP COLORADO T1000e CMS1000 £108

HP COLORADO BACKUP

- Easy to use software
- Works with all HP Colorado devices

COLORADO BACKUP COLORBUPW £39

PARALLEL PORT

TRAKKER 350 CMS1R/350 £142
TRAKKER CARRY CASE CMS1S/CARRY £37

HP COLORADO JUMBO

- Connects to your floppy controller
 - Includes software and cables
- JUMBO 350** CMS1S350 £75
JUMBO 1.36GB CMS1S1.36/I **POWERCUT!** £181
QIC 3020 DC3020 £23
FAST CONTROLLER CARD CMS1S/FC-20 £49
EXTERNAL MOUNTING KIT CMS1SE £61

Mass storage experts available for specialist advice

SYQUEST STORAGE FEATURE



SyQuest



SYQUEST SQ5200

Unsurpassed warranties - 2 years on drives and 5 years on data cartridges

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

NEW!

EZ135 DRIVES

135MB Removeable Disk Drive

SYQ135/I EZ135 IDE Internal £164
 SYQ135/E EZ135 SCSI External £195
 SYQ135/C 135MB Cartridge £17

Free cartridge with all EZ135 disk drives

SYQUEST CARTRIDGES

Capacity	Form	Each	5 Pack
105MB	3.5"	£39	£190
270MB	3.5"	£40	£195
444MB	5.25"	£29	£140
88MB	5.25"	£35	£170
200MB	5.25"	£50	£245

SYQUEST REMOVABLE CARTRIDGE HARD DISK DRIVES

	Type	Capacity	Internal	External
SYQ2701	SyQuest 3.5" IDE	270MB	£249	-
SYQ2705	SyQuest 3.5" SCSI	270MB	£254	£344
SYQ270/P	SyQuest 3.5" PARALLEL	270MB	-	£425
SYQ88	SyQuest 5.25" SCSI	88MB	£179	£269
SYQ200	SyQuest 5.25" SCSI	200MB	£259	£349

IOMEGA TAPE BACKUP FEATURE

IOMEGA
Makers of Bernoulli

DITTO 800

- New, advanced Travan technology
 - Backward compatible with 250, 350 and 420MB tapes
 - 800MB capacity (with compression)
 - Direct drive - no belt
 - Network compatible
- DITTO 800 INTERNAL** IO1DIT800/I £119
DITTO 800 EASY PARALLEL IO1DIT800/E £145

NEW! TRAVAN 3.2GB DRIVE

INTERNAL IO1RAV3/I £249
PARALLEL IO1RAV3/E £335

- 1.7GB INTERNAL IOMEGA1700 £209
- QIC 3020 TAPES (for 1.7GB) DC3020 £23
- QIC & WIDE 420MB DC5122 £89
- TAPE ACCELERATOR CARD IOMEGA/DATA £49
- 700MB DATA CARTRIDGE DCMC3000 £17

TRAVAN



DITTO 800

IOMEGA ZIP DRIVES

- 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
- Excellent and easy for transferring information between two computers



IOZIP Parallel IOZIP/P/I £149 100MB Cartridge Single £12
IOZIP SCSI IOZIP/S/I £149 5 Pack £65 10 Pack £115

NEW! IOMEGA JAZZ DRIVES

1GB Internal SCSI £419 1GB External Parallel £509

Technical Sales
Order Lines
0181-956 7000
(100 lines)

MASS STORAGE & BACKUP

It's time once again to visit...



Dr Jane's Storage Surgery

Dear Dr Jane,
I use a computer at both work and home. A lot of files are shared between the two PCs and I have tolerated floppy disks in the past. As time goes by these files have increased in size and I feel another solution must be available. Furthermore, there are times when I travel and use other customers' computers. If at all possible I would like to use my own files with these PCs as well.
Ailing in Aylesbury

Dear Ailing
Last month we advertised the Amacom Disklite drives. I have now had a chance to examine the 1.2Gb 3.5" drives, and I feel that this will solve all your ailments. The drives come in two sizes and the 2.5" version is very portable. Considering they also work from the parallel port, transfer from machine to machine is easy. If you call my surgery today we will help you with all the available options.
Yours, Dr Jane

Send your thoughts and queries to Dr Jane, c/o Memory Bank, The Powermark Centre, The Waterfront, Elstree Road, Elstree, Herts WD6 3RP or fax her on 0181 956 7100. You can also Email Doctor Jane 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!

Memory Bank
The Powermark Centre,
The Waterfront, Elstree Road,
Elstree, Hertfordshire WD6 3RP

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Email membank@powermark.com

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Email edsales@powermark.com

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MOUSEMAN
COMBO LOGCOMBO £36

- Ergonomic design
- Ready for Windows 95



SENSA LOGSENSO 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

CORDESS LOGC £49

CHROMA LOGCHROMA £24

- 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 LOGVISTA £43

- Ergonomic design
- Ready for Windows 95

TRACKMAN LIVE LOGLIVE £99

- A unique radio-wireless solution for presentations can be used for controlling slideshows or as a handheld

TRACKMAN VOYAGER LOGTV £48

- Sets new standards in comfort, flexibility and performance for travellers

POWERPAGE SCANNER LOGPPAGE £290

SCANMAN COLOUR LOGSCC £179

SCANMAN 256 LOGSCAN £87

FOTOMAN PLUS DIGITAL CAMERA LOGFOTO £439

TRACKMAN MARBLE LOGMARBLE £59

WINGMAN EXTREME JOYSTICK WINGMAN/EXT £32

THUNDER PC GAME PAD THUNDERPC £14

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 PANAPRO/IDE £115

OPTIONAL INTERFACE CARD PAN/INTERFACE £10



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 PANAPRO/SCSI/WO £157

QUADPRO SCSI KIT WITH INTERFACE CARD PANAPRO/SCSI £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
- Supports Video-CD and CD-i movie

PD SYSTEM KIT WITHOUT I/F CARD PAN/PDI £489

PD SYSTEM KIT WITH I/F CARD PAN/PDIWI £569

PD 650MB MEDIA PAN/PDCART £37

PD SYSTEM EXTERNAL KIT PAN/PDE £699

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. Ideal for displaying full motion TV.

- Fast 320 x 240 lossless AVI clip capture
- Integrated TV tuner/teletext
- Square Pixel (CCIR 601) support
- MAET technology support: on board motion artifacts elimination
- Teletext feature is Reuters 1000 ready, supporting dynamic data exchange (DDE) see page 876 on CNNtext, for updated news

WIN/TV CELEBRITY WINTVCELEB £259

VIDEO OUT MODULE FOR WIN/TV CELEBRITY WIN/VIDOUT £149

WIN/CINEMA 95 WINTVCINEMA £175

WIN/TV PRISMA WINTVPRISMA £147

- SVGA compatible
- 640 x 480, up to 800 x 600 resolution, audio line-out



NEW! WIN MOTION 60 WINMOTION £389

INNOVATIVE COMMUNICATIONS FEATURE

PORTABLE SOUND PLUS

- Ideal solution for portable PCs
- Perfect for multimedia presentations



PORTABLE SOUND PLUS ICPORT £109



The first slimline CD ROM drive with optional built in 16-bit sound card and it's Windows 95 compatible too!

CYBERROM DUAL CD ROM

- Designed for the newest generation of 'sound ready' computers
 - Play Audio CDs
- CYBERROM DUAL CD ROM CYBERROMZX £269



CYBERROM QUAD CD ROM

CYBERROM QUAD CD ROM CYBERROM4X £395



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VAT at 17.5% will be added to all prices



EARLY BIRD
Order Bonus
See page 31



Everyone at Memory Bank passes through the Powermark Academy

BANK

at Powermark

DFI MULTIMEDIA KIT FEATURE

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.

QUAD SPEED DFI/SANYO CD ROM DRIVE

- Internal quad speed E-IDE drive
- 600Kb/sec data transfer rate
- 190ms access time
- Tray loading
- 256Kb cache



Amazing Value

CONTAINS:

- Quad speed IDE CD ROM drive
- High quality 16-bit sound card
- Quickshot SoundMate II stereo amplified speakers
- Microsoft Home pack consisting of:
 - Microsoft Encarta 95
 - Microsoft Works
 - Microsoft Dangerous Creatures
 - Microsoft Golf
 - Microsoft Home Sampler

Complete Multimedia Bundle DFI/M/KIT £199

- DFI QUAD SPEED CD ROM DRIVE ONLY (CDFI4V) £99
- ORCHESTRA 16 SOUND CARD ONLY (DFISOUND) £59

ORCHESTRA 16 SOUND CARD

- Fully compatible with SoundBlaster 16, SoundBlaster Pro, SoundBlaster 2.0, AdLib and Microsoft Windows Sound System
- Built-in stereo amplifier
- IDE CD ROM interface
- Full duplex MIDI port to let you record and play back at the same time

- Jumperless plug and play for easy installation
- 15 treble/bass tone control and stereo balance

Also includes:

Audiosession, a powerful Windows application that gives you a mixer, wave player, CD player and MIDI player. Audiosession makes it easy to record, edit, play files, adjust volume, balance and a lot more

Special Limited Offer while stocks last

10 pack of top CD ROM titles for only £18

NEW! TEAC 6 SPEED CD ROM DRIVE FEATURE



TEAC®

Powermark special offer

WIN A CD ROM DRIVE!

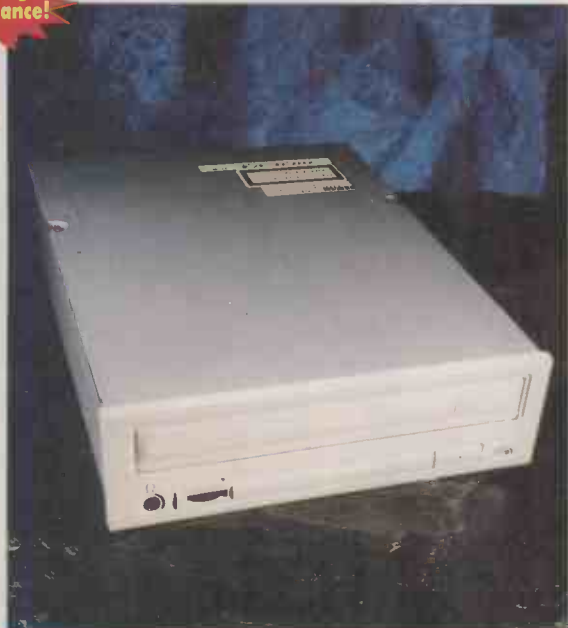
Amazing performance!

TEAC 6 SPEED CD ROM DRIVE

- 900Kb/sec transfer rate
- Seek time 110ms, access time 139ms
- Tray loading
- CD ROM XA, Photo CD and CD-I compatible
- Audio output
- Windows 95 compliant
- 256Kb buffer
- IDE interface
- Can be mounted vertically or horizontally

TEAC 6 SPEED CD-ROM DRIVE

- INTERNAL IDE (CDEAC6E) £199
- EXTERNAL SCSI (CDEAC6S) £275



Simply purchase any product over £50 from Memory Bank and answer the following question and you could win a Teac 6 speed CD ROM drive.

What is the seek time of the TEAC 6 speed CD ROM drive?

- A. 150ms
- B. 110ms
- C. 139ms

THERE WILL BE ONE LUCKY WINNER EACH MONTH FROM NOW UNTIL 31/05/96

Ask our Technical Sales Team for details of the offer when you place your order

Terms and conditions

1. Competition open to persons aged 18 and over, and excludes entry from employees and any suppliers associated with Powermark plc or any of its company divisions.
2. Only one prize draw entry per person per prize.
3. Only one prize per month until the end of the competition.
4. No cash alternatives can be offered.
5. One correct entry will be picked out each month until the 31/05/96.
6. The winners name will be published in the following month's advertisement.
7. The winner will be notified within 14 days of the draw each month.

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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 Brothers Juke Box Adventure | Battlestorm |
| Titus Fox | Super Cauldron |
| Crazy Cars 3 | Titan |
| | Prehistorix |
| | Prehistorix II |

11 CD ROMs for £19!

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|------------------------|-----------------------|
| Return to Ringworld | Spectre VR |
| Microcosm | Compuserve Starter CD |
| Jutland | The Psychotron |
| The Cyberplasm Formula | Jurassic Park |
| Bodyworks | Shadowlands |
| Voyager | Sleepwalker |

CHILDREN'S CD BUNDLE £19

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| Lenny's Musictoons | Family Circus |
| Cinderella | Putt Putt's Fun Pack |
| Basic Spelling | Sing-along Kids |
| Tricks | |

16 TITLES ON 10 CDS for £29

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| World Atlas | James Pond 2 |
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| Winter Olympics | Comedy Central |
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| Thunderhawk | Michael Jackson |
| Curse of | Phil Collins |
| | Abba |

10 CDs MEGAPACK Now only £19

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|-------------------|--------------------------------------|
| 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 clip-art! |
| Dinosaur Safari | |
| Audubon's Mammals | |

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... and here's what some of our customers have said ...

I telephoned seeking information on an Iomega Zip drive. The call was taken by David Corrigan. I commented on the perfect way be handled my enquiry and actually carried out what, I do indeed hope, were the set of instructions that your sales trainer had issued. It is quite a while since I had the pleasure of being professionally sold to... be qualified that the product was the one I needed and that it would suite my requirements.

Full marks for a great performance. Do make certain that he is amply recognised.

A G Benson
Berkshire

I would like you to know that I thought the telephone manner of Danielle today was the deciding factor in making a purchase through your Company...

N C W John
Hants



**FREE
Baseball Cap**
worth £4.95

With every order
over £500

When ordering just ask for your FREE baseball cap as it is not shipped automatically.

POWERMARK MULTIMEDIA FEATURE



powermark
Multimedia

POWERMARK MULTIMEDIA KIT

- Quad speed CD ROM drive
- Sony, Mitsumi, Panasonic interface
- 16-bit sound card
- Stereo speakers
- Microphone
- CD ROM game pack

MMMLKIT POWERMARK
MULTIMEDIA KIT £145



Multimedia experts
available for
specialist advice

POWERMARK QUAD CD ROM DRIVE

- Quad speed CD ROM drive
- 600Kb/sec transfer rate
- 190ms access time
- Manufactured by Pioneer
- Top quality design
- Tray loading

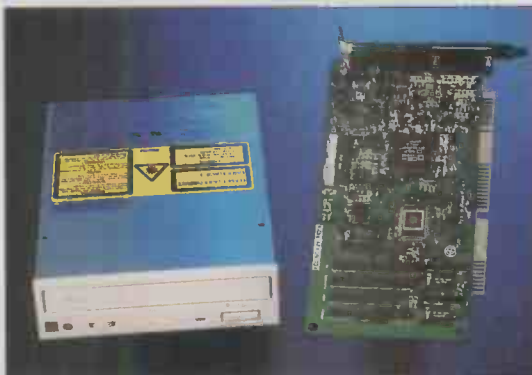
MCQRDM POWERMARK QUAD
CD ROM DRIVE £89

POWERMARK 16-BIT SOUND CARD

- SoundBlaster compatible
- Sony, Mitsumi, Panasonic and IDE interface
- Integrated MIDI interface
- 20 voice music synthesizer
- Wave table synthesizer
- Upgrade connector

MSB16 POWERMARK 16-BIT
SOUND CARD £39

POWERMARK VALUE AUDIO KIT



- Quad speed CD ROM drive
- Sony, Mitsumi, Panasonic interface
- 16-bit sound card

MAVALKIT POWERMARK VALUE AUDIO KIT £129



POWERMARK KEYBOARD FEATURE



powermark
KEYBOARDS

POWERMARK ERGONOMIC KEYBOARDS

Conventional keyboards have a major ergonomic problem, users must angle their hands along the side of the keyboard when typing. This posture is unnatural and can lead to injuries. This problem is known in the medical profession as Repetitive Strain Injury (RSI). The Powermark Ergonomic

Keyboard can greatly reduce the risk of developing RSI.

- **Micro joystick for full mouse control**
 - 106-key ergonomic enhanced keyboard layout
 - Built-in Windows 95 keys
 - Comfortable tactile feel
 - Arc shaped arm and wrist rest
 - Membrane key switch
 - Full functioned keyboard for complete compatibility with Windows applications
- MBKBERG95/MJ £49
MBKBERG95 - As above but without joystick mouse £39



POWERMARK ERGONOMIC KEYBOARD

WINDOWS 95 KEYBOARDS

- Top quality design
 - Full 105 key design
 - Optional ergonomic wrist support
- MBK95 WITH REST £19
MBK95 WITHOUT REST £17

17

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**DELIVERY
CHARGES**
See page 9

**EARLY BIRD
Order Bonus**
See page 31



Everyone at
Memory Bank
passes through the
Powermark
Academy

CREATIVE LABS FEATURE

SOUNDBLASTER CARDS

SOUNDBLASTER AWE 32 FULL PLUG & PLAY SB32AWE/IDE £158

- 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 WBLSTII £94

- Programmable Advanced WavEffects generator
- Plug & Play
- Easy installation
- 512K Memory on board
- Upgradable to 28MB
- Windows 95 compatible

SOUNDBLASTER SB 32 PLUG & PLAY SB32AWE/V £121



SOUNDBLASTER DISCOVERY CD QUAD SPEED KIT

/// NEW! BLASTERKEYS



MIDI keyboard for SoundBlaster cards £109

VIDEO BOARDS

VIDEOBLASTER SE100 VBLST/SE £135

- Live full motion video
- Capture single frames in BMP, TIFF, GIF, MMP, PCX, TGA or JPEG

VIDEOBLASTER RT300 VBLSTRT300 £245

- Intel i750PE chip inside

VIDEOBLASTER MP400 VBLSTMP400 £119

- Displays full motion MPEG video in a scalable window up to full screen

3DO BLASTER 3DOBLASTER £269

- Requires CR-563 CD ROM drive and SoundBlaster with CD audio connector

TV CODER EXTERNAL SBTV/CE £109

MULTIMEDIA KITS

GAMEBLASTER 32 4X KIT GAMEBLASTER/V £259

- SoundBlaster AWE Value sound card
- Dual speed IDE Panasonic CD ROM
- SX2000 joystick
- Speakers
- Doom, Heretic, Theme Park

/// NEW! CREATIVE LABS PERFORMANCE 6X KIT £329

HOMESTUDIO KIT HOMESTUDIO £299

- MIDI compatible keyboard
- AWE 32 IDE Lite sound card
- Windows software included

/// NEW! DISCOVERY QUAD SPEED KIT PLUG & PLAY SBDS/4XKIT £225

- Quad speed internal drive
- SoundBlaster 16 Pro
- Top selling bundled software
- Ideal for home and office use

DISCOVERY QUAD VALUE KIT SBDS/4XKIT/V £224

/// NEW! CREATIVE LABS 6x CD ROM £139

SHAREVISION

PC3000 SHAREPC000

Easy to use video conferencing over a regular telephone line.

Realtime application sharing

PC300 SHAREPC300

Easy to use audio conferencing over a regular telephone line

Call for pricing

POWERMARK MULTIMEDIA KITS

POWER PERFORMANCE PACK POWER/PM £489

- Toshiba 3601 4.4 SCSI CD ROM drive
- 16-bit SCSI controller card
- AWE 32 sound card
- Quality 25 watt speakers

SMART QUAD KIT SMART/PM £219

- Mitsumi FX4 quad speed internal drive
- SoundBlaster 16 Pack
- 10 CD ROM bundle
- Lotus Smartsuite
- 15 watt speakers

TOSHIBA 4x4 KIT TOSH4X/PM £365

- 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 TOSH4X/PMFULL £399

GAMEBLASTER AWE 32 KIT GAMEBLST/AWE £287

- Quad speed internal drive
- SoundBlaster AWE32 IDE Lite
- Stereo speakers
- Joystick
- Top selling bundled software titles
- CSP Socket

NEW FROM CREATIVE!

Infrared pointing devices

Aero Mouse AEROMOUSE £69

Aero Pen AEROPEN £69

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MULTIMEDIA & KEYBOARDS

Aaron's Answers



Dear Aaron,
Working in a design office we use a selection of three CD-ROM disks containing files important to our work. It is irritating changing the disks constantly and we are getting a little concerned as the disks get scratched and misplaced. Is there a viable way around this problem?
Hopeful in Henley

Dear Hopeful,
The answer is quick, simple and economical. The NEC 4x4 CD ROM Drive: 4 CD's contained in one drive with quad speed access. This will keep the disks safe and accessible. It even comes with its own internal cache to speed up the operation. Give me a ring today and we can discuss it further.

Yours, Aaron

Send your questions to Aaron's Answers, c/o Memory Bank, The Powermark Centre, The Waterfront, Elstree Road, Elstree, Herts WD6 3RP or fax him on 0181 956 7100. 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.

Memory Bank
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The Waterfront, Elstree Road,
Elstree, Hertfordshire WD6 3RP

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Multimedia experts
available for
specialist advice



SOUNDBLASTER 16 VALUE IDE

SOUNDBLASTER CARDS

SOUNDBLASTER 16 VALUE IDE SB16B/IDE £60

- 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 SBP16/IDE £79

- Voice recognition software
- Panasonic interface

/// NEW! PHONEBLASTER V34 £239

- V34 Modem
- BABT approved

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THE SKIP

- Exploring Plant Sciences CD DEXPPS £30
- Star Trek The Next Generation CD DSTAR/NG £20
- Hutchinson Medical Encyclopedia DHNME £25
- Peter Pan CD DPETERPAN £15
- Rise of the Robots DRISE £20
- NEC 3i SCSI CD ROM CON3XI £99
- Robocop 3 and Dune DR03D/DUNE £10
- Sage Payroll V5 Dos SAGE/PR2D5 £130
- Trust Ami Scan colour TRUSTSCAN/C £70
- TFX CD DTFX £20
- Theme Park CD DTHME £20
- 7th Guest and Dunc D7TH/DUNE £19
- Sam and Max hit the Road CD DSAM £15
- Mountain Sidecar 1 backup MOUNT/SIDECAR1 £245
- Grolhier Encyclopedia DGEE £39
- Lemmings 1 & 2 DLEMMINGS £10
- Guinness Disk of Records DGR £25
- Dexxa hand held scanner DEXXA/320 £35
- Media Pro Plus VMPRO £170
- Lotus SmartSuite V3 UG LOTUSSUG £150
- Ultimate Football ULTIMATE/FOOT £15
- Return to Zork CD DRETURN £20
- Intuit Quickbook Win V2 3.5 IQ/BOOKSUNV2 £70
- PGA Golf DPGAGOLF £20
- Arthur Teachers Trouble CD DATT £15
- Al User Racing ALUSR £10
- 1st Act for Windows ACL/1ST £55
- Andest MSL - 1100 phone manager PHONENGR1100 £50
- 100 years of Motoring CD D100YEARS £15



CD ROM DRIVES, SOUND CARDS AND SPEAKERS FEATURE

MULTIMEDIA KITS

AZTECH HOME QUAD OFFICE KIT AZTHOME/OFF £249

- 16-bit sound card
- Speakers and microphone
- MS Encarta, Money, Works

SONY MDH-10 DATA DRIVE

Optional PCMCIA interface
Rewritable - 140MB
MiniDisc audio compatible
£499

RECORDABLE CD ROMS

PLASMON CDR4220 INTERNAL CDPLAS/24W £849
PLASMON CDR4220 EXTERNAL CDPLAS/24E £899

- Record dual speed
- Playback quad speed
- INCAT CD PRO software

HEWLETT PACKARD
4020i CDH4020I £799
4020e CDH4020E £859

DIAMOND ULTRA 8000 KIT

8 Speed CD ROM
16 bit Wavetable sound card
3D sound
Yamaha YST-M5 speakers
Games software

VIDEO CARDS

TV BUSTER PRO EXTERNAL VTB/1 £69
REELMAGIC MAXIMA REELMAGIC/MAX £189

- Watch VideoCDs on your PC
- Resolution up to 1280 x 1024
- Includes bundled software

MIRO VIDEO PCI
20TD LIVE MIRO20TD/L £345
MIRO VIDEO
20SD TWIN MIRO20TD/TWIN £549

MOVIE
MACHINE II MOVIE/MACHII £475
MOVIE MACHINE PRO MOVIE/MACHP £299

SPEAKERS

Quality speakers supplied as matched pairs

CREATIVE LABS
SBS 300 STEREO SPEAKERS PWRS300 £79

- 10 watts
- Built-in amplifier

CREATIVE LABS
SBS 37 STEREO SPEAKERS PWRS37 £18

LABTEC CS150
SPEAKERS LABTECCS150 £7

SCREENBEAT £9

- Amplified

SONY SPEAKERS PWRCSS-0100 £72

TRUST SW10
SPEAKERS PWTRUST/SW10 £20

- 80 Watts

YAMAHA YST-M10 PWRSPL/YAMAHA £49

- 10 watts per channel
- 80Hz - 20KHz frequency

YAMAHA YST-SW10 SUB WOOFER YAM/MSW10 £79

CD ROM ACCESSORIES

QUALITY DISK
CADDY CDRC/1 £5
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- The widest range of Sound Boards

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- SB Pro compatible
- 3D Sound

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- Includes MS Sound System

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- Wave table synthesis

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2 MB WRAM PCI £255
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ANALOGUE 'Y' CABLE YCBL £11
MIDI ADAPTER MID/C £21
DESK MICROPHONE SBMIC £11
HEADPHONES SBHD £9

SOUND BOARD SOFTWARE

CREATIVE VOICE EDITOR £37
MS WINDOWS SOUND SYSTEM SOFTWARE MSSPSS £47



PLUG & PLAY CD ROM RECORDER

CD ROM DRIVES

	Product Code	Type	Speed	Transfer rate	Access	Loading	Cache	Interface	Int	Ext	
NEW!	Aztech 6Xi	AZTECH6X	IDE	6	900Kb/sec	150ms	Tray	256Kb	E-IDE	£135	-
	Aztech 4Xi	AZTECH4X	IDE	Q	600Kb/sec	300ms	Tray	256Kb	E-IDE	£95	£109
	DFI / SANYO	CDDFI/1	IDE	Q	600Kb/sec	190ms	Tray	256Kb	E-IDE	£99	-
	Goldstar GCD-R540B	CDG540B	IDE	Q	600Kb/sec	220ms	Tray	128Kb	E-IDE	£98	-
	Mitsumi FX400	CDMIFEX4	IDE	Q	600Kb/sec	230ms	Tray	128Kb	E-IDE	£99	-
	Nakamichi (7 CD-ROM)	CDNAM07	SCSI	D	330Kb/sec	380ms	Caddy	256Kb	16-bit SCSI	-	£249
	NEC 3XP	CDN3XP	SCSI	T	450Kb/sec	250ms	Caddy	128Kb	16-bit SCSI	-	£245
	NEC 6Xi/e	CDM6X	SCSI	6	900Kb/sec	150ms	Caddy	256Kb	16-bit SCSI	£265	£355
NEW!	Panasonic 504B	CDPAS04B	IDE	Q	600Kb/sec	150ms	Tray	128Kb	E-IDE	£125	-
	Panasonic LF1004PDO	PAN/PD	SCSI	Q	600Kb/sec	220ms	Caddy	512Kb	16-bit SCSI	£489	£569
	Pioneer DRM624X	CDPDRM624X	SCSI-II	Q	670Kb/sec	150ms	Caddy	256Kb	16-bit SCSI	£399	£469
	Pioneer DRU124X	CDPDRU124	SCSI	Q	660Kb/sec	150ms	Tray	256Kb	16-bit SCSI	£185	£245
	Pioneer 124X	CDP124	IDE	Q	600Kb/sec	150ms	Tray	256Kb	E-IDE	£115	-
	Plextor 6x	CDPLEX/6	SCSI	6	900Kb/sec	115ms	Caddy	512Kb	16-bit SCSI	£289	£329
	Plextor 4xi	CDPLEX/4	SCSI	Q	600Kb/sec	150ms	Caddy	256Kb	16-bit SCSI	£239	£299
NEW!	Powermark	MBCDR0M	IDE	Q	600Kb/sec	190ms	Tray	256Kb	E-IDE	£97	-
	Sony CDU76E	CD576E	IDE	Q	600Kb/sec	190ms	Tray	256Kb	E-IDE	£117	-
NEW!	TEAC CD56E	CDTEAC56E	IDE	6	900Kb/sec	139ms	Tray	256Kb	E-IDE	£179	-
NEW!	Toshiba XM-3701B	CDT3701B	SCSI-II	6	1000Kb/sec	135ms	Caddy	256Kb	16-bit SCSI	£279	-
	Toshiba XM5402B	CD5402	E-IDE	Q	600Kb/sec	190ms	Tray	256Kb	E-IDE	&Call	&Call

Key to drive speeds: D=Double, Q=Quad, T=Triple, 6=Six speed

19

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DELIVERY CHARGES
See page 9

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MICROSOFT® FEATURE

Microsoft®



NEW! ENCARTA® 1996

- New 40 country fact boxes, covering climate, religion, economy, geography, musical styles and more
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Puts the fast, furious world of 32-bit gaming technology right in your face!

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Wine Guide	POWERCUT!	CD ROM	£21
Oceans V1.0		CD ROM	£21
AutoRoute Express			
UK and Ireland V4		floppy	£35
UK and Ireland V4		CD ROM	£39
Europe V4		floppy	£29
Europe V4		CD ROM	£39
Cinemanía '96		CD ROM	£23
Bookshelf '95	POWERCUT!	CD ROM	£58
Dinosaurs	POWERCUT!	CD ROM	£21
Art Gallery	POWERCUT!	CD ROM	£27
Musical Instruments		CD ROM	£21
Schubert	POWERCUT!	CD ROM	£21
Stravinsky	POWERCUT!	CD ROM	£21
Strauss	POWERCUT!	CD ROM	£21
Mozart	POWERCUT!	CD ROM	£21
Beethoven	POWERCUT!	CD ROM	£21
Composer Collection		CD ROM	£49
• 3 CD ROM set includes Mozart, Beethoven and Schubert			
World Of Flight	NEW!		
For Windows		CD ROM	£29



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Flight Simulator 5.1	NEW!	CD ROM	£26
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Golf	POWERCUT!	CD ROM	£22
Golf course - Mauna Kea		floppy	£15
Golf course - Pinehurst		floppy	£15
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Return Of Arcade			Call

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MICROSOFT® HARDWARE FEATURE

MICROSOFT® MICE

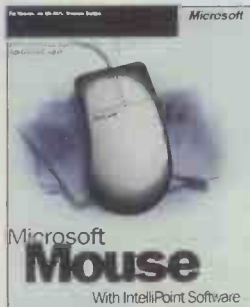
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- Plug and Play with Windows 95
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MICROSOFT MOUSE 2.0 £35

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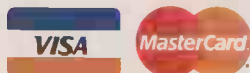
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MOVIE MEMORIES

47th Parallel Port

The Missing Bus

Gunfight at the OK Corel



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 DIA-SPEEDSTAR64/1 £105
SPEEDSTAR 64 ISA 2MB DIA-SPEEDSTAR64/2 £147

STEALTH SE

- The best price/performance card for Windows/games packages
 - DRAM based
 - PCI or VLB bus
- STEALTH SE
PCI 1MB DIA-ST32P/1 £69
STEALTH SE
VLB 1MB DIA-ST32V/1 £69

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 PCI 1MB DIA-ST64D/1V £89
STEALTH 64 VIDEO PCI 2MB DIA-ST64D/1 £129
STEALTH 64 VIDEO VLB 1MB DIA-ST64D/2V £89
STEALTH 64 VIDEO VLB 2MB DIA-ST64D/2PCI £129



STEALTH 64 VIDEO VRAM

- The world's fastest 64-bit graphics accelerator
 - Now with software MPEG support
- STEALTH 64 VV PCI 2MB DIA-ST64V/2PCI £215
STEALTH 64 VV PCI 4MB DIA-ST64V/4PCI £325
STEALTH 64 VV VLB 2MB DIA-ST64V/2VLB £215
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FISKARS POWER FEATURE

FISKARS

POWERSERVER 10

Cost-effective UPS for servers, workstations and other LAN applications.

Model	Power Range	Watts at Power Factor 0.7	Typical Backup Time	
PS10/0.4	400VA	280W	10 Mins	£229
PS10/0.6	600VA	420W	10 Mins	£259
PS10/1.0	1000VA	700W	10 Mins	£459
PS10/1.4	1400VA	980W	10 Mins	£539
PS10/1.8	1800VA	1260W	10 Mins	£849
PS10/2.2	2200VA	1540W	10 Mins	£950

POWERRITE PLUS

	Power Range	Typical Backup Time	
PRP/250	250VA	5 Mins	£85
PRP/400	400VA	5 Mins	£119
PRP/600	600VA	5 Mins	£155



VIDEOLOGIC FEATURE



A new generation of leading price/performance 64-bit Windows accelerators... expandable with low-cost multimedia options



MPEG PLAYER

The quality solution for Video CD playback
MPEG PLAYER VID928MP £199



	GrafixStar 300	400	700
64-bit Graphics Controller	S3 Trio64	S3 Trio64V+	S3 Vision968
Performance	85+ million W/m	95+ million W/m	110+ million W/m
Memory	DRAM 1	DRAM 1	VRAM 2-4
Max Resolution	1280 x 1024	1600 x 1200	1600 x 1200
AVI Acceleration	Optional	Standard	Standard
Software MPEG playback	No	Yes	Yes
SmartTools Software	Yes	Yes	Yes
Video upgrade	VMC	LPB	VMC
Bus	PCI/VLB	PCI	PCI/VLB
	1MB - £97	1MB - £105	2MB - £235
	2MB - £135	2MB - £150	4MB - £379
Order Code	VIDGS/300	VIDGS/400	VIDGS/700

CAPTIVATOR PRO TV

- Sensational quality still/video capture upgrade
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CAPTIVATOR PRO VIDCAP-PRO £165
GrafixStar 300/400 1MB upgrade VIDGS/300/400 £47
GrafixStar 300/400/700 VMC Controller VIDGS/VMC £39
GrafixStar 700 2MB upgrade & VMC Controller VIDGS/VMC2MBUG £149

MEDIATOR XLC

- Low cost PC to TV converter
MEDIATOR XLC VIDMEDIATOR £135

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EARLY BIRD
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Personal Computer World
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The Ergovision series offers compatibility with the US EPA Energy Star programme as well as the VESA DPMS and TCO 92' Power Management standards. All monitors are also Macintosh compatible (Macintosh cable required). Now with 2 year warranty. On site warranty available on request.

Monitor experts available for specialist advice

TAXAN 2100LR

	Size	Dot pitch	Resolution at up to:	Frequency	Tube		
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TX410LR	14"	0.28mm	1024 x 768	60Hz	Conventional	POWERCUT!	£197
TX420LR	14"	0.28mm	1280 x 1024	60Hz	Conventional	POWERCUT!	£239
TX580+LR	15"	0.28mm	1280 x 1024	60Hz	FST	POWERCUT!	£285
TX880LR	17"	0.28mm	1280 x 1024	60Hz	FST	POWERCUT!	£515
TX885LR	17"	0.26mm	1600 x 1200	65Hz	FST	POWERCUT!	£599
TX895LR	17"	0.25mm	1600 x 1200	67Hz	Trinitron	POWERCUT!	£799
TX1080LR	20"	0.28mm	1600 x 1200	65Hz	Conventional	POWERCUT!	£869
TX2100LR	21"	0.30mm	1600 x 1200	72Hz	Diamondtron		£1389
TXCV100	9.4"	0.30mm	640 x 480	72Hz	TFT LCD Colour		£1659
TXCV200	9.4"	0.30mm	640 x 480	72Hz	STN LCD Colour		£1199



TAXAN 410LR



TAXAN 580+LR
(WINDOWS 95 PLUG & PLAY)



TAXAN 880LR

TAXAN GRAPHICS CARDS

POWERED BY



A strategic alliance to provide the perfect graphics solution.

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GTS WINTURBO (VRAM)

ISA	2MB VRAM	£197
ISA	4MB VRAM	£338
VLB	2MB VRAM	£195
VLB	4MB VRAM	£338
PCI	2MB VRAM	£196
PCI	4MB VRAM	£338



- GTS WINTURBO**
- With Windows 3x & Windows 95 software MPEG player
 - Windows 95 Plug & Play

WINBOOST ACCELERATORS

GTS WINBOOST (DRAM)

ISA	1MB DRAM	£99
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VLB	1MB DRAM	£99
VLB	2MB DRAM	£136
PCI	1MB DRAM	£99
PCI	2MB DRAM	£136

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- Up to 100Hz flicker free display
- Windows motion video accelerator



- Up to 16.7 million colours
- Easy installation with no DIP switches



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PC Guardian

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* Fixes into 3.5" floppy drive with security cable.
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Secures all PC's monitors, keyboards and drives.
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10 PACK PCGU136/10 £210

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• Protects data
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• Prevents copying of data
NOTEBOOK FLOPPY LOCK PCG7350 £14.95
10 PACK PCG7350/10 £120



MASTER QUIZZY

Famous quiz show sayings...

Come on down!

The Price Is Right

Nice to see you...

Generation Game

Let's see what you would've won

Bullseye

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 15MVX Value



HITACHI 17MVX Value

17MVX Value

- 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

	Code	Size	Dot pitch	Resolution	Refresh	Tube	
15MVX Value	HITMON/15MVXY	15"	0.28mm	1280 x 1024	60Hz	FST, Energy Star	£249
17MVX Value	HITMON/CM1711	17"	0.26mm	1280 x 1024	60Hz	FST, VESA-DPMS	£467
CM1711	HITMON/17MXY	17"	0.26mm	1280 x 1024	77Hz	FST, VESA-DPMS	£589
CM2096	HITMONCM2096	20"	0.31mm	1280 x 1024	75Hz	Standard, VESA-DPMS	£875
CM2098	HITMONCM2098	20"	0.28mm	1600 x 1200	72Hz	Standard, VESA-DPMS	£1139
NEW CM2111	HITMONCM2111	21"	0.28mm	1600 x 1200	75Hz	FST, VESA-DPMS	£1459
NEW CM2112	HITMONCM2112	21"	0.26mm	1600 x 1280	107Hz	FST, VESA-DPMS	£Call
CM2199	HITMONCM2199	21"	0.26mm	1600 x 1280	80Hz	FST, VESA-DPMS	£1969

VIEWSONIC MONITOR FEATURE



VIEWSONIC 21PS

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ViewSonic®

from the Economy range for the home user to the Graphics and Professional range for office and professional users.



VIEWSONIC 17GS

	Code	Size	Dot pitch	Resolution	Frequency	Tube	
14ES	VIEW/14ES	14"	0.28mm	1024 x 768	60Hz	FST	£222
15ES	VIEW/15ES	15"	0.27mm	1024 x 768	77Hz	FST	£309
17GS	VIEW/17GS	17"	0.27mm	1280 x 1024	65Hz	FST	£599
20G	VIEW/20G	20"	0.28mm	1600 x 1280	60Hz	FST	£1119
Multimedia series with built-in speakers							
15GA	VIEW/15GA	15"	0.27mm	1280 x 1024	65Hz	FST	£429
17GA	VIEW/17GA	17"	0.27mm	1280 x 1024	65Hz	FST	£657
17EA	VIEW/17EA	17"	0.28mm	1280 x 1024	65Hz	FST	£609
Professional series							
17PS	VIEW/17PS	17"	0.25mm	1600 x 1280	60Hz	FST	£699
21PS	VIEW/21PS	21"	0.25mm	1600 x 1280	60Hz	FST	£1559



VIEWSONIC 17GA
PerfectSound™

Monitor experts
available for
specialist advice



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MBMON17
17" Monitor

MBMON15

15" FLATTER SQUARER TUBE MONITOR (MPRII)

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.

Top quality, low radiation, non-glare, non-interlaced monitor with Energy Star power saving. Flatter squarer tube and Invar mask give even crisper fuller screen images.

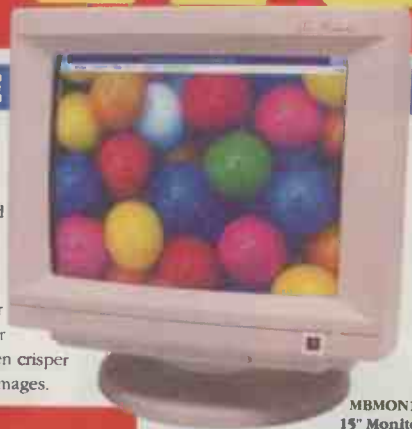
15" minimum recommended screen size for Windows 95

All Powermark monitors are MPRII compliant and feature EPA Energy Star power saving

EXCLUSIVE MONITORS AT LOW, LOW PRICES!

	Size	Dot pitch	Resolution	Frequency	Features	
MBMON15	15"	0.28mm	1024 x 768	65MHz	FS, NG, IM, TSB	£214
MBMON17	17"	0.28mm	1280 x 1024	64MHz	FS, NG, IM, OS, TSB	£399
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



MBMON15
15" 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!

NOKIA MONITOR FEATURE

NOKIA

In a world where energy consumption and conservation is continuously discussed in the media, Nokia has come up with an innovative approach to power consumption on their range of monitors. Nokia's "PowerSaver" is based on the NUTEK and VESA standards. This means that all their monitors meet the strictest industry energy emission regulations.

The broad range of monitors that Nokia manufacture means that they have a monitor to meet everybody's needs. For the graphics, CAD and DTP professional, the Multigraph 17" range offers a powerful mix of features and performance.

Other features such as the on-screen menu give an overview

about the actual user-mode and make programming of parameters very easy.

NOKIA 449M

- 15" TRINITRON TUBE
- 0.25mm dot pitch
- 1024 x 768 @ 80Hz
- On screen menu
- Power saver option
- MPRII
- Minimum screen edge distortion



Model	Code	Size	Dot pitch	Resolution	Frequency	Tube	
Multigraph 449M	NOKIA449M	15"	0.25mm	1024 x 768	80Hz	Trinitron	£365
Multigraph 447M	NOKIA447M	17"	0.25mm	1024 x 768	60Hz	Trinitron	£639
Multigraph 447X	NOKIA447X	17"	0.25mm	1280 x 1024	76Hz	Trinitron	£829
Multigraph 447M092P	NOKIA447M092P	17"	0.25mm	1024 x 768	76Hz	Trinitron	£789
Multigraph 445M	NOKIA445M	21"	0.28mm	1280 x 1024	65Hz	FS Invar	£1449
Multigraph 445X092P	NOKIA445X092P	21"	0.28mm	1600 x 1200	80Hz	FS Invar	£1799

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0181-956 7000
(100 lines)

Educational Sales Order Lines
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HUGE STOCKS
Guaranteed next working day delivery on a 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.

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Memory Bank is the direct division of Powermark plc which 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 of low, low prices.

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Dedicated after sales technical support teams on line to help with installation.

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We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

FULL MANUFACTURERS' WARRANTIES
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Same day delivery charges - there's plenty of parking too! 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: 9.30am to 4.00pm. Technical Support and Customer Service from 10.00am to 2.00pm.

Memory Bank

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**Achieve the
full potential
of your 28.8
modem with
our High
Speed Serial
Card**



If you don't have a 16550 UART IC on your system board, your modem will run at only 50% of its maximum speed!

Here's how to check:

- 1) From C:\ prompt type MSD <enter>
- 2) Select C
- 3) If your system does not report with 16550 then you need a Powermark High Speed Serial Card

**Our easily
installed**

**High Speed
Serial Card
gives you
maximum
performance.**

MBSERIAL/2A £27

Save £8 -
Only £19 when
purchased with any
modem

RACAL ISDN FEATURE

ISDN

RACAL

Bring your business partners closer, faster with a comprehensive range of low cost plug and play ISDN solutions from Racal - Datacom



X.TOLL ISA

- Windows 95, NT, 3x(TA only)
- 128Kbps data throughput
- Plug and Play
- No memory Space
- Half size card for ISA and EISA
- Synchronous and Asynchronous PPP

X.TOLL ISA £250



X.TOLL PCMCIA ISDN

- PCMCIA type II
- Plug and Play
- 128Kbps data throughput
- Windows 95, NT, 3x(TA only)

X.TOLL PCMCIA ISDN £475

ISDN APPLICATIONS

- Internet access
- E-mail access
- On-line teleworking
- Remote network access
- Simultaneous analogue and data
- Video conferencing

EXTERNAL ISDN ADAPTORS

- Data & Analogue model
 - Data model
 - High Speed V24 port
 - Plug and Play
 - Sub-second connection time
 - Bundled with Transend software
 - Calling line identification
 - Multiple subscriber numbering
- DAP 6200
from £399

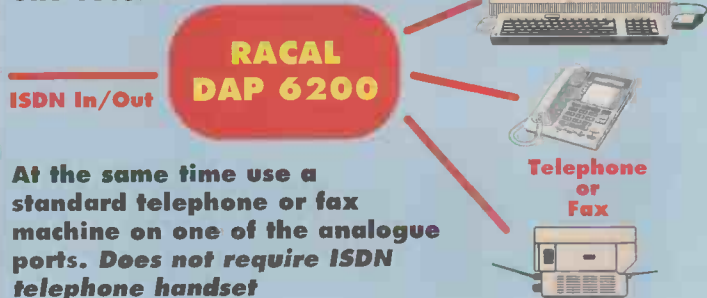


The Racal Datacom Solution

ISDN offers direct access to the core of the telephone network. Standard modems utilize older analogue technology with maximum speeds of 28.8Kbps. The Racal range of ISDN products utilize leading edge digital technology allowing you to directly access the digital telephone network which can operate at up to 64Kbps (more with compression). The net result is considerable cost savings.

	Typical 14.4Kbps modem	Typical 28.8Kbps modem	Racal DAP6300 ISDN
Speed	14.4Kbps	28.8Kbps	115.2Kbps
File Transfer	43 minutes	23 minutes	10 minutes
Call Charge	£3.53	£1.81	£0.80
Annual Call Charge	£1,771	£907	£401
Typical Annual Line Rental	£132	£132	£336
Total Annual Charges	£1,903	£1,039	£737
Annual Savings by using the Racal DAP6300	£1,166	£302	

**Data In/Out to COM port from
RACAL DAP 6200 - up to 64
Kbps. Connects in less than
one second!**



BANK

at Powermark

U.S. ROBOTICS MODEM FEATURE

USRobotics®

The Intelligent Choice in Data Communications

U.S. ROBOTICS MODEMS

Model	V32bis	V32terbo	V.34	MNP2-4	V42	V42bis	MNP5	LIST Cellular	Fax	Internal	External
USRP14/V1 Sportster Vi 14.4 + Voice	●	●	●	●	●	●	●	●	●	£97	£97
USRP28 Sportster 28,800 V.34 + Fax	●	●	●	●	●	●	●	●	●	POWERCUT!	£159
USRP28E/MAC Sportster 28,800 V.34 Mac + Fax	●	●	●	●	●	●	●	●	●	POWERCUT!	£165
USRCDF/I Courier Dual Standard V.34 + Fax	●	●	●	●	●	●	●	●	●	£239	
USRCDFV Courier Dual Standard V.34 + Fax	●	●	●	●	●	●	●	●	●	POWERCUT!	£238
USRW/A WorldPort Dual Standard Cellular + Fax	●	●	●	●	●	●	●	●	●	POWERCUT!	£129
USRP28/F WorldPort PCMCIA V.34	●	●	●	●	●	●	●	●	●	POWERCUT!	£161

USRSERIAL/2 **PowerPort High Speed Dual Async Serial Card.**
Recommended for turbo and V34 modems to prevent bottleneck of data. £49



SPORTSTER VI 14.4 + VOICE

NEW! SPORTSTER Vi 14.4 + VOICE

Desktop 14.4Kbps modem with personal voice mail. Offers fax on demand. Access the Internet via Pipex Dial trial. Cables included.



COURIER V.34

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.



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.



WORLDPORT DUAL STANDARD CELLULAR

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 Memory Bank are BABY APPROVED

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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, working and communications.

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We only supply products from leading manufacturers and at low, low prices.

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Dedicated after sales technical support teams on line to help with installation.

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We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

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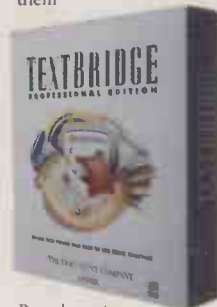
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VISA



TEXTBRIDGE PROFESSIONAL EDITION OCR SOFTWARE FEATURE

- Award winning accuracy on normal, faxed and dot matrix text
- Exclusive DocuRT technology re-constructs cell tables that can be edited as if you created them



- Page layouts with columns and pictures are maintained for true text flow editing
- Instant Access OCR from within your Windows application
- Post Recognition Editing within your word processor
- On-line word training, user dictionaries and saving for future use
- OLE 2.0, drag and drop support
- 11 European languages
- Easy to use automatic functions

Includes voucher for FREE upgrade to Windows 95 version

TEXTBRIDGE 3.0	
TEXTBRIDGE/D	£65
TEXTBRIDGE PROFESSIONAL EDITION	
TEXTBRIDGE/P	£269
COMPETITIVE	
UPGRADE TEXTBRIDGE/CUG	£129

LASAT MODEM FEATURE

LASAT MODEMS

Model	V32bis	V.34	MNP2-4	MNP5	MNP10	Fax	External
LASAT/UNQ	Unique 144	•	•	•	•	•	£169
LASATSAF/144	Safire 144 (Main only)	•	•	•	•	•	£113
LASAT/P	Credit 144 PCMCIA	•	•	•	•	•	£147
LASAT/P28	Credit 288 PCMCIA	•	•	•	•	•	£169
LASATSAF/288	Safire 288	•	•	•	•	•	£189
Unique 640i single channel ISDN/T/A							£399



LASAT

SAFIRE 288

The Safire 288 V.34 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 Memory Bank are **TEST 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

DATAFLEX MODEM FEATURE



DATAFLEX MODEMS

Model	V32bis	V.34	MNP2-4	V.42	V.42bis	MNP5	MNP10	Voice	V17Fax	Internal	External
FLEXGEM	PC SuperGEM	•	•	•	•	•	•	•	•	£135	
FLEXGEM/C	Comms Office	•	•	•	•	•	•	•	•	£135	£169
FLEXGEM/I	PC HyperGEM	•	•	•	•	•	•	•	•	£155	POWERCUT!
FLEXGEM/E	Portable HyperGEM	•	•	•	•	•	•	•	•	POWERCUT!	£169
FLEXGEM/D	Desktop HyperGEM	•	•	•	•	•	•	•	•		£179

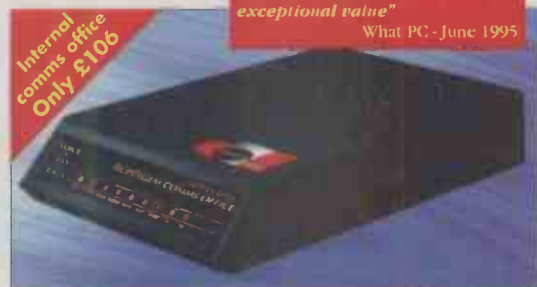
SuperGEM Comms Office

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.

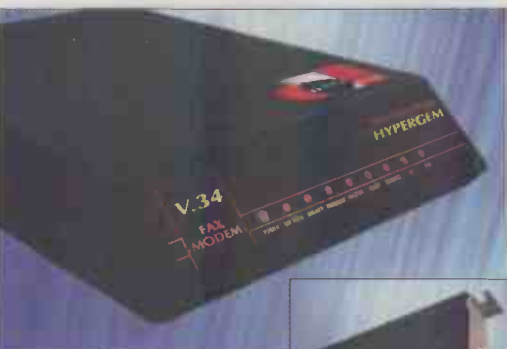
- Touch tone selection
- Voice mail
- Pager notification
- Call screening
- Sound card support
- Fax broadcasting
- Faxback/Faxforward
- Super Voice 2.0 software
- Windows fax and comms software

"Versatile modem combining answering machine with fax and data functionality - exceptional value"

What PC - June 1995



Internal comms office Only £106



HyperGEM

Available as portable, PC card or desktop

- V.34 (28,800bps)
- Ideal for Internet
- Windows fax and comms software



BANK

at Powermark

Windows 95 compatible

POWERMARK MODEM FEATURE



powermark
Modems

Top quality, fully featured, Internet ready, BABT 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 compression offer enhanced reliability and improved throughput of data giving you complete peace of mind whilst saving you money.

Internet ready



MBM288 External

ONLY £139

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
- Comprehensive user manual
- Free introductory subscription to Compuserve - your gateway to the Internet
- Telephone cable
- Serial cable and AC adapter (with external models)



MBM288 Internal



MBM144 External

ONLY £83

POWERMARK MODEMS

Model	V32bis	V34	MNP2-5	V42	V42bis	Fax	Internal	External
MBM0144	●	●	●	●	●	●	£79	£83
MBM0288	●	●	●	●	●	●	£132	£139

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 BABT APPROVED

ZOOM MODEM FEATURE

ZOOM

Personal Computer World:
Editor's Choice Award Dec '93 and June '93

Windows User:
Best On Test, February 94

ZOOM MODEMS

Model	V32	V32bis	V34	MNP2-5	V42	V42bis	Fax	Internal	External
ZOOM144X	●	●	●	●	●	●	●	POWERCUT!	£92
ZOOM144I	●	●	●	●	●	●	●	POWERCUT!	£84
ZOOM144X/MAC	●	●	●	●	●	●	●	POWERCUT!	£105
ZOOM288X	●	●	●	●	●	●	●	POWERCUT!	£159
ZOOM288I	●	●	●	●	●	●	●	POWERCUT!	£142
ZOOM288X/MAC	●	●	●	●	●	●	●	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)

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CABLES

2 metre
9F to 25M £8
2 metre
25F to 25F £8
Call for modem/serial cables
and adapters not listed here.



SMALL ITEMS

Examples: memory,
sound/video cards,
CD ROM titles, small
software packages
UP TO 3 ITEMS
£6.95 total

4 ITEMS OR MORE
£1.95 for each
additional item

LARGE ITEMS

Examples: CD ROM
drives, multimedia
kits, software suites

1ST ITEM
£8.95

EACH ADDITIONAL ITEM
£4.95

VERY LARGE
ITEMS
£Call

Call for rates outside
UK mainland

HAYES MODEM FEATURE



ACCURA 288 V.34 + FAX

OPTIMA+FAX

Offers outstanding performance
with the ability to compress
data twice as much as other fax
modems.

NEW! VOICE RANGE

- 8:1 data compression
- Asynchronous/synchronous
- Ideal for communicating with networked systems
- Built in security with caller ID and password encryption
- Access voice mail remotely

ACCURA+FAX

Low cost fax modems with all
of the quality and ease-of-use
that comes with the Hayes
name.

INTERNET VERSION

- Full Internet connection software

VOICE VERSION

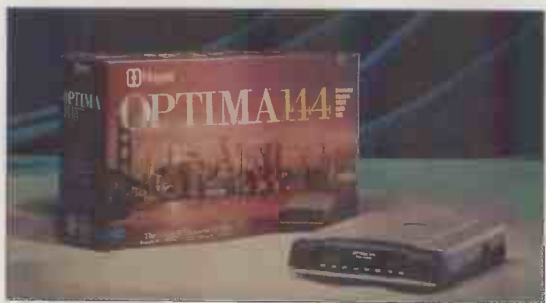
- Voice compatible Accura modem with:
- Full voice messaging
 - Remote accessing
 - Fax on demand

HAYES MODEMS

The industry standard

Windows 95 compatible

Model	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	Fax	Internal	External
HAAC14+	●	●	●	●	●	●	●	●	●	£99
HAAC28+	●	●	●	●	●	●	●	●	●	£195
HAAC28/V	●	●	●	●	●	●	●	●	●	£195
HAOP14/V	●	●	●	●	●	●	●	●	●	£272
HAOP28/V	●	●	●	●	●	●	●	●	●	£365
HAOP14/F	●	●	●	●	●	●	●	●	●	£249
HAOPPCM34	●	●	●	●	●	●	●	●	●	£199
HAOP28	●	●	●	●	●	●	●	●	●	£369
HAOP28/DIAL	●	●	●	●	●	●	●	●	●	£669
HAULT14	●	●	●	●	●	●	●	●	●	£419
HAULTSDN										£599
HAOPESP										1 port £59, 2 port £89



OPTIMA 144 + FAX

MULTITECH MODEM FEATURE



MULTITECH MODEMS

Model	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	Fax	Simultaneous voice & data	External
MULTI28	●	●	●	●	●	●	●	●	●	£329
MULTI19	●	●	●	●	●	●	●	●	●	POWERCUT! £105
MULTI/PCM	●	●	●	●	●	●	●	●	●	£159
MULTI/PCMCIA	●	●	●	●	●	●	●	●	●	£215
MULTI4P	●	●	●	●	●	●	●	●	●	POWERCUT! £299
MULTI14	●	●	●	●	●	●	●	●	●	POWERCUT! £271
MULTI28Z	●	●	●	●	●	●	●	●	●	POWERCUT! £155
MULTI28PCSI	●	●	●	●	●	●	●	●	●	POWERCUT! £435



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)

Comms experts available for specialist advice

Credit cards are not debited until despatch
VAT at 17.5% will be added to all prices



EARLY BIRD
Order Bonus
See page 31



Everyone at
Memory Bank
passes through the
Powermark
Academy

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at
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MOTOROLA MODEM FEATURE



MOTOROLA MODEMS



Model	V.32bis	V.32terbo	V.34	MNP2-4	V.42	V.42bis	MNP5	Fax	Voice*	External	Price
MOT034/ON	3400 Online	●	●	●	●	●	●	●	●	●	£165
MOT034/MAC	3400 Pro Mac	●	●	●	●	●	●	●	●	●	POWERCUT! £175
MOT034	3400 Pro PC	●	●	●	●	●	●	●	●	●	POWERCUT! £155

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 28.8bps 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 Win/DOS 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 BAPT 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	V.32bis	V.32terbo	V.34	MNP2-4	V.42	V.42bis	MNP5	ISDT Cellular	Fax	Internal	External	
DFIMOD144	Passport F1114V	●	●	●	●	●	●	●	●	●	£85	£85
DFIMOD288	Passport F1128V+	●	●	●	●	●	●	●	●	●	POWERCUT! £155	£155



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

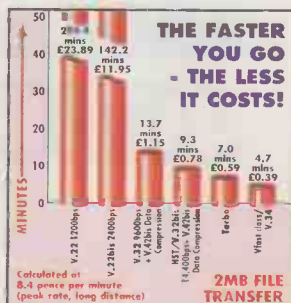
- Delrina's 4 in 1 Win/DOS Fax Lite and Comit Lite DOS/Win software for data transmission

Access

- Introductory membership to CompuServe

Warranty

- 5 years



MODEMS

Technical Sales Order Lines

0181-956 7000
(100 lines)

Educational Sales Order Lines

0181-956 7890

HUGE STOCKS
Guaranteed next working day delivery 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
Memory Bank is the direct division of Powermark plc which 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.

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 Memory Bank carry manufacturers' warranties and full Powermark plc guarantees.

PERSONAL CALLERS VERY WELCOME
Same day delivery charges - there's plenty of parking too! 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.

Memory Bank
The Powermark Centre,
The Waterfront, Elstree Road,
Elstree, Hertfordshire WD6 3RP

Technical Sales
Fax 0181-956 7100
Email membank@powermark.com

Educational Sales
Fax 0181-956 7744
Email edsales@powermark.com

Customer Service
Tel 0181-956 7700
Fax 0181-956 7477

After Sales Technical Support
Tel 0181-956 7711
Fax 0181-956 7478



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VISA

MasterCard

POWERMARK
Gold
Card



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**

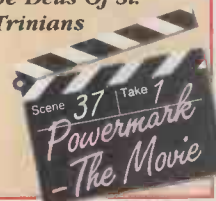
**MOVIE
MEMORIES II**

Another chance to read...

*A Hard Disk's
Night*

The Macintosh Man

*The Dells Of St.
Trinians*



PSION MODEM FEATURE



PSION DACOM MODEMS

Model	V3.2bis V.F.C.	V34	MNP2-4	MNP10	V42	V42bis	MNP5	Fax	PC Card
PSIONDP632	V.32bis Gold Card	●	●	●	●	●	●	●	POWERCUT! £157
PSIONDP634	V.34 Gold Card	●	●	●	●	●	●	●	£195
PSIONMET14	V.32bis Meteor	●	●	●	●	●	●	●	£175
PSIONMET28	V.34 Meteor	●	●	●	●	●	●	●	£225

Windows 95
compatible

All modems supplied
by Memory Bank are
BANK APPROVED

Comms experts
available for
specialist advice

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

3COM FEATURE



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	●		●	£65	£319
3C509TP		●		£65	£319
3C509C	●	●	●	£77	£335

3C529 RANGE

• MCA Etherlink III cards

	BNC	RJ45	AUI	Unit	5 Pack
3C529	●		●	£149	£689
3C529TP		●	●	£149	£689
3C529C	●	●	●	£139	£699

3C579 RANGE

• 32-bit EISA interface using Parallel Tasking Architecture

	BNC	RJ45	AUI	Unit	5 Pack
3C579	●		●	£149	£699
3C579TP		●	●	£149	£699

3C589 RANGE

• PCMCIA cards

	BNC	RJ45	AUI	Unit	5 Pack
3C589T	POWERCUT!		●	£109	£490
3C589C	POWERCUT!	●	●	£139	£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

SMC NETWORKING FEATURE



SMC ETHERCARD ELITE ULTRA

	Single	6 Pack
Elite 16 Ultra BNC	£58	£339
Elite 16 Ultra TP	£58	£339
Elite 16 Ultra Combo	£68	£386

SMC ETHERCARD ELITE 32C ULTRA

	Single	6 Pack
Elite 32C Ultra Combo	£141	£769

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

TIGER HUBS

	TP	Number of Ports			
		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

ETHEREZ ADAPTERS

	Single	5 Pack
EtherEZ Adapter BNC	POWERCUT! £59	£279
TP	POWERCUT! £59	£259
Combo	POWERCUT! £66	£299

31

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debited until despatch
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**DELIVERY
CHARGES**
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See page 31



**POWERMARK
ACADEMY**

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at **Powermark**

POWERMARK COMBO NETWORK ADAPTER FEATURE



powermark

Networking

MBNET PCMCIA

- Credit card sized PCMCIA Ethernet card
- Use of EPA Energy Star components
- Uses NE2000 drivers
- Conforms to IEEE 802.3 and fits into Type I, II and III PCMCIA slots
- BNC/UTP auto-detection
- Supports NetWare, LAN Manager, Windows for Workgroups and Packet Driver for TCP/IP
- Two LED indicators



It runs with NetWare



MBNET2000C

- 35% faster than Novell NE2000
- Fully NE2000 compatible
- Jumperless or jumper configuration
- Automatic configuration
- Auto detection for media
- Auto detection for ISA bus
- Supports 8 IRQs and 8 I/Os
- Smart boot ROM support
- 16K on-board buffer

MBNET2000C £26

MBNET2000C/P PLUG AND PLAY

- Improved performance by full-duplex capability (20Mbps) with full downward compatibility
- Green Ethernet Chipset
- Includes McAfee anti-virus
- Full duplex design doubles the performance of standard NE2000 cards
- Plug and Play, auto-setup IRQ and I/O
- Jumper or software configuration



- Auto-detection for media
- Auto-detection for ISA bus
- Supports 8 IRQs and 8 I/Os
- Diagnostic program
- Smart remote boot ROM
- Uses NE2000 drivers - needs no additional drivers

MBNET2000C/P £35

NEW! MBNETHUB/8 HUB

- 8 port hub
- RJ45

MBNETHUB/8 £69

Network experts available for specialist advice

MBNET32PCI PLUG AND PLAY

- Ideal for high-performance system application
- AUI, BNC and RJ45
- Complies to PCI local bus specification
- Supports Windows 95 Plug & Play function
- High performance Bus Master architecture with DMA Buffer Management Unit
- Low power consumption
- Comprehensive software drivers for most popular networking systems including Novell NetWare, Microsoft LAN Manager, Windows for Workgroups, Windows NT, SCO UNIX,
- Auto BNC and RJ45 detection

MBNET32PCI £65



MBNET32PCI

XIRCOM FEATURE

Xircom

CREDIT CARD TOKEN RING ADAPTER IIps

- High-performance, memory-saving SmartRing software
- 16 or 4 Mbps software selectable ring speed

PS-CT2-16CTP (TP) XIRPCM/TR £299



PS-CT2-16CTP (TP)

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

- CEM2-10BT (TP) XIRPCM/T-FM £269
- CEM2-10B2 (BNC) XIRPCM/B-FM £279
- CEM2-10BC (COMBO) XIRPCM/C-FM £299

PCMCIA ETHERNET

- BNC XIRPCM/B £125
- TP XIRPCM/T £109
- COMBO XIRPCM/C £145



POCKET ETHERNET ADAPTER III

- Universal connection for all notebook, laptop and desktop PCs
 - Enhanced Parallel Port (EPP) capable
 - Requires no internal slots
- PE3-10B2 (BNC) XIRPPE £185
- PE3-10BT (TP) XIRPPE/TR £185
- PE3-10BC (COMBO) XIRPPE £202

Technical Sales Order Lines

0181-956 7000
(100 lines)

MODEMS & NETWORKING

Another spin for Webster's Web



Dear Webster,
I have been given a 28.8bps modem as a birthday present. I can only connect to bulletin board services at 14.4bps, half the speed that the modem is capable of. Is my system to blame or have I not set the software correctly?

Bemused in Belfast

Dear Bemused,
To judge your speed, you have to take into account a few things when using BBS systems. Firstly, the modem at the other end may only support speeds up to 14.4bps, alternatively your comm port may not have a 16650 UART chip on-board. You can overcome the latter problem by simply installing a Powermark High Speed Serial Card that can give you an extra 2 Com Ports too. This can support modems with speeds of 28.8bps and more! Double-check your system, and give me an email today.
Yours, Webster

Send your communications problems to Webster, c/o Memory Bank, The Powermark Centre, The Waterfront, Elstree Road, Elstree, Herts WD6 3RP or fax him on 0181 956 7100. You can also Email Webster on: web@powermark.com. Webster makes every effort to answer your communication problems, but he cannot guarantee to reply to everyone.

Memory Bank
The Powermark Centre, The Waterfront, Elstree Road, Elstree, Hertfordshire WD6 3RP

Technical Sales
Fax 0181-956 7100
Email membank@powermark.com

Educational Sales
Fax 0181-956 7744
Email edsales@powermark.com



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NOVELL NETWORK 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

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

PERSONAL NETWORK

• Share all your printers, drives (CD ROMs etc), directories and files

PERSONAL NETWORK 5 PACK	£44 £189
-------------------------	-------------

UMAX SCANNERS FEATURE

UMAX FLATBED SCANNERS

• All Umax flatbed scanners come with 12 months on-site warranty

VISTA T630 UMAX/T630 £298

- 300 x 600 dpi up to 4800 dpi interpolated
- A4 scan area
- 16.7 million colours
- Adobe Photoshop LE V.3

Our best seller

VISTA S8 UMAX/S8 £539

- 400 x 800dpi up to 6400 dpi interpolated
- A4 scan area
- 16.7 million colours
- Adobe Photoshop LE V.3

UC1260 UMAX/U1260 £625

- 600 x 1200 dpi up to 2400 dpi interpolated
- A4 scan area
- 16.7 million colours

With LE Adobe Photoshop V.3

POWERLOOK II

UMAX/POWERLOOKII £2299

- 600 x 1200 dpi up to 9600 dpi interpolated
- 36-bit
- Enhanced calibration

• Full Adobe Photoshop V.3

DOCUMENT FEEDER UMAX/SRDF £399

OMNIPAGE DIRECT OMNIPAGE/DIR £39

TRANSPARENCY ADAPTER UMAXTRANS £399

UMAX



PAGEOFFICE

Page-Office is the way to bridge the gap between piles of paper accumulating on your desk and PC. Its impeccable design lets you work efficiently and easily.

PageOffice performs important functions including: document filing OCR translation, image editing, electronic mail, faxing, form-filing and copying.



- 300 dpi optical resolution
- 8-bit 256 shades of grey
- 5-10 sheet built-in document feeder
- 16-bit ISA SCSI interface included
- Fully TWAIN compatible

NEW! Now with PRESTO OCR software

PAGEOFFICE UMAX/PAGE £249



HP SCANNERS FEATURE

NEW FROM HP HP SCANJET 4Si

- Mono 400 dpi enhanced to 1200 dpi
- Up to 12 pages per minute



• Includes award winning *Visioneer Paperport V3.0* and *Autolaunch* software

HP SCANJET 4Si HPSJ4S £1639

AUTOMATIC DOCUMENT FEEDER HPSJ4S/ADP £139

3 YEAR ON-SITE MAINTENANCE £85

HP SCANJET 4S HPSJ4S £233

• A4 mono



Authorised Reseller Personal Computer Products



HP SCANJET 4c

- 600 dpi enhanced to 2400 dpi
- 30-bit colour gives you 1 billion colours
- Up to 18 pages per minute



NEW! Caere Omnipage Limited Edition and Visioneer Paperport V3.0 software included

HP SCANJET 4C HPSJ4C £625

AUTOMATIC DOCUMENT FEEDER HPSJ4C/ADF £315

TRANSPARENCY UNIT HPSJ4C/TRANS £449

Scanner experts available for specialist advice

HP SupportPack



- Onsite warranty by HP engineers
- Recommended for all HP Laserjets & Deskjets

PRINTER ACCESSORIES

ORIGINAL TONER CARTRIDGES

HEWLETT-PACKARD

LaserJet II/IIID/III/IIID	£47
LaserJet II HP/III+/IIIIP	£46
LaserJet III/III+/III+/4MX	£77
LaserJet 4/4+/4M/4M+	£67
LaserJet 4L/4ML/4P/4MP	£44
LaserJet 4V/4MV	£115
LaserJet 5 Series	£Call

DESKJET CARTRIDGES

HP DESKJET BLACK CARTRIDGE	£18
HP DESKJET COLOUR CARTRIDGE	£21

PRINTER CABLES

	1.5m	3m
PARALLEL		
25M - 25M	£4	£9
25M - 36M	£6	£8

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DELIVERY CHARGES
See page 9

EARLY BIRD Order Bonus
See page 31



Everyone at Memory Bank passes through the Powermark Academy

HP PRINTER FEATURE



Authorised Reseller
Personal Computer
Products

HP OFFICEJET LX

The complete office solution

- High quality printer
- Integrated fax
- Photocopier
- Scanner

HP OFFICEJET LX HPOFFICELX £489

HP DESKJET 1200C

- 600 x 300 dpi
- Up to 6 pages per minute in black

HP DESKJET 1200C HPDJ1200C £651

HP DESKJET 1200C/PS HPDJ1200/PC £1029

HP DESKJET 600

- 600 x 600 dpi, REt
- Colour option
- High resolution in black

HP DJ600 HPDJ600 £191



HP DESKJET 660C

HP LASERJET 5P

- 6 pages per minute
- 600 dpi, REt, microfine toner
- 2MB RAM, up to 50MB

HP LASERJET 5P HPLJ5P/P £597

HP LASERJET 5MP HPLJ5MP/P £729

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 HPLSR/COI £4338

250 SHEET REAR FEED UNIT HP250SHEET £315



HP LASERJET 5P



HP COLOR LASERJET



HP OFFICEJET LX

HP DESKJET 340

- 600 x 600 dpi in black
- Up to 3 pages per minute in black
- 13 scalable Windows fonts

HP DESKJET 340 WITH CUT SHEET FEEDER HPDJ340 £178

COLOUR KIT UPGRADE HPDJ340COLUG £32

3 YEAR ON-SITE WARRANTY HPWARR/DJ340 £45

HP DESKJET 660C

- 600 x 600 dpi in black
- 14 TrueType fonts

HP DESKJET 660C HPDJ660C £252

HP DESKJET 1600C

- 600 x 600 dpi in black
- 4MB RAM

HP DESKJET 1600C HPDJ1600C £839

HP LASERJET 4V

- A3 paper handling
- 8 pages per minute in A3, 12 in A4
- Delivery: £27 on this printer

HP LASERJET 4V HPLJ4V £1409

HP LASERJET 4MV HPLJ4MV £2039

HP LASERJET 4V 500 SHEET TRAY SYSTEM HPLJ4V/SHEET £279

3 YEAR ON-SITE WARRANTY HPWARR/LJ4V £205

Matched Memory Kits for HP Printers on page 7



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 HPDJ850C £343

Printer experts available for specialist advice

HP LASERJET 4 PLUS

- 12 pages per minute
- Up to 600 dpi
- 2MB RAM

HP LASERJET 4 PLUS HPLJ4PLUS £1018

HP LASERJET 4M PLUS HPLJ4M/P £1335

HP DUPLEX UNIT HPLJ4PLUS/DUP £479

3 YEAR ON-SITE WARRANTY HPWARR/LJ4V £165

HP LASERJET 4Si

- 16 pages per minute
- 600 dpi
- 1 year on-site warranty
- Delivery: £27 on this printer

HP LASERJET 4Si HPLJ4Si £2099

HP LASERJET 4SiMX HPLJ4SiMX £3041

3 YEAR ON-SITE WARRANTY HPWARR/LJ4Si £479

HP LASERJET 5Si

- 24 pages per minute
- 600 dpi
- 4MB RAM
- 1 year on site warranty

HP LASERJET 5Si HPLJ5Si £2115

HP LASERJET 5SiM HPLJ5SiM £3039

• 12MB RAM

HP SupportPack

- Onsite warranty by HP engineers
- Recommended for all HP Laserjets & Deskjets



Technical Sales Order Lines

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(100 lines)

SCANNERS & PRINTERS

Another Case For The Backroom Boys To Investigate



Dear Backroom Boys, I run a small but select, dating agency in London. The business is steadily growing with ten computers in the office connected to our server. We have been using a Thin Ethernet system around the office connected to the PC's Combo network cards, but this is beginning to cause problems as we move and add PCs to the system. Is another, easier system available that can meet the needs of a growing company?

Gertie in Guernsey

Dear Gertie, The Backroom Boys have networked with one another and come up with the ideal solution. Powermark 8 Port Network Hubs are the easiest, practical option. From your file server you link into the hubs. Now every time you move a PC or add to the system you simply connect a twisted pair cable from the computer into the hub. This will enable you to work without disruption. Call the Technical Sales Department direct for more information.

The Backroom Boys

Send your investigations to The Backroom Boys, c/o Memory Bank, The Powermark Centre, The Waterfront, Elstree Road, Elstree, Herts WD6 3RP or fax them on 0181 956 7100. You can also Email The Backroom Boys on: hbboys@powermark.com. The Backroom Boys makes every effort to investigate your problems, but they cannot guarantee to reply to everyone.

Memory Bank

The Powermark Centre, The Waterfront, Elstree Road, Elstree, Hertfordshire WD6 3RP

Technical Sales Fax 0181-956 7100

Email membank@powermark.com

Educational Sales Fax 0181-956 7744

Email edsales@powermark.com



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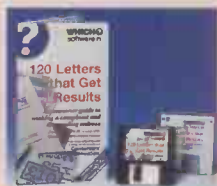
**Educational Sales
Order Lines**
**0181-
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WHICH? SOFTWARE FEATURE

WHICH? software

Ever been frustrated by a garage over-charging? A shop selling faulty goods? A misleading holiday brochure? Inexplicable debits from your bank account? Noisy neighbours?



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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 KYOF5400 **POWERCUT!** £358
NETWORK-SPECIFIC ETHERNET
INTERFACE KYOF5400/N £169
TONER KIT KYOF5400/TONER £16
3 YEAR ECOSHIELD
ON-SITE WARRANTY KYOWARR/FS400 £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 KYOF51550 £899
NETWORK-SPECIFIC ETHERNET
INTERFACE KYOF51550/N £279
TONER KIT KYOF51550/TONER £51
3 YEAR ECOSHIELD
ON-SITE WARRANTY KYOWARR/FS1550 £199
Also available -
KYOCERA FS1600 KYOF51600 £1089
KYOCERA FS3600 KYOF53600DX £1789



KYOCERA FS-1550



KYOCERA FS-1550 WITH ACCESSORIES

ECOSYS
**Printing costs.
Stop paying the price.**

Dr. SOLOMON'S FEATURE

DR SOLOMON'S



Dr. SOLOMON'S ANTI-VIRUS TOOLKIT

Combat viruses in DOS, OS/2, Windows and Netware
The best answer to the serious problem posed by viruses. Each toolkit is made up of four programs geared to locate, identify and destroy existing viruses and then protect your system.

FINDVIRUS - Detects and identifies viruses in files, partition code and boot sectors using an extensive database of virus recognition information.

GENERIC DECRYPTION ENGINE - An amazing program that can actually detect those viruses that mutate.

VIRUSGUARD - This is the memory resident utility that is installed every time you restart your computer. It checks every

program for viruses before it is opened or copied.
VIVERIFY - ViVerify is a unique program that finds new and undiscovered viruses by monitoring executable code changes.

DRSOLAN/D ANTI-VIRUS TOOLKIT DOS £59
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PC Protection for IT Professionals

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See page 9

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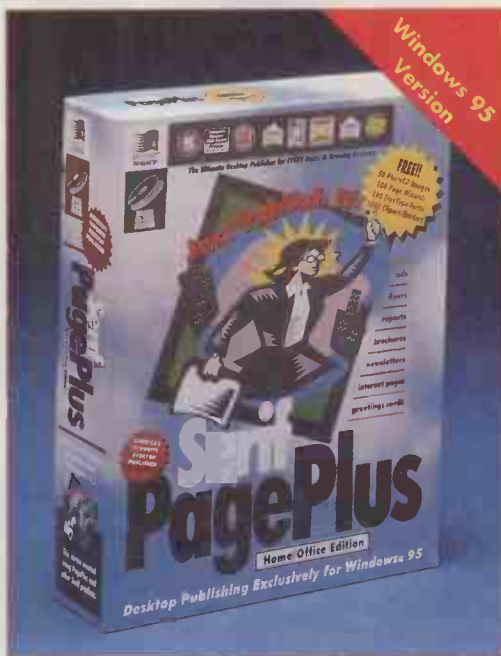
SERIF SOFTWARE FEATURE



quickly and effortlessly business presentations in the most stylish and professional way possible. Design newsletters, catalogues, reports, flyers, advertisements, and brochures with the feature rich PagePlus for Windows 95.

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Serif PagePlus Home/Office Edition CD SERIPL0 £30



Software experts available for specialist advice

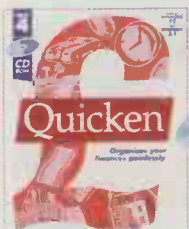
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Serif PagePlus Home/Office Edition for Windows 95 is the brand-new version of best selling PagePlus which sold over 1 million copies.

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Quicken™
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- Corel PRESENTS 6

These offer you access to

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- Over 750 3D models

COREL DRAW 6 CORDRAW £279



COREL FLOW 3

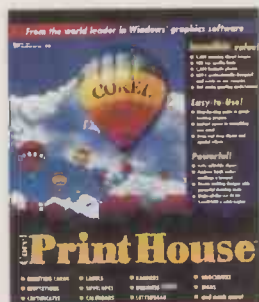
Corel Flow allows you to produce advanced, graphical, intuitive flow charts.

COREL FLOW 3 CORELFWPS £92

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Corel Print House with 32-bit processing is now the fastest and easiest way for everyone to create great looking greeting cards, stationery, banners and more! Features include

- 5,000 stunning clipart images
- 1,000 catchy phrases



• 1,000 fantastic photos
• Over 900 easy to use samples
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MOLPS**

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Upgrade now
to Office 95 Standard
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MICROSOFT OFFICE 95 FEATURE

Microsoft

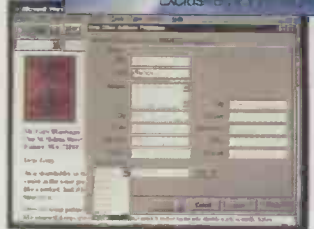
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Save time with Microsoft® Word for Windows® 95, with features like the integrated **Address Book** and grammatical **Find and Replace**.

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Word for Win 95	£229
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In Microsoft® Office Standard for Windows® 95, you get: Excel, Word, PowerPoint® and the new Microsoft Schedule+.

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Microsoft Office Professional offers next-generation integration. All the features of Microsoft Office Standard plus Access, a powerful relational database. Build complex intuitive databases or use the built in Tips and Wizards for storing simple data.

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- Take meeting notes and assign action items on the spot with the Meeting Minder
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PowerPoint for Windows 95	
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KEY			
CCP	Compliance Checking Product	MS	Microsoft Product
CD	CD ROM	SL	Site Licence
CUP	Competitive Upgrade	UP	Upgrade
DOS	DOS Version	Vxx	Version
		WIN	Windows Version

Credit cards are not debited until despatch. VAT at 17.5% will be added to all prices.

DELIVERY CHARGES
See page 9

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BANK

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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

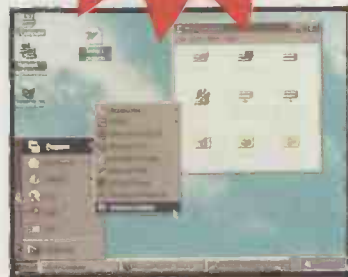
- Save time with an easier-to-use interface; long filenames; and one-click access to all of your programmes and documents with the Start button
- Plug and Play technology automatically connotes compatible disk drives, sound cards and more
- 32-bit, pre-emptive multitasking lets you run multiple programmes 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®
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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
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MICROSOFT® PLUS! FOR WINDOWS® 95

To give Windows® 95 even more space and style, add new Microsoft® Plus!

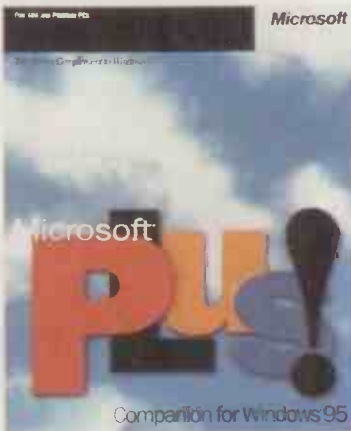
Introducing Microsoft® Plus! - the way to fully exploit the power of 486 and Pentium PCs.

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 compression whether you have a 486 or Pentium computer. As an added bonus, 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
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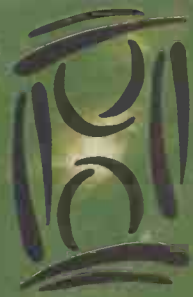
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Computer Systems Ltd.

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Issue 96/1
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- ◆ 486DX2-66 or 75MHz Pentium® processor
- ◆ 8Mb RAM (4Mb on DX2)
- ◆ 540Mb hard disk
- ◆ 14" SVGA colour screen
- ◆ £1000 worth of software including Lotus SmartSuite and 100 Hours FREE Internet access with Best Buy models



486DX2-66 MT

486DX2-66 with 540Mb hard disk and 4Mb RAM

£499 + VAT

Best Buy Multimedia Model

With software suite, 850Mb hard disk and 0.28 dp 14" screen £627

75MHz Pentium® MT

75MHz Pentium® with 540Mb hard disk and 8Mb RAM

£699 + VAT

Best Buy Multimedia Model

With 850Mb hard disk, 0.28dp screen and software suite £858



P75 Multimedia PowerStation



£999 + VAT

See inside for full details

Multimedia Time Machine '95



£39

Per Month
Interest Free Credit

See inside for full details

Ultimate Time Machine



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Interest Free Credit

LASER PRINTER PACKS FROM

£19

Per month



0% INTEREST FREE CREDIT

Interest Free Credit is available subject to status only on certain bundles. 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

APR

COLOSSUS 133MHz PENTIUM®

£1199 + VAT

BGIA

Your Guide To Model Selection

Time offer a wide selection of systems to give customers more choice. Systems are differentiated by two main criteria - Payment Option and whether or not they are 'Pre-configured' or are 'Tailor Made' to your individual specification.

PAYMENT OPTION

Many systems shown are sold by immediate payment (credit card, cheque, bank transfer, draft, switch or cash). These "cash" systems can also be transferred to a credit option with a low APR of 19.8% over a period of usually 2 years. Most systems are however sold on Interest Free Credit. These systems usually have a higher specification with more software or printer included and are available with Interest Free Credit over 2 years, two and a half years or 6 months.

PRE-CONFIGURED OR TAILOR MADE

Most of the popular configurations or bundles are pre-configured and 'Ready to Ship' normally within 7 days. These usually provide the best value and are our recommended configurations. However, we do appreciate that some customers wish to have a particular specification and we can build systems tailored to their needs. These tailor-made systems usually add some extra days to the delivery time and are not available on Interest Free Credit.

MODEL SELECTION

Once you have selected the payment method, you can select the appropriate model by considering your preferences for the following:

Processor

Models are available with the following processors (with increasing power) 486DX2-66, 486DX4-100, C5x86-100, C6x86-100, Intel® 75, 100, 120, 133, 166Mhz Pentium® processors. At present the best value is offered by 75MHz Pentium® based multimedia systems.

RAM

We recommend a minimum of 8Mb RAM. Many of our models now include 16Mb RAM as standard. A 16Mb 100MHz Pentium® system will cost less and outperform an 8Mb P133 system. Speed of RAM makes very little difference.

Hard Disk

850Mb, 1Gb or 1.6Gb are the popular sizes. All disks used are enhanced IDE with onboard cache.

Multimedia Hardware

Over 90% of systems are purchased with multimedia which is now becoming essential for most applications. As many programs run from the hard disk, the speed of the CD-ROM drive is less critical. Double speed CD-ROM drives are the most popular because of their low cost and are almost as good as the more expensive but faster quad or six speed drives.

Modem

A modem is recommended. It can be used as a fax machine, used to transfer programs and data, link to on-line services and to the Internet. 2496 is adequate for fax but slow for Internet use. 14.4 speed is the most popular with the fastest being at 28.8 speed.

Brand or Make

Despite all the attention to specification, latest technology and expandability, the brand or make is still important. We would recommend the Compaq Presario, IBM Aptiva and Colossus as our top brand multimedia models. IBM are the world's largest computer company and the Compaq Presario is the world's best selling PC. Colossus Computer Corporation are famous for producing the highest specification products and Omega, Toshiba, Apple and Texas Instruments provide incredible quality and value. With printers Hewlett Packard, Epson and NEC are our top selling brands.

Case Style

An expandable case with plenty of drive bays (at least 5) is recommended. Most popular models are desktop or midi-tower style.

Screen

We would recommend a 14" NI .28dp screen as a minimum although a .39dp (slightly dotty) screen may be available at lower cost. Most of the high end systems come with a 15" .28dp NI screen.

Software Bundle

Models are available bundled with different applications. Lotus software suite is the most popular and provides everything you are ever likely to need. Microsoft® Office or Novell PerfectOffice is available as an optional extra with all systems. Various CD multimedia titles are included with many systems. Most systems come with Windows® 95 which is the most popular operating system. We also offer attractively priced DOS & OS/2 systems.



Immediate Payment

Payment can be made by credit card, cheque, bank transfer, draft, switch or cash. These "cash" systems can also be transferred to a credit option with a low APR of 19.8% over a period of usually 2 years.

PRE-CONFIGURED SYSTEMS

Internal options are not available for these systems which are normally 'Ready to Ship'.

Page 4/5 Best-Buy Omega OS/2 Multimedia Tower A, B, & C -OS/2 based multimedia mini-tower systems with plenty of software and very low prices.

Page 6/7 Omega Win 95 Multimedia Powerstations B, C & D -Windows® 95 based multimedia desktop systems.

Page 10/11 Compaq, IBM, Colossus Best Buys
Selected hot selling models from these leading brands arranged in different price brackets to make your selection easier.

Page 12/13 Multimedia Powerstations
The best selling high performance Windows® 95 based multimedia systems. Include models from Omega and Colossus.

TAILOR MADE SYSTEMS

Pages 4 to 7 standard models (excluding best buys) are listed without multimedia and basic configurations for you to select the most appropriate options. In practice, it may be better value to select a ready to ship multimedia system near to your desired configuration.

Page 4 Omega 486 mini-tower Range.

Page 5 Omega 586 (Pentium®) mini-tower range.

Page 6 Omega 486 desktop range.

Page 7 Omega 586 (Pentium®) desktop range.



Interest Free Credit

These high specification systems are available with Interest Free Credit over 2 years, 2½ years or 6 months. Please note that Interest Free Credit is available subject to status.

PRE-CONFIGURED SYSTEMS

All Interest Free Credit systems are 'pre-configured' and normally 'ready to ship'.

Page 2 Buy Now Pay Later: Multimedia Power PC
Popular Windows® 95 based multimedia models from Omega and Colossus available on a 'buy now pay 6 months later' offer.

Page 8/9 Multimedia Time Machines
Our most popular range. These systems offer a high specification with additional software, larger screens and are available with a low deposit and payments spread over 2 years.

Page 12/13 Multimedia PC/Printer Solutions
These systems offer very high specifications and come complete with the largest collection of software and a choice of printer included in the price. These are very popular as you pay a small deposit and get a fully functional PC set-up including printer with nothing more to pay for 6 months. After 6 months you can spread your payments over 2 more years on Interest Free Credit.

Page 12/13 Multimedia Business PC
The Multimedia Business PC is basically the above PC/Printer solutions shown on these pages but without the printer (with some price saving). These too are available on deferred 2½ years Interest Free Credit terms.

Page 22 Ultimate Time Machine
The most powerful system you can buy at £99 per month.

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Buy Now....Pay Later

System Specification

- ◆ 486 Models: 486DX2-66 or 486DX4-100 processors
- ◆ Pentium® Models: 75MHz Pentium® or 100MHz Pentium® processor with PCI local bus and 64-bit PCI graphics
- ◆ 8Mb or 16Mb RAM expandable to 64/128Mb
- ◆ 540Mb, 850Mb or 1.08Gb fast enhanced IDE hard disks with 256K cache
- ◆ 1.44Mb floppy drive.
- ◆ 14" or 15" SVGA low radiation colour screen
- ◆ Omega desktop case with 7 drive bays and 7 slots (models B, C & D). Model A features Omega mini-tower with 5 drive bays. Model E features Colossus desktop case with 7 drive bays.
- ◆ 102 keyboard and deluxe 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 stereo sound card
- ◆ Twin stereo speaker system
- ◆ PC joystick

Fax & Internet Packs

- Model D2 & E2 only
- ◆ 14.4 BABT approved fax & data modem
- ◆ Easy to use fax software



- ◆ Communications software
- ◆ Introductory subscription to CompuServe with Internet mailbox.

Software**

Included with all systems. See software section for details

- ◆ Lotus 1-2-3 v5 spreadsheet
 - ◆ 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
 - ◆ Pacioli 2000 Business Accounts
- Multimedia Software**
- ◆ Bodyworks Multimedia CD
 - ◆ Infopedia Multimedia Encyclopaedia CD
 - ◆ Wintutor 95 Multimedia CD
 - ◆ Time Almanac CD
 - ◆ EZ Language Multimedia CD - Learn French, German, Spanish and more
 - ◆ Play & Learn Educational CD
 - ◆ UFO for Windows CD
 - ◆ Dinosaur Museum CD
 - ◆ Shareware CD including Doom, Raptor, Pinball and many other games.

6 Months Interest Free Credit

Pre-Configured Ready To Ship Systems



The new Multimedia Power PC 95 systems from Time feature a range of popular high specification Best Buy configurations from Omega and Colossus which represent the best value in the UK today. 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, latest chipsets, fast controllers and plenty of expansion potential.

All are fully multimedia ready with fitted fast CD-ROM drives, 16-bit sound cards, PC joystick and an excellent range of educational and leisure CD

titles including full feature multimedia encyclopaedia, WinTutor 95 and EZ Language.

Also included is a range of excellent business software from Lotus and others which will handle all your requirements for word processing, filing, number crunching, organising, graphics and accounts. At these excellent prices with our INTEREST FREE CREDIT Buy Now, Pay Six Months Later offer, these systems are unbeatable.

APPROVED for credit purchase of communication systems specified in the conditions for use subject to the conditions set out in them

*APR

0%

INTEREST FREE CREDIT

Example: Multimedia Power PC A/95 - Cash purchase £899 +VAT = £1078.65 inc. delivery & VAT. Credit Purchase - £107.87 deposit, then pay nothing for 6 months. After six months pay the rest. Total price £899 +VAT = £1078.65 inc. delivery & VAT. APR 0%. 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.

Multimedia Power PC 95/A 486DX2-66	Multimedia Power PC 95/B 486DX4-100	Multimedia Power PC 95/C 75MHz Pentium®	Multimedia Power PC 95/D 75MHz Pentium®	Multimedia Power PC 95/D2 100MHz Pentium®	Multimedia Power PC 95/E2 100MHz Pentium®
486DX2-66 Mini tower with 8Mb RAM, 850Mb hard disk, double speed CD-ROM and 14" screen	486DX4-100 desktop with 8Mb RAM, 850Mb hard disk, double speed CD-ROM local bus graphics and 14" sharp 0.28 NI screen	75MHz Pentium® desktop with 8Mb RAM, 850Mb hard disk, double speed CD-ROM, 64-bit PCI graphics and 14" sharp 0.28 NI screen	75MHz Pentium® desktop with 8Mb RAM, 850Mb hard disk, quad speed CD-ROM, 14.4 modem, 64-bit PCI graphics and 14" sharp 0.28 NI screen	100MHz Pentium® Colossus mid-tower with 8Mb RAM, 1.08Gb hard disk, quad speed CD-ROM, 14.4 modem, 64-bit PCI graphics and 14" sharp .28 NI screen	100MHz Pentium® Colossus desktop with 16Mb RAM, 1.08Gb hard disk, 64-bit PCI graphics with 2Mb video RAM, Intel Triton chipset with 265K cache, six speed CD-ROM, 14.4 modem and 15" screen
£899	£999	£1099	£1199	£1399	£1799
+VAT	+VAT	+VAT	+VAT	+VAT	+VAT
Pay just £107.87 deposit	Pay just £119.62 deposit 14" to 15" upgrade.....+£99	Pay just £131.37 deposit 14" to 15" upgrade.....+£99	Pay just £143.12 deposit 14" to 15" upgrade.....+£99	Pay just £154.87 deposit 14" to 15" upgrade.....+£99	Pay just £213.62 deposit 15" to 17" upgrade.....+£199

CALL NOW!

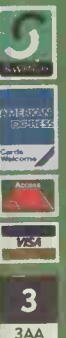
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Tel: 01282 777 111 Fax: 01282 77 07 01. All prices exclude delivery (£19) and VAT (17.5%). *Finance prices include delivery and VAT. **All software applications are pre-loaded or on CD. Pack shots shown for illustration purposes only. Printed manuals and back-up media are available as options. £8.0E.



3
3AA

Expandable Tower Systems

at the UK's Best Prices

Our incredible buying power coupled with our direct relationships with leading manufacturers allows us to offer you these incredible mini-tower systems at the best prices in the UK.

These expandable mini-tower systems from Omega are also available with our massive collection of the best business, educational and leisure software (including Lotus SmartSuite) - applications that would cost over £1000 if

bought individually! - Available FREE with our Best Buy models, and at a small extra charge with all other systems

Models shown here are Tailor made systems. Multimedia and other options can be added to the basic configurations to your individual specifications. Best buy multimedia models shown in the boxes at the bottom are pre-configured and 'ready to ship'.

ALL OFFERS END 11th FEBRUARY



486DX2-66 540 MT

- ◆ 486DX2-66 processor
- ◆ 4Mb or 8Mb RAM expandable to 64Mb
- ◆ Pentium® technology upgradeable
- ◆ 540Mb IDE hard disk
- ◆ 3.5" 1.44Mb floppy drive
- ◆ 14" SVGA colour screen with 16-bit SVGA card
- ◆ IDE hard and floppy controller
- ◆ Parallel, 2 serial and keyboard ports
- ◆ Expandable mini-tower case
- ◆ 5 Drive bays and 7 expansion slots (2VESA)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double speed CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Software bundle including Lotus SmartSuite worth over £1000 (see below) and 100 Hours Internet access worth over £300 (modem required) available at a small extra cost - FREE with our Best Buy models



486DX4-100 850 MT

- ◆ 486DX4-100 processor
- ◆ 4Mb or 8Mb RAM expandable to 64Mb
- ◆ Pentium® technology upgradeable
- ◆ 850Mb IDE hard disk
- ◆ 3.5" 1.44Mb floppy drive
- ◆ 14" SVGA colour screen with 16-bit SVGA card
- ◆ IDE hard and floppy controller
- ◆ Parallel, 2 serial and keyboard ports
- ◆ Expandable mini-tower case
- ◆ 5 Drive bays and 7 expansion slots (2VESA)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Software bundle including Lotus SmartSuite worth over £1000 (see below) and 100 Hours FREE Internet access worth over £300 (modem required) available at a small extra cost



486DX4-100 850 8Mb MT

- ◆ 486DX4-100 processor
- ◆ Faster than most P60 systems
- ◆ 8Mb RAM expandable to 64Mb
- ◆ Pentium® technology upgradeable
- ◆ 850Mb IDE hard disk with 256K cache
- ◆ 3.5" 1.44Mb floppy drive
- ◆ 14" SVGA colour screen with 16-bit SVGA card
- ◆ IDE hard and floppy controller
- ◆ Parallel, 2 serial and keyboard ports
- ◆ Expandable mini-tower case
- ◆ 5 Drive bays and 7 expansion slots (2VESA)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Software bundle including Lotus SmartSuite worth over £1000 (see below) and 100 Hours FREE Internet access worth over £300 (modem required) available at a small extra cost - FREE with our Best Buy model

£499

+VAT

486 DX2-66, 850Mb model £529
Multimedia models +£99
14" crisp sharp 0.28dp NI screen +£40

Best Buy - Multimedia Tower A

486DX2-66, 540Mb 4Mb system with double speed CD-ROM, 16-bit sound card, stereo speakers and Lotus SmartSuite software bundle shown below
£598
with 850Mb disk and 14" 0.28dp screen . £627

£549

+VAT

Multimedia models +£99
14" crisp sharp 0.28dp NI screen +£40

£649

+VAT

Multimedia models +£99
14" crisp sharp 0.28dp NI screen +£40

Best Buy - Multimedia Tower B

486DX4-100, 850Mb 8Mb system with double speed CD-ROM, 16-bit soundcard, stereo speakers and Lotus SmartSuite software bundle shown below
£749
with 14" 0.28dp screen £778

Please Note: Mouse is not included with this range as a choice of different mice is available from as low as £9 + VAT

Software Applications**

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, Pacioli 2000 Business Accounts, Fun School, the best shareware games and other programmes. It is included FREE with our Best Buy systems and is available for a small extra charge with all other systems. Best buy models also include additional Fun School titles and five Infoware Encyclopaedias.



Lotus 1-2-3 spread sheet is the worlds best spread sheet package



Lotus Ami Pro word processor with advanced features



Lotus Freelance Graphics presentation and drawing package



Lotus CC-Mail single user electronic mail licence



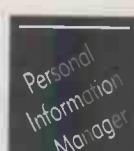
IBM Works is a superb easy to use collection of 5 great programs inc. WP, spread sheet, charting, database & reporting



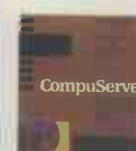
FaxWorks allows you to send and receive faxes easily (modem required)



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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£33*
Per Month

100 Hours FREE Internet access worth over £300 with Best Buy Systems

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75MHz Pentium® 540 MT

- ◆ Intel® 75MHz Pentium® processor
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 540Mb enhanced IDE (fast ATA) hard disk
- ◆ 3.5" 1.44Mb floppy drive
- ◆ PCI bus with 4 PCI slots
- ◆ Integrated PCI bus graphics with 1Mb
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 fast serial and keyboard ports
- ◆ Expandable desktop case
- ◆ 5 Drive bays and 7 expansion slots (4 PCI)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double speed CD-ROM drive, 16-bit sound card and twin stereo speakers.
- ◆ Software bundle including Lotus SmartSuite worth over £1000 (see below) and 100 Hours FREE Internet access worth over £300 (modem required) available at a small extra cost



75MHz Pentium® 850 MT

- ◆ Intel® 90MHz Pentium® processor
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 850Mb or 1.08Gb enhanced IDE (fast ATA) hard disk with 256K hard disk cache
- ◆ 3.5" 1.44Mb floppy drive
- ◆ PCI bus with 4 PCI slots
- ◆ PCI bus graphics with 1Mb
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 fast serial and keyboard ports
- ◆ Expandable desktop case
- ◆ 5 Drive bays and 7 expansion slots (4 PCI)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double speed CD-ROM drive, 16-bit sound card and twin stereo speakers.
- ◆ Software bundle including Lotus SmartSuite worth over £1000 (see below) and 100 Hours FREE Internet access worth over £300 (modem required) available at a small extra cost - FREE with our BestBuy models



100MHz Pentium® 850 MT

- ◆ Intel® 100MHz Pentium® processor
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 850Mb or 1.08Gb enhanced IDE (fast ATA) hard disk with 256K hard disk cache
- ◆ 3.5" 1.44Mb floppy drive
- ◆ PCI bus with 4 PCI slots
- ◆ PCI bus graphics with 1Mb video RAM
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 fast serial and keyboard ports
- ◆ Expandable desktop case
- ◆ 5 Drive bays and 7 expansion slots (4 PCI)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers.
- ◆ Software bundle including Lotus SmartSuite worth over £1000 (see below) and 100 Hours FREE Internet access worth over £300 (modem required) available at a small cost

£699 +VAT

- 16Mb RAM models £Call
- Multimedia models +£99
- 14" 0.28dp NI screen +£40
- 15" 0.28 dp NI screen +£110
- Cyrix 586-100 model £Call

£729 +VAT

- 1.08Gb models £779
- 16Mb RAM models £Call
- Multimedia models +£99

£849 +VAT

- 1.08Gb models £899
- 16Mb RAM models £Call
- Multimedia models +£99

Best Buy - Multimedia Tower C

75MHz Pentium® processor, 850Mb 8Mb system with double speed CD-ROM, 16-bit sound card, stereo speakers and Lotus SmartSuite software bundle shown below with 14" 0.28dp screen **£829** £858

Best Buy - Multimedia Desktop D

New desktop model with 75MHz Pentium® processor, 850Mb, 8Mb, quad speed CD-ROM, 16-bit sound card, stereo speakers and Lotus SmartSuite. Software bundle shown below, includes 14" .28dp screen **£899**

Finance from under

£33* Per Month See example

Finance Example Multimedia Tower A: Cash Purchase: £598 +VAT =£724.98 inc. delivery & VAT. Credit Purchase: 10% (£72.50) deposit and 24 equal monthly payments of £32.63. Total Price £855.62 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.

***APR 19.8%**



Pacioli 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, 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



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When it comes to providing the latest PC technology and specification at down to earth prices, no-one gives you better value than Time. As the UK's leading direct PC supplier, we have the resources and buying power to offer you truly incredible deals on top quality high specification 486 and Intel® Pentium® processor based systems.

These great new systems from Omega feature ergonomic designs and provide excellent expansion potential with a total of seven drive bays. Simply tailor the models shown to your individual requirements.

Our pre-configured Best Buy multimedia powerstation models come complete with a superb Windows 95 software suite that includes five top Lotus applications, Quicken personal finance pack and other programs.

These systems are incredible value for money and with our popular finance option are affordable by virtually everyone from an amazing £30 per month*!



486DX2-66 850 DT

- ◆ 486DX2-66 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
- ◆ 14" SVGA colour screen
- ◆ IDE hard and floppy controller
- ◆ Parallel, 2 serial and keyboard ports
- ◆ Expandable desktop case
- ◆ 7 drive bays and 7 expansion slots (2 VESA)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double (or quad speed option) CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Windows® 95 software bundle including Lotus software suite available at extra cost with 8Mb models only

£549 +VAT

Multimedia models +£99
Crisp sharp 14" .28dp NI screen +£40



486DX4-100 850 DT

- ◆ 486DX4-100 processor
- ◆ Faster than most P60 systems
- ◆ 4Mb RAM expandable to 64Mb
- ◆ Pentium® technology upgradeable
- ◆ 850Mb enhanced IDE hard disk with 256K cache
- ◆ 3.5" 1.44Mb floppy drive
- ◆ 1Mb local bus graphics with Windows® accelerator
- ◆ 14" SVGA colour screen (15" optional)
- ◆ IDE hard and floppy controller
- ◆ Parallel, 2 serial and keyboard ports
- ◆ Expandable desktop case
- ◆ 7 drive bays and 7 expansion slots (2 VESA)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double (or quad speed) CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Windows® 95 software bundle including Lotus software suite available at extra cost with 8Mb models only

£569 +VAT

Multimedia models +£99
Crisp sharp 14" .28dp NI screen +£40



486DX4-100 850 8 DT

- ◆ 486DX4-100 processor
- ◆ Faster than most P60 systems
- ◆ 8Mb RAM expandable to 64Mb
- ◆ Pentium® technology upgradeable
- ◆ 540Mb or 850Mb IDE hard disk with 256K cache
- ◆ 3.5" 1.44Mb floppy drive
- ◆ 1Mb local bus graphics with Windows® accelerator
- ◆ 14" SVGA colour screen (15" optional)
- ◆ IDE hard and floppy controller
- ◆ Parallel, 2 serial and keyboard ports
- ◆ Expandable desktop case
- ◆ 4 drive bays and 7 expansion slots (2 VESA)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double (or quad speed) CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Windows® 95 software bundle including Lotus software suite available at extra cost

£669 +VAT

Multimedia models +£99
Crisp sharp 14" .28dp NI screen +£40

Best Buy - Multimedia Powerstation 95/B

486DX4-100, 850Mb, 8Mb model with double speed CD-ROM, 16-bit sound card, stereo speakers, 14" 20dp NI screen and Windows® 95 software bundle including Lotus software suite and 8 CD titles - mouse and joystick included

£899 +VAT

Please Note: Mouse is not included with this range as a choice of different mice is available from as low as £9 + VAT

Software Applications

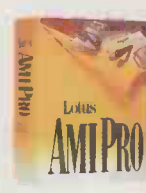
The following Windows® 95 based software suite is included with our best buy multimedia powerstation models and is also available as an option with all other 8Mb systems. Best Buy powerstation models also come with 8 CD titles.



Microsoft Windows 95 is the latest and best 32-bit operating system



Lotus 1-2-3 for Windows is the world's most popular spread sheet



Lotus Ami Pro word processing package for professional documents and reports



Lotus Approach v3 database filing system managers your data with ease

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Omega



75MHz Pentium®

- ◆ Intel® 75MHz Pentium® processor
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 850Mb enhanced IDE (fast ATA) hard disk
- ◆ 3.5" 1.44Mb floppy drive
- ◆ Integrated 64-bit PCI bus graphics with 1Mb
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 fast serial and keyboard ports
- ◆ Expandable desktop case
- ◆ 7 drive bays and 7 expansion slots (4 PCI)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Windows® 95 software bundle including Lotus software suite available at extra cost



100MHz Pentium®

- ◆ Intel® 100MHz Pentium® processor
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 850Mb enhanced IDE (fast ATA) hard disk
- ◆ 3.5" 1.44Mb floppy drive
- ◆ Integrated 64-bit PCI bus graphics with 1Mb
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 fast serial and keyboard ports
- ◆ Expandable desktop case
- ◆ 7 drive bays and 7 expansion slots (4 PCI)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Windows® 95 software bundle including Lotus software suite available at extra cost



120MHz Pentium®

- ◆ Intel® 120MHz Pentium® processor
- ◆ 8Mb or 16Mb RAM expandable to 128Mb
- ◆ 1.08Gb enhanced IDE (fast ATA) hard disk
- ◆ 3.5" 1.44Mb floppy drive
- ◆ Integrated 64-bit PCI bus graphics with 1Mb
- ◆ 14" SVGA colour screen (15" optional)
- ◆ Enhanced PCI IDE hard and floppy controller
- ◆ Parallel, 2 fast serial and keyboard ports
- ◆ Expandable desktop case
- ◆ 7 drive bays and 7 expansion slots (4 PCI)
- ◆ 102 Enhanced keyboard
- ◆ Multimedia models include double or quad speed CD-ROM drive, 16-bit sound card and twin stereo speakers
- ◆ Windows® 95 software bundle including Lotus software suite available at extra cost

£739 +VAT

1.08Gb 8Mb model£789
16Mb RAM modelsCall
Multimedia models+£99

Best Buy - Multimedia Powerstation 95/C

75MHz Pentium®, 850Mb, 8Mb model with double speed CD-ROM, 16-bit sound card, stereo speakers, 14" .28dp NI screen and Windows® 95 software bundle including Lotus software suite and 8 CD titles
£999 +VAT
- mouse and joystick included

£859 +VAT

1.08Gb 8Mb model£909
16Mb RAM modelCall
Multimedia model+£99

Best Buy - Multimedia Powerstation 95/D

75MHz Pentium®, 850Mb, 8Mb model with 14.4 BABT fax/data modem, quad speed CD-ROM, 16-bit sound card, 14" .28dp NI screen, stereo speakers and Windows® 95 software bundle including Lotus software suite and 8 CD titles - mouse and joystick included
£1099 +VAT

£959 +VAT

16Mb RAM modelCall
Multimedia model+£99
14" .28dp NI screen+£40
15" .28dp NI screen+£110
PC joystick+£19
8 multimedia CD titles+£69

Please Note: Mouse is not included with this range as a choice of different mice is available from as low as £9 + VAT



Lotus Organizer allows you to schedule your appointments and manage your workload



Lotus SmartPics provides excellent clipart graphics that can be used in any document



Pacioli 2000 is a full feature accounts package that outperforms many packages costing over £500



Quicken v4 personal finance package is the fastest and easiest way to organize your home finances

Finance from under

£29
Per Month

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 inc. delivery & VAT. APR 19.8%

*APR

19.8%

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.

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Multimedia '95 Time Machine

The new enhanced Multimedia Time Machine 95 systems now all come with superb 15" and 17" SVGA NI colour screens and our top of the range systems feature fast 28.8 modems, minimum of 16Mb RAM, six speed CD-ROM drives, PC TV with Teletext, massive 1.6Gb disks and the fastest Intel® chipsets and Pentium® processors.

These pre-configured systems are the ideal future-proof purchase for home and small office users looking for powerful Windows® 95 optimised hardware and a plethora of leading software applications.

All are fully multimedia ready with fitted fast CD-ROM drives, 16-bit sound card, PC microphone, PC joystick and an excellent range of educational and leisure titles including WinTutor 95 multimedia tutorial,

Infopedia full feature multimedia encyclopaedia, World Atlas Multimedia Edition, Fun school Educational suite, and much more.

Remember a computer is useless without software and the software included with these systems enables their use for virtually any application. As well as our standard Lotus software suite, we include leading applications such as TurboCAD for home designs and CAD, Pressworks desktop publisher, Designworks drawing pack, PC Paintbrush paint program and more!

All systems are available on Interest Free Credit with a low deposit and payments spread over two years. Add a quality printer pack or scanner pack (available on Interest Free credit) for a complete solution.



System Specification

- ◆ 486 model: 486DX4-100 processor
- ◆ Pentium® models: 75, 100, 120 or 133MHz Pentium® processor with PCI local bus and 64-bit PCI graphics
- ◆ 8Mb or 16Mb RAM expandable to 64/128Mb
- ◆ 850Mb, 1.08Gb or 1.6Gb fast enhanced IDE hard disks with 256K cache
- ◆ Superb 15" or 17" SVGA NI low radiation colour screen
- ◆ 1.44Mb floppy drive.
- ◆ Omega desktop case with 7 drive bays and 7 slots (models B, C & D). Model E features Colossus desktop with 7 drive bays. Model D2 and F feature Colossus midi-tower case with 8 drive bays. Model G features Colossus full-tower case with 9 drive bays.
- ◆ 102 keyboard and deluxe Microsoft® compatible mouse
- ◆ Microsoft® Windows® 95
- ◆ 12months warranty extendable to 5 years

Multimedia HardWare

- ◆ Double speed, quad speed or six speed IDE CD-ROM drive
- ◆ 16-bit high quality stereo sound card
- ◆ Twin stereo speaker system
- ◆ PC joystick
- ◆ PC microphone

Fax & Internet Packs -Models D, D2, E2, F and G

- ◆ 14.4 or 28.8 BABT approved fax & data modem
- ◆ Easy to use fax software
- ◆ Communications software
- ◆ Introductory subscription to CompuServe with Internet mailbox.
- ◆ Model G Also features PC-TV with Teletext and 3.2Gb tape back-up

APPROVED for connection to telecommunication systems specified in the standard for use subject to the conditions set out in them.

*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.

Novell Perfect Office Plus Models

These systems are available with everything listed plus the following additional Novell/Wordperfect titles at a small extra cost:-

- ◆ WordPerfect for Windows word processor
 - ◆ Quattro Pro for Windows spread sheet
 - ◆ Presentations Graphics Pack
 - ◆ InfoCentral Organizer
 - ◆ GroupWise Electronic Mailing System
 - ◆ Envoy Document System
- Microsoft® Office 95 is also available at a small extra cost.



Multimedia Time Machine 95/B 486DX4-100

486DX4-100 desktop with 8Mb RAM, 850Mb hard disk, double speed CD-ROM, local bus graphics and 15" sharp 0.28 NI screen

£39 Per Month

£159.15 deposit and 24 monthly payments of £53 OR £495.15 deposit and 24 monthly payments of £39. Total price £1199 +VAT = £1431.15 inc. delivery and VAT. APR 0%



Multimedia Time Machine 95/C 75MHz Pentium®

75MHz Pentium® desktop with 8Mb RAM, 850Mb hard disk, double speed CD-ROM, 64-bit PCI graphics and 15" sharp .28 NI screen

£49 Per Month

£156.65 deposit and 24 monthly payments of £58 OR £372.65 deposit and 24 monthly payments of £49. Total price £1299 +VAT = £1548.65 inc. delivery and VAT. APR 0%



Multimedia Time Machine 95/D 75MHz Pentium®

75MHz Pentium® desktop with 8Mb RAM, 850Mb hard disk, 64-bit PCI graphics, quad speed CD-ROM, 14.4 modem and 15" sharp .28 NI screen

£59 Per Month

£178.15 deposit and 24 monthly payments of £62 OR £250.15 deposit and 24 monthly payments of £59. Total price £1399 +VAT = £1666.15 inc. delivery and VAT. APR 0%

Model D2: 100MHz Pentium® Colossus midi-tower, with 1.08Gb drive, 256K cache and above spec £69 per month - call for details

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Software

Included with all systems. Pre-loaded or on CD's

Business Software

- ◆ Lotus 1-2-3 v5 Spreadsheet
- ◆ 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
- ◆ GSP Pressworks 2 Desktop Publisher
- ◆ GSP Designworks 3 Graphics Pack
- ◆ TurboCAD for Windows CAD Pack
- ◆ Organize your way organiser

- ◆ CV & Job Search Pro
- ◆ MasterClips SE Clipart
- ◆ Picture This Graphics system
- ◆ Intuit Quicken v4 Personal Finance Pack
- ◆ Pacioli 2000 Business Accounts

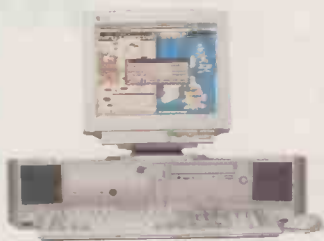
Educational/Leisure Software

- ◆ Fun School 4
- ◆ Fun School Maths
- ◆ Fun School 5 in Time
- ◆ Fun School Spelling
- ◆ Fun School Paint & Create
- ◆ EZ Language French, German & Spanish
- ◆ Computerworks, Bodyworks & Autoworks
- ◆ Flying Fingers keyboard & typing tutorial

- ◆ Dinosaurs for Windows
- ◆ Doom, Blake Stone, Raptor and Pinball Shareware games

CD Multimedia Software

- ◆ Wintutor 95 Multimedia CD
- ◆ Infopedia Multimedia Encyclopaedia CD
- ◆ World Atlas Multimedia CD
- ◆ BodyWorks Multimedia CD
- ◆ Time Almanac CD
- ◆ EZ Language Multimedia CD
- ◆ Play & Learn Educational CD
- ◆ UFO for Windows CD
- ◆ Dinosaur Museum CD
- ◆ Shareware CD



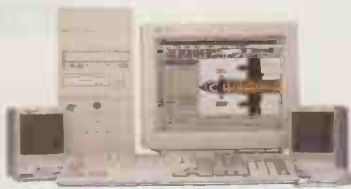
Multimedia Time Machine 95/E2 100MHz Pentium®

100MHz Pentium® Colossus desktop with Triton chipset, 256K cache, 16Mb RAM, 1.08Gb hard disk, 64-bit PCI graphics with 2Mb video RAM, six speed CD-ROM, 14.4 modem and 15" sharp .28 NI screen

£79 Per Month

£259.15 deposit and 24 monthly payments of £88 OR
£475.15 deposit and 24 monthly payments of £79. Total price
£1999 +VAT = £2371.15 inc. delivery and VAT. APR 0%

15" to 17" upgrade +£199



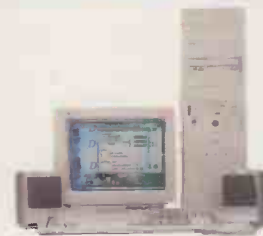
Multimedia Time Machine 95/F 120MHz Pentium®

120MHz Pentium® Colossus mid-tower with Triton chipset, 256K cache, 16Mb RAM, 1.6Gb hard disk, 64-bit PCI graphics with 2Mb video RAM, six speed CD-ROM, 28.8 modem and 15" sharp .28 NI screen

£89 Per Month

£278.15 deposit and 24 monthly payments of £97 OR
£470.15 deposit and 24 monthly payments of £89. Total price
£2199 +VAT = £2606.15 inc. delivery and VAT. APR 0%

15" to 17" upgrade +£199



Multimedia Time Machine 95/G 133MHz Pentium®

133MHz Pentium® Colossus full tower with Triton chipset, 256K cache, 16Mb RAM, 1.6Gb hard disk, 64-bit PCI graphics with 2Mb video RAM, six speed CD-ROM, 28.8 modem, 3.2Gb tape backup, PC TV with Teletext and 15" sharp .28 NI screen

£99 Per Month

£356.65 deposit and 24 monthly payments of £128 OR
£1052.65 deposit and 24 monthly payments of £99.
Total price £2899 +VAT = £3428.65 inc. delivery and
VAT. APR 0%

15" to 17" upgrade +£199

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Compaq, Colossus, IBM & Omega

Our most popular multimedia systems from these leading brands are listed here for you to make your selections easier. All systems are full-feature multimedia systems and are ready for use.

**Under
£ 1000**

Ideal For Home Use

Our Choice

Compaq Presario CDS 528

Although this system is not as expandable as others and features a slower 486DX2-66 processor, it does include a full feature PCTV & integral fax/data modem!

Omega Multimedia Powerstation 95B

- ◆ 486DX4-100 processor
- ◆ 8Mb RAM
- ◆ 850Mb hard disk
- ◆ CD-ROM, sound card & speakers
- ◆ PC joystick
- ◆ 7 drive bay desktop
- ◆ 14" .28dp SVGA screen
- ◆ Windows® 95
- ◆ Lotus Software Suite including 1-2-3, Ami Pro, Approach, SmartPics & Organizer Quicken v4 & Pacioli 2000 Business Accounts
- ◆ 8 CD Titles: Encyclopaedia, Bodyworks, UFO, Time Almanac, Dinosaurs, Play & Learn, Shareware CD & EZ Language



£ 899
+VAT

IBM Aptiva 914

- ◆ 486DX2-66 processor
- ◆ 8Mb RAM
- ◆ 540Mb hard disk
- ◆ CD-ROM, sound card & speakers
- ◆ 3 drive bay desktop
- ◆ 14" .28dp SVGA screen
- ◆ PC DOS, Windows® 3.1 & OS/2 Warp
- ◆ Lotus Software Suite including 1-2-3, Ami Pro, Approach, Freelance & Organizer MS Works & Aptivaware



£ 899
+VAT

**£ 1000 to
£ 1249**

**Ideal For Home &
Business Use
Our Choice**

Omega Multimedia Powerstation D

This system from Omega is very expandable and features a fast 75MHz Pentium® system with large hard disk, 64-bit graphics, quad CD-ROM, modem and plenty of software- all at just **£1099**

IBM Aptiva 921

- ◆ 486DX4-100 processor
- ◆ 8Mb RAM
- ◆ 540Mb hard disk
- ◆ Quad CD-ROM, sound card & speakers
- ◆ 3 drive bay desktop
- ◆ 14" .28dp SVGA screen
- ◆ PC DOS, Windows® 3.1 & OS/2 Warp
- ◆ Lotus Software Suite including 1-2-3, Ami Pro, Approach, Freelance & Organizer MS Works & Aptivaware



£ 999
+VAT

COMPAQ Presario CDS 7110

- ◆ 486DX4-100 processor
- ◆ 8Mb RAM
- ◆ 540Mb hard disk
- ◆ Quad CD-ROM, sound card & speakers
- ◆ 14.4 fax/data modem
- ◆ 4 drive bay desktop
- ◆ 14" .28dp SVGA screen
- ◆ 32-bit PCI graphics
- ◆ Dos 6.2 & Windows® 3.1
- ◆ Novell Perfect Works for Windows
- ◆ Microsoft® Money 3, Sim City, Lode runner, Kids corner & Compaq Software,
- ◆ 2 CD Titles: Cromptons Encyclopaedia & Kings Quest 7



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+VAT

**Over
£ 1299**

**Ideal Power Users
Our Choice**

Colossus Multimedia Powerstation 95 E2

Although not the cheapest this system from Colossus is very expandable and features a fast 100MHz Pentium® CPU with 16Mb RAM, large 1Gb hard disk, triton chipset, 2Mb 64-bit graphics, six speed CD-ROM, large 15" screen, modem and plenty of software

IBM Aptiva 931

- ◆ 75MHz Pentium® processor
- ◆ 8Mb RAM
- ◆ 540Mb hard disk
- ◆ Quad CD-ROM, sound card & speakers
- ◆ 6 Drive bay mini-tower
- ◆ 14" .28dp SVGA screen
- ◆ PC DOS, Windows® 3.1 & OS/2 Warp
- ◆ Lotus Software Suite including 1-2-3, Ami Pro, Approach, Freelance & Organizer MS Works & Aptivaware



£ 1299
+VAT

COLOSSUS Multimedia Powerstation 95 D2

- ◆ 100MHz Pentium® processor
- ◆ 8Mb RAM; 256K cache
- ◆ 1.08Gb hard drive
- ◆ Quad CD-ROM, sound card & speakers
- ◆ PC joystick
- ◆ 14.4 fax/data modem
- ◆ 8 drive bay mid-tower
- ◆ 64-bit PCI graphics
- ◆ 14" .28dp SVGA screen
- ◆ Windows® 95
- ◆ Lotus Software Suite including 1-2-3, Ami Pro, Approach, Smartpics & Organizer Quicken v4 & Pacioli 2000 Business Accounts
- ◆ 8 CD Titles: Encyclopaedia, Bodyworks, UFO, Time Almanac, Dinosaurs, Play & Learn, Shareware CD & EZ Language



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Presario CDS 528

- ◆ 486DX2-66 processor
- ◆ 8Mb RAM
- ◆ 420Mb hard disk
- ◆ CD-ROM, sound card & speakers
- ◆ 3 drive bay desktop
- ◆ 14" integral SVGA screen
- ◆ 2496 fax/data modem
- ◆ PCTV card
- ◆ Dos 6.2 & Windows® 3.1
- ◆ Works for Windows®
- ◆ Microsoft® Money & MS Entertainment pack
- ◆ 2 CD Titles: Encarta® 95 & Ultimate Human Body



£949
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COMPAQ

Presario CDS 7106

- ◆ 486DX4-100 processor
- ◆ 8Mb RAM
- ◆ 420Mb hard disk
- ◆ CD-ROM, sound card & speakers
- ◆ 4 drive bay desktop
- ◆ 14" .28dp SVGA screen
- ◆ Dos 6.2 & Windows® 3.1
- ◆ Novell Perfect Works for Windows®
- ◆ Microsoft® Money 3, Sim City, Lode runner, Kids corner & Compaq Software
- ◆ 2 CD Titles: Cromptons Encyclopaedia & Kings Quest 7



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Omega Multimedia Powerstation 95 C

- ◆ 75MHz Pentium® processor
- ◆ 8Mb RAM
- ◆ 850Mb hard disk
- ◆ CD-ROM, sound card & speakers
- ◆ PC joystick
- ◆ 7 drive bay desktop
- ◆ 14" .28dp SVGA screen
- ◆ Windows® 95
- ◆ Lotus software Suite including 1-2-3, Ami Pro, Approach, Smartpics & Organizer
- ◆ Quicken v4 & Pacioli 2000 Business Accounts
- ◆ 8 CD Titles: Encyclopaedia, Bodyworks, UFO, Time Almanac, Dinosaurs, Play & Learn, Shareware CD & EZ Language



£999
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Omega Multimedia Powerstation 95D

- ◆ 75MHz Pentium® processor
- ◆ 8Mb RAM
- ◆ 850Mb hard disk
- ◆ Quad CD-ROM, sound card & speakers
- ◆ PC joystick
- ◆ 14.4 fax/data modem
- ◆ 7 drive bay desktop
- ◆ 64-bit PCI graphics
- ◆ 14" .28dp SVGA screen
- ◆ Windows® 95
- ◆ Lotus Software Suite including 1-2-3, Ami Pro, Approach, SmartPics & Organizer
- ◆ Quicken v4 & Pacioli 2000 Business Accounts
- ◆ 8 CD Titles: Encyclopaedia, Bodyworks, UFO, Time Almanac, Dinosaurs, Play & Learn, Shareware CD & EZ Language



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COLOSSUS

Multimedia 1 with Perfect Office

- ◆ 75MHz Pentium® processor
- ◆ 8Mb RAM
- ◆ 850Mb hard disk
- ◆ Quad CD-ROM, sound card & speakers
- ◆ 14.4 fax/data modem
- ◆ 8 drive bay mini-tower
- ◆ 14" .28dp SVGA screen
- ◆ 64-bit PCI graphics
- ◆ Windows® 95
- ◆ Novell PerfectOffice with Wordperfect, Quattro Pro, Presentations, Envoy, InfoCentral & Groupwise,
- ◆ 8 CD Titles: Infopaedia Encyclopaedia, Bodyworks, UFO, Time Almanac, Dinosaurs, WinTutor 95, World Atlas & EZ Language



£1099
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COMPAQ

Presario CDS 7150

- ◆ 75MHz Pentium® processor
- ◆ 8Mb RAM
- ◆ 540Mb hard disk
- ◆ Quad CD-ROM, sound card & speakers
- ◆ 14.4 fax/data modem
- ◆ 4 drive bay desktop
- ◆ 32-bit PCI graphics
- ◆ 14" .28dp SVGA screen
- ◆ DOS 6.2 & Windows® 3.1
- ◆ Novell Perfect Works for Windows
- ◆ Microsoft® Money 3, Sim City, Lode runner, Kids corner & Compaq Software
- ◆ 2 CD Titles: Cromptons Encyclopaedia & Kings Quest 7



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COMPAQ

Presario CDS 7170

- ◆ 90MHz Pentium® processor
- ◆ 8Mb RAM
- ◆ 840Mb hard disk
- ◆ Quad CD-ROM, sound card & speakers
- ◆ 14.4 fax/data modem
- ◆ 4 drive bay desktop
- ◆ 32-bit PCI graphics
- ◆ 14" .28dp SVGA screen
- ◆ Dos 6.2 & Windows® 3.1
- ◆ Novell Perfect Works for Windows
- ◆ Microsoft® Money 3, Sim City, Lode runner, Kids corner & Compaq software
- ◆ 2 CD Titles: Cromptons Encyclopaedia & Kings Quest 7



£1349
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IBM

Aptiva 932

- ◆ 75MHz Pentium® processor
- ◆ 8Mb RAM
- ◆ 540Mb hard disk
- ◆ Quad CD-ROM, sound card & speakers
- ◆ 28.8 fax/data modem
- ◆ 6 drive bay mini-tower
- ◆ 15" .28dp SVGA screen
- ◆ PC DOS, Windows® 3.1 & OS/2 Warp Lotus Software Suite including 1-2-3, Ami Pro, Approach, Freelance & Organizer
- ◆ MS Works & Aptivaware



£1399
+VAT

COLOSSUS Multimedia Powerstation 95 E2

- ◆ 100MHz Pentium® processor
- ◆ 16Mb RAM; 256K cache
- ◆ Intel Triton chipset
- ◆ 1.08Gb hard disk
- ◆ Six speed CD-ROM, sound card & speakers
- ◆ PC Joystick
- ◆ 14.4 fax/data modem
- ◆ 7 drive bay desktop
- ◆ 64-bit PCI graphics
- ◆ Windows® 95
- ◆ Lotus Software Suite including 1-2-3, Ami Pro, Approach, SmartPics & Organizer
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Multimedia PowerStation '95

The new multimedia Powerstation '95 systems from Time feature a range of popular high specification Best Buy configurations from Colossus and Omega and represent the best value in the UK today. 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 upto 1.6Gb, latest chipsets, fast controllers and plenty of expansion potential.

All are fully multimedia ready with fitted fast CD-ROM drives, 16-bit sound cards, PC joystick and an excellent range of educational and leisure CD titles including full feature multimedia encyclopaedia, Bodyworks, EZ Language and games such as Doom. Most models also include fast fax & data modems with Internet pack.

Also included is a range of excellent business software from Lotus and others, which will handle all your requirements for word processing, filing, number crunching, organizing, graphics and accounts. At these special introductory prices, with the finance option from under £44 these systems are a great buy.



System Specification

- ◆ 486 Models: 486DX2-66 or 486DX4-100 processors
- ◆ Pentium® models: 75, 100, 120 or 133MHz Pentium® processor with PCI local bus and 64-bit PCI graphics
- ◆ 8Mb or 16Mb RAM expandable to 64/128Mb
- ◆ 540Mb, 850Mb, 1.08Gb or 1.6Gb fast enhanced IDE hard disks with 256K cache
- ◆ 1.44Mb floppy drive.
- ◆ 14", 15" or 17" SVGA low radiation colour screen
- ◆ Omega desktop case with 7 drive bays and 7 slots (models B, C & D). Model A features Omega mini-tower with 5 drive bays. Model E features Colossus desktop with 7 drive bays. Model D2 and F features Colossus midi-tower case with 8 drive bays
- ◆ 102 keyboard and deluxe Microsoft® compatible mouse
- ◆ Microsoft® Windows® 95
- ◆ 12 months warranty extendable to 5 years

Multimedia Hardware

- ◆ Double, quad or six speed IDE CD-ROM drive
- ◆ 16-bit high quality stereo sound card
- ◆ Twin stereo speaker system
- ◆ PC joystick

Fax & Internet Packs - Models D, D2, E & F

- ◆ 14.4 or 28.8 BABT approved fax & data modem
- ◆ Easy to use fax software
- ◆ Communications software
- ◆ Introductory subscription to CompuServe with Internet mailbox.

APPROVED for use in telecommunications systems specified in the conditions for use subject to the conditions set out in them.



Pre-Loaded Software

Included with all systems. See software section for details

- ◆ Lotus 1-2-3 v5 Spreadsheet
- ◆ 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
- ◆ Pacioli 2000 Business Accounts

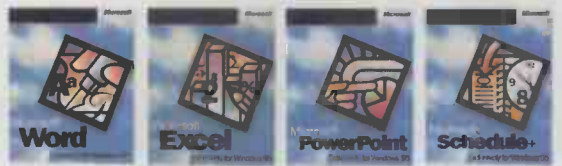
Multimedia Software

- ◆ BodyWorks multimedia CD
- ◆ Multimedia Encyclopaedia CD
- ◆ Time Almanac CD
- ◆ EZ Language multimedia CD - Learn French, German, Spanish and more
- ◆ Play & Learn Educational CD
- ◆ UFO for Windows CD
- ◆ Dinosaur Museum CD
- ◆ Shareware CD including Doom, Raptor, Pinball and many other games.

Microsoft Office 95 Plus Models

These systems are only £149 extra and include everything listed plus the following Microsoft titles:-

- ◆ Microsoft Works
- ◆ Microsoft Word 95
- ◆ Microsoft Excel 95
- ◆ Microsoft Schedule 95
- ◆ Microsoft PowerPoint 95



Word 95

Excel 95

PowerPoint 95

Schedule 95



Multimedia PowerStation 95/A 486DX2-66

486DX2-66 mini-tower with 8Mb RAM, 540Mb hard disk, double speed CD-ROM and 14" screen

£799 +VAT

850Mb model with 14" sharp 0.28dp screen£849+VAT



Multimedia PowerStation 95/B 486DX4-100

486DX4-100 desktop with 8Mb RAM, 850Mb hard disk, double speed CD-ROM, local bus graphics and 14" sharp 0.28 NI screen

£899 +VAT

14" to 15" upgrade+£99



Multimedia PowerStation 95/C 75MHz Pentium®

75MHz Pentium® desktop with 8Mb RAM, 850Mb hard disk, double speed CD-ROM, 64-bit PCI graphics and 14" sharp .28 NI screen

£999 +VAT

14" to 15" upgrade+£99

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Credit Purchase: 10% (£96.12) deposit and 24 equal monthly payments of £43.29. Total Price £1134.36 inc. 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.

**APR
19.8%**



CompuServe is only available with fax & Internet packs



**Multimedia
PowerStation 95/D
75MHz Pentium®**

75MHz Pentium® desktop with 8Mb RAM, 850Mb hard disk, 64-bit PCI graphics, quad speed CD-ROM, 14.4 modem and 14" sharp .28 NI screen

£1099 +VAT

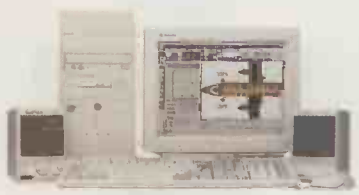
MODEL D2: features 100MHz Pentium® processor, Colossus midi-tower with 1.08Gb drive, 256k cache and above spec +£1299 +VAT



**Multimedia
PowerStation 95/E2
100MHz Pentium®**

100MHz Pentium® Colossus desktop with Triton chipset, 256K Cache, 16Mb RAM, 1.08Gb hard disk, 64-bit PCI graphics with 2Mb video RAM, six speed CD-ROM, 14.4 modem and 15" screen

£1599 +VAT
15" to 17" upgrade +£199



**Multimedia
PowerStation 95/F
120MHz Pentium®**

120MHz Pentium® Colossus midi-tower with Triton chipset, 256k cache, 16Mb RAM, 1.6Gb hard disk, 64-bit PCI graphics with 2Mb video RAM, six speed CD-ROM, 28.8 modem and 15" screen

£1799 +VAT
15" to 17" upgrade +£199

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Tel: 01282 777 111 Fax: 01282 77 07 01. All prices exclude delivery (£19) and VAT (17.5%). *Finance prices include delivery and VAT. **All software applications are pre-loaded or on CD. Pack shots shown for illustration purposes only. Printed manuals and back-up media are available as options. E8.0F.



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These amazing Multimedia PC & printer solutions come complete with everything you need for serious home or business use. All PC systems include a high specification similar to the Time Machines and include extra software. You can choose from a choice of 3 leading printers from Hewlett Packard, Epson or NEC.

All systems are available on Interest Free Credit with a low deposit with nothing more to pay for 6 months. After 6 months payments can be spread over another 2 years on Interest Free Credit.



System Specification

- ◆ 486 Model: 486DX4-100 processor
- ◆ Pentium® models: Intel® 75, 100, 120 or 133MHz Pentium® processor with PCI local bus and 64-bit PCI graphics
- ◆ 8Mb or 16Mb RAM expandable to 64/128Mb
- ◆ 850Mb, 1.08Gb or 1.6Gb fast Enhanced IDE hard disks with 256K cache
- ◆ Superb 15" or 17" SVGA NI low radiation colour screen
- ◆ 1.44Mb Floppy drive.
- ◆ Omega desktop case with 7 drive bays and 7 slots (models B, C & D). Model E2 features Colossus desktop with 7 drive bays. Model D2 and F features Colossus midi-tower case with 8 drive bays. Model G features Colossus full-tower case with 9 drive bays.
- ◆ 102 Keyboard and deluxe Microsoft® compatible mouse
- ◆ Microsoft® Windows® 95
- ◆ 12 months warranty extendable to 5 years

Multimedia Hardware

- ◆ Double speed, quad speed or six speed IDE CD-ROM drive
- ◆ 16-bit high quality stereo sound card
- ◆ Twin stereo speaker system
- ◆ PC joystick
- ◆ PC microphone

Fax & Internet Packs -Models D, D2 E2 & F

- ◆ 14.4 or 28.8 BABT approved fax & data modem
- ◆ Easy to use fax software
- ◆ Communications software
- ◆ Introductory subscription to CompuServe with Internet mailbox.
- ◆ Model G also features PC-TV with Teletext and 3.2Gb tape back-up

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Multimedia Business PC

These systems are identical to the Multimedia PC/Printer Solutions but do not include the printer. They are available on similar buy now pay later terms with two and a half years Interest Free Credit. Please call for details on Multimedia Business PC Models B, C, D, D2, E and F

*APR

Printer Specifications

Select any ONE of the following 3 printers. All printers include shielded PC printer cable.

NEC Laser Printer

The new NEC SuperScript 610 Plus printer with virtual 600dpi resolution, fast 6 page per minute speed and full Windows 95 compatibility. Ideal for business and professional use.

HP Deskjet 660C Colour Inkjet Printer

The popular colour inkjet printer with resident black and colour cartridges 600dpi resolution and built-in automatic sheet feeder.

Epson Stylus Colour 2

The best colour inkjet with 720dpi resolution producing the best mono and colour output. Includes built-in automatic sheet feeder.



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 PC/Printer Solution B

486DX4-100

Printer of your choice plus 486DX4-100 desktop with 8Mb RAM, 850Mb hard disk, double speed CD-ROM, local bus graphics and 15" sharp 0.28 NI screen

£75 Per Month

£217.48 deposit, then nothing to pay for 6 months. After 6 months pay 24 monthly payments of £75. Total price £1698 +VAT = £2017.48 inc. delivery and VAT. APR 0%



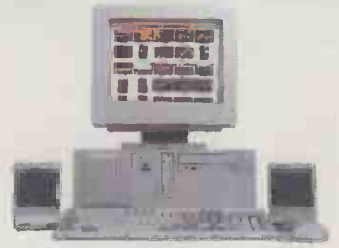
Multimedia PC/Printer Solution C

75MHz Pentium®

Printer of your choice plus 75MHz Pentium® desktop with 8Mb RAM, 850Mb hard disk, double speed CD-ROM drive, 64-bit PCI graphics and 15" screen

£82 Per Month

£225.72 deposit and then pay nothing for 6 months, after 6 months pay 24 monthly payments of £82. Total price £1848 +VAT = £2193.73 inc. delivery and VAT. APR 0%



Multimedia PC/Printer Solution D

75MHz Pentium®

Printer of your choice plus 75MHz Pentium® desktop with 8Mb RAM, 850Mb hard disk, quad speed CD-ROM, 14.4 modem and 15" screen

£88 Per Month

£257.97 deposit and then pay nothing for 6 months, after 6 months pay 24 monthly payments of £88. Total price £1998 +VAT = £2369.98 inc. delivery and VAT. APR 0%

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systems**

Software

Included with all systems.
Pre-loaded or on CD. See software
section for details

Business Software

- ◆ Lotus 1-2-3 v5 spreadsheet
- ◆ 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
- ◆ GSP Pressworks 2 desktop publisher
- ◆ GSP Designworks 3 graphics pack
- ◆ TurboCAD for Windows CAD Pack
- ◆ Organize your way organiser
- ◆ CV & Job Search Pro
- ◆ MasterClips SE Clipart

- ◆ Picture This graphics system
- ◆ Intuit Quicken v4 Personal Finance Pack
- ◆ Pacioli 2000 Business Accounts

Educational/Leisure Software

- ◆ Fun School 4
- ◆ Fun School Maths
- ◆ Fun School 5 in Time
- ◆ Fun School Spelling
- ◆ Fun School Paint & Create
- ◆ EZ Language French, German & Spanish
- ◆ Computerworks, Bodyworks & Autoworks
- ◆ Dinosaurs for Windows
- ◆ Doom, Blake Stone, Raptor and Pinball Shareware games

CD Multimedia Software

- ◆ WinTutor 95 Multimedia CD
- ◆ Infopedia Multimedia Encyclopaedia CD
- ◆ World Atlas Multimedia CD
- ◆ Bodyworks Multimedia CD
- ◆ Time Almanac CD
- ◆ EZ Language Multimedia CD
- ◆ Play & Learn Educational CD
- ◆ UFO for Windows CD
- ◆ Dinosaur Museum CD
- ◆ Shareware CD
- ◆ 5 Infoware Encyclopaedias CD



**Multimedia PC/Printer
Solution D2
100MHz Pentium®**

Printer of your choice plus 100MHz Pentium®
Colossus midi-tower with 8Mb RAM, 256K cache,
1.08Gb hard disk, quad speed CD-ROM, 14.4 modem
and 15" screen

£97 Per Month

£276.97 deposit and then pay nothing for 6
months, after 6 months pay 24 monthly payments
of £97. Total price £2198 +VAT = £2604.98 inc.
delivery and VAT. APR 0%



**Multimedia PC/Printer
Solution E2
100MHz Pentium®**

Printer of Your Choice Plus 100MHz Pentium® Colossus
desktop with Triton chipset, 256K cache, 16Mb RAM, 1.08Gb
hard disk, 64-bit PCI graphics with 2Mb video RAM, six speed
CD-ROM, 14.4 modem and 15" sharp .28 NI screen

£115 Per Month

£314.97 deposit and 24 monthly payments of
£115. Total price £2598 +VAT = £3074.98 inc.
delivery and VAT. APR 0%

15" to 17" upgrade +£199



**Multimedia
PC/Printer Solution F
120MHz Pentium®**

Printer of Your Choice Plus 120MHz Pentium® Colossus midi-
tower with Triton chipset, 256K cache, 16Mb RAM, 1.60Gb
hard disk, 64-bit PCI graphics with 2Mb video RAM, six speed
CD-ROM, 28.8 modem and 15" sharp .28 NI screen

£124 Per Month

£333.97 deposit and 24 monthly payments of £124.
Total price £2798 +VAT = £3309.98 inc. delivery and
VAT. APR 0%

15" to 17" upgrade +£199

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Mobile Comms Office

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approved Intel® PCMCIA modem with appropriate fax and comms software. Fax your documents to anyone and connect to your PC to your base and many other on-line services with ease. At just £49 per month on Interest Free Credit, these Mobile Comms Office Solutions are going fast. Hurry place your order today!

*APR

0% INTEREST FREE CREDIT

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All 486 systems also come with a complete fax & Internet Pack including a BABT

APPROVED for credit by telecommunications systems specified in the conditions for use subject to in them



Lotus 1-2-3



Lotus Ami Pro



Lotus Approach



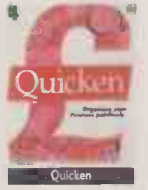
Lotus Organizer



Lotus SmartPics



AutoRoute



Quicken



Notebook Specification

Texas Instruments latest 4000M models with built-in multimedia, Intel® modem and pre-loaded software. The Portable CD-ROM dock & mega bundle is also available as an option on Interest Free Credit.

- ◆ Intel® 486DX2-50, 486DX4-75 or 486DX4-100 processor
- ◆ 4Mb or 8Mb RAM
- ◆ 455Mb or 520Mb IDE hard disk
- ◆ Superb large 10.5" VGA TFT or dual scan colour screen
- ◆ 1Mb VESA video
- ◆ Built-in 16-bit sound card, microphone and speakers
- ◆ Built-in point mouse
- ◆ Adaptec fast SCSI-II port
- ◆ Optional CD-ROM drive clips on
- ◆ 1.44Mb floppy drive
- ◆ PCMCIA II/III and all standard ports
- ◆ MS DOS 6.2 and Windows 3.1 (Free Windows 95 voucher)
- ◆ Intel PCMCIA fax & data modem with software on all 486 models

Portable CD ROM & Mega CD Bundle

This is available on IF credit at extra cost (£26* per month) and includes the following:

- ◆ Double speed CD-ROM drive
- ◆ Larger speaker system with controls for volume, balance and mix
- ◆ Microsoft headphones and external microphone
- ◆ NiMH battery giving option of AC or battery power
- ◆ SCSI II connector and SCSI II bay option
- ◆ Additional Software on Mega CD:- GSP Pressworks 2 and Designworks 2, TurboCAD for Windows, Pacifi 2000 Business Accounts, Computerworks, Bodyworks and Autoworks plus many more educational and leisure programs



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
- ◆ Intuit Quicken v4 Personal Finance Pack
- ◆ AutoRoute Express UK v3 for Windows



TI COMMS OFFICE 4A
486DX2-50 340Mb, 4Mb, dual scan

£49* Per Month

£245.15 deposit and 24 monthly payments of £69 OR £725.15 deposit and 24 monthly payments of £49. Total price £1599 + VAT = £1901.15 inc. delivery & VAT. *APR 0%

8Mb model£149+VAT Extra

TI COMMS OFFICE 5
486DX4-75 520Mb, 4Mb, TFT

£69* Per Month

£275.65 deposit and 24 monthly payments of £102 OR £1067.65 deposit and 24 monthly payments of £69. Total price £2299 + VAT = £2723.65 inc. delivery & VAT *APR 0%

8Mb model£149+VAT Extra

TI COMMS OFFICE 6
486DX4-100 520Mb, 8Mb, TFT

£99* Per Month

£335.15 deposit and 24 monthly payments of £124 OR £935.15 deposit and 24 monthly payments of £99. Total price £2799 + VAT = £3311.15 inc. delivery & VAT *APR 0%

New 75MHz Pentium® model
TI OFFICE 7

P75 520Mb, 8Mb dual scan with built-in CD-ROM and sound card

£128* Per Month

£356.65 deposit and 24 monthly payments of £128 Total price £2899 + VAT = £3428.65 inc. delivery & VAT *APR 0%

CD-ROM DOCK BUNDLE with 486 models £147.65 deposit and 24 monthly payments of £26. Total price £599 +VAT = £843.65 inc delivery & VAT. *APR 0%

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If you are looking for the ultimate notebook systems, take a look at our special deals on the incredible Colossus range of power notebooks. These systems come with fast 486DX4 processors, massive hard disks and ample RAM and are pre-loaded with the best software applications

including Lotus 1-2-3, Lotus Ami Pro, Lotus Organizer 2, Lotus Approach, Lotus SmartPics, Quicken v4 and AutoRoute Express.

They are completely modular and have a full range of docking facilities.



Notebook Specification

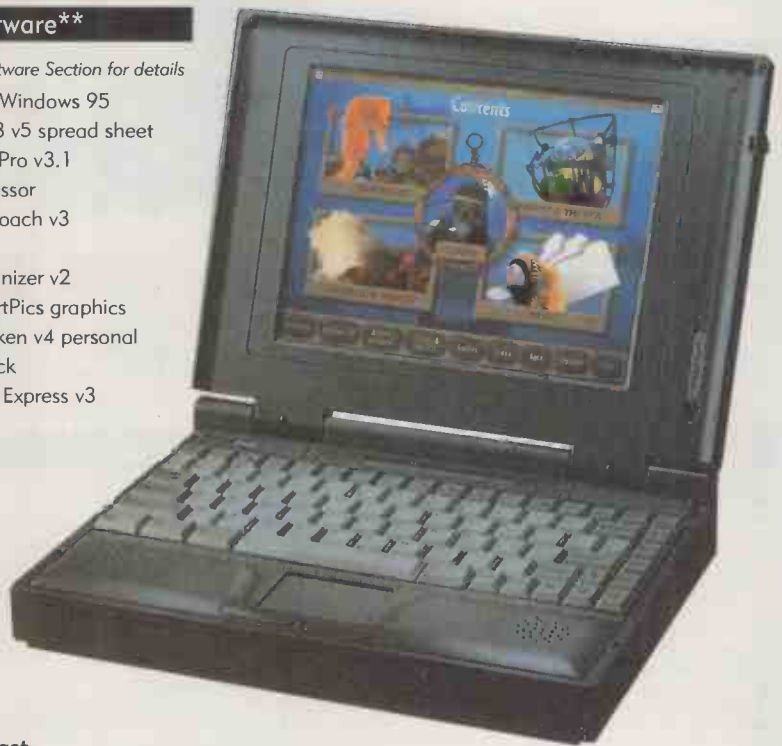
- ◆ Intel® 100MHz 486DX4 processor
- ◆ 4Mb, 8Mb or 16Mb RAM expandable to 32Mb
- ◆ Removable 1.44Mb 3.5" floppy drive
- ◆ Removable 520Mb, 810Mb or 1.2Gb IDE disk
- ◆ 9.4" STN VGA mono, 10.4" dual scan colour or 9.4" TFT colour screens
- ◆ 2 PCMCIA Type II/1 Type III slot
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- ◆ The latest NiMH rechargeable battery is removable. There is full advance power management
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Software**

See Software Section for details

- ◆ Microsoft® Windows 95
- ◆ Lotus 1-2-3 v5 spread sheet
- ◆ Lotus Ami Pro v3.1 word processor
- ◆ Lotus Approach v3 database
- ◆ Lotus Organizer v2
- ◆ Lotus SmartPics graphics
- ◆ Intuit Quicken v4 personal finance pack
- ◆ AutoRoute Express v3 road atlas



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Colossus dual scan colour notebook
486DX4-100

with 540Mb hard disk, and 8Mb RAM

£1499

+ VAT

Best Buy 3

Colossus TFT colour notebook
486DX4-100

with 540Mb hard disk, and 8Mb RAM

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+ VAT

Other Options

RAM upgrade per 4Mb.....	£140
Sound card module.....	£80
Carry case.....	£25
Port replicator (mini docking station).....	£95
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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® 133MHz Pentium® processors, 1.6Gb enhanced IDE hard disk, a minimum of 16Mb RAM, the fastest 64-bit 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 six speed full-feature multimedia.

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**PC TV
READY**

APPROVED for communication systems specified in the conditions in them



System Specification

- ◆ Intel 133 or 166MHz Pentium® processor
- ◆ Intel Triton Chipset with 256K external cache
- ◆ 16Mb or 32Mb RAM expandable to 128Mb
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- ◆ Microsoft Windows 95
- ◆ 12 months warranty extendable to 5 years

Multimedia Hardware

- ◆ Six speed IDE CD-ROM drive
- ◆ 16-bit high quality sound card
- ◆ Twin premium 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
- ◆ Novell PerfectOffice suite with Word Perfect, Quattro Pro, Presentations, Envoy, GroupWise and InfoCentral
- ◆ 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
- ◆ Doom, Blake Stone, Pinball and Raptor Games

CD Multimedia Software

- ◆ Infopedia Encyclopaedia CD
- ◆ WinTutor 95
- ◆ World Atlas CD
- ◆ Bodyworks CD
- ◆ EZ Language Multimedia CD
- ◆ Time Almanac CD
- ◆ UFO for Windows CD
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Just Look At The Spec !

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|--|--|--|
| <input checked="" type="checkbox"/> 133MHz, or 166MHz Pentium® CPU | <input checked="" type="checkbox"/> 16Mb or 32Mb RAM; 256K cache | <input checked="" type="checkbox"/> Six speed multimedia |
| <input checked="" type="checkbox"/> 1.6Gb enhanced IDE hard disk | <input checked="" type="checkbox"/> 64-bit Graphics with 2Mb video RAM | <input checked="" type="checkbox"/> 9 bay Colossus tower |
| <input checked="" type="checkbox"/> 17" NI MPRII screen | <input checked="" type="checkbox"/> 3.2Gb tape back-up | <input checked="" type="checkbox"/> The best software bundle in the UK |
| <input checked="" type="checkbox"/> 28.8 Fax/data modem | <input checked="" type="checkbox"/> Advanced PC TV with Teletext | <input checked="" type="checkbox"/> Superb CD multimedia titles |

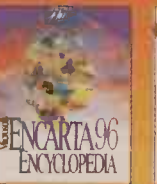
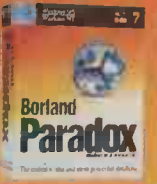
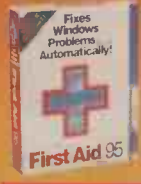
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First Aid 95
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Quicken 4
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Print Studio
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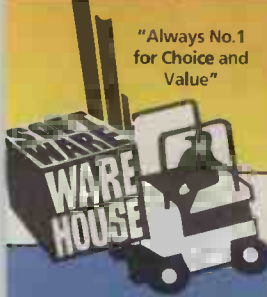
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Encarta 96
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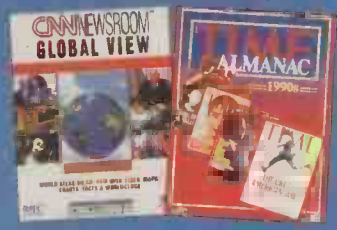
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See page 6

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Windows 95

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See page 5



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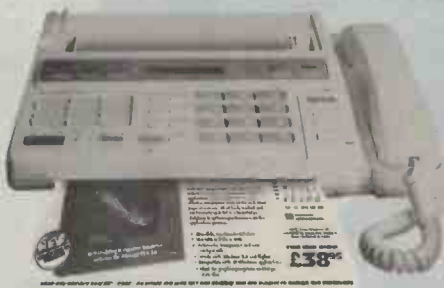
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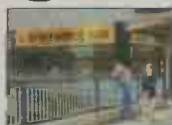
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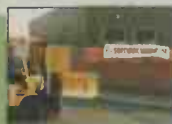
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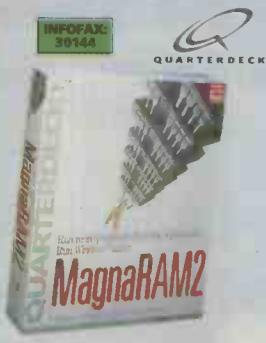
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Run more programs. Run larger programs. Run Windows faster.

End the frustration of low Windows memory without spending money on more RAM chips. The powerful memory multiplier capability of Quarterdeck MagnaRAM gives you the maximum available memory for your Windows programs. When Windows runs out of physical RAM chips it looks to your hard drive to store data in "virtual memory". Of course virtual memory is not as fast as RAM so your system slows down. MagnaRAM solves this problem by providing more memory space for your programs. Quarterdeck MagnaRAM works right out of the box so you will instantly gain the power and speed to make your system more efficient than ever - no chips to install, no technicians to pay.

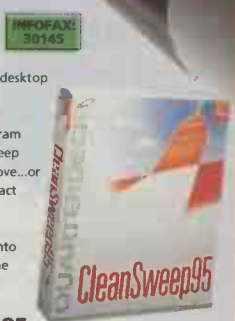


MAG021 MagnaRAM 2 **£34⁹⁵**

Save mega-bytes with CleanSweep 95!

CleanSweep 95 is the essential 32-bit uninstaller program for Windows 95.

There's simply no other way to clean up the remnants of your old Windows desktop and manage your new 32-bit environment properly. Best of all, CleanSweep 95 is simple to use. CleanSweep 95 monitors your system and completely and effectively hunts down and removes any 16 and 32-bit program and files to save disk space. You select your level of interaction: let CleanSweep 95's automated wizards determine which components of a program to remove...or choose to confirm every action yourself. These files can be placed into compact packages which can be deleted completely, backed up to any location in compressed form, archived so they can be brought back with a mouse click, moved to another location on a local drive or the network or transported onto another machine. Any user who needs to make room on a disk or remove the clutter, will need and appreciate the simplicity, power and effectiveness of CleanSweep 95.



CLE010 CleanSweep 95 **£29⁹⁵**

WINProbe 4 - solves PC problems!

Operate your system at peak performance.

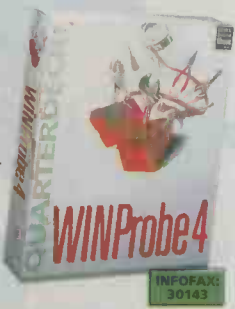
Quarterdeck WINProbe, the troubleshooter toolbox is essential for every Windows and Windows 95 user to diagnose the source of hardware and configuration problems and optimise Windows configuration.

Few things are more aggravating than computer downtime and lockups - you waste your time and your money. WINProbe will troubleshoot your PC with over 200 individual tests including tests to your memory, system board, multimedia adapters and your hard drive. You will be able to quickly and accurately identify the source of problems at the best possible time - before they ever happen, so you can fix them in time.

WINProbe uncovers the secrets to faster Windows and Windows 95 operation. Simply click on the Tune-Up button and WINProbe gives you hundreds of suggestions on how to speed up your system.

WINProbe also includes great value bonus software:

- A complete Windows and Windows 95 uninstaller to rid your PC of unwanted programs and files
- CD Certify Pro, the CD troubleshooter toolbox
- INI and Registry editor for Windows and Windows 95
- Quarterdeck Mosaic, the fastest way to get on the World Wide Web



WIN060 WINProbe 4 **£49⁹⁵**

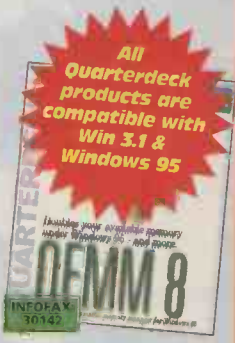
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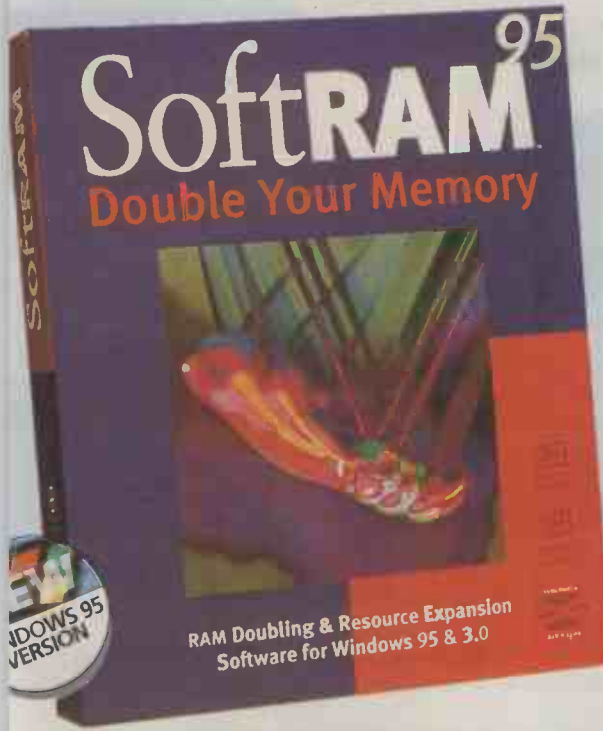
More memory for programs, networks and multimedia

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- Fewer crashes and memory problems. QEMM takes into account troublesome software, so your system runs better
- Load more DOS programs and work better in Windows. QEMM finds more conventional memory needed by Windows and the DOS
- Disk compression without the memory penalty. QEMM's exclusive stealth technology saves 40K of precious DOS memory for Double Space or Drive Space users.
- No more memory headaches! After installing QEMM you'll have lots of memory for CD-ROM drivers, soundcard drivers and games. QEMM is recommended by many games makers.



QEM005 QEMM 8 **£45⁹⁵**

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Now you can double your existing memory in software with the fastest and most inexpensive way to add RAM to your Windows 3.x or Windows 95 PC.

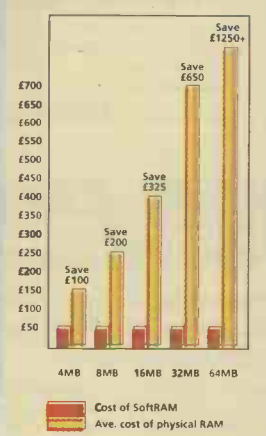
SoftRAM is an innovative Windows-Software-Only technology which approximately doubles the amount of RAM available to Windows applications.

And with SoftRAM's one-click, one-time installation you eliminate the hassle and expense of opening your PC to install hard RAM.

SoftRAM's unique RAM Analyst dynamically reviews the memory requirements of all your applications and pre-calculates the most effective compression method for each RAM page of memory. All of this is tracked and continuously updated in a knowledge database to optimise performance on the applications you use.

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Page 3



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Microsoft Leisure Titles

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MIC314 MS Fury³ **£29**



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MIC353 MS Cinemanía 96 **£19⁹⁵**



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MIC208 MS Creative Writer CD **£22**
MIC126 MS Creative Writer 3.5" **£22**

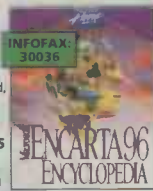


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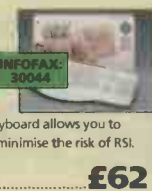
MIC350 MS 3D Pro SideWinder **£39⁹⁵**



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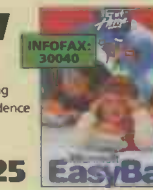
MIC169 MS Golf 2.0 **£19**



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Discover the easy to use pointing device that gives kids the confidence to use a computer. Includes Microsoft Explorapedia.

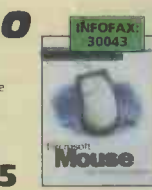
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MS Mouse 2.0

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Flight Sim 5.1

More detail & realism than before!
Feel the thrill of full throttle flight. Experience the white-knuckle intensity of a near crash landing. With stunning photo-realistic scenery and authentic flight sounds, Microsoft Simulator is as real as it gets.

MIC270 MS Flight Sim 5.1 **£25**



MS Publisher for Windows 95

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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.

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Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	28

Page 4

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Although not included in Microsoft Office or Office Professional, when added to MS Office it will integrate seamlessly, and provide the best business planning tools available today.

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New interface: Smarter, easier to use interface features longer file names and simpler file and document management.

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For Office 4.2 & 4.3 See Page 28

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New Version of World's Best Selling CAD Software

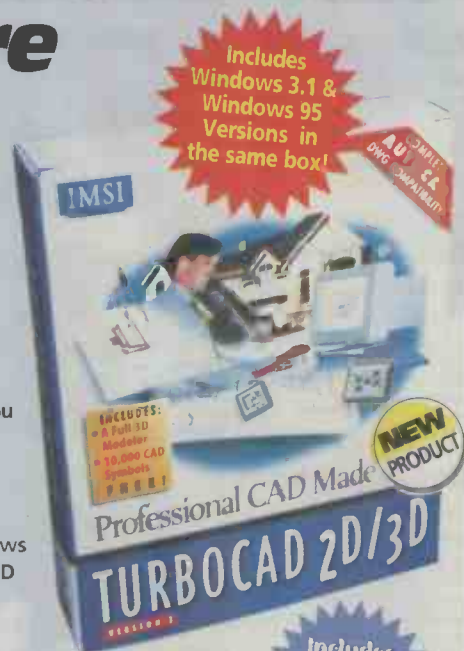
TURBOCAD 2D/3D V3

Stunning NEW features!

TurboCAD Version 3 is out - and it's a killer! FACT! This latest version of the worlds most popular CAD program is arguably the most exciting and significant new product release in the CAD software environment for years. It has simply hundreds of new features and bags of added value to make your designing faster and easier than ever - for both the professional and entry level users. AND, TurboCAD now has a full featured professional 3D module with rendering and ray tracing so you can see your designs on screen exactly as they'll appear in reality.

We didn't stop there! TurboCAD V3 is now so powerful that it will read and write native DWG and DXF files from any other program (including AutoCAD), supports both Windows 3.1 (16 bit) and Windows 95 (true 32 bit), and includes an awesome 10,000 professionally drawn CAD symbols, absolutely FREE! Put TurboCAD to the test today, and you'll quickly discover that it outclasses the competition by miles!

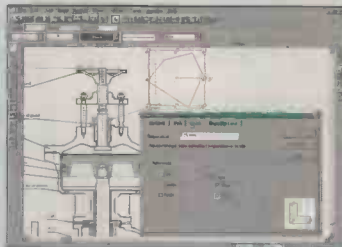
Best of all, it's still only at an unbelievable RRP of £99.95 (excl. VAT) and with a Software Warehouse price of only £59.99 you will not get a better value for money CAD offering this decade!. GET IT!



Over 10,000 symbols can be added simply by dragging and dropping directly to the point of insertion.



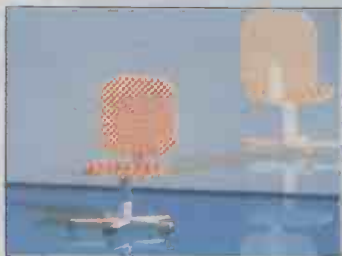
NEW Object property sheets make editing your drawings fast and easy!



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Drag-And-Drop Symbols	YES	NO	YES
Intuitive, MS Office-Compatible Interface	YES	NO	NO
User-Selectable Scale & Drawing Size	YES	NO	YES
Local, Context-Sensitive Menus	YES	NO	NO
World And Paper Units Instant Toggle	YES	NO	YES
Associated Crosshatching	YES	NO	YES
Select By Entity Type Or Attributes	YES	NO	NO
CAD Edit Bar With Constraints	YES	NO	NO
OLE 2.0 Client, Server & In-Place Editing	YES	NO	NO
Parametric Macro Language	YES	YES	NO
AutoCAD DWG/DXF Compatibility	YES	YES	YES
FREE Technical Support	YES	NO	YES
Symbols Included	10,000+	MINIMAL	500+

TURBOCAD's 3D MODELLER

	YES	NO	NO
One Step 3D Shape Tools	YES	NO	NO
"Virtual Trackball" for 3D rotations	YES	NO	NO
Add, Subtract, Combine Shapes	YES	NO	NO
3D Dimensioning	YES	NO	NO
Rendering & Ray Tracing With Light Sources	YES	NO	NO
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Other Cool New Features Include:

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- Online tutorial to get you going fast
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- Drag and Drop symbol libraries
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Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	32

Page 6



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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.

Includes 50 pre-designed forms and over 200 clipart images

FORM18 FormTool Gold..... **£49⁹⁵**

4 EASY STEPS TO FORMS AUTOMATION...

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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 Tutors give you database reports and industry standard labels at the click of a button. Even fax your form directly from your computer!



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WinDelete V2

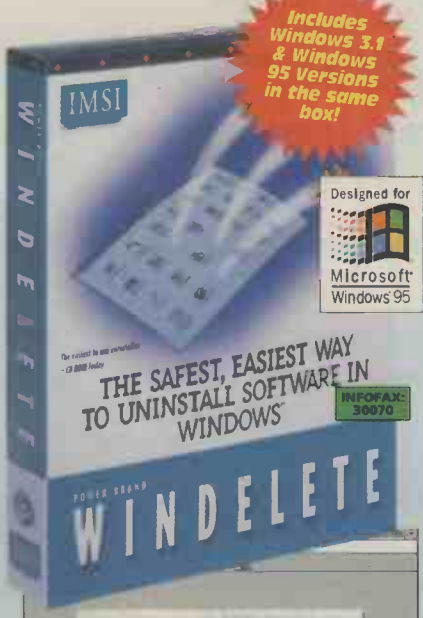
No other un-installer is safer or more thorough than WinDelete!

The new WinDelete Version 2 is the latest version of this award winning Un-Installer program. This release offers new features and enhancements that make it safer 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 reviewed before being executed, and the new range of tools facilitates better system management.

's Green-Yellow-Red "traffic light" colour coding helps prevent accidental deletion of vital files, but allows all the loss to be removed, with an Undo/Restore option when you change your mind.

Features include:

- Intelligent un-installing of virtually every file type including Windows and DOS applications CD-ROM and display device drivers, uninstalls system support files, fonts, temporary files, backup files, duplicate files, orphan files etc;
- Direct access to INI files with View, Edit, Backup, and Save;
- System Consultant that analyses your system and suggests changes to improve performance;
- System Tuner with hundreds of tips for optimising Windows performance and much more.



Includes Windows 3.1 & Windows 95 Versions in the same box!

Quick Reference Card	
Install Install using WinDelete	Uninstall Remove an application
Duplicate Finder Find duplicate files	Graph Viewer Display of system file use
System Tuner Fine tune your system	Log Viewer Display & WinDelete log file
System Editor Edit important system files	System Consultant Display system information

WIN50 WinDelete Version 2 **£29⁹⁵**

Next-day delivery only £6⁹⁵ E&OE. All prices are plus VAT and delivery and are subject to change and availability.

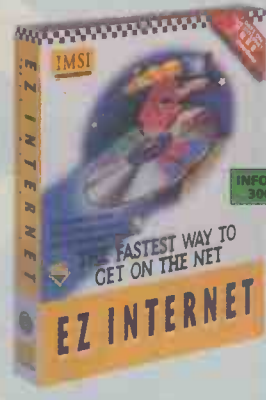
EZ Internet for Windows

The best, fastest way to get yourself on the Internet.

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.

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EZ1001 EZ Internet for Windows **£29⁹⁹**



Ready Set Grow!

The fun, interactive program that makes parenting easy(er)!

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. Store vital dates, events and emergency numbers with the ultimate "handbook" for any couple expecting, or with young children.



RS010 Ready Set Grow! **£28⁹⁵**

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Page 7

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EVERYTHING FOR YOUR PC - NEXT DAY!

Mind-expanding multimedia titles from Softkey for Windows 95



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SOFT08 ArtRageous **£16⁹⁵**

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This CD-ROM contains 12 interactive chapters for you to work through at your own pace. There are videos, narrations and graphs and more than 150 quiz questions providing practice and assessing your progress.

SOFT09 Teach Yourself Calculus **£16⁹⁵**

Leonardo The Inventor

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SOFT06 Leonardo The Inventor **£16⁹⁵**

Pathways Through Jerusalem

With carefully-crafted video and meticulously recreated historical sites, Jerusalem comes alive in this interactive movie. Includes a database with easily accessible information via keywords and alphabetical searches, and a timeline which contains an overview of 3,000 years of history.

SOFT10 Pathways Through Jerusalem **£16⁹⁵**

Explorers

A fully interactive and historically accurate title that lets you study the journeys of the greatest explorers. Includes an extensive timeline, interactive maps, and an authentic period musical score.

SOFT04 Explorers **£16⁹⁵**

Martial Arts Explorer

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SOFT02 Martial Arts Explorer **£16⁹⁵**

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A powerful multimedia resource which is designed to make learning fun and easy for all age groups. Includes videos, photos, animations and recordings throughout eight complete reference works.

SOFT03 Infopedia **£16⁹⁵**

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SP1001 PowerAlbum **£16⁹⁵**

WinTutor 95

WinTutor 3.1 95 will teach users the operating system Windows 95. Includes: Computer Basics, Learning Window 95, Moving from Windows 3.1 to Windows 95, Moving from the Mac to Windows 95, Windows 95 Quick Start

SOFT113 WinTutor 95 **£16⁹⁵**

News

Our new Internet Site goes live in January. Using our new service you will be able to get the latest information and pricing which will be updated daily.

Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	32

Page 8

Key Kids makes learning fun!

Softkey's first line of children's entertainment products initially includes four titles for children aged from three to eight years old. All titles feature loveable characters, animation, music, video, interactive games and learning tools to help children read, write and problem solve whilst having fun.

Pocket And Tails Go Exploring

Two kangaroos go exploring learning about people, plants, animals and many more exciting parts of the world. Skills learnt include: colour recognition, letter and sound matching, shape and size identification, listening and speaking.

SOFT27 Pocket & Tails Go Exploring **£12⁶⁵**

Pocket And Tails Go To Town

Together with the two kangaroos wander through a busy town. There are hidden surprises to uncover and exciting places to explore. Skills enhanced include: counting, the alphabet, numbers, sound matching, and computer navigation.

SOFT28 Pocket & Tails Go To Town **£12⁶⁵**

Otters Adventure

Join Ozzie the Otter as he and his friends have exciting adventures. With five colourful environments and three different skill levels. Skills learnt include: problem solving, observation, memory skills, ecology awareness, computer navigation skills and much, much more.

SOFT25 Otters Adventure **£12⁶⁵**

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Help Hyperman save the universe from total destruction.

Our planet is in danger! Join Superhero Hyperman and Emma C. Squared, kid genius, as they set out to save the universe from whacky extraterrestrial villains. Along the way, you explore scientific puzzles, using what you learn to help Hyperman capture the aliens. The adventures of Hyperman is a completely interactive, full motion, animation game and comes with 9 cool trading cards and a puzzle-filled adventure book.



BM014 The Adventures of Hyperman..... **£27⁹⁵** INFOFAX: 30014

Peter and the Wolf Kid Riffs

Introduce your child to the world of classical music.

Peter and the Wolf opens the world of symphonic music for children, setting the stage for a lifetime of enjoyment. Including music appreciation games, interactive escapades and easy program navigation, this classic children's tale is made both educational and fun. Young viewers can start, stop or select the segments and characters they wish to see while being taught music appreciation and instrument sound recognition.



IBM018 Peter and the Wolf..... **£19⁹⁵** INFOFAX: 30015

Make music! Cut loose!

Kid Riffs allows your children's natural creativity to lead the way, even if they don't have any musical training. With Kid Riffs you can experiment with any of over 100 instruments, compose, record and playback tunes you create, combine your compositions with prerecorded riffs and create hundreds of musical effects providing endless possibilities. Now it's easy for children of all ages to make music without having to spend years mastering an instrument or sound mixing techniques.



IBM016 Kid Riffs **£19⁹⁵** INFOFAX: 30016

Quest For Fame

Jam with Aerosmith in the ultimate rock'n'roll game.

Quest for Fame will take you from obscurity to rock'n'roll superstardom! You don't have to be a musician to be a star in this virtual music game. Along with the software you get an electronic lectrum that has a thin cable to connect to your aerial port. As the music plays you have to strum along, moving the plectrum up and down either in thin air, against guitar strings or even a tennis racket and you will hear the results. Play along with a moving image that shows you the correct timing to improve your guitar playing. Play well and earn a once in a lifetime tadium gig with Aerosmith. Quest for Fame has four skill levels, stunning graphics, digitised sound.



BM019 Quest for Fame..... **£29⁹⁵** INFOFAX: 30017

Rapid Assault

The enemy is out there!

The United World Council will release you from prison but there's a catch. You have to track down Spectre, a ruthless criminal who's massing an arsenal of weapons to overthrow the government. The risks are high but it's your only way out. There are 20 missions and multiple game scenarios to provide endless playing opportunities. If you succeed, you win your freedom, if you fail no-one's coming to help you. Startling 3D graphics, 16 viewing angles, digitised sound effects and music add to the realism and suspense in this fast-paced combat environment.



IBM017 Rapid Assault..... **£19⁹⁵** INFOFAX: 30018

Triple Threat

3 explosive combat games on 1 CD.

Quatra Command: You are ordered to investigate sightings of an enemy battleship but your communications are severed and you must make the combat decisions and take on the enemy single-handed.
F-18 No Fly Zone: You're caught in a life and death battle as you attempt to neutralise enemy aircraft in the "No Fly Zone"
Black Rein: The enemy will not give up easily. The survival of our country depends on your strategy, skill and weapons expertise.



IBM015 Triple Threat - An Arcade Adventure..... **£19⁹⁵** INFOFAX: 30019

Dorling Kindersley Europress

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.



DK009 DK Encyclopedia of Nature..... **£32⁹⁵** INFOFAX: 30020

History of the World

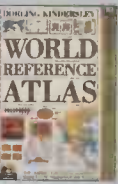
Uncover fascinating facts and stories through history. Watch a medieval archer loading and firing his longbow, hear the passion in the actual spoken words of Martin Luther King, and share in the joy of German crowds as they tear down the Berlin Wall. Investigate historical stories, facts and artefacts from around the world with a simple mouse click.



DK007 DK Eyewitness History of World CD..... **£32⁹⁵** INFOFAX: 30021

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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.



DK006 DK World Reference Atlas CD..... **£44⁹⁵** INFOFAX: 30022

Cat and Bird

The ultimate multimedia guides to the worlds of cats and birds.

Hear the range of sounds from the cat family, see them in action and find out what makes cats such supreme hunters. You will also find out where every member of the wildcat family lives, what it eats and whether it is threatened by its natural habitat. You will also hear folk stories that surround cats and discover works of art inspired by their mysterious ways.

Enter the extraordinary world of the masters of flight, from the huge Andean condor that soars on its four metre wingspan to the amazing, flightless ostrich that stands more than three metres high. Understand the world of birds and it's effect on human culture.



DK011 DK Cat CD..... **£24⁹⁵**
DK012 DK Bird CD..... **£24⁹⁵** INFOFAX: 30023

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Page 9

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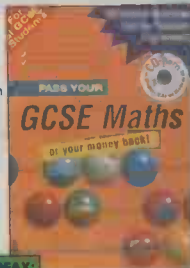


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- Interactive maths examples are included to help the student understand the more difficult concepts, and to make the product more engaging
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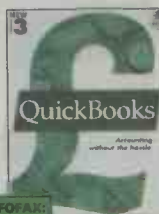
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YOU002 You Don't Know Jack ... **£24.95** AFT006 After Dark 95 **£17.95**
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PRO003 Procomm Plus 2.1 **£56.95**

Accent Duo

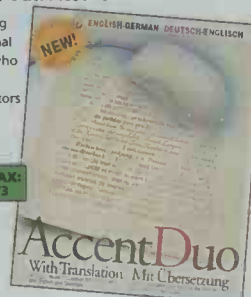
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French / English	✓	✓	✓	✓	✓	✓	✓
English / German	✓	✓	✓	✓	✓	✓	✓
German / English	✓	✓	✓	✓	✓	✓	✓
English / Italian	✓	✓	✓	✓	✓	✓	✓
Italian / English	✓	✓	✓	✓	✓	✓	✓
English / Spanish	✓	✓	✓	✓	✓	✓	✓
Spanish / English	✓	✓	✓	✓	✓	✓	✓

INFOFAX: 30173

ACC012 Accent Duo Spanish **£79.95**
 ACC009 Accent Duo French **£79.95**
 ACC011 Accent Duo Italian **£79.95**
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Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	28

Page 10

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- PS1002 V34 28.8 Gold Card **£194⁹⁵**
- PS1003 V34 28.8 Gold Drive PCMCIA Reader..... **£99⁹⁵**

Tel-Me

The first on-line information service designed for your PC.

Get the latest news instantly, find phone numbers faster, avoid jams with up to the minute traffic reports, choose where to stay, eat or visit anywhere in the UK. Lets your PC do the hard work, so searches take only a few seconds and Tel-Me's "Hardly On-Line" technology keeps your phone bill right down. Plus FREE Internet E-Mail.



- TEL-ME **£49**
- TEL-ME with Modem **£99**

Pace NetLink Fax/Modems

NetLink and NetLink Gold are the complete packs for accessing the world of the Internet quickly and easily.

Each pack contains all the modem accessories you will need to get you up and running on the Internet. Both packs include free Internet software and 21 days free Internet connection time. You will also get an Internet guide book that will help you get 'surfing' the Internet in under 10 mins!

The free software provided will give access to sites such as FTP, Telnet, Gopher, The WorldWide Web and many other sites that you may wish to visit. The NetLink packages are the affordable way to send and receive data and faxes all from within one device.

NetLink GOLD features:

- All data speeds to V34bis (28,800 bps)
- All fax speeds to V17 (14,400 bps)
- Group III EIA Class 1 send and receive
- V42 / MNP 4 software error correction
- V42bis / MNP 5 software data compression



- 70015 Pace NetLink **£98⁹⁵**
- 70016 Pace NetLink GOLD **£183⁹⁵**

Next-day delivery only £6⁹⁵ E&OE. All prices are plus VAT and delivery and are subject to change and availability.

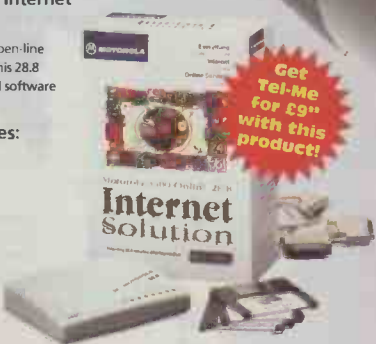
Motorola 3400 Internet Solution Data/Fax Modem!

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 28.8K Internet solution includes all the necessary hardware and software that you need to get your PC online to the Internet.

Motorola 3400 28.8 fax/modem features:

- High speed data transfer
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- 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 BABT 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.



Get Tel-Me For £9⁹⁵ with this product!



INFOFAX: 30127

Motorola Online Bundle 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 3400 (with On-line)..... **£155⁹⁵**
- MOT002 3400 (without On-line) **£141⁹⁵**



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 computer 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 phonenumber - 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 finger tips. 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 file application you use). The new SmartSend reduces file transfer time 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 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, chat-back, keyboard disabling, screen blanking, and more. ReachOut now supports WinStock (TCP/IP), which means you can access another PC across the Internet or any TCP/IP network.

- REAO02 ReachOut Remote Control Version 5.0 **£78⁹⁵**

Network Version

You can give support to any other 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 modern sharing option.

- REAO07 ReachOut Remote Control 5-User LAN..... **£147⁸⁵**



ReachOut V5.0 Won More Awards in 95 Than Any Other Remote Control Software!

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Ventana - The Internet Publishing Pack For Home Page Power

Everything you need to create professional Web pages

The secret to building a powerful, profitable presence on the Internet's World Wide Web is in this box - cutting-edge tools, professional techniques and insider tips - the most comprehensive, affordable Internet solution available!

- Professional publishing toolkit - Unprecedented array of publishing software: a platform-independent package for creating attractive, effective Web documents. Includes HoTMetal PRO (the hottest HTML editor on the Web), Netscape Navigator, a variety of image-editing tools and much more!
- Publishing tips from the pros - the 500-page HTML Publishing on the internet, featuring insightful tips on creating powerful Web pages plus advice on applying HTML tags; working with forms; adding graphics, sound and video; and much, much more!
- Innovative CD-ROM-based Internet guides that let you combine money-saving off-line browsing with instant online hyperlinks to exiting Web sites! Includes electronic versions of two bestselling Ventana books: Walking the World Wide Web - featuring a personalized, annotated tour of the Web's graphical riches. Netscape Quick Tour - the first in-depth guide to the hottest browser software to hit the Net.

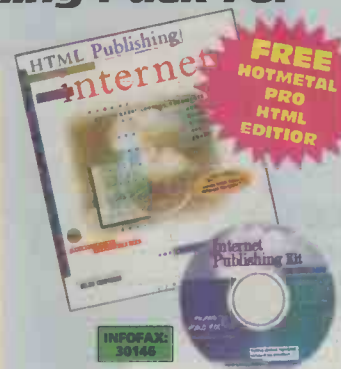
Free Interactive book / CD-ROM

Three bestselling Ventana guides! Includes a comprehensive guide to internet publishing plus a unique CD-ROM - containing the full text of two of Ventana's top-selling Web titles, fully hyperlinked for easy internet touring!

Complete Publishing Toolkit

- HoTMetal PRO - the industry-leading HTML editor
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- Internet Assistant - Microsoft's new document converter
- RTF to HTML - converter for word-processed files
- Panorama - SGML document reader
- Adobe® Acrobat® Reader - Portable Document Format (PDF) reader
- Common Ground Viewer - for viewing formatted documents
- HTTPD server and MWAC server - turn your PC into an Internet server
- Polyform - interactive forms designer
- CGI back end program - Microsoft Access query tool
- giftrans.exe - transparent.gif graphics converter

& Free Online Companion



FREE HOTMETAL PRO HTML EDITOR

INT016 Internet Publishing Pack **£87⁹⁵**

Internet Phone

Forget costly long-distance bills! Internet Phone literally transforms any PC into a tool for two-way conversations - with full two-way sound. Talk to a friend, over the internet for not a penny over your regular Internet connection fee.

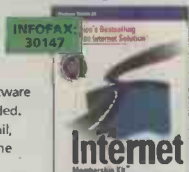
Internet Phone **£39⁹⁵**
 Internet Phone (2 pack) **£69⁹⁵**



Internet Membership Kit™ V2.0

The No.1 Selling All-in-One Internet Solution!

Ventana Mosaic™ - a fully licensed and commercially supported version of Enhanced Mosaic™ from Spyglass™ Inc, the most widely recognised World Wide Web browser. Newsreader - enables users to read and post to newsgroups anywhere in the world; software highly acclaimed for ease of use and custom capabilities. complete documentation included. Easy Graphical E-mail and Browsing - simple point and click software with built-in e-mail, Gopher, FTP, Telnet and more. Includes an elite shareware selection for Macintosh and the popular Chameleon Sampler™ from NetManage™ for Windows. Special Access Offer with easy one button sign-on - Instant access to IBM Internet Connection service provided by IBM Global Network, with local phone numbers as well as 800-line service. Sign-up takes only a few minutes, via a customized Ventana user interface.



INT 014 Internet Membership Kit™ V2.0 **£39⁹⁵**

World Wide Web Kit™

The World Wide Web is where the Internet really shines - with graphics, video, sound and live links between remote sites. The kit offers everything users need to navigate and stay up-to-date on the Web's extensive graphical and audio resources.

INT015 World Wide Web Kit™ **£38⁹⁵**



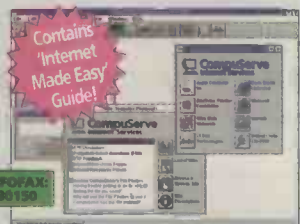
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Internet Roadside Attractions
 Innovative, interactive listings guide featuring full text on CD-ROM and hyper-linked for instant connections on-line.

CompuServe Value Pack for Windows

Get on the information superhighway with the world's premier on-line information service

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. 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.



Contains 'Internet Made Easy' Guide!

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 **£22⁹⁹**

Norton 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.

New! Norton System Doctor

Runs in the background monitoring resources and makes your Windows 95 system self-tune.

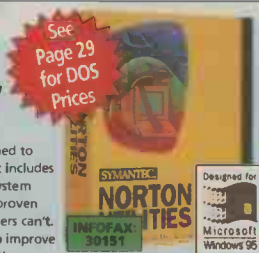
Exclusive! Emergency Rescue Disk

Includes a ready-made bootable disk that will restart and repair your system even when Windows 95 won't load.

Norton Disk Doctor

Provides diagnosis and repair of standard or compressed files.

NOR031 Norton Utilities for Windows 95 3.5" **£83⁹⁵**
 NOR032 Norton Utilities for Windows 95 CD **£83⁹⁵**
 NOR032 Utilities Trade-Up **£48⁹⁵**



See Page 29 for DOS Prices

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 **£53⁹⁵** NOR035 AntiVirus Trade-Up **£27⁹⁵**



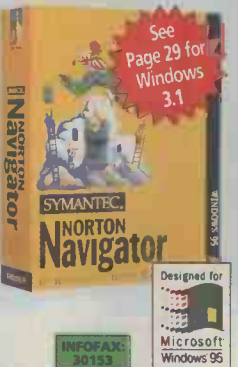
Norton Navigator

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 application or from the Windows 95 explorer. You can even access Internet FTP sites directly from the file manager.

NOR037 Navigator Trade-Up **£33⁹⁵**



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Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	32

Page 12



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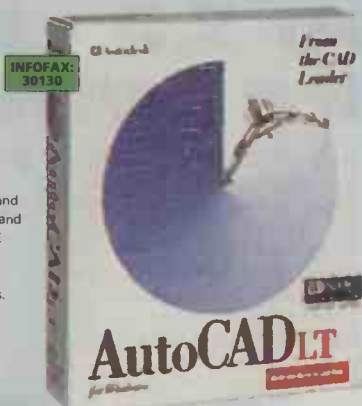
EVERYTHING FOR YOUR PC - NEXT DAY!

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 extrusion, 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.



AutoCAD LT Release 2 for Win.....**£352⁹⁵**

AutoSketch 2 for Windows

AutoSketch for Windows combines CAD precision, drawing flexibility and Windows simplicity in one!

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.

AUT027 AutoSketch 2 Win**£89**

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**

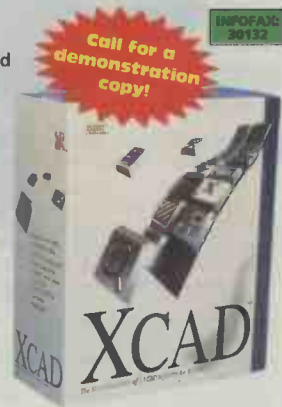


XCAD 3.0 for Windows

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. 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 and 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**

MathCAD V6 Standard Edition

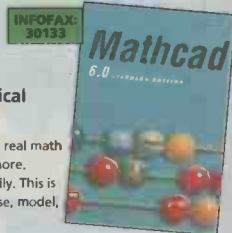
The powerful calculation software package for technical professionals!

MathCAD V6 is the powerful calculation package that solves problems using real math notation. The ideal package for engineers, scientists, mathematicians, and more. Combine your advanced math work with text and graphics - quickly and easily. This is the first complete problem-solving environment that lets you explore, analyse, model, test, refine and document even the most complex problems.

MathCAD's Many Features Include:

- Windows 95 compatible, runs on 3.1 or NT
- World Wide Web aware
- Find all roots of a polynomial
- Simultaneous equation solver
- Polar, contour and parametric plots
- Fast Fourier Transform
- Complex numbers
- Symbolic algebra
- Animation
- Trace and Zoom

MAT004 MathCAD V6 Standard Edition**£169**



Auto Addressing System

The Auto Addressing System is a database that holds 1.6 million postcodes, covering all of UK, (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. In the system are 24 million individual addresses across 1.6 million postcodes. You can load the whole of the UK (taking up just 10Mb of hard disk space) or one of ten regions.



DD004 Auto Addressing System**£149⁹⁵**

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, Stampion and others. Alternatively, you can custom design any format of your own.

LAB003 Labels Unlimited for Windows**£26⁹⁵**

LAB001 Labels Unlimited for DOS**£26⁹⁵**



Toplevel

"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 Forms**£68⁹⁵**

TOP004 FastForms**£24⁹⁵**

TOP009 Forms /Win95**£68⁹⁵**

TOP008 FastForms /Win95 **£24⁹⁵**

Performance Now!

Employee appraisal - what to write and how to write it

If you've ever put off writing an employee review because you didn't have the time, or you just plain hate writing them, Performance Now! is for you. Evaluating employee is one of the most difficult tasks for a manager or superior, but a sensible employee review process is essential for improving communication and helping your employees become more productive. Features include dozens of performance elements, Intelli-Text write text for you, Language checker, built-in expert advice and much more.

ER022 Performance Now!**£108⁹⁵**

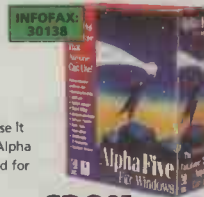


Alpha 5 Home & Business Edition.

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.

ALP010 Alpha 5 Home and Business Edition (Win)**£39⁹⁵**



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- 2 4,000 different products
- 3 Order before 4pm and use tomorrow
- 4 Credit card charged on despatch
- 5 Buy mail order or retail
- 6 Always lowest prices
- 7 No hidden surcharges
- 8 Free technical support
- 9 Award-winning service
- 10 8am-8pm (Mon-Fri)

page 13



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*How to use & charges see page 2

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FileMaker Pro 3.0 - Easier to use and more powerful!

When it comes to managing, presenting and sharing information, you won't find a more versatile database program than Filemaker™ Pro software. It's the network-ready, easy-to-use relational database for workgroups and end-users with built-in support for relational tables.

With Filemaker Pro 3.0, an array of sophisticated graphics tools gives you access to powerful layout and organisational features without having to learn complicated programming commands. You can instantly sort

and search through your data by any criteria you choose - to create and update mailing lists, prepare invoices and purchase orders, and manage a host of other functions from inventory to sales reports and project tracking.

Filemaker Pro 3.0 makes it easy for anyone to design visually appealing, professional-looking custom reports and forms. Or you can use its pre-designed templates to get productive even more quickly. Then easily share files across a network with colleagues with having to make file translations.

New features in V3.0 include:

- **International Enhancements:** Use system format alert, additional script steps and functions, index and sort individual fields

using different languages

- **Relational capabilities:** Ability to place a field on a layout from another file, allows multiple fields from multiple related records to be displayed in a section of layout
- **Object Linking and Embedding (OLE):** Picture fields renamed Container fields, support for OLE 2.0, OLE objects can be stored in Container fields or placed on layouts
- **Networking:** TCP/IP network plug-in, integration with FM Server allows indexing to be performed on the host, choose the network interface from a Network Interface Panel, peer-to-peer - 50 files, 50 guests
- **Error Capture:** Ability capture errors and handle them in the script



INFOFAX: 30091

CLA011 FileMaker Pro 3.0.....**£179**
CLA002 FileMaker Pro 2.1.....**£89**

NEW! ClarisWorks 4.0 for Windows

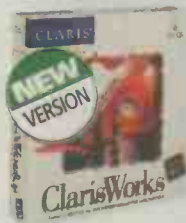
ClarisWorks 4.0 is the all-in-one choice for every business, home and education project, providing unparalleled power for all the things you do - letters, reports, budgets, presentations, proposals, flyers, mailing labels, term papers, newsletters and more.

New ClarisWorks 4.0 has an all-in-one design design that completely integrates word processing, spreadsheet, database, drawing, painting and presentation functions. So you learn just one program - not half a dozen separate ones.

You'll also appreciate the way it works, from its consistent menus to the effortless way it combines words, graphs, tables, images and even video on a single page.

ClarisWorks 4.0 is full of time-saving features that help you get your work done fast. Expert Assistants guide you through complex tasks and documents in a flash - from creating footnotes and mailing labels to formatting envelopes and laying out a newsletter. ReadyArt™ Libraries, pushbutton Shortcuts and FastReport™ capabilities automate your work. And the ExpressStyle™ feature formats anything - text, paragraphs, outlines, tables and graphics - in a single click.

CLA012 ClarisWorks 4.0**£93** INFOFAX: 30089



NEW! ClarisDraw for Windows

ClarisDraw gives you a graphics program that's powerful, yet amazingly easy to use.

You don't have to be a graphics professional to get the results you want with ClarisDraw! Its breadth of drawing, painting, image editing and text tools can bring to life any graphic you can visualise - from technical drawings and schematics to newsletters, posters and logos. ClarisDraw has comprehensive drawing tools, colours, fills, shadows and gradients, plus full-colour painting and dazzling image editing effects to enhance drawings, scanned images or photos.

You can also work more productively thanks to a host of smart features that automatically maintain alignment, size and connections between objects, even if you move or edit your drawing. And pull-down menus and keyboard shortcuts let you quickly access frequently-used features. Then there's its smart clip art libraries that put thousands of professionally-designed maps, figures and form elements, plus engineering, scientific and architectural art, at your fingertips. All you have to do is drag and drop an object onto the page. The result is much faster creation and editing than with traditional drawing packages.

CLA013 ClarisDraw**£39** INFOFAX: 30090



ASAP! Great looking reports and presentations quickly!

Imagine... The boss called just before noon: "The Big Guy wants you to present your proposal to the Executive Committee. Tomorrow 9AM. Be there. With handouts. Bye." Now, I'm pretty good on my feet, but good-looking presentations can take hours. And the software is scary! But new ASAP is amazing. I typed the whole concept into ASAP's outliner. I clicked to preview a beautifully laid out presentation. I presented - and it flowed. So they bought it - smiles and handshakes all round!

✓ Create Presentations Quickly and Easily

Simple user interface

With a simple user interface and intelligent Formatting, ASAP is easy to learn and easy to remember. The interface is laptop-friendly - a great tool for mobile presenters.

Total integration

ASAP is especially adept at handling text and presenting ideas. Users are able to

include work they have completed in another application by incorporating ASAP's integration features. Thoughts outlined in Word can be turned

into an ASAP presentation in a single click using the ASAP button on the Word toolbar.

Performance

ASAP lets users be more productive because it always gets the job done fast. ASAP has minimum system requirements (3.5Mb of disk space and 1Mb of free RAM). ASAP will run on any PC capable of running Windows 3.1 or Windows 95.

✓ Enhancing Creativity and Communication

Intelligent Layouts & Designs

By offering different ways of presenting text, ASAP offers a pardon from death by bullets. ASAP comes with 22 Intelligent Layouts to arrange ideas in a variety of ways such as Orbits, Pyramids, Cycles and Flows. Intelligent designs automatically

place the title, body and other elements on the page, ensuring each presentation has consistency. This allows the user to concentrate on the content and not worry about the look and feel of their presentation.

Intelligent Colour Schemes

With a variety of pre-formatted Intelligent Colour Schemes, ASAP guarantees a great looking presentation. You no longer have to worry about choosing the correct colour combination. With intelligent Colour Schemes, you will never see light text on a light background, and last minute changes are a snap and you get it right every time.

✓ Presenting with Confidence

Output Flexibility

ASAP satisfies almost every need - acetates, electronic projection, hardcopy or electronic distribution can be all used with

confidence and any presentation can be delivered in multiple forms. **Quick Editing & Arrangement** With ASAP users can edit quickly and effectively to make the presentation appropriate for today's audience. Logos can be changed. Customers names can be placed on each page. A last minute chart can be included to show the quarter's performance.

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£99

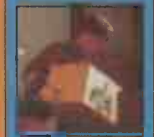
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News



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Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	32

Page 14



EVERYTHING FOR YOUR PC - NEXT DAY!

Complete Virus Protection With Dr. Solomon's Anti-Virus Toolkits

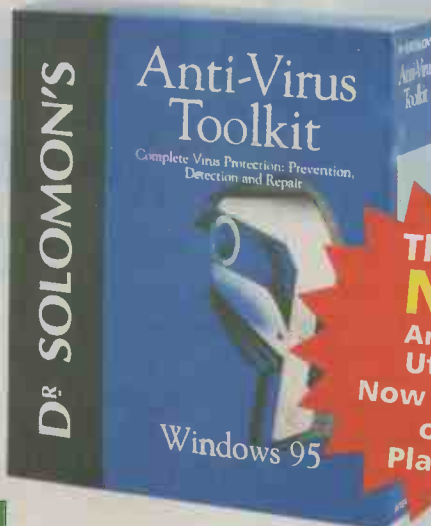
Dr. Solomon's Anti-Virus Toolkits are the UK's Number One anti-virus utilities. They are industry-renowned for combating all known viruses in DOS, OS/2, Windows, Netware and now Windows 95 systems.

Dr. Solomon's range of Anti-Virus Toolkits provide the best answer to the serious problems posed by viruses. Each toolkit is made up of basic programs geared to locate, identify and destroy existing viruses and then protect your system.

WINGUARD - on-access scanner to check all files and disks before access is allowed.

FINDVIRUS - on-demand scanner with the ability to carry out a more extensive check - even inside compressed files.

VIRUS GUARD - memory resident TSR only requires 9k of memory and can be loaded high. Checks every program for viruses before it is opened or copied.



The UK's NO.1 Anti-Virus Utilities!
Now Available on All Platforms

Why choose Dr Solomon's Anti-Virus Toolkit?

- Widely recognised as the most effective anti-virus product
- Award winning technology • Finds more viruses and finds them faster
- Simple to install and easy to use
- Comes complete with both on-line and paperback Virus Encyclopedia containing detailed information on hundreds of viruses and what they do.
- Restores boot and partition sectors and CMOS after known and unknown infections
- Scans archived or compressed files, those downloaded from bulletin boards and CD-ROM collections
- FREE technical support - 7 days a week, 24 hours a day
- Monthly or quarterly updates via post, CompuServe, CIX, Internet or BBS

INFOfAX: 30113

Dr Sol Antivirus v7 DOS Qtrly	£58⁹⁹
Dr Sol Antivirus Win + DOS Qtrly	£69⁹⁹
Dr Solomons Antivirus Toolkit Win 95	£74⁹⁹
Dr. Sol Virus Guard 5 User Str Pack	£174⁹⁹
Dr. Sol Antivirus For Netware Server	£239⁹⁹
Dr. Sol Antivirus Toolkit for OS/2.....	£98⁹⁹

Uninstaller V3.5

The No.1 selling Windows utility just got better!

Uninstaller is a simple utility that you can trust to clean up your system. Most Windows application place bits of itself hidden throughout your system. This takes up memory and can lead to rather a catastrophe if not dealt with effectively. Uninstaller 3.5 can uncover hidden files lurking in your system and remove them whenever you want to.

Not only does Uninstaller 3.5 safely clean Windows, it goes beyond just deleting applications - its unique technology allows you to:

Move applications and supporting data files

Move controls unruly directory structures by relocating applications to new directories or drives. Keeps all related files intact and updates all Windows settings. Put stuff where you want it. Take advantage of a second hard drive. Organise your system.

Archive seldom-used applications and restore them quickly with a single click.

Archive saves disk space by compressing and storing the programs you only use once in a while on your hard drive or floppies. The program's icon stays on your desktop marked as an archive - just click to restore.

Transport applications to other PCs with no re-install hassle.

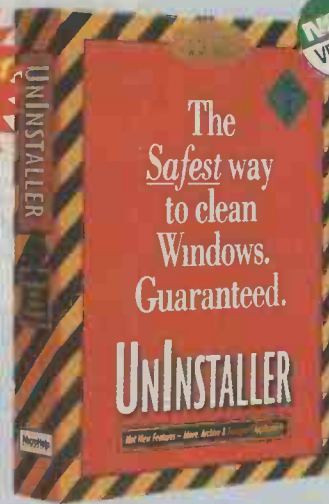
Need to take office work home? No problem. Transport replicates the applications and data you need to your home PC or laptop with a click. All preferences stay intact - no need to reinstall. True application portability, finally.

Uninstaller 3.5 also includes two new modules, 'Disk Data' and 'Windows Cleanup'. Keep tabs on your hard drive space with Disk Data, a colour-coded graphical display that shows which files and applications are eating up disk space. And with Windows Cleanup you can remove Windows files, fonts, drivers, wallpaper, sounds and screen savers. Before deciding to delete or not, you can view or do a trial run.

Unneeded Files Are Multiplying On Your Hard Drive

Uninstaller's Windows Cleanup roots out hundreds of unneeded files, including fonts, help files, clip art, backup files, temp files, sounds, screen savers and more. You can view, hear or try out every one before delete or archive it. Saves dozens of megabytes of disk space on the average PC.

Get Both Windows 3.1 & 95 In Same Box



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Features, Functions and Fail-Safes

- Duplicate File Finder - Duplicate File Finder discovers wasteful duplicated files throughout your system. Also, filters find all files with by type, date, size and location.
- Orphan Finder - Tracks down and eliminates "orphan" files left behind by applications you deleted manually before you got Uninstaller. You'll be amazed at the megabytes you discover!
- INTClean - Scrubs unneeded entries from Windows INT files to enhance your system's performance.
- Backups - A safe and simple backup and restore option in case you accidentally uninstall something you need.
- Disk Data - Your map through the jungle. Colour-coded graphics reveal which drives and directories are hogging disk space.
- Network Version - Uninstaller is available in a network version too, to root out waste throughout your LAN.

How Much Disk Space Will I Save?

Typical System	Savings
Delete Unwanted Applications	10 - 15 MB
Archive Seldom Used Applications	10 - 15 MB
Discover Wasteful Duplicate Files	5 - 10 MB
Remove Unneeded Windows Components	2 - 3 MB
Clean Out Help and ReadMe Files	8 - 15 MB
Archive Unused Clip Art and Sound Files	5 - 9 MB
Scrub Backup and Temp Files	3 - 7 MB
Your Total Savings	43 - 74 MB

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UN1006 Uninstaller 3.5

£35⁹⁵

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Page 15

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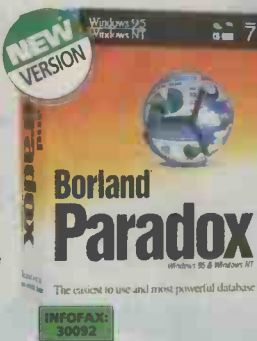
EVERYTHING FOR YOUR PC - NEXT DAY!

Borland Paradox 7

Paradox 7 is the relational database for Windows 95 and Windows NT.

Paradox 7 delivers what database users need most - ease of use, superior integration with other applications, query speed, reporting speed and a smooth transition to Windows 95. All types of users will benefit from Paradox's new experts that make common tasks simpler than ever.

Database developers will find Paradox's powerful application language and integrated development tools provide the best environment for creating and delivering powerful applications. And since Paradox 5.0 for Windows can share applications and data with Paradox 7, you can start using Paradox today and be ready for the future.



- Borland Paradox 7 for Windows 95 **£99**
- Borland Paradox 7 Suite Upgrade (Upgrade any integrated suite) **£79**
- Borland Paradox 7 Upgrade from earlier versions..... **£69**

Borland Delphi

RADical Windows application development.

Delphi - BYTE's Best Technology of Comdex 1994 - facilitates Rapid Application Development (RAD), letting you progress from prototype to production. The only Windows development tool that combines a high-performance optimising native code compiler with a visual design environment and integrated database access.



- DEL006 Borland Delphi CD **FROM £119⁹⁵**
- DEL006 Delphi RAD Pack CD **£124⁹⁵**

trueSpace V1!

Computer Shopper Editor's Choice 94

An award-winning, revolutionary package that integrates professional 3D modelling, rendering and broadcast quality animation within an easy-to-use, "natural" interface.

Until now, 3D modelling, rendering and animation was really 2D, enhanced with orthogonal views.

• 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. Most 3D formats such as DWG, 3D Studio, Wavefront, Lightwave, Image and others are supported. Import 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! 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. trueSpace is 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!



- TRU003 trueSpace **£148⁹⁵**

Macromedia Director V4

The most powerful authoring tool for multimedia production.

Only **£749⁹⁵**

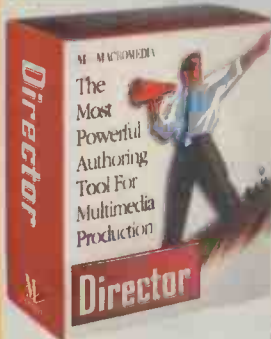
Director 4 for Windows is the tool of choice for all your multimedia needs. This popular program includes powerful features that let you easily combine, text, graphics, animations, sounds, digital video and interactivity to create dynamic multimedia productions. Use Director to create entertainment and education CD-ROMs, simulations, visualisations, digital publications, multimedia corporate presentations, electronic reference materials, software demonstration disks and more!

The uses of Director are virtually unlimited. Artists, Creative Directors, Corporate Presentation Specialists, students and publishers - in fact, more than 100,000 people currently use Director.

Director gives you precise control of virtually every element in your multimedia production. Import elements from digital video (AVI), sound files, graphic files (BMP, DIB, WMF, EPS, PIC, PCT, PNT, GIF, TIF), and much more. Use these Imported elements to cast, paint and score Windows to create and sequence your production and then use Lingo to add interactivity to your multimedia production.

- AC009 Director .. **£749⁹⁵**

INFOFAX: 30096



Macromedia Freehand

For Powerful Design & Illustration

Amazing Macromedia Bundle!



Get Director, MacroModel, Sound Forge & Adobe Premiere for only... **£999⁹⁵**



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:

- Calligraphy Pen and Pressure-sensitive Pen Let you create natural strokes.
- Draw Starbursts, Polygons and Spirals right on the screen without using dialog boxes!
- AutoTrace automatically turns any object into editable Bezier curves.
- Unique Eyedropper actually pulls colours from placed TIFFs for further use in the work.
- 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.
- Import and Export EPS, PICT, PICT2, TIFF etc.

Free Gift!



"When you buy from Software Warehouse you get a FREE gift with every order. Don't forget to ask when you call."

See page 2 of advert for details.

Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	32

Page 16

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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 0.1 micron.

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!

- OR124 CorelDraw! 6 - U/G from V5 on CD **£138⁹⁵**
- OR122 CorelDraw! 6 - Full Version on CD **£259⁹⁵**
- OR123 CorelDraw! 6 - U/G from V3 or 4 on CD **£224⁹⁵**



Call us! We will not be beaten on Corel!

CorelDraw! 3

The ideal entry-level package. Excellent type manipulation and drawing features plus CorelChart, Corel PhotoPaint and CorelSHOW. Also includes over 14,000 clip-art images / symbols, and 250 fonts.

COR038 CorelDRAW! 3 CD **£42**

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.

COR012 CorelDRAW! 4 CD **£83⁹⁵**

CorelDraw! 5

Includes Corel VENTURA 5. As CorelDraw! V4 but with 825 fonts, 22,000 clip art images, advanced 3D dimensioning, 100 royalty-free photos on CD-ROM, and much more.

COR031 CorelDRAW! 5 (3-5)CD **£194⁹⁵**

Serif PagePlus

Home/Office Edition

Ultra-Powerful DTP at an Ultra-Low Price

Serif PagePlus Contains Awesome features like:

- Powerful Wizards for creating publications, checking spelling and layout, adding headers, footers and backgrounds... and more.
- Built in LogoPlus for Incredible text effects that leap off the page.
- Import of all major Windows 95® text and graphic file formats, including Kodak PhotoCD pictures.
- Deluxe CD-ROM is packed with designer fonts, photos and extra Page Wizards.

Serif has done it yet again with the first DTP exclusively for Windows 95®. This brand-new version of the best selling PagePlus (over one million users world-wide) will be launched mid-November. Demand is already huge so reserve your copy now at our exclusive launch price! It's total design power and instant ease of use at a jaw-dropping price!

Quickly and easily design and print ANY publishing project imaginable! Automated Wizards create instant, professional quality leisure and business documents before your eyes. Then simply add the final impact with the huge library of designer fonts, clipart and photos.

With Serif PagePlus Home/Office Edition you don't need any design experience to present your company in the most professional and stylish way possible. Newsletters, labels, brochures & reports, flyers & posters, greeting cards, business stationery... even Internet Home Pages are simple to create.

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SPECIAL INTRO OFFER £29⁹⁵! RRP £49⁹⁵

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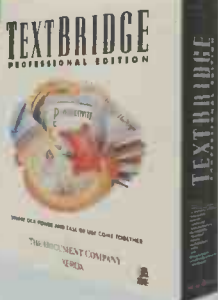
KEROX TextBridge

Windows-based OCR that redefines the industry standard. Buy now and receive a FREE upgrade to the Windows 95!

TextBridge lets you convert paper documents to electronic files on your PC. You can then edit, store and distribute the text within Windows applications. It features the highest level of accuracy, and at a fraction of the cost of other OCR. Requires scanner.

- OR002 TextBridge..... **£67⁹⁵**
- OR003 TextBridge Professional..... **£259**
- OR003 TextBridge Upgrade **£149**

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Instant 3D for Windows 95

An amazing new way to add stunning 3D, words and clip-art to Microsoft Word, Powerpoint, Excel or any other Windows 95 word processor, graphics or presentation package. With Instant 3D you can turn any text into a 3D object, right on the page.

Instant 3D comes with catalogues of hundreds of objects for everything from business graphics to 3D buttons for your World Wide Web home page - and it all happens in an instant! Instant 3D adds tremendous value to your suite of productivity applications.

Drag and drop simplicity!

Simply drag objects, textures or light settings from a convenient on-screen catalogue into your document. Using an intuitive control you can clip, rotate and scale text and objects in a 3D window, whilst remaining in your original document page.

Instant 3D's advanced text editor uses standard Windows TrueType fonts that can be extruded and deformed using a wide selection of pre-defined shapes.

Take full advantage of Windows 95!

Instant 3D takes full advantage of Windows 95 thanks to OLE 2.0 support. Instant 3D works inside your application adding a user-friendly button bar menu option to your favourite word processor, presentation or spreadsheet package. Alternatively, you can choose to use Instant 3D in a standalone mode and save your images in popular graphic file formats for use at a later date.

Instant 3D for Windows **£39⁹⁵**



CorelXARA!

Fast, Easy & Amazing 32-bit Graphics!

CorelXARA is an ultra-fast vector and bitmap illustration program for the beginner and professional alike. The easy-to-use interface, online tutorial, dynamic fill editing, colour styles and linked colours make creating graphics quick and easy. Optimize your productivity with lightning-fast redraw and powerful drag and drop colours, fills, line styles, fonts, clipart, textures, smooth dithering of graduated fills, graduated transparency and anti-aliasing to create a realistic rendered image. Including over 10,000 clipart images, 300 textures, 500 photos plus 500 TrueType and Type 1 fonts, CorelXARA is the perfect complement to any graphics package or DTP application.

Some of CorelXARA's many features include:

- Anti-aliasing for internet graphics
- Interactive graduated transparency
- Stepless graduated fills for photo-realistic images
- Change colours of artwork in one easy step

32-bit Speed and Performance

- Ultra-fast redraw
- High precision with 25,000% zoom
- Internal accuracy of 72,000 dpi

Incredible value!

- 10,000+ clipart images
- 500+ photos
- 500 TrueType® and Type 1 fonts
- 250 textures

The perfect complement to:

- CorelDRAW*3
- CorelDRAW*4
- CorelDRAW*5
- CorelDRAW*6
- Corel Ventura*...and all other DTP and graphics software!

COR133 CorelXARA **£158⁹⁵**



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- 4 Credit card charged on despatch
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- 7 No hidden surcharges
- 8 Free technical support
- 9 Award-winning service
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Page 17

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EVERYTHING FOR YOUR PC - NEXT DAY!

The smart way to create all your business diagrams and much more!

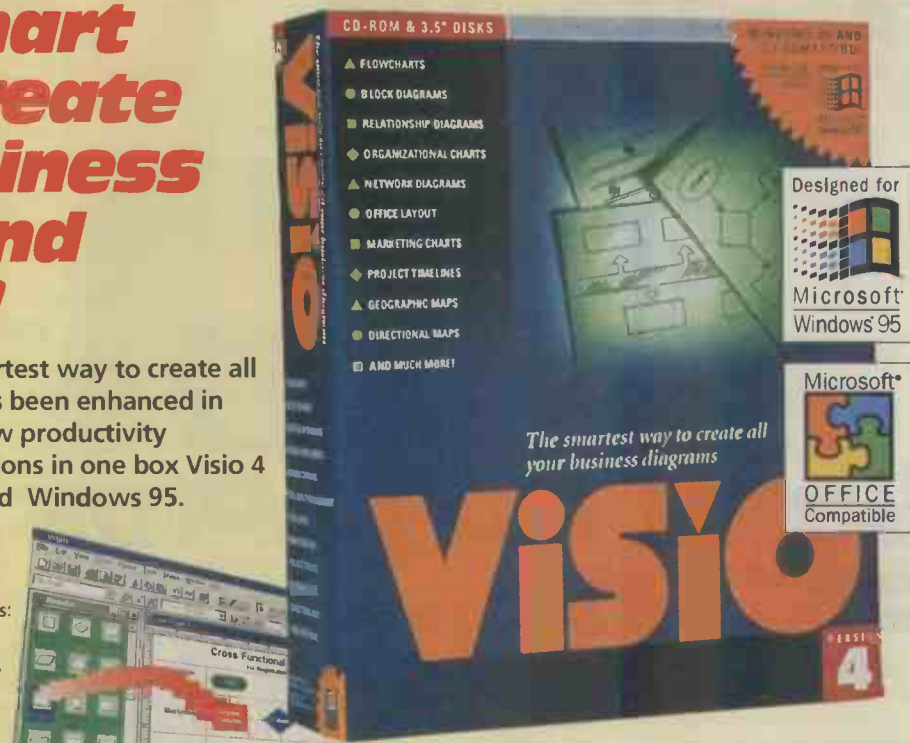
Now more than ever, Visio is the smartest way to create all your business diagrams. Version 4 has been enhanced in almost every area, boasting many new productivity features. With both 16 and 32bit versions in one box Visio 4 is optimised for both Windows 3.1 and Windows 95.

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 make 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
- More efficient mouse button menus and actions
- Use Windows 95's new multitasking to continue working while other tasks are 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 4 will automatically connect to Microsoft Office and Lotus Notes. Its compatibility with Office toolbars means that you are already familiar with Visio from the start.



only £99⁰⁰ STOCK CODE: VIS060

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!

- Advanced Flowcharts£39
More than 260 shapes for flowcharting
- Network Diagrams£39
Design and model detailed data networks

- Electrical Engineering£39
Create electrical and electronic diagrams
- Marketing£39
Illustrate business, sales and marketing concepts
- Software Diagrams£39
Produce data flows, processes & logic structures
- Space Planning£39
240 shapes for planning office layouts
- Chemistry£39
Draw complex chemical structures & functions
- Chemical Engineering£39
Accurately display plant equipment & facilities
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Illustrate experimental & physiological processes
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Plan your dream home or your next remodel
- Kids£39
A wealth of fun illustrations & shapes for kids
- Landscape Planning£39
Landscape your garden & create planting charts
- Visio Technical Productivity Packs enable you to produce technical drawings and schematics with the ease of Visio.
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SOFTWARE WAREHOUSE VOUCHER £600

With every order you will automatically receive a voucher book with over £600 of genuine savings provided by the manufacturers that we closely work with. It pays to shop at Software Warehouse!

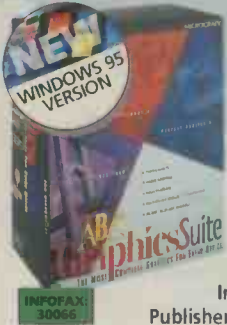
Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	32

Page 18

ABC Graphics Suite

The complete graphics package for Windows 95 and Office 95 users.



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 MS Office 95 interface. Because it's a true 32-bit Windows 95 application, its performance is up to four times that of 16-bit applications. It 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.

Includes: ABC FlowCharter, Micrografx Designer, Micrografx Picture Publisher & Media Manager, Visual Clipart Libraries and Fonts

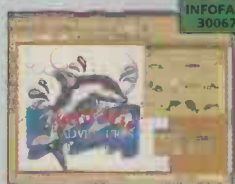
- ABC006 ABC Graphics Suite£239⁹⁵
- ABC007 Comp. Upgrade£99⁹⁵

A massive 39,000 items in stock across 4,000 different product lines. Nobody delivers faster!

Windows Draw 4.0

The complete Graphics suite.

This Windows 95 graphics suite for the home and office includes drawing, diagramming, photo-editing, painting and a drag-and-drop clipart manager, plus more than 10,000 clipart and photo images, and 250 fonts. More than 150 quick-start templates are provided for all the common graphics projects - charts, banners, certificates, business cards, newsletters and more.



- MIC386 Micrografx Windows Draw 4.0.....£39

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EVERYTHING FOR YOUR PC - NEXT DAY!

Animate it all with Visual Reality 2.0!

The latest and greatest release of the leading 3D graphics and animation package from Visual Software.

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 implemented 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.

Visual Reality 2.0 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

INFOFAX: 30104

Visual Reality 2.0 (7 CD set) **£199**

Simply 3D SuperPack!

The Simply 3D SuperPack features everything you need to explore exciting 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, use 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.

Simply 3D SuperPack **£69⁵⁰**

More Great Products from Visual Software

SIM008	Simply 3D.....	£39
VIS056	Double Vision.....	£29⁹⁵
VIS054	Visual Reality V1.5 - Pro 3D.....	£95⁹⁵

Ray Dream Studio

The Cutting Edge of 3D Illustration & Animation

Whether you're a graphics professional or budding digital artist, Ray Dream Studio is the perfect synergy of cutting-edge 3D tools and effortless ease of creation... of awe-inspiring 3D illustrations and dramatic animations... of the drag and drop simplicity of hundreds of fully-realised 3D models and the limitless power of application extensions.

Ray Dream Studio™ - four seamlessly integrated components that together create the most powerful and affordable 3D imaging suite available for the Macintosh and Windows: Ray Dream Designer™ 4, Ray Dream Animator™, Dream Models™ and Extensions Portfolio.

Ease of Creation

- Scene Wizard™ - Automatically creates professionally designed indoor/outdoor and logo scenes complete with lighting effects, backgrounds and props. Or create your own virtual photo studio. Intuitive and Easy-to-Use
- Seamlessly Integrated Environment - all the tools you need to create and animate 3D illustrations; no switching from one application to another.
- Cutting-Edge 3D Tools
- Unlimited Camera - All the tools a photographer uses: isometric perspective and zoom cameras with dolly, pan and track control. View your scene from any camera at any time.

3D Animation

- Total Control Timeline Animator - A fully editable score with user control of keyframe events, object attributes, cameras, lights and scenes.

Rendering Controls

- Ray Tracing Rendering Engine - Highest quality rendering option generates pixel perfect images and animations.

Special Effects

- 3D Paint - Brush brilliant colours, wild patterns, extraordinary textures onto the surface of your 3D model - even bump and transparency maps. Every brush stroke automatically conforms to even the most complex object surface.

Added Value

- Over 500 fully-textured Dream Models - Created in Ray Dream Designer format by leading 3D model vendors Acuris, Inc. and Viewpoint Datalabs. Fully editable, these "smart" 3D models are animation ready.

Ray Dream Designer 4

The world's leading 3D illustration program enables graphics users of all types to easily create digital images with the visual impact and photorealism of 3D.

Ray Dream Animator

Bring your 3D scenes to life! Easily animate your objects to add another dimension to your portfolio. Ray Dream Animator includes high-end features such as inverse kinematics, movies as textures and deformations that give your animations unbelievable realism. Ray Dream Animator puts you in the director's chair.

Dream Models

Over 500 fully-textured models in Ray Dream Designer format.

These drag-and-drop models, created by some of the world's best 3D modellers, feature fully-editable textures and shapes.

Extensions Portfolio

Ray Dream Studio comes with its own documentation for creating custom add-ons. The Extensions Portfolio includes some amazing extras such as a beam light and star-shaped objects.

Build and arrange objects in the perspective window

3D Paint: Brush colours and textures directly on your 3D object

Total Control Timeline: full editable animation score



Customisable Tear-off Tool Palettes

Over 500 fully editable 3D Dream Models created in Ray Dream Designer format

Integrated Animation: 3D illustration and animation in one program

RAY002 Ray Dream Studio **£189**

RAY001 Ray Dream Designer **£89**

Import/Export

- Import CorelDRAW™, Adobe Illustrator™, Macromedia FreeHand™, WMF, CGM and PICT files directly into Ray Dream Designer's modeler
- Import texture maps in TIFF, PICT, BMP, TGA, PCX, Adobe Photoshop™, or any file format for which you have a Photoshop acquire plug-in
- Import/Export DXF models
- Export TIFF, PICT, JPEG, BMP, TGA, Adobe Photoshop, or any file format for which you have a Photoshop acquire plug-in
- Animation output: QuickTime™ and AVI (Microsoft Video)

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Page 19

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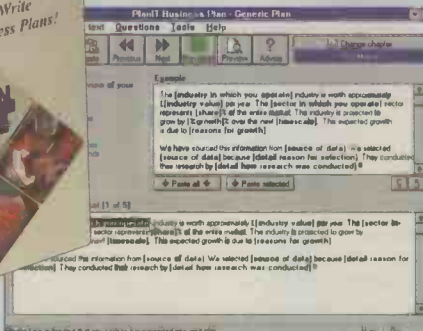
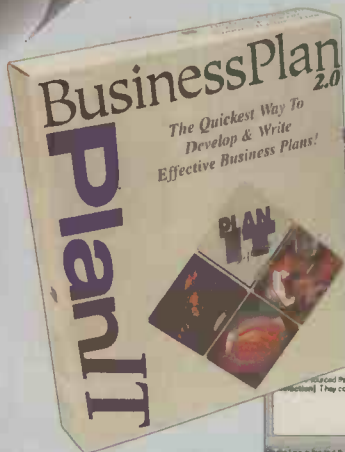
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EVERYTHING FOR YOUR PC - NEXT DAY!

Build professional business plans the easy way!



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.

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 throughout. Simply answer the questions and fill in the blanks - Business Plan 2.0 does the rest!

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.

Market Analysis

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 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 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

All of the information provided on B.I.F. is compiled by a panel of experts from across a wide range of industries. BusinessPlan 2.0 users will automatically be kept up to date.

What you 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

ONLY £88⁹⁵ STOCK CODE: RMG016

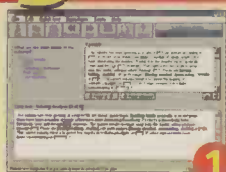


BUSINESS PLAN 2.0 IS ANOTHER GREAT PRODUCT FROM RODERICK MANHATTAN

PlanIT Business Plan - 100% BRITISH BUSINESS INFORMATION

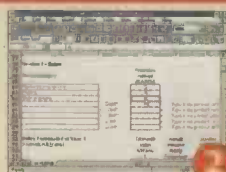
You can be sure of Business Plan 2.0's relevance to your business ideas because it is a 100% British development. All funding information is British and all the database information relates specifically to UK business needs. Over 2,500 names and addresses you need. Everything from the DTI, Health & Safety to MPs and Trade Unions!

5 EASY STEPS TO PRODUCING EFFECTIVE BUSINESS PLANS OR YOUR MONEY BACK!



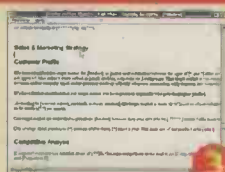
PlanIT Business Plan

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.



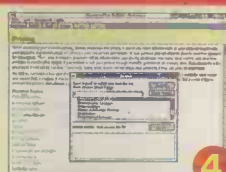
Projected Financials

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.



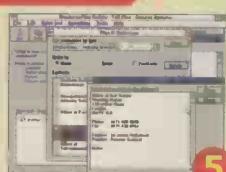
Print Preview

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.



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.



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.

News



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Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	32

Page 20

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EVERYTHING FOR YOUR PC - NEXT DAY!

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. When you call Technical Support you're put on hold for ages and when you finally get to speak to someone, it's difficult to explain the problem accurately, 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 95, you won't see cryptic messages or lose all your work since the last time you saved it. First Aid 95 actually intercepts most crashes and lets you save your work in all open applications!

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!

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.



NEW
WINDOWS 95
VERSION

Works on both Windows 95 and 3.1

WHAT THE PRESS ARE SAYING ABOUT FIRST AID 95

"...takes the headaches out of installing multimedia peripherals."
Erka 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
"...easy to use, comprehensive, and efficient. ...First Aid would be an excellent addition to any PC system."
Daniel Brown, Info World

FR007 First Aid for 95 on 3.5" **£38⁹⁵**

RMG015 First Aid for 95 on CD **£38⁹⁵**

£38⁹⁵ RRP £49.00

Dashboard 95 for Windows 95



Dashboard can be used vertically or horizontally

INFOFAX: 30002



It's 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.

STOCK CODE: DAS004

DASHBOARD 95 ONLY
£28⁹⁵ RRP £49.00

DAS002 Dashboard for Windows 3.1 **£27**



NEW
WINDOWS 95
VERSION

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- 5 Buy mail order or retail
- 6 Always lowest prices
- 7 No hidden surcharges
- 8 Free technical support
- 9 Award-winning service
- 10 9am-5pm (Mon-Fri)

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. Taking up a fraction of the memory other PIMs use, you can keep it running all the time without affecting your system's performance.

Sidekick 95 helps 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 automatically prints letters, schedules, notes, names and addresses in over 70 different formats including labels, envelopes and popular paper organiser formats like Filofax™.



Starfish UK

INFOFAX: 30004

SIDEKICK 95

STOCK CODE: SID004

£28⁹⁵ RRP £49.00

SID002 Sidekick 2.0 for Windows 3.1 **£27**



NEW
WINDOWS 95
VERSION

The simplest way to stay organized.

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How to use & charges see page 2



Page 21

EVERYTHING FOR YOUR PC - NEXT DAY!

Touchstone WINCheckIt 4.0

WinCheckIt 4.0 from Touchstone is the all-in-one Windows problem solver for Windows 3.1 and 95!

WINCheck It 4.0 provides optimum performance while keeping problems to a minimum. Here are some reasons why you need the all-in-one Windows problem solver!

Be Sure You Don't Have a Hardware Problem!
When something goes wrong, the first question is: Is it Hardware or Software? If you've got a hardware failure, you'll need to have someone repair it. But if the problem is a setup or compatibility Issue, you can often fix it yourself, perhaps with a little technical help over the telephone.

- Tests Main System Board
- Tests Serial and Parallel I/O Ports
- Test Hard Drive
- Test Floppy Drive
- Tests Memory (RAM)

Make Room for More Programs & Data Files!
Let WINCheck It help you with your housekeeping. Over time, every hard drive accumulates a lot of unnecessary files - like temporary files, duplicates, old versions of applications, and setup programs that are no longer needed. Use WINCheck It to quickly identify unwanted files and clean up disk space. WINCheck It finds unnecessary files:

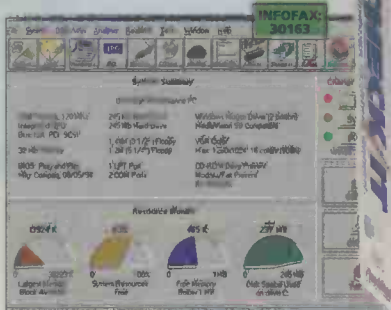
- Duplicate Files
- Empty Files
- Empty Directories
- Files by Extension
- Files by Size
- Files by Date & Time

Recovery That Works Even When Windows Won't!
Not all change is good. Sometimes installing a new application, updating the operating system, or even the changes YOU make, just don't work. WINCheck it will help you undo these changes:

- Restore WIN.INI and other system files from Windows or DOS
- Find Hardware Changes
- Restore CMOS Settings
- Find DOS or Windows Setup Changes
- Cut & Paste Between INI Files

WINCheck It features :

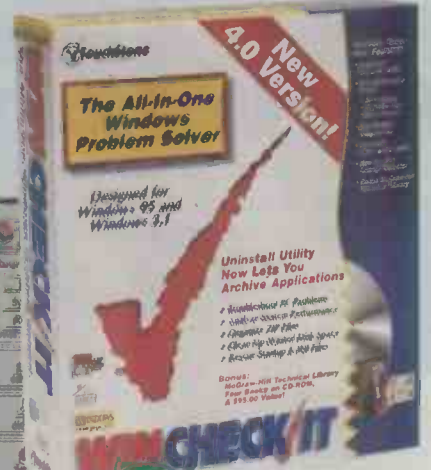
- Improved Uninstaller with program archiving options for safer uninstalls
- New One-of-a-kind CD-ROM diagnostic
- Improved Clean & Zip utility
- New comprehensive Modern Diagnostic
- Windows 3.1 and Windows 95 compatible
- New multimedia benchmarks for thorough system performance testing



Get Rid of Unwanted Windows Applications!

Everyone has them - Windows applications that don't work right, or that you just don't use any more. But getting rid of them isn't easy because the programs and their related files may be scattered throughout several directories! WINCheck It presents you with a list of your current program groups, then helps you identify and delete the following files for any program item, with your permission, of course!

- Program Item Icon
- Program Executable
- Files in Related Program Directory
- Related INI Files
- Files in Related Working Directory



NEW VERSION

R.

STOCK CODE: WIN093 **£38.95**



TouchStone

FastMove!

Copies files from one PC to another, FastMove! Includes all necessary software and cables. More than ever people are using multiple PCs - a system at work, a PC at home, a notebook for travelling.

With all this increased mobility, users need a fast but safe, powerful but easy to use, feature rich but inexpensive way to keep their files up-to-date across multiple PCs.

FastMove shows you which files need to be updated, then allows you to select just the ones you want and preview the exchange of files before it occurs.

The graphic interface lets you synchronise PCs and drag - and drop selected files without leaving the main screen. A state of the art virus remover scans each file as it's transferred, keeping your PC safe from contamination. Despite the virus scan, the transfer across FastMove's PC-to-PC parallel port cable still averages over 20% faster than other transfer methods.



FAST MOVE!

FastMove Features Include :

- Supports simple one-way transfers or full two-way synchronisation
- As you transfer, FastMove! scans each file for viruses
- Free virus scan updates available on Touchstone's BBS and on-line forums
- 20% faster than Laplink™ (parallel)

STOCK CODE: FAS005

£39.95

A massive 39,000 items in stock across 4,000 different product lines. Nobody delivers faster!

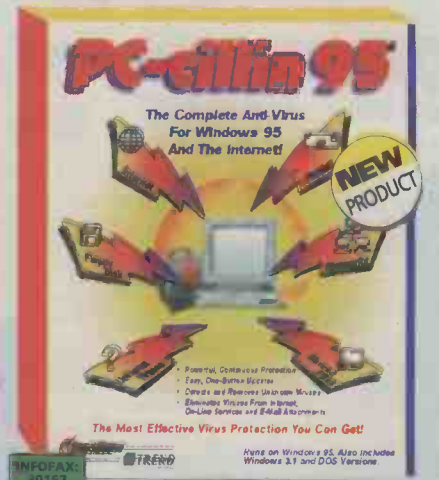
PC-cillin 95

The protection you need! Windows 95's sophisticated communication and multi-tasking capabilities have created a virtual breeding ground for viruses - demanding that you must have powerful, continuous protection.

PC-cillin 95 is the only anti-virus package that has what it takes to guard your Windows 95 system.

Advance features include powerful internet defense, one-button virus pattern updates and total protection throughout all your shared folders.

Don't leave your system's defense open for attack - get the protection you need with PC-cillin 95.



RMG009 PC-cillin **£39.95**

PC-cillin 95

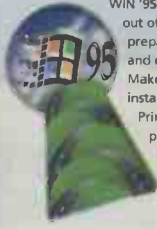
WIN '95 Advisor

Are you ready for Windows 95?

WIN '95 Advisor is designed to take all the guesswork out of installing Microsoft Windows 95 and prepare your Windows 3.1 system for a fast, safe and easy upgrade.

Make the right decisions with Win 95 Advisor and install Windows 95 right the first time.

Primarily a Windows 3.1 application, the program will rate your current system then, based on the results of the rating, help you plan for key installation options. Don't try to install Windows 95 without it!



WIN '95 Advisor **£14.99**



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Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	28

Page 22



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Lotus

Lotus supplies its products and services through the reseller channel only. As a Lotus Premium Business Partner, Software Warehouse plc receives our full support for its marketing initiatives, staff training and the promotion of new Lotus products. Software Warehouse plc will be playing a key role in the distribution of our products to a diverse market and we will continue to work closely with them to ensure that our customers get what they want, when they want it.



LOTUS BUSINESSES OPTIONS

Lotus License Pack (LLP)

If more than one copy of a Lotus application or comms package is needed, then you must 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 can be purchased as a single license or in 20 packs.



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SmartSuite = 2 points

Lotus Passport

Designed for organisations that require large numbers of licenses for Lotus products. With an initial order of just 50 points, you can enrol into the passport scheme, and benefit from preferential pricing on the Lotus range of Software. The minimum reorder level is only 20 points. Passport licenses can be used on different sites, even in different countries, and are available for DOS, Windows, Unix or Macintosh. Passport is probably the versatile license programme available today.



This is just a sample of Lotus' products.

LOTUS LLPs

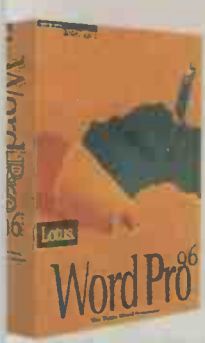
Word Pro Single LLP	£73
Word Pro 20 User LLP	£1360
Approach Single LLP	£73
Approach 20 User LLP	£1420
Lotus 1-2-3 Single LLP	From £78
Lotus 1-2-3 20 User LLP	From £1540
SmartSuite Single LLP	From £149
SmartSuite 20 User LLP	From £2849
Lotus Notes	£POA

LOTUS Passport

entry level pricing i.e. 50 points	
Word Pro	£32 per user
Approach	£54 per user
Lotus SmartSuite	From £117 per user
Lotus 1-2-3	From £54 per user
Lotus Notes	£POA

Call our Corporate team now and let them work out the best solution for your companies needs!

Word Pro 96 - Productivity for Teams, Power for Individuals!



Lotus Word Pro 96 rethinks word processing, revolutionising the way people create, review and edit text and documents.

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.

Lotus Word Pro 96 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.

01113 Lotus Word Pro '96 **£89⁹⁵** INFOFAX: 30007

Lotus SmartSuite 4.0 is now even better value!

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!

Full boxed product inc. manuals and disks. No vouchers, etc.

All five leading applications from Lotus are available individually (see features) or in this new release of Lotus SmartSuite Version 4.

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 bidirectionally between desktop applications and Lotus Notes.

SmartSuite V4 now also includes Lotus' multimedia screen and sound-capture utility, ScreenCam 1.1. The SmartCenter Icon Palette is included and allows easy switching and drag-and-drop copying between applications.



01016 SmartSuite V4 CD **£168⁹⁵**
01016 SmartSuite V4 3.5

Lotus SmartSuite 96

It's the new desktop solution for your team



Lotus SmartSuite 96 is the best suite available for you and your team, bringing together your five most important desktop tools: the Lotus 1-2-3 spreadsheet, the Lotus Approach database, the Freelance graphics presentation package, the Lotus Organizer personal information manager and the new WordPro 96 word processor.

Lotus SmartSuite 96 Key features:

- Its unique Team Computing features enable you to easily communicate and collaborate with other colleagues and SmartSuite users.
- Lotus' innovative interface is consistent throughout all the SmartSuite 96 applications. If you're familiar with one, you're familiar with them all!
- The new and exclusive SmartMasters and Lotus Assistants give users an easy and quick way to increase productivity.
- SmartSuite 96 is truly integrated so it works the same way that you do - moving from one task to the next, whether you're working in one application or between them.
- Lotus SmartSuite 96 takes full advantage of the new Windows 95 operating system.

01140 Lotus SmartSuite 96 CD **£168⁹⁵**
01143 Lotus SmartSuite 96 3.5



Lotus 123 is the spreadsheet that has everything you need to make your everyday tasks easier. With multiple spreadsheets now available under one file name, it's even easier to transfer data from one spreadsheet to another within a group of spreadsheets.

01108 Lotus 1-2-3 V5 From **£84⁹⁵**



Lotus Approach makes managing data as easy as Lotus 123! And you don't have to be a programmer.

01062 Lotus Approach V96 **£82⁹⁵**



Lotus Organizer is a full-feature PIM that allows you to manage your time and work.

01078 Organiser V2.1 **£89**



Lotus ScreenCam V2 is the full-featured application for all your multimedia needs.

SCR003 Lotus ScreenCam V2 **£82⁹⁵**



Lotus Freelance Graphics lets you influence, persuade or inform at your next meeting.

01108 Freelance V96 From **£84⁹⁵**

INFOFAX: Lotus 123 - 30010

INFOFAX: Lotus Approach - 30011

INFOFAX: Lotus Organizer - 30012

INFOFAX: Lotus-ScreenCam - 30013

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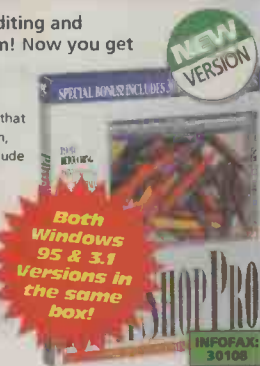
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Paintshop Pro V3.12

Fast and fully-featured photo-editing and graphics conversion in one program! Now you get the Windows 95 and Windows 3.1 versions in the same box!

Paintshop Pro is a highly popular graphics conversion program that now includes full photo-editing facilities. New tools include done 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, IPI, 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**

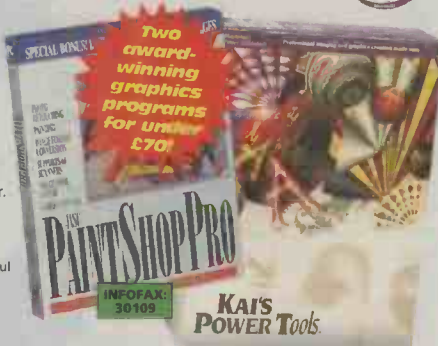


Paintshop Pro V3 & Kai's Power Tools SE Bundle

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 Tools.....**£69⁴⁵**



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, catalogues and newsletters on disk, computer-based training, special material for special needs, interactive curriculum vitae, multimedia encyclopedias, 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, graphic, 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.

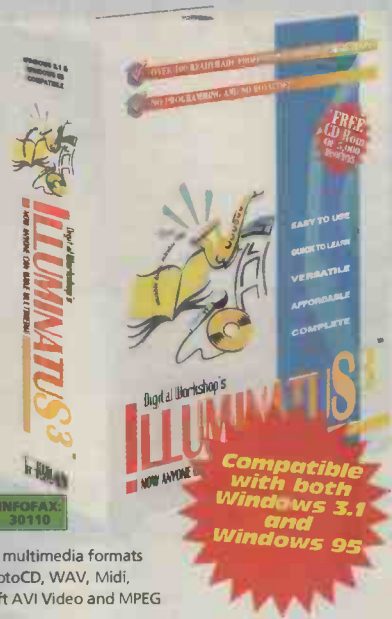
Supports industry standard multimedia formats

Illuminatus v3 supports industry-standard multimedia formats including PCX, BMP, TGA, TIFF, Kodak PhotoCD, WAV, Midi, AutoDesk Animator FLC/FLI 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**

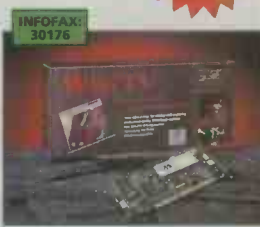


Hauppauge!

Hauppauge TV Cards are the easiest way to turn your PC into a TV!

Hauppauge introduces the Win/TV celebrity and Prisma cards, 16 bit multimedia PC cards that run under Windows 3.1X, Windows NT, Windows 95 and DOS 6.X. They display full motion television in a resizable overlay window on a PC Screen, and can capture 24 bit colour still images. Both cards feature on board teletext, which can be viewed on your desktop PC.

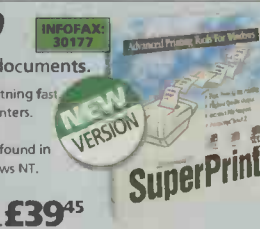
HAP002 Hauppauge Prisma**£149**
 HAP001 Hauppauge Celebrity**£269**
 HAP009 Hauppauge Celebrity & FX/T**£409**



SuperPrint 4.0

Recommended for printing Windows documents. SuperPrint 4.0 allows you to print your documents lightning fast! Works with all popular laser, Ink jet and dot matrix printers. Improves your output quality by sharpening greyscale and colour images. Includes 10 new printing tools not found in Windows 95, also works with Windows 3.1 and Windows NT.

SUP019 SuperPrint 4.0**£39⁴⁵**



Pressworks V.2

The award winning DTP and Graphics program in a 'once-in-a-lifetime' bundle.

GSP have long been the leaders in graphics and DTP. This award winning bundle, includes the latest versions of both Pressworks & Designworks. Both of these packages make drawing and designing simple. With their easy to use interfaces, producing even the most complex DTP document is easy. And for a limited period get three additional CDs, containing 5000 Clipart Images, 1000 fonts and 1500 photos. This bundle has a suggested retail price of over £150.



GSP011 GSP Graphics & DTP Ultimate Bundle**£59⁹⁹**

Gift Voucher

With every order you will automatically receive a voucher book with over £600 of genuine savings provided by the manufacturers that we closely work with. It pays to shop at Software Warehouse!

Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	28

Page 24

Graphic Artpad II from Wacom

Professional graphics tablets for designers, illustrators and Graphic Artists.

ArtPad II has all the features of a mouse and more but needs less space than an average mousemat. It functions as easily as using paper, pencil and an eraser by just pointing, clicking, dragging, freehand drawing, painting or writing becomes simple.

ArtPad II includes the lightweight UltraPen Eraser which is pressure sensitive and operates without cords or batteries. With drawing and painting applications like CorelDRAW! Dabblor and Painter you can vary line thickness, colour intensity or other tool properties by pressing harder with the pen.

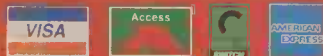
The Wacom ArtPad is a high-tech product from the leading manufacturer of graphics tablets for DTP.

WAC001 Wacom ArtPad II	£149⁹⁵	WAC002 A5 Tablet	£349
WAC004 Wacom ArtPad II + Dabblor	£179⁹⁵	WAC005 A5 Tablet + Painter 3	£499
WAC003 Wacom ArtPad II + Painter 3.0	£389⁹⁵	WAC006 A4 Tablet	£469
		WAC007 A3 Tablet w/Menu Overlay	£599
		WAC008 A3 Tablet w/Electrostatic	£689

A massive 39,000 items in stock across 4,000 different product lines. Nobody delivers faster!

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EVERYTHING FOR YOUR PC - NEXT DAY!

PRIMAX *The leaders in scanners!*

Primax are the largest suppliers of mice, pointing devices and scanners that you've probably never heard of - and they've chosen Software Warehouse as its first business partner to market their range in the UK.

Primax are one of the world's leading manufacturers in mice, game pads, sound cards, speakers, scanners, cables, printer-share devices, and communications hardware. The extensive range of scanners includes handscanners (colour & black and white), flatbeds, mobile scanners and pen scanners so whatever your needs may be, Primax will have something for you.

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.

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.

PR101 Primax 32 Greyscale.....**£39⁹⁵**

PR102 Primax 256 Greyscale.....**£49⁹⁵**

Primax Colour Mobile Scanners

The mobile version includes all the features as the handscanners, 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.

PR104 Primax Colour Mobile.....**£129⁹⁵**

PR120 Primax Colour Office.....**£169⁹⁵**

PR127 Primax Flatbed Scanner.....**£269⁹⁵**

Primax Paperease

A True A4 Scanner

The Primax Paperease scanner also offers the functions of a photocopier and fax machine. Just scan the document you wish to fax into your fax software.

If you want a hard copy of your document, just drag it into the print icon...it's as easy as that to print! And this at a rate of up to 10 full pages per minute.

PR129 Primax Paperease.....**£119⁹⁵**



INFOFAX: 30117

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.

PR103 Primax Colour.....**£89⁹⁵**



INFOFAX: 30122



INFOFAX: 30119

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 11 languages. The DataPen is easy to install and connects to your standard parallel port.

PR105 Primax DataPen.....**£119⁹⁵**



INFOFAX: 30116

Vista Colour Scanner

High performance budget colour scanners from the world's largest digital imaging manufacturer.

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 - "...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."

All UMAX scanners come with Presto productivity Suite which consists of OCR, Archiving, Fax, E-Mail and Image Editing software.

VIS050 UMAX Vista T630.....**£297⁹⁵**



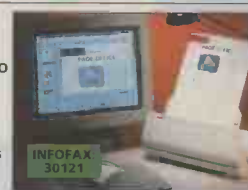
INFOFAX: 30115

PageOffice

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. 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. All UMAX scanners come with Presto productivity Suite which consists of OCR, Archiving, Fax, E-Mail and Image Editing software.

PAG030 UMAX PageOffice.....**£238⁹⁵**



INFOFAX: 30121

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. All UMAX scanners come with Presto productivity Suite which consists of OCR, Archiving, Fax, E-Mail and Image Editing software.

VIS052 UMAX Vista S8.....**£537⁹⁵**



INFOFAX: 30120

SICOS Colour Page Scanner

Scanning, faxing and copying

The SICOS 24 bit colour A4 page scanner allows you to scan pictures and it also recognises text so that you can convert documents into text files without retyping. Improve your business presentations and reports with coloured images and start a paperless office by filling, retrieving and faxing images and documents.

- Compatible with HP Scanjet II driver (necessary for multiple page scanning) and TWAIN driver.
- Software - Photo Plus for image processing, TextBridge V.2 for OCR and Sicos Fax/Copy utility.
- Scanning modes: 16.8 million true colours and 256 greyscale, dither (half tone) and line art. • Resolution: up to 1200dpi
- Scan width: up to 216mm - full A4 page. • Scan speed: 3.5 ppm (lineart mode).
- Scans in a single pass. • Scanner automatically calibrates colour.
- Auto sheet feeder supplied: up to 50 pages.
- Interface card supplied: 16 bit ISA with 6 IRQs - 3, 4, 5, 10, 11, 12.
- No power cable required - power is supplied through Interface card and 25 pin cable is supplied.
- 3.5" Driver disk supplied with full User's Guide and Test photograph.
- Dust cover supplied.
- Compact size: 335 x 240 x 95mm (LxWxH).
- Weight: 4.5K.

SIC001 SICOS Colour Page Scanner.....**£199⁹⁵**



New low price!

INFOFAX: 30118

Price Pledge



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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 DF-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.

CAD001 Microtek ScanMaker II.....**£294**

Next-day delivery only £6⁹⁵ E&OE. All prices are plus VAT and delivery and are subject to change and availability.



Microtek ScanMaker II only £299

INFOFAX: 30115

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

10 Good Reasons to buy from us

- 1 Free gift with order
- 2 4,000 different products
- 3 Order before 4pm and use tomorrow
- 4 Credit card charged on despatch
- 5 Buy mail order or retail
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Page 25

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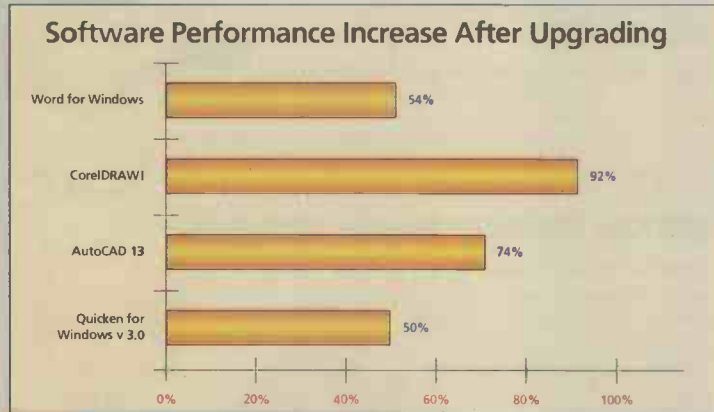
Intel Pentium® OverDrive® Processor Upgrades

Better Performance For Today's and Tomorrow's Applications!

Today's software applications - both at the office or in the home - are demanding greater processing power than ever. Spreadsheets can never calculate fast enough and graphics always redraw too slowly. If you attempt to run Windows 95 on your Intel486™ processor-based PC, you'll find that features such as multitasking will tax your system beyond belief. That's why you need to consider the Intel Pentium® OverDrive® Processor Upgrade.

The Advantage of Pentium-Based Performance

The Pentium OverDrive processor is the highest-performance OverDrive processor upgrade available. It features Pentium processor superscalar architecture, enhanced on-chip cache and faster floating point, a 32-bit bus interface, and an on-package voltage regulator and fan heatsink. It also offers a 3:2 bus ratio, that operates the OverDrive processor at two and a half times the speed of the system bus. A system upgrade with a Pentium Overdrive processor delivers a substantial performance increase to most Intel 486 CPU-based systems. For example, an upgraded IntelDX2 66-MHz CPU-based system will realise more than a 50% performance increase in most typical applications (performance results depends on your system configuration and the applications used).



Upgrade Your PC to run Windows 95 more effectively!

Frequently Asked Questions About the Intel Pentium® OverDrive® Processor

What is a Pentium® OverDrive® processor?
The Pentium OverDrive processor is the highest-performance OverDrive processor upgrade available today. It provides a simple, inexpensive performance upgrade for most IntelSX2™ and IntelDX2™ systems, as well as a superior upgrade option for many Intel486™ SX and DX CPU-based systems.



Is the Pentium OverDrive processor really a Pentium® processor?
Yes, it is a true Pentium processor. It is based on 3.3 volt, .6 micron Pentium processor technology, the same used by the range of 75-120MHz Pentium processors available today. In addition to featuring Pentium processor superscalar architecture, enhanced on-chip cache and faster floating point, it also offers a 32-bit interface, an on-package voltage regulator and fan heatsink, and a 5:2 core:bus ratio that operates the OverDrive processor at two-and-a-half times the speed of the system bus.

How much of a performance increase will be gained with a Pentium Overdrive processor?
In comparing the relative performance of the Pentium Overdrive processor with an Intel DX2-66MHz CPU-based system, the Pentium Overdrive processor has an iCOMP® (Intel Comparative Microprocessor Performance) index of 581, representing a 96 percent increase over the Intel DX2-66MHz system (iCOMP Index 297). The Pentium OverDrive processor delivers a substantial performance increase for many of today's applications (see table above left). For example, an upgraded Intel DX2-66MHz CPU-based system will realise more than a 50 percent performance increase across most typical applications like Word for Windows, CorelDRAW and Quicken for Windows (depending upon the system configuration and applications used).

News

We will be exhibiting at the Windows 96 Show at Olympia at the end of February 1996. For the best deals at the show please visit our stand.

Index

SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	32

Upgrading an IntelDX2 66-MHz System
In addition to providing improved performance for today's software applications, upgrading with a Pentium OverDrive processor gives your system enough power for more demanding operating systems like Windows 95 and emerging communications and video applications. Increased processing power also makes games more fun. By upgrading your CPU, keyboard and control, responsiveness improves as well as the quality and detail of the graphics. In fact, many of today's games are designed to offer different levels of detail based on the performance of your systems CPU. These games will recognise your system's Pentium OverDrive processor upgrade and automatically turn on key graphic features without sacrificing performance.

IntelDX2 and IntelDX4 Overdrive processor upgrades
Also available are these OverDrive upgrades. The IntelDX4 OverDrive processor is a mainstream CPU upgrade for Intel486 SX and DX-based CPU-based systems. It features "speed tripling" technology, a larger 16K cache and an on-chip math coprocessor, as well as an on-package voltage regulator and heatsink.

The IntelDX2 OverDrive processor is the entry-level CPU upgrade designed for Intel486 SX and DX CPU-based systems. It features "speed doubling" technology, an on-chip math co-processor, and an attached heatsink.

The Pentium OverDrive processor is available in two versions, based on your system's bus speed

Present System	Pentium® OverDrive® Processor Upgrade	Stock Code	Price
33-MHz Intel486 - or - 66-MHz IntelDX2™	83-MHz Pentium OverDrive Processor	INT019	£187⁹⁵
25-MHz Intel486 - or - 50-MHz IntelSX2™ - or - IntelDX2	63-MHz Pentium OverDrive Processor	INT018	£174⁹⁵



PRICES FROM

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£174⁹⁵
INT018 63-MHz Pentium OverDrive Processor.....

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Super Desktop Video Editing!

Miro Video DC1 Plus

The ultimate desktop video editing system for Windows!



The ideal video solution for real-time capture and play back 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. DC1 Plus includes Premier 4.0 LE, Photoshop LE & Asymetrix 3DFX Complete.

MIR015 DC1 Plus	£299	INFOFAX: 30027
MIR013 Miro PCM10 Sound Card	£79	
MIR014 Miro PCM1 Pro Sound Card	£129	
20TD Live 2Mb VLB or PCI	£295	
12PD Live 1Mb VLB or PCI	£89	
12PD Live 2Mb VLB or PCI	£129	

miroCONNECT 34 Wave

miroCONNECT is not just a fast Fax/Modem or a high quality DSP sound card but an integrated H/W & S/W solution.



With 100% Word and Excel compatible S/W totally integrated into the miroCONNECT 34 office provides you with seamless communications. At work or at play miroCONNECT 34 Office will play your favourite sounds at high quality. 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	£239	INFOFAX: 30028
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Movie Machine Pro - Video Digital Centre

Editing with Movie Machine Pro is easier than anything you've ever done. Use Movie Studio to choose you video sources, mix or cut and then use the T-Bar to add real-time digital effects: fades, zooms, flips, colour reversals, mosaic, luma and chroma keying, etc. Of course, you can also set the speed and direction of the effects.



FAS011 Movie Machine Pro	£275⁹⁵	INFOFAX: 30029
FAS005 Movie Machine II (includes tuner)	£485⁹⁵	
FAS006 MJPEG Extension Card for MM II	£289⁹⁵	
FAS007 MPEG Extension Card for MM II	£234⁹⁵	
FAS008 Movie Machine II Power Pack (includes MJPEG & MPEG)	£984⁹⁵	
Fast FP/5 60	£484⁹⁵	
FAS009 MJPEG Extension Card for MM Pro	£284⁹⁵	

CyberRomCD from IC

The portable CD ROM drive for AutoRoute Express.

Plan all your trips while on the move using the CyberRomCD and Microsoft AutoRoute Express. There are over 100,000 miles of road and more than 33,000 place names to access on CD-ROM making this the complete portable solution for travelling, using the CyberRomCD.

cy8005 Microsoft AutoRoute Express/CyberRomCD Promotion	£279⁹⁵
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Portable Sound Plus

A true plug and play Windows 95 sound solution. The Portable Sound Plus is a parallel port-based 16bit sound card which has its own printer pass through point. It comes with a high fidelity speaker and a built-in microphone with line-in/out jacks for use with CD-ROM drives and external speakers.

cy8010 Portable Sound Plus	£109⁹⁵	INFOFAX: 30033
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Quad Speed PC Card CD-ROM

The first quad speed drive available for plug and play under Windows 95!

This plug and play compatible CD-ROM drive gives the ultra-fast speed required for use with large applications, video and animation. With the CyberRomCD Quad you will find no rivals on the road to multimedia.

cy8011 Quad Speed PC Card CD-ROM	£379⁹⁵	INFOFAX: 30034
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Panasonic Quad Pro IDE



Includes everything you need to upgrade your PC.

- 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 CDi movie
- Includes all accessory parts for quick, trouble free installation
- Optional IDE interface card available

PAN008 Quadro Kit IDE	£115⁹⁵
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Panasonic PD System

- Quad speed CD-ROM drive and 650Mb rewritable optical disk drive. Removable 650Mb optical
- SCSI-2 interface for Mac or PC
- Corel SCSI™ supports most SCSI host adapters
- CD-ROM function supports video CD and CDi movie
- Includes all accessory parts for quick trouble-free installation

PAN007 PD Kit w/out I/F card	£475
PAN009 PD Kit with I/F card	£525
PAN010 650Mb Optical disc	£35⁹⁵

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!



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.

wes006 Western Digital 540MB IDE Kit	£139	
wes007 Western Digital 850MB IDE Kit	£149	
wes008 Western Digital 1.2 GB IDE Kit	£209	
wes010 Western Digital 1.6 GB IDE Kit	£299	
wes003 IDE Western Digital AC2850A 850Mb	£149	
wes005 IDE Western Digital AC3312 1280Mb	£195	
wes010 IDE Western Digital 1.6Gb	£269	

Next-day delivery only £6⁹⁵ E&OE. All prices are plus VAT and delivery and are subject to change and availability.

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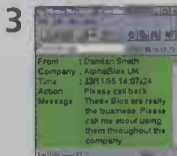
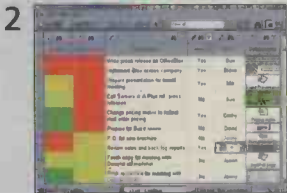
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- 1 Free gift with order
 - 2 4,000 different products
 - 3 Order before 4pm and use tomorrow
 - 4 Credit card charged on despatch
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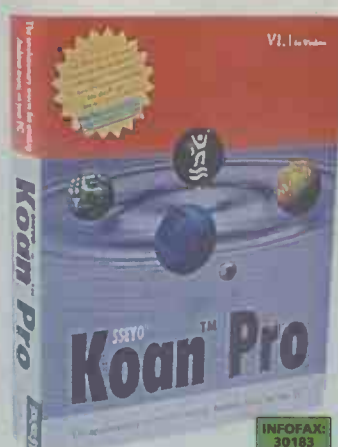
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SUBJECT	PAGE
Introduction	2
Hot Sellers	3
Microsoft	4
IMSI	6
Home	8
Comms	11
Best Business	13
Hot Graphics	24
Hot Peripherals	25
Product Index	28

Page **32**



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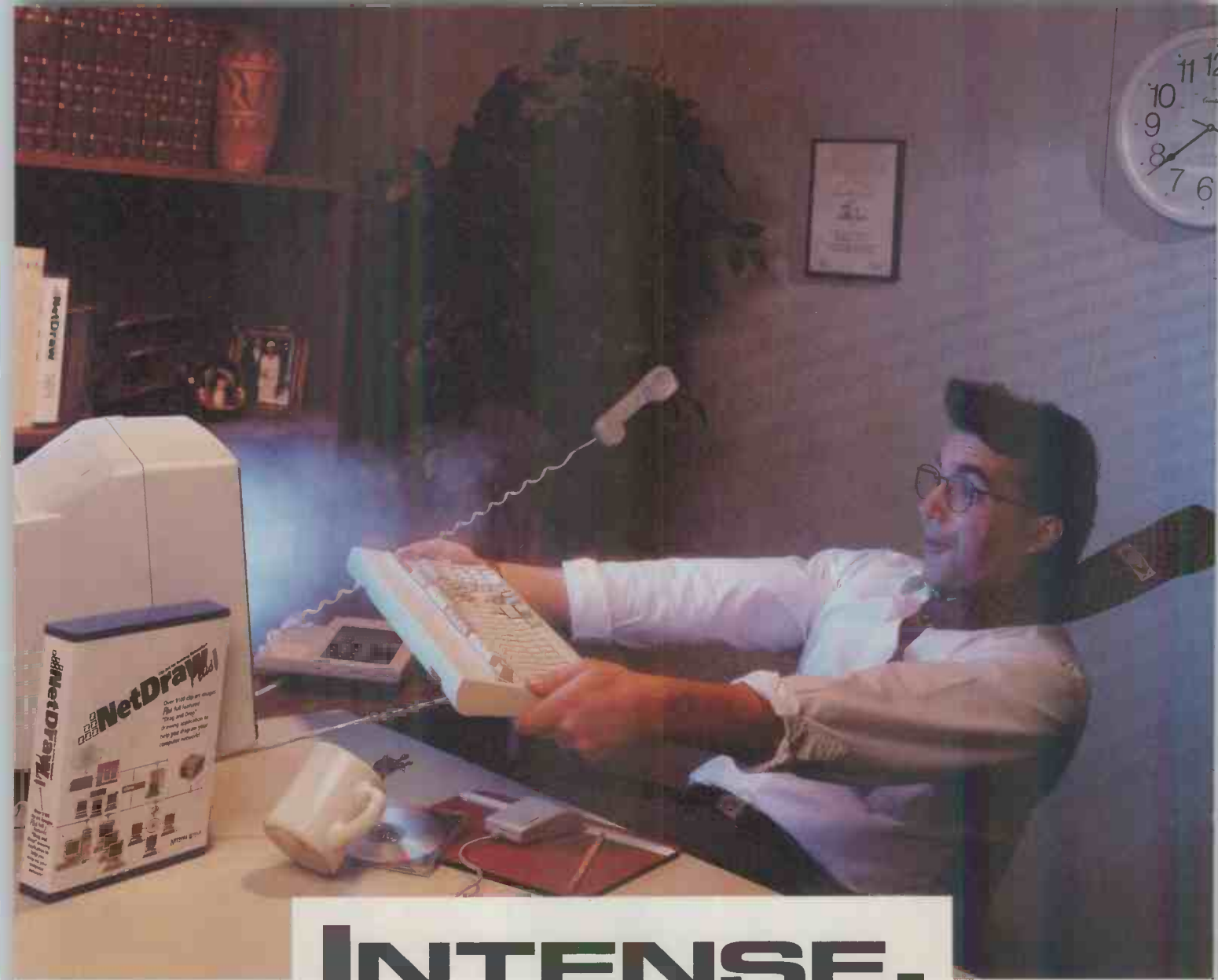
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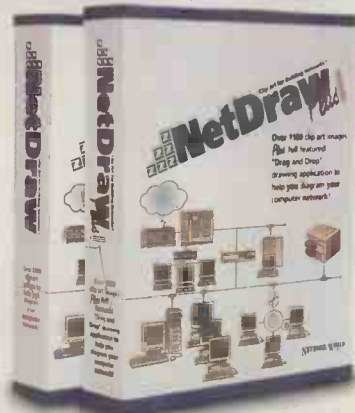
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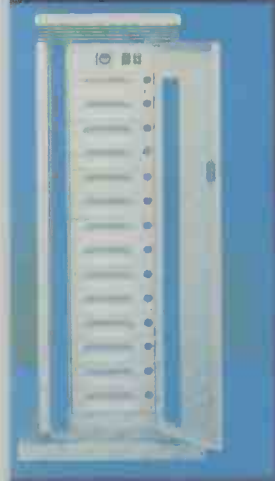
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Nov 94 PCW

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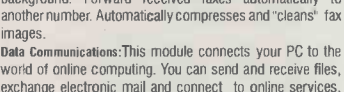
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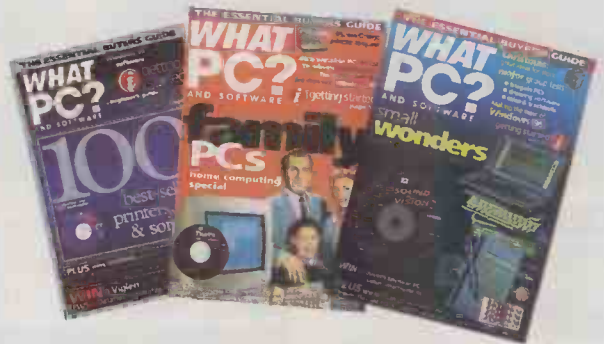
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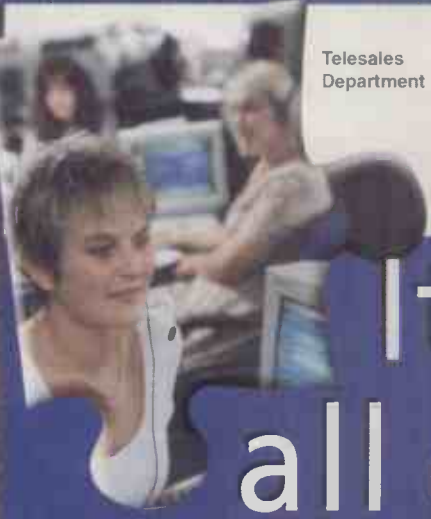
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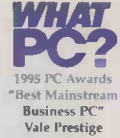


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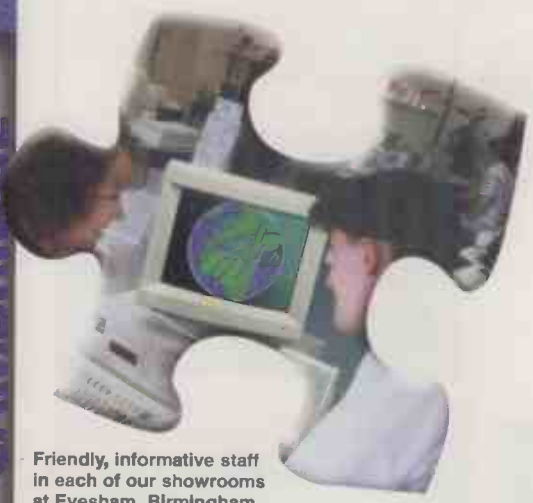
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256kb cache

The Vale Prima – a quality conscious computer at a budget conscious price.

With the Vale Prima 'entry level' doesn't mean no performance. You get a well constructed PC with 8Mb RAM, proper PCI hard disk and video systems, a ZIF socket for processor upgrades, and even 256kb cache.

- ♦ 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 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
- ♦ Mitsumi mouse and 102-key keyboard
- ♦ Includes *Iris Anti-virus software* (3 month license), and your choice of either Windows95, or MS-DOS 6.22 and Windows for Workgroups 3.11. Full manuals and disks supplied. "Introduction to Windows" manual supplied with Windows for Workgroups 3.11
- ♦ 30 day moneyback guarantee
- ♦ 1 year On-Site Maintenance for parts and labour
- ♦ Lifetime technical support hotline
- ♦ Lifetime labour warranty

now
8Mb
 standard

PRIMA OPTIONS

- 16Mb RAM instead of standard 8Mb£180.00 +VAT
 - Fully non-interlaced 15" monitor (as Vale Platinum) ..£99.00 +VAT
 - Quad speed CD-ROM drive£90.00 +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

PRIMA MODELS

For full details of Microsoft Media 96 and Lotus Multimedia Office 96, see the first page of our advert.

486dx2-66	Standard	EDO-96	Lotus Office 96
528Mb	£799+VAT	£949+VAT	£989+VAT
1Gb	£849+VAT	£999+VAT	£1039+VAT
486dx4-100	Standard	EDO-96	Lotus Office 96
528Mb	£819+VAT	£969+VAT	£1009+VAT
1Gb	£869+VAT	£1019+VAT	£1059+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 first page).



Prima

Vale Prima – your budget is our concern.

Previously the Vale range has not included a budget Pentium® processor based PC so we thought it was time to prove a point! We set out to build a quality PC and sell it at a bargain price, whilst still offering a standard of equipment that allows us to maintain our award winning level of service and support. It's motherboard is based on the famous Intel Triton chipset (almost unheard of at this price) and is capable of expanding with your needs. In fact the beauty of this PC is that it is so upgradeable – who knows in a years time your P75 might have grown into a P166 with Pipeline-Burst cache and a mountain of EDO RAM.

- ♦ Integrated motherboard with Intel Triton chipset
- ♦ Intel socket 7 for processor upgrades
- ♦ 2xPCI, 1xPCI/16-bit & 3x16-bit expansion slots
- ♦ On-board fast PCI IDE hard disk controller
- ♦ 8Mb EDO RAM (expandable to 128Mb)
- ♦ 1 EPP parallel port and 2 serial ports with 16550 UART
- ♦ 1Mb PCI video card
- ♦ 14" SVGA MPR II monitor (0.28mm dot pitch)
- ♦ Multimedia models include a double speed CD-ROM drive
- ♦ 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 *Iris Anti-virus software* (3 month license), and your choice of either Windows95, or MS-DOS 6.22 and Windows for Workgroups 3.11. Full manuals and disks supplied. "Introduction to Windows" manual supplied with Windows for Workgroups 3.11
- ♦ 30 day moneyback guarantee
- ♦ 1 year On-Site Maintenance for parts and labour
- ♦ Lifetime technical support hotline
- ♦ Lifetime labour warranty

Designed for
 Each system includes your choice of Windows 3.11 or Windows 95 at no extra cost.
 Microsoft®
 Windows® 95

intel
Triton
 Chipset



PRIMA OPTIONS

- 16Mb RAM instead of standard 8Mb£190.00 +VAT
 - 32Mb RAM instead of standard 8Mb£620.00 +VAT
 - Fully non-interlaced 15" monitor (as Vale Platinum) ..£99.00 +VAT
 - Quad speed CD-ROM drive£90.00 +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

PRIMA MODELS

For full details of Microsoft Media 96 and Lotus Multimedia Office 96, see the first page of our advert.

P 75	Standard	EDO-96	Lotus Office 96
528Mb	£849+VAT	£999+VAT	£1039+VAT
1Gb	£899+VAT	£1049+VAT	£1089+VAT
P 90	Standard	EDO-96	Lotus Office 96
528Mb	£949+VAT	£1099+VAT	£1139+VAT
1Gb	£999+VAT	£1149+VAT	£1189+VAT

P120 Add £50+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 double speed CD-ROM drives (see first page).



NO DEPOSIT PERSONAL FINANCE
 Example: Prima P75/528Mb Media 96 PC (Cash price £1173.83 inc VAT).
£41.95 inc VAT
 per month. No deposit.
 36 monthly payments.
 APR 18.5%. Total payable £1510.20 inc VAT.

A Vale Prima Media 96 PC



Prestige



Vale Prestige – for a little bit more...

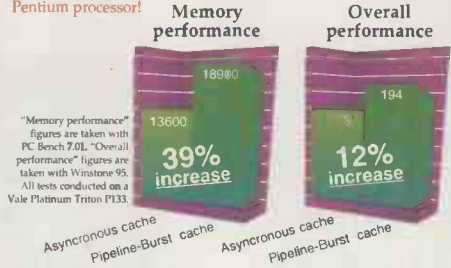
It is amazing what spending a few more pounds can do to the performance and pleasure of use of a PC. The addition of Pipeline-Burst cache (at this price!!!), the famous Diamond Stealth 64 Video card and the best 14" monitor we have seen results in a specification that truly earns the title "Prestige".

- ◆ Integrated motherboard with Intel Triton chipset
- ◆ Intel socket 7 for processor upgrades
- ◆ Fast PCI mode 4 IDE hard disk controller and drive (528Mb Mode 3)
- ◆ 8Mb fast page RAM (expandable to 128Mb)
- ◆ 256kb Pipeline-Burst cache
- ◆ 2xPCI, 1xPCI/16-bit & 3x16-bit expansion slots
- ◆ 1 EPP parallel port and 2 serial ports with 16550 UART
- ◆ Diamond Stealth 64DRAM 1Mb PCI video card
- ◆ 14" MPR II fully non-interlaced monitor (0.28mm dot pitch)
- ◆ Multimedia models include a quad speed CD-ROM drive
- ◆ 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
- ◆ Includes *Iris Anti-virus software* (3 month license), and your choice of either *Windows95*, or *MS-DOS 6.22* and *Windows for Workgroups 3.11*. Full manuals and disks supplied. "Introduction to Windows" manual supplied with *Windows for Workgroups 3.11*
- ◆ Mitsumi mouse and 'Windows95' keyboard
- ◆ 30 day moneyback guarantee
- ◆ 1 year On-Site Maintenance for parts and labour
- ◆ Lifetime technical support hotline
- ◆ Lifetime labour warranty

NOW WITH
Pipeline-Burst
cache

THE CASE FOR PIPELINE-BURST CACHE:

The most significant performance improvement since the Pentium processor!



To get these...

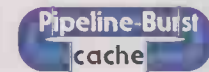


"Overall, this is a well-specified, well-constructed computer with good expansion potential, plenty of bells and whistles and sharp performance. A hard combination to beat." *February 1995 Vale Prestige*



"The Evesham Vale Prestige PCI is well specified with a good build quality and good performance at a reasonable price. This machine is just what your business needs...and it comes from a reputable UK supplier." *1995 PC Awards "Best Mainstream Business PC" Vale Prestige*

We fit these...



Each system includes your choice of Windows 3.11 or Windows 95 at no extra cost.



PRESTIGE MODELS

For full details of Microsoft Media 96 and Lotus Multimedia Office 96, see the first page of our advert.

Model	Standard	Media 96	Lotus Office 96
P 75 528Mb 1Gb	£949 ^{+VAT} £999 ^{+VAT}	£1149 ^{+VAT} £1199 ^{+VAT}	£1189 ^{+VAT} £1239 ^{+VAT}
P 100 528Mb 1Gb	£1049 ^{+VAT} £1099 ^{+VAT}	£1249 ^{+VAT} £1299 ^{+VAT}	£1289 ^{+VAT} £1339 ^{+VAT}

P120 Add £50^{+VAT} to the price of P100 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).

PRESTIGE OPTIONS

- 16Mb RAM instead of standard 8Mb£180.00 + VAT
- 32Mb RAM instead of standard 8Mb£580.00 + VAT
- Fully non-interlaced 15" monitor (as Vale Platinum)£79.00 + VAT
- Diamond Edge 2Mb DRAM card (requires Windows 95) ..£169.00 + VAT
- Diamond Edge 2Mb VRAM card (requires Windows 95) ..£210.00 + VAT
- Diamond Stealth 64VideoVRAM card (2Mb).....£85.00 + VAT
- Stealth 64VideoVRAM upgrade to 4Mb.....£120.00 + VAT
- Diamond Motion Video Player accessory for Stealth 64VideoVRAM (gives MPEG decoding and gives upgrade to 4Mb)£249.00 + VAT
- Quad speed CD-ROM drive£90.00 + 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

ViewSonic® Monitor The Vale Viewsonic 14ES 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.

FULL SCREEN
DISPLAY IN
ALL MODES

NO DEPOSIT PERSONAL FINANCE

Example: Prestige P75/528Mb

Lotus Multimedia

Office 96 PC

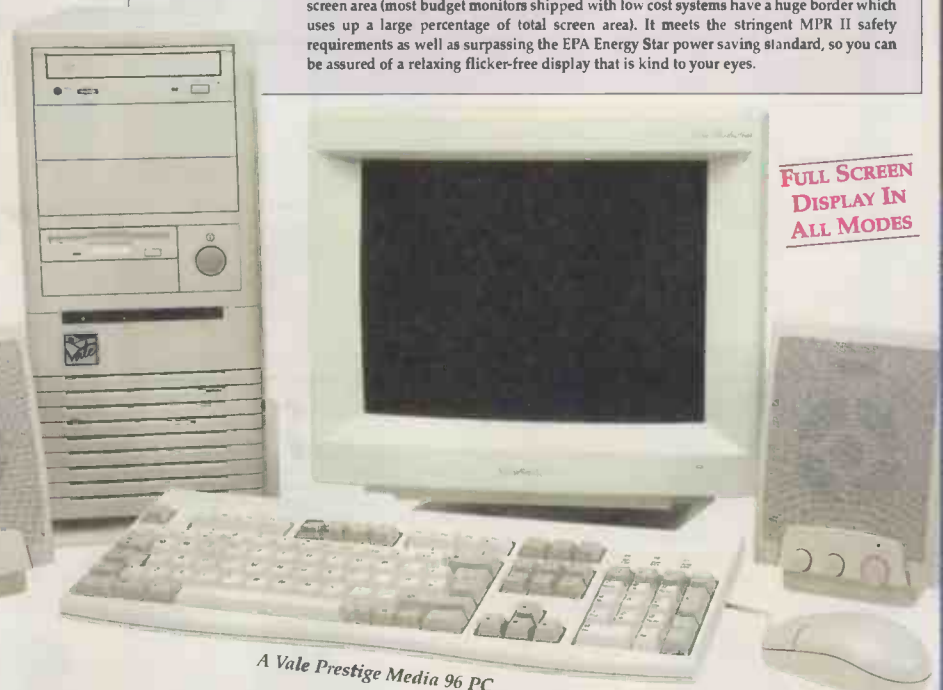
(Cash price £1397.08 inc VAT)

£49.93 inc VAT

per month. No deposit.

36 monthly payments. APR 18.5%.

Total payable £1797.48 inc VAT.

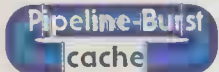


A Vale Prestige Media 96 PC

MILTON KEYNES
BIRMINGHAM
CAMBRIDGE
EVESHAM



Platinum



Vale Platinum... the reviewers' favourite.

A giant killer. How does a relatively small company consistently produce award winning PCs that beat the multi-national mega corporations at their own game? The answer is quite simple - attention to detail. We use components that are chosen for performance, quality and feel; every component has been selected from leading suppliers to offer that rare quality, usability.

You need these...

PLATINUM MODELS

For full details of Microsoft Media 96 and Lotus Multimedia Office 96, see the first page of our advert.

Model	Standard	EDIA 96	Lotus Office 96
P 100	1Gb	£1279+VAT	£1429+VAT
	2Gb	£1429+VAT	£1579+VAT
P 133	1Gb	£1389+VAT	£1539+VAT
	2Gb	£1539+VAT	£1729+VAT
P 150	1Gb	£1469+VAT	£1659+VAT
	2Gb	£1619+VAT	£1809+VAT

P 166 Add £160+VAT to the price of P150 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 first page).

PLATINUM OPTIONS

Upgrade to 16Mb EDO RAM (Platinum)	£190.00 +VAT
Upgrade to 32Mb EDO RAM (Platinum)	£620.00 +VAT
Upgrade to 32Mb EDO RAM (Platinum SE)	£440.00 +VAT
Upgrade to 512kb Pipeline-Burst cache (Platinum)	£50.00 +VAT
1Gb SCSI hard disk instead of 1Gb IDE	£99.00 +VAT
2Gb SCSI hard disk instead of 2Gb IDE	£279.00 +VAT
Diamond Edge 2Mb DRAM card (requires Windows 95)	£169.00 +VAT
Diamond Edge 2Mb VRAM card (requires Windows 95)	£210.00 +VAT
Diamond Stealth 64VideoVRAM card (2Mb)	£85.00 +VAT
Stealth 64VideoVRAM upgrade to 4Mb	£120.00 +VAT
Diamond Motion Video Player accessory for Stealth 64VideoVRAM (gives MPEG decoding and gives upgrade to 4Mb)	£249.00 +VAT
Matrox Millennium video card (Platinum)	£75.00 +VAT
Matrox Millennium video card (Platinum SE)	No cost option
Quad speed CD-ROM drive	£90.00 +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

Monitor

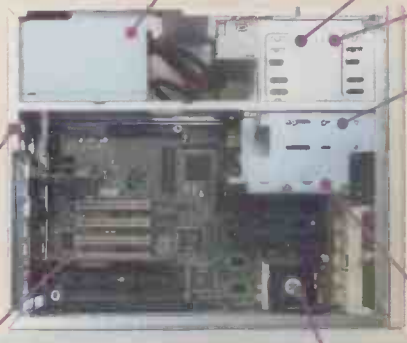
The Vale EcoScan 15 that is supplied with the Platinum range is a superb quality micro-processor controlled 15" monitor. It's dark non-glare FST screen with 'Edge-to-Edge' display gives as much as 30% greater useable picture area than most 14" models. An ingeniously simple digital push button system allows complete control over all display adjustments, including pin-cushion, trapezoid, parallelism and rotation, 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. Platinum SE models use the Vale EcoScan 17.

MONITOR UPGRADES	PLATINUM	PLATINUM SE
15" Idek iiyama SVGA colour (up to 65kHz scan, 1280x1024 max)	£50.00 +VAT	N/A
17" Vale EcoScan17 SVGA colour (up to 65kHz scan, 1280x1024 max)	£200.00 +VAT	N/A
17" Idek iiyama Vision Master SVGA colour PC Magazine "Editors Choice" April 1995	£320.00 +VAT	£120.00 +VAT
20" Tatung SVGA	£699.00 +VAT	£499.00 +VAT
21" Idek iiyama SVGA colour (up to 92kHz scan, 1600x1200 max)	£1050.00 +VAT	£850.00 +VAT

intel Motherboard

For the Platinum models we use a genuine Intel Advanced Endeavour motherboard with Intel Triton chipset. It has flash BIOS, and full support for native signal processing and the Windows 95 'plug and play' environment.

- ◆ 3x PCI, 1xPCI/16-bit & 2x16-bit expansion slots
- ◆ EPP and ECP capable printer port
- ◆ Two 16550 compatible UART driven high speed serial ports
- ◆ 256kb Pipeline-Burst cache (Platinum)
- ◆ 512kb Pipeline-Burst cache (Platinum SE)
- ◆ 8Mb EDO RAM, expandable to 128Mb (Platinum)
- ◆ 16Mb EDO RAM, expandable to 128Mb (Platinum SE)
- ◆ On-board fast PCI enhanced IDE mode 4 hard disk controller
- ◆ Integrated sound using the Creative Labs vibra 16 chipset



- ◆ Choice of desktop or mini-tower case
- ◆ Full-tower case available at extra cost

DIAMOND MULTIMEDIA Video card

- ◆ Diamond Stealth 64DRAM 2Mb 64-bit video card (Platinum)
- ◆ Diamond Stealth 64VideoVRAM 2Mb 64-bit video card (Platinum SE)



Designed for



- ◆ Includes Iris Anti-virus software (3 month license), and your choice of either Windows95, or MS-DOS 6.22 and Windows for Workgroups 3.11. Full disks and manuals supplied. "Introduction to Windows" manual supplied with Windows for Workgroups 3.11

Microsoft Mouse version 2.0

KEY TRONIC Keyboard

"Not only is it pleasantly curved and delightful to type on, but it's also the only one sporting the three extra keys that first appeared on the Microsoft keyboard.. PC Pro, November 1995

- ◆ 1 year On-Site Maintenance (next working day response) for parts and labour
- ◆ Lifetime technical support hotline
- ◆ Lifetime labour warranty
- ◆ 30 day moneyback guarantee

...and our legendary reputation for SERVICE & SUPPORT...

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. The video cards are all based around 53 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.

- EDGE 3D (Option).** The new Diamond Edge is the 3D multimedia accelerator which will give you an edge in the virtual world. It also provides fast True-Colour 2D graphics acceleration, and has a 32 voice 16-bit hardware wavetable, software MPEG decoding for digital video playback. It is fully compatible with SEGA PC games, and has ports for two SEGA Saturn control pads. 2Mb DRAM or 2Mb VRAM versions available. Free CD games software includes Virtua Fighter Remix from SEGA PC, Descant: Destination Saturn, and NASCAR racing. Requires Windows95.
- STEALTH 64DRAM (Vale Prestige and Platinum).** 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 64VideoVRAM (Vale Platinum SE).** The new Stealth 64VideoVRAM 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.





Platinum SE



Vale Platinum SE: Maximum specification – maximum performance.

By enhancing the already highly specified Vale Platinum, we have created the computer that answers the dreams of the most demanding user.

to get these...



"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 Vale Platinum Media 95 is an all too rare example of a quality multimedia PC that's well specified enough to keep up with today's growing software demands, yet cheap enough to make it a good buy for both home and business users." *PC Direct "The Best of Everything" supplement, Winter 1995*
Vale Platinum P90 Media 95



"The combination of an excellent multimedia platform and high all-round DOS and Windows performance, at a good price, makes the Vale Platinum an excellent multimedia PC, and a worthy Editors' Choice" *May 1995*
Vale Platinum P90



January 1995
Vale Platinum P90 Media 95 PC



"Attention to detail made this machine a good all-rounder. Expensive but well specified, and a lightning performer too." *November 1995*
Vale Platinum Triton 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

Specification enhancements:

- ◆ 16Mb EDO RAM
- ◆ 512kb Pipeline-Burst cache
- ◆ Diamond Stealth 64VideoRAM 2Mb 64-bit video card
- ◆ Vale EcoScan17 monitor
- ◆ TEAC CD-56E six speed CD-ROM drive



P150 AND P166
NOW AVAILABLE



166MHz Pentium processor
Intel Triton chipset
16-bit sound
16Mb EDO RAM
17" Vale EcoScan monitor
2Gb mode 4 IDE hard disk
512kb Pipeline-Burst cache
TEAC Six speed CD-ROM drive
2Mb Diamond Stealth 64VideoRAM

£2389+VAT

NO DEPOSIT PERSONAL FINANCE

Example: Buy the Platinum P150/1Gb Lotus Multimedia Office 96 PC (Cash price £1949.33 inc VAT).

£69.66 inc VAT per month.
No deposit. 36 monthly payments.
APR 18.5%. Total payable £2507.76 inc VAT.



BUSINESS FINANCE

Example: Lease the Platinum SE P166/2Gb Lotus Multimedia Office 96 PC for

£84.57 +VAT per month.
3 year term, payable quarterly.

PLATINUM SE MODELS

For full details of Microsoft Media 96 and Lotus Multimedia Office 96, see the first page of our advert.

Model	Standard	Media 96	Lotus Office 96
P 133	1Gb £1999+VAT	£2069+VAT	£2109+VAT
	2Gb £2149+VAT	£2219+VAT	£2259+VAT
P 150	1Gb £2079+VAT	£2149+VAT	£2189+VAT
	2Gb £2229+VAT	£2299+VAT	£2339+VAT
P 166	1Gb £2239+VAT	£2309+VAT	£2349+VAT
	2Gb £2389+VAT	£2459+VAT	£2499+VAT

Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Multimedia models feature six speed CD-ROM drives (see first page).

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 V32bis (14400bps modem and FAX) or 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 £129+VAT
IOMEGA 3.2Gb £225+VAT
Tapes for above£29 + VAT

MICROSOFT OFFICE 95

- ◆ MS Word
- ◆ MS Excel
- ◆ MS Schedule+
- ◆ MS Powerpoint
- ◆ MS Access (Office professional only)



Special offer with any Vale PC:
OFFICE 95 STANDARD **£179+VAT**
OFFICE 95 PROFESSIONAL **£249+VAT**

(Supplied via voucher redemption)

EVESHAM CAMBRIDGE BIRMINGHAM MILTON KEYNES

MILTON KEYNES
BIRMINGHAM
CAMBRIDGE
EVESHAM



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 486x2+66
Dual Scan Colour
January 1995

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.

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.

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}

TRACKBALL

A 19mm ergonomically designed trackball is built-in. The surrounding surface makes for a comfortable hand rest whilst typing.

BATTERY



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.



Designed for Each system includes your choice of Windows 3.11 or Windows 95 at no extra cost.



A Vale Voyager with the supplied carrying pouch

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

Monochrome		
486dx2+66	250MB £899 ^{•VAT}	528MB £999 ^{•VAT}
486dx4+100	£949 ^{•VAT}	£1049 ^{•VAT}
Dual Scan Colour		
486dx2+66	250MB £1249 ^{•VAT}	528MB £1349 ^{•VAT}
486dx4+100	£1299 ^{•VAT}	£1399 ^{•VAT}
TFT Colour		
486dx2+66	250MB £1499 ^{•VAT}	528MB £1599 ^{•VAT}
486dx4+100	£1549 ^{•VAT}	£1649 ^{•VAT}

VOYAGER FEATURES

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.

KEYBOARD

Voyagers use full function 86-key keyboards. Unlike many notebooks, they have a good solid feel.

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 1-hour.

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 your choice of either Windows95, or MS-DOS 6.22 and Windows 3.11, installed and ready to run.

ACCESSORIES

- PCMCIA V34 bis FAX/Modem...£199^{•VAT}
- PCMCIA Ethernet card£139^{•VAT}
- External keyboard£29^{•VAT}
- Soundplus speakers/microphon /earphones system£19^{•VAT}
- ZyFi2 amplified speakers.....£29^{•VAT}
- Total care warranty.....£see panel

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.



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, £12.38^{•VAT} for 486dx2-66/250Mb mono model.

NOTEBOOK CARRYING CASES

VALE Carry Case £30.00^{•VAT}

A neat, compact padded case with carrying handle and detachable shoulder strap. Ideal for protection "out in the field".



SOLIDEX PERFORMANCE

SystemTraveler II™ £49.00^{•VAT}

SystemTraveler II™ is the complete luggage carrier for the modern business traveller.

- Thickly padded to protect your equipment
- Luggage compartment (15.5"x11"x4")
- Printer compartment (13"x9"x2.25")
- Notebook compartment (15.5"x11"x2")
- Cellular phone pocket
- Document compartments
- Holders for diskettes, pens, business cards etc.



Voyager II



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 its stride.

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, CACHE & RAM

Designed to use 3.3V Pentium processor and fitted with 256k asynchronous cache, the Voyager II offers superb performance with maximum battery life. 8Mb RAM is fitted, and can be upgraded to a maximum of 40Mb.

PCI HARD DISK

The enhanced IDE hard disk is driven by a PCI local bus controller, and can be removed for upgrading.

POINTPAD™

The built in Pointpad™, with palm rest, controls the cursor effortlessly and accurately.



Removable battery. Upgradeable hard disk.

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}



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.

Dual Scan Colour		
Pentium P75	528MB £1699 ^{•VAT}	1GB £1999 ^{•VAT}
Pentium P90	£1779 ^{•VAT}	£2079 ^{•VAT}
TFT Colour		
Pentium P75	528MB £1899 ^{•VAT}	1GB £2199 ^{•VAT}
Pentium P90	£1979 ^{•VAT}	£2279 ^{•VAT}

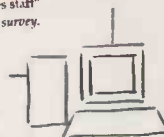
Corporate and Network Sales



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 have dedicated account managers ready to support all your I.T. needs; indeed they have been awarded best "Product knowledge of Sales Staff" by nearly 2000 users in the Computer Weekly/KEW Associates 'Quality of IT Suppliers 1995' survey. 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.

COMPUTERWEEKLY

Best "Product knowledge of sales staff" in 'Quality of IT Suppliers 1995' survey.



Vale Fileservers and Workstations

The Vale Fileserver

- ◆ Intel Advanced Endeavour motherboard with Triton chipset
- ◆ 100MHz Pentium® processor
- ◆ 16Mb EDO RAM
- ◆ 512kb Pipeline-Burst cache
- ◆ 1Gb SCSI hard disk with Adaptec 2940 PCI controller

With the full-tower case:

£1699+VAT

- ◆ 1Mb PCI video
- ◆ 14" SVGA monitor
- ◆ 32-bit PCI ethernet card

With the dedicated fileserver case:

£1999+VAT



Vale Advanced NT Fileserver

- ◆ Intel Advanced Endeavour motherboard with Triton chipset
- ◆ 133MHz Pentium® processor
- ◆ 2Gb SCSI hard disk with Adaptec 2940 PCI controller
- ◆ 32Mb EDO RAM
- ◆ 512kb Pipeline-Burst cache

With the full-tower case:

£3599+VAT

- ◆ 1Mb PCI video
- ◆ 14" SVGA monitor
- ◆ 32-bit PCI ethernet card
- ◆ Quad speed CD-ROM drive
- ◆ Microsoft NT Advanced Server software

With the dedicated fileserver case:

£3899+VAT

BUSINESS FINANCE

Example: Lease the *Advanced NT Fileserver (dedicated case)* for

£138.02+VAT per month.

3 year term, payable quarterly.



A Vale Fileserver with the purpose designed case.



The Pentium® PRO processor – the new standard for file servers and workstations.



Vale Advanced NT PRO Fileserver

- ◆ Intel Aurora ATX motherboard
- ◆ 150MHz Pentium® PRO processor with 256kb integrated cache
- ◆ 32Mb EDO RAM
- ◆ 2Gb Seagate SCSI hard disk with Adaptec 2940 PCI controller
- ◆ Six speed SCSI CD-ROM drive

Purchase price

£4299+VAT

- ◆ 1Mb PCI video
- ◆ 14" SVGA monitor
- ◆ 32-bit PCI ethernet card
- ◆ Full tower case (see first page)
- ◆ Microsoft NT Advanced Server software

Lease rental per month

£152-18+VAT

Vale Advanced NT PRO Workstation

- ◆ Intel Aurora ATX motherboard
- ◆ 150MHz Pentium® PRO processor with 256kb integrated cache
- ◆ 32Mb EDO RAM
- ◆ 2Gb Seagate IDE hard disk with PCI controller
- ◆ 17" SVGA monitor

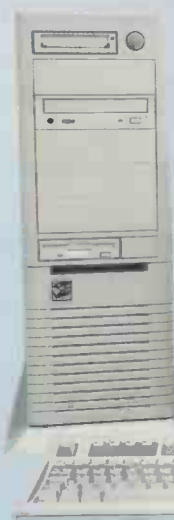
Purchase price

£3899+VAT

- ◆ Diamond Stealth 64VideoVRAM 2Mb PCI video
- ◆ Six speed CD-ROM drive
- ◆ Full tower case (see first page)
- ◆ Microsoft NT Workstation software

Lease rental per month

£138-02+VAT



A Vale Advanced NT PRO Workstation



NB – The lease rental prices quoted are for a 3 year term, payable quarterly.



Network Services

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.

Evesham Micros Corporate Sales Centres

- EVESHAM 01386 769404
- CAMBRIDGE 01223 323898
- BIRMINGHAM 0121 446 5050
- MILTON KEYNES 01908 230898



Confused about your network requirements? Speak to our knowledgeable sales staff regarding:

Fault tolerance options –

Mirrored disks, Duplexed disks, RAID systems, Dedicated server case (illustrated above left) with redundant power supply, Uninterruptable Power Supplies.

Workstations –

Individual stations or multi-user solutions.

Printer services –

Many options available.

Cable installation –

Hubs, patch boxes and cabling.

Installation and commissioning –

Hardware installation, configuration of workstations, setup of print services.

Training –

We can arrange Certified Novell Administrator courses at a Novell Authorised Education Centre.

TWO GREAT MULTIMEDIA BUNDLES

Microsoft

OFFERED WITH A VARIETY OF PACKS

- ◆ Works 3 (for Windows 3.1) or Works 4 (for Windows95) - Your choice, please specify which
- ◆ Money 4
- ◆ Encarta 96 (International Edition)
- ◆ Fine Artist
- ◆ Explorapedia
- ◆ Dinosaurs
- ◆ Golf
- ◆ Scenes
- ◆ Fury 3 (trial version)
- ◆ Windows Entertainment Pack



Lotus Suite:

- Lotus 1-2-3
- Lotus Word Pro
- Lotus Approach
- Lotus Freelance Graphics
- Lotus Organizer

Productivity Software:

- Quicken 3, CorelDraw 4, Sage Moneywise

Top Games Titles:

- Dragon Lore, MegaRace, Theme Park, FIFA International Soccer

Grolier Encyclopaedia:

- Software Toolworks Grolier Encyclopaedia for 1995 - version 7

Plus: Suprivoice, Professor Windows, Professor Training Suite, Professor Multimedia; Typing Tutor; Pilot Multimedia including 'Interlude' and 'Get Organized'

Upgrade speakers in any pack to ZyFi 2 PROs for a surcharge of £30+VAT.

Lotus Office 96



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-562/563 Double Speed, multi-session drive
limited offer at only
£39.00+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** £49.00+VAT CR-562/3 with AT-bus driver card
- 1F** £75.00+VAT CR-562/3 bundled with Soundplus 16 card
- 1B** £90.00+VAT CR-562/3 with genuine SoundBlaster 16 card

Microsoft MEDIA 96

- 7C** £136.00+VAT CR-562/3 with Media 96 pack, ZyFi2 speakers and Soundplus 16 card
- 7A** £150.00+VAT CR-562/3 with Media 96 pack, ZyFi2 speakers & genuine SoundBlaster 16

Lotus Office 96

- 9C** £176.00+VAT CR-562/3 + Lotus Multimedia Office 96, ZyFi2 speakers and Soundplus 16
- 9A** £190.00+VAT CR-562/3 + Lotus Multimedia, ZyFi2 speakers & genuine SoundBlaster 16

PANASONIC QUAD SPEED IDE CD-ROM DRIVE

PANASONIC CR-581 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.



- 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

drive only £82.00+VAT
 Includes cables and driver software

NB - requires sound card or motherboard with secondary IDE connector

Microsoft MEDIA 96

- 5** £160.00+VAT CR-581 with Media 96 pack and AT-bus driver card
- 5A** £200.00+VAT CR-581 with Media 96 pack, ZyFi2 speakers and SoundBlaster 16 card
- 5B** £260.00+VAT CR-581 with Media 96 pack, ZyFi2s and SoundBlaster AWE32 value
- 5C** £325.00+VAT CR-581 with Media 96 pack, ZyFi2s and SoundBlaster AWE32

Lotus Office 96

- 6** £195.00+VAT CR-581 with Lotus Multimedia Office 96 and AT-bus driver card
- 6A** £235.00+VAT CR-581 with Lotus Multimedia Office 96, ZyFi2s and SoundBlaster 16
- 6B** £295.00+VAT CR-581 with Lotus Multimedia Office 96, ZyFi2s and AWE32 value
- 6C** £360.00+VAT CR-581 with Lotus Multimedia Office 96, ZyFi2s and AWE32

SPECIAL OFFER! - LIMITED STOCKS

"Software Toolworks Grolier Encyclopaedia for 1994 - Version 6" with any of our multimedia packs for only... **£10+VAT**

MILTON KEYNES
BIRMINGHAM
CAMBRIDGE
EVESHAM

TEAC SIX SPEED IDE CD-ROM DRIVE

True **6X** speed performance.

Only **£127^{+VAT}**. NB - bare drive requires sound card or motherboard with secondary IDE connector

- 8A** £135.00^{+VAT} CD-56E with AT-Bus driver card
- 8B** £175.00^{+VAT} CD-56E with genuine SoundBlaster 16 card
- 8C** £235.00^{+VAT} CD-56E with genuine SoundBlaster AWE32 value
- 8D** £300.00^{+VAT} CD-56E with genuine SoundBlaster AWE32



- 11** £196.00^{+VAT} CD-56E with Media 96 pack and AT-bus driver card
- 11A** £236.00^{+VAT} CD-56E with Media 96 pack, ZyFi 2s speakers and genuine SB 16 card
- 11B** £296.00^{+VAT} CD-56E with Media 96 pack, ZyFi 2s and SoundBlaster AWE32 value
- 11C** £361.00^{+VAT} CD-56E with Media 96 pack, ZyFi 2s and SoundBlaster AWE32

CREATIVE LABS, INC.

- SoundBlaster 16 Value pack £67.00^{+VAT} with IDE CD-ROM interface
- SoundBlaster 16 MCD card £99.00^{+VAT} with Panasonic/Sony/Mitsumi CD-ROM interfaces
- SoundBlaster AWE32 card £169.00^{+VAT}
- MIDI Kit £59.00^{+VAT}
- VideoBlaster SE £189.00^{+VAT}
- TV Coder £129.00^{+VAT}

SOUNDPLUS 16 CARD

A 16-bit stereo sound card, compatible with the SoundBlaster and SoundBlaster Pro, as well as the Windows Sound System, MPU-401 and AdLib standards. It provides CD-ROM interfaces for Panasonic, Sony, Mitsumi and IDE CD-ROM drives, has a MIDI interface/joystick port, and also interfaces for microphone, speakers, audio in/out, and wave table synthesizer. The high specification includes 48kHz stereo sampling rate, a 20 voice FM music synthesizer, and a 4 Watt per channel stereo power amplifier.

Incredible value...**£39.99^{+VAT}**

ZYFI 2 SPEAKERS

THE NEW ZYFI 2 ACTIVE POWER AMPLIFIED STEREO SPEAKERS OFFER THE VERY BEST IN SOUND REPRODUCTION - IDEAL FOR ALL SOUND CARDS AND MULTIMEDIA SYSTEMS!

Feature built-in power amplifier with separate L/R volume controls and tone control. Magnetically shielded.



March 1995

"Sound quality is splendid and a great improvement over the originals - stereo comes across well and the sound is crisp. You can get a fair amount of bass too... ZyFi 2s are definitely a sound investment."



Only **£29.00^{+VAT}**

Beware! - Many 6x and 8x drives being offered are modified quad speed units

- Enhanced IDE ATAPI interface
- Six speed 900kb/sec sustained data transfer rate
- Super fast 139ms access
- Plug and Play compliant
- Output from audio CDs via headphone socket
- Multi-session drive - compatible with Kodak Photo CD
- MPC and White Book (CDi) compatible



Lotus Office 96

- 10** £236.00^{+VAT} CD-56E + Lotus Multimedia Office 96 and AT-bus driver card
- 10A** £276.00^{+VAT} CD-56E + Lotus Multimedia Office 96, ZyFi 2s and genuine S/Blaster 16
- 10B** £336.00^{+VAT} CD-56E + Lotus Multimedia Office 96, ZyFi 2s and S/Blaster AWE32 value
- 10C** £401.00^{+VAT} CD-56E + Lotus Multimedia Office 96, ZyFi 2s and S/Blaster AWE32

SPECIAL OFFER! SoundBlaster AWE32 Value

SoundBlaster AWE32 Value

Now only....**£99.00^{+VAT}**

Integrated design combining SB16 with WaveBlaster, bringing the power of Advanced WaveEffects Synthesis. Has Wave table, IDE CD-ROM interface and 512kb RAM for sampling.



ZYFI COMPACT

Experience great audio reproduction from your PC Sound Card with ZY-FI Compact Speakers - the discrete and economical way to give your PC great sound.

- Built-in Stereo Power Amplifier
- 16 Watts PMPO (4 Watts RMS)
- Active or Passive use
- 3" Full Range Cone
- Magnetically Shielded
- Volume Control
- Bass Booster
- Treble Booster

Only **£12.00^{+VAT}**

ZYFI 2 PRO SPEAKERS

The latest addition to the serious multimedia system must be our ZYFI 2 PRO Active speaker system.

With a PMPO of 60 Watts per channel and an amplifier with a true 18 Watts RMS per channel rating, the PROs deliver a rich dynamic sound. They feature separate volume, bass and treble controls, and are magnetically shielded. Speaker size 14x23x15cm.



March 1995 "If you've invested in a decent sound card, then you've got to get some serious amplification to do it justice, and these are the boys to add a bit of oomph to your PC, especially if you plan to play some audio CDs or are serious about games."

PC Zone, April 1995: Rating 9/10. "Excellent value for money."



Only **£49.00^{+VAT}**



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.



SPECIAL OFFER Includes F15 III on CD

Switchable autofire, throttle control and suction feet complete the package. Requires game port.



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!



FLIGHTSTICK £27.00^{+VAT}

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 energy kill rate will increase. Excellent construction - looks and feels like the real thing! Includes throttle control and 7ft long connection cable. Requires game port.

FLIGHTSTICK PRO £55.00^{+VAT}

THE ULTIMATE COMBAT STICK FOR COMPUTER PILOTS!

The new Flightstick PRO from CH Products offers the ultimate in fingertip control. It has four fire buttons, and a four-way switch which allows you to control weapons, radar and viewing functions on more advanced software - all without taking your hand from the stick! With its top quality sturdy construction it is designed to last for years. Includes driver software and long connection cable. Requires game port.



VIRTUAL PILOT £62.00^{+VAT}

THE MOST REALISTIC FLIGHT YOKE AVAILABLE FOR THE PC

Enjoy the ultimate realism in all flight simulation games with the Virtual Pilot, made in the USA by CH Products. Looking just like a real airplane yoke, it is designed for the ultimate precision, giving you superb control. Also ideal for driving games. Clamps to table top. Requires game port.



VIRTUAL PILOT PRO £72.00^{+VAT}

The VIRTUAL PILOT PRO has all the best features of the award winning VIRTUAL PILOT. It adds four extra fire buttons and two four-way switches for unrivaled control in all combat and simulation games. Requires game port.



PRO PEDALS £75.00^{+VAT}

Featuring dual operating modes for forward and back rudder motion, as well as pivot movement for driving games, the CH Products PRO PEDALS provide gamers with the most realistic flying and driving experience. They also include aircraft style toe-brakes, and independent accelerator and brake controls. They are designed to work with all CH Products joysticks and yokes, and are built with rugged components to withstand the toughest competitor. Requires game port.



GAME PORT 2000 £12.50^{+VAT}

Game port card for any of these joysticks and yokes. Works with any clock speed. Particularly recommended for 486px2-66 and Pentium systems.

MILTON KEYNES
BIRMINGHAM
CAMBRIDGE
EVESHAM

UPGRADES & ACCESSORIES

PROCESSORS



486dx2-66	£39.00 ^{+VAT}
486dx4-100	£59.00 ^{+VAT}
Motherboard support for 3.3V required.	
Pentium P75	£120.00 ^{+VAT}
Pentium P90	£200.00 ^{+VAT}
Pentium P120	£300.00 ^{+VAT}
Pentium P133	£430.00 ^{+VAT}
Heatsink and fan recommended for all above processors.	
CPU Heatsink	£3.00 ^{+VAT}
486 fan & heatsink	£10.00 ^{+VAT}
Pentium fan & h/sink	£9.00 ^{+VAT}

Memory SIMMs

1Mb 30-pin SIMM (3 chip) 70ns	£34.00 ^{+VAT}
4Mb 30-pin SIMM (3 chip) 70ns	£130.00 ^{+VAT}
4Mb 72-pin SIMM 70ns 32-bit	£95.00 ^{+VAT}
8Mb 72-pin SIMM 70ns 32-bit	£190.00 ^{+VAT}
16Mb 72-pin SIMM 70ns 32-bit	£360.00 ^{+VAT}
EDO RAM: 4Mb 72-pin SIMM 70ns 32-bit	£100.00 ^{+VAT}
EDO RAM: 8Mb 72-pin SIMM 70ns 32-bit	£190.00 ^{+VAT}
EDO RAM: 16Mb 72-pin SIMM 70ns 32-bit	£420.00 ^{+VAT}



PCI MOTHERBOARDS



SPECIAL PRICES

Our bulk purchase of motherboards allows us to offer you these special prices...

486 Up to DX4-100 (TYPE 7).....£85.00^{+VAT}

- Will accept most 486 CPUs up to DX4-100 • 3xPCI local bus slots
- 4xISA slots • ZIF socket • P24T upgradeable • 256kb Cache
- On-board PCI IDE hard disk controller • 2x 16550 compatible UART driven high speed serial ports • EPP and ECP compatible parallel port
- Accepts 72-pin SIMMs.

Type 7 board with 486dx2+66 processor.....£119.00^{+VAT}

Type 7 board with 486dx4+100 processor.....£139.00^{+VAT}

NB - all board + CPU offers include heatsink and fan.

Pentium (TYPE 6).....£119.00^{+VAT}

- 2xPCI local bus slots • 1xPCI/ISA bus slot • 3xISA slots • ZIF socket • 256kb Cache • On-board PCI IDE hard disk controller
- 2x 16550 compatible UART driven high speed serial ports • EPP and ECP compatible parallel port • Accepts 72-pin SIMMs.

Type 6 board with P75 processor.....£235.00^{+VAT}

Type 6 board with P90 processor.....£315.00^{+VAT}

Type 6 board with P120 processor.....£415.00^{+VAT}

NB - all board + CPU offers include heatsink and fan.

Triton For Pentium CPUs (TYPE 8).....£219.00^{+VAT}

- Intel Advanced Endeavour board with Triton chipset • 3xPCI local bus slots • 1xPCI/ISA bus slot • 2xISA slots • ZIF socket
- 256kb Asynchronous Cache • On-board PCI IDE hard disk controller
- 2x 16550 compatible UART driven high speed serial ports • EPP and ECP compatible parallel port • Support for EDO RAM, Pipeline-Burst cache and Native Signal Processing • On-board sound with Creative Labs Vibra 16 chipset • Accepts 72-pin SIMMs.

Upgrade to 256k Pipeline-Burst cache.....£50.00^{+VAT}

Upgrade to 512k Pipeline-Burst cache.....£100.00^{+VAT}

Type 8 board with P90 processor.....£415.00^{+VAT}

Type 8 board with P120 processor.....£515.00^{+VAT}

Type 8 board with P133 processor.....£645.00^{+VAT}

NB - all board + CPU offers include heatsink and fan.

Monitors

Due to our bulk purchasing power for our own Vale PCs, we are able to offer the following high specification monitors at very competitive prices.



Vale EcoScan monitors

Our own family of 15" and 17" models, as illustrated above. They feature an ingeniously simple digital push button system which allows complete control over all display adjustments, including pin-cushion, trapezoid, parallelism and rotation, with on-screen representation of the settings.

- 0.28mm dot pitch
- Up to 65kHz horizontal scan
- 1280 x 1024 max. res.
- Fully non-interlaced
- 72Hz Flicker-Free at 1024x768
- MPR II and EPA compliant

EcoScan15 ..£249^{+VAT} EcoScan17 ..£449^{+VAT}

iiyama Vision

Master 15".....£279^{+VAT}
0.26mm dot pitch • 1280x1024 max • Up to 65KHz horiz. scan • 1024x768 @ 75Hz refresh • MPRII and EPA compliant

iiyama Vision Master 17".....£549^{+VAT}
0.26mm dot pitch • 1600x1200 max • Up to 86KHz horiz. scan • 1280x1024 @ 74Hz refresh • MPRII and EPA compliant

– PC Magazine "Editor's Choice" April 1995
3 year on-site maintenance for Vision Master 17".....£80^{+VAT}

iiyama Vision Master PRO 17".....£619^{+VAT}
0.25mm dot pitch DiamondTron tube • Other spec as above

iiyama Vision Master 21".....£1238^{+VAT}
1600x1200 max • Up to 92KHz horiz. scan • 1280x1024 @ 72Hz refresh • MPRII and EPA compliant

Viewsonic 14ES 14".....£180^{+VAT}
0.28mm dot pitch • 1024x768 max non-interlaced • 800x600 @ 72Hz refresh • EPA Energy Star compliant

Tatung 20".....£899^{+VAT}
1280x1024 max. res (non-interlaced) • 0.31mm dot pitch • Auto 29-65KHz horiz. scan

TAPE BACKUP • MEGA ZIP DISK DRIVE

ditto™ Top quality tape streamers available as either internal or a stand alone units. The stand alone versions simply connect to the PC's parallel port, with a through port for printer operation.

- ♦ Compatible with Novell and Lantastic networks
- ♦ Utilises the latest Travan technology
- ♦ Supplied with backup software for DOS/Windows
- ♦ Quoted capacities are with compression software supplied
- ♦ 2 year manufacturer's warranty



"A superb combination of tape drive and software."
PC Today, December 1993
Imaging Tape250 Parallel Port Unit



800Mb Internal unit.....£129^{+VAT}
Parallel port unit£149^{+VAT}
Tape for ditto 800Mb.....£29.00 +VAT

3.2Gb Internal unit.....£225^{+VAT}
Parallel port unit£295^{+VAT}
Tape for ditto 3.2Gb.....£29.00 +VAT

Hard Disks

COST EFFECTIVE MASS STORAGE



Optional installation kit (5.25" mounting bracket kit plus cables).....£10.00^{+VAT}

SEAGATE DRIVE MECHANISMS:

107Mb (IDE).....£59.00 ^{+VAT}	ST3660A (IDE) 528Mb£115.00 ^{+VAT}
170Mb (IDE).....£79.00 ^{+VAT}	ST51080A (IDE) 1Gb£179.00 ^{+VAT}
214Mb (IDE).....£89.00 ^{+VAT}	ST51080N (SCSI) 1Gb.....£199.00 ^{+VAT}
	ST32430N (SCSI) 2Gb....£499.00 ^{+VAT}

HD CONTROLLER CARDS



PROMISE CACHING HARD DISK CONTROLLERS

DC99M (ISA bus) c/w 512kb RAM (upgradeable to 8.5Mb)	£39.00 ^{+VAT}
DC4030 (VL bus) c/w 0kb RAM (upgradeable to 16Mb)	£69.00 ^{+VAT}
DC4030 (VL bus) c/w 2Mb RAM (upgradeable to 16Mb)	£119.00 ^{+VAT}

Video Cards

Why Diamond DIAMOND Video Cards? MULTIMEDIA

The highly acclaimed Stealth range has won many press accolades including the coveted PC Magazine "Editors Choice", and the new Stealth SE and Stealth 64 Video continue the tradition of delivering the best price/performance available. 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.

Diamond Stealth SE PCI Bus (1Mb)	£74.00 ^{+VAT}
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Diamond Stealth 64VideoVRAM PCI Bus (2Mb)	£190.00 ^{+VAT}
Upgrade to 4Mb for Stealth 64VideoVRAM	£130.00 ^{+VAT}
Diamond MVP accessory for Stealth 64Video, gives MPEG decoding and upgrade to 4Mb VRAM	£249.00 ^{+VAT}
Diamond Edge 2Mb DRAM	£239.00 ^{+VAT}
Diamond Edge 2Mb VRAM	£299.00 ^{+VAT}

Please see page 1 for a full description of the Diamond Edge

Zip Disk is the newest, smallest, most portable drive. It works just like a hard drive, but the 100Mb cartridges give it unlimited expansion potential. It simply plugs into your parallel port in an instant, with a through port for printer operation.

3 DRIVES IN ONE:

- Expand your hard drive with unlimited capacity 100Mb at a time
- Take it with you Zip drive and disks are portable
- Backup your hard drive Quickly and easily



- ♦ 29ms seek time
- ♦ Up to 1Mb/sec data transfer
- ♦ Very compact (180mm x 136mm x 37mm)
- ♦ Light weight (approx 450g)
- ♦ Includes one 100Mb disk, and Zip tools software to help you organise your data
- ♦ Limited lifetime warranty on Zip disks

Inexpensive, reliable, and ready to help you organise everything. Use as many disks as you need. Software helps you keep track of it all. Work stuff. Home stuff. School stuff. Play stuff. Whatever.

ZIP DISK DRIVE.....ONLY £149.99^{+VAT}
100Mb Zip disk£16.95 +VAT

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Reliability is the key to network installations – you cannot afford to make compromises. We offer top quality branded products at an affordable price.

Novell Authorised Reseller
We are NOVELL Authorised Resellers. Please contact us regarding your specific networking requirements.

Instant Ethernet

WORKING HEADACHES?
Solve all your problems with these revolutionary new self-installing adapters.



Instant-Link



- Hassle free automatic installation – just plug it in, type NDCGO, and you have instant Ethernet
 - 10BaseT and 10Base2 ports
- | | |
|------------------------------------|-------------------------|
| ISA bus internal card | £49.00 ^{+VAT} |
| PCI bus 32-bit internal card | £89.00 ^{+VAT} |
| PCMCIA card | £139.00 ^{+VAT} |

Cabling.

BNC connectors: T Connector	£3.20 ^{+VAT}
Through Connector	£1.80 ^{+VAT}
Cable plug	£1.75 ^{+VAT}
Ethernet Cable: Loose, per metre	£0.75 ^{+VAT}
5m length with BNC plugs at each end	£8.50 ^{+VAT}
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Novell compatible 16-bit network card.
Fully Novell authorised and tested.

- Faster than and compatible with NE2000 cards
- 10BaseT and 10Base2 I/O
- NETBIOS compatible
- 10Mbps

£39.00 +VAT

Kingston card with Novell Network Lite



Network hubs.

- 9 port stackable hub
- 16 port hub

£129.00^{+VAT}

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Pocket LAN adaptor

10Base2 & 10BaseT (connects to parallel port)

£110.00^{+VAT}

Fast FAX/MODEMS

The Internet

V32bis package.....**£90^{+VAT}**
V34bis package...**£195^{+VAT}**



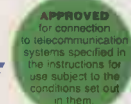
This package is the affordable way to enhance your PC with communications ability. Send and receive faxes, and access online information services and the Internet. Apart from your PC and a phone socket, everything you need is included:

- Pace FAX/modem: either V32bis (14400 bps modem & FAX) or 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

SPECIAL OFFER

All modems include free Pipex Dial Internet connection trial pack, awarded "PC PRO Excellence" November 1995.



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- MICROLIN fx 34 portable external unit.....**£180^{+VAT}**
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Linnet V34 Message Desk...**£185^{+VAT}**

Desktop Voice, Data and Fax Modem. Integrates your PC and your telephone to provide complete communications facilities.



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Made for us by Mitsumi, this is the 102-key keyboard used in our Vale Prima and Prestige ranges of PCs. A very neat and attractive design, it is superb value for money.

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A top quality 102-key keyboard as used in our Vale Premier range of PCs. It features proper tactile keys and a sturdy metal base. This unit has consistently impressed reviewers: "...almost traditional in its weight and touch. A deeply desirable device." Computer Buyer, June 1994

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Windows 95 Upgrade pack

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ALL SCANNERS ARE TWAIN COMPLIANT

Colour ⁸⁰⁰

True 24-bit colour, 800dpi



£89.99+VAT

or with 'parallel port' interface (see below) £139.00+VAT

COLOUR SCANNER FEATURES:

- Colour mode gives genuine 16 million colour, 800dpi scanning
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- Halftone and Line-art modes at up to 800dpi

PACKAGE INCLUDES:

- HAND-HELD COLOUR SCANNER & INTERFACE CARD
- 'iPhoto Plus' top professional Windows based image scanning and photograph re-touching software
- 'Recognita GO-CR' powerful OCR Windows software, giving simple, efficient operation with highly effective results

Requires '386 or higher, Windows 3.1 or higher, at least 4Mb RAM, Mouse, Hard Drive and 256 colour SVGA graphics or higher.

Scanners from **Mustek**

True 256 GREYSCALE HANDY SCANNER with all the right features, including O.C.R. and extensive graphics editing facilities.

- Genuine 256 greyscale performance – not interpolated from 32 greyscales (Beware: Many scanners advertised as 256 greyscale are 32 greyscale, achieving 256 only by software interpolation)
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- Full 105mm wide scanning head
- Eight selectable scanning resolutions between 100 and 800dpi
- Variable brightness control • Built-in scan speed indicator
- Includes "iPhoto Plus" top professional Windows based image scanning and photograph re-touching software, and "Perceive OCR" software



WHAT PC? BEST BUY

"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

with internal interface card £49.99+VAT

with 'parallel port' interface (see below) £99.99+VAT

Requires '386 CPU or above with Colour Monitor, at least 4Mb RAM, Windows 3.1 or higher, Hard Drive and Mouse.



A4 SHEETFED SCANNER

The simple, effective document scanning solution for office and home!

Expand your PC into a multi-purpose office tool – scan documents of all sizes for filing or faxing, or use with a printer for easy copying.

- Genuine 256 greyscale performance – not interpolated from 32 greyscales
- Halftone and Line-art modes
- Genuine 300dpi resolution, interpolated to 600dpi
- Document size: 216x356mm max, 51x89mm min
- 10 sheet automatic document feeder
- Very compact "small footprint" design
- Very simple, fast scanning (only 12 seconds per page)
- Includes "iPhoto Plus" top professional Windows based image scanning and photograph re-touching software, and "Wordlinx" OCR software



with internal interface card £149.00+VAT

Requires '386 CPU or above with Colour Monitor, at least 4Mb RAM, Windows 3.1 or higher, Hard Drive and Mouse.

SCAN SAMPLE SERVICE TRY BEFORE YOU BUY

To help with your choice of scanner we have prepared a sample disk pack for the scanners featured on this page.

Each sample pack contains several images (including the Car) 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 incl delivery. Refundable on purchase of a scanner.

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.



only £59.00+VAT

FLATBED A4 COLOUR SCANNERS

- Conventional models: 600dpi unit giving up to 4800dpi via interpolation, or 1200dpi unit giving up to 9600dpi via interpolation
- Very fast single-pass models: 800dpi giving up to 6400dpi via interpolation, or 1200dpi giving up to 9600dpi via interpolation
- Colour, 8-bit grey and line art modes • 12 built-in halftoning patterns
- 216mm x 356mm scan area • SCSI expansion card interface supplied
- Image scanning and photograph re-touching software, and powerful OCR software

	Paragon 600	single pass Paragon 800SP	single pass Paragon 1200SP
OPTICAL RESOLUTION:	300x600dpi	600x800dpi	600x1200dpi
INTERPOLATED RESOLUTION:	4800dpi	6400dpi	9600dpi
COLOUR DEPTH:	24-bit	30-bit	30-bit
FREE SOFTWARE:	iPhoto+ Wordlinx OCR	Image Pals GO TextBridge OCR	Image Pals GO TextBridge OCR
	£249+VAT	£329+VAT	£499+VAT

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.

new fast single pass models



"Excellent value for money. The works for only £700." PERSONAL COMPUTER December 1992

Personal Computer World April 1993

"The MFS6000C is a quality piece of hardware... Superb results."

"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

PRINTERS

HP OfficeJet LX

Inkjet Printer, Scanner, Fax



NEW

If you can't decide between a new printer, fax or copier, get all three.

£519.00 +VAT

HP's new OfficeJet combines the convenience of a printer, fax and copier in one neat unit, without compromising quality or performance.

- Printer** ■ Up to 600 x 300dpi precise inkjet printing at up to 3ppm ■ Prints on plain paper, transparencies and envelopes
- Fax** ■ 20 page document feeder ■ Standard (203x98dpi) and Fine (203x196dpi) send resolution ■ 32 halftone levels ■ 9600 bps ■ 10 seconds per page transmission ■ 24 page incoming fax memory ■ 60 number speed dial memory ■ Auto redial ■ BAPT approved ■ Fax directly from and to your PC with the supplied software
- Copier/Scanner** ■ 50 second per page scanning ■ Copy reduction down to 70% ■ Twain scanner interface ■ Up to 99 unattended copies
- General** ■ 100 sheet paper capacity ■ 1 year manufacturer's warranty



Lazer-sharp type and brilliant colour - at a very affordable price...

HP DeskJet 660C

InkJet Printer



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Colour kit £29.99



Authorised Reseller Personal Computer Products

HP DeskJet 850C

Inkjet Printer

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- Print on plain, glossy or recycled paper, transparencies, envelopes and labels ■ 1Mb RAM ■ 26 scalable fonts ■ 150 sheet paper tray & manual feed plus envelope and single sheet feeder ■ 1000 page per month duty cycle ■ 1 year manufacturer's warranty

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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 specifiies any other printer..." Few will be disappointed after buying this printer." October 1995

- HP LaserJet 5 L£375.00 +VAT
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- HP LaserJet 4 ML£799.00 +VAT
- HP LaserJet 4 Plus£1059.00 +VAT
- HP LaserJet 4 M Plus£1399.00 +VAT

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- HP DeskJet 340 with sheet feeder£201.00 +VAT
- Colour kit for 310/320/340/540£30.00 +VAT
- HP DeskJet 600£200.00 +VAT
- Colour kit for 600£29.00 +VAT
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- HP DeskJet 1200C/PS£1069.00 +VAT
- HP DeskJet 1600£899.00 +VAT

- HP Deskjet long life black ink cartridge£25.00 +VAT
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- HP Deskjet 3 year On-Site warranty agreement (mono models)£55.00 +VAT (colour models)£65.00 +VAT
- 256kb RAM cartridge for DeskJet Plus / 500£59.00 +VAT

- Epson LX300£105.00 +VAT
- Epson LQ570+£235.00 +VAT
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- Epson Stylus 25 Colour£278.00 +VAT
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- Panasonic KX-P3626£329.00 +VAT
- Canon BJ-30£169.00 +VAT
- Canon BJ-200EX (Epson compatible)£190.00 +VAT
- Canon BJ-230£269.00 +VAT
- Canon BJ-C600E£369.00 +VAT
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This product can seriously SAVE you money... INK REFILLS
For HP DeskJet/500/Plus/DeskWriter printers

The best and easiest to use inkjet refills we have found. Comprehensive and simple to follow instructions are supplied. Each pack will refill a standard cartridge four times, or a long life cartridge twice.

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 - Sharp PC6220, 12Mhz 286, 20Mb HD, 1Mb RAM Ideal for DOS applications NEW£125.00 +VAT
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Evesham Micros



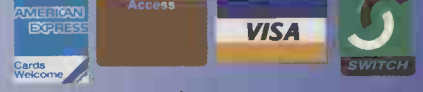
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Aries Universa MKII
486DX4-100
540Mb Hard Disk
£599



Shown above with MultiMedia kit (optional)
Monitor/Case may be cosmetically different to that shown.
Software boxes shown for illustrative purposes only.

ALL UNIVERSA SYSTEMS ARE BUNDLED WITH THE FOLLOWING SOFTWARE



All software is pre-loaded for your convenience!

Universa 486DX SYSTEMS

- ◆ 4Mb RAM expandable to 64Mb
- ◆ 540Mb Hard Disk
- ◆ 128K External Cache RAM
- ◆ Processor Upgradable to Pentium* Overdrive P24T
- ◆ Windows Accelerator SuperVGA Graphics Controller Card
- ◆ IDE Hard Disk & Floppy Drive Controller
- ◆ 3 x VESA & 4 x ISA expansion slots
- ◆ Dual Serial & Parallel Port
- ◆ Expandable Desktop Case
- ◆ 102 Key Enhanced Keyboard
- ◆ 14" Super VGA Non-Interlace Colour Monitor
- ◆ 3.5" 1.44Mb Floppy Drive
- ◆ 102 key enhanced keyboard
- ◆ Microsoft compatible mouse
- ◆ MS DOS v6.22 & MS Windows v3.11
- ◆ 12 Months Parts & Labour Warranty
- ◆ Technical Support Hotline

Universa PENTIUM®-based SYSTEMS

- ◆ 8Mb RAM expandable to 128Mb
- ◆ 540Mb Hard Disk
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- ◆ Advanced Pentium* upgradable motherboard using Type 5 ZIF socket
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- ◆ 102 key enhanced keyboard
- ◆ Microsoft compatible mouse
- ◆ MS DOS v6.22 & MS Windows v3.11
- ◆ 12 Months Parts & Labour Warranty
- ◆ Technical Support Hotline

Aries Universa 486DX Systems

Description	Price	Finance per month
486DX2 66MHz	£579	—
486DX4 100MHz	£599	—
486DX2 66MHz	£799	£42*
486DX4 100MHz	£819	£43*

† Above system with 8Mb RAM and Microsoft Office v4.2† Software



OPTIONS FOR UNIVERSA SYSTEMS:

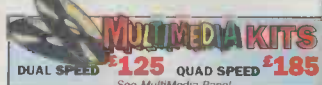
4Mb to 8Mb RAM upgrade	£110
540Mb to 1Gb Hard Disk Upgrade	£68
Upgrade to 15" Super VGA Colour 1024 x 768 Non Interlace Monitor	£99
12 Months On-Site Maintenance	£35
3 years On-Site Maintenance	£118

* See example of calculations
† All software supplied pre-loaded for your convenience with built-in tutorial, and may change from those shown without notice. Disks and manuals available as an optional extra.

Universa Pentium-based Systems

Description	Price	Finance per month
Pentium 75MHz	£849	£45*
Pentium 90MHz	£899	£47*
Pentium 75MHz	£1038	£55*
Pentium 90MHz	£1098	£58*

† Above system with 1Gb HD and Microsoft Office v4.2† Software



OPTIONS FOR UNIVERSA SYSTEMS:

8Mb to 16Mb RAM Upgrade	£185
540Mb to 1Gb Hard Disk Upgrade	£68
Upgrade to 15" Super VGA Colour 1024 x 768 Non Interlace Monitor	£99
12 Months On-Site Maintenance	£35
3 years On-Site Maintenance	£118

* See example of calculations
† All software supplied pre-loaded for your convenience with built-in tutorial, and may change from those shown without notice. Disks and manuals available as an optional extra.

UPGRADE ANY **Universa** PC TO A COMPLETE MULTIMEDIA SYSTEM

MultiMedia Kits MM2 & MM4

- ◆ Dual Speed (MM2 Kit) or Quad Speed (MM4 kit) CD ROM Drive
- ◆ Sound Blaster 16 Compatible Sound Card
- ◆ Aries HiFi Speaker Set (10W per channel)
- ◆ Microsoft CD Bundle Pack (see panel)

Dual Speed Kit MM2

£125

Quad Speed Kit MM4

£185



MultiMedia Kit prices only applicable when purchased with a PC

Complete Bundle Software Pack Included

- MS Encarta 1995
- MS MultiMedia Works
- MS Dangerous Creatures
- MS Money ● MS Golf
- MS Scenes (3.5" disks)

APR **18.5%** Finance calculation example: **Cash Price: £799 + VAT = £938.83 Deposit: 10% £93.88 and 24 equal payments of £41.84 Total Price: £1098.04** Finance is available subject to status. Be sure you can afford the payments prior to entering into an agreement. Price excludes carriage

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Aries Universa^{MKII} LCF Systems

Ultra Low Cost Finance

APR 9.9%

LIMITED PERIOD ONLY



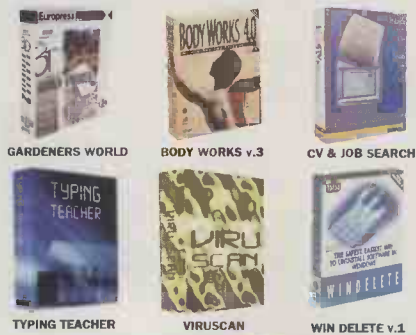
Shown above with MultiMedia kit, 15" monitor and 80 watt speakers (optional). Monitor/Case may be cosmetically different to that shown. Software boxes shown for illustrative purposes only.

ALL UNIVERSA LCF SYSTEMS ARE BUNDLED WITH THE FOLLOWING SOFTWARE*

APPLICATIONS & OPERATING SYSTEM



LIFESTYLE, REFERENCE & UTILITIES



ENTERTAINMENT



EDUCATION, BOOKSHELF & LANGUAGES



All software is pre-loaded for your convenience!

Universa 486DX SYSTEMS

- 4Mb RAM expandable to 64Mb
- 540Mb Hard Disk
- 128K External Cache RAM
- Processor Upgradable to Pentium® Overdrive P24T
- Windows Accelerator SuperVGA Graphics Controller Card
- IDE Hard Disk & Floppy Drive Controller
- 3 x VESA & 4 x ISA expansion slots
- Dual Serial & Parallel Port
- Expandable Desktop Case
- 102 Key Enhanced Keyboard
- 14" Super VGA Non-Interlace Colour Monitor
- 3.5" 1.44Mb Floppy Drive
- 102 key enhanced keyboard
- Microsoft compatible mouse
- MS DOS v6.22 & MS Windows v3.11
- 12 Months Parts & Labour Warranty
- Technical Support Hotline

Universa PENTIUM®-based SYSTEMS

- 8Mb RAM expandable to 128Mb
- 540Mb Hard Disk
- 256K External Cache RAM
- Advanced Pentium® upgradable motherboard using Type 5 ZIF socket
- EPA EnergyStar Compliant
- 64 bit SuperVGA Graphics Controller Card with 1Mb Video Memory
- Enhanced IDE I/F supporting 4 drives
- 3 x PCI/4 x 16 bit exp. slots (1 shared)
- Enhanced Parallel Port (EPP/ECP)
- Two Enhanced Serial Ports - 16550 UART
- 102 Key Enhanced Keyboard
- 14" SVGA Non-Interlace Colour Monitor
- 3.5" 1.44Mb Floppy Drive
- 102 key enhanced keyboard
- Microsoft compatible mouse
- MS DOS v6.22 & MS Windows v3.11
- 12 Months Parts & Labour Warranty
- Technical Support Hotline

Aries Universa 486DX Systems

Description	Price	Finance per month
86DX2 66MHz	£679	£32*
86DX4 100MHz	£699	£33*
186DX2 66MHz	£899	£42*
186DX4 100MHz	£919	£43*

Above system with 8Mb RAM and Microsoft Office v4.2' Software

MULTIMEDIA KITS
 DUAL SPEED £125 QUAD SPEED £185
 See MultiMedia Panel

OPTIONS FOR UNIVERSA SYSTEMS:

4Mb to 8Mb RAM upgrade	£110
540Mb to 1Gb Hard Disk Upgrade	£68
Upgrade to 15" Super VGA Colour 1024 x 768 Non Interlace Monitor	£99
12 Months On-Site Maintenance	£35
3 years On-Site Maintenance	£118

* See example of calculations
 † All software supplied pre-loaded for your convenience with built-in tutorial, and may change from those shown without notice. Disks and manuals available as an optional extra.

Universa Pentium-based Systems

Description	Price	Finance per month
Pentium 75MHz	£949	£44*
Pentium 90MHz	£999	£46*
Pentium 75MHz	£1138	£53*
Pentium 90MHz	£1198	£55*

Above system with 1Gb HD and Microsoft Office v4.2' Software

MULTIMEDIA KITS
 DUAL SPEED £125 QUAD SPEED £185
 See MultiMedia Panel

OPTIONS FOR UNIVERSA SYSTEMS:

8Mb to 16Mb RAM Upgrade	£185
540Mb to 1Gb Hard Disk Upgrade	£68
Upgrade to 15" Super VGA Colour 1024 x 768 Non Interlace Monitor	£99
12 Months On-Site Maintenance	£35
3 years On-Site Maintenance	£118

* See example of calculations
 † All software supplied pre-loaded for your convenience with built-in tutorial, and may change from those shown without notice. Disks and manuals available as an optional extra.

APR 9.9% Finance calculation example: Cash Price: £679 + VAT = £797.83 Deposit: 10% £119.67 and 24 equal payments of £31.12 Total Price: £866.56 Finance is available subject to status. Be sure you can afford the payments prior to entering into an agreement. Price excludes carriage

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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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 exp. 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
- ◆ GrafixStar 300 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-Interface 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

Aries Perfecta PCI Systems		
Description	Price	Finance per month from
486DX2-66MHz	£679	£38
486DX4-100MHz	£699	£39
 Above system with 8Mb RAM and Microsoft Office v4.2		
486DX2-66MHz	£889	£49
486DX4-100MHz	£909	£50

Perfecta PCI Upgrade Option		
Part No.	Description	Price
PCI-01	4Mb to 8Mb RAM Upgrade	£99
PCI-02	4Mb to 16Mb RAM Upgrade	£270
PCI-05	Upgrade to GrafixStar 300 2Mb 64 bit 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	£79
P5-30	MS Office - Manuals & Disks	£49



Shown with optional MultiMedia Kit


DUAL SPEED MULTIMEDIA KIT
See MultiMedia Panel **£129**

QUAD SPEED MULTIMEDIA KIT
See MultiMedia Panel **£189**

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
- ◆ GrafixStar 300 64 bit Graphics Card with 1Mb Video Memory
- ◆ 3.5" 1.44Mb Floppy Drive
- ◆ Enhanced Parallel Port (EPP/ECP)
- ◆ 2 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-Interface 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

Aries Perfecta P5 Systems		
Description	Price	Finance per month from
Pentium P75	£925	£49
Pentium P90	£995	£53
 Above system with 16b HD and Microsoft Office v4.2		
Pentium P75	£1095	£59
Pentium P90	£1165	£63

Perfecta P5 Upgrade Options

Part No.	Description	Price
P5-01	8Mb to 16Mb RAM Upgrade	£175
P5-02	8Mb to 32Mb RAM Upgrade	£525
P5-06	Upgrade to GrafixStar 300 2Mb DRAM 64 bit Video Graphics Card	£59
P5-07	Upgrade to GrafixStar 700 2Mb VRAM 64 bit 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	£79
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



Shown with MultiMedia Kit with Aries HiFi Plus 15 Watt Speakers and 15" Aries 6000 monitor (optional)

DUAL SPEED MULTIMEDIA KIT
See MultiMedia Panel **£129**

QUAD SPEED MULTIMEDIA KIT
See MultiMedia Panel **£189**



LOW COST CREDIT APR 18.5%
Available on all Perfecta PC's. See examples on previous pages

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
- ◆ GrafixStar 300 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 dp)
- ◆ 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



Shown with MultiMedia kit and 80 watt speakers



Aries Perfecta P5 Triton Systems

Description	Price	Finance per month from
Pentium P90	£1195	£67
Pentium P120	£1379	£77
Pentium P133	£1449	£82



CALL for SPECIAL PRICES for MICROSOFT OFFICE v4.2 when purchasing the above range of PC's

Perfecta P5 Triton Upgrade Options

Part No.	Description	Price
P5-Tr01	8Mb to 16Mb EDO RAM Upgrade	£198
P5-Tr02	8Mb to 32Mb EDO RAM Upgrade	£649
P5-Tr03	8Mb to 64Mb EDO RAM Upgrade	£904
P5-Tr04	Upgrade to 256K Pipeline-Burst Cache Module	£50
P5-Tr06	Upgrade to GrafixStar 700 2Mb VRAM 64 bit Graphics Card	£78
P5-Tr10	2Gb IDE Hard Disk Drive instead of 1Gb IDE Drive	£195
P5-Tr11	2Gb SCSI Hard Drive + Adaptec PCI Controller instead of 1Gb IDE	£678
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 APR 18.5%
Available on all Perfecta PC's. See example on previous pages

DUAL SPEED MULTIMEDIA KIT £129
See MultiMedia Panel

QUAD SPEED MULTIMEDIA KIT £189
See MultiMedia Panel



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 **£129**
Quad Speed Kit MM4 **£189**



Complete Bundle Software Pack Included

- MS Encarta 1995
- MS MultiMedia Works
- MS Dangerous Creatures
- MS Money
- MS Golf
- MS Scenes (3.5" disks)



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.

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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Aries Perfecta® 7000 Series

More features than most desktop PC's

FREE
MoneyBox® Finance Organiser
& 16 bit Soundcard (fitted)
Worth £98
with any purchase of a
Notebook this month

Aries introduce you to 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. 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.

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. Suspend to memory or suspend to disk ensures data is never lost when you leave the notebook.

FLEXIBLE PCMCIA

Compartment for two type I/II or one type III PCMCIA slot with removable cover.

LOW POWER 3.3V

All the components in the notebook run at 3.3V, giving up to three times longer life.

BUILT-IN-SOUND

Built-in Speaker/Microphone. Stereo 16 bit Sound System

SUPERB PERFORMANCE

CPU Upgrade up to Intel DX4-100. External connectivity enhanced by use of 16C550 Serial Port and Parallel Port with support for EPP/ECP.

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.

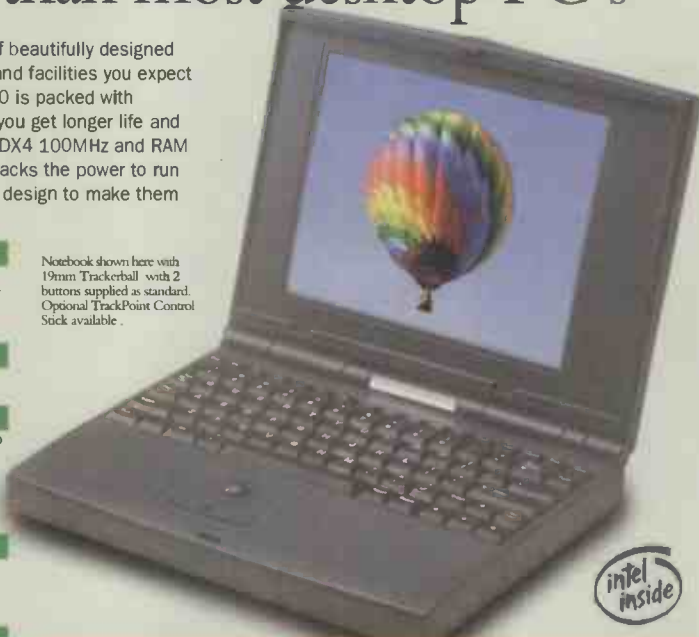
INTERNAL STATUS INDICATOR PANEL

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.

REMOVABLE HARD DISK DRIVE

Security conscious? Remove the Hard Disk easily and be sure that your data is safely out of reach of unauthorised users.

Notebook shown here with 19mm Trackball with 2 buttons supplied as standard. Optional TrackPoint Control Stick available.



DOCKING STATION WITH 4x CD-ROM

- ◆ Inc quad-speed CD-ROM drive
- ◆ Two expansion slots and drive bays (one expansion slot and drive bay remaining with CD ROM installed)
- ◆ Built-in Parallel, Serial, PS/2 Mouse, keyboard and VGA ports.

£399

OFFICE COMMS UPGRADE

Turn your Aries 7000 notebook into a complete voice mail system with the Aries Office Comms Workstation Kit.

Suitable for home or business, supporting multiple mail boxes, Fax on Demand, and data communications. Contains high speed V32bis (14400

FREE INTERNET CONNECTION 30 DAY TRIAL

baud) Voice/Fax Modem and software package, providing users with remote access to voice, fax and data messages.

ONLY £125

- ◆ Intel Low Powered Enhanced CPU
- ◆ 4Mb RAM expandable to 32Mb
- ◆ 340Mb Removable Hard Disk Drive
- ◆ Advanced Power Management
- ◆ LCD Status Indicator
- ◆ Fully Modularised Design - Upgradable CPU, LCD, Removable Hard Disk & Keyboard
- ◆ 1Mb VESA Bus Video with accelerator
- ◆ Advance PMU Function
- ◆ Mono/Stereo 16 bit Sound System (Optional)
- ◆ Audio (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 (1024x768 256 Colours)
- ◆ Simultaneous Display capability
- ◆ External Keyboard/PS/2 Mouse connector
- ◆ Optional Internal 14.4K Fax/Modem
- ◆ Rechargeable Ni-MH Battery Pack
- ◆ MS-DOS v6.22 & Windows v3.11 plus MoneyBox® Personal Finance Organiser
- ◆ Weight: 3Kg ◆ Carrying Case

* Pre-loaded for your convenience, Manual/Disk available as an option.

All prices are for standard 340Mb Hard Disk, Supplied with FREE Carrying Case

7000 Series Display	7100 10" Mono 64 Grey Scale	Finance per month from	7300 10" Colour Dual Scan	Finance per month from	7400 10" Colour TFT Active Matrix	Finance per month from
SL i486SX™-33	£939	£37	£1239	£49	£1798	£68
SL i486DX4™-75	£949	£38	£1249	£51	£1799	£69
SL i486DX4™-100	£999	£42	£1299	£53	£1849	£72

ADDITIONAL OPTIONS

4 to 8Mb RAM Upgrade*	£159
4 to 16Mb RAM Upgrade*	£525
4 to 32Mb RAM Upgrade*	£1089
Track-point device	£25
16 bit Internal Sound Card	£49
Aries HiFi Speakers	£29
PCMCIA Game Card	£45
PCMCIA 9600 Fax/Modem	£59
PCMCIA US Robotics Worldport	£165
14400 Fax/Modem	£165

PCMCIA Ethernet Card	£99
Spare NiMH Battery Pack	£69
Spare AC Mains Adaptor	£49
Car Lighter Adaptor	£29
External Keyboard	£25
Internal V32bis 14.4K Fax/Modem (non-approved) with software	£125
*Requires module exchange	

1 YEAR SUPPORT

All Perfecta Notebooks are covered by a FREE 12 Months Warranty in mainland UK.

APR **18.5%**

Finance calculation example: Cash Price: £969 + Carriage and VAT = £1152.68 Deposit 10% £115.27 and 36 equal monthly payments of £37.07 Total Price £1334.52. Finance is available subject to status. Be sure you can afford the payments prior to entering into an agreement

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

Aries Perfecta MediaBook

The Ultimate Portable MULTIMEDIA Solution

The Aries MediaBook brings true multimedia capabilities to the notebook platform. Running a high performance Intel Pentium processor, MediaBook is the ideal presentation tool, with an optional MPEG module for video playback, a standard UHF output enabling you to display on any standard TV and PCMCIA slots for adding network adapters, etc.

Model	RAM	HDD	Cache	Dual Scan	TFT
Pentium P75	8Mb	510Mb	256K	£1749	£2178
Pentium P90	8Mb	510Mb	256K	£1849	£2248

ADDITIONAL OPTIONS

8Mb to 16Mb RAM Upgrade	£279	Docking Station	£345
8Mb to 32Mb RAM Upgrade	£759	Port Replicator Module	£125
510Mb to 1.0Gb Hard Drive	£198	Carry Case	£29
Dual Speed CD ROM Drive	£168	3yr Return-2-Base warranty (D/S)	£99
Quad Speed CD ROM Drive	£215	3yr Return-2-Base warranty (TFT)	£189



Processor	Intel Pentium processor (75/ 90/100MHz)
Memory	8Mb RAM exp. to 64Mb via proprietary module. Opt. upgrade to 256K Level 2 Cache RAM
Video	1Mb PCI bus video simultaneous display on LCD and external monitor/TV. Dual Scan Colour LCD : 10.4" 800 x 600 @ 256 colours. Active Matrix Colour LCD 10.4" 800 x 600 @ 64K colours
Storage	Removable Enhanced IDE hard disk drive - capacities from 340Mb to 1.0Gb. Integral 2X or 4X CD ROM drive (optional), can be replaced with a 3.5" floppy disk drive or secondary battery
PCMCIA	Built-in PCMCIA - two type 2 or one type 3 card.
Keyboard	86-key keyboard, supporting Enhanced AT operation. Inverted 'T' cursor keys and embedded hot keys
I/O Ports	Enhanced Serial port (16550), Enhanced Parallel port(ECP/EPP), PS/2 port, external monitor port (supports SVGA), external UHF TV port, Joystick/MIDI port and connection for docking station/port replicator module.
Power	Autosensing (110-240v) mains adaptor. Removable rechargeable Lithium-Ion battery. Second battery option (replaces CD or floppy drive)
Pointing	Built-in touchpad
Audio	Built-in 16-bit stereo sound, with integral speakers. Ports for external speakers and mic
Other...	EPA compliant Power Management System. Security lock feature.

"The Watford is the better buy" Computer Shopper Labs, Jan 96 Report on 12 Multimedia notebooks

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

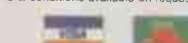
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Showroom only: 250 Lower High Street, Watford, WD1 2AN. Tel: 01923 237774



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Handy Scanners from the UK's No.1 Genius Supplier

Up to true 800dpi resolution and supplied complete with OCR software, a powerful presentation graphics package and an advanced image scanning, enhancement and editing application.

EasyScan 256

800 dpi



- ◆ Powerful image software - PhotoFinish 3.0 software has image auto enhancement functions and 87 tools to satisfy your creativity.
- ◆ Hi resolution - up to 800 dpi gives you the best image quality available.
- ◆ Powerful OCR - included SmartPage Direct means you'll never have to re-key data again.
- ◆ TWAIN Compliant - Lets you use the scanner with all TWAIN compatible programs
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Flat Bed Scanner type	256 Grey Scale	Colour	Colour	Colour	Colour
Scanning Process	N/A	Three Pass	Single Pass	Single Pass	Single Pass
Image Data Colour - 24 bit	N/A	167.7 million	16.7 million	16.7 million	16.7 million
Image Data mono - 8 bit	256 Greyscale	256 Greyscale	256 Greyscale	256 Greyscale	256 Greyscale
Effective Scanning Area	216 x 356mm	216 x 356mm	216 x 356mm	216 x 356mm	216 x 356mm
Zoom Out Feature	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Resolution - Optical Interpolated	300 x 600dpi 1200	300 x 600dpi 1200	300 x 1200dpi 2400	400 x 1600dpi 4800	600 x 2400dpi 9600
Brightness/Contrast Settings	256/256	256/256	256/256	256/256	256/256
Interface	SCSI II	SCSI II	SCSI II	SCSI II	SCSI II
Auto Document Option	ADF-30	ADF-30	ADF-30	ADF-40	ADF-60
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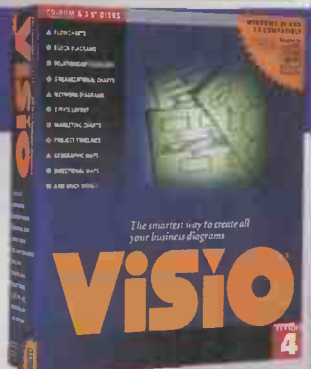
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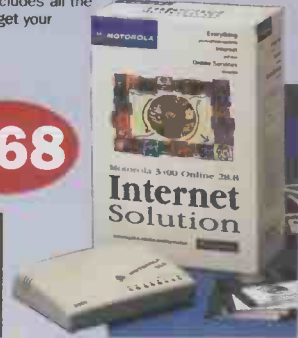
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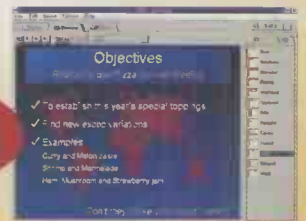
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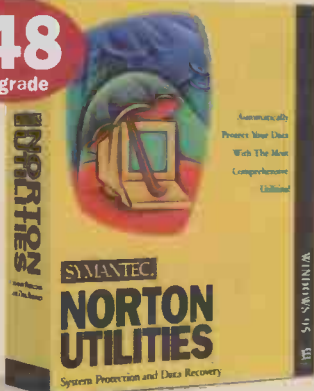


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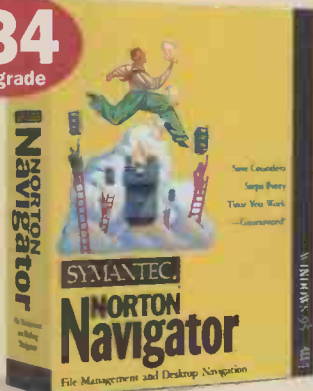
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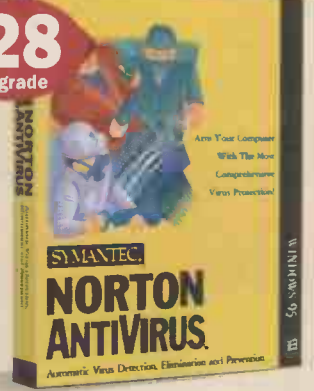
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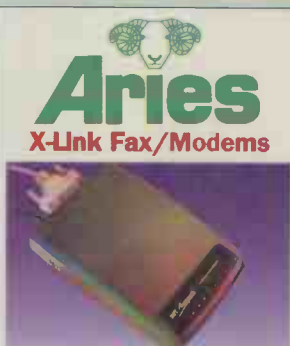
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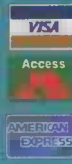
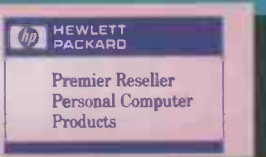
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PRINTERS

Canon PRINTERS FOR ALL OCCASIONS...

NEW LBP-460



£279

The Personal Laser Printer

The LBP 460 includes the latest generation of Microsoft® Windows® Printing system software - the fastest, easiest way to get top quality output from Windows applications! Also includes 1 year on-site maintenance.

- 4 pages per minute printing
- Super fast return to software application
- Effective 600 dpi text and graphics with Auto Image Refinement
- A personal workhorse for home and office

BJ-200EX MONO



£158!

The Professional Monochrome Printer

- 720 x 360 dpi resolution
- Three pages per minute
- Laser-quality text and graphics
- Auto feeds 100 sheets, 50 transparencies or 10 envelopes
- One year warranty
- 20 TrueType fonts included
- Compact design

BJC-610



£323

Professional Colour Printer

- Prints on plain paper
- 4 colour cartridge system for lower running costs
- Latest edition of Microsoft® Windows® Printing system software
- 720x720dpi colour

A3 CANON BUBBLE JET PRINTERS

BJ-230 A3 Monochrome Bubble Jet Printer	£236
BJ-330 A3 Monochrome Bubble Jet Printer	£389
BJC-800 A3 Colour Bubble Jet Printer	£975

BJC-70/BJ-30



The Portable Printers

The next generation of the world's best-selling portable printers • Built-in sheet feeder • High quality 360 x 360 dpi resolution • 1 year warranty.

Colour BJC-70 £218 Mono BJ-30 £139

BJC-4000



Home Colour Printer

- 360dpi colour
- 100 sheet feeder
- 1 year warranty

£217

DON'T FORGET SPARE CARTRIDGES

	BJ-30	BJC-70	BJ-200ex	BJ-300	BJC-610	BJC-4000	BJC-800
Canon Black	£10	£10	£10	£11	£10	£7	£14
Canon Colour	-	£14	-	-	£7*	£14	£18*

*specify C/M/Y Cartridges



AFFORDABLE LASER PRINTERS FROM brother

HL-630 PERSONAL LASER



£321

- 300 dpi resolution
- 16 MHz microprocessor
- High-speed, bi-directional parallel port
- Includes 45 fonts and Microfine toner
- Prints envelopes, different paper stocks & sizes

The HL-630 allows you to produce great-looking laser output simply, easily, and at a price you can afford. But this printer is far from a stripped down laser printer. It includes 45 great-looking fonts. Enhanced Memory Management, and the ability to print on a wide variety of paper types and sizes.

HL-631 LASER PRINTER £349

HL-660 OFFICE LASER



£455

- 2MB RAM - 6ppm printer
- True 600 dpi resolution
- Photoscale technology
- Straight Paper Path Technology prints on a variety of papers

- High speed, bi-directional parallel port and Optimized Windows driver
- Includes 35 scalable fonts
- Easy to setup and use

The HL-660's exclusive Straight Paper Path design coupled with a super fast 600 dpi print engine makes it the best performing and most affordable printer in its class.

HL-600 Series Toner Cartridge £25

NEW! WL-660 £379
GDI Laser Printer, 1MB

HL-1260 NETWORK LASER



£889

- Fast 12ppm output
- 2MB RAM memory upgradable to 26MB
- 20 MHz RISC Processor
- PCMCIA Type III slot
- Optimized Windows driver
- High-speed, bi-directional parallel port and serial port

The HL-1260 produces 1200 dpi class output by using its Advanced Photoscale Technology (APT), High Resolution Control to produce output which is as spectacular as it is fast. Network users will find it provides plenty of storage. Features 500 sheet multi-purpose tray and PCL5e and Postscript Level 2.

Toner Cartridge for HLI260 £79
Duplexing Unit for the HLI260 £399
HPI260 Lower Paper Tray (500shots) £199

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- ◆ 15" FST Multiscanning Monitor
- ◆ Up to 1280 x 1024 Non-interlaced
- ◆ Horizontal Freq 30-65KHz
- ◆ 0.28mm Dot Pitch

ERGOVISION 880LR



£515

- ◆ 17" FST Multiscanning Monitor
- ◆ Up to 1280 x 1024 Non-interlaced
- ◆ Horizontal Freq 30-64KHz
- ◆ 0.28mm Dot Pitch

ERGOVISION 885LR



£589

- ◆ 17" FST Multiscanning Monitor
- ◆ Up to 1600 x 1200 Non-interlaced
- ◆ Horizontal Freq 30-82KHz
- ◆ 0.28mm Dot Pitch

ERGOVISION 1080LR



£879

- ◆ 20" Auto-scanning, low radiation, ultra high resolution
- ◆ Up to 1600 x 1200 Non-interlaced
- ◆ Horizontal Freq 30-82KHz
- ◆ 0.28mm Dot Pitch

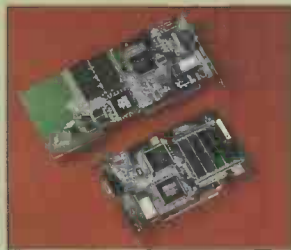
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- ◆ Windows 95 compatible
- ◆ Microprocessor Control

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POWERED BY**



- ◆ Super Fast 64 Bit Windows Accelerator
- ◆ Powered by ATi Mach 64 Processor
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- ◆ 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	£308	VLB	£310	PCI	£309

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OF
SERVICE*

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- ◆ 17" flat, square tube
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- ◆ Integral 2 watt speakers
- ◆ Digital controls
- ◆ Power saving
- ◆ MPR II



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READY**

Techno Vision Monitors

Common Features

- FROM **£149** include:
- ◆ 0.28mm Dot pitch
 - ◆ Power management
 - ◆ MPR II standard
 - ◆ Low radiation



	14"	15"	17"
Max Res (Ni):	1024x768	1280x1024	1280x1024
Horiz Freq Khz:	up to 48	30-60	30-64
Vert Freq Hz:	50-90	50-90	50-100
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Netware V4.1 is the most powerful, scalable and flexible network operating system available today. It extends the capabilities of Netware's 11 years of proven technology which is used by more than 40 million people worldwide. Netware 4.1 makes networks simpler to use, easier to administer, and less expensive to work, operate and maintain.



Novell Network	4.1(CD)	3.12 (3.5"+CD)
5 User	£419	£419
10 User	£999	£999
25 User	£1399	£1399
50 User	£1999	£1999
100 User	£2975	£2725

NOVELL AUTHORISED RESELLER

MICROSOFT WINDOWS

NT SERVER 3.51

Microsoft Windows NT Server 3.51 provides the ideal network foundation for mission critical business solutions. Hundreds of powerful applications are available for Windows NT Server and provide a base for secure, flexible solutions to suit your particular business needs. The latest version now includes PowerPC support, NTSS file compression, license management tools and a concurrent licensing option.



MS Windows NT v3.51 Workstation

Full Version CD + 3.5"	£225
Upgrade from v3.5 (CD)	£39

Windows NT v3.51 Server

Full Version 3.5" or CD £495

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HP NETWORKING POWER & SPEEDS

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.



PC Adapter Cards

PC LAN Adapter NC/16 TP (ISA)	£59
HP 10/100VG Adapter (EISA)	£147
HP 10/100VG Adapter (PCI)	£130

Intelligent Hubs

HP AdvanceStack Hub 8U (RJ45)	£129
HP AdvanceStack Hub 16U (RJ45)	£249
HP AdvanceStack Hub 24	£780
HP AdvanceStack 100VG Hub 15	£1750

NEW

NETWORKING THE WORLD

STOP PRESS	Adapter		IPk	5Pk	
ALL B VERSIONS ARE PLUG & PLAY	3C509 B	BNC	ISA	£65	£305
	3C509 B	TP	ISA	£66	£299
	3C509 B	Combo	ISA	£75	£349
	3C579 B	BNC	EISA	£145	£699
	3C579 B	TP	EISA	£144	£699
	3C590 B	Combo	PCI	£99	£475
	3C529 B	BNC	MCA	£142	£699
	3C529 B	TP	MCA	£139	£685
	3C589 B	Combo	PCMCIA	£129	£649

intel PRINTER SERVERS

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2 PARALLEL PORTS FOR NOVELL NETWARE 3.X

ETHERNET **£255** TOKEN RING **£389**

NETPORT XL

2 PARALLEL PORTS & 1 SERIAL PORT WITH MULTI PROTOCOL SUPPORT

ETHERNET **£315** TOKEN RING **£449**

DISCPORT CONNECTS CD ROM DRIVES ANYWHERE ON YOUR NOVELL NETWORK (NETWARE 3.12)
THIS FLEXIBLE CD-ROM SERVER ALLOWS UP TO 7 SCSI CD-ROM DRIVES TO BE CONNECTED ANYWHERE ON YOUR NETWARE NETWORK. **£599**

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JetDirect Print Servers

SUPPORTS MIXED ENVIRONMENTS

CONNECTING PRINTERS TO YOUR NETWORK HAS NEVER BEEN EASIER.

HP Jet Direct EX Plus 3

£309

3 HIGH SPEED PARALLEL PORTS

- Support for all major network operating systems
- SNMP agents for support of industry-standard network management applications
- Powerful software utilities (HP JetAdmin, HP JetPrint)
- Better overall printing performance than PC print servers

HP offers a complete network printing solutions and automatic network/protocol switching for simplified printing in mixed environments. Support for up to 16 Novell NetWare file servers and 64 print queues, and locally administered addresses for Token Ring networks supporting IBM LAN Server and Novell NetWare.

DEP1114: JetDirect Ethernet (Thin / 10Base-T/Local Talk) J2552A **£295**

DEP1125: JetDirect EX Ethernet (Thin/10Base-T) J23825 **£249**

DEP1152: JetDirect EX Plus 3 Ethernet (Thin/10Base-T) **£309**

Genius

PCMCIA Ethernet Adapter ME3000II Series

Size - Ultra-size Ethernet connectivity
Weight - Light, no power supply required

Convenience- Supports socket service, card service direct PCMCIA slot enables and "Hot Card" insertion and removal transmission
Flexibility - Both BNC and RJ-45 connectors are supported

- Complies with IEEE 802.3 standard, PCMCIA Release 2.1, JEIDA 4.1 Standard
- Fits into Type II PCMCIA slot
- Provides Power-On Self-Test(POST) for automatic diagnostics conditions
- Automatic polarity detection and correction diagnostic

EURNT0455 Genius ME2000II-2 PCMCIA Ethernet Adapter **£79**

EURNT0454 Genius E3000II-2 Pocket Network Adapter + Parallel Port **£59**

Ethernet Combo Adapter GE2000D

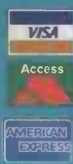
- Fully Novell NE2000 compatible
- Drivers for: IPX & ODI for Netware Windows for Workgroups NDIS for Lan Manager Packet for TCP/IP
- BNC & RJ45 connectors
- Jumper & Jumperless
- Auto-Setup hardware using software
- Auto-Detect media type
- Auto-Detect 8 bit or 16 bit Bus
- Includes diagnostic software
- Up to 35% performance improvement

Genius GE2000D Combo Network Card EURNT0455 **£27**

5 PACK **£119**

GENIUS GE2000 PNP **£35**

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OPTIONS

- 4MB Module **£155**
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- 16MB Module **£499**
- 2nd Battery Pack **£85**
- AC Adaptor **£59**
- Car Adaptor **£49**

Psion Dacom Goldcard V34 Modem

Genius ME3000II
BNC/TP Ethernet
Card...
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AST COMPUTER ASCENTIA 810N

486 DX2 - 66

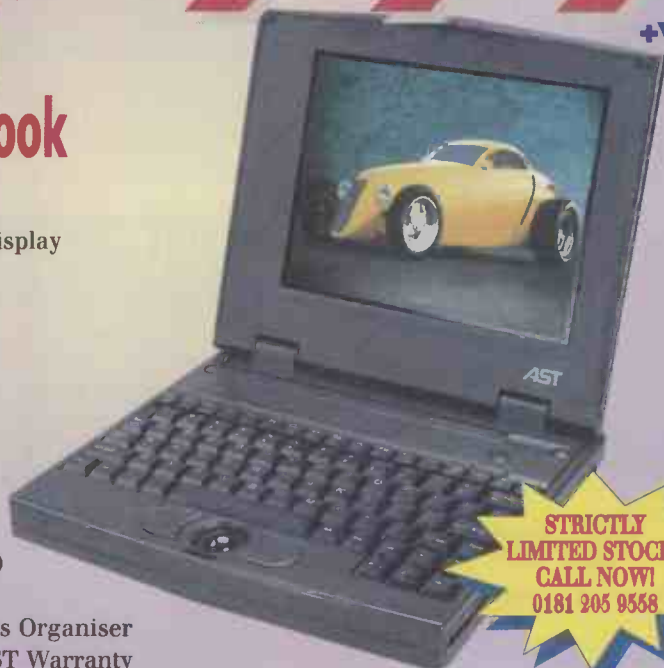
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Colour Notebook

£999

+VAT

- 486DX2-66 Processor
- 10.4" Dual Scan Colour Display
- 4MB RAM (20MB max)
- 250MB Hard Disk
- 1MB LocalBus Video
- 82 key keyboard
- Integrated trackball
- 3.5" Floppy Drive
- Flash upgradeable Bios
- 2 x Type II or 1 X Type III PCMCIA slot
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- Optional 2nd Battery
- MS DOS & Windows, Lotus Organiser
- 3yr Worldwide Limited AST Warranty



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- Intel Pentium Processor
- 850MB Hard Drive Enhanced IDE
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- Quad Speed CD-ROM Drive
- Soundblaster Compatible 16bit Soundcard
- Speakers
- Microsoft Family Pack inc Encarta 95, Money, Works, Golf & Dangerous Creatures

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NEW MODELS
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PRICES**



Model		AI	A0
HP DesignJet 230	Mono - Single feed	£1485(a)	£1999(a)
HP DesignJet 250c	Colour - Single feed	£1845(a)	£2489(a)
HP DesignJet 750c	Colour - Roll feed	£3669(a)	£4395(a)
HP DesignJet 755cm	Colour - Roll feed - Printer		£6650(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.

• No Pens • No Mess • No Fuss



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FROM
£839



Satellite T2110

- 486DX4-75 CPU
- 4MB RAM, 350MB HD
- 9.5" Mono Screen

£839

Satellite T2130CT

- SL Enhanced Intel DX4/75CPU
- 8MB RAM, 520MB HD
- 10.4" TFT Colour Screen

£1789

Satellite Pro 410CDT

- Powerful Intel Pentium 90MHz CPU
- 8MB EDO RAM, 810MB HD
- 11.3" TFT Colour Screen
- Internal x4 CD-ROM drive

£3389

Model	Screen	CPU	RAM (MB)	HD (MB)	Price	3yr OSM
T2110	Mono 9.5"	4/75	4	350	£839	£200
T2130CS	DSTN Col 10.4"4/75		8	520	£1369	£250
T2150CDS*	DSTN Col 10.4"4/75		4	520	£1699	£450
Sat Pro400CS	DSTN Col 10.4"5/75		8EDO	810	£2399	£450
T2130CT	TFT Col 10.4"	4/75	8	520	£1789	£300
T2150CDT*	TFT Col 10.5"	4/75	8	520	£2379	£650
Sat Pro400CDT*	TFT Col 10.4"	5/75	8EDO	810	£3130	£450
Sat Pro410CDT*	TFT Col 11.3"	5/90	8EDO	810	£3389	Call
Portege 610CT	TFT Col 9.5"	5/90	8EDO	720	£2999	£450
Tecra 700CT	TFT Col 11.3"	5/120	16	1215	£4275	Call

*CD-ROM Drive included

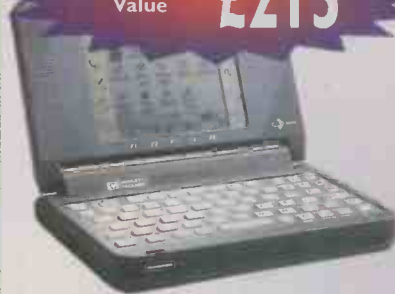
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£215*

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YOUR BEST PERSONAL ORGANISER!



Now with the HP OmniGo 100, business professionals have the perfect handheld organiser to access immediately their schedules and personal information, as well as HP financial tools, anytime, anywhere.

Thanks to the GEOS™ operating system, you can enter your data using either pen or keyboard - it is an intuitive tool. The OmniGo 100 provides you with sophisticated financial features and all personal information management tools you need - it becomes your unique everyday business companion.

"Hewlett-Packard OmniGo - the winner"

The Independent on Sunday (1 October 1995) asked expert Adam Banks, editor of Computer Buyer magazine, to test a range of Personal Organisers taking into account how convenient they are to use, their range of functions, and value for money. The winner was the HP OmniGo and was awarded '5 Star' rating. Below is an extract of the evaluation:

"This brand-new computer... was Adam Bank's top choice. He found it incredibly easy to use because, as well as a keyboard, it has a touch pen which is pointed at items to operate functions. "It makes a big difference just being able to point at the screen."

As an alternative to the keyboard, the screen can be folded back so it becomes a notepad. The organiser can convert this handwritten information into computer text and store it, or store it as an actual facsimile of your handwriting.

The Hewlett Packard has all the usual functions, including a quite advanced finance module, allowing you, for example, to work out the loan rate, and a good calculator. Another bonus was the anti-reflective screen... He said this was good value for money

- cheaper and better value than the Psion (unless you were going to use all its extra software). Best of all, this model is fun to play with - and unless an organiser is enjoyable, it won't be used."

- Technical Specifications**
- Includes: Two AA and one CR2032 backup batteries
 - Dimensions: 15.3 x 9.5 x 2.6cm
 - CPU 80186 16MHz

- Memory 1MB SRDRAM, 3MB ROM; PCMCIA version 2.0 Type II Card Slot
- Display 360 hinge, "rotatable" display, "portrait" and landscape modes: 240 x 240 FSTN LCD



BENEFITS TO YOU:-

- **Personal Information management**
Appointment book; Phone book; Notepad; Database; Worldtime
- **Financial analysis**
HP Calculator; Finance tools (12C, TVM, Cash Flows, statistics, conversions etc); Spreadsheet
- **Pen input** (in addition to the keyboard)
Pen "navigation"; "Digital Ink" across applications; Graffiti handwriting character recognition; Jotter ("Capture first, organise later"); GEOS Pen-OS

HP PENTIUM™ PCS!

Pentium-75
as low as
£1049



- ★ Intel Pentium™ Processor : 75 to 133MHz
- ★ PCI architecture with local bus IDE & video, min. 8MB RAM
- ★ MS Windows for WorkGroups 3.11

VL3 : 420MB or 840MB HD,
3 PCI/ISA slots, Enh. IDE on LB

VL4 : 540MB or 1GB HD,
4 PCI/ISA slots, Enh. Master IDE on LB

3YR OSM ONLY £125

RAM	8MB			16MB	
HD	420MB	540MB	840MB	840MB	1GB
VL3 5/75	£1049	-	£1089	£1299	-
VL4 5/90	-	£1139	-	-	£1469
VL4 5/100	-	£1215	-	-	£1575*
VL4 5/120	-	£1359	-	-	£1679
VL4 5/133	-	-	-	-	£1829
VT 6/150	-	-	-	-	£3965*

*Mini-Tower

Prices exclude monitors:-

HP 14" SVGA £215 HP 15" Ergo UVGA £325 HP 17" Ergo UVGA £585

NEW! VECTRA VL4 SERIES

HP OMNIBOOK 600



- ★ Lightest - 3.3-3.8lbs
- ★ Full size keyboard
- ★ 8.5" DSTN or 9.4" TFT screen

- ★ 486DX2-50 or 486DX4-75 CPU

HP have a mobile PC to suit every need; through the world's lightest colour notebook, the HP Omnibook 600, to the class leading HP Omnibook 5000.

Model	Price
HP Omnibook 600C 4/50, 4, 260, 8.5" DSTN col	£1249(a)
HP Omnibook 600C 4/75, 8, 340, 8.5" DSTN col	£1739(a)
HP Omnibook 600CT 4/75, 8, 340, 9.4" TFT col	£2059(a)

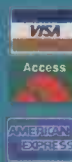
HP NETSERVERS



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.

	CPU	RAM	HD	Price
HP Netserver LF	4-66	8	1GB,CD	£2049(2a)
HP Netserver LH	5-75	16	1GB,CD	£3899(2a)
HP Netserver LH	5-100	32	Chassis,CD	£4399(2a)
HP Netserver LS	5-100	32	2GB,CD	£6800(2a)
HP Netserver LS	5-100*2	64MB	Chassis,CD	£11,000(3a)

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CONTURA NOTEBOOKS



**FROM ONLY
£735**

The Compaq Contura range of notebooks offer excellent pricing, high level of specification (inc. DOS, Windows & Lotus Organizer) and 3 year warranty. Contura Aero offers sub-notebook portability, ext. 3.5" FDD and PCMCIA slot; Contura 420/430 offer 486DX4 power, larger colour screens,

comfortable ergonomics with built-in trackball and PCMCIA slots.

Model	CPU	RAM	HD	Screen	Price	Model	CPU	RAM	HD	Screen	Price
Aero	4/25	4	250	8" Mono	£735(a)	420CX	4/75	8	420	10.4" TFTcol	£1839(a)
Aero	4/33	4	250	7.8" STNcol	£1039(a)	430C	4/100	8	720	10.4" DScol	£1749(a)
420C	4/75	4	350	10.4" DScol	£1299(a)	430CX	4/100	8	720	10.4" TFTcol	£2099(a)
420C	4/75	8	420	10.4" DScol	£1489(a)						

NEW! LTE 5000 RANGE - CALL

MEMORY UPGRADES	4MB	8MB	16MB
Contura Aero	£140	£280	-
Contura 410/420/430	£190	£370	£830
LTE Elite	£220	£440	£880
Prolinea (new) 486	£185	£355	£655
DeskPro (new) 486	£185	£355	£655
ProSignia 300/50C	£360	£710	£1465
ProLinea/DeskPro (586)	£370	£710	-
Proliant	-	£360	£710



FREE
Microsoft
Windows 95
Upgrade Voucher*

*With all Compaq Prolineas, Contura 420s and DeskPros

PROLINEA PCS



**FROM ONLY
£819**

The Prolinea is Compaq's best-selling desktop computer. It offers value for money and a broad range of specifications: Intel processors, PCI architecture with LB for Video and dual IDE disk interface, 8MB or 16MB

RAM as standard, a choice of case sizes to allow for future expansion capacity and a three year warranty. This position of leadership has been further enhanced by the introduction of the highly affordable entry level Pentium Prolinea 'e' family (optional 256k secondary cache £95).

CPU-HDD	RAM	Case	Price*	CPU-HDD	RAM	Case	Price*
4/66-630	8	3x3	£819(a)	5/100-1GB	16	4x4	£1599(a)
4/100-420	8	3x3	£929(a)	5/120-1GB	16	4x4	£1859(a)
5/75-420	8	4x4	£1099(a)	5/75e-630	8	3x3	£925(a)
5/90-630	8	3x3	£1199(a)	5/100e-630	8	3x3	£1145(a)
5/100-720	16	5x5	£1559(a)				

*MONITORS NOT INCLUDED

MONITORS

14" SVGA	£209(a)
14" 1024	£250(a)
15: 151FS	£349(a)
17" 171FS	£569(a)
17" QV172	£850(a)
20" QV200	£1570(2a)

ON-SITE WARRANTY

3yr OSM	486 Desktops	£200
3yr OSM	Pentium Desktops	£300
3yr OSM	Mono Notebooks	£200
3yr OSM	Colour Notebooks	£300

Call for full range of Notebooks, Desktops and Servers

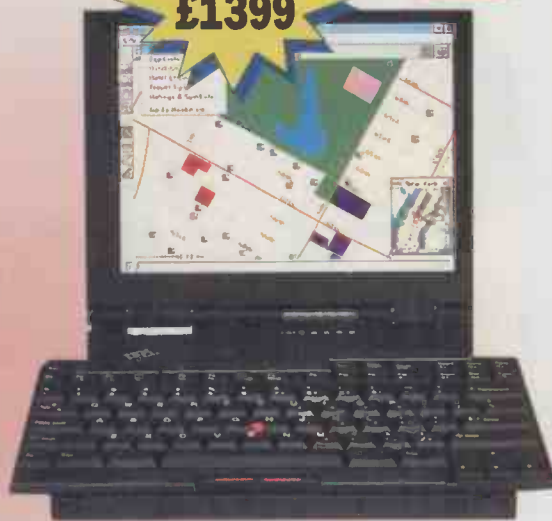


THE FUTURE OF NOTEBOOK COMPUTING UNFOLDS

IBM's ThinkPad 701 Series of notebook computers gives the mobile computer user something never before available. When opening the 701, you'll reveal a unique, highly innovative design. This includes a TrackWrite keyboard which automatically unfolds to become an 84-key, full-size keyboard. Even more amazing for its compact size is its 10.4" incredibly crisp and vivid Active-Matrix TFT colour display, which can be viewed from any angle. So much technology, in fact, that PC Magazine (US) also says the 701C "sets new notebook standards for others to match..." These tiny computers are fully-loaded business machines --- ready to handle your toughest computing challenge!

**AS LOW AS
£1399**

**THINKPAD
701**



ITEM	CPU	HARD DRIVE/RAM	SCREEN	PRICE
TP701CS-DS1	486DX2/50	360MB/4MB	10.4" VGA DSTN	£1399
TP701CS-DS4	486DX4/75	540MB/8MB	10.4" VGA DSTN	£1899
TP701C-TF4	486DX4/75	540MB/8MB	10.4" VGA TFT	£2199
TP701C-TF5	486DX4/75	720MB/8MB	10.4" VGA TFT	£2349
4MB memory upgrade for the ThinkPad 701C, 701CS				£185
8MB memory upgrade for the ThinkPad 701C, 701CS				£410



APTIVA

Complete system computer, monitor, software, keyboard, mouse and support.

910 Standard	4/66,540	4	14"	Desktop	£769
911 Multi-media	4/66,540	4	14"	Desktop	£849
914 Multi-media	4/66,540	8	14"	Desktop	£929
921 Multi-media	4/100,540	8	14"	Desktop	£999



OTHER THINKPAD NOTEBOOKS

Model	CPU	RAM	Screen	HD	Price
TP345Cs	4/75	4	10.4" Dsc	540	£1375(a)
TP345C	4/75	4	10.4" TFT	540	£1750(a)
TP755CX	5/75	8	10.4" TFT	540	£2889(2a)
TP755CX	5/75	8	10.4" SVGA	1.2GB	£3949(2a)
TP755CD	5/75	8	10.4" TFT	810,CD	£3699(2a)
TP755CD	5/75	8	10.4" TFT	1.2GB,CD	£4049(2a)
TP755CDV	5/75	8	10.4" OHP	810,CD	£4999(2a)
TP760-COI	5/90	8	10.4" SVGA	720	£3999(2a)
TP760-CDI	5/90	8	12.1" SVGA	1.2GB,CD	£5289(2a)



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Sat: 9am to 5pm
Callers welcome - check availability for collection
Prices valid from 4/11/96

STORAGE & SCANNERS

NEW

HEWLETT-PACKARD SCANNERS

The launch of these new models moves the HP Scanjet range up to a new level of convenience and usability. The whole range is now focussed on easily providing working information rather than the mechanical process of scanning and manipulating data.



£1645*

HP Scanjet 4Si

- ★ Fast 15ppm, 300dpi, 256 gray-scales
- ★ Auto OCR & file compression
- ★ High reliability 20 sheet ADF built-in
- ★ Network i/f & 20 user licence for software

★ Easy to use - NetWare 3.1 and 4.0 support
3YR OSM £140



£619

HP Scanjet 4C

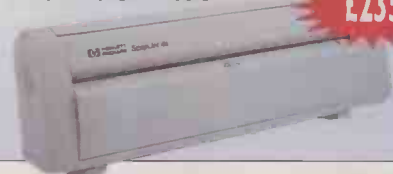
- ★ Hi-performance colour A4 flat-bed
- ★ Improved integration with office apps
- ★ Strong software suite

3YR OSM £140
Auto Doc Feeder £299
Transparency Unit £449

HP Scanjet 4s

- ★ Easy to move around/uses serial port
- ★ Very compact yet A4 capable
- ★ Excellent software capabilities

3YR OSM £66



£235

COLORADO MEMORY SYSTEMS INC.

NEW TECHNOLOGY-PERSONAL BACKUP SOLUTIONS



HP Colorado T1000i
2 year limited warranty

FROM £108

T1000e & T1000i

- ★ Easy to connect
 - ★ Easy to use
 - ★ Data Protection for your PC
- External version connects to Parallel Port

Includes full featured Colorado Backup for Windows & Windows 95



HEWLETT PACKARD

SURESTORE DAT DRIVE SOLUTIONS

Protect your most valuable component - your data

- ★ High Performance
- ★ High Capacity
- ★ Wide System Connectivity
- ★ Low Cost Media
- ★ Compatibility
- ★ Reliability

Travan		Trakker		Jumbo	
T1000e	T1000i	350	1400	350	350
Parallel	Internal	Parallel	Internal	Internal	Internal
800MB	800MB	340MB	1.3GB	340MB	340MB
2yr	2yr	1yr	2yr	1yr	1yr
C	C	A E	D F	A E	A E
Price	£108	£142	£195	£72	£72
Tapes		3M Unformatted		1-PK	
Colorado Formatted 3PK		E DC2120XL		5-PK	
A DT-350	£52	B DT-740	£66	£14	£66
C DT-1000	£85	D DT-1400	£70	£21	£100

Model	Ext	Int
HP SureStore 2000 2GB (DDS)	£629	£549
HP SureStore 5000 4GB (DDS)	£715	£639
HP SureStore 6000 8GB (DDS-2)	£785	£715
HP SureStore 12000e Autoloader 48GB		£1999



1GB ONLY
£169

Seagate Hard Drives

Fast ATA Interface

High Performance Drivers for Servers

Medalist™ Family



- Transfer rates up to 16.6MB/sec
- Master/Slave Capability
- Backward compatible with standard IDE

3 Year Warranty



Hawk™ Family

- Fast SCSI-2 Interface
- 5,400 RPM Spindle Speed Performance
- External Transfer Rate of 10MB/Sec.

Item #	Model	Capacity	Cache/	Avg. Seek	Price
			Time (M/S)		
DR455	ST3660A	545MB	128KB	14	£129
EURDR1367	ST51080A	1083MB	128KB	10.5	£169
NEW	ST31640A	1640MB	256KB	12	POA

Item #	Model	Capacity	Cache/	Avg. Seek	Warr.	Price
			Time (M/S)			
NEW	ST51080N	1080MB	128KB	12.5	3yr	£269
DR4529	ST32430N	2147MB	512KB	9/10.3	5yr	£575
DR4533	ST15230N	4294MB	512KB	9/10.5	5yr	£799

Seagate

Panasonic PD System

2 in 1 CD-ROM and Optical Disk drive

- New combined quad speed CD-ROM drive and 650MB rewritable Optical disk 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 £489.00
PD System kit + I/F card £569.00
PD 650MB media £39.00

QuadPro 4X Speed upgrade kit

- New quad speed CD-ROM drive
- Corel SCSI software supports most SCSI host adapters
- Complies with MPC level 3
- 256K cache memory
- Video-CD and CD-i movie
- Includes all accessory parts for quick, trouble free installation

QuadPro SCSI kit £149.00
QuadPro SCSI kit + I/F card £209.00

QuadPro 4X Speed 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 (Part No IDE16003)

QuadPro IDE kit £129.00
Optional interface card £10.00

Panasonic

FROM ONLY
£129



FREE TECHNICAL SUPPORT
DIRECT FROM PANASONIC

ESSENTIAL FOR MODEM USERS

High speed serial card 2 x 16550 serial ports, 1 x enhanced parallel port, 1 x game port **£29 (b)**



SALES 0181-205 9558

FAX 0181-205 0190

ADMIN 0181-358 8100

PRICES EXCLUDE VAT @ 17.5%



MODEMS

Robotics: Number 1 FOR HIGH SPEED MODEMS (Dataquest 94)

Sportster



28.8 SPORTSTER
NEW INTERNET
READY & INCLUDES
MODEM CABLE

Vi 14.4 Voice/Fax/Data
Desktop

£99

AMAZING VALUE

28.8 + FAX
DESKTOP

£155.95



NEW

Sportster Range

- 28.8 + Fax Desktop (Ext) **£155.95**
- 28.8 + Fax PC Card (Int) **£156**
- Vi 14.4 Voice/Fax/Data (Ext) **£99**
- 14.4 + Fax PC Card (Int) **£106**
- 28.8 + Fax Mac & Fax **£165**
- PC/AT Modem Cable 9/25 **£8**

Robotics

AUTHORISED RESELLER

5 year WARRANTY

MODEL

	SPEED						EMUL. CORN.	DATA COMP.	FAX	ASYNCHRONOUS	SYNCHRONOUS	DIAL UP	LEASE LINE	DESKTOP (EXT)	PC CARD (INT)	POCKET	PCMCIA	
	VOICE	28800 (V34)	19200 (V32 turbo)	14400 (V32bis)	9600 (V32)	2400 (V23bis)	1200 (V23)	1200/75 (V23)	300 (V21)	V42	MNP 2-4	V42bis	MNP 5	9600	14400 (V17)			
SPORTSTER 28.8 + FAX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SPORTSTER 14.4 + FAX		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SPORTSTER Vi 14.4	✓																	
COURIER V34		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WORLDPORT 28.8		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

WORLDPORT



PCMCIA Dual Standard (28.8 + HST + Fax) **£159**

USR HIGH SPEED DUAL SERIAL PORT
Essential for all windows users
faster than 9,600. 2 yr warranty **£55 (a)**

Courier

FREE HIGH SPEED SERIAL PORT (EXT ONLY)



FROM £238

COURIER PROFESSIONAL RANGE

- V34 + Fax Desktop Modem only **£239**
- inc FREE USR High speed Dual Serial Port
- V34 + Fax PC Card modem **£240**

Robotics
THE INTELLIGENT CHOICE
IN INFORMATION ACCESS

FREE DIRECT TECHNICAL SUPPORT 5 YEAR WARRANTY

APPROVED for Connection to telecommunication systems specified in the instruction for use subject to the Conditions set out in them.



V34 + FAX £195

"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 £195(a)

- ◆ Ratified 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





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A **WAREHOUSE** Company

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Prices valid from 4/1/96

MODEMS

MultiTech Systems Communications Power and Performance



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.

Part No.	Model No.	SPEED						ERROR CORR	FAX	ASYNCHRONOUS	SYNCHRONOUS	DIAL-UP	2-4 WIRE LEASED LINE	DIAL - BACK UP	UUCP	AS400 SUPPORT	REMOTE CONFIG	DESKTOP (EXT)	PC CARD (INT)	POCKET	PCMCIA	PRICE
		28,800 - V34	19,200 - V32Terbo	14,400 - V32bis	9,600 - V32	2,400 - V22bis	1200 - V22															
EURMM0103	MT1932ZDXK	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	£105
EURMM0104	MT2834ZDXK	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	£149
NEW	MT2834ZPXI-UK	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	£145
EURMM0524	MT1432BLK	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	£269
EURMM0489	MT2834BLK	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	£339
EURMM0487	MT1432LT1-UK	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	£169
NEW	MT2834LT1-UK	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	£199

MULTI-TECH HIGH SPEED SERIAL PORT

Essential for all Windows 3.1 & Windows user £49
PC/AT Modem Cable 9/25 £8

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the Conditions set out therein.



ISDN Bring your business partners closer, faster with a comprehensive range of low cost plug and play ISDN solutions from Racal - Datacom



£250.00

- Windows 95, NT 3x (TA Only)
- 128Kbps data throughput
- Plug and Play
- No memory Space
- 1/2 Card ISA and EISA
- Sync and Async PPP

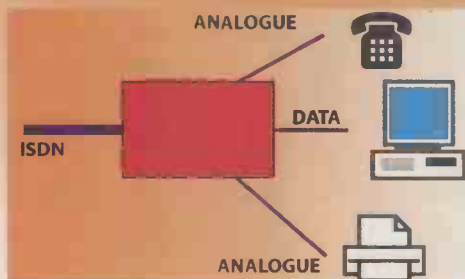
- Internet Access ✓
- E-Mail Access ✓
- On-Line Teleworking ✓
- Large File Transfer ✓
- Remote Network Access ✓
- Voice and data ✓
- Video Conferencing ✓

PCMCIA ISDN

- PCMCIA Type 2
- Plug and Play
- Basic rate ISDN (2B+D)
- 128kbps data throughput
- Windows 95, NT 3x (TA only)



£475.00



External ISDN Adaptors



from £399.00

- Data+ Analogue or Data Only Model
- High Speed v24 port
- Plug and Play
- Sub second connection time
- Bundled with Trans Send Software
- Calling line identification
- Multiple Subscriber numbering

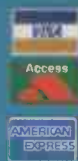
RACAL

Racal - Datacom

The UK Market Leader in ISDN Solutions

ESSENTIAL FOR MODEM USERS

High speed serial card 2 x 16550 serial ports, 1 x enhanced parallel port, 1 x game port **£29 (b)**



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ADMIN 0181-358 8100

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MODEMS



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



NEW LOW PRICE £165

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

3400 PRO DESKTOP MODEM

£155

EVERYTHING YOU NEED TO CONNECT TO THE INTERNET

3400 ONLINE INTERNET SOLUTION

£165



APPROVED for Connection to telecommunication systems specified in the instruction for use subject to the Conditions set out in them.

EASY INSTALL
INCLUDES ANIMATED INSTRUCTION DISK



Hayes
Authorised Dealer

NEW VOICE MODELS

FROM £99

Accura 288 Business Modem Voice/Data/FAX

Optima 288 Business Modem Voice/Data/FAX



TWICE THE SPEED OF OTHER 28.8 MODEMS!
Now you can support data throughput rates of up to 230,400 bit/s! Hayes AutoSync facilitates micro to mainframe communications, without the need for any additional hardware. Send and receive faxes plus FAX-On Demand, communicates by voice, and have tighter security support with Caller ID and password encryption. Configure your modem or access your quality message system's voice mail remotely. And Flash ROM

upgrades make adding future enhancements to your modem fast, flexible and inexpensive. The Optima 288 Business Modem is the most practical modem for your business.

- Optima 288 Business Modem Voice/Data/FAX NEW **£369** ALSO AVAILABLE FROM HAYES
 Optima 288 V.34 + Fax EXT Fax/Modem DMD1367 **£315** Optima 144 Business Modem Voice/Data/FAX NEW **£275**
 Optima 288 PCMCIA Fax/Modem EURMM0644 **£199**

TALK & LISTEN TO THE WORLD!
Send and receive faxes at a 4:1 compression data throughput rate - up to 115,200 bit/s!
Asynchronous data transfer support provides compatibility with PC, Macintosh, or UNIX systems. New features allow you to create and change multiple voice mailboxes, and communicate by voice, data, or fax. In conjunction with modem tone (DTMF) recognition, Hayes Smartcom Voice/Data/FAX software provides fast and automatic FAXes-On-Demand. And you can identify the number of an incoming call with Caller ID support. The Accura 288 Business Modem also comes with a serial cable.

Accura 288 Business Modem Voice/Data/FAX NEW **£199**
 Accura 144 + FAX EXT Fax/Modem MM2840 **£99**
 Accura 288 + Fax EXT Fax/Modem MM4783 **£173**
 ESP II at Single Port Serial I/F EUREX0212 **£59**
 ESP II at Dual Port Serial I/F EUREX0213 **£89**

Hayes Authorised Dealer	VOICE	FAX ON DEMAND	FAX SEND	DATA RATE				COMPRESSION RATIO	ERROR CORRECTION	ASYNCHRONOUS	SYNCHRONOUS
				28,800	14,400	9600	2400				
ACCURA 288 VDF	✓	✓	✓	✓	✓	✓	✓	4:1	✓	✓	
ACCURA 288			✓	✓	✓	✓	✓	4:1	✓	✓	
ACCURA 144			✓	✓	✓	✓	✓	4:1	✓	✓	
OPTIMA 288 VDF	✓	✓	✓	✓	✓	✓	✓	8:1*	✓	✓	✓
OPTIMA 288			✓	✓	✓	✓	✓	8:1*	✓	✓	✓
OPTIMA 144 VDF	✓	✓	✓	✓	✓	✓	✓	8:1*	✓	✓	✓
OPTIMA 144			✓	✓	✓	✓	✓	8:1*	✓	✓	✓

*COMPRESSION OF 8:1 AVAILABLE WITH MATCHED PAIR IE OPTIMA AT EACH END



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Callers welcome - check
availability for collection
Prices valid from 4/11/96

MEMORIES

IBM

SYSTEM	SIZE	CODE	PRICE
"THINKPAD 700,700C,720,720C,750,755"	4MB	EURMY1017	£169
PS/2 CL575X	8MB	EURMY1018	£299
THINKPAD 330/340/355/360/ 730C/370	4MB	EURMY1019	£159
	8MB	EURMY1020	£259
"THINKPAD 701C SERIES,701C5 SERIES"	4MB	EURMY1012	£149
	8MB	EURMY1013	£275
	16MB	EURMY1014	£479
"PS/2 L40SX,PS/NOTE 182,PS/NOTE 2141,N82"	2MB	EURMY1015	£89
"THINKPAD 350C,710T"	4MB	EURMY0998	£149
	8MB	EURMY1000	£285
	16MB	EURMY1001	£459
"PS/2 N51 SLC, SX"	2MB	EURMY1022	£89
	4MB	EURMY1023	£159
	8MB	EURMY1024	£299
"PS/2 56/57/77 SERIES"	2MB	EURMY1005	#85
PS/2 90/95 SERIES	4MB	EURMY0974	#129
"PS/2 SERVER 85,PS/2 E SERIES"	8MB	EURMY0981	£259
PS/2 EXP-BOARD FOR PS/2 70 & 80 SERIES	2MB	EURMY1030	£189
ADD ON	4MB	EURMY1029	£235
ADD ON	2MB	EURMY0988	£85
ADD ON	4MB	EURMY0957	£139
"PS/2 57SLC,57SX,MS7SLC," "56SLC/L5,56SX,L5"	2MB	EURMY1005	£85
	4MB	EURMY0974	£129
	8MB	EURMY0981	£259
PS/VP 6381-FY1/FYE/KYO/ "MYO/MY1/VVO,433DX/SI"	4MB	EURMY1028	£119
	16MB	EURMY1025	£429
PS/VP 6382-C20/C21/C41/C2A/ C4A/F3C/K3C/M5C/W5C/M5D/W5D (C/K/F/M)	4MB	EURMY0974	£129
	8MB	EURMY0981	£259
	16MB	EURMY1025	£429
PS/VP 6384 F/M/W SERIES (EXCEPT F00/F20/F23/F40/F43/ M00/M20/M40/M43/M50/M53/W40/W53)	4MB	EURMY0974	£129
	8MB	EURMY0981	£259
	16MB	EURMY1025	£429
PS/VP 6384 F00/F20/F23/F40/F43/ M00/M20/M40/M43/M50/M53/W40/W53	4MB	EURMY0965	£136
	16MB	EURMY0967	£499
PS/VP C00/C2A/C20/C4A/C40	2MB	EURMY1002	£85
	4MB	EURMY0957	£139
	8MB	EURMY1009	£259
"PS/1 2133-G43/W43/S43/174/154," 2155-G44/W44/S44	4MB	EURMY0965	£136
	16MB	EURMY0967	£499
PS/1 2133-G11/G13/W11/W13/811/ "S11/S13/111/451/461/471/483/551," "2168-452/473/493/573," 2155-G14/W14/S14	1MB	EURMY0970	£65
	2MB	EURMY1002	£85
	4MB	EURMY0974	£129
	8MB	EURMY0981	£259
"PS/1 2133-571/642/652," PS/1 2168-574/584/S94/653/873 PS/1 2155-582/592/593	4MB	EURMY0996	£119
	8MB	EURMY0997	£249
	16MB	EURMY1239	£399
PS/1 PRO 386SX 2123 (EXCEPT E31/E81)	2MB	EURMY1005	£85
	4MB	EURMY0974	£129
	8MB	EURMY0981	£259
APTIVA	4MB	EURMY1245	£119
	8MB	EURMY1249	£219
HURDLA 486 SERIES SPRINTA 486DX/DX2/SX	4MB	EURMY0698	£136
	16MB	EURMY0699	£476
SPRINTA II	4MB	EURMY0701	£119



"ASCENTIA 800N,810N"

SYSTEM	SIZE	CODE	PRICE
"CONTURA 3/20,3/25,3/25C"	2MB	EURMY0818	£75
	4MB	EURMY0819	£155
	8MB	EURMY0820	£259
CONTURA 400/410 SERIES	4MB	EURMY0808	£149
	8MB	EURMY0809	£275
"CONTURA 4/25,CX,EX"	4MB	EURMY0821	£155
	8MB	EURMY0822	£25
	16MB	EURMY0823	£549
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DESKPRO M & SPLIT SERIES (EXPBOARD) (NOT LT486/33)	0MB	EURMY0835	£129
	2MB	EURMY0836	£215
	4MB	EURMY0837	£249
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PROLIANT 1000 486DX2-66	4MB	EURMY0790	£129
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	8MB	EURMY0812	£259
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	4MB	EURMY0772	£129
	8MB	EURMY0812	£259
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	32MB	EURMY1462	£1399
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	4MB	EURMY1146	£159
	8MB	EURMY1176	£295
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	8MB	EURMY1173	£295
	16MB		£679
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T3200SXC	2MB	EURMY1174	£85
	4MB	EURMY1158	£159
T2400/T3600/T2450	4MB	EURMY1165	£169
	8MB	EURMY1168	£299
	16MB	EURMY1170	£559
T3400	4MB	EURMY1165	£169
	8MB	EURMY1168	£299
	16MB	EURMY1169	£569
"T4400C/SX/SXC,T6400" T6600 SERIES	2MB	EURMY1144	£85
	4MB	EURMY1149	£159
	8MB	EURMY1177	£289
	16MB	EURMY1159	£539
"T4500,T4600,T1900C,1910" "1950C,1960,T4700 SERIES" "T4800,4850 SERIES,DYNAPAD T200"	4MB	EURMY1161	£169
	8MB	EURMY1163	£299
	16MB	EURMY1164	£599
T5200/T5200C/T8500	2MB	EURMY1154	£89
	8MB	EURMY1178	£345
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VECTRA 486 VL	1MB	EURMY0892	£45
	2MB	EURMY0894	£85
	4MB	EURMY0899	£129
	8MB	EURMY0902	£259
VECTRA VL2 (NOT PENTIUM)	4MB	EURMY0916	£119
	8MB	EURMY0917	£249
	16MB	EURMY0918	£429
VECTRA 486-25N/33N/50N/66N NETSERVER LE SERIES (486XM SERIES 32BIT)	2MB	EURMY0894	£85
	4MB	EURMY0899	£129
	8MB	EURMY0902	£259
	16MB	EURMY0907	£429
"OMNI BOOK 530,600C"	4MB	EURMY1318	£169
	8MB	EURMY1319	£319
DELL			
"320SX,325P,325D,333D/P"	4MB	EURMY0849	£129
"486P/66/50/33/25/20/16," 486D/66/50/33/25/20/16	1MB	EURMY0847	£45
	4MB	EURMY0849	£129
	16MB	EURMY0852	£429
PERFORMANCE ME SERIES	4MB	EURMY0862	£129
	8MB	EURMY0863	£258
	16MB	EURMY0864	£429
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	8MB	EURMY0859	£439
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	4MB	EURMY0844	£158
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	16MB	EURMY0846	£495
	32MB	EURMY0853	£858
325D/325P/333D/333P 433/433P	1MB	EURMY0847	£45
	4MB	EURMY0849	£129
"320SX,325P,325D,333D/P"	4MB	EURMY0849	£129

All Memories on pages 13 & 14 are 3rd party memories from reputable manufacturers such as Samsung, Toshiba, TI, Fujitsu, Transcend.

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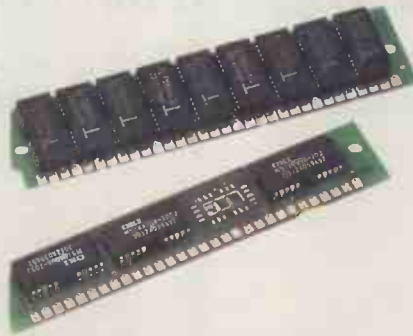
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Code	Configuration	Price
30 PIN PARITY SIMMS		
EURMY1218	1MB X 9-60NS 9 CHIP	£31.00
EURMY1219	1MB X 9-60NS 3 CHIP	£31.00
EURMY1221	1MB X 9-70NS 9 CHIP	£31.00
EURMY1222	1MB X 9-70NS 3 CHIP	£31.00
EURMY1224	1MB X 9-80NS 9 CHIP	£34.00
EURMY1225	1MB X 9-80NS 3 CHIP	£31.00
EURMY1229	4MB X 9-60NS	£119.00
EURMY1230	4MB X 9-70NS	£115.00
CACHE RAM		
EURMY1189	32K X 8-20NS (28PIN)	£7.00
EURMY1190	32K X 8-15NS (28PIN)	£7.50
EURMY1192	128K X 8-20NS (32PIN)	£26.00
EURMY1196	8K X 8-20NS (28PIN)	£115.00
DRAM		
EURMY1194	1MB X 1-70NS (DIL)	£4.90
EURMY1208	256K X 4-60NS (DIL)	£5.75
EURMY1210	256K X 4-70NS (DIL)	£5.40
EURMY1212	256K X 17-70NS (SOJ)	£22.00
EURMY1213	256K X 16-80NS (SOJ)	£18.00



Code	Configuration	Size	Price
PARITY SIMMS			
EURMY1232	256K X 37-70NS	1MB	£45.00
EURMY1234	512K X 36-70NS	2MB	£79.00
EURMY0416	1MB X 36-60NS	4MB	£125.00
EURMY1235	1MB X 36-70NS	4MB	£119.00
EURMY1236	1MB X 36-80NS	4MB	£125.00
EURMY1237	2MB X 36-70NS	8MB	£229.00
EURMY1238	4MB X 36-60NS	16MB	£429.00
EURMY1239	4MB X 36-70NS	16MB	£399.00
EURMY1241	8MB X 36-70NS	32MB	£839.00
NON PARITY SIMMS			
EURMY1242	512K X 32-70/80NS	2MB	£79.00
EURMY1244	1MB X 32-60NS	4MB	£109.00
EURMY1245	1MB X 32-70NS	4MB	£99.00
EURMY1248	1MB X 32-80NS	4MB	£109.00
EURMY1250	2MB X 32-60NS	8MB	£215.00
EURMY1249	2MB X 32-70NS	8MB	£205.00
EURMY1253	4MB X 32-60NS	16MB	£399.00
EURMY1252	4MB X 32-70NS	16MB	£369.00
EURMY1293	8MB X 32-60NS	32MB	£799.00
EURMY1254	8MB X 32-70NS	32MB	£789.00
EURMY1336	1MB X 32-600NS	4MB EDO	£109.00
EURMY12255	1MB X 32-70NS	4MB EDO	£109.00
EURMY1332	2MB X 32-60NS	8MB EDO	£229.00
EURMY1262	2MB X 32-70NS	8MB EDO	£229.00

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	1MB	EURMY1122	£59
JX-9500/E/H/9700	1.5MB	EURMY1123	£119
	4MB	EURMY1124	£195
"JX-9400,9460,9600,9600PS"	1MB	EURMY1125	£65
"JX-9660,9700E"	2MB	EURMY1126	£99
	4MB	EURMY1127	£179

Panasonic

SYSTEM	SIZE	CODE	PRICE
KXP-4410/4430	1MB	EURMY1096	£89
	2MB	EURMY1097	£129
	4MB	EURMY1098	£199
KXP-4420/4450/4451	1MB	EURMY1099	£69
	2MB	EURMY1099A	£19
	4MB	EURMY1102	£179
KXP-4440/5410	1MB	EURMY1106	£72
	2MB	EURMY1107	£19
	4MB	EURMY1108	£193
	1MB	EURMY1104	£47
	2MB	EURMY1105	£84

hp HEWLETT PACKARD

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"LASERJET IIP/IIIP+/II/III/IIIP"	1MB	EURMY0929	£59
	2MB	EURMY0931	£89
	4MB	EURMY0941	£155
LASERJET III/III D	1MB	EURMY0928	£65
	2MB	EURMY0935	£95
	4MB	EURMY0940	£159
DESIGNJET 200/600/650C	4MB	EURMY0939	£129
	8MB	EURMY0945	£259
PAINTJET XL300 (EXP. BOARD REQUIRED)	1MB	EURMY0924	£49
	2MB	EURMY0932	£85
	4MB	EURMY0936	£129
	8MB	EURMY0942	£259
EXP. BOARD	0MB	EURMY0950	£69
LASERJET 414M/451/451MX/551	1MB	EURMY0924	£49
"IIISI, DESKJET 1200C"	2MB	EURMY0932	£85
	4MB	EURMY0936	£129
	8MB	EURMY0942	£259
LASERJET 5L	1MB	EURMY1328	£65
	2MB	EURMY1329	£99
	4MB	EURMY1327	£165
LASERJET 4L	1MB	EURMY0927	£59
LASERJET 4P/4MP/4+/4M+/4V/4MV/	1MB	EURMY0926	£45
"SP/5MP/COLOR/DJ/1600C/CM"	2MB	EURMY0934	£85
	4MB	EURMY0938	£129
	8MB	EURMY0944	£255
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	4MB	EURMY0729	£185
HL6 SERIES	2MB	EURMY0722	£119
	4MB	EURMY0723	£195
HL8-D/E/V	1MB	EURMY0726	£79
	2MB	EURMY0728	£115
HL10-V/DV/PS/DPS	2MB	EURMY0730	£12
	4MB	EURMY0731	£179
HL10-H	1MB	EURMY0732	£49
	2MB	EURMY0733	£89
	4MB	EURMY0734	£129
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"KXP-4400,"	1MB	EURMY1090	£65
KXP-5400 2MB ONLY	2MB	EURMY1091	£95
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OL400	SIZE	CODE	PRICE
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	2MB	EURMY1062	£99
	0MB	EURMY1069	£1
"OL400E/EX,410E/EX"	1MB	EURMY1063	£69
	2MB	EURMY1064	£19
	4MB	EURMY1065	£179
"OL410,OL810"	1MB	EURMY1066	£75
	2MB	EURMY1067	£115
	4MB	EURMY1068	£185
	0MB	EURMY1070	£1
"OL800,OL820"	1MB	EURMY1072	£69
	2MB	EURMY1073	£19
	4MB	EURMY1074	£179
	0MB	EURMY1071	£28
"OL830,OL840"	2MB	EURMY1075	£89

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"LBP-4, LBP-4+, LBP-4Lite"	SIZE	CODE	PRICE
	1MB	EURMY0736	£89
	2MB	EURMY0742	£125
"LBP-8II, 8IIR, 8IIT"	1MB	EURMY0737	£65
	2MB	EURMY0743	£95
	4MB	EURMY0746	£159
LBP-8II/III+/IIIIR	1MB	EURMY0738	£99
	2MB	EURMY0744	£129
	3MB	EURMY0745	£169
"LBP-8IV,LBP-4U,LBP-4I"	1MB	EURMY0739	£49
	4MB	EURMY0740	£119
	8MB	EURMY0741	£259

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LP4	SIZE	CODE	PRICE
	1MB	EURMY1129	£79
	2MB	EURMY1134	£119
	4MB	EURMY1137	£199
LP8	1MB	EURMY1130	£79
	2MB	EURMY1135	£115
	4MB	EURMY1138	£195
LS-5/5EX/5TT EXPBOARD	1-5MB	EURMY1131	£76
	2-6MB	EURMY1136	£115
	1MB	EURMY1132	£55
	2MB	EURMY1133	£95

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ACTION LASER II	1MB	EURMY0870	£62
	2MB	EURMY0876	£119
	3MB	EURMY0882	£159
	4MB	EURMY0884	£229
EPL-5000/5200	1MB	EURMY0872	£55
	2MB	EURMY0877	£89
	4MB	EURMY0885	£21
"EPL 5600 (2 SOCKETS),1600"	1MB	EURMY1232	£45
	2MB	EURMY1242	£85
	4MB	EURMY1245	£19
	8MB	EURMY1249	£219
	16MB	EURMY1252	£369
EPL8000/EPL8100	1MB	EURMY0874	£7
	2MB	EURMY0880	£11
	3MB	EURMY0883	£155
	4MB	EURMY0886	£25



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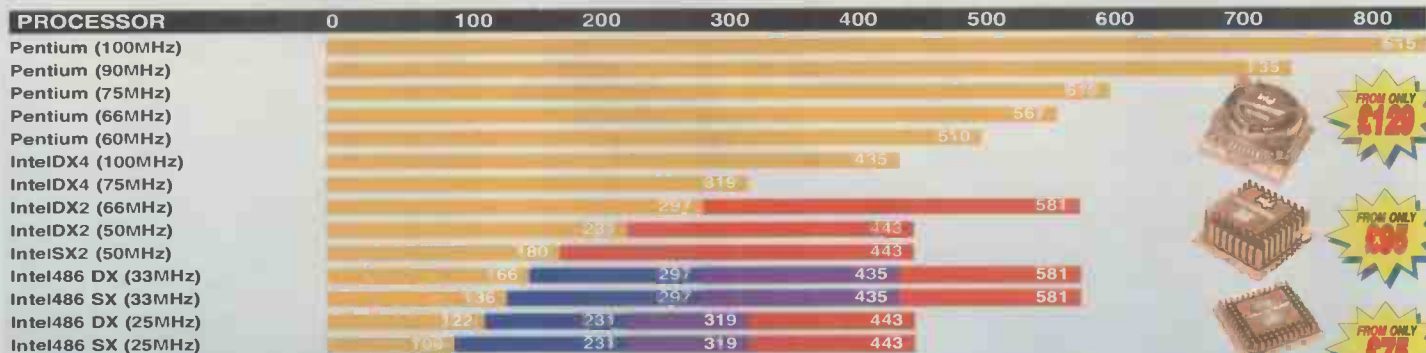
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Source: iCOMP, A Simplified Measure of Relative Intel Microprocessor Performance, Intel Corp., 1992. Indicated names are Trademarks of other companies.

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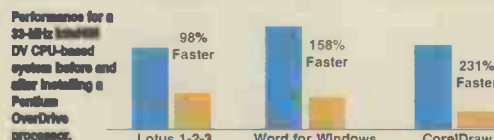


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EUREX0003	INTEL DX2 OVERDRIVE 25-50 MHz	Yes	£75
EUREX0004	INTEL DX2 OVERDRIVE 25-50 MHz	No	£75
EUREX0006	INTEL DX2 OVERDRIVE 33-66 MHz	Yes	£95
EUREX0005	INTEL DX2 OVERDRIVE 33-66 MHz	No	£95
EX6330	INTEL DX4 OVERDRIVE 25-75 MHz	Yes	£99
EX6332	INTEL DX4 OVERDRIVE 25-75 MHz	No	£99
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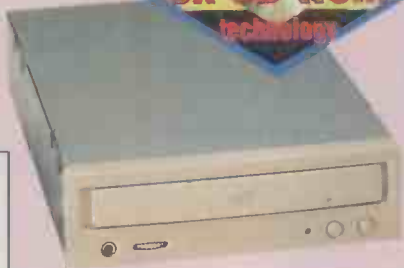
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IGES Option	Yes	No	Yes
Programming Environment	Yes	No	Yes
Memory Requirements	4/8MB	4/8MB	20/32MB
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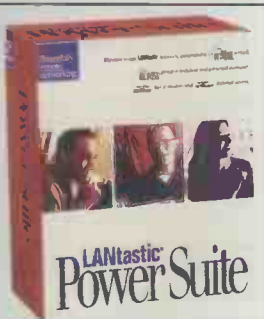
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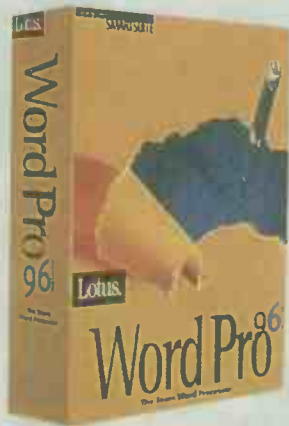


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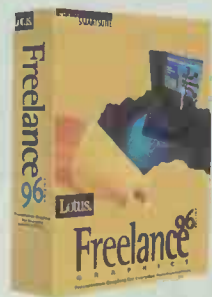
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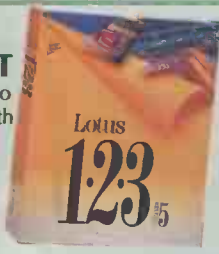
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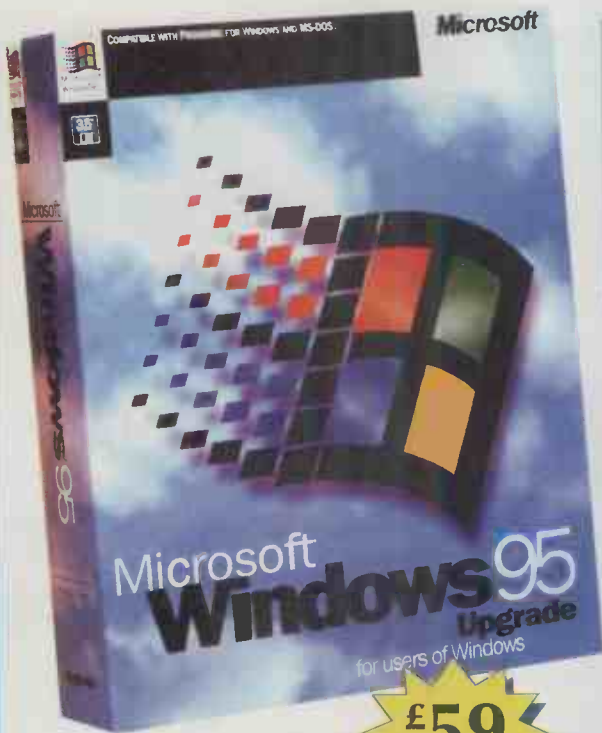
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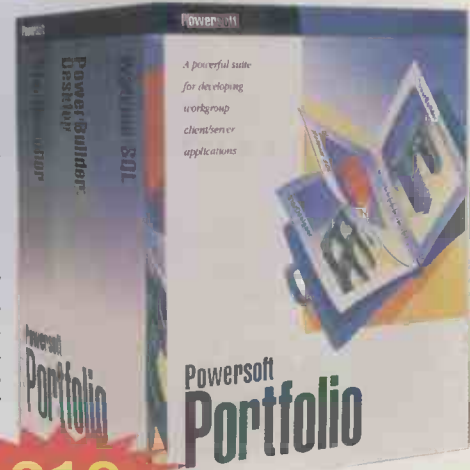
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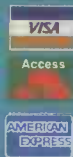
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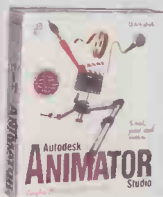
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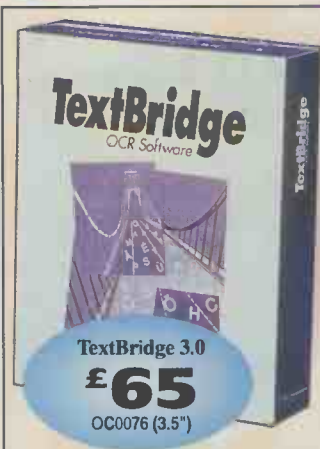
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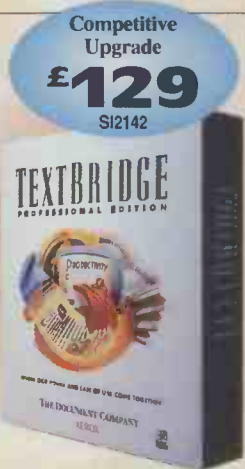
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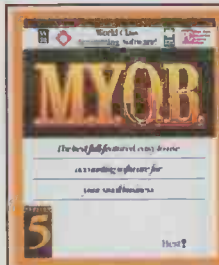
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Lotus 123 v4 DOS	287			246
Lotus 123 v2.4 DOS	245			212
S 5 0 2 3 2 Quattro Pro V5.5 DOS	45			
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MS Access Developers Toolkit Win 95	399			
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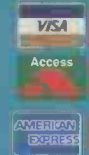
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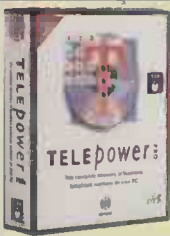
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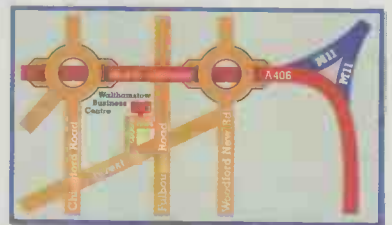
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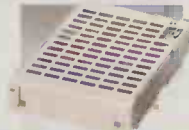
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Orchid

Orchid NuSound FM.....	£59
Orchid NuSound PnP.....	£115
Orchid Wavebooster 2Mb + CueBase Lite.....	£65
Orchid Wavebooster 4Mb + CueBase Lite.....	£89
Orchid Wavebooster 4Mb + FX + Midisoft.....	£99

Gravis

Gravis Ultrasound Max Card.....	£130
Gravis Ultrasound Midi Kit.....	£26
Gravis Ultrasound ACE Waveable Add-in Card.....	£75

TruSt

Sound Expert Deluxe 16+3D £49

Aztech

Sound Galaxy Nova 16 Extra.....	£68
Sound Galaxy Pro 16 - 2.....	£58
Sound Waverider 32+.....	£88
Sound Waverider 32+ Kit.....	£275

Miro

MiroSOUND FM10.....	£62
MiroSOUND PCM10.....	£81
MiroSOUND PCM1 PRO.....	£128
MiroSOUND PCM12.....	£138
MiroSOUND PCM20 Radio.....	£190

Others

Portable Sound Plus.....	£129
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(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
Screen Beat Super Woofer Speaker System.....	£109

(Complete with Mid & High Frequency Satellite Speakers)

Creative

CREATIVE

Creative 300 10W Speakers £69

Creative 20W Speakers £75

Labtec CS-600 Speakers.....	£19
Small Mains Powered Amp Speakers.....	£19

**LARGE
£49**



**80w Mains Powered
AMP SPEAKERS**

Sony Multimedia PC Speakers SRS-PC30.....	£45
Sony Multimedia PC Speakers SRS-PC50.....	£65

TruSt

TRUST

Trust Soundwave 240.....	£41
Trust Soundwave 20.....	£25
Trust Soundwave 30.....	£24
Trust Soundwave 40.....	£17
Trust 3D Sound Dimension.....	£49

Yamaha Multimedia Speakers YST-M5.....	£36
Yamaha Multimedia Speakers YST-M10.....	£43
Yamaha Multimedia Sub Woofer.....	£75
ZYFI 2 Speakers.....	£24
ZYFI Pro 2 Speakers.....	£38

ACCESSORIES

TRUST

Trust Midi Headset.....	£12
Trust Home Music Maker.....	£65
Trust Professional Music Maker.....	£123

Headphones.....	£5
Microphone.....	£9
Creative Microphone.....	£17



MODEMS

US Robotics SPORTSTER



US Robotics Sportster Vi EXT.....	£89
US Robotics Sportster 14.4 INT.....	£104
US Robotics Sportster 28.8 V34 Fax EXT.....	£155
US Robotics Sportster 28.8 V34 Fax INT.....	£155

(Now With Free Internet Access Software)

US Robotics Courier V34 Int.....	£235
US Robotics Courier V34 Ext.....	£235
US Robotics Worldport Dual Standard Cellular.....	£121
US Robotics Worldport - Dual Standard Cellular V34 PCMCIA.....	£159

Simply

Simply Modems

Simply V34 External Fax Modem.....	£139
Simply V34 Internal Fax Modem.....	£139
Simply 14400 Internal Fax Modem.....	£69
Simply 14400 External Fax Modem.....	£99

Simply Modems are BABT approved and come with Windows software.

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).....	£249
Hayes Optima 14.4 + Fax144.....	£199
Hayes Optima 14.4 + Fax144 PCMCIA.....	£199
Hayes Accura V34 Internet Delux.....	£179

(with 30 days free connection to the Internet)

Hayes Accura 28.8 + Fax VFC V32bis V 34.....	£175
Hayes Accura 14.4 + Fax V32bis.....	£99

Miro

MIRO CONNECT 34 OFFICE
V34 Modem, High Speed Fax, Voice Over Data, PnP. Loads of Bundled Software. **£235**

Motorola



3400 Online Internet Solution with Data/Fax Modem.....	£155
<i>(V34, 28,800 bps 1 month free access to CompuServe)</i>	
3400 Pro 28.8 Data/Fax Modem.....	£140

Pace

Pace MICROLIN fx34 PC Internal V34 Fax Modem.....	£149
Pace Linnet 34 PLUS fx Desktop V34 Fax Modem.....	£149
Pace MICROLIN fx34 V34 Pocket Fax Modem.....	£155
Pace MICROLIN NB34 PCMCIA V34 Fax Modem.....	£178
Pace Linnet 32 Plus fx - Desktop V32bis Fax Modem.....	£159
Pace MICROLIN fx32 Plus - Pocket V32bis Fax Modem.....	£149
Pace MICROLIN fx 32 Internal - V32bis Fax Modem.....	£145
Pace MICROLIN NB 32Plus - PCMCIA V32bis Fax Modem.....	£185
Message Desk - Desktop V32bis Voice, fax and data modem.....	£168
Netlink V32.....	£99

Complete internet Access Pack containing Pace MobiFax144, FREE 21 Days direct connection time Plus all Software needed.

Netlink Gold V34.....	£185
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Complete internet Access Pack containing Pace MobiFax144, FREE 21 Days direct connection time Plus all Software needed.

Pision Dacom

DACOM GOLD CARD

Gold Card V34 + Fax PCMCIA Modem.....	£190
Gold Card V32bis + Fax PCMCIA Modem.....	£149

Multitech ZDX 288 External V34 Fax Modem.....	£152
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Apex Data

ClipperCom V32 PCMCIA Modem.....	£149
ClipperCom V34 PCMCIA Modem.....	£199

Creative

Creative PhoneBlaster V 34.....	£238
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(14.4 Fax Modem, Music on Hold, Pager Notification, Remote Access, Voice Over Data Capability, 16 Bit Stereo Recording and Playback, IDE CD Interface).

Cables

9 to 25 Pin Modem Cable.....	£9
25 to 25 Pin Modem Cable.....	£9
Null Modem Cable (9 and 25 pin connectors).....	£15

AUTOMATIC FAX SWITCHES

Avro Pacific Fax Friend

Automatic Fax & Data Switch

£49



Andest MSL Manager 1100 Fax/Phone.....	£89
Andest MSL Manager 3300.....	£105
Andest MSL Manager 3300M.....	£125
Andest MSL Manager 7700.....	£145



MULTI-MEDIA CARDS

CREATIVE

Creative MP400 (MPEG Player).....	£119
Creative TV-Coder External.....	£109
Creative Video Blaster RT300.....	£215

Aztech

Video Galaxy Gamma.....	£155
Video Galaxy Gamma MPEG Upgrade.....	£119
Video Galaxy Teletext Upgrade Module.....	£38
Video Galaxy Oscar (MPEG Playback board).....	£189

Diamond

1Mb Diamond Edge DRAM PCI.....	£219
2Mb Diamond Edge DRAM PCI.....	£259
2Mb Diamond Edge VRAM PCI.....	£319
4Mb Diamond Edge DRAM PCI.....	£439

(All Diamond Edge cards offer 2D & 3D graphics, Full motion Digital Video, Hardware Waveable, Digital Gameport & Plug & Play for Win 95)

Fast Electronic

Fast Aviator MN502010.....	£182
Fast Movie Machine Pro.....	£275
Fast Movie Machine Pro MJPEG Upgrade.....	£275
Fast Movie Machine 2.....	£465
Fast Movie Machine 2 MJPEG Upgrade.....	£275
Fast Movie Machine 2 MPEG Upgrade.....	£225
Fast FPS 60 Card with MJPEG.....	£485
Fast FPS 60 Card MPEG Upgradable.....	£225
Screen Machine II.....	£655
Screen Machine II MJPEG Upgrade.....	£275

Hauppauge!

WIN/TV CELEBRITY

- Frame Grabbing on the fly
- NTSC/PAL Compatible
- Scalable viewing window from icon to full screen
- Teletext



£255

Hauppauge Win/TV Cinema 95.....	£179
Hauppauge Win/TV Prisma.....	£149

Kodak

KODAK

Kodak Digital Camera 40.....	£815
Kodak Camera AC PowerAdaptor.....	£69



(Automatic exposure & built in flash, 756x504 image resolution (4 x Apple Quicktake 100 resolution), includes batteries, AC Adaptor optional).

Miro

Mirovideo 2Mb 20TD Live PCI or VLB.....	£295
Mirovideo DC1 (With Adobe Premiere, Photoshop LE, Asymetrix 3D).....	£299
1Mb MiroVIDEO 12PD PCI or VLB.....	£89
2Mb MiroVIDEO 12PD PCI or VLB.....	£129
MiroMPEG Maker.....	£185

Orchid

Orchid Vidiala.....	£249
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Sigma Design

Realmagic Full Version.....	£325
Realmagic Lite.....	£199

Quantum Leap Software

Media Pro Plus Hi-Res.....	£209
Media Pro Plus.....	£189
PC Tuner.....	£65
TV Buster External.....	£45
TV Buster Internal.....	£45

TruSt

TRUST

Trust PCTV Home Video Card.....	£165
Trust Home Cinema Module.....	£123
Trust Home Teletext Module.....	£33
Trust FM Stereo Radio Card.....	£32

Videologic

Videologic 1Mb 928 Movie ISA or VLB.....	£125
Videologic 1Mb 928 Movie ISA or VLB Sound.....	£155
Videologic 1Mb 928 Movie with MPEG Player ISA.....	£355
Videologic 1Mb 928 VRAM Upgrade Kit.....	£69
Videologic Captivator Pro.....	£165
Videologic Captivator Pro & TV.....	£209
Videologic MPEG Player for VMC.....	£209
Videologic Mediator XLC PC to TV Converter.....	£165

Videolabs

FLEXCAM™

DESK TOP TV CAMERA
Flexcam is a high resolution, integrated colour camera and microphone. **£499**

Others

Compro LaserWave Movie Studio - MPEG Video Board.....	£239
Intel Smart Recorder Pro.....	£285
Spea Showtime (MPEG Player).....	£299

VIDEO CONFERENCING

Creative Labs ShareVision PC 3000.....	£995
Intel ProShare Premiere Edition SPW.....	£199
Intel ProShare Video System 200.....	£1,849

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General Sales 0181 498 2100 - Software Sales 0181 498 2120 - PC System Sales 0181 498 2130



VGA CARDS

Generic	ISA	VLB	PCI
256K VGA 800 x 600 16C	£18		
512K VGA 1024 x 768 156C	£24		
1Mb Trident 8900D 1024 x 768 256C	£39		
1Mb Cirrus Logic 16.7 Win Accelerator	£42		
1Mb Tseng ET4000 16.7m Colours	£65		
1Mb Cirrus Logic 5429 Win ACC		£48	
1Mb Cirrus Logic 5434		£58	
1Mb Tseng ET4000/W32		£79	£75
2Mb Tseng ET4000/W32P		£109	£108
1Mb Advanced Logic AL2301			£65
2Mb Cirrus Logic 5434			£98

Diamond	ISA	VLB	PCI
1Mb Diamond Stealth 64 Dram 2000			£82
1Mb Diamond Stealth 64 Dram 2001			£82
1Mb Diamond Stealth 64 Video Dram 20001 MPEG			£115
2Mb Diamond Stealth 64 Dram 2001			£122
2Mb Diamond Stealth 64 Dram 2000			£125
2Mb Diamond Stealth 64 Video Dram 20001 MPEG			£136
2Mb Diamond Stealth 64 Video Vram 3200			£179
2Mb Diamond Stealth 64 Video Vram 3000			£195
4Mb Diamond Stealth 64 Video Vram 3000			£319

Hercules	ISA	VLB	PCI
1Mb Hercules Dynamite Pro		£135	
2Mb Hercules Dynamite Power		£145	£195
2Mb Hercules Graphite Terminator 64		£235	£265
4Mb Hercules Graphite Terminator 64		£345	£379
1Mb Hercules Stingray			£98
1Mb Hercules Stingray Pro Video			£78
1Mb Hercules Stingray 64 Video			£95
2Mb Hercules Stingray 64 Video			£145

MATROX

2Mb Matrox Millennium WRAM	£215
4Mb Matrox Millennium WRAM	£315
Windows '95 compatible Plug & Play	

Orchid	ISA	VLB	PCI
2Mb Orchid Kelvin Video 64			£79
4Mb Orchid Kelvin Video Video 64			£129
1Mb Orchid Fahrenheit ProVideo 64		£205	£185
4Mb Orchid Fahrenheit ProVideo 64		£309	£295

Taxan	ISA	VLB	PCI
1Mb Taxan GTS WinBoost	£114	£119	£119
2Mb Taxan GTS WinBoost	£134	£145	£145
2Mb Taxan WinTurbo 64	£194	£245	£193
4Mb Taxan WinTurbo 64	£338	£395	£338

Number Nine	ISA	VLB	PCI
1Mb 9FX Vision 330		£95	£83
2Mb 9FX Vision 330		£139	£124
1Mb 9FX Motion 531		£135	£118
2Mb 9FX Motion 531		£179	£155
2Mb 9FX Motion 771		£225	£218
4Mb 9FX Motion 771		£339	£318
4Mb Imagine 128 1280		£475	£485
4Mb Imagine 128 1600		£610	£685
8Mb Imagine 128		£1,039	£949

Spea	ISA	VLB	PCI
2Mb Spea V7 Mercury P64 VLB		£208	

STB	ISA	VLB	PCI
1Mb STB Powergraph 64		£119	£119
2Mb STB Powergraph 64		£149	£149
STB Powergraph 64v MPEG			
2Mb STB Velocity 64V MPEG		£219	£245
4Mb STB Velocity 64V MPEG		£319	£395
2Mb STB Nitro 64			£145

VideoLogic GrafixStar Range

	VLB	PCI
1Mb GrafixStar 300	£83	£79
2Mb GrafixStar 300	£125	£115
2Mb GrafixStar 700 inc AVI scaling	£233	£229
4Mb GrafixStar 700 inc AVI scaling	£375	£375



MONITORS

14" Mono VGA Monitor	£69
14" Crystal Colour SVGA Interlaced	£159
15" Crystal Colour Monitor N-I MPRII	£228
17" Crystal 17HQ 1280 x 1024 N-I	£498

CTX

14" CTX 1451CLR N-I MPRII	£165
15" CTX 1565CD SVGA MPRII	£235
17" CTX 1765CD SVGA MPRII 28 1024 x 768	£438
17" CTX 1785GM SVGA MPRII 26 1280 x 1024	£488
LMT 1000 16 Grey Scale LCD VGA Screen 9.4"	£485
LMT 5020 4096 Colour LCD VGA Screen 9.4"	£1,965
All the above monitors come with one year on-site Warranty	



MONITORS Cont.

Iiyama (IDEK) 15" Iiyama Vision Master FST MF-8115	£279
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17" IIYAMA
VISION MASTER
FST MF-8617E
£520

17" Iiyama Vision Master FST Pro MT9017E	£585
21" Iiyama Vision Master FST MF8221E	£1,165
21" Iiyama Vision Master FST MT9021E	£1,250
<i>(All 21" Monitors Bundled with Colorific Kodak SFW)</i>	

NEC		
NEC Multisync XV14 14" 1024 x 768 N-I		£215
NEC Multisync XV15 15" 1280 x 1024 80Hz		£274
NEC Multisync XV17 17" 1280 x 1024 80Hz		£569
NEC Multisync XE15 15" 1280 x 1024 80Hz		£405
NEC Multisync XE17 17" 1280 x 1024 80Hz		£719
NEC Multisync XE21 21" 1280 x 1024 75Hz		£1,335
NEC Multisync XP17 17" 1280 x 1024 76Hz		£925
NEC Multisync XP21 21" 1600 x 1200 70Hz		£1,698

Panasonic		
15" Panasync (TX-T1562) 1024 x 768 NI		£279
17" Panasync (TX-D1733) 1280 x 1024 NI		£495
17" Panasync (TX-D1733FU) 1280 x 1024 NI		£555
<i>(Including Built in Speakers)</i>		
17" Panasync (TX-D1752) 1280 x 1024 NI		£675
20" Panasync (TX-D2051) 1280 x 1024 NI		£999
21" Panasync (TX-D2151) 1280 x 1024 NI 1600 x 1281		£1,359

2 year On-Site Warranty with exchange on Panasonic Monitors

Philips		
14" Philips Mono Monitor 14M		£89
14" Philips Enhanced VGA Color Monitor 14C		£163
15" Philips Brilliance Autocan Colour Monitor 15B		£254
15" Philips Brilliance Autocan N-I Colour Monitor 15A		£275
<i>(Built in Stereo for Multimedia Applications)</i>		
17" Philips Brilliance Autocan Colour Monitor 17A		£669
<i>(Built in Stereo for Multimedia Applications plus plug N play compatibility)</i>		
17" Philips Autocan Colour Monitor 17C		£429
<i>(Built in Stereo for Multimedia Applications)</i>		
17" Philips Autocan Colour Monitor 17B		£560
17" Philips Trinitron Monitor 17T		£599
20" Philips Autocan Colour Monitor 20C		£775
20" Philips Autocan Colour Monitor 20T		£1,299
21" Philips Autocan Colour Monitor 21B		£1,439
21" Philips Brilliance Autocan - Colour Monitor with CyberScreen Technology 21A		£1,749

Samsung		
14" Syncmaster 3NI 800x600 CQA		£159
14" Syncmaster 3NE 1024x768 CVP		£179
15" Syncmaster 15GLE 1024x768		£249
15" Syncmaster 15GLI 1280x1024 Plug & Play		£289
17" Syncmaster 17GLI NI 1280x1024		£499
17" Syncmaster 17GLSI NI 1280x1024 76Hz		£599
<i>(15" & 17" monitors come with a 3 year on site warranty)</i>		

Sony

Sony 15" CPDSF1 1024 x 768 NI 25	£297
Sony 17" GDM-17SEI SVGA N-I	£785
Sony 20" GDM20 SEV 1280 x 1024 N-I	£1,295
Sony 20" GDM20 SE1 1280 x 1024 N-I	£1,395
Sony CSS-B100 Computer Speaker System	£75

Taxan		
14" Taxan Ergovision 400LR Interlaced		£185
14" Taxan Ergovision 410LR N-I		£195
14" Taxan Ergovision 420LR N-I		£235
15" Taxan Ergovision 580 + LR 1280x1024 N-I		£285
17" Taxan Ergovision 880 LR 1280x1024 N-I		£505
17" Taxan Ergovision 885 LR 1600x1200 N-I		£625
17" Taxan Ergovision 895 LR 1600x1200 N-I		£819
20" Taxan Ergovision 1080 LR 1600 x 1200 N-I		£910
21" Taxan Ergovision 2100 LR 1600 x 1200 N-I		£1,530

Viewsonic

14" Viewsonic 14ES 1024 x 768 N-I	£178
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15" Viewsonic 15ES

17" Viewsonic 17-2 1280 x 1024 NI	£625
20" Viewsonic 20G 1600 x 1200 N-I	£935
21" Viewsonic 21PS 1600 x 1200 N-I	£1,328

Accessories		
Universal Monitor Drawing/Dust Cover		£11
14" Anti Glare Screen Filter		£29



SCANNERS

Andest Andest FaxScanner (Win)	£99
<i>(Converts your fax machine into an A4 scanner)</i>	
Avro Pacific	

SCANAFAX
Turns Your Fax Machine into a Scanner
"BABT APPROVED"
£29

Scanafax & Delrina Lite (makes your fax machine into a scanner)	£39
Epson	
Epson LapCAT GT3000	£290
Epson GTX5000 Parallel	£325
<i>(Corel Photopaint 5, DRAW! 4, Xerox Colour Mgmt Suite)</i>	
Epson GTX5000 SCSI	£385
<i>(Corel Photopaint 5, DRAW! 4, Xerox Colour Mgmt Suite)</i>	
Epson GTX8500 Parallel (Photoshop LE, OmniPage Direct)	£489
Epson GTX9000 SCSI (Photoshop LE, OmniPage Direct)	£565
Epson GTX9000 SCSI (Photoshop LE, OmniPage Direct)	£665
Epson GT18500 SCSI (Adobe Photoshop V3)	£765
Epson GT19000 SCSI (Adobe Photoshop V3)	£848
Epson GTX9000 Parallel (Photoshop LE, OmniPage Direct)	£613
Epson Bi-Directional Parallel Port	£35
Genius	
Scanmate/256	£59
Scanmate Colour	£125
Hewlett Packard	

HEWLETT PACKARD
HP 4s Grey Scale Document Scanner £225
HP 4c Colour Scanner £595
HP 4si Colour Scanner for Networking £1,602

Logitech	
Logitech 256 Scanner	£69
Logitech Easy Touch Scanner	£99
Logitech Scanman Colour	£135
Logitech PageScan	£278
Logitech Scan Pad	£12
Nikon	
Nikon Scantouch I.E.	£915
Nikon Super Coolsan	£1,399
Sicos	

SICOS
Sicos Colour Page Scanner
£199

Trust		
TRUST		
Trust Ami-Scan Colour		£82
Trust 1200dpi Flatbed Scanner		£285
Trust 2400dpi Flatbed Scanner		£385

Other	
ScanFX - Scanner, Fax, Copier	£379
<i>(Colour/BW 1200 x 1200dpi Scanner with Fax & Copying. Comes with WordScan OCR & Picture Publisher LE)</i>	
Umax	

UMAX
VISTA T-630
£299
300 x 600 dpi COLOUR SCANNER

Page Office	£275
Vista S8 400 x 800dpi Colour Scanner	£525
UC 1260 Colour Scanner	£749
Gemini D16 Dual Lense Flat Bed Scanner	£765
Powerlook 600 x 1200dpi Colour Scanner	£1,945

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Simply NE2000 Compatible 16 Bit BNC.....	£19
Simply NE2000 Compatible 16 Bit RJ45.....	£19
Simply NE2000 Compatible 16 Bit Combo Card ISA.....	£25
Simply NE2000 Compatible 32 Bit Combo Card VLB.....	£79
Simply NE2000 Compatible 32 Bit Combo Card PCI.....	£89
Simply NE3210 Compatible	
EISA 32 Bit Combo Card.....	£159
Simply NE2000 Boot Rom.....	£5

All the Above Cards are Novell Approved

Novell

Novell NE1000 8 bit ISA.....	£74
Novell NE2000 Plus 16 Bit BNC.....	£48
Novell NE2000T Plus 16 bit RJ45.....	£48
Novell NE2000 Plus 3 16 bit Combo Card.....	£59
Novell NE2000 Plus 5 Pack 16 bit either RJ45 or BNC.....	£225

3Com

3COM Etherlink III 3C509B ISA BNC.....	£64
3COM Etherlink III 3C509B ISA RJ45.....	£64
3COM Etherlink III 3C509B ISA RJ45 / BNC Combo.....	£73
3COM Etherlink III - 3C509 ISA BNC or RJ45 5 Pack.....	£295
3COM Etherlink III - 3C509 ISA BNC or RJ45 Combo 5 Pack.....	£315
3COM Etherlink III 3C579 EISA BNC.....	£139
3COM Etherlink III 3C579 EISA RJ45.....	£139
3COM Etherlink III 3C589 PCMCIA RJ45.....	£98
3COM Etherlink III 3C589 PCMCIA RJ45 & BNC.....	£129
3COM Etherlink III 3C590 PCI Combo Card.....	£99

SMC Ethernet

SMC PCI EtherPower Adaptor Combo.....	£92
SMC PCI EtherPower Adaptor Combo 5 Pack.....	£425
SMC EtherEZ ISA RJ45.....	£58
SMC EtherEZ ISA BNC.....	£58
SMC EtherEZ ISA Combo RJ45 & BNC	
Windows 95 Plug & Play.....	£63
SMC EtherEZ ISA Combo RJ45 & BNC.....	£63
SMC EtherEZ ISA RJ45 or BNC 5 Pack.....	£305
SMC EtherEZ ISA Combo RJ45 & BNC 5 Pack.....	£335

D-Link

D-Link

D Link DE600CT Pocket Adapter BNC/RJ45.....	£55
D Link DE620CT Pocket Adapter BNC/RJ45.....	£59
D Link DE220CT Ethernet Card BNC/TP.....	£45
D Link DE320CT MCA Ethernet Card BNC/TP.....	£85
D Link DE400 EISA Ethernet Card BNC/TP/AUI.....	£129
D Link DE530CT PCI Ethernet Card BNC/TP.....	£99
D Link NE650CT NE2000 PCMCIA Combo Card.....	£99
D Link DT 220 Token Ring ISA.....	£229

Intel

INTEL Etherexpress ISA 16 BNC.....	£64
INTEL Etherexpress ISA 16 RJ45.....	£73
INTEL Etherexpress ISA Flash Combo.....	£89
INTEL Etherexpress ISA 16 BNC 5 Pack.....	£385
INTEL Etherexpress ISA 16 RJ45 5 pack.....	£385
INTEL Etherexpress ISA Flash Combo 5 pack.....	£445
INTEL Etherexpress Pro/100.....	£115
INTEL Etherexpress Pro/100 Smart Adapter.....	£535



CABLES AND CONNECTORS

Connectors

BNC Connector with Boot.....	£1
BNC T-Connector.....	£2
BNC Terminator.....	£1
BNC In-Line Coupler.....	£2
RJ45 Connector with Boot.....	£1
Single BNC Outlet (FacePlate).....	£4
Dual BNC Outlet (FacePlate) & Back Box.....	£6
Dual RG45 Outlet (FacePlate).....	£12
EAD Thinwire Tap Outlet.....	£24
EAD Thinwire drop Lead 2M.....	£26
EAD Thinwire drop Lead 5M.....	£36
Professional Tools	
BNC Crimp Tool.....	£29
Ethernet Cable Stripper BNC.....	£15
RJ45 Crimp Tool.....	£75
RJ45 & BNC Cables made to order.....	P.O.A.



HUBS & REPEATERS

Ethernet Hubs

Simply Hubs

Simply 8 Port TP Hub (8 x RJ45, 1 x AUI).....	£124
Simply 12 Port TP Hub (12 x RJ45, 1 x BNC, 1 x AUI).....	£169
Simply 16 Port TP Hub (16 x RJ45, 1 x BNC, 1 x AUI).....	£249
Simply 24 Port TP Hub (24 x RJ45, 1 x BNC, 1 x AUI).....	£354

3Com

3C16670 12 port FMS II Hub (12 x RJ45, 1 x AUI).....	£389
3C16671 24 port FMS II Hub (12 x RJ45, 1 x AUI).....	£689
3C625 FMS II Link Cable.....	£29

D-Link

D-Link

D Link DE-805TP SNMP
5 Port with Keyboard
Port Power Cable

£77

D Link DE-809TC 8 Port Hub with BNC.....	£129
D Link DE-812TP + 12 Port Hub with BNC & AUI.....	£175
D Link DE-816TP 16 Port Hub with BNC & AUI.....	£235
D Link DE-824TP 24 Port Hub with BNC & AUI.....	£359



D Link DE-1200
12 Port Stackable
Hub BNC/AUI
£300

D Link DE-1400-45
Port Stackable Hub.
£469

D Link DE-1600i
SNMP 12 Port
Stackable Hub
£550

SMC

SMC Tiger Hub TP6-Port.....	£165
SMC 3812 14 Port Hub.....	£495

Switches

SMC TigerSwitches

24 Port Ethernet Switch with dual 100Base Tx ports.....	£5,550
24 Port Ethernet Switch with dual 100Base Fx ports.....	£5,945
12 Port Ethernet Switch with dual 100Base Tx ports.....	£3,855
12 Port Ethernet Switch with dual 100Base Fx ports.....	£4,245
24 Port Ethernet Switch with unconfigured slot.....	£4,555
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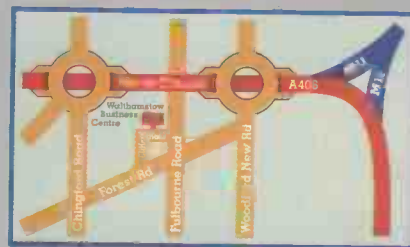
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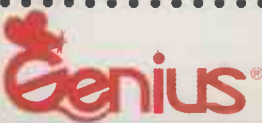
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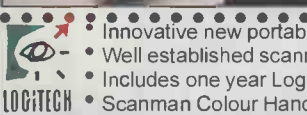
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THE LOWEST UK PRICES - CALL NOW!

EPSON®

- Epson manufacture the highest resolution inkjets now available
- New models improve the existing popular range of printers
- Professional desktop publishing models now reduced in price
- Epson microdot technology (PRO models) improves resolution
- We offer the complete selection of Epson scanners and printers



EPSON STYLUS COLOUR II

- Fantastic high resolution printing on various papers
- Compare the specifications with other inkjets!
- 720 x 720 dpi colour and true black printing
- Improved version of the Epson Stylus Colour
- Handles 720dpi, 360 dpi and glossy papers
- 3 year warranty included as standard
- New even lower pricing from Tech Direct

£249



EPSON STYLUS PRO XL

- This is the professional desktop publishing answer!
- 720 x 720 dpi with Epson MicroDot technology
- Handles A4, A3 and Super A3 paper sizes
- Handles plain, 360 dpi, 720 dpi, and gloss papers
- Includes parallel and RS422 high speed serial port
- One year manufacturers warranty included
- Ideal as a pre-press proofing solution

£824



EPSON EPL-9000 LASER

- Handles true A3 printing and A4 at up to 8 p.p.m
- Includes high speed SPARClite RISC processor
- Up to 80 built-in fonts, and with print enhancement
- PCL5e, Epson and HPGL2 compatible
- High speed parallel and serial interface
- 250 sheet universal paper feeder
- EPL9000 Postscript available

£999

EPSON STYLUS COLOUR II	£249
EPSON STYLUS COLOUR IIs	£196
EPSON STYLUS 1500 - A3 PLUS, 720DPI, TRACTOR, OPTIONAL COLOUR	£549
EPSON STYLUS PRO A4	£387
EPSON STYLUS PRO XL A3	£824
EPSON EPL5500 LASER	£379
EPSON EPL9000 LASER	£999
EPSON EPL9000PS LASER	£1510
EPSON 720 DPI PAPER - 200 SHEETS	£21

OKI

- Several brand new laser and inkjet printers just launched!
- These affordable printing solutions from OKI are available today
- The highest specifications and fastest speeds for the money!
- OKI has an excellent reputation for outstanding value
- Tech Direct are *the* authorised OKI reseller!



OKI 2010

- Brand new colour inkjet printer from OKI
- Fast high quality text and graphics output
- On screen software control from within Windows
- 600 x 300 dpi output with resolution enhancement
- Will print to DOS via Windows DOS box
- Dual head ready for black and colour
- Straight paper path to prevent jams

£248



OKI 600EX

- Presenting OKI's best selling laser printer!
- 600 x 600 dpi when printing through Windows
- 6 pages per minute output, PCL4.5 emulation
- Standard 1Mb of memory (max 18Mb)
- OKI 610EX (2Mb Ram & PCL5e) £379
- 5 year LED head warranty as standard
- The alternative 600 dpi solution!

£297



OKI 400W

- New GDI laser for Windows users!
- 300 x 300 dpi resolution (upgradeable to 600dpi)
- Separate toner & drum units for lower running costs
- The cheapest laser printer on the market today
- PCL4.5 emulation allows DOS printing
- 4 pages per minute print speed
- 5 year warranty on LED head

£258

OKI 610ex - 600 x 600 dpi, 6 pages per minute, PCL5e, 2Mb Ram	£385
OKI 810ex - 600 x 600 dpi, 8 pages per minute, PCL5e, 2Mb Ram	£629
OKI 1200ex - 600 x 600 dpi, 12 pages per minute, PCL5e, 2Mb Ram	£975
OKI MICROLINE 380 80 Column, 24 pin dot matrix printer	£249
OKI MICROLINE 386 136 Column, 24 pin dot matrix printer	£399
OKI MICROLINE 520 80 Column, 9 pin dot matrix printer	£399
OKI MICROLINE 521 136 Column, 9 pin dot matrix printer	£449
OKI MICROLINE 590 80 Column, 24 pin dot matrix printer	£499
OKI MICROLINE 591 136 Column, 24 pin dot matrix printer	£599

Canon

- Fantastic choice of colour and mono printers at affordable prices
- Canon are one of the worlds largest printer manufacturers
- From portable compact A4 models up to desktop A3 sizes
- Pioneers in low cost inkjet printing - refillable cartridge designs
- Call Tech Direct for the best Canon prices available!



CANON BJC-610

- Brand new model just launched!
- 720 x 720 dots per inch on plain paper!
- 20 scalable true type fonts, 6 internal bitmapped
- Prints on plain paper, transparencies, & high res paper
- Four separate cartridge system - more economic!
- Microsoft Windows printing system
- 100 sheet auto document feeder

£319



CANON BJC-4000

- Colour desktop printing in compact design!
- True black and colour cartridges together
- 360 x 360 dot per inch colour printing
- 720 x 360 dpi black printing with BC20 cassette
- Includes built in 100 sheet feeder as standard
- Optional high capacity black tank (BC20)
- Refillable ink tanks for black and colour

£215



CANON LBP-460

- 300 x 300 dpi with image refinement technology.
- Compact and attractive desktop design
- Windows 3.1, 3.11 and Windows 95 compatible
- Software jointly developed with Microsoft
- Prints to transparencies, envelopes and labels
- One year on-site warranty as standard
- Fast return to application time

£279

CANON BJ30 portable A4 mono printer	£137
CANON BJ200ex desktop A4 mono printer	£153
CANON BJ230 compact wide carriage printer	£234
CANON BJ600e dedicated A4 colour printer	£274
CANON BJ300 A4 mono tractor fed printer	£343
CANON BJ330 A3 mono tractor fed printer	£386
CANON BJC800 A3 colour printer	£986
CANON LBP 460 Windows laser printer - NEW!	£279
CANON LBP1260 laser printer	£886

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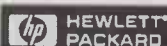
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Personal Computer
Products

HP INKJET PRINTERS



HP DESKJET 600

- 600 x 300 dpi Ret enhanced
- 3 ppm print speed in black
- Optional colour kit for just £29
- £218 including supportpack
- Built in sheetfeeder
- 3 year warranty

£178

This latest addition to the Hewlett Packard inkjet range is the ideal entry level printer for the home or small business. Although only a mono printer as standard the colour upgrade option is just £29 extra, and a worthwhile purchase at the same time as the printer.



HP DESKJET 660C

- 4 ppm print speed in black
- Improved 600 x 300 dpi colour
- New 2 Button control panel
- £302 including supportpack
- Built in sheetfeeder
- Excellent value

£237

Another new printer from Hewlett Packard! The 660C comes equipped for colour and mono printing with the advantage over the Deskjet 600 that you can print true black and colour on the same page. Now offered at an even lower price from Tech Direct!



HP DESKJET 850C

- 6 ppm print speed in black
- Faster 600 x 300 dpi in colour
- New Model - 2 Button control
- £388 including supportpack
- Built in sheetfeeder
- Accepts envelopes

£323

The higher specification 850C is the ideal choice for faster printing in colour or in black and white. Offering a class leading print speed of up to 6 pages per minute in mono and improved colour production from new ink technology. This inkjet is the professional choice!

HP LASER PRINTERS



HP LASERJET 5L

- 4 ppm print speed
- 600 dpi with enhancement
- £444 with supportpack
- 100 sheet paper input tray
- 1Mb standard memory
- 26 scalable fonts

£339

Just launched the new Hewlett Packard 5L sets an incredible pace to follow! Despite being the entry level laser in the range this unit delivers an incredible 600 dots per inch resolution at a rapid 4 page per minute sprint speed! Quite simply excellent value for money.



HP LASERJET 5P

- Rapid 6 ppm print speed
- 600 dpi with enhancement
- Infrared Port for Windows 95
- £700 including supportpack
- 2 Mb standard memory
- £718 5MP model

£565

For those requiring more speed take the Hewlett Packard 5P for a quick spin round the block! 6 pages per minute and 600 dpi make this the obvious choice for general office work. With 2Mb Ram as standard this unit is built to cruise through your paperwork!



HP LASERJET 4PLUS

- 12 pages per minute
- 600 dpi with enhancement
- Network options available
- £1129 including supportpack
- 2Mb standard memory
- £1288 4MPlus model

£959

Designed specifically to handle serious workloads the 4Plus delivers rocket ship performance at 600 dots per inch. If you want your business to really take off buy a Hewlett Packard 4Plus and blast past the opposition. If you're not starstruck yet just look at our pricing!

HP OFFICEJET LX	£459
HP DESKJET 340	£167
HP DESKJET 340 COLOUR KIT	£29
HP DESKJET 1600C	£812
HP DESKJET 1600C PS	£1217

HP LASERJET 5SI	£1999
HP LASERJET 5SIMX	£2899
HP LASERJET 4V	£1355
HP LASERJET 4MV	£1959
HP COLOR LASERJET	£4190

LEXMARK™

- Lexmark have scooped several printer awards
- Lexmark lead the market with new products
- Tech Direct are authorised resellers for Lexmark
- We will not be beaten on price! Please call us!

LEXMARK OPTRA R+ - 16 p.p.m., 2Mb Ram	£995
LEXMARK OPTRA RT+ - 16 p.p.m., 2Mb Ram, Postscript	£1199
LEXMARK OPTRA LX+ - 16 p.p.m., 8Mb, Postscript	£1699
LEXMARK OPTRA LXi+ - 16 p.p.m., 8Mb, Postscript	£2249
LEXMARK OPTRA C - 600 dpi colour laser, 8 Mb Ram	£Call
LEXMARK OPTRA C pro - 32Mb Ram and Ethernet card	£Call
OPTRA ON-SITE WARRANTIES	£Call



LEXMARK 150C

- Personal Computer World Ed's Choice!
- Computer Shopper Best Buy winner!
- 600 x 300 dpi colour and black
- Free CorelDraw 4.0 software (on CD)
- Ready for Windows 95 (inc. drivers)
- 3 Year Warranty included
- Fast Windows printing

£249



OPTRA R+ LASER

- Brand new class leading model!
- The only true 1200 x 1200 dpi laser
- 16 pages per minute @ 600 dpi
- Fully networkable office printer
- High speed 32 bit RISC processor
- One year on-site warranty
- Simply the ultimate laser!

£995



LEXMARK 1020

- Our cheapest colour printer!
- The new multimedia printer
- Free CorelDraw version 3.0 software
- 600 x 300 dpi in black or colour
- Colour solution for the home or office
- Three year warranty as standard
- Ready for Windows 95

£175

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offers you...

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Your credit card will only be debited on despatch of your order

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SATURDAY:
9.00am to 1.00pm

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To offer you the lowest prices we operate on a payment to accompany order basis. Add delivery (please call for rates) and V.A.T. at 17.5% to all prices. Please allow six working days for cheque clearance. We are delighted to fax or send Pro-forma invoices on request.

CONDITIONS OF SALE

Prices and specifications are unfortunately subject to change. Please check suitability with manufacturers before purchase. Goods are not supplied on a trial basis and are subject to our standard conditions of sale. A re-stocking fee of 15% will apply to non-defective returns. Errors and omissions excepted.



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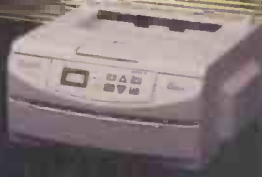


- Kyocera lead the way in economic printing
- Drums are guaranteed for the printer life
- The latest cost saving technology
- Three year on-site support options
- New A3 laser just launched!



LIMITED STOCKS ONLY!

KYOCERA FS400



- 4 pages per minute printing
- Enhanced 300 x 1200 dpi
- Energy Star compliance
- 100,000 page drum guarantee
- 79 bitmap, 13 scalable fonts
- Optional Postscript emulation
- Low cost per page output
- Cartridge free design
- 12 month warranty **£335**

The above Kyocera FS400 desktop personal printer offers outstanding longterm value for money. The cartridge free design means the only consumable to buy is a replacement toner for £15.50 whilst the FS400 is still equipped with a wealth of features and network/paper options. Be kind to the planet and your wallet with a Kyocera FS400 printer.

KYOCERA FS1550



- 10 pages per minute
- Enhanced 300 x 1200 dpi
- 250 page sheet feeder
- 79 bitmap, 13 scalable fonts
- HP Laserjet III emulation
- Optional network interface
- Optional Postscript
- Optional paper bins
- Low running costs **£851**

For speed and economy the FS-1550 leads the pack. Resolution enhancement ensures all your work is clear and precise, whilst the low running costs ensure you are making the best long-term investment. There is also an excellent selection of options for an expanding office, allowing the FS-1550 to actually grow with your business!

KYOCERA LASERS

FS-400 Twin Bin	£449
FS-1600	£1039
FS-3400	£1335
FS-3600	£1745
FS-5500	£3329
FS-6500 A3 New!	£1548

KYOCERA TONER KITS

FS-400	£15.50
FS-1550/1600	£44
FS-1500	£31
FS-5500	£38
FS-6500	£44

KYOCERA ON-SITE WARRANTIES

	1 YEAR	2 YEAR	3 YEAR
FS-400	£49	£79	£99
FS-1550/1600	£99	£166	£199
FS-5500	£260	£416	£499
FS-6500	£199	£333	£399

KYOCERA MEMORY

1 MEG	£60
2 MEG	£99
4 MEG	£159

We can also supply the above units network ready. Please call Tech Direct for the best prices.



- Popular well-tested range
- Straight through paper paths
- Windows and DOS models

£312



The HL630 printer shown on the left is the top selling entry level laser from Brother. Running at 6 pages per minute and 300 dpi this printer has won several prestigious awards from Computer magazines. The printer includes 0.5Mb of memory and PCL4 for direct printing with DOS programmes. A straight through paper path allows a wide variety of paper thickness with less risk of jamming.

The new WL660 printer shown on the right has been designed specifically with the discerning Windows user in mind. The printer uses the GDI based printer system to improve print speeds and provide a faster return to application time. The printer operates at 600 dots per inch and includes 1Mb of memory as standard. An excellent entry level laser at a bargain price from Tech Direct!



£378

HL631 The HL631 laser printer is a fast low cost laser for Windows, Dos and is networkable. 6 pages per minute, PCL4, enhanced memory management, straight paper path, 1Mb memory. **£337**

HL660 The HL660 is a 600 dpi laser compatible with Windows, Dos and is networkable. 6 pages per minute, PCL5e, enhanced memory management, straight paper path, 2Mb memory. **£447**

HL1260 The HL1260 laser printer runs at a rapid 12 pages per minute at 600 dpi. 500 sheet A4 tray and 150 sheet multi-purpose tray, Postscript level 2, 2Mb Ram. An optional 500 sheet bin is available. **£877**

Panasonic

COLOUR GDI LASER JUST LAUNCHED!!

£263



KX-P6100	£263
KX-P6150	£314
KX-P6500 - NEW!	£359
KX-P6600 - NEW!	£Call
Colour Laser	£792

Panasonic have managed to produce a compact laser printer at an inkjet price! The Panasonic 6100 and 6150 lasers are designed to fit into the smallest desk space whilst still offering an incredible 6 pages per minute print speed. Having recently won the Personal Computer World Editors choice and the Computer Shopper Best Buy awards need we say more?

SHARP

New range from Tech Direct!
• Smallest laser in the world!

£233



Tech Direct are pleased to offer the latest JX-9200 laser from Sharp. As can be expected from this top name in business machines Sharp have produced a quality Windows 95 laser whilst bearing in mind the needs of the personal user (A4 footprint). New "SLEEK" printer software has been developed in conjunction with Microsoft as an improvement over the GDI method!

JX-9200 300 dpi	£233	JX-9460 Postscript	£689
JX-9210 600 dpi	£306	JX-9660 8 p.p.m.	£739
JX-9460 6 p.p.m.	£579	JX-9680 12 p.p.m	£859

NEC

Superscript 610 Plus	£266
Superscript 660	£387
Superscript 660i	£508
Superscript Color 3000	£488

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- The world's most popular notebooks
- Now available from Tech Direct
- Trust Toshiba for your notebook!



Toshiba are the undisputed market leader for notebooks. As specialists in notebooks Toshiba have the resources and development team to continually lead the field. The comprehensive range covers all the way from a mono notebook up to colour screen notebooks with CD-ROM and full MultiMedia capabilities. A free 3 year warranty is included on most models - please call for details.

T2110 486DX4/75 350/4Mb	£835	T4900CT P75 CT/810/8Mb	£2790
T2130CS 486DX4/75 520/8Mb	£1375	PORTEGE 610CT	£2995
T2130CT 486DX4/75 520/8Mb	£1795	SATELLITE PRO 400CS	£2395
T2150CDS 486DX4/75 260/4Mb	£1475	SATELLITE PRO 400CDT	£3095
T2150CDS 486DX4/75 520/4Mb	£1695	SATELLITE PRO 410CDT	£3375
T2150CDT 486DX4/75 520/8Mb	£2395	TECRA 700CT	£4345
Port Replicator for above	£133	Port Replicator for Satellite Pro	£225
Toshiba Nylon Carry Case	£36	CD Rom for Satellite Pro	£265
NiH2 Battery for above	£85	Lithium Battery for Satellite Pro	£175
Deskstation IV	£395	Memory upgrades	£Call

IBM

- IBM regularly gains worldwide acclaim and press awards
- The best value for money and service from Tech Direct
- IBM is the brand name you can trust for quality & performance



Tech Direct are delighted to offer the IBM Thinkpad range at exceptional prices. Since entering the market IBM have established themselves as innovators in the field including the folding full-size keyboards on the 701 series notebooks. Special offers are currently available on the entry-level 340 and 345 models with prices from just £875 for a colour notebook!

340 486/50MHz, DS, 200/4	£875	701CS DS DX2-50 360/4	£1499
340 486/66MHz, DS, 360/4	£999	701CS DS DX2-50 540/4	£1599
345 486/75MHz, DS, 540/4	£1399	701CS DS DX4-75 360/8	£1899
345 486/75MHz, TFT, 540/4	£1799	701CS DS DX4-75 540/8	£1999
370 486/75MHz, TFT, 340/4	£2299	701CS DS DX4-75 720/8	£2199
370 486/75MHz, TFT, 540/4	£2499	701C TFT DX2-50 360/4	£1749
760 P90, 10.4" TFT, 720/8	£3949	701C TFT DX2-50 540/4	£1899
760 P90, 12.1" TFT, 720/8	£4349	701C TFT DX4-75 360/8	£2199
760 P120, 12.1" TFT, 720/8	£4599	701C TFT DX4-75 540/8	£2299
Call for 760 models not listed above		701C TFT DX4-75 720/8	£2499

COMPAQ

- Compaq are the largest PC supplier!
- Comprehensive range of notebooks
- 3 year warranty on most models



As the world's largest supplier of PC's Compaq can be relied on to manufacture an incredible range of notebooks. These large volumes allow Compaq to produce notebooks with a high specification at excellent prices and this includes a free three year warranty on most models. Please call Tech Direct for full specifications and next day delivery of these popular models.

LTE 5000/P75, STN, 510/8	£2607	AERO 4/25, MONO, 250/4	£699
LTE 5000/P75, STN, 810/8	£3125	AERO 4/33, STN, 250/4	£1025
LTE 5000/P75, TFT, 810/8	£3295	420C 4/75, DS, 350/4	£1395
LTE 5100/P90, TFT, 810/8	£3645	420C 4/75, DS, 420/8	£1547
LTE 5100/P90, CDTFT, 810/8	£3895	420CX 4/75, TFT, 420/8	£1895
LTE 5200/P120, TFT, 1.3/8	£4255	430C 4/100, DS, 720/8	£1895
LTE ELITE 4/75C, 340/4	£1795	430CX 4/100, TFT, 720/8	£2312
LTE ELITE 4/75CX, 340/4	£2295	Memory upgrades	£Call
LTE ELITE 4/75CXL, 510/4	£2645	SmartStation	£Call
LTE ELITE 4/75CXL, 810/4	£2895	MiniStation	£Call

A.S.T.

ASCENTIA 810N 4/66 CS10 M250	£1075
ASCENTIA 810N 4/66 CS10 M340	£1099
ASCENTIA 810N 4/66 CS10 M510	£1199
ASCENTIA 910N 4/75 CS10 510W	£1799
ASCENTIA 910N 4/75 CT10 510W	£2349
ASCENTIA 910N 4/75 CT10 703W	£2449
ASCENTIA 950N P75 CSS10 M500	£1999
ASCENTIA 950N P75 CSS10 M800	£2399
ASCENTIA 950N P75 CTS10 M800	£2899
ASCENTIA 950N P75 CTS10 M1200	£3199
ASCENTIA 950N LM90 CSS10 M800	£2749
ASCENTIA 950N LM90 CSS10 M1200	£2999

TEXAS

EXTENSA 486DX4/75 340Mb DS	£1189
EXTENSA 486DX4/75 340Mb TFT	£1589
EXTENSA P75 524/8Mb DS	£1889
EXTENSA P75 524/8Mb CD DS	£2289

PANASONIC

CF-41 486 DX4/75 450/8Mb CD TFT	£2399
CF-41 486 DX4/100 680/8Mb CD TFT	£2599
CF-41 P75 680/16Mb CD TFT	£3399
CF-41 P90 1Gb/16Mb CD TFT	£3799

TWINHEAD

SL8 P90 500/8Mb DS	£1999
SL8 P90 810/8Mb DS	£2149
SL8 P90 500/8Mb TFT	£2499
SL8 P90 810/8Mb TFT	£2699
SL8 P90 500/8Mb CD DS	£2199
SL8 P90 810/8Mb CD DS	£2249
SL8 P90 500/8Mb CD TFT	£2599
SL8 P90 810/8Mb CD TFT	£2799

H.P. OMNIBOOK

OMNIGO 100	£198
OMNIGO 100 CONNECT	£85
600C 4/75 DS M340	£1749
600C 4/75 TFT M340	£2149
4000C 4/50 M340	£1599
4000C 4/50 M520	£1799
4000CT 4/75 M340	£1749
4000CT 4/75 M520	£1949
4000CT 4/75 M810	£2099
4000C 4/100 M340	£1899
4000C 4/100 M520	£1999
4000C 4/100 M810	£2249
4000CT 4/100 M340	£2149
4000CT 4/100 M520	£2249
4000CT 4/100 M810	£2499

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- The highest specs, the lowest prices, the best value!
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- Multimedia ready systems at incredible prices
- Genuine alternatives to a desktop only machine

THE TECHBOOK MULTIMEDIA NOTEBOOK

Tech Direct are delighted to present the ultimate range of multimedia ready notebook computers. With the increased popularity of CD ROMS as a means of software distribution and more applications making use of stereo sound it makes sense to purchase a system with these abilities either built-in or as a simple upgrade. These tech direct multimedia notebooks provide just that choice. Buy a standard specification machine now and in the future you can upgrade with an internal CD-ROM, bigger hard disk, faster processor or even overhead projector tablet. These units are available with the latest 3.3 volt Pentium processors, and come as standard with stereo sound. Just compare our system specifications and prices then call us for next day delivery!

486DX4-100 DUAL SCAN, 340 HDD, 4 RAM	£1299
PENTIUM 75 DUAL SCAN, 340 HDD, 8 RAM	£1549
PENTIUM 90 DUAL SCAN, 340 HDD, 8 RAM	£1609
486DX4-100 TFT SCREEN, 340 HDD, 4 RAM	£1649
PENTIUM 75 TFT SCREEN, 340 HDD, 8 RAM	£1899
PENTIUM 90 TFT SCREEN, 340 HDD, 8 RAM	£1959

OPTIONAL EXTRAS	
• Dual Speed internal CD-ROM	£125
• Quad Speed internal CD-ROM	£199
• 4Mb Ram upgrade	£160
• 8Mb Ram upgrade	£315
• Upgrade to 510Mb Hard Disk	£99
• Upgrade to 810Mb Hard Disk	£199
• US Robotics V34 PCMCIA modem	£159
• Spare NiMH Battery	£75
• Carry case	£19

- Upgradeable processor socket
- Removeable and upgradeable Hard Disk
- Optional dual speed CD-ROM (or faster)
- Built-in Trackpoint pointing device
- Two built-in speakers, Built-in microphone
- 1Mb VESA 32 Bit Local Bus graphics card
- 16 bit sound blaster compatible card
- 4 Mb RAM expandable to 64Mb
- 1 x Type III or 2 x Type II PCMCIA slots
- NiMH Battery with RTG for longer life
- 256 K External Cache
- Upgradeable Dual Scan 10.4" screen
- External mouse and keyboard ports
- External SVGA monitor port
- Autoswitching Mains battery charger
- External microphone and speaker ports
- MPEG live video option
- 3.5" (1.44Mb) Floppy Disk Drive
- Ports = 2 serial/1 Parallel, 1Midi/Joystick
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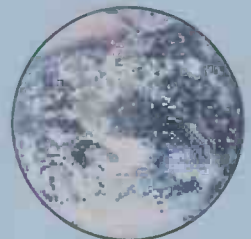
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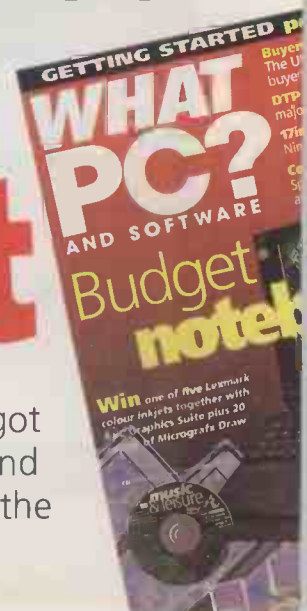
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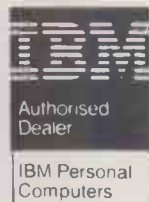
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News & Views

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● We hear that high-rolling music bizz research dudes could be forking out for a seriously priced CD-ROM. Okay, so it does include more than 750,000 tracks, 90,000 artists, and 100,000 writers. But priced at £1,173? We're talking most serious wedge here, man.

The imaginatively titled ROCK'n'ROM contains 40 years' worth of pop reference material and is the brainchild of the appropriately named Woodstock film director, Michael Wadleigh...



● Continuing on a musical note, readers who listen to the radio or those up early enough to watch Channel 4's *The Big Breakfast* may have found themselves swinging their pants to a catchy new number called "Right Here, Right Now". The song is the debut single from pop-tastic UK duo The Flood, half of which is none other than PCW's own Steven "Hands On Sound" Helstrip.

Now we know where all those Sound-Blasters went...



"Don't bother your father when he's on the web dear."

● When people register with Demon Internet they get an address with a name and a domain. So, for example, this page could be chipchat@pcw.demon.co.uk. A number of people have gone to great lengths to get themselves a noticeable name, but perhaps the most rewarding is

Sorry, wrong numbers

- In the September issue of *PCW*, page 196, we printed the wrong number for Elonex. The correct one is 0181 452 4444.
- Anyone having trouble getting through to Roderick Manhattan on the number printed on page 19 of the January 1996 issue should try 0181 875 4444 instead.



The news that Carling has put a Web site on the Net dedicated to "the best league in the world" (no, not Serie A) will delight millions of football fans across the country. Except those without computers, of course. Or modems. Or any interest in PCs whatsoever. After all, when was

the last time you heard a couple of football fans discussing the Internet? Picture the scene:

"Internet? Nah, can't be bothered with all that technical boll*cks. But blimey, mate, didja see the game last night — blinder, eh? Beautiful dummy. A nutmeg. He shimmied, parried, lobbed it to Incey — ****ing magic. Straight as an arrar, on his left. Fancy a pint?"

Now that's a language we can all understand. Eh? Ref? Hello?

Carling Net <http://www.fa-carling.com>

the person who wanted the domain of tombomb.demon.co.uk. This makes more sense when you add in the name of Ivegotta. You can find out more by mailing him, but be careful — you don't want to upset someone that well armed...

● When Digital launched its Alpha RISC processor a few years ago, it came complete with predictions that we'd soon see notebooks with the power of mainframes. Of course, the company forgot to mention that due to the size and heat output of the chip, the machines would probably also need the same kind of cooling systems.

With this in mind, when Tadpole decided to build an Alpha portable, it gave the design a suitable code name. Previous machines had gone by names such as Milton and Wordsworth, so there was only one choice for the new box — Burns.

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P5 UPGRADE OPTIONS

P5 CPU UPGRADE TO: Pentium [®] Processor 90MHz	P5 HARD DISK UPGRADE TO: 810MB Hard Disk	P5 MEMORY UPGRADE TO: 16MB RAM 24MB RAM 40MB RAM	£99	£129 £309 £679 £1359
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ALL PRICES EXCLUDE VAT AT 17.5%

Personal Computer World

July 1995

"...something most people secretly lust after."
Viglen Dossier P50

COMPUTER SHOPPER

August 1995

"...a very nice package."
Viglen Dossier P5SD

PC MAGAZINE

September 1995

"...at the top of the windows performance charts."
Viglen Dossier P5ST

PERSONAL COMPUTER REVEALED

May 1995

Dossier P590

WINNER'S CHOICE

June 1995

Dossier 486

Personal Computer World

March 1995

"...the Viglen is a 'no nonsense' machine at a competitive price."
Viglen Dossier 486 ADVANCED Sound

March 1995

"...this hot-rod: it's very, very quick."
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.



Docking station accessory option. Just slip the Dossier ADVANCED Sound into the docking station to transform it into an instant desktop system.

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.

N4ADXDK0	Docking station for Dossier 486	£309
N4XDDELUX	Deluxe padded carrying case	£49
N4XPSXDC	Universal car battery adaptor	£59
CMDP0T3F	14400/14400 PCMCIA Fax/Modem	£185
PAMMPS03	External amplified speakers	£10

EASY 2 OWN
MONTHLY PAYMENT SCHEME
see order page

Organiser
Working Together
Supplied as standard

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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 PCI, 2 ISA 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 14PE, 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**

Designed for

Microsoft®
Windows®95



Executive

Professional

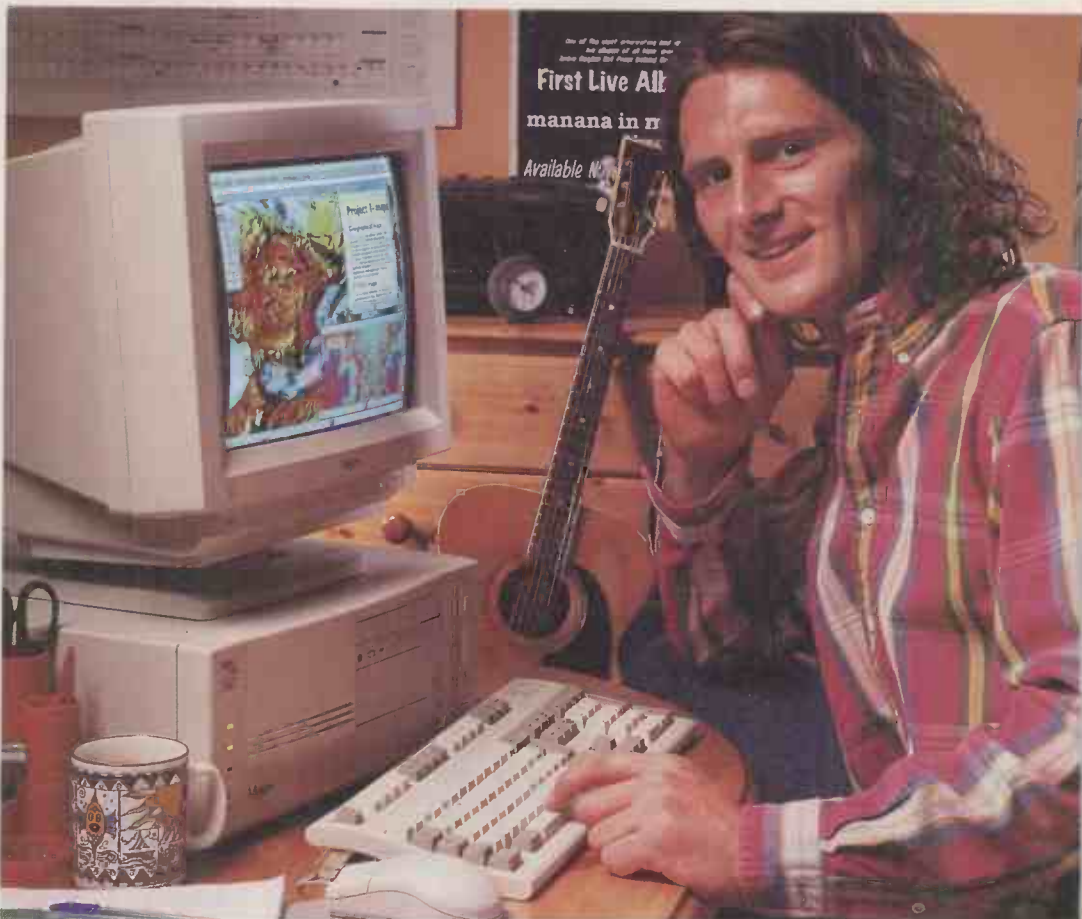
Medium Tower

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	£1239	£1289	
1GB 16MB	£1369	£1449	£1489	£1539	
1.6GB 32MB	£1999	£2089	£2139	£2179	

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



SOFTWARE BONUS

SEE 'VIGLEN UPGRADES & OPTIONS' PAGE

Tel **0181 758 7000**
Fax **0181 758 7080**

Viglen® 649

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, Pipeline Burst Cache 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.
 - 3 PCI, 2 ISA and for Professional and Medium Tower models an additional PCI/ISA shared slot.
 - 256K Pipeline Burst Cache.
 - One 1.44MB floppy drive.
 - Triton Chipset.
 - Capable of Mode 4 Enhanced IDE.
 - EDO DRAM as standard.
 - Socket 7 as standard with upgradeability 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):
390W x 145D x 410H
Two free 5.25" drive bays.
- Medium Tower:** Dimensions (mm):
170W x 380D 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:

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 **£149**

For the optional **MPEG module** providing CD-i and Video CD compatibility (when a CD ROM is fitted) please add a further **£229**

PDDXPM2 Matrox Millennium VideoCard with 2MB of VRAM **£159**

UCDMP503 Stereo amplified speakers to connect to Genie PCI (includes mains adaptor) **£15**

CPU UPGRADEABLE **PLAY** **PCI LOCAL BUS**

WHAT PC? **WORKS** **ENVY**

SOFTWARE BONUS **yes** **NETWARE**

SEE 'VIGLEN UPGRADES & OPTIONS' PAGE **MONTHLY PAYMENT SCHEME** **see order page**

THE PRICE YOU PAY

THE GENIE PCI PENTIUM[®] PROCESSOR BASED RANGE

COLOUR SUPER VGA HARD DISK	P5/75 RAM (EDO) 75MHz	P5/90 90MHz	P5/100 100MHz	P5/120 120MHz	P5/133 133MHz
540MB IDE 8MB	£1279	£1359	£1399	£1449	£1579
1GB IDE 16MB	£1559	£1639	£1669	£1719	£1849
1.6GB IDE 32MB	£2239	£2299	£2359	£2399	£2539
2GB SCSI-2 32MB	£2489	£2559	£2599	£2649	£2789

Includes Pipeline Burst Cache and EDO RAM as standard

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%**

COMPUTER BUYER
August 1995
...the best benchmark scores Computer Buyer has seen...
Viglen Genie PCI 133MHz

PC PRO
November 1995
...a fast well constructed, well specified PC...
Viglen Genie PCI P5/90

PC MAGAZINE UK CHOICE
June 1995
Viglen Genie Pentium PCI 120MHz

WHAT PC?
OCTOBER 1995
...another well specified PC from a reliable British manufacturer...
Viglen Genie PCI P5/75

PCDirect
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Viglen Genie PCI 120

MICROSOFT[®] ERGONOMIC MOUSE

ENHANCED IDE

AS STANDARD

WHAT PC?
April 1995
Genie PCI P5/90

WHAT PC?
June 1995
Genie PCI P5/90

WHAT PC?
Feb 1995
PC Today

WHAT PC?
January 1995
Genie PCI P5/60

CPU UPGRADEABLE

PLAY

WORKS

SOFTWARE BONUS

yes

NETWARE

Tested and Approved

MONTHLY PAYMENT SCHEME

PCI LOCAL BUS

ENVY

NETWARE

see order page

650 Tel **0181 758 7000**
Fax **0181 758 7080**

Viglen[®]

Viglen Limited, Viglen House, Alpetton Lane, Alpetton, Middlesex HA0 1DX.

Viglen Upgrades and options . . .

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 (new version TBA) - 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.**

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 voice fax/modem to your system and join the information superhighway. The Viglen/DATAFLEX VFM14 Voice Fax modem provides

you with 14,400 baud fax and data facility with **Internet, CompuServe, and MSN** (if using Windows® 95) access software as well as a free starter pack. All this and the ability to receive and send faxes as well as operating an answerphone. Two versions are available: **Order code UMMAFM01** VFM14 Voice/Fax/Modem with answerphone facility for Viglen Multimedia PCs **£89+VAT**. **Order code CMDNVCFF** VFM14 Voice/Fax/Modem with answerphone facility (with speakers and mic) for standard Viglen PCs **£109+VAT**.

msn.



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 17 or the even more enhanced ENVY 17PE.

Upgrade from:
Contender Range
Contender Range
Genie Range
Genie Range

Upgrade to:
ENVY 17
ENVY 17PE
ENVY 17
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.

- PDCKPX10** Single PCMCIA (Type 1,2 or 3) slot at the back of the System. **£134+VAT**
- PDCKPX20** 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**
- PDCKPF20** 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 ZSM12DS £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.

MULTIMEDIA OPTION

For a complete multimedia solution why not add one of our multimedia options to your system.

For a Contender PCI system choose Option 1/2.

Option 1/2 includes a genuine 16 bit SoundBlaster card, along with a 2X CD ROM drive as well as a pair of amplified speakers, microphone, SoundBlaster Ensemble software, 3 Microsoft CD titles (Encarta '95, Musical Instruments, and Golf) and Microsoft® Works for Windows® 95 and Money. To order this option fully fitted to your Contender PCI system quote **order code UMMCDN12** and add **£149+VAT** to your order.

For a Genie PCI Pentium® Processor Based system choose Option A4.

Option A4 is only for the Genie PCI Pentium® processor based system as it does not include a sound card (Genie PCI Pentium® processor based systems now have sound as standard on the motherboard). This option is supplied with a 4X CD ROM drive, a pair of amplified speakers, microphone, Voyetra Audiostation software, 3 Microsoft CD titles (Encarta '95, Musical Instruments, and Golf) and Microsoft® Works for Windows® 95 and Money. To order this option fully fitted to your Genie PCI Pentium® processor based system quote **order code UMMCDNA4** and add **£169+VAT** to your order.



FROM ONLY **£149+VAT**



Multimedia option A4 fitted to a Genie Professional system.

Tel **0181 758 7000**

Fax **0181 758 7080**

Viglen 651

Viglen Limited. Viglen House, Alpertown Lane, Alpertown, Middlesex HA0 1DX.

Special Configurations direct to you

Designed for

 Microsoft®
 Windows®95

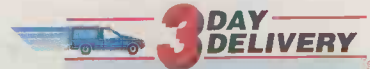
Viglen produce a wide range of PCs and options to give you the ultimate choice. We have also designed a number of special configuration packages offering an abundance of software applications to suit specific needs and budgets.

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.



CRT Multimedia

A comprehensive interactive tutorial guide to learn Windows® 95.



We will do our utmost to despatch the special configuration models shown here within 3 working days from clearance of payment. Any upgrades or additional options will require extra time up to 10 working days.

1 HOME MULTIMEDIA PC

The Home Multimedia PC provides everything you need for a good performance Multimedia system including an abundance of software to get you started.

**NEW
EXTRA VALUE**

only
£43.50
 per month
APR 19.9%
EASY PLAN
 monthly payment
 scheme



£999

+ Delivery & VAT
 = **£1191.45**

**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
 - 4W Stereo Amplified Speakers
 - Microphone
 - Microsoft® Works for Windows® 95
 - Microsoft® Money
 - Multimedia CD Titles from Microsoft®: Encarta® '95, Musical Instruments and Golf
 - CRT Easy Tutor for Windows® 95



PCI LOCAL BUS

ORDER CODE: SXHM1075

1a HOME MULTIMEDIA PLUS PC

Same as above but in addition includes: 256K cache, QUAD SPEED CD-ROM. **ORDER CODE: SXHMA075**

£1199 + VAT & Delivery = **£1426.45**

only
£52.08
 per month
APR 19.9%
EASY PLAN
 monthly payment
 scheme

2 PERFORMANCE 90 MULTIMEDIA PC

The Performance Multimedia PC brings together the fast 90MHz Pentium® processor, along with a fast VGA card and 14" monitor to provide one of the best price/performance systems available and is ideally suited for business and home.

NEW

only
£58.52
 per month
APR 19.9%
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£1349

+ Delivery & VAT
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**8MB RAM
 540MB HD
 14" SVGA Colour Monitor
 Fast 64 bit PCI Graphics card
 Quad speed CD ROM Drive**

PENTIUM® PROCESSOR 90MHZ

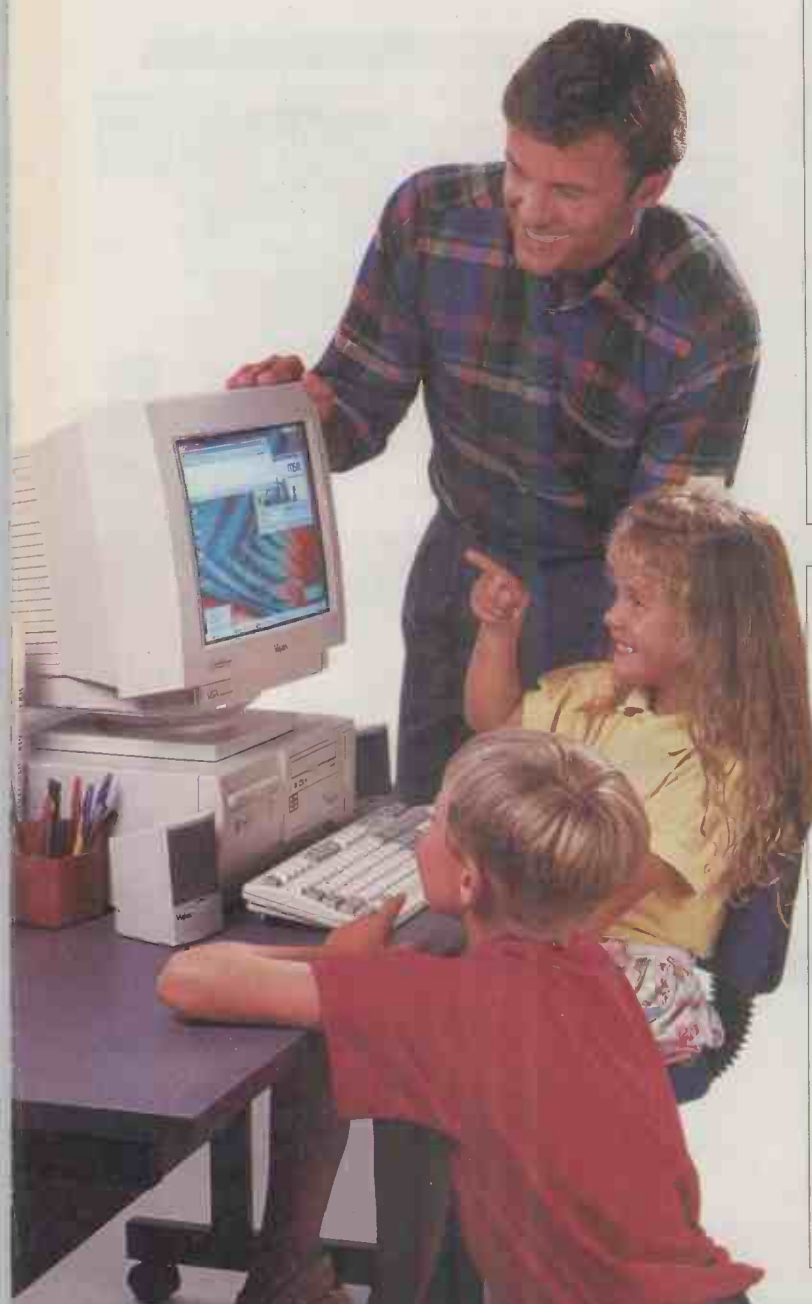
- Viglen Contender® PCI Professional with Intel Pentium® 90MHz Processor
- 256k cache
- 2 serial, 1 parallel, 1 games port
- 3.5" Floppy Drive
- Ergonomic Compact Keyboard
- Genuine Microsoft® Ergonomic Mouse
- Microsoft® Windows 95 Ready To Run

- Plus**
- Genuine 16 Bit SoundBlaster Card
 - 4W Stereo Amplified Speakers
 - Microphone
 - Microsoft® Works for Windows® 95
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 - Multimedia CD Titles from Microsoft®: Encarta® '95, Musical Instruments and Golf
 - CRT Easy Tutor for Windows® 95



PCI LOCAL BUS

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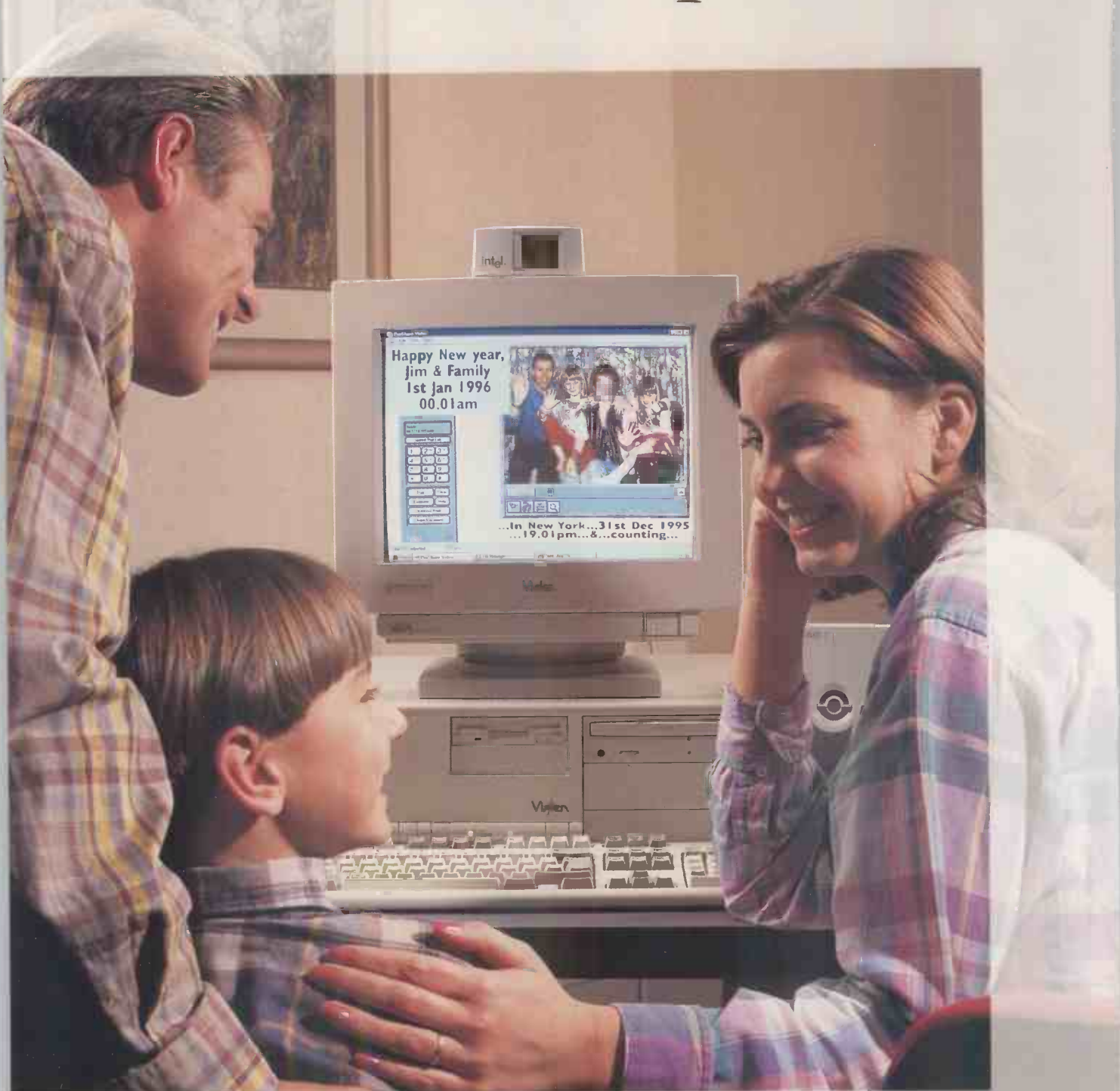
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652
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Viglen[®]
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Personal Computers



Setting the standards
in Personal Computing.

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 Microsoft 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 (new version TBA) 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 supplied in Viglen OEM packaging

MONITOR UPGRADES

You can upgrade your special configuration monitor to an even higher specification.

- 1, 1a and 2 Home and Performance 90**
Upgrade to: ENVY 15P, 15" Monitor
Price to add: £90+VAT
Upgrade to: ENVY 17, 17" Monitor
Price to add: £330+VAT
- 3 and 4 Power 100 and Ultimate 120**
Upgrade to: ENVY 17, 17" Monitor
Price to add: £240+VAT
Upgrade to: ENVY 17PE, 17" High spec Monitor
Price to add: £320+VAT
- 5 Ultimate 133**
Upgrade to: ENVY 17PE, 17" High Spec Monitor
Price to add: £80+VAT

3 POWER 100 MULTIMEDIA PC
The Power Multimedia PC takes the Performance Business Multimedia PC a stage further, with a faster processor, higher Hard Disk capacity and a 15" monitor, providing increased performance capabilities.

8MB EDO RAM
1GB HD
15" SVGA Colour Monitor
Fast 64 bit PCI Graphics card
Quad speed CD ROM Drive
256K Pipeline Burst Cache

PENTIUM® PROCESSOR 100MHZ

- Viglen Genie® PCI Medium Tower with Intel Pentium® 100MHz Processor
- 2 serial, 1 parallel, 1 games port
- 3.5" Floppy Drive
- Ergonomic Compact Keyboard
- Genuine Microsoft® Ergonomic Mouse
- Microsoft® Windows® 95 Ready To Run

Plus

- Genuine 16 Bit SoundBlaster Chip
- 15W 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
- CRT Easy Tutor for Windows® 95

ORDER CODE: SXPWR100

only **£63.32** per month
APR 14.9%
EASY 2 OWN
monthly payment scheme

£1549
+ Delivery and VAT = £1837.70

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.

32MB EDO RAM
1.6GB HD
17" ENVY 17 Colour Monitor
Stealth 64 Video VRAM with 2MB
Six speed CD ROM Drive
14400/14400 Voice 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
- Genuine Microsoft® Ergonomic Mouse
- Microsoft® Windows® 95 Ready To Run

Plus

- Genuine 16 Bit SoundBlaster Chip
- 15W Stereo Amplified Speakers
- Microphone
- Microsoft® Works for Windows® 95
- Microsoft® Publisher
- Microsoft® Money
- Multimedia CD Titles from Microsoft®: Encarta® '95, Musical Instruments and Golf
- CRT Easy Tutor for Windows® 95

ORDER CODE: SXULT133

only **£113.94** per month
APR 14.9%
EASY 2 OWN
monthly payment scheme

£2799
+ Delivery and VAT = £3306.45

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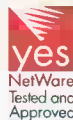
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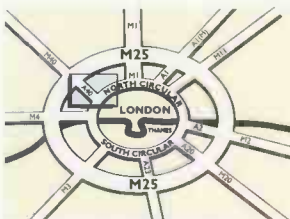


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