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12-printer battle

Group Tests

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DELL HAS A GIFT FOR A VERY PRESENT

ALL DIMENSION SYSTEMS INCLUDE MICROSOFT WINDOWS 95* + 105 KEY SPACESAVER WINDOWS '95 KEYBOARD + DE
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DELL DIMENSION P133v

- ◆ Intel® 133MHz Pentium® Processor
- ◆ Intel 430VX PCIset
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- ◆ 256Kb Pipeline Burst Cache
- ◆ 2Gb EIDE Hard Drive
- ◆ Integrated 64-bit PCI Local Bus Video with 1Mb video memory
- ◆ 15" Colour SVGA Monitor (13.75" Viewable Area)
- ◆ 3 PCI, 2 ISA and 1 PCI/ISA Shared Expansion Slots
- ◆ Mid-Sized Desktop Chassis

DELL FINANCE 3 YEAR RENTAL: £8.11 PER SYSTEM, PER WEEK, EXCLUDING DELIVERY AND VAT (P133v)

DELL DIMENSION P133v

£949 (£1,144.45 INCLUDING DELIVERY & VAT)

DELL DIMENSION P166v

£1,099 (£1,320.70 INCLUDING DELIVERY & VAT)

(Upgrade to a 166MHz Pentium Processor and 512Kb cache)

DELL DIMENSION XPS P200s

- ◆ Intel 200MHz Pentium Processor
- ◆ Intel 430VX PCIset
- ◆ 16Mb High Performance SDRAM
- ◆ 512Kb Pipeline Burst Cache
- ◆ 2Gb EIDE Hard Drive
- ◆ STB Powergraph 64 3D™ graphics card with 2Mb EDO video memory
- ◆ 15" Colour SVGA Monitor (13.75" Viewable Area)
- ◆ 3 PCI, 2 ISA and 1 PCI/ISA Shared Expansion Slots
- ◆ Integrated 16-bit Sound (Speakers Optional)
- ◆ Mid-Sized Desktop Chassis

DELL FINANCE 3 YEAR RENTAL: £10.67 PER SYSTEM, PER WEEK, EXCLUDING DELIVERY AND VAT

DELL DIMENSION XPS P200s

£1,249 (£1,496.95 INCLUDING DELIVERY & VAT)

DELL DIMENSION XPS P200s

£1,428 (£1,707.28 INCLUDING DELIVERY & VAT)

(Upgrade to a 3Gb Hard Drive and 32Mb RAM)

DELL DIMENSION XPS Pro 180n

- ◆ Intel 180MHz Pentium Pro Processor
- ◆ Intel 440FX PCIset
- ◆ 16Mb EDO RAM
- ◆ 256Kb Cache
- ◆ 3Gb EIDE Hard Drive
- ◆ STB Powergraph 64 3D™ graphics card with 2Mb EDO video memory
- ◆ Eight Speed CD-ROM Drive
- ◆ 15" Colour SVGA Monitor (13.75" Viewable Area)
- ◆ 3 PCI, 3 ISA and 1 PCI/ISA Shared Expansion Slots
- ◆ Mid-Sized Desktop Chassis

DELL FINANCE 3 YEAR RENTAL: £11.10 PER SYSTEM, PER WEEK, EXCLUDING DELIVERY AND VAT

DELL DIMENSION XPS Pro 180n

£1,299 (£1,555.70 INCLUDING DELIVERY & VAT)

DELL DIMENSION XPS Pro 180n

£1,699 (£2,025.70 INCLUDING DELIVERY & VAT)

(Upgrade to a 32Mb RAM, 17" TCO Monitor (15.65" Viewable area), Matrox 4Mb graphics card and 12 speed CD ROM)

READY-TO-RUN PCs INCLUDING MICROSOFT OFFICE PRO

DELL DIMENSION P133v

- ◆ Intel 133MHz Pentium Processor
- ◆ Intel 430VX PCIset
- ◆ 16Mb High Performance SDRAM
- ◆ 512Kb Pipeline Burst Cache
- ◆ 2Gb EIDE Hard Drive
- ◆ Integrated 64-bit PCI Local Bus Video with 2Mb video memory
- ◆ 15" Colour SVGA Monitor (13.75" Viewable Area)
- ◆ 3 PCI, 2 ISA and 1 PCI/ISA Shared Expansion Slots
- ◆ Eight Speed CD-ROM Drive
- ◆ Mid-Sized Desktop Chassis
- ◆ Microsoft Office Professional 95

DELL FINANCE 3 YEAR RENTAL: £9.39 PER SYSTEM, PER WEEK, EXCLUDING DELIVERY AND VAT (P133v)

DELL DIMENSION P133v

£1,099 (£1,320.70 INCLUDING DELIVERY & VAT)

DELL DIMENSION P166v

£1,199 (£1,438.20 INCLUDING DELIVERY & VAT)

(Upgrade to a 166MHz Pentium Processor)

DELL DIMENSION XPS P200s

- ◆ Intel 200MHz Pentium Processor
- ◆ Intel 430VX PCIset
- ◆ 16Mb High Performance SDRAM
- ◆ 512Kb Pipeline Burst Cache
- ◆ 2Gb EIDE Hard Drive
- ◆ STB Powergraph 64 3D™ graphics card with 2Mb EDO video memory
- ◆ 15" Colour SVGA Monitor (13.75" Viewable Area)
- ◆ 3 PCI, 2 ISA and 1 PCI/ISA Shared Expansion Slots
- ◆ Twelve Speed CD-ROM Drive
- ◆ Integrated 16-bit Sound (Speakers Optional)
- ◆ Mid-Sized Desktop Chassis
- ◆ Microsoft Office Professional 95

DELL FINANCE 3 YEAR RENTAL: £11.53 PER SYSTEM, PER WEEK, EXCLUDING DELIVERY AND VAT

DELL DIMENSION XPS P200s

£1,349 (£1,614.45 INCLUDING DELIVERY & VAT)

DELL DIMENSION XPS P200s

£1,679 (£2,002.20 INCLUDING DELIVERY & VAT)

(Upgrade to a 32Mb RAM and 17" TCO Monitor (15.65" Viewable area))

DELL DIMENSION XPS P166s MT

- ◆ Intel 166MHz Pentium Processor
- ◆ Intel 430VX PCIset
- ◆ 16Mb High Performance SDRAM
- ◆ 512Kb Pipeline Burst Cache
- ◆ 2Gb EIDE Hard Drive
- ◆ STB Powergraph 64 3D™ graphics card with 2Mb EDO video memory
- ◆ 15" Colour SVGA Monitor (13.75" Viewable Area)
- ◆ 3 PCI, 2 ISA and 1 PCI/ISA Shared Expansion Slots
- ◆ Eight Speed CD-ROM Drive
- ◆ Integrated 16-bit Sound plus Altec Lansing ACS90 Speakers
- ◆ Mid-Sized Tower Chassis
- ◆ Microsoft Office Professional 95

DELL FINANCE 3 YEAR RENTAL: £11.10 PER SYSTEM, PER WEEK, EXCLUDING DELIVERY AND VAT

DELL DIMENSION XPS P166s MT

Multimedia Configuration

£1,299 (£1,555.70 INCLUDING DELIVERY & VAT)

DELL DIMENSION XPS P166s MT

£1,478 (£1,766.03 INCLUDING DELIVERY & VAT)

(Upgrade to a 3Gb Hard Drive and 32Mb RAM)



INSTALLED DESKTOP UPGRADES

- 28.8 Internal data/fax modem **£149 + VAT**
- 1.6/3.2Gb Tape Backup Unit (including Accelerator Card) **£179 + VAT**
- Fast Eight Speed, multi-session CD-ROM drive, 16-bit Sound Card and Altec Lansing ACS90 stereo speakers **£179 + VAT**
- Altec Lansing ACS90 speakers **£30 + VAT**
- Altec Lansing ACS90 speakers with ACS160 sub-woofer **£80 + VAT**

- Upgrade from 2Gb to 3Gb EIDE Hard Drive on XPS Systems **£120 + VAT**
- Upgrade from integrated 16-bit Sound to AWE 32 Wave Table (XPS P166s and XPS P200s systems only) **£50 + VAT**
- Upgrade from 8 Speed CD to a 12 Speed CD **£50 + VAT**
- Upgrade from STB Powergraph 64 3D™ 2Mb graphics card to Matrox Millennium 4Mb card **£80 + VAT**

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TECHNOLOGY AT TABLE PRICE.



ALL DIMENSION SYSTEMS INCLUDE MICROSOFT WINDOWS 95* + 3.5" DISKETTE DRIVE

DELL DIMENSION XPS Pro 180n MT

- Intel 180MHz Pentium Pro Processor
- 32Mb EDO RAM
- 256Kb Cache
- 2Gb Fast SCSI-2 Hard Drive
- Adaptec 2940UW SCSI Controller
- Matrox Millennium 64-bit PCI graphics card with 4Mb WRAM.
- Twelve Speed CD-ROM Drive
- High Performance TCO 17" Colour SVGA Monitor (15.65" Viewable Area)
- 3 PCI, 3 ISA and 1 PCI/ISA Shared Expansion Slots
- Mid-Sized Tower Chassis
- Windows NT Workstation 4.0

INCLUDES
WINDOWS NT4.0
PRE-LOADED

DELL FINANCE 3 YEAR RENTAL: £17.94 PER SYSTEM, PER WEEK, EXCLUDING DELIVERY AND VAT.

DELL DIMENSION XPS Pro 180n MT

£2,099 (£2,495.70 INCLUDING DELIVERY & VAT)

DELL DIMENSION XPS Pro 180n MT

- Intel 180MHz Pentium Pro Processor
- Intel 440FX PCIset
- 32Mb EDO RAM
- 256Kb Cache
- 3Gb EIDE Hard Drive
- Matrox Millennium 64-bit PCI graphics card with 4Mb WRAM
- High Performance TCO 17" Colour SVGA Monitor (15.65" Viewable Area)
- 3 PCI, 3 ISA and 1 PCI/ISA Shared Expansion Slots
- Twelve Speed CD-ROM Drive
- AWE 32 Sound plus Altec Lansing ACS90 Speakers with ACS160 Subwoofer
- Mid-Sized Tower Chassis
- Windows NT Workstation 4.0
- Microsoft Office Professional 95

DELL FINANCE 3 YEAR RENTAL: £15.80 PER SYSTEM, PER WEEK, EXCLUDING DELIVERY AND VAT.

DELL DIMENSION XPS Pro 180n MT
Multimedia Configuration

£1,849 (£2,201.95 INCLUDING DELIVERY & VAT)

WE ARE CONSTANTLY UPGRADING
OUR SYSTEMS AND REVIEWING OUR PRICES
TO MAINTAIN OUR MARKET LEADERSHIP.
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Windows 95

MICROSOFT
WINDOWS NT
READY-TO-RUN

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Microsoft
Products

ALL LATITUDE SYSTEMS INCLUDE MICROSOFT WINDOWS 95* + 3.5" DISKETTE DRIVE
MOBILE COMPUTING

DELL LATITUDE XPI P133ST

- PC PRO "EXCELLENCE" AWARD (June 1996)
- Intel 133MHz Pentium Processor
 - 11.3" SVGA (800x600) TFT Colour Display
 - 8Mb RAM Upgradeable to 40Mb
 - 256Kb Level 2 Cache
 - 810Mb EIDE removable Hard Drive
 - Integrated 16-bit Sound Blaster Pro-Compatible Audio with internal microphone and Speaker
 - Headphone, Speaker & Microphone Jacks
 - Extra high performance 128-bit PCI graphics controller
 - Infrared communication port (IRDA 1.0 compatible)
 - 2 PCMCIA type II slots
 - 19mm 'optical' trackball mouse
 - 'Smart' Lithium Ion battery pack

DELL FINANCE 3 YEAR RENTAL: £17.08 PER SYSTEM, PER WEEK, EXCLUDING DELIVERY AND VAT.

Additional Lithium Ion Battery for only £99 + VAT
DELL LATITUDE XPI P133ST

£1,999 (£2,378.20 INCLUDING DELIVERY & VAT)

DELL LATITUDE XPI CD P150ST

- Intel 150MHz Pentium Processor
- 12.1" SVGA (800x600) TFT Colour Display
- 16Mb EDO RAM Upgradeable to 48Mb
- 256Kb Level 2 Cache
- 1.3Gb EIDE removable Hard Drive
- Internal 6X CD-ROM and 3.5" 1.44 floppy disk drive
- Integrated Audio system with 'Spatializer' 3D Stereo and integrated speakers
- High performance 128-bit PCI graphics controller
- Infrared communication ports - front and rear ('Fast' IRDA 1.1 compatible)
- IRDA Pointing Device
- 'Smart' Lithium Ion battery pack
- 2 PCMCIA type II and/or I type III slots - Cardbus capable
- 19mm 'optical' trackball mouse

DELL FINANCE 3 YEAR RENTAL: £28.88 PER SYSTEM, PER WEEK, EXCLUDING DELIVERY AND VAT.

Add a 28.8Kb/s PCMCIA Fax/Modem for only £199 + VAT
DELL LATITUDE XPI CD P150ST

£3,499 (£4,140.70 INCLUDING DELIVERY & VAT)

MOBILE OFFICE SOLUTIONS

DELL LATITUDE XPI P133ST

£2,199 (£2,613.20 INCLUDING DELIVERY & VAT)

(As above except 16Mb RAM, Microsoft Office Professional 95, IRDA Printer and Receiver, Attaché carry case)

DELL LATITUDE XPI CD P150ST

£3,699 (£4,375.70 INCLUDING DELIVERY & VAT)

(As above except with Microsoft Office Professional 95, Infrared Receiver, Large Attaché carry case)

MOBILE BUSINESS SOLUTIONS

DELL LATITUDE XPI P133ST

£2,799 (£3,318.20 INCLUDING DELIVERY & VAT)

(As per £1,999 spec except 16Mb RAM, 1.3Gb Removable Hard Drive, External 4X CD-ROM, 28.8Kb/s PCMCIA fax/modem, Microsoft Office Professional 95, Attaché carry case, Kensington Lock)

DELL LATITUDE XPI CD P150ST

£3,999 (£4,728.20 INCLUDING DELIVERY & VAT)

(As per £3,499 spec except 24Mb RAM, Microsoft Office Professional 95, Psion 28.8Kb/s Modem, Large Attaché carry case)

NOTEBOOK ACCESSORIES

Dell Desktop Ready Kit

- Dell UltraScan 15TE monitor, (13.7" Viewable Area) Deskdock, 105-key keyboard and desktop mouse, 10 base T Advanced Port Replicator and Attaché carry case **£549 + VAT**
- Deskdock and Advanced Port Replicator (Ethernet & SCSI capabilities) **£189 + VAT**
- Psion Dacom 28.8Kb/s PCMCIA Fax/Modem **£199 + VAT**
- Spare Lithium Ion battery **£99 + VAT**
- External 4xCD-ROM drive (includes SCSI-2 PCMCIA Card) **£315 + VAT**
- Upgrade from 8Mb to 16Mb RAM **£100 + VAT**



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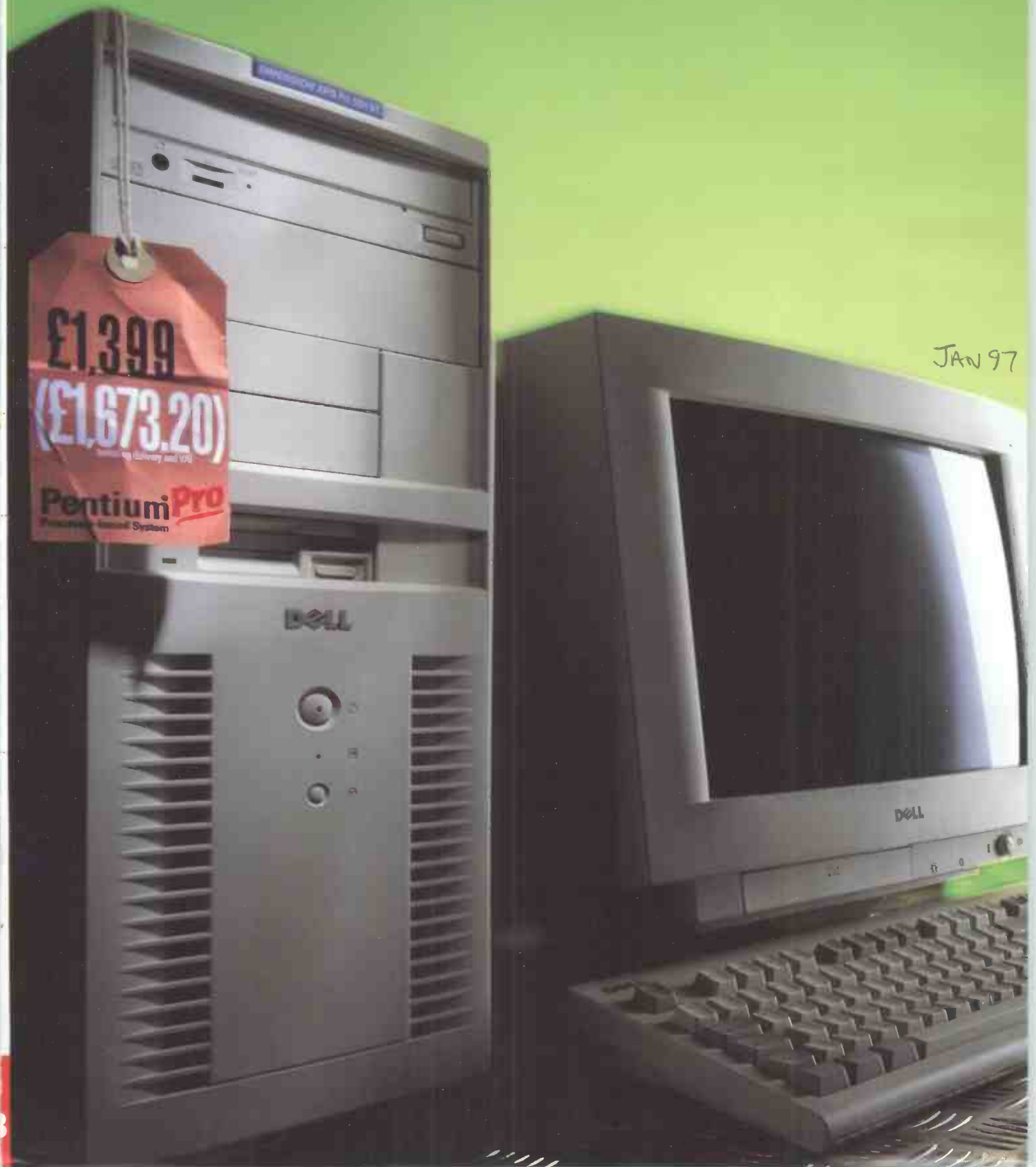
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JAN 97

3

**WE'VE DECIDED TO REUSE OUR OLD
PRICE TAGS. SOMEHOW
WE DON'T THINK YOU'LL MIND.**

4



JAN 97

DELL DIMENSION XPS Pro 180n MT

- ◆ Intel® 180MHz Pentium® Pro Processor
- ◆ Intel 440FX PCIset
- ◆ 16Mb EDO RAM
- ◆ 256Kb Cache
- ◆ 3Gb EIDE Hard Drive
- ◆ STB Powergraph 64 3D™ graphics card with 2Mb EDO video memory
- ◆ 15" Colour SVGA Monitor (13.75" Viewable area)
- ◆ 3 PCI, 3 ISA and 1 PCI/ISA Shared Expansion Slots
- ◆ Twelve Speed CD-ROM Drive
- ◆ Mid-Sized Tower Chassis

NEW

Look at the price and you'd be forgiven for thinking we're offering a Pentium® processor based system at our usual excellent value.

Look again and you'll see the Dell Dimension™ XPS Pro 180n MT is actually equipped with the 180MHz Pentium Pro® processor - which runs up to 55% faster than a Pentium 166MHz processor.*

What's more the high level of specification doesn't stop at the processor. Every aspect of this new system has been designed to let you enjoy state-of-the-art performance without paying a price penalty:

◆ Intel 180MHz Pentium Pro Processor.

The latest processor technology, optimised for 32-bit software. Its in-built 256Kb Cache runs at the full processor speed, giving better performance than larger external caches. It also uses advanced data flow analysis to look ahead into applications and calculate answers, before the software even asks the questions.

◆ Intel 440FX Chipset.

The second generation Pentium Pro Processor support chipset, giving increased performance, supporting EDO RAM and the latest PCI expansion specifications.

◆ A choice of Windows 95 or Windows NT 4.0.

A 32-bit operating system is essential for achieving the best performance from a Pentium Pro processor and is particularly suitable for running intensive applications. For users who want the flexibility to retain existing DOS applications, we offer the Dimension XPS Pro 180n MT already pre-loaded with Windows 95. Or for only an extra £100 (+VAT), we can supply it with 32Mb EDO RAM and Windows NT 4.0 - the operating system set to become tomorrow's industry standard.

◆ High performance all the way.

Other high performance features include: the **9FX Reality 332 Card** with 'Virge' chipset, giving fast 2D and 3D acceleration; the latest **Twelve-Speed CD-ROM Drive** for faster access than ever before to CD ROM databases and multimedia software; a **2Gb EIDE Hard Drive**, twice the size of many of our competitors' and ready for your expanding needs; and **Microsoft Office Professional 95**, the world's leading business application, pre-installed and ready-to-run.

◆ A high-performance multimedia notebook at a low-ticket price.

We also apply our philosophy of high technology at low prices to mobile computing. Take our new Latitude™ XPI CD P150ST Notebook. The latest addition to an award winning range, it's the high-performance multimedia notebook for the connected environment. No other notebook offers such a high specification for the price.

- ◆ Microsoft® Windows 95
- ◆ Microsoft Office Professional 95
- DELL FINANCE 3 YEAR RENTAL £11.96 PER SYSTEM PER WEEK, EXCLUDING DELIVERY AND VAT.

DELL DIMENSION XPS Pro 180n MT

£1,399 (£1,673.20 INCLUDING DELIVERY & VAT)

DELL DIMENSION XPS Pro 180n MT

£1,499 (£1,790.70 INCLUDING DELIVERY & VAT)

(As £1,399 spec above but with 32Mb RAM, 2Gb EIDE Hard Drive and Microsoft Windows NT Workstation 4.0)



DELL LATITUDE XPI CD P150ST

- ◆ Intel 150MHz Pentium Processor
- ◆ 12.1" SVGA (800x600) TFT Colour Display
- ◆ 16Mb EDO RAM Upgradeable to 48Mb
- ◆ 1.2Gb EIDE removable Hard Drive
- ◆ Internal 6X CD-ROM and 3.5" 1.44 floppy disk drive
- ◆ High performance 128-Bit PCI graphics controller
- ◆ Integrated Audio system with 'Spatializer' 3D Stereo and integrated speakers
- ◆ 256Kb level 2 cache
- ◆ Infrared communication ports Front and Rear ('Fast' IRDA 1.1 compatible)
- ◆ Two PCMCIA type II and/or 1 type III slots - Cardbus Capable
- ◆ IRDA Pointing Device
- ◆ 'Smart' Lithium ion battery pack
- ◆ 19mm 'Optical' trackball mouse
- ◆ One Parallel port, one serial port, one mouse/keyboard port, VGA port
- ◆ Choice of Microsoft Windows 95 or MS-DOS and Windows 3.11
- ◆ 24 hour, 7 day telephone support
- ◆ One year Collect & Return service with SelectCare Service options available
- ◆ Advanced Port Replicator Options for Network Connectivity

DELL LATITUDE CD P150ST

£3,499 (£4,140.70 INCLUDING DELIVERY & VAT)



◆ Direct value from the industry's leaders.

So how can Dell offer such advanced systems at such low prices? Thanks to our close working relationships with Intel®, Microsoft® and other industry pacesetters, we're at the technical forefront. Unlike some manufacturers, we build each of our systems to order. So we can incorporate new technology fast. And, as the world's largest direct PC manufacturer** we can pass on to you our huge economies of scale.

◆ Support that wins awards.

Our Latitude range of notebooks recently came first in the PC Magazine 1996 Readers' choice Survey of Service and Reliability. And indeed all Dell systems benefit from a high level of support, including 1 year's 'Collect and Return' Service and a flexible choice of warranty options. For details of other advanced Dell desktop and notebook systems, turn the page opposite. Then call us on 01344 724781. Whatever size price tag you're looking at, you'll find our systems are just the ticket.

*When running 32-bit applications. Source: iComp 2.0 index **Source: IDC

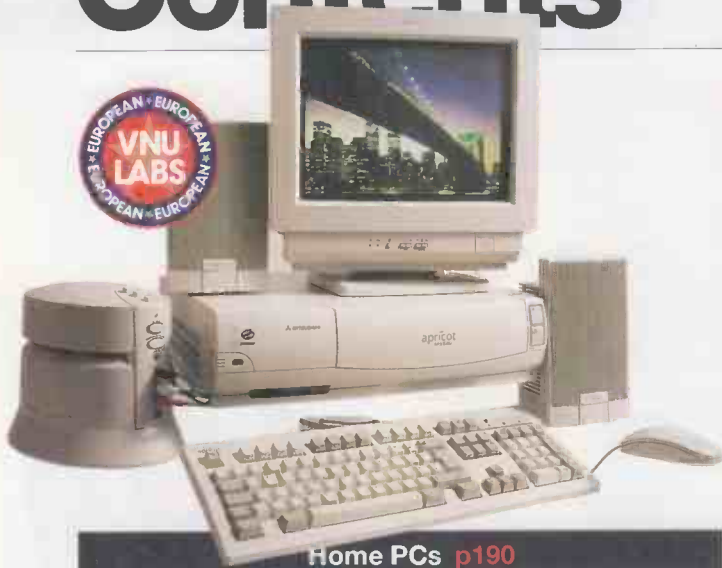
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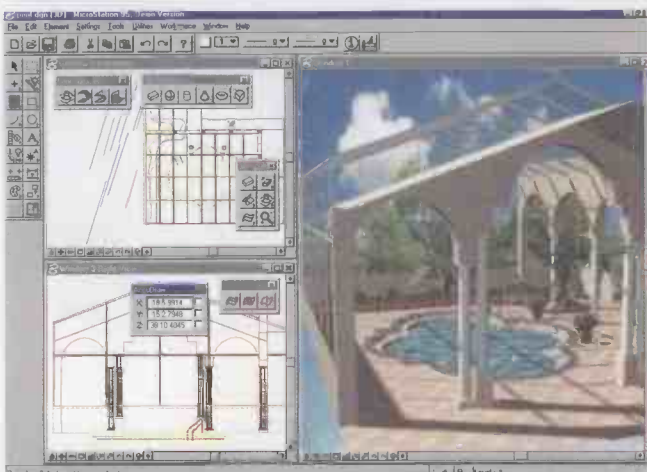
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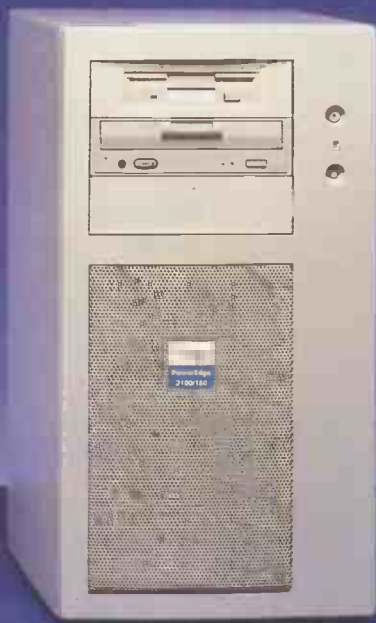
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A NEW GENERATION OF SERVERS. SO POWERFUL, THEY BRING THEMSELVES IN UNDER BUDGET.



DELL POWEREDGE® 2100

- ◆ 180MHz Pentium® Pro Processor
(200MHz option available)
- ◆ 32Mb EDO ECC RAM as standard
(Upgradeable to 256Mb)
- ◆ Integrated PCI Ultra/Wide SCSI controller
- ◆ 2Gb SCSI Hard Disk Drive
(Expandable to 27Gb Internal Storage)
- ◆ 8 Speed SCSI CD-ROM
- ◆ 3Com 3C590 PCI Network Card
- ◆ Intel® Server Manager V2.5

£1,999

- ◆ Price for above configuration with pre-installed Microsoft® Windows NT Advanced Server V4.0 (including 10 Client licenses)

£2,599

If you're thinking of buying a server, think again: Dell® have just rewritten the rulebook.

Our two new PowerEdge® systems bring levels of features and functionality that you may have thought were out-of-reach.

◆ Dell PowerEdge 2100.

Uniquely, among the major brands of entry-level servers, the Dell PowerEdge 2100 incorporates the latest Pentium Pro Processors, with 180MHz and 200MHz options.



From just £1,999, it redefines server price/performance.

And that's not just our view: in independent

benchmark testing by Client/Server Labs of Atlanta, Georgia, the Dell PowerEdge 2100 achieved the best price/performance rating of any server tested.

Its superior performance is matched by superior storage: with an ultra-wide SCSI controller and large-capacity hard drives, it is expandable up to 27Gb internally – more than any other comparable server.

In every respect, the PowerEdge 2100 is a fully featured server giving performance without compromise.

◆ Dell PowerEdge 4100.

Never before has a server offered so much value. The PowerEdge 4100 chassis has the flexibility to be free

“ It represents excellent value for money, being priced to compete head-on with existing Pentium® Processor-based systems, few of which have specifications anywhere near that offered by the PowerEdge ”

SOURCE: PC MAGAZINE NOVEMBER 1996,
reviewing the PowerEdge 2100/200MHz Pentium Pro Processor.



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PROCESSOR



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Solutions for a small planet

Editorial

One of this month's group tests turns its attention to PCs for the home (p190) and it seems we are at the start of a new era in home computing. There was a time when, if you wanted a PC for the home, it looked pretty much like the one you used in the office: beige, square and ugly. Hardly the stuff to give Bang & Olufsen cause for concern.



But times change, and manufacturers are at last designing PCs for the home that really look like they belong. IBM, in developing the new Aptiva S-Series, went into

people's homes to see just how they used PCs in a domestic situation and found that home users were forced to adapt to the PCs, rather than the other way round. It seems that the research was worth it. After reading our evaluation of the new Aptiva, on page 196, I think you'll agree that it's a significant step forward in PC design.

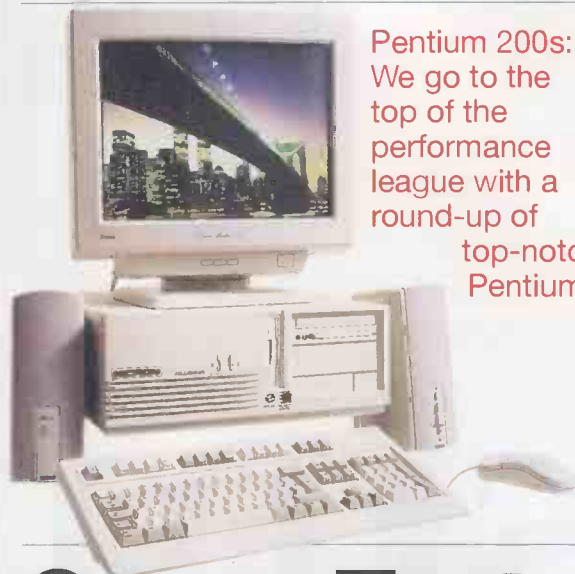
But it won't stop there. 1997 sees the arrival, on our shores, of the radical Toshiba Infinia series which evolves the PC into a slick home entertainment system. It's already winning plaudits in America. Waiting in the wings are new designs from Compaq, Acer and Packard Bell. And importantly, these new systems are also powerful business computing devices for the home office units — not just for playing games or surfing the net. Your home deserves good design, and at last the leading PC vendors are starting to wake up to that fact. By the end of next year, any vendor serious about selling PCs into homes should have taken heed of the style leaders.

Meanwhile, PCW also enters the new year in better shape, with more reviews, more group tests and more staff than ever before. This means you can look forward to unrivalled coverage of the whole world of computing in what are fast-changing times. Which is good news for you and bad news for our rivals. Happy New Year!

PJ Fisher

Managing Editor

Next Month



Pentium 200s:
We go to the top of the performance league with a round-up of top-notch Pentiums

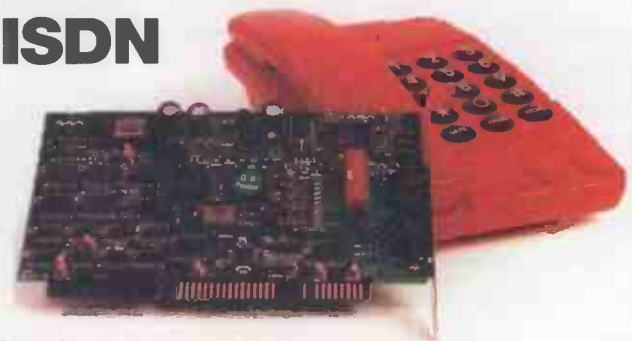
Group Test

Digital Cameras



An imaging revolution is on the way. PCW calls the shots in a comprehensive group test

Plus... ISDN



Is this the end of the modem?

What is DVD?

The technology behind the super-CD

February 97 issue

■ On sale Thursday 2nd January

March 97 issue

■ On sale Thursday 6th February

* Next month's contents subject to change.

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the rest

will discover

a clear path

ahead."

SAGE.

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THAT CAN HELP
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Every business would like to find itself in the enviable position of being in front of the opposition. But actually getting there is another matter.

A good first move would be to obtain some help from a company which has already made it to the front. A company like Sage.

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Sage software can give your business a head start over your competitors, because it does much more than just accounting. It's a complete system which can incorporate sales and marketing, payroll and fee billing software in addition to accounting.

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Surname _____
Position _____
Company Name _____
Company Address _____
Postcode _____
Telephone _____

APCW2

**Personal
Computer
World**

January Cover disc

Welcome to issue 5 of our new-look PCW CD-ROM cover disc. This month, we present more than 600Mb of games, multimedia, music, images and PC tips for you to enjoy.

The CD is divided into nine sections, each with its own icon. Each of the nine section buttons is almost always visible on-screen so you can move from section to section just by clicking on that button, rather than having to continually return to a home page. If you are not sure where each section is, roll over the buttons, and the name of that section will be displayed, along with a contents list of the section. Exit the disc by clicking on the "Q" in the bottom left of the screen.



An interactive Jukebox containing music from Co-Star. The first part of an exciting interactive sci-fi comic called "Zarnak", by Denova. Plus thirty-two 24-bit colour images from the book *The Heart of Britain* — royalties from this book are being donated to the Royal Brompton Hospital.

Will Rhonar "keep it tight"?... and will Mummy actually be watching when she does? All will be revealed, interactively, in Part I of Zarnak

How to use the CD-ROM



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

3. Win 95: If you've got Windows 95, the PCW interactive loader will appear on your screen. If your CD doesn't auto-load, start Windows Explorer and double-click PCW.exe.

Win 3.1: From Windows Program Manager choose File/Run, then type in <CD Drive>:\PCW.exe and press enter.

4. Click on main menu. If you don't have Quicktime for Windows and Video for Windows installed, you will be offered the chance to install them before continuing.

Hardware requirements

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



Possible CD-ROM problems

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

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

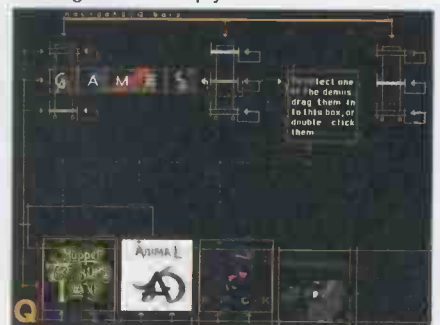
■ For other problems concerning the CD, call 0891 715929. Calls cost 39p/minute off-peak and 49p at all other times.

CD Index

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

Games

Great games to keep you entertained



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

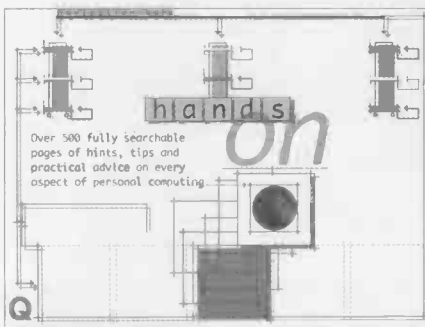
Getting Started

A beginner's interactive guide to printers and desktop PCs.



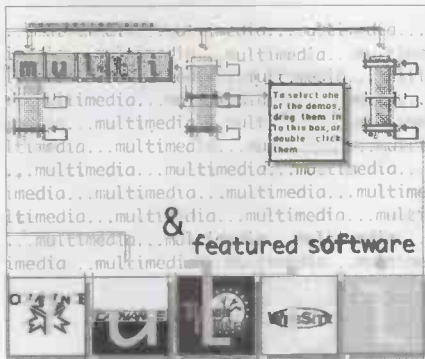
Hands on

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

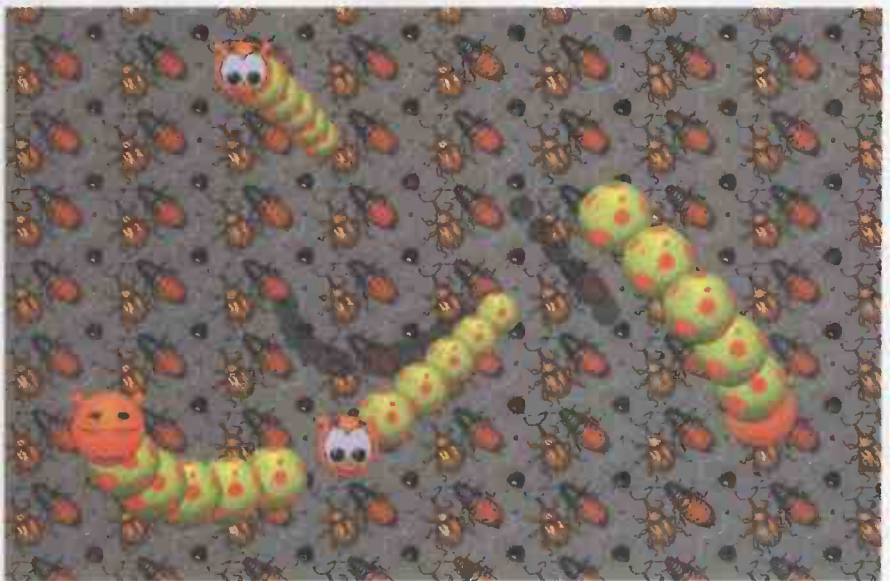


All the regulars are here in a year's *Hands On*

Multimedia



Floppy disk



Just one of the ten screensavers on this month's floppy disk

This month's floppy disk contains a shareware screensaver program for Windows, called Mez. It includes ten screen savers and 60 tiles for your desktop. This demo of Mez is fully functional (and has no irritating messages).

- To install Mez onto your desktop from the floppy disk, insert the floppy into the drive:
Windows 95 — Click on START/RUN from the taskbar. Type into the box a:\PCWJAN97.EXE then click OK.
Win3.11 — Go to FILE/RUN on PROGRAM MANAGER. Type into the box a:\PCWJAN97.EXE then click OK.
- To install Mez from the CD:
 From Windows Explorer, or File Manager,

double-click on PCWJan97.exe in the directory <CD Drive>/FLOPPY/
 This will unpack the compressed file, run the Mez installation program and tidy up afterwards, too.

Possible problems with the floppy

- If you have problems with the floppy, such as a message "cannot read from drive a:", please return the disk to TIB plc, TIB House, 11 Edward Street, Bradford BD4 7BH, together with a SAE and two 25p stamps. Where it is a duplication fault, the postage will be returned with your replacement disk. TIB is on 01274 736990.
- Our floppy-disk hotline is available on weekdays from 10.30am - 4.30pm on 0891 715929.
- PCW cover disks are thoroughly virus checked, but PCW cannot accept liability for problems arising from use of the disk.

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

Jet Away with CompuServe and Air UK

Already fed up with Christmas? Take heart! CompuServe has teamed up with Air UK to offer PCW readers the chance to win a pair of return tickets to one of more than 30 European destinations on the Air UK network. We have ten pairs to give away. (Further details are available online).

How to enter

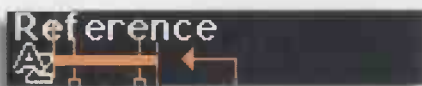
If you are already a CompuServe member just follow the instructions detailed in our Questions section. If you are not a CompuServe member already, don't worry! You can use the newly-released version of CompuServe's software, on this month's cover, to sign up and enter the competition.

Get your first month's membership *free* with ten hours' *free** online time. To install the software, follow the instructions on your CD-ROM wallet and, when prompted, insert the Offer code printed on the rear. In just a few minutes your membership will be confirmed and you



CompuServe 3.0 — the brand new interface

The Multimedia and Featured Software section contains four interactive Windows demos for you to explore.



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



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



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

Software Library

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

Multimedia & Featured Software

To preview any of the multimedia demonstrations, either drag one of the images along the bottom into the box in the top right corner, or double-click one of those images.

Commence A package which utilises state-of-the-art email, internet, paging and remote replication technologies. This demo is the same as the full version, minus the network capabilities.

CADvance A complete integration of CAD with other applications in the Windows environment.

Technomaker A sample sequencer.



Create your own web-site server with this free package

WebSite1.1 Complete Web Server A package that lets you create your own web-site server. This copy of O'Reilly & Associates WebSite 1.1 is a fully working version of one of the world's best web servers and is worth over £180. It is not timed-out and is yours free to use. However, you are not entitled to technical support from O'Reilly & Associates or a reduced cost upgrade to WebSite Professional, but WebSite 1.1 is one of the easiest web servers to set up and use. Full Online Help is included, to get you started. You can use WebSite to set up your own company Intranet or serve web pages to the Internet and it is ideal for small to medium-sized businesses and groups. WebSite runs on Windows NT 3.5 (or higher) and Windows 95 only and requires 12Mb RAM (min), 5Mb of HD space plus TCP/IP connectivity.

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



Find all the answers at Air UK's web site

will be online. To find out more about the world of CompuServe, take a look at the Interactive Tour on the CD.

** (Access CompuServe via a local call from anywhere in the UK. A communications surcharge applies if you access via GNS DialPlus. Premium Services (indicated with a PS) carry a surcharge and free online time does not apply when using these.)*

The Prizes

Ten lucky PCW readers will win a pair of return tickets to the European destination of their choice on the Air UK Network between 1st March, 1997 and 28th February, 1998 (excluding flights on or within two days of a public holiday).

Questions

Once you are online, type PCWQUIZ at the GO command and follow the instructions. You will be asked the questions below (and

to provide your membership ID details). The answers can be found at Air UK's web site (www.airuk.co.uk/) and querying their flight schedules and airport information.

1. What is the flight number of the plane that leaves London Stansted airport at 9.20am on Saturdays, arriving in Florence at 12.45pm between 28th October, 1996 and 29th March 1997?

- a) UK 963 b) UK 918 c) UK 923

2. How many short-stay car parking spaces are there at Stansted airport?

- a) 1,500 b) 2,000 c) 2,500

Tie-breaker

If you could fly a plane, where would you fly to and why? (Answers restricted to 100 characters).

Competition rules

1. All entries must be made online. Type PCWQUIZ at the GO command. Entries submitted via any other media will not be accepted. 2. GO PCWQUIZ is a free service, but normal telephone charges apply. A communications surcharge will apply if you access via GNS DialPlus. 3. If you stay online beyond your first month, subsequent months are charged at £6.50 per month with five hours' free online time each month. If you stay online beyond your free usage time you will be charged £1.95 per hour. You can access CompuServe via a local call from anywhere in the UK. Premium Services (indicated with a PS) carry a surcharge and free online time does not apply when using these. 4. This competition is only open to UK CompuServe members. Employees of CompuServe worldwide, VNU Business Publications

Ltd and participating suppliers, are expressly excluded. 5. Entries are strictly limited to one per member. 6. The ten prize-winners will be selected from those email entries with questions 1 and 2 entered correctly and who, in the sole opinion of the judges, have submitted the most witty and original tie-breakers. 7. The judges' decision is final and no correspondence will be entered into. 8. All prize winners will be notified by email or by post. 9. The closing date for entries is 31st January, 1996. All prize winners will be notified by 28th February. 10. Proof of submission of entry is not deemed to be proof of receipt. 11. There is no cash alternative to any of these prizes. 12. The destinations included on the Air UK Network are correct at the time of going to press but may be subject to change. 13. By submitting an entry, entrants will be deemed to have read and understood the rules and be bound by them.

Check out O'Reilly & Associates excellent range of books and software for computer professionals in their 1997 catalogue (www.ora.com), also on our cover CD in Acrobat format, and order now for Christmas. To view the catalogue, launch Acrobat then go to file/open and double-click <CD Drive>:\catalog.PDF

Games

To preview any of the games, drag one of the images along the bottom into the box in the top right corner or double-click one of those images.

The Muppets Treasure Island Aimed at a lower age range, this interactive adventure



Left Technomaker. A sample sequencer for solid sounds

Below Enter the Necrodome at your peril. There's no such thing as a good loser in this deadly sport.



still manages to include all the Muppet mayhem we expect and love. Animal At last, the outrageous Peperami stars in his very own computer game. Using guile, cunning and raw violence, he must solve the mystery of Peperenstein's kidnapping,



Interactive Muppet madness to keep the kids occupied

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

in this point-and-click adventure.

Amok This fast-paced shooter puts you in control of a hi-tech battle mech on one of many pre-determined suicidal missions. Amok offers the gamer many hours of thrills and excitement. (Sorry, Win 3.x users, this game is Win95 only).

Necrodome Enter a future where sport has turned deadly. You drive heavily-armed vehicles against opponents in 15 different arenas in an attempt to remain victorious. (Sorry, Win 3.x users, this game is Win95 only).

● Please note: The Necrodome installer may take a while to load — please be patient.

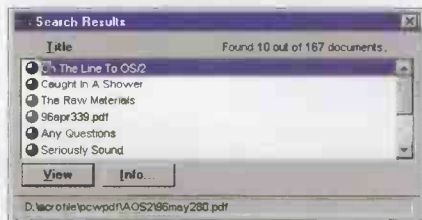
Using the Hands On section

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

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



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



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



results dialogue will appear containing a list of the files containing that word.

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

The default index for the Acrobat files is a global search of all files. You should find

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

Using the Software Library section

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

■ Compressed Zip files or self-extracting archives

Most files in this section are compressed Zip files or self-extracting archives. Click on the file that you would like to copy to your hard disk. A box will appear, stating the name of the file to copy and the destination directory. Click on OK. If you're using the default browser, you will be given the option of:

1. Copy the file only, from the CD to a chosen destination, with no further action
2. Decompress the files contained in the archive into the destination of your choice

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

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

■ Other file types

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

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

Using Netscape

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

If you're on the internet, chances are you're already using Netscape and have a rough idea how it works. If you're not, this provides a great opportunity to find out what this browser business is all about.

You navigate through web (or HTML) pages using hyperlinks. These are images or, more often, highlighted text which take

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

To go to another section click on one of the eight navigation buttons

This is the Software Library. In this section you'll find scores of utilities, games, fonts and more to download to your hard disk. To enter this section's main library (viewed using Netscape Navigator) click the "Main Library" button.

MAIN LIBRARY

For some additional goodies this month click the AOL button below

AOL

On next month's CD



Realms of the Haunting — 100Mb demo of Gremlin Interactive's new supergame.

you backwards and forwards through different pages. You can also move back and forth through pages you've already visited by using the back and forward arrows on the toolbar.

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

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

Installing PKUnzip or Winzip

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

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

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

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

January 1997



PCW INTERACTIVE

Entire Contents List:

Multimedia section

- CADvance
- Commence
- Technomaker
- WebSite 1.1 Complete Web Server

Games section

- Amok (Win95 only)
- Animal
- Muppets Treasure Island
- Necrodome (Win95 only)

Arts section

- Heart of Britain — 32 graphic images from the book
- Jukebox — music from Co-Star
- Zarnak (pt 1) — new interactive sci-fi comic

Getting Started

- A beginner's interactive exploration of notebooks, printers and desktop PCs



Personal Computer World

CD Index

- A searchable index of the PCW cover disks since Sept '96

Hands on

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

The Room

- A browse through VNU's new e-zine

F O L D E R E

Reference section

- 15-month products and features archivable database
- Advertisers index
- General info about the CD
- Glossary of PC terms

Software library section

Including those files referred to in our Hands On section

- Acrobat Reader v3.0 (Win95/Win 3.11)
- Anim8
- Avery Label templates
- Cachchk
- Chain Reaction
- Chameleon
- Chess
- Commander Keen 4
- CV Author
- Cyberpuck
- Flash View

- Flying Tigers
- Focus Picture Library — 16 downloadable images
- Font Presenter
- Frontier Mail
- Global Positioning System software
- Heart of Britain — 32 downloadable images
- Help Maker Plus
- Home Finance
- Internet Explorer 3.0 (Win95/NT)
- Kids' Icons
- Klik-N-View Business Cards
- Magic Crayon 4.0
- MicroAngelo v2.1
- Netscape Navigator v3.0 (Win 3.x/Win95/NT)
- Ornamatica — the masterpiece border-maker
- Paint Shop Pro v4.1 (Win3.11/Win95)

- PKZIP & PKUnzip
- Plastic Morph
- Ponger
- Ponger 32
- Porsche Screensaver
- Prosound
- Quake v1.01
- SpeedyRom
- Tardis for Windows
- Tardis 95
- Terrapin
- ThunderBYTE Anti-Virus (Win95/Win 3.x)
- VBRUN 100, 200, 300, 400.dll
- Video for Windows
- What PC? — mobile pages buyers' guide for Psion 3a incl. the new Nicholson London Pages
- Wincode
- Win95 service pack 1
- Winzip
- Yahoo! News Ticker

Wanted: material for PCW cover CD-ROMs

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

A well specified machine with award winning peripherals at a decent price.
A trustworthy product backed by quality technical support.

dan Ultimate/166. Recommended, PC PRO, Feb '96



dan dantum/133
Best Buy
March 96



dan dantum Home/100
Recommended
Feb 96



dan dantum 95/100
Gold Award
April 96



dan dantum DUO Server
Runner-Up
June 96



dan dantum PCI Server
Winner
June 96



dan dantum 95/133
Best Buy
June 96



dan dantum 95/166
Winner 1996 Award
June 96



dan Ultimate/133
Editor's Choice
June 96



dan dantum Home Plus/133
Best Value Award
June 96



dan Ultimate/166
Recommended
Feb 96



dan 95/100
Performance
Jan 96



dan Ultimate/133
Recommended
Dec 95



dan Supermedia/PS75
Recommended
Dec 95



dan dantum 95/90
Award for Speed
Dec 95



dan dantum 95
Highly Commended
Sept 95



dan dantum 95
Technical Merit
Sept 95



dan dantum 90
Recommended
Sept 95



dan Supermedia/100
Recommended
Aug 95



dan Ultimate/133
Recommended
Aug 95



dan Ultimate/120
Recommended
Aug 95



1995 Winner
Service & Reliability
Aug 95



dan Supermedia/100
Value for Money
Aug 95



dan Premium/100
Performance
July 95



dan Ultimate/120
Excellence
July 95



A Very Big THANK YOU To Everyone Who Voted For Us



Which PC Company has received PC Magazine's Readers Award for Service and Reliability for FOUR years running?



Which PC Company was voted by readers as having the BEST After Sales Service?



Which PC Company was also voted as having the BEST Telephone Support?



Can you guess which Personal Computer was voted the MOST Reliable PC?



Which PC was voted the BEST Professional Multimedia PC in 1996?



Do you know which Fileserver was voted the BEST Fileserver?

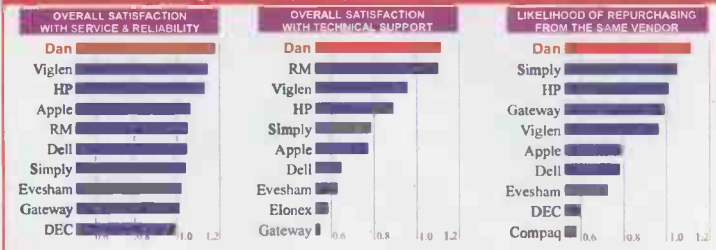


And which Fileserver was voted as the Runner-up Fileserver?



The answers may surprise you but during the last few years dan technology has received 113 awards and accolades from PC users and industry experts, more than any other UK PC company. Dan is now in its eighth year of selling Personal Computers directly to its customers and offers a whole range of PCs from systems for the first time buyer up to the most powerful PCs using the latest technology.

"Perhaps the most important area of our survey is the analysis of Customer Satisfaction with technical support, system reliability and repairs. For the 4th year in a row, Dan has won the overall satisfaction scores. This result is made even more remarkable when you think that it actually raises customer expectations further, so meeting them becomes harder and harder. Congratulations to dan for winning the desktop Category." *PC Magazine, Service & Reliability 1996*



dan Ultimate Plus

The PC with removable Media

- Intel Pentium® Processor - Intel Chipset
- 512KB Pipeline Burst Cache Memory
- 32MB EDO RAM
- 2GB EIDE or SCSI Hard Disk Drive
- Matrox Mystique 2MB SGRAM Video Card
- 17" Iiyama L/R Digital Control Diamondtron Monitor (9017E)
- 28.8/33.6KBPS Fax/MODEM
- Soundblaster AWE Value 512K
- Panasonic PD: TWO Devices in ONE 4xspeed SCSI CD ROM & 650MB Optical re-writable / removable drive with one 650MB Cartridge
- Full size Tower Case
- Microsoft Natural Keyboard
- dan Hi-Fi Power Speakers (80WPMPO)
- 1.44MB Floppy disk Drive
- Windows 95
- 1 Parallel & 2 Fast Serial Ports
- Microsoft Mouse, Microphone
- Microsoft Works, Page Plus DTP ENCARTA 96 US Int Encyclopedia

EIDE Hard Disk Drive Model

Free Slots: 1 PCI

NEW	133MHz	£ 2152	£ 2529	incl. VAT
	166MHz	£ 2312	£ 2717	incl. VAT
	200MHz	£ 2398	£ 2818	incl. VAT

2.5GB HDD upgrade £ 15 (£ 18 inc VAT)

SCSI Hard Disk Drive Model

Adaptec 2940 PCI SCSI Controller
Free Slots: 1 PCI & 1 ISA or PCI

NEW	133MHz	£ 2447	£ 2876	incl. VAT
	166MHz <td>£ 2607 <td>£ 3064 <td>incl. VAT</td> </td></td>	£ 2607 <td>£ 3064 <td>incl. VAT</td> </td>	£ 3064 <td>incl. VAT</td>	incl. VAT
	200MHz <td>£ 2693 <td>£ 3165 <td>incl. VAT</td> </td></td>	£ 2693 <td>£ 3165 <td>incl. VAT</td> </td>	£ 3165 <td>incl. VAT</td>	incl. VAT

4GB SCSI HDD upgrade £ 393 (£ 462 inc VAT)

Video Card Upgrade from Matrox Mystique to:

- Millennium 4MB WRAM add £ 67 (£ 79 inc VAT)
- Millennium 8MB WRAM add £ 240 (£ 282 inc VAT)

Delivery cost to most of UK for one system is £18.



go direct to dan

“ This machine's overall value and performance wins it the **PC Plus GOLD Award**. ”

dan dantum 95/100, Gold Award, PC Plus, April '96



Winner: dan Best Telephone Support July 96



dan Technology Best After Sales Service July 96



dan Technology Most Reliable PC July 96



Service & Reliability User Survey, Desktop PCs PC Magazine, August 1993, 1994, 1995 & 1996



dan Home Plus/133 Best Buy August 96



dan Home PC/166 Recommended September 96



dantum 95/200 Buy it September 96



dantum 95/133 Recommended September 96

Removable Media Option

Instead of the Panasonic PD Drive we can supply an 8xSpeed CD-ROM & the Iomega JAZ 1GB Removable Drive with one 1GB cartridge

1 JAZ 1GB

Add £ 110 (€ 130 inc VAT) to dan Ultimate Plus prices

3 X SPEED CD-ROM

This option requires one extra drive bay.

Microsoft Natural Keyboard



A result of extensive ergonomic and usability research, it enables you to work more comfortably and includes a split-key sloped keyboard, built-in palmrest, soft

tactile key action and a standard key layout. It also comes with Intellitype software and Windows logo function keys to simplify access to the Windows operating system.



The Panasonic PD system:

A 4 x Speed CD ROM and 650MB Removable Optical Disk Drive in One Unit



The 4x Speed CD ROM is only half the story for the Panasonic PD System is also a rewritable optical disk drive. Loading an optical disk into the PD System provides an extra 650MB of memory that you can write to and re-write to as many times as you like.

The high performance disks are also removable so large amounts of data can be stored without filling up your hard disk. Loading a CD ROM disk into the tray turns it into a 4x Speed CD ROM Drive which enables you to get the full benefit from an ever-growing choice of multimedia software.

For less than the price of an optical disk drive, the PD System gives you the best of both worlds in one half-height drive.



Cert. No: 95/4556 ISO 9002/EN 29002 (BS 5750 Pt 2)



dan Premium/66sMM Editor's Choice June 95



dantum 95/90 Recommended June 95



Dantum PCi Server Winner June 95



dan PCi Server Runner-Up June 95



486 Systems Runner-Up June 95



Best PC System Most Reliable PC Best After Sales Service Best Direct PC Dealer Runner-Up May 95



dan Nx P5-90 Value for Money April 95



dan Premium/66sMM Recommended Feb 95



Best Customer Liaison Award Nomination Feb 95



1994 Technical Innovation Award Jan 95

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dan
technology plc 25

“ Quality and performance at a slightly higher cost, but worth the premium. ”

Personal Computer World (PCW), Aug '96

You know you can rely on dan

Dan's commitment to continuous improvement and customer satisfaction has already resulted in numerous awards and accolades, both from customers and industry experts. To date dan has received 115 awards from industry experts & readers of the computer press, including PC Magazine's Overall Satisfaction with Service and Reliability Award for FOUR years running.



dantum Value 1/s

Entry Level Pentium® Processor System

- 8MB RAM
- Fast 850MB HDD
- Intel Pentium® Processor
- Intel Chipset
- 256KB Pipeline Burst Cache Memory
- Fast Graphics card 1MB/32-bit
- 14" Super VGA L/R N/I Monitor
- Free Slots: 2 PCI, 1 PCI or ISA & 2 ISA
- Fast EIDE PCI HDD Controller
- 1.44MB Floppy Disk Drive
- Desktop Case w/200W PSU
- Cherry Win 95 UK Keyboard
- Windows 95 or Win 3.11
- 1 Parallel & 2 Fast Serial Ports
- dan Serial Mouse
- MS Works Suite

EASY BUY
Monthly Payment
APR 19.9%

120MHz	£ 717	£ 843 incl. VAT	£28.12
133MHz	£ 774	£ 910 incl. VAT	£30.31
150MHz	£ 834	£ 980 incl. VAT	£32.60
166MHz	£ 934	£ 1098 incl. VAT	£36.45
200MHz	Call for availability		

1.2GB EIDE HDD Upgrade £30 (£36 inc VAT)



dantum 1/s

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- Fast EIDE PCI HDD Controller
- Desktop Case w/200W PSU
- Cherry Win 95 UK Keyboard
- Windows 95 or Win 3.11
- 1 Parallel & 2 Fast Serial Ports
- Microsoft Serial Mouse
- MS Works Suite

EASY BUY
Monthly Payment
APR 19.9%

120MHz	£ 882	£ 1037 incl. VAT	£34.46
133MHz	£ 939	£ 1104 incl. VAT	£36.65
150MHz	£ 999	£ 1174 incl. VAT	£38.93
166MHz	£ 1099	£ 1292 incl. VAT	£42.79
200MHz	Call for availability		



dantum 95/s

High Power Pentium® Processor System

- 32MB EDO RAM
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- Intel Pentium® Processor
- 100MB ZIP Drive or 2GB Streamer
- 256KB Pipeline Burst Cache Memory
- Fast Graphics card 2MB SDRAM/64-bit
- 15" Super VGA L/R N/I Monitor
- Free Slots: 2 PCI, 1 PCI or ISA & 2 ISA
- Fast EIDE PCI HDD Controller
- 1.44MB Floppy Disk Drive
- Desktop Case w/200W PSU
- Cherry Win 95 UK Keyboard
- Windows 95 or Win 3.11
- 1 Parallel & 2 Fast Serial Ports
- Microsoft Serial Mouse
- MS Works Suite

EASY BUY
Monthly Payment
APR 19.9%

120MHz	£ 1102	£ 1295 incl. VAT	£42.88
133MHz	£ 1159	£ 1362 incl. VAT	£45.07
150MHz	£ 1219	£ 1433 incl. VAT	£47.39
166MHz	£ 1319	£ 1550 incl. VAT	£51.21
200MHz	£ 1405	£ 1651 incl. VAT	£54.51

2GB EIDE HDD Upgrade £58 (£69 inc VAT)

Matrox Mystique (2MBSGRAM) Upgrade £54 (£64 inc VAT)

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Add an 8x Speed EIDE CD-ROM to any dan system for just £69 (£82 inc VAT)

Higher Spec New LOWER Prices

Other Configurations

Based on the above specification with 14" SVGA Monitor & your choice of Hard Disk Drive & PENTIUM® Processor

Pentium Processor	120	133	150	166
1GB	£ 904	£ 973	£1046	£1168
1.2GB	£ 912	£ 982	£1054	£1177
1.6GB	£ 937	£1006	£1079	£1201
2GB	£ 983	£1052	£1125	£1247
2.10GB	£1345	£1414	£1487	£1609

Pentium Processor	120	133	150	166
1GB	£ 978	£1047	£1120	£1242
1.2GB	£ 986	£ 1056	£1128	£1251
1.6GB	£1011	£1080	£1153	£1275
2GB	£1057	£1126	£1199	£1321
2.10GB	£1419	£1488	£1561	£1683

Pentium Processor	120	133	150	166
1.2GB	£1257	£1326	£1399	£1521
1.6GB	£1281	£1351	£1423	£1546
2GB	£1327	£1396	£1469	£1591
2.10GB	£1689	£1758	£1831	£1953
4.10GB	£2168	£2238	£2311	£2433

200MHz upgrade - Call for availability

All SCSI models use the Adaptec AHA-2940 Controller that uses an extra PCI Slot. 2GB, 4GB & 9GB SCSI Hard Disk drives are available.

Delivery cost to most of UK for one system is £15. (£18 inc VAT)



dan desktop with Multimedia & Hi-Fi Power Speakers Option



"Dan technology is renowned for building technically advanced PCs and pricing them competitively. The dantum/166 is the machine with all the extras - extra memory, extra secondary cache and a removable hard disk storage in the form of the jaz drive. It has good sound and a fine monitor. You're going to need an extra few fivers for the Dan, but if you're after the ultimate in 166 performance, this is currently the machine to go for." *PC Plus, (dantum166), Nov '96*



"From dan we wanted an all-purpose machine; something we could throw anything at. We got rather more than we bargained for. The dantum 95 P200 represents excellent value. The modem is a sensible addition, the zip drive will soon become indispensable and the TV tuner is just plain fun. And since dan systems are traditionally built to survive minor earthquakes, this all-rounder will last for years." *Computer Life, (dantum 95), Sept '96*



Cart No: 95M556
ISO 9002/EN 28002 (BS 5750 Pt 2)

go direct to dan

“ Dan technology is renowned for building technically advanced PCs and pricing them competitively. ”

PC Plus, Nov '96

Encarta 96 US & Page Plus DTP (Home/Office)



dan Multimedia '96 Upgrade Kits

Choice of Software Bundles
(OEM Packages with On-Line Help)

dan MM Software Pack 1

Quicken 5, 500 Nations, Dangerous Creatures 1, Dinosaurs 1, Dogs, Musical Instruments 1, Multimedia Golf 2 & World of Flight.



dan MM Software Pack 2

Quicken 5, Microsoft Cinemania 96, Art Gallery & Golf 2.0

Cinemania 96 works only with Windows 95



Dan MM'96 Kit 1

16 bit Sound Card
8x Speed CD-ROM
dan Advanced 10W (PMPO)
Speakers with Microphone
Microsoft Encarta '96 US
Page Plus 95 (Home/Office)

£151
£178 inc VAT



Dan MM'96 Kit 2

as dan MM Kit 1
Plus
dan MM Software Pack 1
or
dan MM Software Pack 2

£192
£226 inc VAT

Sound
BLASTER

8x SPEED
CD-ROM



dan Midi Tower Case Option

Super Sound Upgrade

Upgrade the dan Multimedia Kit to Creative's SoundBlaster AWE Value 512 Sound Card & the dan HI-FI Power Speakers 80W PMPO.

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Sound
BLASTER

£ 76
£90 inc VAT

The Best Games Collection

Bioforce + Hi Octane + Magic Carpet + Theme Park Soccer

Add the dan Games Collection to any dan System or Multimedia Upgrade Kit.

FIFA
SOCCER

£ 22
£26 inc VAT

dan internal Fax/Modems

14.4KBPS £ 49 (£ 58 inc VAT)
28.8/33.6KBPS £ 90 (£ 106 inc VAT)

US Robotics External Fax/Modem

28.8/33.6KBPS £164 (£ 193 inc VAT)

Microsoft Office 95 Upgrade

from pre-installed MS Works £173 (£204 inc VAT)

Memory upgrade from

8MB to 16MB £ 47 (£56 inc VAT)

17" iiyama 8617E Monitor Upgrade

from 15" £266 (£313 inc VAT)



"Dan has a reputation for building good quality, fast PCs and in this respect the dan Ultimate is no exception. The dan Ultimate has a lot to offer, including a high level of performance and a comprehensive specification. Built to the usual high dan standard, the Ultimate is well equipped and fast. Just about everything you need comes as standard, and there is plenty of scope to add more to the system if needed." *PC Magazine, (dan Ultimate 166), Sept '96*

Personal Computer World

"Quality and performance at a slightly higher cost, but worth the premium. Dan technology is one of those PC companies that seems to deliver quality every time. One example of dan's good service shows up immediately when you start the PC. The first things you notice are the Windows 95 shortcuts for the floppy, hard disk and CD-ROM drives, plus an application shortcut to MS Works. Very few of the other manufacturers have done this, and all in the PCW office agree that this is a good example of customer sensitivity." *PCW, (dantum95/133), Aug '96*



"Perhaps the most important area of our survey is the analysis of Customer Satisfaction with technical support, system reliability and repairs. For the 4th year in a row, dan has won the overall satisfaction scores. This result is made even more remarkable when you think that it actually raises customer expectations further, so meeting them becomes harder and harder. Congratulations to dan for winning the desktop Category." *PC Magazine Aug '96 Service & Reliability 1996 Reader Survey*

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Further Dan Technology Adverts can be found on pages 357-361

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Newsprint

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

CE palmtops unveiled

■ Six manufacturers showed palmtops using cut-down Windows CE at Comdex. The hardware, from Casio, Compaq, Hitachi, LG Goldstar, NEC and (pictured) Philips, offered little new: a calculator-size keyboard, mono touch-screens. All offer easy PC connectivity with file synchronisation. Some offer web access but CE does not support Microsoft's Active X. Prices start at £300 (plus VAT). See p45.



400Kb satellite net link

A new satellite service offers fast web access at prices that could soon hit consumer level. The DirecPC service, from Hughes Olivetti Telecom (HOT), delivers up to 400Kb/sec one way (two ISDN lines provide 128Kb/sec duplex).

The primary use is to deliver business information, but a Turbo service for web users offers full interactivity. You link by a standard line to your service provider and return data is diverted via satellite. A dish and PC Card costs £1,100 (plus

VAT). Subscriptions are £13 a month for up to 30Mb, plus 95p per extra 1Mb; or £52 for up to 130Mb, plus 85p per extra 1Mb.

Brian Milnes, MD of distributor Satellite Digital Systems, said "The more people who use the system, the cheaper it can get."

En offers a cheaper PC Card to receive web pages and new forms of edutainment sent via a dedicated TV signal. UK agent, Martyn Rose, says broadcasts could start next year.

SDS 01494 455460; En 01823 665100 www.entechnology.com

Java chips with everything

Chips hardwired to run Java will be available as early as next year, according to Sun. It claims they will run Java code much faster than general-purpose processors like the Pentium.

Java chips could turn devices such as smart phones

and PDAs into powerful web boxes. They exist at the moment only as core designs which other manufacturers will implement in silicon, adding memory and input and output facilities to suit their target applications. More details are at

www.sun.com

PC giants fight NC tidal wave

Giants of the PC world fought back against a tide of interest in the network computer in the weeks leading up to Fall

of-use and cost issues.

Microsoft and Intel even came up with a design for a PC-NC hybrid (see p44) and IBM announced a cost of ownership initiative.

The NC wave gathered pace at Comdex, where various vendors including Wyse (see p35) showed models. Lotus announced that it will release a Java version of its component software, which will give NCs applets for tasks like word processing.

Corel has posted a beta of Java versions of its WordPerfect Suite at www.corel.com.

Some 10,000 new products were launched at Comdex — see pages 36 and 43.



The tower version of Sun's new network computer

Comdex, the major industry event of the year.

Sun and Oracle (with Britain's Acorn) both unveiled NC models amid much razamataz. The Sun model starts at a stiff £695 (plus VAT) with no monitor, but is said to cut costs by 65 percent.

Claims like this have forced the Wintel axis to answer awkward ease-



GROVE OUTLOOK: Web livecast of Intel chief, Andy Grove, giving his Comdex keynote in which he predicted that in 15 years processors with a billion transistors, running at 10,000MHz, will perform 100,000 million operations per second compared with the 400MIPS of a 200MHz Pentium



GRAPHIC DESCRIPTION: A sequence from a £29.29 CD of animations called Animation Movie Collection. The idea is that you email them instead of greetings cards. Birthdays will never be the same again. MultiMedia Factory: Freephone 0500 011722

Web gets down to business

A new form of trading institution could bring web commerce to small business and home users. BT, UUNet Pipex and AT&T have all signed up to be Commerce Service Providers (CSPs), taking care of electronic transactions on behalf of businesses.

They use software from Open Market (OM) which can transform a web site from an advertisement into a fully-fledged online business in a matter of hours, says UK managing director, Peter Stanley.

It supports credit card and other transactions up to a minimum of £5. Smaller ones can be charged on account. OM has signed a deal with Cybercash which should allow micro-transactions by next year.

OM has formed a partnership with Logica, one of Britain's largest enterprise system builders, to sell the system throughout Europe and Asia. Customers are likely to include banks and other institutions

that risk being sidelined. BT and Pipex both offer CSP services through their web page business arms; respectively BT WebWorld and The Bureau.

Microsoft has launched merchant-server software to allow businesses to take care of transactions themselves.

www.openmarket.com; www.bureau.pipex.com; www.btwebworld.com; www.microsoft.com

Forget PCs and NCs: the big money will be made on specialist devices like this prototype map reader from Diba (www.diba.com) which showed a number of similar appliances at Comdex. Watch out for more on them next year.



Robot Cupid unites web lonely hearts

A robot Cupid is helping to bring lovers together, across the world. It's an intelligent software agent that searches the One & Only online dating database of over 15,000 and emails users a list of compatible people. Single people can place a personal ad free, and special categories include nationality (including British) as well as people with disabilities.

One and Only: www.one-and-only.com



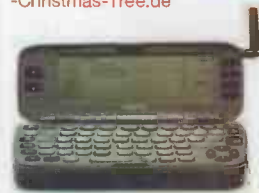
"He said he looked like Keanu Reeves... I said I looked like Madonna. The robot had us matched as a perfect pair of liars."



Short Stories



■ Er... we hope you don't mind us mentioning this, as it is the season of festive overdose, but if you or your children wish to contact Mr Claus, you can do so via www.christmas.com where you can see this picture of his latest sleigh. Werth, a seller of Christmas trees, has Santa pages in English at www.German-Christmas-Tree.de



Win a Nokia 9000

■ You can win a Nokia 9000 communicator at Online Information 96, the world's largest electronic publishing exhibition, which runs from the 3-5th December at Olympia, London. Just take your business card to the Quza stand (560) in the Net City section. Quza is a joint Racal-Integralis venture to provide managed internet solutions.

Demon wires users for sound

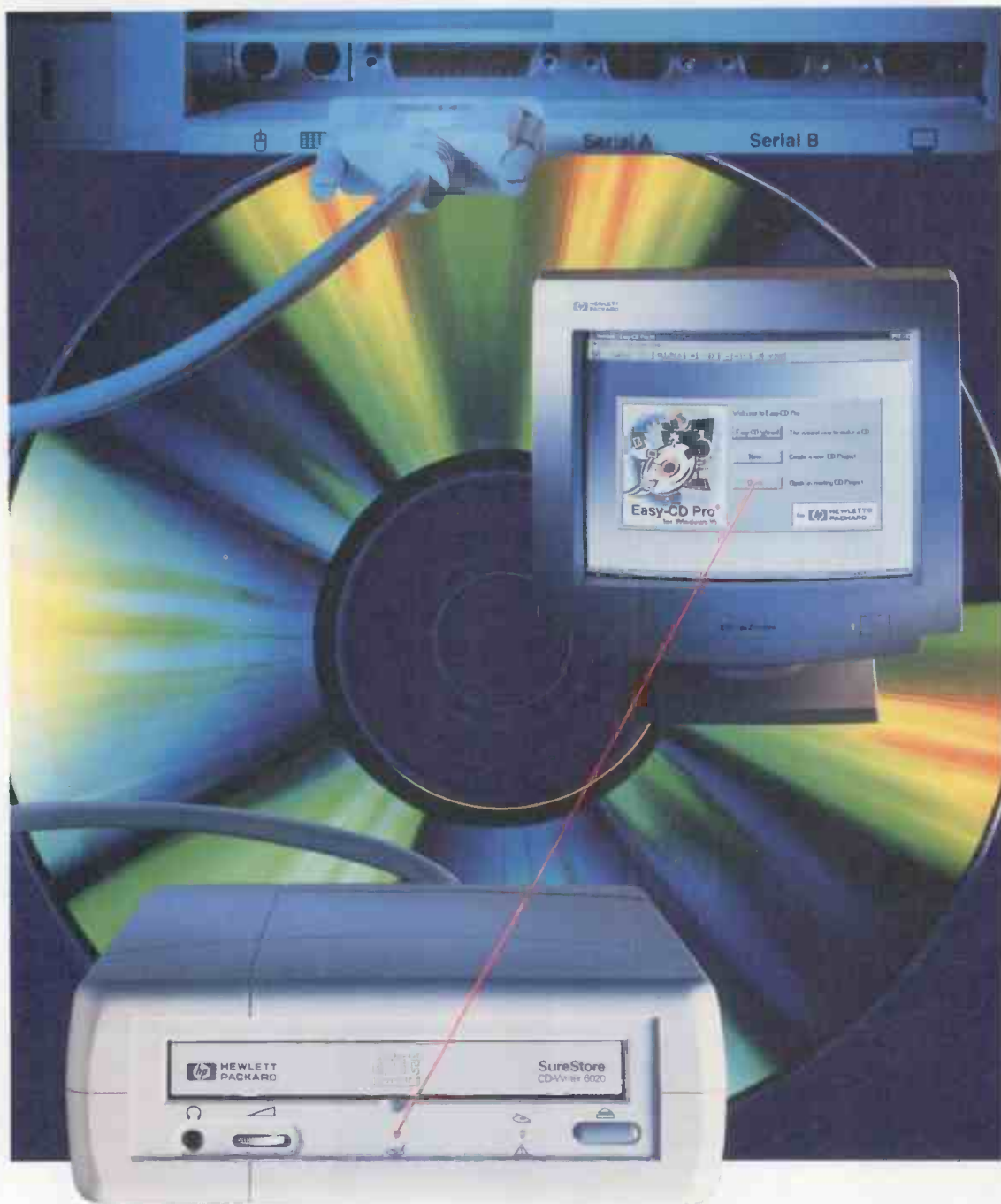
■ Demon Internet is offering two Real Audio streams to its £10-a-month customers, enabling them to add sound to home pages for which they get 5Mb of space, free. The new facility allows two people to listen simultaneously.

Demon 0181 371 1234

Danmere

■ A price is omitted for the Danmere Backer advertised on page 319. It is £39.95 (incl. VAT).

Now we've made writing a CD
as easy as printing.



 **HEWLETT®
PACKARD**

HP SureStore

Simply connect the new external HP SureStore CD-Writer to the parallel port on your PC or laptop, click on the helpful HP Wizards, and transfer up to 650MB of files onto CD. It's as easy as printing!

Because today's enhanced parallel port transfers data so quickly, we've now designed a CD-Writer to use it to write CDs.

The HP SureStore CD-Writer 6020ep.

In addition to this model, we also offer both external and internal SCSI models (the HP SureStore CD-Writer 6020es and 6020i), so you can choose between a portable unit to share with other PCs, or a dedicated internal model. A 6 times reading speed provides faster file transfers, while recording speed is an industry standard 2 times.

All models come with the latest, full-featured software to enable you to store all kinds of information on CD – from customer records and reference catalogues to multi-media presentations.

Furthermore, the CDs created are industry standard, and can be read by millions of PCs with CD-ROMs worldwide. Once the information is on the CD, it's completely safe – HP SureStore media has a 100 year archival life. And the HP SureStore CD-Writer is so reliable that we offer an Express Exchange Warranty.

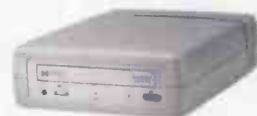
For more information, ring 0990 474747. And, while stocks last, we'll send you a free multi-media demonstration on CD.



FREE CD



HP SureStore CD-Writer 6020i



HP SureStore CD-Writer 6020ep
and 6020es

New PCs get higher class of Windows 95

The Windows 95 shipping with many PCs is not the one that was launched last year, nor the one you buy off the shelf. Called the OEM Service Release 2 (OSR2), it has so many bug fixes and new features that under the old Win 3.x naming system it would have got its own "x" number: Win95.x does not have quite the same ring.

New features include IDE bus mastering, drivers for CD jukeboxes and optical drives, plus support for CD file system enhancements and Intel's new MMX extensions (see page 34).

A big change is the FAT 32 file system, which handles disk partitions up to 8Gb in

4Kb blocks, called clusters; the old 16-bit system can use a 32Kb cluster for a two-byte file and requires fiddles to address

big disks. PC makers have got the features early because the software needs to be tested only for their specific hardware.

Anne Mitchard, desktop-systems marketing manager, explained: "It can take months to test for all possible devices all over the world."



Partition Magic 3, which can change disk partitions on-the-fly, supports FAT32 and NT's NTFS file systems
Software Warehouse
01675 466467



■ C++ developers were salivating over Borland's new C++ Builder, which uses the highly-popular Delphi development environment. The product will ship early next year.

■ The Universal Serial Bus (USB), the biggest external change to the PC since the 3.5in disk drive, appeared in force for the first time. It provides a 10Mbit/sec serial connection, plus 5v power, for up to 127 peripherals daisy-chained from hubs, and is expected eventually to replace both the serial and parallel ports.

The USB Implementers' Forum showed products from some of the 200 companies now developing USB.

Devices on show include a gamepad from Alps, the ScanMan Color 2000 scanner from Logitech, monitors from Philips, a telephone from Intel and an ISDN adaptor from Inforvent.

Hubs and controllers came from Intel, Future Technology Devices, Texas Instruments, Philips, Multivideo Labs and National Semiconductor.

Faster connections, particularly for video, will use new Firewire (aka 1394) ports. ACC Microelectronics showed a 64-bit PCI controller; Adaptec also offers a PCI solution.

USBIF (503) 264-0509;
ACC (408) 980-0622

■ Panasonic showed a phone, using Diba technology (see page 29), that receives email and browses WWW text. A keyboard connects to the rear.

Integrated Technology released CompuNet 2000, a PC keyboard telephone with internet capabilities.

Panasonic (201) 348-9090;
Integrated Technology
(201) 907-0200

■ @loha, from Media Synergy, lets email users add animation and sound to ordinary plain-text messages. Recipients need only a Windows email package for viewing.

Media Synergy (416) 369-1100

Many of the Windows 95 enhancements are available free for download. To obtain any of the following, just add the filename indicated to the URL www.microsoft.com/windows/software/ in your browser address box:
Kernel 32 Update Stops a browser hogging memory on prolonged use. Not for non-English versions. [knlupd.htm](#)
Kernel Toys Useful tools include keyboard mapper and memory monitor. [krlntoy.htm](#)

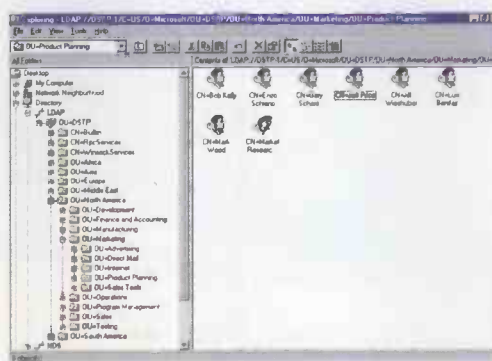
Exchange Update Replaces the Inbox. Better performance is claimed but there are reports of problems with faxes. [exupd.htm](#)
IRDA drivers Infra-red support. [irda.htm](#)
ISDN accelerator Support for ISDN expansion cards. [isdn.htm](#)
Backup Update Performance boost to the backup applet. [backupd.htm](#)
Powertoys Applets for customising the user interface and taskbar. [powertoy.htm](#)

NT 5.0 secrets actively revealed

Microsoft last month gave glimpses of what is to come in the next version of Windows NT, codenamed Cairo, only weeks after the release of the latest NT 4.0.

Developers at a Microsoft conference in Los Angeles were given 16 CDs with key NT 5.0 technologies, including a kit for "clustering" NT machines to boost power. Chairman, Bill Gates, promised improved support for multiprocessors. The emphasis on scalability is aimed at boosting NT's share of enterprise-size systems where Unix reigns.

A feature called Active Directory will be able to support more than ten million items per store to enable the expansion of NT installations. It supports a number of file systems (NT Server 3.x and 4.x, NetWare directory services and 3.x binderies, HTTP and DNS Internet services, LDAP repository and X.500) to help machines with different



operating systems work together.

Active Server covers a variety of sins including messaging, database transaction facilities and Active Server Pages (previously called Denali), which is included in the new Internet Information Server 3.0 software.

ASP adjusts Web pages on-the-fly to suit the browser accessing them and supports a number of scripting languages. Some of the new features will also be in Windows 97.

■ More details in *News Analysis* on page 44.



Your old integrated plain paper fax, phone, copier, scanner and colour printer.

There are stacks of reasons to buy the new Samsung Multijet SF4200.

First, it's a superior-quality ink-jet fax machine which takes standard A4 plain

paper. Second, you can connect it to your PC to send faxes without having to use any paper at all. Third, when it's connected, you can use it as a colour printer.

(Beginning to see where the 'Multi' part of its name came from?)

It's also a copier. And a scanner. Oh yes, and a telephone. We could go

The Samsung Multijet range is available through Comet, Tempo, Viking Direct and Neat Ideas, or for more information on the new range of Samsung Multijet fax machines (including the SF4000 plain

Name..... Address.....



Our new integrated plain paper fax, PC fax, phone, copier, scanner and colour printer.

on - so we will. It has a 24 page (upgradeable to 48 pages) full dual access memory, which allows documents to be scanned for transmission whilst

simultaneously receiving a fax! And it comes complete with a 30 sheet automatic document feeder. All this means you'll not only improve

productivity and efficiency, but also reduce capital investment and running costs. And at just £799.99 all in, the Multijet SF4200 will also save you a pile.

paper fax and the SF4100 monoprinf) send the coupon to Samsung Electronics (UK) Ltd, Samsung House, 225 Hook Rise South, Surbiton, Surrey KT6 7LD. Freephone: 0800 585 869 or Fax: 0181 391 8295

Tel..... PCW 01/97

Short Stories



■ This wireless keyboard, with a touchpad, was one of several shown at Comdex by Keytronic, which makes the Win95 keyboard for Microsoft. It also showed a keyboard using the new USB serial bus. Keytronic, which has sold largely to PC manufacturers, is now selling via shops and dealers.

Keytronic 353 42 38100 (Eire)

Fractally-compressed video for the web

■ Iterated Systems (IS) has released a video version of its fractal compression product which, it claims, allows passable video transmission even on a 28.8K modem link.

IS claims its ClearVideo system can improve on MPEG by up to 25:1, depending on the image. Compression times of around three seconds a frame are too slow for real-time video but are expected to drop. Clear Video costs £695 (plus VAT). The viewer is free, from:

www.iterated.com
Iterated Systems 01734 880261

Confusion as Intel ships MMX

Intel unveiled the first of its multimedia-enhanced MMX chips last month amid confusion over the future of its Pentium Pro processors. The 166MHz and 220MHz Pentium MMX chips are available now at \$447 and \$550 respectively.

MMX chips support 57 new instructions aimed at speeding up the processing of multimedia datastreams. Pentium Pro chips are to get MMX technology in a version codenamed Klamath, due to launch in February. Klamath also improves Pro performance when running 16-bit code — the current 32-bit-optimised generation

actually runs them slower than Pentiums.

Klamath will eventually replace the Pentium Pro, according to a leaked document, writes Mike McGee of VNU Newswire. But you won't be able to upgrade from Pentium Pro to Klamath because the new design uses a processor card with an incompatible pinout.

Some industry experts fear confusion over processor options, particularly in choosing between the 200MHz Pentium Pro and the 200MHz Klamath. "There won't

be that much difference in performance," claimed Lynley Gwennap, editor-in-chief of *The Microprocessor Report* "and to make matters worse, you'll have the P55C [former name of Pentium MMX] there, barking at the old Pentium Pro's speeds."

But an Intel spokeswoman said: "You can bet your life that we'll position these chips clearly. There will be no confusion."

Intel 01793 403000



The start of it all

Intel engineer Ted Hoff, assigned to build circuits for this 1969-design Busicom calculator, came up with what became the 4004, the first general-purpose micro-processor, launched 25 years ago. Intel celebrated with a web display (www.intel.com) and the calculator featured in an anniversary history exhibition at Comdex in Las Vegas.

Compact Windows gets a GEM of a rival

The new compact CE version of Windows faces a rival from the past: the GEM environment which gave the original Amstrad PC a GUI, and room to spare for applications, in a total of just 512Kb RAM.

The source code of GEM, also familiar to Atari users, is about to be placed in the public domain on the web. GEM, originally less than 200Kb, was developed in the mid-1980s by Lee Lorenzen, who joined Digital Research Inc (DRI) from the famous Xerox PARC lab where the GUI was invented.

An intellectual property dispute arose because a DRI employee had signed a non-disclosure agreement with Apple, with the result that DRI had to make GEM less like Apple's GUI. Ownership passed to

Novell in 1991 when DRI found itself unable to compete with Microsoft's OEM licensing practices, subsequently partially curtailed by a US Justice Department antitrust action.

Caldera, founded in 1994 by former Novell CEO, Ray Noorda, bought GEM, with the DR DOS operating system and associated technologies in July. Caldera is now suing Microsoft for "anti-competitive actions" against DR DOS.

Caldera was surprised at the continuing interest in GEM, so it decided to open access to the source code. Apart from device drivers in assembler, GEM is written in C and a 32-bit version is a possibility.

Caldera will also make the source code of DR DOS available and this is expected shortly after GEM. DR DOS will now be

called OpenDOS. So far, Caldera has focused on adding value to its Linux CD distribution and developing OpenDOS for special markets — an OEM version is already available.

Further development of OpenDOS, and any commercialisation of GEM, will be from a new UK office, where key members of the original Hungerford-based DR DOS development team work.

Caldera has some ideas for its use in special markets such as touch-screen terminals, PDAs or computer phones. Another possibility is to link a ROM-based OpenDOS GEM, Java and a simple DOS browser in a low-cost network computer.

Graham Lea

Caldera www.caldera.com

NTriguing Java client puts Windows on the NC world



A new Java applet will allow Network Computers based on all manner of hardware to run Windows applications. The trick using NTrigue, a special version of NT 3.51, is already used with Mac and Unix boxes

It works much like PC remote control software. The application actually runs on the server or host, with the guest or client sending key-presses and receiving screen draws. The resulting network traffic is so light that the system can be run over a phone line. Across a local network, an application may even run faster than on a local PC.

NTrigue comes from the UK emulation specialist Insignia Solutions, which has access to Microsoft source code. The new Java client will allow firms switching to NCs to continue using existing applications.

Another application could be on the web. NTrigue allows site designers to port Windows applications straight to the web. For instance, a Windows-based form linked to a database can be downloaded and run just as if it were a Java applet, though the user would need to have, or be prepared to download, the NTrigue Java client.

Clive Akass

Insignia: www.insignia.com; 01494 453300

Short Stories

Wyse moves in with three-tier NC range

Wyse Technology has a three-tier suite of network computers aimed at corporate users, schools, the health service and government. Its range now consists of the existing Winterm 2000 series, a new high-end Winterm 4000 client, and low-end text-only intranet boxes. The Winterm 2600 is an LCD monitor and can be used as a touch-screen panel with embedded applications. The Winterm 4000s are optimised for Java.

Due to ship next year is a portable wireless Windows terminal, the Winterm 2900, with a touch-screen and a wireless modem.

Wyse 01734 342200

50Gb tape drive

Sony has launched SDX, a range of tape drives and media based on Advanced Intelligent Tape technology which stores 25Gb (50Gb with compression) and gives a transfer rate of 3Mb/sec.

Sony 01932 816641

TV switch-off

PCs are reducing the amount of time that Americans spend watching TV. The drift is particularly marked among the most well off, which could affect advertising revenues, according to a Forrester report.

Virtual home

Business hotel rooms can seem unreal as you stagger in, culture-shocked and jet-lagged, with your body screaming 5am and time for bed when the clock says 3pm. At London's Royal Garden hotel you can abandon all reality for the virtual world. Not only do the rooms have web access, but you get to put on a VR helmet — at least it may keep a few stressed-out travellers from being ripped off in the sin bins of Soho.



The first Web-made celebrity?

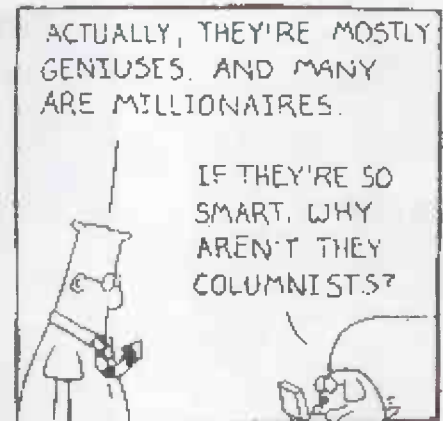
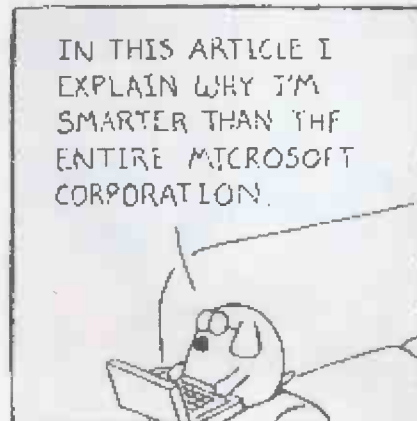
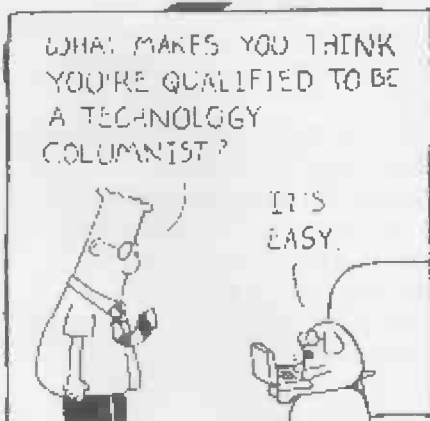
Dilbert, the socially-challenged engineer, was one of the first international celebrities to emerge via the web.

He first appeared in the US press in 1989 but his fame quickly spread abroad after he hit

the web in April, 1993. The humour probably struck a chord with early, predominantly technical, users because author Scott Adams comes from their world: he started drawing Dilbert to relieve the tedium of meetings

while working for the Pacific Bell company.

A new book, *The Dilbert Zone*, has just been published and his web site gets 1.6 million hits a day. You can try it at www.unitedmedia.com



Short Stories



■ Ericsson claims its new Mobile Office offers everything needed to link a laptop PC or PDA to an Ericsson mobile phone to send and receive faxes, email, short messaging services, browse the web, access LANs or WANs and transfer files, over standard or GSM phones. The Mobile Office supports a maximum data transmission rate of 76.8Kb/sec and will be priced at around £399 (plus VAT).

Ericsson 01444 234567

Flowcharter goes with the Basic flow

■ Flowcharter 7 from Micrografx features "Living Flowcharts", which allows developers to apply Visual Basic code to shapes, making them suitable for interactive questionnaires. Flowcharter 7 includes support for ActiveX. URLs can be embedded in shapes.

Micrografx has also launched Small Business Graphics and Print Studio, which includes Windows Draw 5, Picture Publisher and Instant 3D, a package for creating 3D text and graphics. It costs £79 (plus VAT).

Micrografx 01483 747526

Local Alta Vista

■ Digital has launched a piece of software based on Alta Vista's search engine, called Alta Vista Search My Computer. The idea is that internet and intranet users can integrate PC and web search facilities. The £20 software can be downloaded from the company's site at www.digital.com

Oh Brother!

■ The new Brother Professor MultiMedia Powerhouse PC has been launched, with a Pentium Pro 200 processor, an Intel 440FX chipset, 32Mb EDO RAM, 256Kb pipeline burst cache and a 2Gb hard drive.

Brother 01279 416888

Sharp puts digital camera in new colour palmtop

Sharp showed off its new, colour Zaurus palmtop, the MI-10, at Comdex. The device is currently available only in Japan and may not be sold in Britain (where the Zauruses are called the ZR range, because of a trademark clash).

The Zaurus (pictured, right) in Japan has a 5in, 65,000-colour screen and one model, the Mi-10DC, comes with a PC card-based digital camera.

It has a 32-bit RISC processor, an infra-red port, built-in web connection and browser software, and can send and



receive faxes. Email comes with a "multimedia mail" facility which allows you to attach still image or audio files to mail messages. A built-in voice memo function allows voice messages to be stored as sound files, or forwarded.

Sharp also launched the first wide-screen portable. The PC-W100T has a 16in x 9in screen with 1024 x 600 resolution. It has a 133MHz Pentium processor, 16Mb RAM and a 1.1Gb hard disk, and costs a recommended £2,995 (plus VAT). Watch out for a review in our next issue.

Jessica Hodgson

Sharp 0161 204 2633



Toshiba cuts prices as rivals snap at its high-end heels

The Dolch L-PAC lacks card slots but costs less than its stable-mates

Toshiba has introduced seven new notebooks across its range and cut prices of existing models by up to 27 percent, as rival notebook makers vie for a slice of the high-end corporate market.

The four Satellites, one Portege and two

new Tectra models, all boast 800 x 600 screens, optional CD drives and Zoomed Video for fast graphics. The new Portege 660CDT takes a new, slimline, ten-speed CD drive.

Dell has launched its most powerful Latitude yet. The XPI CD P150 has a 150MHz Pentium processor, 16Mb of RAM, a 12.1in SVGA TFT display, six-speed CD and a 1Gb disk.

Samsung has introduced a new range of Pentium-based multimedia notebooks, the Sens Pro500, priced from £1,595 to £2,999 (plus VAT). The entry-level N500 model has a 100MHz Pentium processor, 8Mb EDO RAM, 810Mb hard disk and 11.3in SVGA DSTN display.

Toshiba 01937 828828; Dell 01344 720000;

Samsung 0181 391 0168;

Dolch 01928 263622

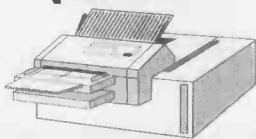


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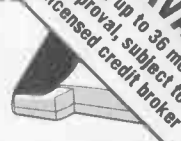
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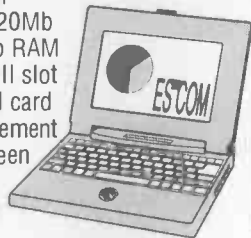


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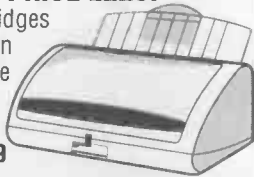


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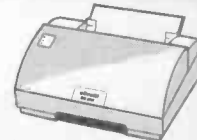
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Short Stories



Pure Virgin sound with RealAudio 3.0

■ A beta version of RealAudio 3.0, which offers stereo sound over a standard internet link, can be downloaded from Virgin Radio's site at www.virginradio.co.uk/radio.html

Virgin broadcasts live over the net in RA 3.0 stereo, so you can try it out while you are at the site. Further details are at www.realaudio.com

The new Virgin Net is offering a free personalised news service called Autonomy to tempt new subscribers. It delivers daily news on your specified areas of interest. The Autonomy software is also available separately for £49.99 (incl VAT) from major outlets, or CD Revolution on 01932 562000.

Insurance job

■ Total Computer Cover, backed by Sun Alliance, is offering what it claims to be unique insurance cover for computers for homes or businesses. Users can claim for fire and other damage as well as theft, and TBC says claims will be settled quickly to minimise down times.

TBC 01625 526777

Family way

■ Epson is giving away a kit for printing up to ten T-shirt designs with every Stylus Color 500 inkjet printer sold. The recommended price has been cut from £274 to £257.

Epson 01442 611144

History of games

■ An exhibition on the history of video games runs at London's Museum of the Moving Image until next May 15th.

MOMI 0171 815 1331

Cheap ISDN card

■ Solwise is offering a 128Kb ISDN card, with an analogue port for a standard phone, for £149 (plus VAT). The card fits a standard PC ISA slot and comes with Win3.x/95 drivers.

Solwise 01482 473899

Free storage offer as off-site backup goes mainstream

Remote storage, long used by big companies to back up vital data in case local files are damaged or stolen, is about to go mainstream, according to the directors of a new low-cost web-based service.

Camberley-based Netstore, in partnership with the US company Connected Systems, is offering up to 100Mb of off-site data storage free as a way of turning people on to the idea.

The offer is open even to home users who do not plan to take up the paid-for service. They can expand their storage only at the rate of 5Mb a month up to the maximum.

"We believe that small businesses will need more than that," said Netstore

managing director, Jeff Maynard. Charges for greater volume depend on the amount of data backed up, the number of workstations, and the frequency of backup.

The standard service costs £3 a month for up to five workstations, adding up to 15Mb a month to an unlimited total. Full details are at www.netstore.co.uk. Netstore automates regular backups in such a way that only changes to files are transmitted.

Clients can use a standard web connection to access their data, which is encrypted to ensure confidentiality. A bonus is that the data, stored physically in highly-secure US servers, can be accessed from anywhere.

Netstore 07000 638786



World creator

The PC's new 3D graphics capabilities, once the teething problems are sorted out (see *News Analysis*, page 46), will be useless until games and applications are written for them. 3D authoring has tended to be done on expensive workstations, but MultiGen is shipping the latest version of its flagship, GameGen, in versions for Windows NT on the PC, as well as its traditional Silicon Graphics platform. GameGen II allows you to create 3D worlds, and either create or import "assets" and characters to go in them. The standard format can then be used for 32-bit or 64-bit games on platforms as diverse as Macs, PCs, the Nintendo 64, the Sega Saturn and the Sony Playstation. Product manager Rick Bess said GameGen II will allow small software houses to get into 3D game development. It costs £6,995 per user.

Transformation Software 01844 261456

Compaq follows the Sun

Compaq has launched a high-end workstation range in a bid to grab marketshare from Sun and Unix. Compaq's Workstation 5000 range is targeted primarily at the finance and CAD markets. Hugh Jenkins, enterprise product manager, Compaq UK, said: "Compaq professional workstations priced at £3,000 performed better than a £20,000 Sun. We are challenging the Unix/RISC markets with

products that deliver far better price/performance." Dataquest predicts a massive takeover of NT/Intel workstations.

Compaq 5000 workstations will come with one or two 200MHz Pentium Pros, wide-ultra SCSI controller, up to 512Mb of ECC DIMM memory, an eight-speed CD-ROM drive, and 10/100Mb/sec Ethernet.

Compaq 0990 134456

● Sun fights back — page 41.

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Before this page self destructs..... Turn to page 105

Sun puts a Sparc board into PC boxes

Sun is the latest high-end workstation vendor to come up with a low-cost desktop option, as increasing Pentium Pro power enables PCs to threaten the high-price, high-performance market.

Sun has taken a different approach to Silicon Graphics and its £5,000 O2 graphics station. It is offering a motherboard, based on its UltraSparc chip and Solaris operating system, which has the same dimensions as a PC

ATX board so it will fit into a cheap PC system box. It will operate on a standard PC power supply (heavily smoothed by two



daughterboards), off-the-shelf memory chips and PCI cards. Processor options range from the entry-level 167MHz UltraSparc-I to the 250MHz

UltraSparc-II.

Sun claims all these outperform the 166MHz PowerPC 604e and 620e, and the 200MHz Pentium Pro, particularly on floating-point operations.

Product manager Peter Palm said PC system builders will be able to make UltraSparc stations for as low as \$4,000. Applications are expected to include web and Java servers.

Sun 01276 204444

Smart searcher Muscat rambles to the tune of Java

CAMBRIDGE is the breeding ground for some smart little software creatures that are getting themselves Java enabled. Muscat, a small Cambridge firm, is being tracked down by the great and the good for developing intelligent search engines that nose out any clues thrown their way.

Such talents have not gone unnoticed. In the House of Commons, a Muscat engine is indexing and searching for Hansard archives. Over the past year, Muscat has been busy developing the search engine and software for Reuters News Explorer, launched this month at Olympia Online.

Last month, Muscat was at the launch of the Java workstation in New York and in Brussels — the I-Station, using a Java

front-end to Muscat. The server system was written by Muscat customer, Cascade Systems. At the demo stage, John Snyder, one of Muscat's founders, said: "We are putting Muscat into Java so programs can be written and deployed on any system including Mac. We will build Java front-ends to an engine inside Netscape, to make it more interactive."

Any Java-enabled browser can be used. "When someone comes to our search engine they download a Java applet which gives them a three-dimensional screen which is interactive."

Muscat gets emailed love letters — "We love your ferret". The company is moving Euroferret back up to Cambridge from London in order to put more resources into

FEN WATCH
CAROLINE SWIFT, business editor of the *Cambridge Evening News*, continues her reports from Silicon Fen

it. Traffic has increased and the plan is to be able to index one million people a day.

The search engine crawls around the web and indexes only European pages. For the football fan it means not being caught with irrelevant American football pages. Its technology has been selling to those needing a closer focus — wanting to index their own part of the web — and has been taken up by organisations such as Business Link.

Virgin is the biggest corporate customer of the Muscat multi-site indexes, using its Euroferret technology on the newly-launched Virgin Net service. It has indexed all 5,000 sites of interest to the Virgin user.

Java is calling the tune now, says John Snyder. "There is a general awareness of Java and how it is going to change things. It is making the browser front-end much more interactive as part of the search process.

"Putting all Muscat software into Java makes it independent for deployment by other software companies who want to use Muscat in their own applications."

Java Muscat software, launched early this month, can be sampled on Muscat's site at www.muscat.co.uk under Muscat.fx. freeware. The freeware can be used to index HTML pages.

■ A Cambridge company was launched last month on £1 million funding from a group of private investors to enable secure electronic transactions using strong cryptography.

Investors in the startup, called nChipher, include Terence Matthews, chairman of the billion dollar Canadian networking and telecoms company, Newbridge Networks.

Technical director Dr Nicko van Someren and chief scientist Ian Harvey graduated with firsts in computer science from Trinity College. The firm is on the fast track to developing products that simplify the use of cryptography in applications such as internet security and electronic commerce. Believed to be ahead of the field, they are claiming to be able to speed up the authentication process 100-fold using a bolt-on product. The first product, Fastness, is due out in the spring.



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Apple gets mobile in schools

Apple has launched a stylish machine called the eMate for schools. It's notebook-sized, weighs 4lb, and runs the Newton palmtop OS. Basic applications are built in, with an emphasis on education features such as graphing. It uses a 25MHz ARM 710a processor, 3Mb of RAM, and has a PC Card slot. Apple and Acorn have a joint company called Xemplar to sell into UK schools. A Xemplar spokesman said the

eMate, priced at about \$800, will not appear here until next year and will not compete with Acorn's Pocketbook, a rebadged Psion customised for schools. "The eMate costs more and is better suited to heavy-duty input, he said."

Apple has also launched a new Newton mobile. The MessagePad 2000 uses a high-performance 160MHz StrongArm chip (developed by Acorn stablemate, ARM).
Apple 0800 639866



Apple Chirpy about MacOS for the PowerPC platform

The AIM consortium (Apple, IBM and Motorola) took a tent at Comdex to show off machines from themselves and other vendors based on the PowerPC Platform spec, which is designed to offer the best of the PC and Mac platforms.

The spec is still referred to as Chirp, from the acronym of its original title, the Common Hardware Reference Platform. The idea was to encourage third-party developers to build machines around PowerPC chips that could run either the MacOS or Windows NT. Crucially, they could also use standard PC peripherals, including PCI cards, so that they can take advantage of the economies of scale of the PC market.

Third-party MacOS machines have already appeared from the likes of Umax

and Power Computing. But the turning point should come next spring when the MacOS for the PowerPC ships, bringing optimised software and tightly-specified Chirp hardware together for the first time.

Chirp boards and even chipsets will come from specialist developers and manufacturers, as in the PC clone market, according to Ross Ely, Apple's PowerMac product line manager. This will free Apple engineers from support and mainline development to concentrate on "the 3D graphics, the i/o ... the differentiators for the PowerPC platform."

MacOS for the PowerPC is based on System 7.6, the mini-upgrade of the Mac OS which is expected to ship in January.

Clive Akass



Key to portability

■ One of the best accessories for the MessagePad is this keyboard, weighing practically nothing but being big enough to type on. Apple is to market a wallet next year which takes both, effectively giving the MessagePad the usability of a notebook.

New Winzip

■ The new version 6.2 of Winzip includes support for Uuencode, Xxencode, BinHex, and Mime3. It also supports self-extracting files. A disk containing both 16-bit Win3.1 and 32-bit Win 95 versions can be ordered for \$29.95 from www.winzip.com

Top 10 Windows software

		Last month
1	SoftNET Internet Pack	Software W'house -
2	Windows 3.x to Windows 95 U/G	Microsoft 1
3	Microsoft Encarta 97	Microsoft -
4	First Aid Deluxe	Rod Manhattan 5
5	Norton Anti-Virus 95	Symantec -
6	Partition Magic	POW Distribution 9
7	Microsoft Flight Simulator 95	Microsoft -
8	Microsoft Publisher v3	IMSI -
9	McAfee Virus Scan 3 in 1	Mcafee 10
10	WinDelete v3	IMSI -

Top 10 DOS software

1	System Commander	POW Distribution 1
2	Ski Europe	Pearson -
3	MSDOS v6.22 U/G	Microsoft 4
4	Turbo C++v3	Borland 6
5	Formula 1 Grand Prix	Pinnacle 5
6	Turbo Pascal v7	Borland -
7	Quake Full Release	GT Interactive -
8	Tas Books	Megatech -
9	The Last Dynasty	Sierra -
10	Flightshop	Appollo -

Top 10 CD-ROMs

1	Inside Independence Day	Electronic Arts -
2	Encarta 97	Microsoft -
3	Encarta 97 World Atlas	Microsoft -
4	The Unexplained	Flagtower 5
5	Cinemanla	Microsoft 2
6	Organic Art	Warner Interactive 4
7	Autoroute Express UK 97	Microsoft -
8	Autoroute Express Europe 97	Microsoft -
9	Astrologer	Maris 8
10	Music Central 97	Microsoft -

Top 10 peripherals

1	Primax 4,800 Flatbed Scanner	Primax -
2	Sicos DMS2000 & Textbridge OCR	Sicos & Xerox -
3	Mirai 8x CD-ROM	Mirai -
4	Epson Stylus Colour 500	Epson 6
5	Philips 28.8 fax/modem (external)	Philips -
6	miroConnect 34 Office	miro -
7	USR 33,600 voice fax/modem	US Robotics 8
8	8x CD-ROM & 32-bit sound card	Aztech -
9	10x CD-ROM & 32-bit sound card	Aztech -
10	Evergreen 486 to 586	Evergreen -

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

Fat chance for thin clients

Nearly everyone made NC announcements in the run-up to Comdex last month. Clive Akass reports from the Microsoft Developers' Conference.

Life in the US imitates television, especially in the computer industry. The protagonists in the network computer (NC) debate are all straight out of a soap opera: Sun chief Scott McNealy talks in soundbytes and looks as if at any moment he will break into a song and dance act; Oracle's Larry Ellison appears as a megalomaniac, convinced he is about to take over the world. And Bill Gates, who really *has* taken over the world, if only temporarily, conducts his public business like a TV show host, complete with celebrity appearances and special effects. The special effect at this conference was to fly British journalists 8,000 miles to LA and then address them via satellite video-link from his hotel room in London.

Gates has reacted to the NC like a heavyweight champ caught by an unexpectedly severe punch: confident of supremacy, yet rattled enough to look to his guard. The ostensible reason for the international press gathering was to show off work on the next version of Windows NT only weeks after the launch of version 4.0 (see *Newsprint*).

But woven into the proceedings were arguments for the fat client, the feature-laden PC, as opposed to the thin client or NC, the machine that is little more than a window onto the network. Most of the arguments have been chewed over, *ad nauseam*, for the past year. Major among them is the claim that even large companies don't have data pipes big enough to support thin clients, and certainly not enough to sustain the kind of multimedia-rich environment offered by PCs.

Applications group vice-president Paul Maritz boasts that the internal architecture of Windows is being "completely replumbed" in a rolling program of incremental changes to provide high-performance 3D graphics (see *page 46 for a rather less happy perspective*). At the same time, Microsoft implicitly recognised the force of the arguments in favour of the NC, with what it described as two major announcements:

1. The Zero Maintenance Initiative (note the word "initiative"; this is technology still in the making). The main idea is for the central server to hold a registry of all applications and files on its clients, enabling global maintenance from a single machine.

2. The NetPC, which will be made by various vendors to a reference design from Microsoft and Intel. It's a thinnish client, essentially a PC without expansion slots, and using local disk as a cache to relieve network traffic rather than for permanent storage. Gates described this as combining the best of the NC and the PC.

Microsoft also stressed initiatives to make the PC easier to use. The successor to Windows 95, codenamed Memphis, will support automatic system updates via the web. Both it and NT 5.0 will use the Windows Driver Model, allowing the same hardware drivers to be used with either operating system, and OnNow, a standby mode which "wakes up" the PC to take a data or fax call.

NT 5.0 Server will have a new set of tools for managing distributed computers. Most interesting for the desktop user is the server which will store a client's switch-off state: this lets you log straight in to where you left off, even from someone else's machine. Microsoft showed some of this working on top of NT 4.0 code and it was impressive. The company did not get to the top on hype alone, and it is not about to be toppled by hype.

Nevertheless, the computing world is changing in ways beyond even Microsoft's control. I asked Jim Allchin, senior vice-president of Microsoft's desktop and PC division, about the extent to which the company's strategy, particularly its ActiveX component technology, chimed with the all-aboard universality of the web. He insisted that ActiveX was universal, that it was running on Mac and Unix boxes. "We also have NT running on a number of platforms, including RISC," he said. But he admitted that ActiveX will not run on all the new computing devices, like set-top boxes and smart-phones, that will soon hit the market. It will not even run on Windows CE (see *Beyond the desktop*, opposite).

I suggested that here was one aspect of the NC that Microsoft could not counter: the simple elegance of the idea of a virtual machine that can ride the web on any hardware it likes as long as it speaks HTML and runs Java. I was also rash enough to mention Sun's Java chip (see *Newsprint*). Allchin resorted to what Microsofties have been doing all year: trying to destroy the NC message by shooting the NC messengers. "That chip is just Scot McNealy's way of trying to lock people into Java, into Sun's technology. We know that well. We talk to his people all the time and they tell us," he said with some acerbity. Perish the thought that Microsoft might try something like that. ■



Microsoft has been forced to react to the ubiquitous NC. This one, from Wyse, is installed in a UK school

Beyond the desktop

The new CE operating system in the latest handhelds brings take-away data to town. Tim Bajarin considers whether this could be another winner for Microsoft.

One of the most important announcements at Comdex was the introduction of handhelds using Microsoft's new Windows CE operating system. Microsoft will not say what CE stands for: many think "consumer electronics" but it was initially referred to within the company as Windows Compact Edition.

CE was designed to help Bill Gates extend his Windows franchise beyond the desktop as the information appliance market develops over the next few years. Its first incarnation may be on the handheld PC, but it can be used on set-top boxes, Web TVs, smart-phones and any other information appliance.

At first, it will support the Hitachi SH3 and MIPS 4000 RISC processors but can be tuned to support Intel chips, too. Microsoft focused on the Hitachi MIPS 4000 chips because they offer high power at very low cost.

The first reference design is a handheld PC which connects to the desktop and enables users to take desktop data with them on the move. A synchronisation program instantly reconciles data in desktop and handheld files. This automatic procedure should be compelling to anyone who uses a Windows 95 desktop. The other key design feature was to replicate the actual Windows 95 interface, eliminating the learning curve for Windows users.

CE uses the same 32-bit kernel as Windows NT but with only 500 of the 4,000-plus API calls. It ships with pocket versions of Word, Excel, Internet Explorer 3.0, a contact manager, and Schedule Plus on ROM. Files are compatible with their Windows equivalents.

Hewlett-Packard, Compaq, NEC, Casio, Philips and LG Electronics have a six-month exclusive deal to be the first onto the market with these Hand PCs. By late spring, at least five other vendors will jump into the market. Only Casio and Compaq were ready to ship on launch day. Compaq's is actually a rebadged Casio; next year, it will be designed in-house. At the time of writing, NEC was due to ship towards the end of November, with LG Electronics and Philips delivering in January and H-P in spring.

Creative Strategies predicts that 350,000 will be sold worldwide in 1997 and 750,000 in 1998. Sales of "consumer" organisers have reached about 350,000 units a month worldwide and market

leaders like H-P's 200 LX, the Sharp Zaurus and the Psions have, to date, an installed base of about 500,000.

The first CE machines use existing organiser screens and keyboards, and as a result they are hard to read and type on. I expect second-generation versions to have an improved design and broader market appeal.

It is not clear what impact word-of-mouth and magazine reviews will have on sales. The poor screens and keyboards alone could generate bad reviews. But if CE machines are seen as "take-away data" devices with a Windows look-and-feel, Microsoft could have another winner on its hands. With over 500 developers supporting Windows CE, you can expect to see it become a strong candidate for use in many other devices. ■



The CE interface on one of the new handhelds

NC vs PC — the pressure builds

The battle between Microsoft and the network-computer camp is getting serious. Sun and Oracle have both launched NCs (network computers) in the past month, with much hype, and many in their camp actually believe they can de-throne Microsoft in corporate America by the end of the decade as Java applications flood the market.

This may be unrealistic, but my sources say that, for the first time in memory, Microsoft is very concerned. It is not jumping into the NC fray because it wants to. It wishes the NC concept would just go away and allow Windows to become the only operating system for corporate America.

It is being forced to confront the issue by information-system directors who are loath to move to Windows NT because of the cost of upgrading their entire PC line. And the cost, in terms of time and money, of administering these next-generation operating systems is high when compared to the NC, for which almost all upgrading and maintenance can be carried out from a single, central, server. Many PC users, including myself, don't like the idea of relinquishing control of the desktop to a server administrator. But as PCs become more powerful, they become more complicated to use and maintain. I would love one that needed almost no maintenance and worked flawlessly each time I used it.

Hence, Microsoft's talk of its own thin client and "zero administration costs" (see *opposite*). The Sun-Oracle NC consortium is getting so much attention in the *Fortune 500* companies that Microsoft has to make its thin client easy to use and cost efficient. With even Bill Gates getting into the NC arena, you can expect this to be the hottest topic in our industry well into 1997.

Premature extrapolation

Urged on by forecasts of a huge increase in the numbers of 3D boards to be shipped next year, an over-excited industry appears to be putting the cart before the horse, suggests Dylan Armbrust.

According to the John Peddie Report (*JPA Quarterly Hardware Market Report*, 15th June, 1996), up to 40 million graphics boards will have been shipped worldwide by the end of 1996, just over two million of which are 3D boards. It predicts that a further 1.25 million 3D boards will be shipped during the first three months of 1997, indicating sales of five million (if you extrapolate) for the whole, in that year. That is an expected increase of 150 percent over the previous year.

These are impressive statistics and we are already seeing 3D beginning to infiltrate the market. Gateway 2000, one of the highest-volume shippers, has incorporated 3D cards or chips into its boxes and could ship upwards of two million units for the coming year. Even smaller PC builders such as Dan and Panix have shifted towards integrating 3D-capable cards into their machines.

If you ask them why, they'll all say the same thing: they are getting ready for the 3D revolution, especially for games that make use of Direct3D, the new 3D programming interface and part of Microsoft's DirectX multimedia enhancement API.

Last January, I sat through a strategy briefing by Matrox Graphics when representatives talked about the company's Mystique board (top secret at the time) and how they had decided to chase aggressively after the consumer 3D market. "3D graphics acceleration has become one of the most sought-after features in the mainstream computer industry today," they said, and the key to the 3D market was gaming; the largest consumer segment. They projected that by this Christmas 30 percent of all new games titles would be authored under Direct 3D (D3D) — this was pretty optimistic but nothing new, as it has been the industry mantra for the past year.

But the 3D phenomenon can be likened to the emerging cable and satellite TV industry in which there are lots of channels to watch but not enough content to fill them: almost all graphics card manufacturers have a 3D card but there is nothing to play with out there. Only two fully-D3D games; *Monster Truck Madness* and *Hellbender*, were available in Britain in October and a handful more were due to have been released at Comdex in November — this is a far cry from that 30 percent prediction, especially in the UK.

There is also the problem of DirectX driver compatibility (see our *group test*, p210). At the time of going to press, there was an inconsistency in who had DirectX-capable

drivers and which version they were using. Some manufacturers by-passed DirectX 2.0 altogether and decided to implement DirectX 3.0 although, in the case of Hercules, it meant delaying full 3D functionality for the Terminator 3D graphics card.

Lack of content and driver incompatibility does not normally bode well for the industry but all, from games developers to hardware vendors, to Microsoft, put their faith in the future of 3D.

David Weeks, Windows product manager, concedes that D3D "is still in its infancy" but says that DirectX has achieved "tremendous gains" in a year. He predicts that up to 30 D3D games will be available early next year.

Few appear to disagree with Weeks and the Microsoft message. Even those who at first ignored DirectX 2.0 are not doing the same with DirectX 3.0: they know a good thing when they see it, even in the early days.

But with ever-evolving standards the consumer can forget any sort of stability in their display drivers in the days ahead. It has been rumoured that Microsoft will be releasing a DirectX 4.0 update in January, with another due to follow in June. Microsoft has stated that it expects only one update in that time, with the betas shipping in March. Who's to say what is really going to happen?

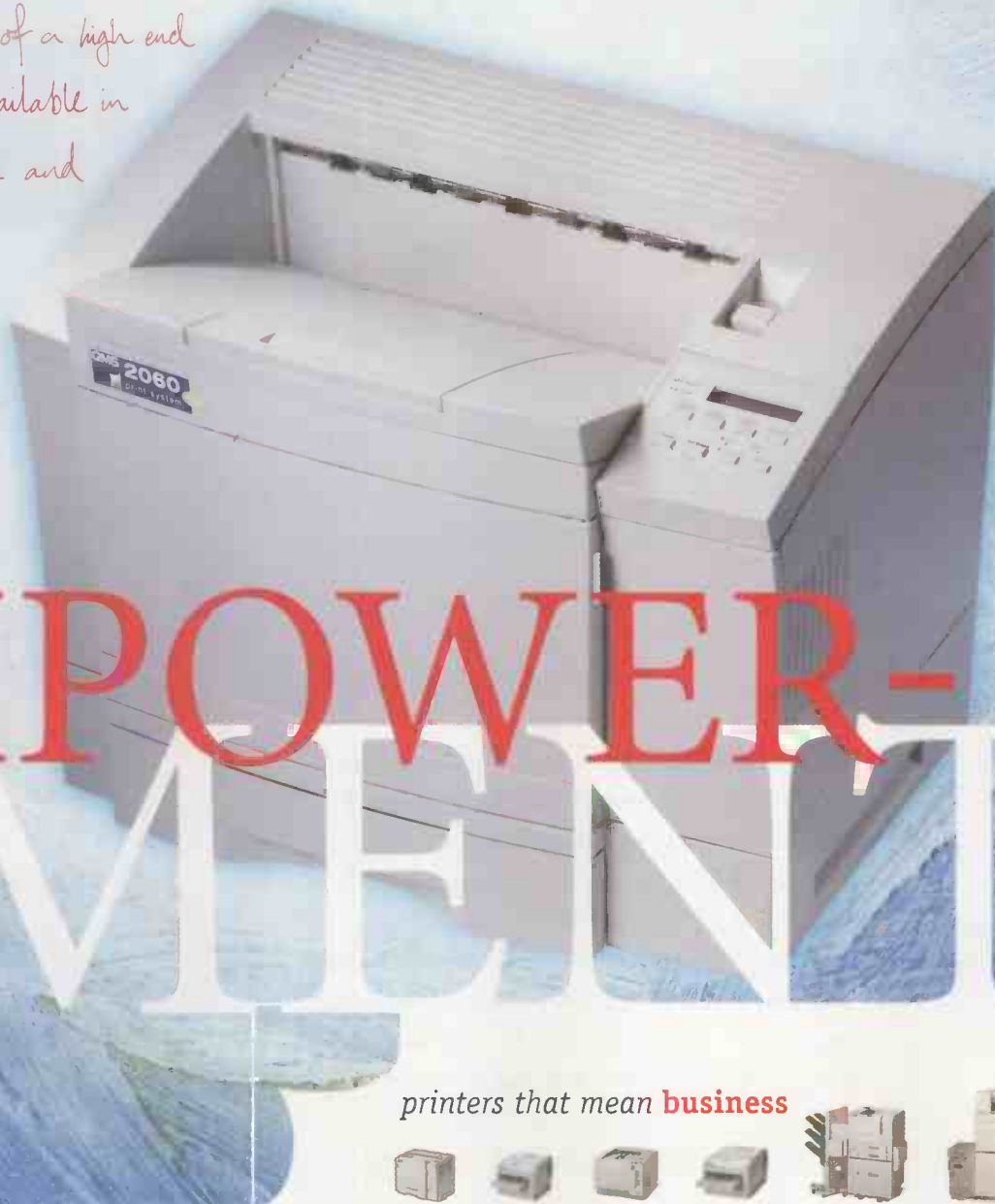
Most hardware vendors claim that they are continually upgrading and honing their drivers, all of which can be downloaded from the web. But this is usually an excuse to rush to market with an incomplete set of drivers so that they can get a market toe-hold and then play "oops, catch-up" via updates on the web. In the end, though, it is the consumer who ends up out in the cold. Pity the majority of PC owners without web access, unable to upgrade their first release and potentially buggy drivers.

With Microsoft's long-term strategy of "re-plumbing" the Windows Multimedia Architecture (see *Newsprint*), you can expect more of the same for the next few years. Let us hope that modem sales increase substantially or that the industry quickly moves from infancy to adulthood. ■



The 3D revolution has arrived, but so far only in small quantities: *Monster Truck Madness*, from Microsoft, is one of the few D3D games available before Christmas

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Of you want some idea of what it's like to be dead, you could do worse than come to Mousehole, in Cornwall. After a few minutes trudging its narcolepsy-inducing, near-lifeless streets, you find yourself desperately seeking some Enchanted Princess to kiss in order to wake the whole place up.

Apologies to Mousehole's residents. They'd doubtless tell me that it only *seems* like the arse-end of nowhere and that, in season, Mousehole is Where It's At; that The Ship Inn, in whose sleepy lounge bar I'm currently tapping away on my laptop, is actually the South West's major sink of iniquity from May through to September, with go-go dancers and a strip show every half hour.

But I live here now. Not in Mousehole but in nearby Newlyn. Shortly before I made the move, I decided a thorough clear-out of my computer equipment was in order. The ensuing casualties included my busted Compaq, hurled into a south London skip, and my Librex (remember them?) which I offered to a good cause. Leaving me with just one laptop: a 1989 Psion MC-400.

I can hear it now: "How can you possibly function with such an obsolete, non-standard, underpowered piece of kit?" Well, say what you will, but in the seven years I've owned the thing, I don't believe any manufacturer (except perhaps Amstrad with its NC100 and NC200) has come close to producing anything better in terms of fitness for purpose. Certainly, I'd like to be able run Windows 95 and the same programs as my desktop machine, but I wouldn't want to give up the MC-400's 50-hour battery life, its near-perfect keyboard and its amazing durability.

I've harped on about this before, I know, but as no-one's bothered to act on my bleatings, I'll do an encore. What particularly irritates me is the way people coo over these multimedia, integral CD-ROM Pentium laptops with their supertwist LCD screens and four-grand price tags. Just recently, a *PCW* reviewer brought himself close to climax describing the latest unit. What particularly impressed him was its four-and-a-half hour battery life. Son, that's not a battery life, it's a battery footnote. If it were human, it would be a criminal offence to serve it anything stronger than Kaliber.

Where did things start going so askew? Five years ago, we were edging towards a conventional laptop that would keep going all day. One of the Zeniths, I recall, boasted eight hours' life before handing in its dinner pail. And that was with a standard Nicad battery, too. Nowadays, with Nickel Ion and Zinc Air, we ought to be approaching something that makes it to pensionable age.

But colour happened and suddenly, everyone wants a colour screen. Everyone wants a CD-ROM and speakers, too. Essentially, everyone wants a dwarf version of their desktop machine. The poor battery must feel like that Caliph with his 365 wives. But why does everyone except me want an all-singing, all-dancing laptop? Or is it just the manufacturers forcing it on them?

This morning, I strapped the MC-400 onto the back of my bike and set off down a bumpy country lane. I wouldn't have dared do that with, say, an IBM Thinkpad. Or any laptop (and that's all of them) with precision-engineered moving parts. First stop was a church in a village called Paul. I got off the bike, undid the Psion and turned it on. On it came. No pissing around for two minutes booting up. Then I typed a few memos to myself. At the end of this, I didn't bother saving the file, I just shut down the Psion, knowing that I'd be able to resume where I'd left off. Which I did once I reached Mousehole. I sat down, turned on the laptop, and continued. Then I got the idea for this month's column, and so closed the clamshell case and headed in the direction of The Ship Inn for lubrication. And, well-lubricated, here I am still. And, more importantly, here, still, is the Psion's battery, with a lot more life in it yet. After finishing this column, I could fill in a spreadsheet, populate a database. Anything. For several more hours.

The point is, most people use computers for word processing, spreadsheets and accounts. Psion and others have shown that you can do all these more than adequately on a machine based around a low-powered 8086 chip. Yes, of course there's a need for a fully-specced colour laptop, but I'd reckon it's a niche market.

Right now, it's technically possible to create a rugged,



Michael Hewitt

Sounding Off

Why do people coo over super-mega-gobsmacking Pentium laptops with a short battery life? It irritates the hell out of Michael Hewitt.

reliable laptop, smaller and more powerful than the MC-400, with a full-size keyboard, high-resolution screen, and the sort of functionality that will keep most computer users perfectly happy. And it will keep on keeping them happy all week from a single set of batteries. Okay, there won't be any snazzy graphics, colour or sound. But if you want that, you'd just point the laptop in the direction of your PC's infra-red port and transfer the data.

So how about it, manufacturers? Eventually, this Psion is going to wear out and I'll need something to replace it. Two years ago I made a similar plea. I hope I won't be doing it again in another two years' time. ■

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Have I done my keyboard rant? Oh yes, back in July, 1995. But to briefly recap, the QWERTY keyboard layout hasn't seen an upgrade since 1872, when it was designed expressly to slow down typing speeds. So let's turn to that other desktop peripheral, the monitor. Based on another piece of 1870s technology, the cathode ray tube, this, at least, has seen some development, notably the advent of colour in the 1950s.

Three years ago, I decided to upgrade my monitor to something I could gaze at all day without risk to eye and brain. Even though I had the privilege of a discount in return for shamelessly plugging the company for the rest of my career (something I've now stopped doing), I still had to write Eizo a four-figure cheque. And, I risked a hernia carrying the thing up the 44 steps to the room where I work, and I had to extend my desk. Now, don't get me wrong. I've never regretted the purchase, and my seventeen inches are much admired by envious visitors. Unlike the rest of my PC, age does not wither it, nor custom stale.

As monitors go, it's excellent, with a clear, undistorted and flicker-free display; the trouble is, monitors *don't* go. Not far enough, anyway. To use Windows as nature intended, say, viewing two legible, lifesize A4 pages, or one page of processed words and a reasonable expanse of spreadsheet, you need at least 1,280 x 1,024 pixels. And given the relentless encroachment of button bars on to the screen real estate, 1,600 x 1,200 would allow a margin of future proofing. I can push my monitor to the former resolution but that's stretching it very near the limits of its dot-pitch. It also means increasing the size of fonts, icons and buttons to the point where the exercise is almost self-defeating. So what I really need is a 21in monitor which would entail another, reinforced, desk extension, provide hernias for two and, even though prices have fallen, give my bank manager a fit.

The desk space thing isn't just a joke. It's advisable to place the screen 50-70cm from the eyes if you want to avoid eyestrain, backache or a cricked neck. Which, given the size of these beasts, means a desk measuring about 120cm, front to back. But even if you had the room for it, you'd have trouble finding one. And while we're talking size, another interesting feature of this antiquated technology is that screen sizes are still measured in inches — even in mainland Europe. Not only that, but the quaint custom of quoting the size of the tube rather than that of the display itself still prevails. To paraphrase Disraeli, there are lies, damn lies and statistics such as "Mine's xx inches".

But never mind. "In five years, the tube-based monitor will be a thing of the past. Large-format colour screens

that you can hang on a wall or slip into a briefcase will be the norm." So wrote one industry pundit in 1988. And every year since, various experts have paraded with their sandwich boards showing a similar "End is nigh" message for the CRT. Jam tomorrow but never, it seems, jam today.

However, things are looking up. You can now get a 17in PixelVision TFT screen. It's just three inches deep and costs around £7,500 plus VAT. In early 1997, Fujitsu will be marketing a 21in, flat TFT display for around ten grand. Jam today, at last, but at prices that would make Fortnum and Mason blush. Me, I'll hang on for another five years, until "the tube-based monitor is a thing of the past". Then, for around £300 we'll be able to get nifty displays that fold up like a slim

magazine, or roll into a tube. Yes, trust me — I'm an industry pundit.

Name that @

Just as this column was stuck for the last 150 words, replies to the search for a name for the @ symbol used in email addresses (Homefront, December) started trickling in. Philip Davies had two suggestions: "com-a" (pronounced "commay"), a shortened version of "commercial at"; and "a-hole", short for "a in a hole". Well, the first isn't much cop as "com" is already in use

Homefront

What Tim Nott really needs is a 21in monitor... and a desk extension to cope with it. Never mind, the end is nigh for the CRT. Isn't it? They've been saying so for years, yet it's always jam tomorrow.

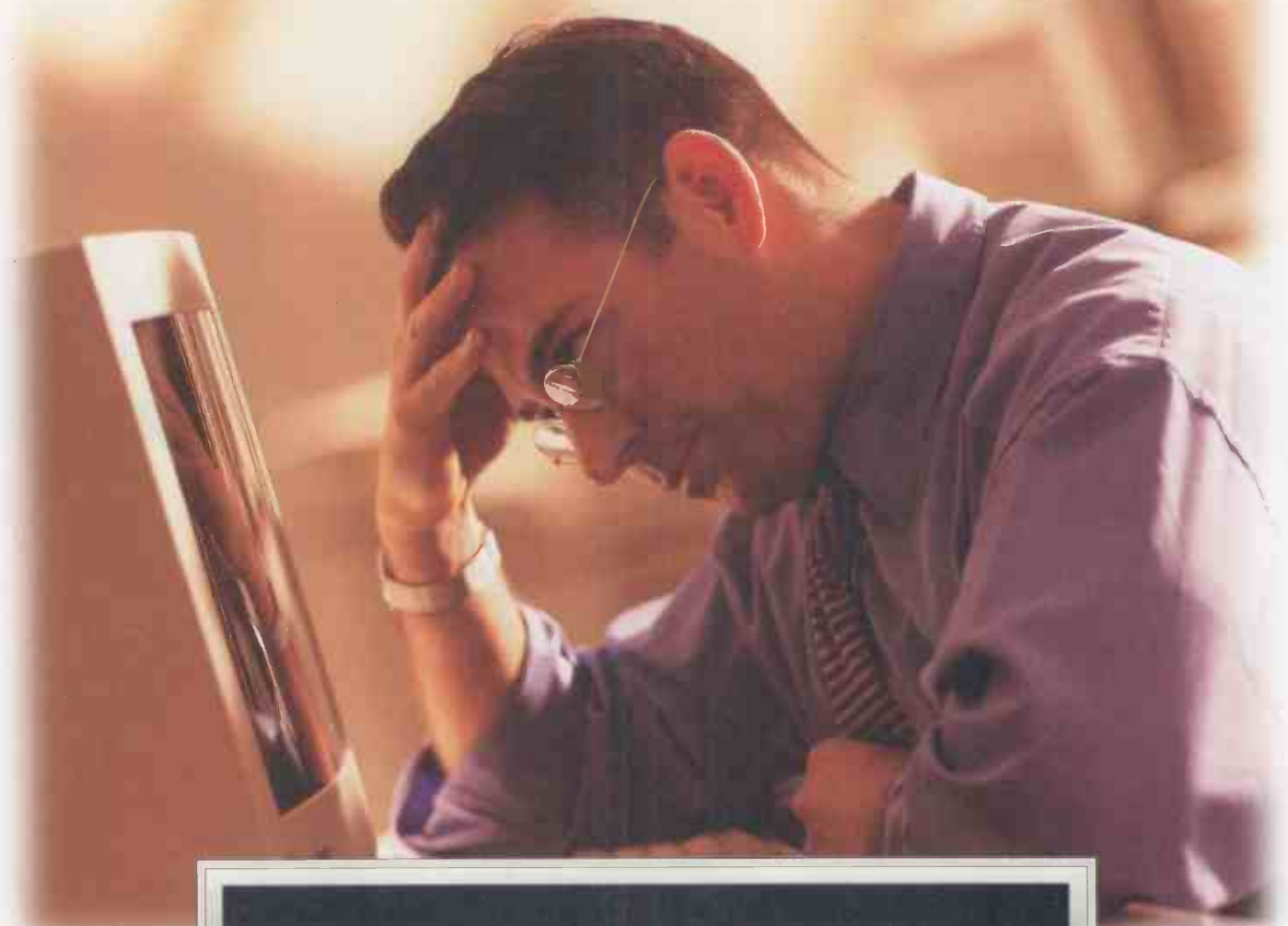
and "fred com-a bc.com" is too confusing when spoken. The second, although sounding rather too much like "aol", shows promise. As Philip points out, "I think a-hole may be doomed to misunderstandings by the more street-wise." And why not? "Arsehole" is certainly graphic, memorable and unlikely to already form part of a host or domain name.

Sophie Dixon had an even better suggestion. Equally anatomically graphic but suitable for polite company, "belly button" is my favourite so far. ■



Tim Nott

"Me, I'll hang on for another five years until the tube-based monitor is a thing of the past"



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Oftel has now decided what to do about BT's decision to increase the price of ISDN lines. After threatening BT with legal action, Oftel's director general, Don Cruickshank, says the increases are "worthwhile price cuts".

"All BT has done is move the figures around and introduce complex tariffs," says Bill Mieran, chairman of the Telecommunications Users Association. "ISDN is still too expensive. We thought Oftel wanted to do something about it, but it hasn't."

To briefly recap, the cheapest way so far to sign up for ISDN has been to pay BT £400 (plus VAT) for connection and then pay £336 a year for line rental. In June, Oftel told BT to be more "imaginative" in its marketing and BT came up with the "flexible approach". The rental on existing lines went up by £16 a year and new users faced a bewildering range of options which bundled a "free" call allowance with rental and installation costs.

These have now been re-jigged so the cheapest connection charge is £199 (plus VAT), with free calls worth £105 a year. But, and it's a big "but", users must pay £535 per year rental for a minimum of two years. Another option leaves connection at £400 and increases the rental to £352. This makes it even more important to know whether the investment is worthwhile.

Tel-Me is a good example of a service that uses ISDN efficiently. Tel-Me's software works on the user's PC to check passwords and prepare an information search request offline. Only then does it wing off to the Tel-Me server. The search result comes back and the call is disconnected in far less time than it takes most email services to logon a caller. But this only happens because Tel-Me is offering direct access to its database server.

ISDN does not speed up logon to an email service such as CompuServe or MSN. However, once you are connected, large files upload and download very fast. But they move pretty fast with a 28.8K modem, and how often do you transfer vast files by email? Once you are out into the net, there is seldom any advantage in using ISDN. Real transfer rates seldom exceed 1Kb/sec, or 10Kb/sec at best. So the real working speed is no faster than you get with a 14.4K modem.

Forget the promise of streaming video, in real time. If you have seen this demonstrated, the source is almost certainly a hard disk or Video CD which is delivering 1.5Mbps/sec. Several companies are now proposing a hybrid system: MPEG video is stored on a CD which works with a browser to blend text from an internet site with pre-packaged video from the disc.

RealAudio 3.0 comes free with Internet Explorer 3, so I tried it on the Microsoft Network. Some of the introductory demos worked well. Other RA 3 showcase sites threw up the error message: "Server alert. You cannot receive this content. Either your network bandwidth is not fast enough to receive this data or your

CPU is not powerful enough to decode it". I received the same message day after day, on several RA sites, using an ISDN line and a Pentium 120. If this is not good enough for RA3, then the publicity claims for RA3 are unjustified.

By trial and error, after no useful helpline help, I got an ISDN connection working with CompuServe. As CompuServe has not yet got its act together on the use of browsers, other than the antique Mosaic, it has been impossible to make any meaningful checks on how the service works with facilities that need Netscape or Explorer plug-ins.

Several readers have asked me to give an update on my warning that a new version of WinCim, which bundles with Netscape, renames existing DLL files when it installs. This puts parts of Microsoft Office (including Word) out of action. Well, I tried to get an update. Believe me, I tried.

I first asked CompuServe for comment in July. PR manager, Pauline Blakemore, promised to get back to me with news of a fix and advice on how subscribers can distinguish old, dangerous versions from new, safe ones. In August, I reminded Ms Blakemore I was still waiting. In September, a PR company suggested a meeting. I said okay, if there's something useful to discuss.

By October, I'd heard nothing and copied another reminder to CompuServe's MD, Martin Turner. Phone



Barry Fox

Straight Talking

Oftel has decided BT's increased ISDN prices are "worthwhile price cuts" and has withdrawn its threat of legal action. Barry Fox does a double take.

calls to CompuServe's PR office hit a wall of voicemail and "dial 0 for operator... sorry, there is no operator available".

I have to hand it to Microsoft, the MSN Helpline seems to be coping well with enquiries, although there has been a deluge of calls following the release of IE3. CompuServe is handing the online market to Microsoft on a plate. It is not yet clear whether MSN can improve net access speeds, and make the investment in ISDN worthwhile.

As things currently stand, there is just no point in donating an arm and a leg to BT for an ISDN connection. Stick with analogue 28.8 modems and save your money. If the rules of the game change, I'll keep you posted. ■

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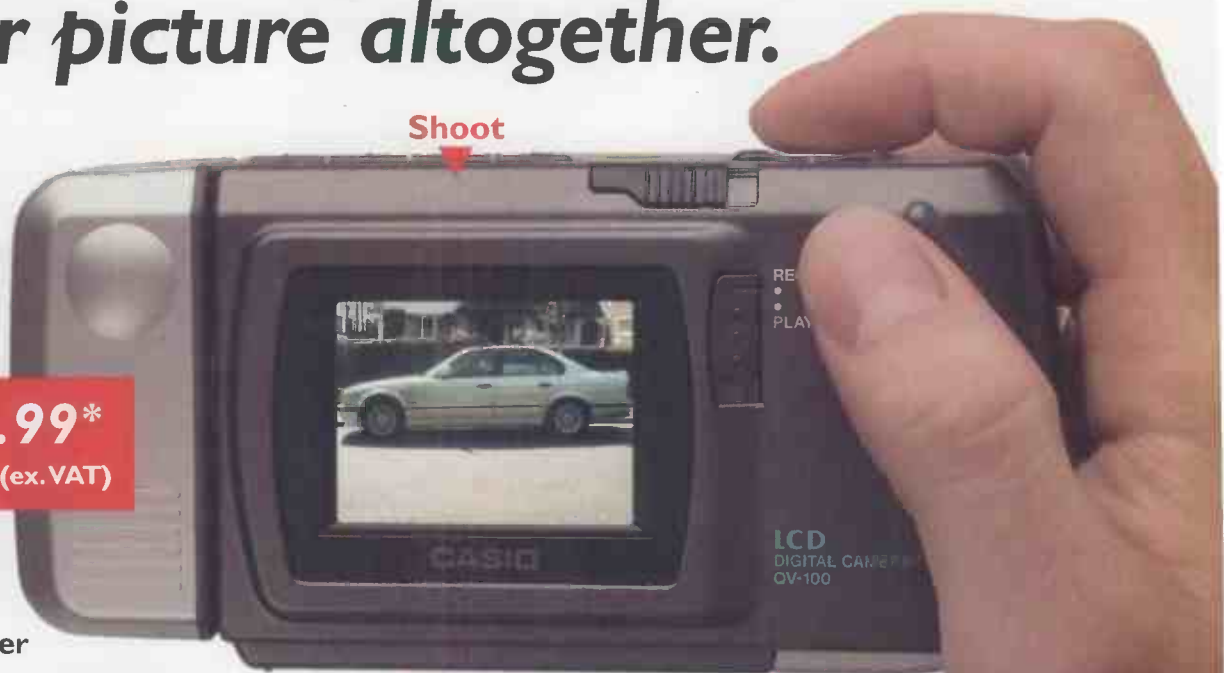
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Shops and banks really do not like money. Actually, that's not true. They like it a lot but they hate hard cash. It's a pain. It's bulky, easy to steal, easy to forge, and it takes considerable effort to sort and count. Not surprising, then, that there are several electronic replacements currently on trial.

Probably the best known is the BT/NatWest/Midland venture. The idea of Mondex is simple, as my recent investigation revealed. Instead of carrying coins and notes in your purse, you have a smartcard with a chip that acts as an electronic wallet. A cash machine charges up your card instead of dispensing notes. You then use it in shops, on buses, in phone boxes — wherever there's a reader.

I started out in a sceptical frame of mind. The benefits for banks and traders were obvious; but what about me? Cash might make a bulge in the pocket but it's physical and it's reassuring. What possible benefit could I derive from Mondex? All I could think of was not having to put a pound into those irritating car park machines that refuse to give change. But using Mondex has been a revelation and I'm now converted, so it's a shame the trial is liable to come up with poor results.

I'll tell you the cause of my pessimism in a moment, but first consider the benefits. First up is accessibility. Cash machines are irritating. If, like me, you live in the country, you might drive a long way to reach one. Even in a town, you can rarely park just to get cash. And when you do get there, a queue invariably materialises. And what happens when you get to the front of the queue? The little red flag comes down, it tells you it's closed. The nearest alternative is 15 miles away.

With Mondex the dispenser can't run out, but more importantly, the number of cash dispensers suddenly grows exponentially. Every payphone converted to accept a Mondex card can also download cash from your bank account. Better still, BT can provide you with a home phone with a smartcard slot. Now you can transfer cash between card and account (or from card to card) without leaving home. No need to rush to the bank, it's all there for you. That's real telephone banking and that alone is enough to convince me. But there's more.

The ability to arrange card-to-card transfers via the phone makes it easy to pay off a loan to a friend when you forget your card, or to send money down the line to your daughter who's stuck at a remote railway station without the fare for a ticket. The inability to physically take cash away acts as a deterrent to petty thieves — particularly school bullies who demand protection money, as has been demonstrated at a school trying out

smartcard cash. And then there's the internet. Yes, as always, the big "I" gets a look in.

Most people are wary about sending credit card numbers across the internet. You can understand it, even though the same people

will often happily order something over the phone using their credit card. Sending credit card data into the electronic void is frightening, especially given the worldwide nature of both the net and the ability to extract cash from your account. Let's do it the Mondex way: pop your card into the phone and transfer an amount of your choice to your PC's wallet, then go online and pay. You have a totally secure firewall. The remote

site knows nothing about the source of your cash. Even if someone were clever enough to break the smartcard's security, they can't gain access to it. They only know there's a fixed amount of verified cash they can transfer. It's solid and secure, and will be internationally recognised by the time Mondex comes into full production at the end of 1997.

So why am I gloomy about the trial? Firstly, it only has

"The benefits for banks and traders are obvious [but] what benefit could I get from Mondex? Cash might make a bulge in the pocket but it's physical and reassuring"



Brian Clegg

Business Matters

Mondex is a card which could replace hard cash forever. Will it catch on? Brian Clegg hopes so.

a small penetration in the population where it's in use; maybe five percent. Then there's the reaction I get from shopkeepers and barkeepers; a sort of raised eyebrow that anyone should be using the thing. None of them has ever admitted having many Mondex customers. Until there's a critical mass of card users, it's bound to seem strange, which means a small-scale trial is likely to fail. Take-up isn't helped by the intention to charge for the card when the trial is over. If the banks could overcome their greed and make do with the huge benefits to them of losing physical cash, and if the trial could be placed in an appropriate context, Mondex and its competitors have a great future. I can't wait to say goodbye to cash. ■

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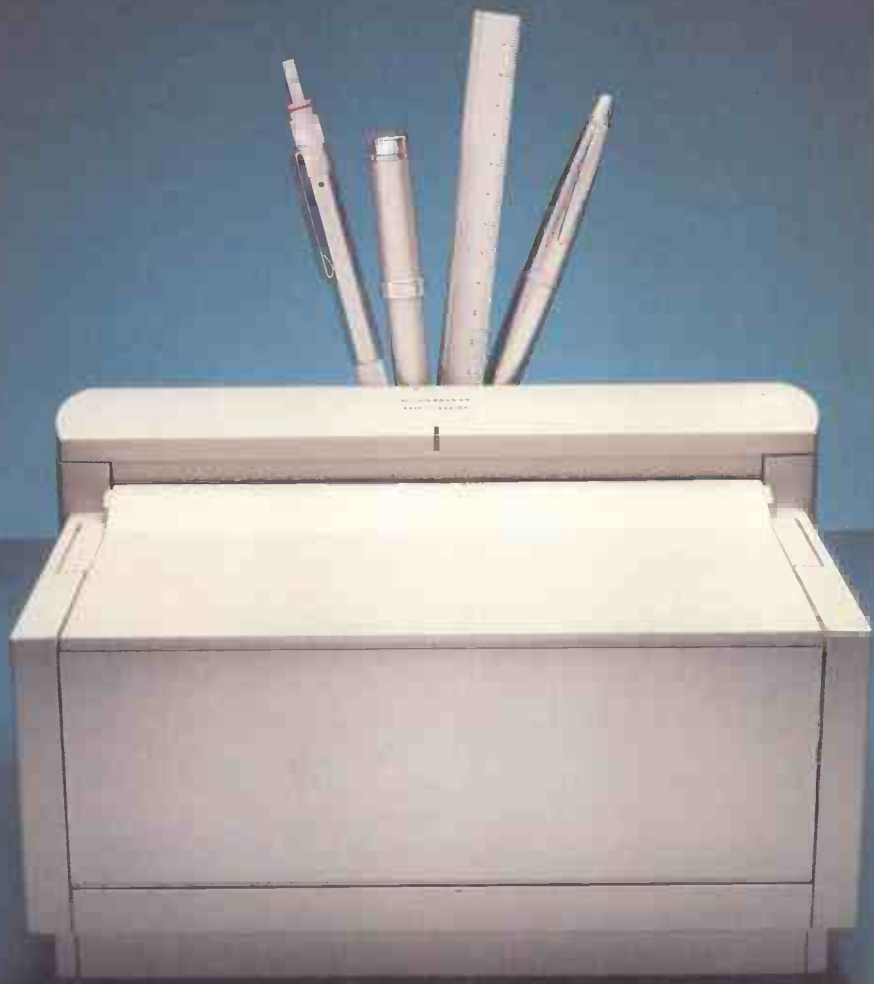
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NT compatibility blues

I have just moved from Windows 95 to NT 4.0 Workstation on my home PC (a Gateway P90 with 32Mb of RAM). My experience in doing this may well be similar to others who have made the same transition.

I have a "top-of-the-range" Logitech mouse and I value the facility to configure the middle button to act, for example, as a double-click. Unfortunately, there are no manufacturer-supplied NT drivers and this facility is unavailable under NT.

Logitech informed me it has no immediate plans to issue NT drivers. My NEC double-speed CD-ROM, which came with my computer, is not supported by NT, either.

The solution was to buy a new CD-ROM, so I bought a Creative Labs eight-speed and even this was hit-and-miss as the packaging mentioned 3.x and '95 but not NT. Winfax no longer functions and I am having trouble finding a fully NT compatible alternative.

Workstation is a sensible alternative to Windows 95 in many SoHo environments and the cost of the necessary processor/RAM is constantly falling. I would encourage you to feature NT compatibility in your reviews in addition to covering NT-only products.

Richard Alberg
 via the internet

PCW replies: Your experience of NT is not unusual and is a reason why many users are

happy to stick with Windows 3.x/95 for now. No doubt NT will grow in importance and this will be reflected in the pages of PCW. Meanwhile...

CD or not CD?

What has happened to my CD in the December issue? It's gone all square and old-fashioned looking and I can only locate about 1.4Mb of software. Is this a new form of DVD? Or have you discovered some highly secret data compression software, that I don't yet know about, which packs 600Mb onto a floppy?

Ian Bostock
 via the internet

Pricing out the pirates

Having read your article about software theft ("Crime Buster", PCW November), I would like to make my own opinions known. I believe the main factor causing software theft is cost. The price of software is prohibitive, and particularly so for home users and small businesses. Who can afford to pay the full cost of Office, for example?

I still use Word 2 and Excel 4, bought at a knock-down rate when the later versions were

released. Software companies could protect their software but don't want to suffer the costs involved. They want to maintain their high margins — margins which appear undented by theft. Are the prices high to ensure legitimate users subsidise the pirates?

The loss attributed to software theft is questionable; I



£10m-worth of counterfeit Microsoft software goes up in flames on Clapham Common, in London (see "Pricing out the pirates")

assume they estimate the number of illegal copies and then multiply this by the retail value. If there were a foolproof way of preventing theft, it is doubtful whether the companies would sell substantially more copies of

their software. People would not pay. They would simply purchase the cheaper products or use what is in Windows (Notepad and so on).

I suspect that reducing the cost of packages to a reasonable level would mean more people would be likely to buy legal copies and the real problem would be attacked: that of organised crime replacing legitimate copies in the channel. The chances are, such a step would boost sales over the higher-priced products. The marginal cost of such sales would be minimal since software reproduction is relatively cheap.

My moral sense, coupled with the fact that I work in computers and view piracy as threatening my job, dictates that I don't copy software. If it is easy and good value, I register shareware, otherwise I do not use it. I believe I am probably in a minority.

Mike Bennett
via the internet

NT overdose

Please tell me, what is going on? For some years now, you have published the best computer magazine by far. If a new product was released, never mind the platform, we could expect a concise, unbiased review. Yet this ability seems to have been lost.

For the past four months, we have been hearing about Windows NT 4. Certainly this is a major upgrade to Microsoft's only operating systems with a future beyond the x86 chip family and so deserves good press coverage. Yet what about OS/2 Warp 4.0? This is just as important and will prove to the computer community at large that OS/2 can be taken seriously. The number of innovative technologies, not to mention the best integration with the internet offered on any

p60 >

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platform, is simply astounding. Name another OS which has a great interface, voice dictation, plug-and-play on PCI and ISA buses, OpenDoc, Java built in, and is able to be diagnosed and upgraded directly from the internet. Let's not forget that Windows only became a true OS in version 4, and Warp still beats it in many ways.

Stuart Clark
Richmond-upon-Thames

PCW replies: *We are planning to conduct a group test of the*

leading operating systems, including OS/2 Warp 4.0, in the very near future.

Nobody's fool

I first heard of fake cache in a rival magazine, just before PCW announced it. Given that it was published around April, my first thoughts were that this was an elaborate April Fool's joke, but out of curiosity I ran cachechk.

Surprise, surprise, it reported fake cache! When the subsequent issue of PCW was still giving space to this

"scandal" and suggested readers check their cache, I began to worry. Surely if this was merely a joke it should have been leaked by now?

The postings on Usenet suggested it was all a scam based around what the real definition of "write-back" cache was. In many cases, buyers were claiming to have received refunds or replacements when suppliers had been threatened with legal action. So what was PCW (having made what I considered a fairly big deal

about this) doing about it? Nothing apparently! Was it just a big joke, as the supplier of my 256Kb cache motherboard claimed? Or did it die a death as buyers began to demand "proper" cache?

Perhaps I was taken in, since I looked at several different diagnostic programs (all of which said my home machine had no cache, yet happily found it on various work PCs) before approaching my supplier. The answer was that this was obviously a big joke since they had never heard of fake cache, only used reliable sources, and anyway, there was no reliable cache-checking programs available to the likes of me.

Denying that anything was wrong, the company responded that I had asked for 256Kb cache and had got exactly that. If I wasn't happy I could return the board which, even though it was out of warranty, would be tested to prove that the cache was there. The company said the BIOS was reporting cache present, so what more evidence did I require?

So what about it? Having started this, are we ever to see either a follow-up to this story or an announcement telling me and probably quite a few others, that it was all a big joke!

Richard Knight
via the internet

PCW news editor, Clive Akass, replies: *"There are, without doubt, boards around with dummy cache chips: some were inserted by manufacturers to reassure buyers of boards intended for non-cached machines; a practice you might consider at the very least to be reckless. Other boards appear to be deliberately fraudulent. Some advertisements for both types have been misleading to the point of fraud, although to be fair, some dealers have themselves been caught out.*

Eating humble pi

I imagine you will have been bombarded with letters pointing out to Michael Hewitt that pi is 3.1415926536 to ten decimal places, not 3.1428571429. I propose that he be forgiven, provided he explains clearly a method of using a slide rule to calculate pi. Mark Burch via the internet

You're right — here's the other one...



Pi-eyed or Pentium problems?

As a retired computer science lecturer, I read Michael Hewitt's article in the December issue with some interest — and some sympathy, until I saw his "calculation" of Pi. His "teaching by rote" upbringing did not I fear, get him, to understand that the ratio of circumference of a circle to its diameter can only be approximated to, and that 22/7 is just a convenient fraction giving the value to three places of decimals, not the ten or so he quotes. Shades of rounding errors in computer calculations!

Shock horror, the Pentium miscalculates! The modern methods he denigrates are intended to give pupils an understanding of mathematics ("internalisation" in the jargon) that is easily overwhelmed by the sheer mechanics of "doing



Children use PCs to calculate sums, rather than using their heads, according to Michael Hewitt

sums", hence the hopefully limited use of calculators. Whether the methods succeed is, as always, down to the ability of the teacher to enthuse his pupils. I still work faster on a slide rule than an adding machine.

Bob Bowker
via the internet

Cachechk gives misleading results on some setups. A "lite" version of the commercial program, PC Checkit, is available from our web site and should be more reliable. You cannot, however, rely on BIOS messages: I have a board which reports 265Kb cache even if you take the chips out. Any cache chips with Writeback or WB, stamped on them are almost certainly dummy.

Get a life

Why, oh why, do your contributors keep going on and on and on about CompuServe being expensive — there's at least one more such comment in your December issue.

I find the sums quite simple: CompuServe costs me £6.20 per month, and everybody else charges at least £10. Okay, so in a month when I spend several extra hours online browsing

airline timetables, it costs a little extra, but that's only once or twice a year. Surely for many people the annual cost with CompuServe will be much less than with anyone else?

Maybe it's just that PCW contributors don't have real lives to get on with and are in the tiny minority who spend so long online that CompuServe really does cost more?

Tim Ward
Cambridge

PCW replies: How dare you suggest we don't have real lives! We all go out regularly — to the coffee machine, the pizza parlour, the toilet etc.

Costing it out

The group test on inkjet printers (PCW November) was thorough and covered nearly all the points I needed to know. But one point I would have liked covered is

the cost per page of printing (or just the number of pages each cartridge lasted during the test, if you wanted to eliminate the costs of different sorts of paper).

I know you listed the makers' claims, but that is not the same as an independent test against which those claims may be measured. Running costs can be as important as capital costs for some of us.

I found it puzzling to have the HP870Cxi (your Editor's Choice) described as having a "four-colour CMYK cartridge set-up" while in your Table of Features at the end of the report, costs are given for a three-colour cartridge and a mono cartridge.

The complaint made time and time again in reviews of colour inkjet printers in various magazines, ever since these printers were developed, is that

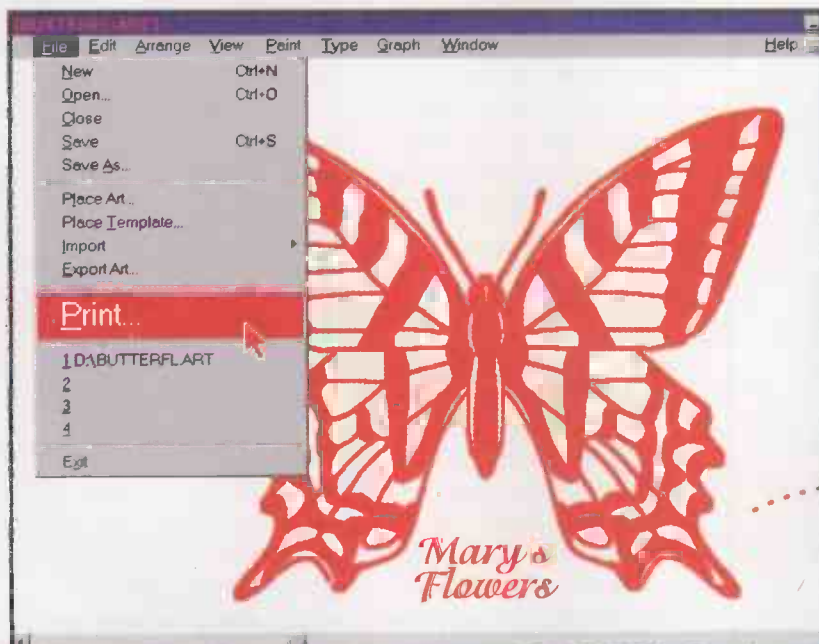
you have to throw away the cartridge when only one colour is exhausted.

This complaint is magnified when a four-colour cartridge has to be disposed of when the black is used up. Can you refill any of these cartridges? All manufacturers will advise against it, but you can take an independent view and can tell us what the advantages and disadvantages are, or even if it is impossible.

Norman Coats
via the internet

PCW's Eleanor Turton-Hill replies: Our first priority in testing inkjet printers is to provide accurate results in two categories: performance and output quality. Unfortunately, cost-per-page tests are impracticable during the short time-frame within which we have to review products.

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Accurate testing to measure the cost per page for each printer in a group test would involve exhausting the cartridge (or cartridges) in each printer several times over — a time-consuming and ultimately unrealistic test.

As for the term "four-colour", this is generally used to distinguish a printer from the cheaper "three-colour" models. The demarcation between the two types of architecture is crucial in a round-up of budget inkjet printers, where CMY and CMYK models offer different sets of pros and cons.

In the review of the HP870Cxi, this is made clear in the sentence "no need for swapping black and colour cartridges as all are included on one easy-to-install unit". See the section in the group test called "How inkjets work".

Ink chemistry is an area which we could research more thoroughly, and it's certainly true that manufacturers advise against refilling cartridges to protect the market for their own consumables. We'll certainly consider including a section on how refill ink affects quality in our next group test.

Microsoft Plus! — and minus

Some years ago, Microsoft created a club for its customers called "Microsoft Plus!". It offered members a magazine with news, software tips and special offers on Microsoft products. There was also a membership reward scheme for registering, which could be redeemed for new products. However, you had to wait for up to three months before you could get the products for your points, and you couldn't obtain upgrades with your points, only the full product.

Then Microsoft decided to use the name "Microsoft Plus!" for the extra bits of Windows

95 it ought to have put into it in the first place. So it changed its name to "Microsoft Advantage". That was no better. So it created "Microsoft Advantage Gold" and charged extra for all the increased benefits of belonging to "Gold".

When it was called "Microsoft Plus!", I had a windfall and decided to pay up and join to the year 2000. Now Microsoft has removed all the advantages of belonging to "Microsoft Advantage": the points system has been abolished, and in the latest edition of the magazine there is no special offer for members. All we get is a rather scrappy magazine singing the praises of Microsoft with 32 pages of "Hints and Tips". This is the only good thing about it, except that most of it is old stuff which anyone who has been using Microsoft products for more than two years will already have discovered for themselves.

The whole point of belonging to "Microsoft Advantage" was that we were to be given insights into ways we could do things with Microsoft software that we could not get anywhere else — "ideas that only Microsoft could give us," it said.

I am somewhat disillusioned with Microsoft. Were it not for the fact that I believe Word to be the best word processor and Excel the best spreadsheet, I think I would be getting out from under. There must be a lot of folk about, like me, who feel they have been conned.

Rev. Cyril Blount
West Yorkshire

Microsoft was asked to comment, but unfortunately we had not received a reply from the company by the time this issue went to press. ■



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The one on the left hasn't.**

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Best of Gadgets 1996

PCW Gadget Photography by David Whyte. Compiled by Gordon Laing.

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GPS mapping for Psion Series 3a

Every James Bond gadget-fanatic's dream comes true with cables to connect the Series 3a to a variety of Global Positioning System (GPS) devices. See *PCW*, March '96, for a full review. Mapper software and cable from Steve Litchfield on 01734 265081; <http://ourworld.compuserve.com/homepages/slitchfield>. GPS unit from Garmin 01794 519222



ADI MicroScan 17X

Most users work on A4 portrait-orientated documents, yet own landscape-orientated monitors. Until now, in order to view full-size A4 portrait documents you've had to invest in huge, expensive 21in monitors. But thanks to ADI and its 17in swivel monitor for Windows, those days could be over. Simply rotate the display, press a hot-key, and the image instantly flips to match the new orientation. No restarting Windows, and it works with most graphics cards. ADI Systems UK 0181 236 0801





IBM PalmTop PC 110

How about running Windows 3.1 on a 630g palmtop? This IBM wonder features a 486SX processor, 4.7in colour LCD display, infra-red and full internet access. Sadly, it's still only available in Japan. Do you want one? Of course you do. Base configuration starts at 169,000 yen (that's just over a grand). Return flights to Tokyo from around the same price. IBM 0345 727272; www.ibm.com

Nokia 9000 Communicator

Is it a mobile phone? Is it a PDA? Is it a world wide web browser? No, it's all three! The remarkable Nokia 9000 also throws in fax, email and diary software, in the most complete mobile communications solution yet. There was a full review in *PCW* June '96.

Street price approx. £1,000 with a line. Nokia 0990 002110



Kodak DC20

Kodak's DC20 digital camera is about as consumer friendly as you can get. The 1Mb internal memory can store up to eight images at the highest 493 x 373 pixel resolution or 16 images at the lower 320 x 240. It is fully automatic and sets the focus and exposure for you. Full review next month.

SRP £349 (incl VAT). Kodak 0800 281487; www.kodak.com

Nakamichi SP-3d

Nakamichi's SP-3d speaker system leaves the largely non-directional deep bass sounds to a single sub-woofer unit. Pop this out of the way and leave the medium- to high-frequency stereo work to a pair of small, magnetically-shielded satellite units. Available in black or white from about £120, they'll significantly enhance your multimedia experience. Reviewed in *PCW*, September 1996. AGP Distribution 01264 336991



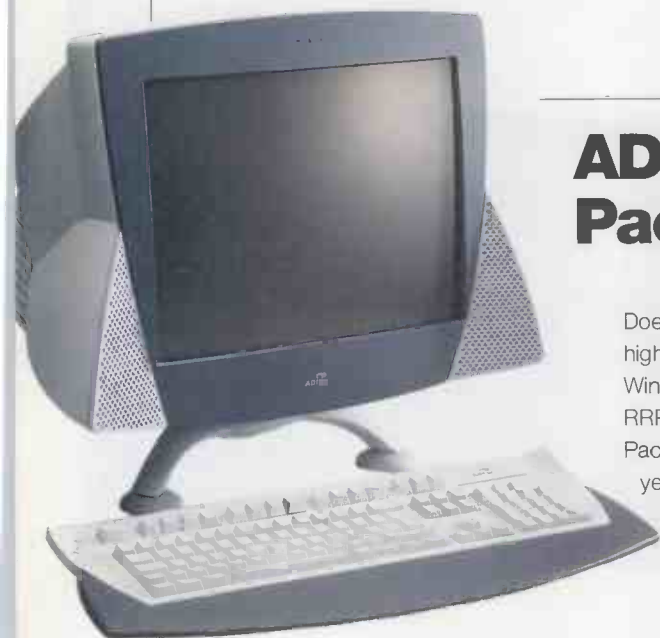
Palm Pilot 5000

The Palm Pilot is small enough to slip into your shirt pocket, yet powerful enough to recognise handwritten text using simplified Graffiti script. It has organiser software, a docking station that plugs into a PC or Mac, and it can reconcile files on the linked machines at the touch of a button. Prices range from £279. See *PCW*, September '96. **Pilot 5000 £349; Pilot 1000 £279; memory upgrade £129 (all prices plus VAT).** US Robotics 01734 228200



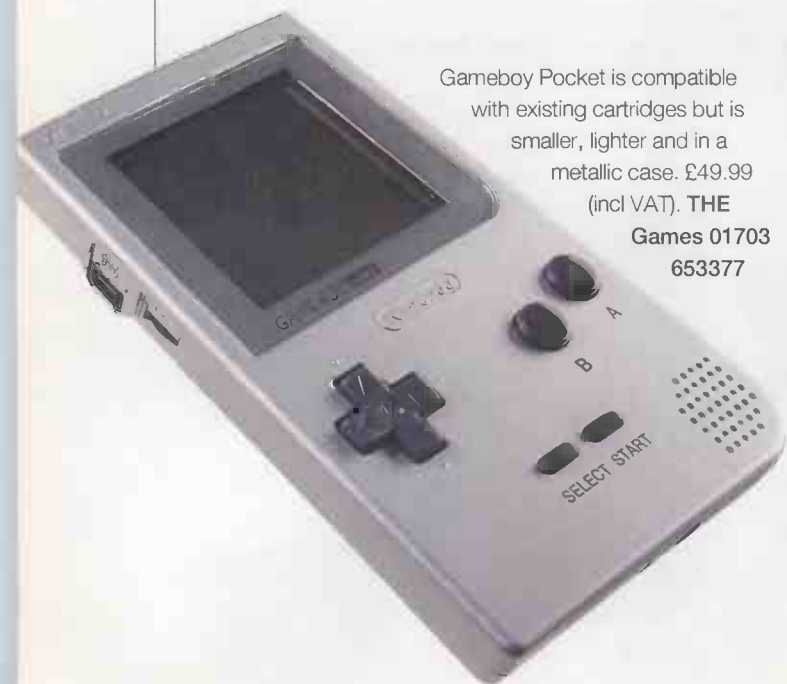
ADI Duo Multimedia Pack

Does your computer look boring? Then consider ADI's highly-styled Duo Multimedia Pack, consisting of mouse, Windows 95 keyboard and 17in multimedia monitor. RRP £589 (plus VAT). ADI says the Duo Multimedia Pack will navigate you from the stone age to the year 2000 — ya-ba-da-ba-Duo indeed. **ADI Systems UK 0181 236 0801**



Nintendo Gameboy Pocket

Gameboy Pocket is compatible with existing cartridges but is smaller, lighter and in a metallic case. £49.99 (incl VAT). **THE Games 01703 653377**



Nintendo 64

Nintendo's long-awaited 64-bit games console was reported to have sold a quarter of a million units on its first day of sale in Japan. It has just come out in the US but we'll probably have to wait until Easter '97 for the UK PAL units. It has an expected price of £250 (plus VAT) just to play the remarkable Mario 64 game. See *PCW*, October '96. **THE Games 01703 653377** (they don't have any for sale yet).



Sony DSC-F1

Sony's first consumer digital camera has an LCD viewing screen, 640 x 480 pixel resolution, and its 4Mb flash memory can store 108 pictures in economy mode, 58 in standard or 30 in fine. Images are transferred to a PC by built-in infra-red or serial interfaces. UK pricing is unknown but both products go on sale in the US this month at \$800 for the camera and \$590 for the printer. Sony IT group 0181 760 0500

Nikon CoolPIX 100

Nikon's compact CoolPIX 100 is one of the most innovative digital cameras we've yet seen. The battery pack slides off the main unit to reveal a PC Card which slots straight into a PC for direct image transfer. The CoolPIX 100 features a 480 x 512 pixel resolution, 42-image capacity (in normal mode), built-in flash, auto-exposure, self-timer and macro close-up mode. It measures 60x152x33mm and weighs only 160g without battery. See next month's digital camera group test. Nikon UK 0800 230220



Taxan Crystalvision 650

Taxan's 650 has a 14.5in colour TFT panel capable of resolutions up to 1024 x 768 pixels at 75Hz, measuring only 2.5ins thick! It is TCO 1992 compliant, has built-in speakers and connects to normal analogue VGA video cards. See *First Impressions*. RRP £2,899; street price £2,175 (both plus VAT). Taxan 01344 484646

Microsoft Sidewinder Gamepad

Microsoft can take you one step closer to the games console experience with a joystick games controller for PCs. The Sidewinder Gamepad, costing £39.99 (incl VAT), boasts six buttons, two triggers and the eight-way pad controller familiar to all console addicts. It's Windows 95 only, can be reprogrammed, and you can even have up to four daisy-chained together — Nintendo, Sony and Sega, watch out!

Microsoft 0345
002000



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COMPAQ

First Impressions

First Impressions leaps straight in to review the new **IBM PC** (below), plus a head-to-head between a **Mac** and a **Umax Mac** clone (p74). **Kodak** shows its tiny Snapshot scanner (p82), and a late beta of **Acrobat 3.0** gets a *PCW* once-over (p84). We wade through the mass of **multimedia encyclopaedias** and design **Barbie's** winter wardrobe.

■ Hardware

IBM Aptiva S-series

Slick, good-looking and a sure sign of IBM's revival.

One of the nice things about exclusive first looks is that you get to gaze into the future and see what brave new products are coming. Judging by this pre-release IBM Aptiva S Series, codenamed the Stealth, the future looks very good.

IBM has undergone a lot of change in its PC division lately and the results are finally beginning to show. Once known to produce sluggish, just-behind-the-times PCs (see *PCW* August 1997), it can now be said that IBM is at the vanguard along with the rest.

The first thing to strike you about the new Aptiva is that does look very Stealth-

like. The charcoal grey colour of the whole unit, from monitor to mouse, adds an air of class not normally associated with a PC. The move to dark grey from vanilla white is reminiscent of the colour switch stereos underwent, from silver to black, in the early eighties. I liked it then and I like it now.

The design of the S Series is unique and IBM obviously put some thought into it. It consists of



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- 90 Lotus ccMail 6
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Ratings

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

VNU European Labs



VNU Labs tests

cover every kind of hardware and software including PC hardware, printers, network products, modems and software applications. The tests are continually developed and enhanced to reflect hardware and software developments. Our suite of PC benchtests uses complete versions of industry-standard Windows 95 applications — currently Word, Excel, WordPerfect and FoxPro. We also run a graphics re-draw test using CorelDraw 6, and a Doom 2 frame rate test which is a good indication of games performance.

Application tests are the backbone of all the VNU Labs system evaluations but it's nearly impossible to pin an application result to a specific machine component. Only system-level tests (also known as



low-level tests) can reliably tell the difference. VNU Labs' system-level test suite is called Euromark. Mainly Windows-based, it is used to isolate specific components like hard disks, graphics cards and CD-ROM drives.

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

three main components: the PC, the media console and the monitor.

The PC is a mini-tower that holds the brains of the unit, from the CPU to the 28.8 IBM modem, but there are no outward facing devices, like the floppy or CD-ROM drive, let alone a power switch. This gives the tower the look of a sleek office server that can be stashed away under your desk.

Our review unit came with a Pentium 200MHz chip but when the Aptiva starts to ship next year it will have the new Intel Pentium 200MHz CPU with MMX capability. All the I/O is hard-wired into the motherboard so there is a minimum of cabling on the inside. IBM has also incorporated a Universal Serial Bus (USB) port to accommodate new USB-enabled peripherals expected next year.

There's plenty of room for expansion as there are four ISA, one PCI and one shared PCI/ISA slot, all located on a riser board. This is standard to IBM PCs, but why they need to do it eludes me. The Aptiva S

Series comes with a whopping 3.2Gb hard drive which has been neatly divided into four partitions. This is a nice touch by IBM as it avoids loss of storage space to under-used clusters. 3D graphics capability, using the ATI 3D Rage II chip, with 2Mb of SGRAM is also included. There will be 16Mb of SDRAM, as opposed to EDO RAM, which will be upgradeable to 64Mb.

The media console is the hub of the machine and fits comfortably on the monitor stand just beneath the monitor. It holds both the floppy and CD-ROM in a nifty James-Bond-like spring-loaded hide-away unit. Press once on the top of the console and up it pops. The only other button on the console is for power and that's it. All control from the console is transmitted through a single cable that plugs into a proprietary ISA card in the PC.

The monitor we looked at was an IBM MM5015in model. Stereo sound and microphone capability is built directly into the 15in monitor, but there are mic and

headphone ports if you need to use them. A sub-woofer, standard with the S Series, plugs directly into the rear. The audio output quality was good, and the only fault we found was that the mute option built into the monitor didn't work on the sub-woofer.

The custom start-up interface, perfect for the novice, and software bundle are impressive. Everything from a CD player to Lotus Smartsuite to a Netscape browser is included on the Aptiva.

Dylan Armbrust

PCW Details

Price Expected to be in the region of top-of-the-range current Aptiva — approx. £2339

Contact IBM 0990 727272

Good Points Good design, great software bundle and utilities.

Bad Points Can't mute sub-woofer and only two PCI slots.

Conclusion IBM is catching up with the times. If it performs as good as it looks, they'll have a real winner.

★★★★

■ Hardware

Micron P200

Superior build quality makes up for slightly slow performance speeds.

Micron is not a name many people will be familiar with in this country, but it is very well known in the States. In fact, it is one of the biggest PC vendors in the States. Panrix has snapped up the sole distribution rights in

larger hard disk or more RAM or a tape backup. The machines are well-specified so the need for a larger hard drive will not be pressing for the average buyer.

The warranty and technical support are taken care of by Panrix itself. The warranty for this machine is 24 months on-site parts and labour, which is a respectable deal.

The machine is more than competent in design and build. In fact, it bears an uncanny resemblance to Panrix's standard machines. The model we saw was a P200, with 32Mb of RAM, 512Kb of L2 cache, a 2.1Gb Western Digital hard disk and an 12-speed TEAC CD-ROM drive. The sound is taken care of via a

Vibra 16C chip on the Micronics ATX motherboard and all the connections come from the

motherboard, rather than take up extra slots with a riser card. There is no USB connection and no space on the motherboard for the connection to be added. There is plenty of expansion room, with three PCI-only slots, three ISA-only slots and one shared slot.

The graphics card was the Diamond Stealth 3D 2000 Virge, one of the new breed of 3D graphics cards, with a stonking 4Mb of DRAM. It is a consumer model so we were a little surprised to see it here. For a run-down on its big brother, the 3000, see our 3D graphics card round-up on page 210. Also included are a V34 modem from Diamond and Yamaha speakers.

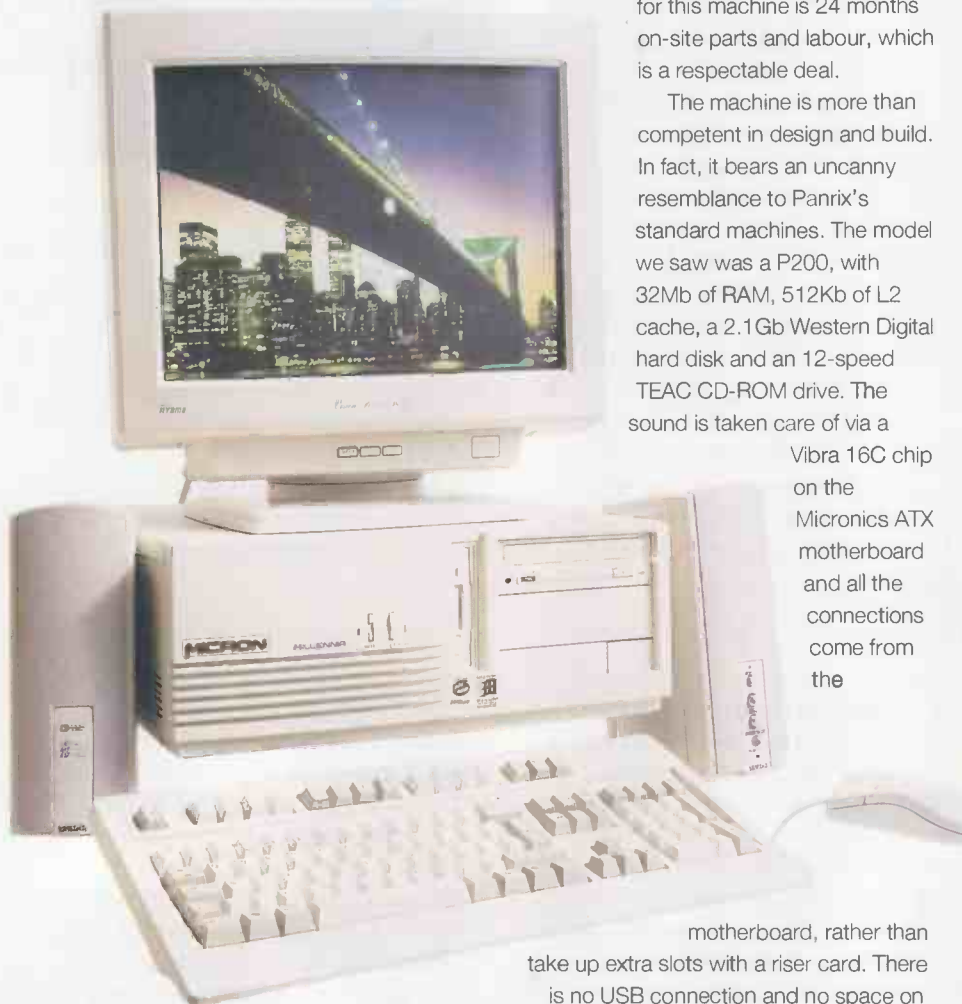
The bundle includes a version of Office 95 Professional, while the version of Windows 95 includes Internet Explorer 3.0 and the Plus pack, all on one CD.

The performance was on a par with other P200s with 32Mb of RAM we have seen, but was down a few points. However, when we are talking about these sports of speeds, a few points is not that important. It certainly does not feel like a sluggard.

As for the price, it compares reasonably with other P200s, but it is not the cheapest on the market. Compared to a number of other manufacturers, it is slightly over the odds, but the inclusion of Office Professional rights this balance. That is, if you bundled Office Pro with other systems advertised this month in *PCW*, you would come out at a price very near this one.

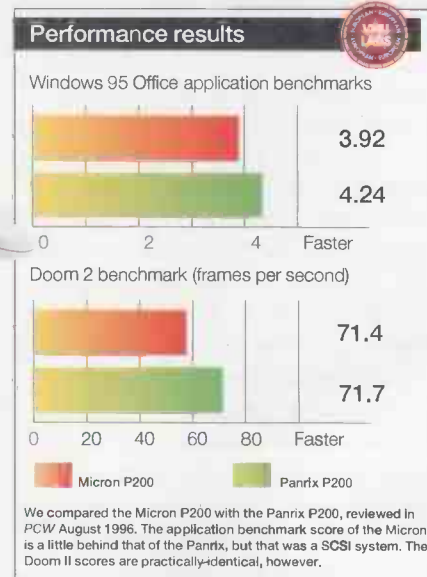
All in all, it is a sound choice from all points of view: build quality, software bundle, performance, warranty and price.

Adele Dyer



this country; the company says the deal came about as it has the same philosophy on marketing and build quality, but is also aiming at the same section of the market.

The deal between Micron and Panrix is quite simple. Micron ships over boxes which are 100 percent assembled, with the motherboard, hard and floppy drives and most of the system software already installed. Panrix will supply the monitor and will change any hardware specs you would like upgraded, for example if you want a



PCW Details

Price £2265

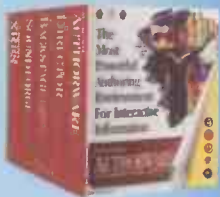
Contact Panrix 0113 244 4958

Good Points Good build quality.

Bad Points Performance slightly below par.

Conclusion A good, solid choice.

★★★★



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■ Hardware

Apple PowerMac 9500/200

Umax Pulsar 200

One-to-one combat between the PowerMac and a new clone from the scanner people, Umax.

After a slow start, Apple's attempts at encouraging third party manufacturers to license the Mac OS are starting to bear fruit.

Power Computing has already established itself as the premier Mac clone manufacturer, and its Power Tower range has been giving Apple's PowerMacs a really good run for their money. Now Umax, best known in this country for its scanners, has joined in with its Pulsar and Apus ranges.

The Apus range consists of PowerPC 603e-based entry-level machines, similar to Apple's Performas, while the Pulsar range is based on the PowerPC 604e and competes head-on with the PowerMac range.

To see what Umax has come up with we compared Apple's PowerMac 9500/200 with the Pulsar 200. Both machines are based around a 200MHz PowerPC 604e processor and represent the top-of-the-range for each company's current products. Their prices are quite similar, with the Pulsar costing £2,995 and the PowerMac dropping to £2,875 following Apple's recent price cuts.

All Mac clones are based on Apple's own



motherboard designs. That means that clone manufacturers don't have too much scope for producing their own variation on the standard Mac theme. However, like Power Computing, Umax is proving that it can come up with competitively priced Mac-clones that have their own attractions.

Externally, the two machines are easy to tell apart, thanks to the scalloped edges of the Pulsar's tower case and the door plate that closes over the CD-ROM and floppy disk bays. Open that plate and you'll see the engraved signatures of the Umax design team, as well as a dedication to "all those who kept the faith". Presumably "the faith" refers to the loyalty of Mac users who have kept the platform going even through Apple's recent mega-million dollar losses. That's touching, but it's hardly a major selling point.

Fortunately, there are some more substantial things to look at on the inside. The stand-out feature of the Pulsar range is that they are all capable of dual processor support. Like Apple's PowerMacs, they carry their CPU on a replaceable daughter card in order to provide an easy upgrade path. Unlike the PowerMacs, the Pulsars all have a slot for a second processor card on the motherboard. A number of high-end Mac graphics applications, such as Photoshop, have already been rewritten to provide dual-processor support, so this is a useful upgrade option for graphics users.

Apple's PowerMac 9500/200 doesn't have dual-processor capabilities, although there is a second 9500 model, the 9500/180MP which is supplied with two 180MHz 604e processors and priced at around £3,500. This means that Apple's product range allows you to buy a single-processor or a dual processor model, but Umax gives users the freedom to buy a single processor model and then upgrade when it suits them. And, of course, the Pulsar will accept two 200MHz processors, compared to the 180MHz processors in the 9500/180MP.



The Pulsar will accept both DayStar's multi-processor card and a planned card from Umax. UK pricing for these was unavailable as we went to press, but it's good to know that you're got a choice of options for this upgrade.

The Pulsar has a maximum RAM capacity of 1Gb, compared to the 9500's maximum of 768Mb. Admittedly, there aren't many users who will actually need 1Gb of RAM, so this isn't a major advantage. What is nice about the Pulsar, though, is that the layout of its motherboard provides much easier access to the RAM slots when you do want to upgrade. The RAM slots in the 9500 are completely inaccessible, and you have to take the entire thing to bits to get at them.

The 9500/200 does include 32Mb RAM as standard, compared to the Pulsar's 16Mb. Bringing the Pulsar up to 32Mb, which most owners of a high-end machine would probably want to do, will make it a good £200 more expensive than the 9500/200. However, don't be at all surprised if Umax' response to Apple's price cuts is to increase the Pulsar's standard RAM complement to 32Mb by the time you read this.

Apart from those differences, the

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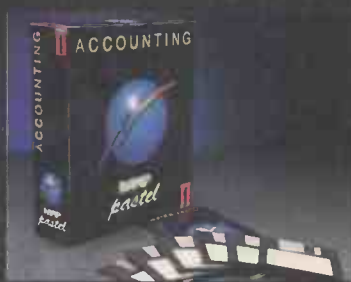
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PCW01/97

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features of the two machines are almost identical. They both have a 2Gb hard disk, 512Kb of level 2 cache, 2Mb VRAM on their graphics cards, and 8x CD-ROM drives. Both motherboards have six PCI slots, with one slot occupied by the graphics card, so their expansion capacity is the same. For networking, both machines have built-in 10Base-T and AAUI Ethernet interfaces.

With similar specifications, it's not surprising there's little difference in performance. The Pulsar did nudge ahead on both CPU and hard disk performance, but the difference was less than one percent — too small to make any practical difference.

The only real performance difference came from the two machines' graphics cards. The 9500/200 scored better than the Pulsar on video performance, according to our benchmark software. This difference was confirmed when running real-world tests in Photoshop, with the PowerMac 9500 proving five to ten percent faster when applying a series of filter effects.

Apple's PowerMac has an edge in terms

of speed, but it is the more expensive by almost ten percent. So, in terms of overall price and performance there's not much to set the two apart. The 9500/200 comes with an extra 16Mb RAM as standard, but the Pulsar's dual processor upgrade option will appeal to the high-end graphics users, for whom a machine like this is designed. The Pulsar has some bundled software, in the form of FWB's CD-ROM and Hard Disk utilities and a copy of ClarisWorks 4.0.

The Pulsar doesn't blow the 9500/200 out of the water, but there's no doubt that it's every bit as attractive as the "official" Apple product. Power Computing currently holds the top spot in terms of sheer horsepower, with its 225MHz Power Tower, but Umax is also about to release its own 225MHz version of the Pulsar. At less than £3,000, the Pulsar 200 suggests that Umax deserves to be taken seriously as a Mac clone manufacturer.

Apple is now back in profit and rumoured to be planning price cuts in order to compete head-on with the clone manufacturers. And,

with Motorola's StarMax clones waiting, Mac users now have more choice, and more cause for optimism, than they've had for a long time.

Cliff Joseph

•PCW Details

Apple PowerMac 9500/200

Price £2895

Contact Apple 0181 569 1199

Good Points High performance, 32Mb RAM.

Bad Points No dual-processor support, RAM upgrades awkward.

Conclusion Powerful machine, but not clearly superior to its clone rivals.

★★★★

Umax Pulsar 200

Price £2,995

Contact Umax 01344 871306

Good Points High performance, dual processor support.

Bad Points Only 16Mb RAM as standard, video card a little sluggish.

Conclusion An affordable PowerMac alternative and more easily upgradable.

★★★★

Hardware

HP OfficeJet

A monochrome multi-function device, perfect for the busy office.

The OfficeJet XL was one of the first multi-function devices on the market and also it was the predominant product of its type. The OfficeJet 350 is this year's update. It has been spruced up and refined, but is essentially the same product as the XL.

As a multi-function device, the

OfficeJet 350 can print, scan, fax and copy. It can, of course, be controlled entirely from the desktop over a network, taking the strain off the queues around the fax machine. The printing capabilities are taken care of by an inkjet, which has a maximum printing resolution of 600dpi. It is, of course, only a monochrome printer, so you do not have the flexibility of a colour as on the Canon MPC30 reviewed last month. However, for a business workhorse, colour is probably not a priority.

The printing quality is good, although recognisably from an inkjet. You can print to three standards: economy, normal and best. The best mode gives very good output, but it does not sacrifice speed. It can print on a number of media, including envelopes and transparencies.

You can scan at either

200dpi or at 300dpi. The scan is automatically loaded into the fax software package, Eclipse.

Also included in the deal is Caere OmniPage Limited Edition, which is a cut-down version of OmniPage Pro. It is a commonly bundled with scanners and is an efficient package, if limited in functionality.

Of equal quality is the copier. This function appears to give better scanning results than the scanner itself, with the prints produced being of nearly the same quality as pages printed straight from your word processor.

Adele Dyer

•PCW Details

Price £650

Contact Hewlett-Packard 0990 474747

Good Points Excellent quality all round.

Bad Points No paper tray to catch sheets faxed and copied.

Conclusion A sturdy workhorse.

★★★★



Hardware

Epson Stylus Color 200

A new and improved bottom-of-the-range printer which needs some heavy-duty cleaning.

Epson has just revamped its bottom-of-the-range product, moving on from the Stylus Color IIs to the Stylus Color 200. Like Epson's other printers, it uses Epson's proprietary piezo printhead technology.

The Stylus Color 200 is a single-cartridge, three (CMY) colour printer, unlike the 500 which is a two-cartridge, four colour printer. You can swap out the colour cartridge and replace it with a black cartridge if you want to print in mono. It is not just the cartridge which swaps, it is the cartridge holder as well.

The use of a swappable cartridge is never entirely satisfactory on any printer as when the colour cartridge is in, it can only produce composite black and not process black, but the Stylus Color 200 does manage to acquit itself rather well in this respect. While the composite black produced is obviously not as good as process black, it is at least recognisably black and does not look an unhealthy brown or grey like the composite black produced by other printers. The process black from the Stylus Color 200 is also an improvement on that of its predecessor, the Stylus IIs, which was a little light in tone.

The drivers on the Stylus Color 200 have been tweaked to let you get the best results from stills taken from a video camera, or snaps taken with a digital camera. This is an interesting development in the light of the growing predominance of the digital camera (see next month's issue for a full round-up of the digital camera market).

In common with Epson's other printers, the Stylus Color 200 has a top resolution of 720dpi. The results of this are impressive, especially on Epson's special 720dpi paper. Obviously, this takes a little more time. If you choose to print text at 720dpi, one full page of text will take nearly seven minutes. However, if you drop the resolution to 360dpi, this is speeded up to just over a minute. The drop in quality is noticeable for text, but the output at 320dpi is still perfectly respectable. The difference to quality that the 720dpi paper makes is a moot point. The paper is not

cheap, costing £10.99 (RRP) for just 100 sheets and so it is not something you would want to use all the time. However, for printing good quality "photo-real" pictures at 720dpi, it is invaluable.

In our Corel test, the output was excellent. The colours were vibrant and solid. There was some banding, but you had to squint

at the paper from close quarters to see it. Epson's new "Auto-Color" function helps to get the colours right, as it scans the paper page and automatically makes settings for the best quality output. It was also able to produce the hairline. The time for this test was also not outlandish, coming in at a very

respectable eight minutes and eighteen seconds. The quality of output is obviously not as good on copier paper, for example it cannot produce the hairline, but it is still respectable.

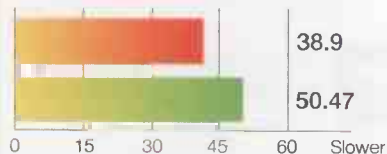
There was one problem we encountered. When we installed a new colour cartridge we needed to run the cleaning cycle three times. We ran it once after installing a new cartridge as the manual recommends, but when we tried printing the yellow did not come through. After a second cleaning cycle, the magenta stopped flowing half way through a sheet. A third cleaning cycle put this to rights and this may have just been a one-off problem with the cartridge, but it was a little disappointing. However, the cleaning cycle is mercifully brief, taking only a few seconds to complete.

Adele Dyer



Performance results

Text/Speed results in seconds per page



CorelDraw colour speed tests in minutes per page



Legend: ■ Epson Stylus Color 200 ■ Epson Stylus Color IIs

The new Epson Stylus Color 200 compared with its predecessor, the Epson Stylus IIs. It shows significant improvements over the IIs, both in speed and in quality, most dramatically shown in the CorelDraw results.

PCW Details

Price Street £174 (incl VAT)

Contact Epson 01442 61144

Good Points Good colours, accurate printing.

Bad Points Cleaning cycle may have to be run repeatedly for new cartridges.

Conclusion Excellent output for the price.

★★★★

Hardware

Canon 620

A capable colour printer with ink wells that can be replaced individually.

The Canon BJC 620 is this year's update to last year's BJC 610. Essentially, it is the same printer but with a few updated features and a lower price. As its predecessor, the 620 has a top resolution of 720dpi. The 620 is a single-cartridge, four-colour CMYK printer with a difference; **handily**, the four inks come in separate wells so that each can be replaced individually.

The printer itself is easy to install. It worked first push and there were no problems with the cartridge. But when you first start to print, it does take a while. It takes so long to get going, in **fact**, that when waiting for the test page to print out you might be forgiven for assuming the printer had failed.

The BJC 620 can print on a wide variety of media, from copier paper to high-res paper, high-gloss paper and transparencies. It will even print on fabric paper, so you can use some of the children's packages such as Barbie Fashion Designer (reviewed on page 108).

The drivers are equally simplistic. The interface is almost entirely graphical, right down to the choice of paper size. For colour printing you can choose from four basic modes: high speed, and three qualities; high text, high graphics and photographic. To help you out, each of these have little pictures next to them to suggest output and a clock showing proportionally how long each will take to print.

The driver software is not desperately helpful, though, when it comes to checking on the status of your print job. It will tell you how much longer the job will last and the time at which the job will be finished. It even shows you, graphically, how much of the page has been printed. What it doesn't tell you is whether the print job is still spooling to the printer, or the level of your inks. Which may not seem desperately important, but at least showing you the level of inks, graphically, gives you fair warning of when you need to start looking for some cartridges. The ink status is instead indicated on the printer body with a series

of LEDs. Even so, the button doesn't tell you which ink needs to be replaced, only that you should open up the printer and take a look.

The printer cover is littered with buttons not only indicating error and power, as you might expect, but also whether you are printing on to an envelope or plain paper and whether you are using the

Windows Printing System. It all seems a little excessive.

The print quality is impressive and the photographic mode does produce some stunning results but in high graphics mode there were one or two disappointing failures for a printer in this price category. It did not print the white on black hairline at 720dpi and there was some banding on the solid colours at 360dpi.

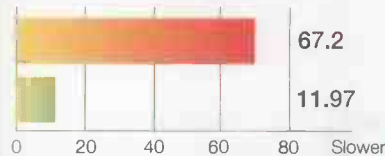
As for print times, these are very similar to the those of the Epson Stylus 200, a much cheaper printer. Canon states in its press release that it is "the ideal colour printer for a larger office", yet the printing times we encountered in our tests suggested that this boast is a little hopeful.

Adele Dyer

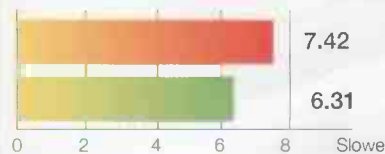


Performance results

Text/Speed Results in seconds per page



CorelDraw colour speed tests in minutes per page



Legend: Canon BJC 620 (red bar), HP DeskJet 660C (green bar)

The Canon BJC 620 is compared against the HP DeskJet 870Cxi, which won the recent inkjet printer group test. Text speeds are well down on those of the HP. Even on its 'high speed' setting, the Canon was still slow on text.

PCW Details

Price RRP £399 (plus VAT)

Contact Canon 0121 680 8062

Good Points Easy-to-use drivers.

Bad Points Rather slow for the price.

Conclusion A good printer, but at the current price it needs sprucing up.

★★★

■ Hardware

Taxan Crystalvision 650

You'll pay more for this monitor but get a good-quality screen.

Flat panel TFT displays are nothing new, but Taxan's Crystalvision 650 offers unrivalled performance and a price which, while four times more than an equivalent CRT monitor, is beginning to sound reasonable.

The 650 boasts a huge 14.5in colour TFT panel, capable of resolutions up to 1024x768 pixels at 75Hz. Bear in mind that all 14.5 inches are viewable, as oppose to 17in CRT monitors, which typically only reveal 15in to the user. So the 650 is comparable in screen size and performance to a 17in CRT, but measures 2.5in thick!

When adjusted correctly, the image is gorgeous. It's also the only panel so far to be certified as TCO-1992-compliant. Suffice it to say the 650 is Windows 95 plug and play compatible and supports VESA DPMS power saving, although it only consumes a mere 27 watts when operating.

The 650 accepts the analogue output of a standard video card, where many panels in the past have required a dedicated video card, resulting in additional cost and inconvenience in fitting. The 650 has stereo loudspeakers. Fantastic, but who's going to fork out the two grand asking price?

TFT panel displays are expensive, but ideal for a number of specialist applications: typically those where small desk footprint, low electrical interference, light weight, or design are paramount. City dealing rooms need a lot of information, so a large screen but thin display is more than welcome. Military and government applications require small and light displays which won't interfere with sensitive equipment. Panel displays are perfect for these applications, along with those times when looks are vital, such as in a reception or meeting room.

Gordon Laing


PCW Details

Price RRP £2899 (plus VAT), street £2175 (plus VAT)

Contact Taxan 01344 484646

Good Points 17in performance at 2.5in thick.

Bad Points Four times more expensive than an equivalent CRT.

Conclusion Everyone wants one.

★★★★

■ Hardware

Snapshot Photo Scanner 1

Turn your photos into calendars, cards or pictures.

The home digital imaging revolution has already begun. Manufacturers left, right and centre are releasing digital cameras, mini printers, mini scanners, and are persuading us to use our computers to add value, so to speak, to our cupboards full of photos. Yes, today it may be just a photo of Uncle Fred, complete with satanic red-eye, but a couple of software wizards later, the eye's back to normal, while Fred has found himself starring on a home made Christmas card or calendar. The possibilities are endless.

As most photos are postcard-sized, there's no need to have a desk-consuming flatbed device. Kodak has come up with a tiny alternative, charmingly called the Snapshot Photo Scanner 1. It measures 162x57x152mm, and can handle prints up to 4x11.5in. This covers most photos, but it's a shame Kodak couldn't accommodate

the wider 5x7in prints offered by most labs.

It connects to your PC's parallel port, and comes with excellent software, TWAIN driver and documentation to guide you through installation and options while in use; Windows 95 users also get the added fun of Kai's Power Goo (yes, goo) software to really muck around with.

Photos are slowly dragged through the device rather like a fax, and emerge on-screen in 24bit colour at up to 600dpi interpolated resolution. Software and hardware integrate well, but the Snapshot's quality isn't great. It's remarkably similar to a handheld scanner, which is not surprising considering the Snapshot is effectively a handheld on its back with motorised rollers. Primax's Photo Organiser is a similar solution costing £127.66 (plus VAT), which makes Kodak's look a little overpriced.

Gordon Laing


PCW Details

Price RRP £199 (plus VAT)

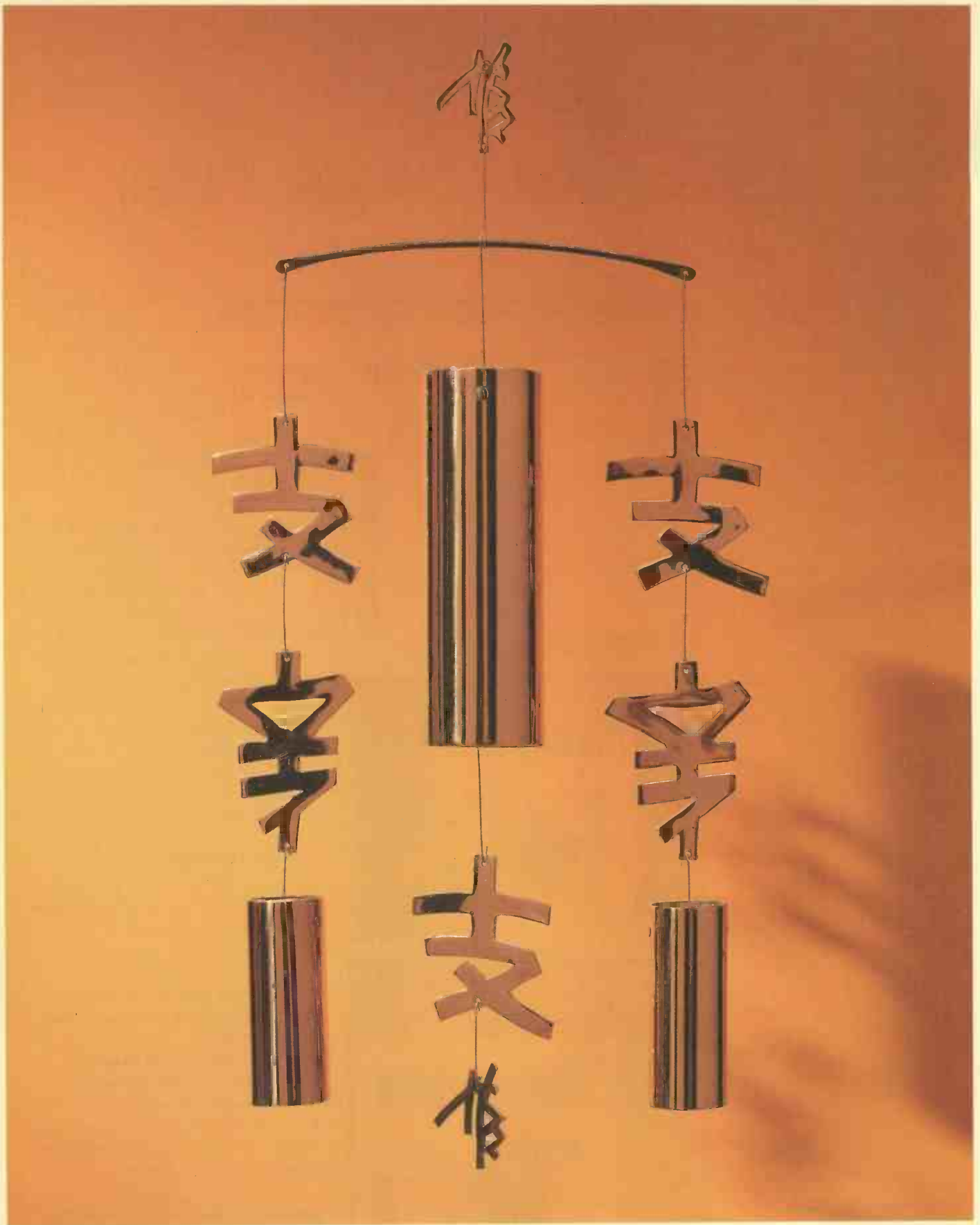
Contact Kodak 0800 281487

Good Points Nice idea and implementation.

Bad Points Average quality. Pricy. Four-inch image width.

Conclusion The future for many, but pricy today.

★★★



Perfect Harmony

One look at Taxan's new 17" colour monitor series could bring music to your ears. The Ergovision 730 & 740 range includes two multimedia models with built-in audio and microphone. Sounds good to me. Call 01344 484646.



TAXAN
MONITORS

Software

Adobe Acrobat 3.0 (late beta)

Adobe turns somersaults and Acrobat gets web friendly.

You know Acrobat 3.0 is different on installation. You are invited to select components depending on which web browser you prefer which means either ActiveX components or Netscape Plug-Ins (Active X — 94Kb, Netscape Plug-In — 187Kb, naturally). You will find that a typical installation takes about 40Mb of disk space and includes Acrobat Distiller, Exchange, Reader and Distiller Assistant.

Once you launch Acrobat Exchange, you'll see other web clues, notably the Go To Adobe Web Site option. Select this, up pops your web browser and in comes Adobe's own PDF page which explains Acrobat technology complete with active web links. Yes, PDF pages can now be seen directly inside browsers.

Creating PDFs is simple from existing DTP docs. Convert the page or pages into PDF format using the Distiller and then open them in Acrobat Exchange. Here you can add dynamic elements such as web links, links to other PDFs and hot spots. These can be created so that a mouse-over on the document triggers actions such as linking to a web site, linking to a data file from Word or Excel or database information. All these work both in the Acrobat Reader or, more specifically, in the web browser which turns PDF's into dynamic web documents.

The test page compresses to 54.4Kb from 166Kb which is respectable and compares well with ShockWave and proves that Adobe has improved the compression tools in Acrobat. Due to a bug which disabled the movie facility, AVI files just wouldn't run. It was difficult to test Acrobat's new multimedia capabilities and see how

well these compressed down.

Despite this, Acrobat worked extremely well and pages converted to the web effortlessly. So well in fact that it showed up the discrepancies between the two leading browsers. Thanks to ActiveX, Internet Explorer 3.0 seamlessly loads the PDF without fuss while Navigator 3.0 chugs along

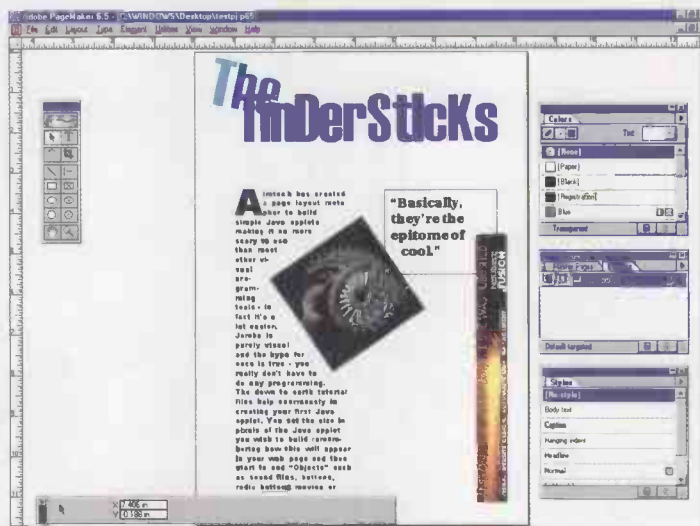
collecting all its plug-ins and helpfully displays the Acrobat splash screen while it doing it. It took about 20 seconds longer to complete the task. Both display PDF files complete with the Acrobat Reader tools and menu items within the browser window, as they should. In Windows 95 new macros are automatically added to Word and Excel to create PDF files which is a neat touch.

In use it is like using the

Reader. The magnification of text is truly impressive and fonts and graphics look great - all images are automatically converted to JPEG.

Apart from the movie bug, Acrobat is an impressive piece of software and at last Acrobat is fulfilling its potential as an alternative to paper. This is one of Adobe's best pieces of software design in recent years.

PJ Fisher



Top Design your page in PageMaker as normal and export it as a PDF or save as an EPS to be distilled

Centre After distillation your page is now available for viewing in Acrobat Exchange

Left Store the PDF in your web server and it opens fully intact within either IE 3.0 or Netscape 3.0. Note that the full Acrobat menu is available within the browser.

PCW Details

Price about £160 (plus VAT)

Contact Adobe UK 0181 606 4000

Good Points Very sexy software which works and gives the web a new dimension.

Bad Points Only works with Netscape 3.0 and IE 3.0.

Conclusion Brilliantly-integrated tool for online publishing that in an ideal world would make Acrobat a web standard.

★★★

A winning combination



FLEXIBILITY



PHOTO QUALITY



SPEED



Choose *Kodak Digital Science 8650 Colour Printers* and watch your profitability rise

Put your business in the winning league with the new *Kodak Digital Science 8650* thermal printer.

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Company _____

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Telephone (_____) _____

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Software

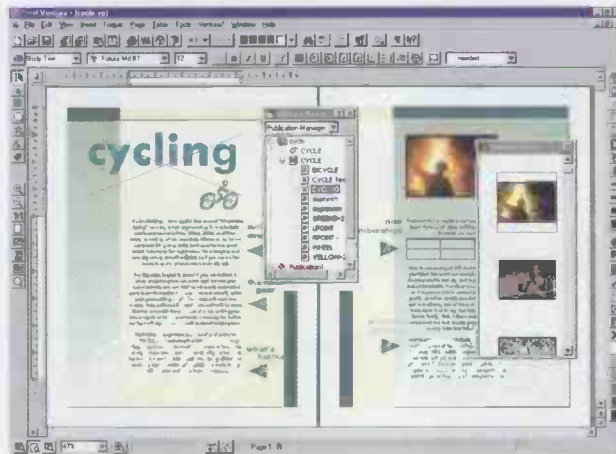
Corel Ventura 7

With an improved interface, this jam-packed version of Ventura is the best yet.

The product reviewed was at Beta 5 stage and came on a single CD-ROM. The final product will follow the Corel "pile it high" practice and contain WordPerfect, PhotoPaint, Depth (a 3D logo creator), diverse database publishing utilities, Media Manager, Script, Web Designer, a version manager, multi-lingual proofing tools, 1,000 fonts and a 30,000+ clipart and image library.

Tuning to the main attraction, there have been some fairly drastic interface changes. Gone are the Corel-style roll-ups, replaced by Microsoft-style toolbars. All are completely customisable with a separate configuration manager to make wholesale changes to the interface — say between layout-intensive and long document publications. Using the product straight from the box, you get the usual file, undo/redo and proofing buttons up top, plus a few others for more esoteric purposes. As well as the normal "Print", you have buttons to output as HTML, Envoy (Corel's portable document rival to Adobe Acrobat) and Barista (a Java and ActiveX aware format that adds multiple fonts, columns and forms to web pages). There are shortcuts to import text and graphic files, and launchers for the only two palettes you are likely to have on screen most of the time. The Navigator provides a tree-like overview of the document, showing chapters, style tags and imported files. The Library can store not just text and graphics for re-use, but styles as well.

As before, the page layout tools are on the left, with zooming and navigation tools below. New toolbars include specific ones for outline attributes and Corel's wonderful assortment of bitmapped, vector, gradient and fractal fills. The main change, however, is the Property Bar. This again follows the Quark/PageMaker pattern (except that it can be docked) in offering "one-stop" formatting of the selected item — replacing many previous dialog boxes and roll-ups. It's context-sensitive, so will show font attributes when editing text, paragraph attributes when applying style tags and positional information of frames and graphic



Left Ventura's new look — Property Bar, Navigator and Library
Below Fractal fills and spreadsheet formulae in Ventura tables

objects.

Ventura's frames — which can hold either text or graphics — are rather clever. You get a variety of pre-formed shapes including hearts, stars and speech bubbles, and you can tweak these further with the node-editing tools. Text will flow to fill the frame and pictures will be cropped to it. There's no longer any need to explicitly change "mode". If the pointer is over a text box, you just click and start typing. If over a graphic, click and the relevant editing tools appear. There's all sorts of "smart" writing aids, such as on-the-fly correction of common errors and a box in the Property Bar that shows the word at the cursor and gives instant access to the spelling checker or thesaurus.

Two long-awaited features are a multiple document interface — you can now open several publications and drag and drop between them — and multiple "Master" pages. The latter act as page templates, containing column guides and "furniture" such as page number and title blocks. Formerly, you could have just one left and one right master page, but if, as with PCW, you have various column layouts, you will need multiple masters. Other new features include "Conditional" tags to create multiple versions within the same document and the

Blue Sky Sales				
Sales '96	January	February	March	Total
North	32000	37000	34000	103000
Central	45000	41000	43000	103000
South	28000	29000	31000	206000
Total	105000			

Corel Script utility to create extra features in a similar way to Quark Xtensions or PageMaker Plug-Ins.

If there's a fault with this package, it's that there's too much. It seems strange to promote Ventura as the one-stop solution for paper, electronic and web publishing and then include a competing web page designer. Similarly, if its story editor, formatting and proofing tools are adequate, why compete with WordPerfect?

Tim Nott

PCW Details

Price £695 (plus VAT)

Contact Corel 0800 973189

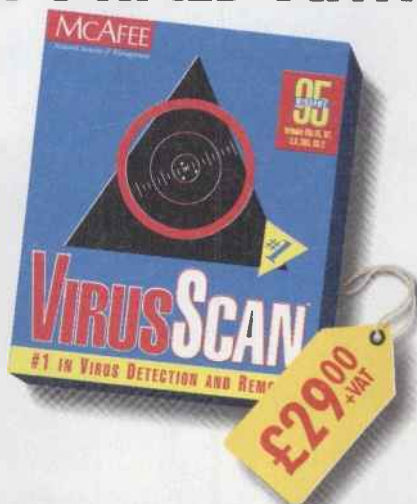
Good Points Vastly-improved interface, good electronic publishing support.

Bad Points Expensive, complex and rather unfocused.

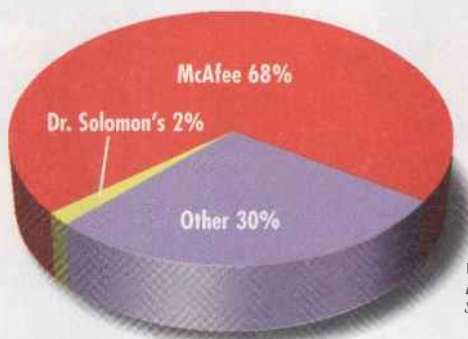
Conclusion The most approachable Ventura yet.

★★★★

THE BEST PRICED ANTI-VIRUS.



THE NUMBER ONE CHOICE WORLDWIDE.



Worldwide Standalone
DOS and Windows
Shipments - IDC, 1994

NO WONDER THE DOCTOR'S LEFT TOWN.



If Dr. Solomon has the #1 anti-virus software, as he claimed, then why did he sell his practice? Maybe the reason was McAfee's VirusScan, the world's most popular – and most effective – anti-virus software. With its 99% virus detection rate that's off the chart compared to the competition*.

No wonder it's the choice of such top organizations as Virgin, Ford Motor Company and London Underground.

The highest detection rate and the lowest price.

Then again, maybe people prefer VirusScan for its low cost. At £29+VAT, it's almost half the price of the product the good doctor used to sell. Or maybe it's the fact that

PLATFORMS SUPPORTED					
Windows95	Windows 3.X	DOS	OS/2	Mac	WindowsNT
✓	✓	✓	✓	✓	✓

VirusScan keeps getting better and better. With 67% market share worldwide, and agents in over 65 countries, we have exclusive access to hundreds of viruses each week that we use to create even better protection.

And McAfee updates detection and removal files each month to keep you safe from the nearly 10,000 known – and unknown – viruses, including the latest macro viruses and the new polymorphics.

We also give you on-line access to virus support from the McAfee Virus Emergency Center 24 hours a day, 7 days a week. Order from your favorite catalogue or visit your local retailer today. Or simply download VirusScan from the Internet. Our virus doctors are the best – and they don't quit.



Available at PC World, Byte, Silica, Staples, and other fine stores. Mail order: Software Catalogue - 01494 455455, Software Warehouse - 01675 466467, Technomatic - 0181 205 9558

Download McAfee: www.mcafee.com [ftp.mcafee.com](ftp://ftp.mcafee.com) America Online: MCAFEE CompuServe: GO MCAFEE The Microsoft Network: MCAFEE

*VSUM DOS Scanner Detection Comparison - 8/96 © McAfee Associates, Inc., 1996. All rights reserved. All brands and products are trademarks of their respective holders.



Don't leave your **Virus Protection** to chance

With Dr Solomon's Anti-Virus Toolkit, there's no need to risk playing Russian Roulette with your PC population.

The world's most effective anti-virus solution ensures total peace of mind to both corporate and personal computer users.

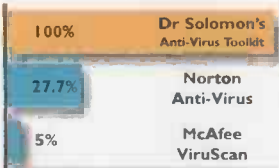
Dr Solomon's Anti-Virus Toolkit detects, identifies and eliminates viruses, including the latest Word & Excel Macro viruses. Scanning archived and compressed files, those downloaded from the Internet, World Wide Web, email, CD-ROM Collections and floppy disks, the award winning Toolkit protects you from all possible forms of attack.

86 • Personal Computer World • January 1997

THE highest detection rates

The Toolkit detects over 10,000 known viruses (as of September 1996) and consistently achieves 100% detection rates in independent tests:

- *What PC & Software*, March 1996
- *PC LAN*, February 1996
- *Secure Computing*, January 1996



Scanning inside compressed and archived files. (Secure Computing, Jan 1996)

The Toolkit is currently available for Windows 95, Windows, Windows NT, DOS, Netware, Macintosh, SCO UNIX and OS/2.

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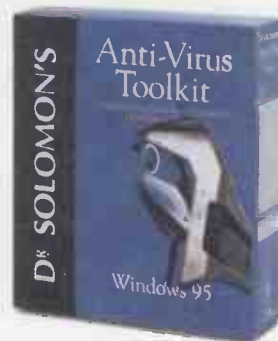
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DR SOLOMON'S

Software

Fractal Design Expression

Another ground-breaking package from an innovative company, but will it catch on?

Fractal Design is a company well-known for taking an innovative approach with its products and Expression is no exception.

Illustration software conventionally falls into one of two camps. There are the bitmap "paint" packages like Paintshop, Photoshop

There's a range of Bézier drawing tools for producing curved lines with "handles" which extend from points along a line and allow you to change the shape and direction of a particular curve section. There are also shape object tools for drawing rectangles and ellipses, node editing tools for adding points to a curve and converting from corner to curve points. The familiar transform tools allow you to reflect, rotate, scale, skew and distort objects.

Although Expression bears striking similarities to vector draw packages in its range of tools: what you can produce with them goes way beyond the usual

"Strokes". These allow you to create a stroke style from an existing illustration. In other words, you can create a drawing of, say, a fish and use that as your line style. Any lines you draw in the fish style will bend and twist the fish to fit along the curve.

Skeletal strokes are useful in a variety of ways but two obvious ones spring to mind. If you want to distort an existing graphic, turning it into a skeletal stroke provides almost unlimited opportunity for distorting it into virtually any shape you like. Skeletal paths also give you the option of repeating, rather than stretching the graphic components and you can also set anchor points to define where the repeat begins and ends. So, if your skeletal path consisted of a train with an engine at the front followed by coaches, you could anchor the engine and set the coaches to repeat. Then, when you drew a path, the longer you made it, the more coaches you would get. This feature would be particularly useful for drawing borders or any graphic that uses repeating elements along a path.

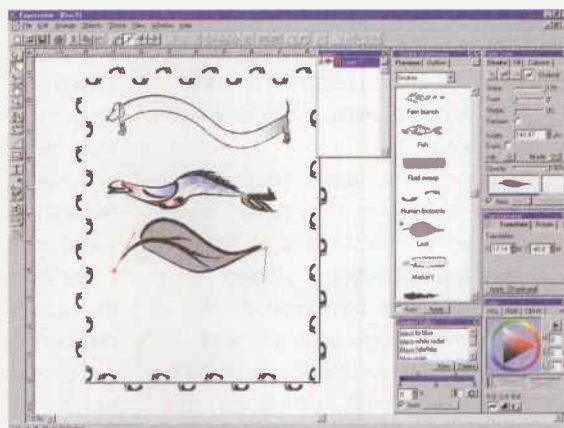
Expression won't appeal to everybody. Those who like their paths vectored and their painting pixellated might consider it a little gimmicky. For professional illustrators, a combination of well-integrated vector and bitmap packages will provide greatest flexibility, although Expression might be relied upon for certain difficult-to-do distortions. Otherwise, if you're looking for the "natural media" style of a paint package with the control and flexibility only previously available to vector graphics, Expression won't disappoint.

Ken McMahon



Top These two views show a typical Expression illustration in path view and preview mode.

Right Skeletal Strokes allow you to in effect "draw with drawings"



and Fractal's own Painter, and "vector" packages like Adobe Illustrator, Corel Draw and Windows Draw from Micrographx. The former work on a pixel-by-pixel basis, creating and adjusting images dot-by-dot, the latter by defining straight and curved lines with mathematical formulae.

Fractal has turned the whole thing on its head by producing a "natural media" paint-style program which uses vectors, in this case PostScript paths, to represent individual brush strokes.

The Expression interface looks like any other vector package with tools for creating and editing PostScript paths.

limits. Expression's strokes go several steps beyond the width and colour limits of ordinary vectors. The stroke warehouse provides a selection of stroke styles akin to natural media — watercolour paint, charcoal, dabs and various brush stroke styles. The width and opacity of the stroke varies across the length of the curve giving a very un-vector like look.

If Expression was merely a vector draw package with a selection of snazzy brush stroke effects, it would be nothing more than an interesting development in illustration software. What really makes the difference is what Fractal calls "Skeletal

PCW Details

Price £299

Contact Principal Distribution 01706 832000

Good Points Innovative use of vector format to create paint-style illustration.

Bad Points Could take getting used to. Possibly a short-lived gimmick.

Conclusion Could be for artists who haven't yet found what they are looking for.

★★★★

Software

Exchequer Enterprise

Heavy-duty accounting for more than keeping tabs on your pocket money.

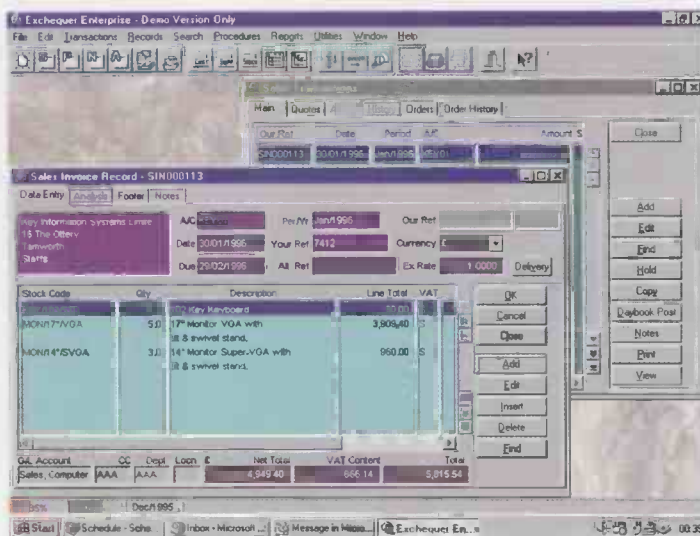
Enterprise is a heavy-duty accounting software suite aimed principally at those companies with more demanding accounting requirements. You'll only just have heard of Enterprise, because it wasn't launched until November. You might have heard of its DOS predecessor, with which it is key-compatible, although that was called Exchequer, having been marketed by SBS Financial Systems, who has changed its name too, and is now Exchequer Software. All clear? Incidentally, the DOS version was Editor's Choice in *PCW*'s last accountancy group test.

Enterprise is sold mainly through dealers with their full arsenal of demonstration and customisation facilities, but if you know what you want from the system, you can get it direct on CD-ROM. For the purpose of the review, Exchequer supplied us with a demo version, complete with tutorial but without a manual (which explains why its star rating must be provisional).

Enterprise is a full 32-bit Windows NT application which will run under Windows 95. This may not impress a market which is hugely keyboard-oriented and still seems happy with DOS. For such traditionalists, it also includes a DOS interface.

It's a modular system, with a central core of the three standard ledgers — Sales, Purchase and General or Nominal — together with Invoicing and a Cashbook. That will set you back a recommended £2,600 for a single user licence, rising through £6,500 for twelve users to £15,600 for forty-eight. Standalone and client/server versions are available. You can also pay slightly more for multi-currency capability (hey, you may need it for the Euro). Extra modules, starting at £500, include Stock Control, Bill of Materials, Sales and Purchase Order Processing, Costing, and a Report Writer. The company promises Job Costing and an Asset Register later. There's a non-optional support charge of ten percent. With these facilities (and prices), Enterprise is thus firmly ranged against systems from Sage (Sovereign), Pegasus and Tetra.

At its simplest, Enterprise's drill-down takes you instantly from summary to detail. Entrys2.bmp Another strong Enterprise area is its support for every kind of chart you've ever heard of, plus some you haven't



As well as its 32-bit power, Enterprise is also hoping to capture your attention with some of its additional capabilities, including drill-down investigation, open periods, and integration with Microsoft's Office. This latter gives you OLE links to Word and Excel (both v7.0), increasing the range of functions like letter writing, stock analysis and budgeting.

Drill-down is a system of recalling and examining any prior records that are linked to a particular transaction, like customer/supplier details, matching transactions (orders, payments), stock records, general ledger accounts, and department accounts. It's equally useful for analysis or fixing blame. In the ledger, you also get sub-groups presented in a tree format, graphically illustrating their interdependency. Open period accounting is well known lower down the accounting software scale where it shields non-accountants from the need to close the books. Now accountants can have it too.

Another neat Enterprise trick is the self-balancing journal, which can be used when you want to post several items to the same general ledger code. In cashbook transactions, for example, specifying the bank account as the self-balancing account for expense categories like wages, bank charges, and tax, means

you need only to enter the debit lines of those transactions for the credit lines to be posted to the bank account automatically.

Enterprise is particularly strong in its support for form design. This is implemented in a separate but integrated program which lets you design your own sales invoices, purchase invoices, quotes and picking lists by sight and print them as required. Forms can consist of text (and graphics like borders, boxes, shading and colour or logos) plus any information from the accounts database, which can be text, numbers or a combination. In addition, you can generate calculated data from a wide range of formulae. There's also provision for serial or batch numbering.

James Taylor

PCW Details

Price £2,600 (plus VAT) single user (System & Core modules); other modules start at £500

Contact Exchequer Software 01202 298008

Good Points Easy operation (but with password control), wide range of reports, flexible drill-down investigation.

Bad Points Poor Windows help file (in Windows 95).

Conclusion An excellent addition to the pantheon of accounting greats. Enterprise offers a good range of ancillary functions and genuinely useful innovation.

★★★★ (Provisional)

■ Software

Micrografx Windows Draw 5

Crammed with tools, guidance and value, the only hitch is the American demo.

Micrografx doesn't waste time in getting upgrades out of the door. Windows Draw 5 follows hard on the heels of Draw 4 (see *PCW* April 1996 p213). Recent purchasers of Draw 4 needn't worry that they've missed out as, aside from a new front end and additional templates, there doesn't look to be that much new.

There's no disputing Micrografx gives you a lot for your money. In addition to Draw 5, the double CD package includes Photomagic (a better-than-average picture editing application), Instant 3D and ABC media manager, a clipart library browser.

Those new to design will find plenty of help available. Initial options include a demo, a "Learn about Windows Draw 5" tutorial and project wizards. The demo is fine if you get your laughs from cheesy voiceovers spouting line's like: "I bet Salvador Dali would've liked this distort feature". (I bet he wouldn't). The tutorial on the other hand provides genuinely useful pointers to some of the less obvious features. A particularly noteworthy one being "Block selecting" which allows you to drag select several objects which are on top of a larger background without inadvertently picking up the background. This is one of those features that you just

hip flasks maybe.

Project wizards make possible the design and production of simple stationery that doesn't look like the work of a drunken imbecile. Wizards exist for certificates, banners, brochures, business cards, calendars, diagrams, kid's stuff, forms, flyers and web pages. They take you through the design in four or five stages giving you the chance to enter personal text details and choose between half a dozen or so styles. At the end of the process what you have may not be ideal, but it's quick and will provide a good basis on which to continue. Disappointingly, the web pages

are transatlantic in content, the fantasy football page turned out to have a grid-iron and oval-shaped balls.

Although the interface could be a lot better, Draw 5 is full of well thought out features that ease the burden of the creative genius. The shadow panel produces instant drop shadows in any colour and direction. Coolshapes provide an instant means to a complicated graphic end be it a starburst, polygon or 3D cube. There's also a palette devoted entirely to arrows which features some of the sexiest shafts you can draw without risk of arrest.

Micrografx boasts that Windows Draw is "Office Compatible"

— it looks and works like those in the MS Office suite. This is supposedly an advantage to anyone who has used Word. Sure enough, you won't have any trouble saving your documents or cutting and pasting or with any of the other mundane tasks. But in aspiring to make its graphics package work like a



word processor or a spreadsheet,

Micrografx has produced an interface that is uninspiring for the user.

Don't let Office compatibility put you off. The fact is that, at the price, there's nothing to touch Windows Draw 5. It is, if you like, the poor man's Corel Draw.

Ken McMahon



Wizards for everything from fake diplomas to business cards. The project help panel on the right gives advice on editing

know has been thought of by a real user, the software equivalent of keyrings that whistle when you clap, or post-it notes, or

don't provide any HTML authoring options, the web description is indicative of the style rather than the form. Even more so, they

PCW Details

Price Street — £44.95 (incl VAT)

Contact Micrografx 0345 089372

Good Points Excellent value. Some groovy tools. Good guidance.

Bad Points Office compatibility. Cheesy demo. Pseudo-web features.

Conclusion One of the best low-cost packages around.

★★★★

p90 >

■ Software

Lotus cc:Mail 6.0

The mail must get through! And it will, with the long-awaited upgrade to this venerable system.

This product has been around since the mid-eighties, first developed by cc:Mail (the company) and then bought out by Lotus in 1991. The last major release was in 1993, and apart from the odd minor update, cc:Mail has remained largely unchanged since then.

The new cc:Mail Release 6.0 system pack includes a rather confusing bunch of updated software for the whole family of mail products. The main module is the back-end administrative software for creating and managing the cc:Mail post office including cc:Mail Admin and cc:Mail Router for DOS and OS/2 as well as the Import/Export module. The client software for DOS, Windows 3.1 and Macintosh is also thrown in for both LAN and Mobile users. But here's the really confusing bit. Client software for Windows 95 and Windows NT is called Release 7.0 and, at the time of writing, this module is still not available, but by the time you read this review, Release 7.0 will be included as part of the Release 6.0 system pack. Hmmm following so far?

And there's more. Lotus Organizer is included in the bundle — this is the current version 2.11 which is already part of Lotus SmartSuite and integrates with cc:Mail to provide shared calendaring and group scheduling. There's also cc:Mail for web, a new package which allows you to access

your mailbox from anywhere using a standard web browser.

There are several major improvements in the administrative software. The major change is one which email gurus everywhere will appreciate. You can now carry out routine administrative procedures at any time regardless of who is logged in or out of the system. That means that administrators can get their evenings and weekends back, and users will always be able to get at their mail boxes.

The second major improvement is the increased number of users supported per Post Office which is now 1000, so traffic from multiple post offices can be handled simultaneously by just one copy of cc:Mail Router. Also, CAPI 2.0 support lets you take advantage of the high speeds of ISDN.

Migrating to this new version is no small task. Any archived mail has to be unarchived before the new database format will recognise it. Also, you'll have to check the amount of disk space on your mail server before upgrading. The installation process requires roughly two and a half times the space used by your current database, and when the product is finally installed, it will take up one and a half times the space of the previous version.

On the plus side, the ability to carry out maintenance tasks while users are still logged in will make a vast improvement to

the system's day to day working efficiency and ultimately makes the upgrade worth the hassle.

Eleanor Turton-Hill



• PCW Details

Price £41 per user based on 100 users

Contact Lotus 01784 445808

Good Points Easier administration all round.

Bad Points Installation is not as smooth as the documentation would have you believe.

Conclusion Many users may now choose a completely different solution (intranet builders, groupware, and browsers) rather than upgrade to this version.

★★★★

p92 >



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on pages 371 & 372

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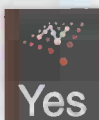
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■ Software

NetObjects Fusion 1.0

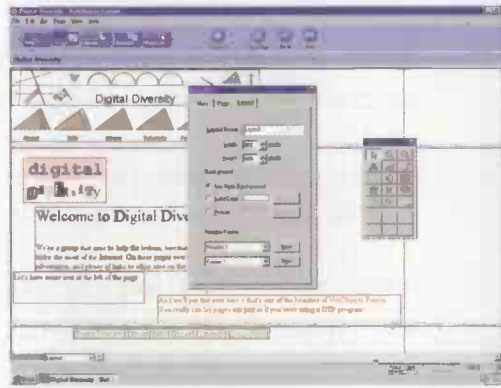
Consistent website creation the powerful way — but only if you're starting from scratch.

Designing web pages is getting easier all the time, but it's still a far cry from the sort of control that any seasoned DTP user is used to. Trying to place text at a particular place on the page is a hit-and-miss affair at best.

Until now. NetObjects Fusion is a web design system which is intended to give a degree of control to users not seen before, even in sophisticated packages like HoTMetal and PageMill. You'd expect nothing less for a price tag of \$695.

When you first create a new site, you're greeted with a blank screen on which you can create your first page, which appears as an icon. You can create additional pages, which will show up as the children of the current page. After you've added a handful, you'll end up with something that looks like a family tree, full of little page icons, each of which can be named. If you're used to the "design a page, then link it" philosophy of other web tools, this might seem strange, but it certainly helps to plan out your site.

The clever business starts when you double click on a page to open it in the editor. Banners are automatically created at the top of pages, complete with button bars if you want them, and a set of text links in a footer, instantly removing most of the tedious work of building a site. Drag a page to a different location in the tree, and all the links update automatically, so they'll point



to the correct parent page, for instance. Hit "Preview" and everything will be launched into your browser.

There's a comprehensive styling facility, with a wide range of templates for those who don't want to work from scratch. You can swap between them and instantly see banners, buttons and bullets update on screen. Properties for everything are controlled via a floating palette, which is usually simple, but confusingly changes often, depending on whether you've clicked in the page body, header or footer.

There are drawing tools which you can use on the page, and Fusion will automatically create a GIF when you hit "Preview" or "Publish". Need complex layout? Just drag a text box to wherever you want it, just like in a DTP program.

All this is possible because Fusion isn't actually editing HTML as you build your site.

You can place text wherever you want with Fusion, but you'll need a resolution of 1024x768 to see everything that's going on

It uses its own format and creates HTML — with extensive use of tables to control layout — when you're done. The flexibility is long overdue, but it does mean that even the "text only" version of your pages will look strange on some older browsers. There's no built-in

support for frames, which means you'll have to enter the code for them automatically and, while you can import individual pages one at a time, there's no easy way to convert an existing site to a Fusion file.

Those niggles aside, this really is an amazing tool. It must be the quickest way yet to create a consistent site from scratch.

Nigel Whitfield

PCW Details

Price US\$695

Contact NetObjects 001 415 943 4048

Good Points A powerful way to create a consistent site.

Bad Points Rather expensive. Use of unsupported features like frames is fiddly.

Conclusion Plenty of power. Probably the easiest way to put together a large web site yet devised.

★★★★



Oh well..
..at least
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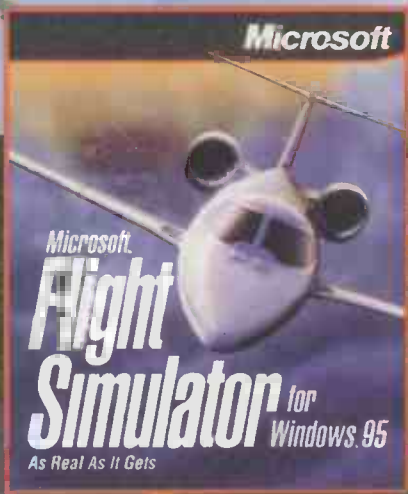
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■ Software

First Aid 95 Deluxe

Do-it-yourself technical support could cut costs and the number of grey hairs on your head.

You are in a queuing system. Please hold on. We will have an operator with you as soon as possible" — words guaranteed to make your heart sink. Some application has suddenly decided not to work and the quick call to technical support puts pounds on your phone bill. Or maybe you spend hours struggling with manuals trying to rectify the problem, usually fixing it, but causing five other problems in the process.

First Aid is one of the best-selling "technical support in a box" products. It fixes problems in several categories and provides a direct link to CyberFix's web site to update First Aid and its knowledge base of Windows applications.

It is UK-specific, which is extremely useful. "The Support Exchange" is a database of some 2000 hardware and software vendors which, in most cases, provides a mailing and email address, corporate, customer service, sales, technical support, fax and BBS phone number, CompuServe and AOL forum information, and FTP and web locations. If you click on a URL, First Aid Deluxe will launch your browser.

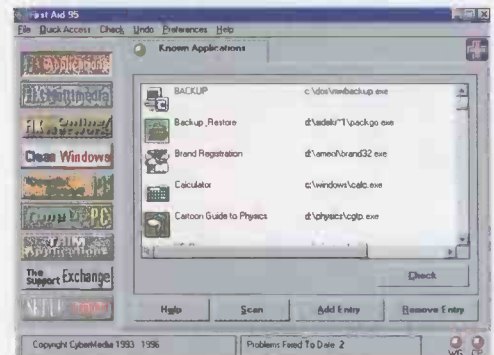
There are two new emergency recovery tools: RetroFix and Startup Recovery Disk. RetroFix Monitor is automatically launched when you start Windows and makes a backup of configuration files and the Windows Registry, or any file you choose,

and tracks changes in them. If you don't want it to launch on startup, you can load it from First Aid 95 Deluxe Launch Control to restore configuration files when needed.

The Startup Recovery Disk is the usual sort of startup disk you should keep for those times when your computer can't access the operating system files and won't boot.

Aside from these additions, First Aid 95 Deluxe has the same features as earlier versions. Fix Applications checks supported installed Windows applications for many types of problems using the information in the CyberMedia Knowledge Base, which it regularly updates from the net, CompuServe or America Online. Unsupported applications are checked for startup problems using the information in the application's static DLL files. Windows Guardian does much the same thing, but only with 16bit applications and only when the application generates an error.

It runs checks on your multimedia setup and fixes some of the problems with audio, video, and MIDI files, CD-ROM performance and multimedia device drivers. It diagnoses problems with your computer's communications and networking capabilities, performs some minor clean-up jobs, so you can delete unwanted files and trims features you don't want from applications.



First Aid Deluxe: Fix Applications — find out what's wrong with your installed applications

Perhaps the best feature is CrashGuard which works in the background and steps in before a General Protection Fault hangs your machine. It lets you save data in open applications before rebooting, a feature which has saved me many times.

Paul Begg

PCW Details

Price £59.95 for First Aid 95 Deluxe, £34.95 for First Aid 95. First Aid 95 users can upgrade to the Deluxe version for £19.95.

Contact CyberMedia 0800 973631

Good Points Packs in a lot of useful information and tools.

Bad Points It doesn't really do enough.

Conclusion If you install and uninstall a lot of software and hardware, you'll benefit from First Aid 95. But if things usually run trouble-free, you won't get use out of it.

★★★★



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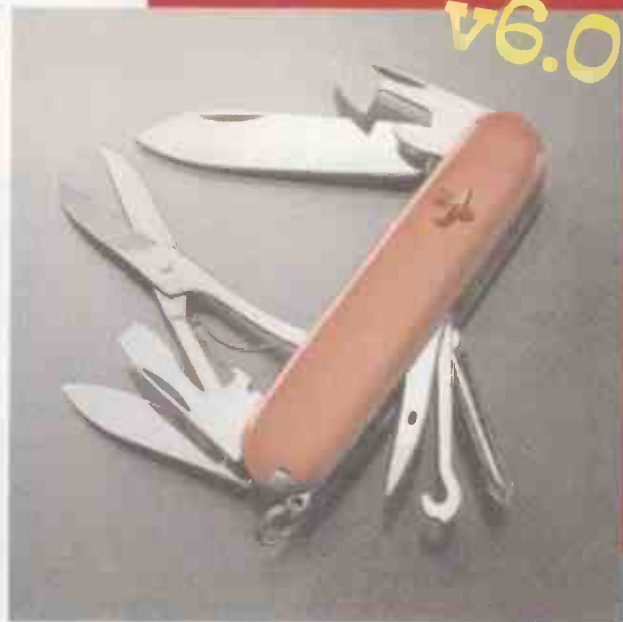
See page 373

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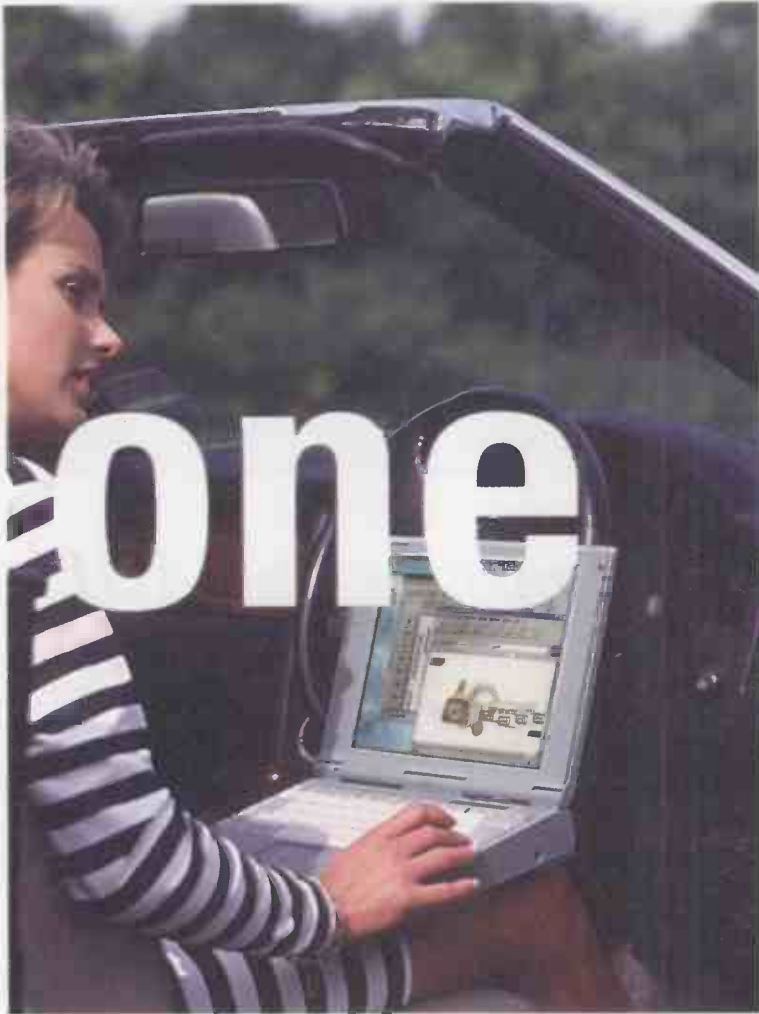
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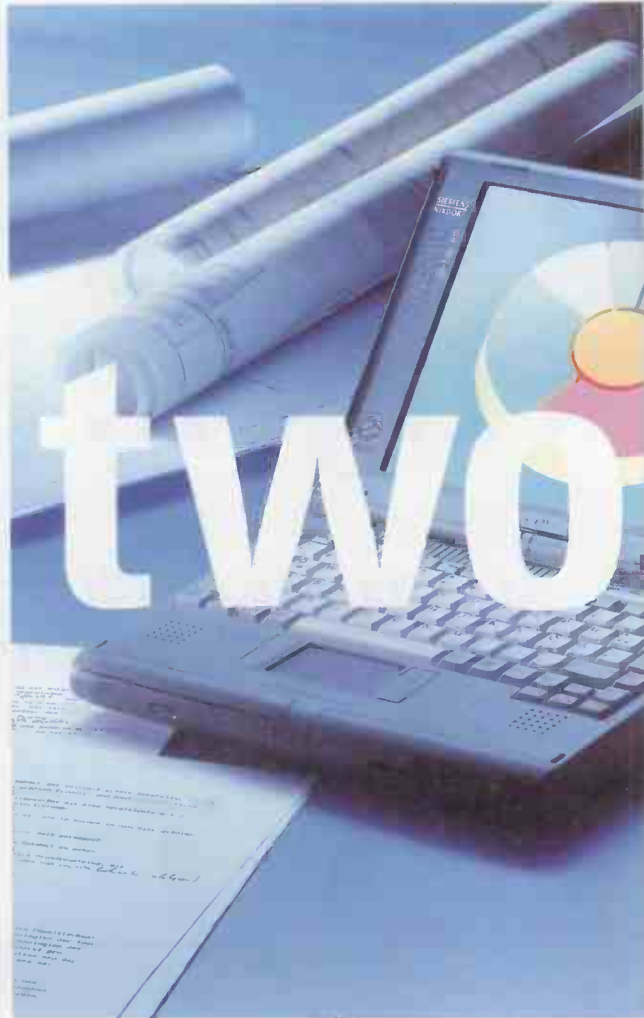
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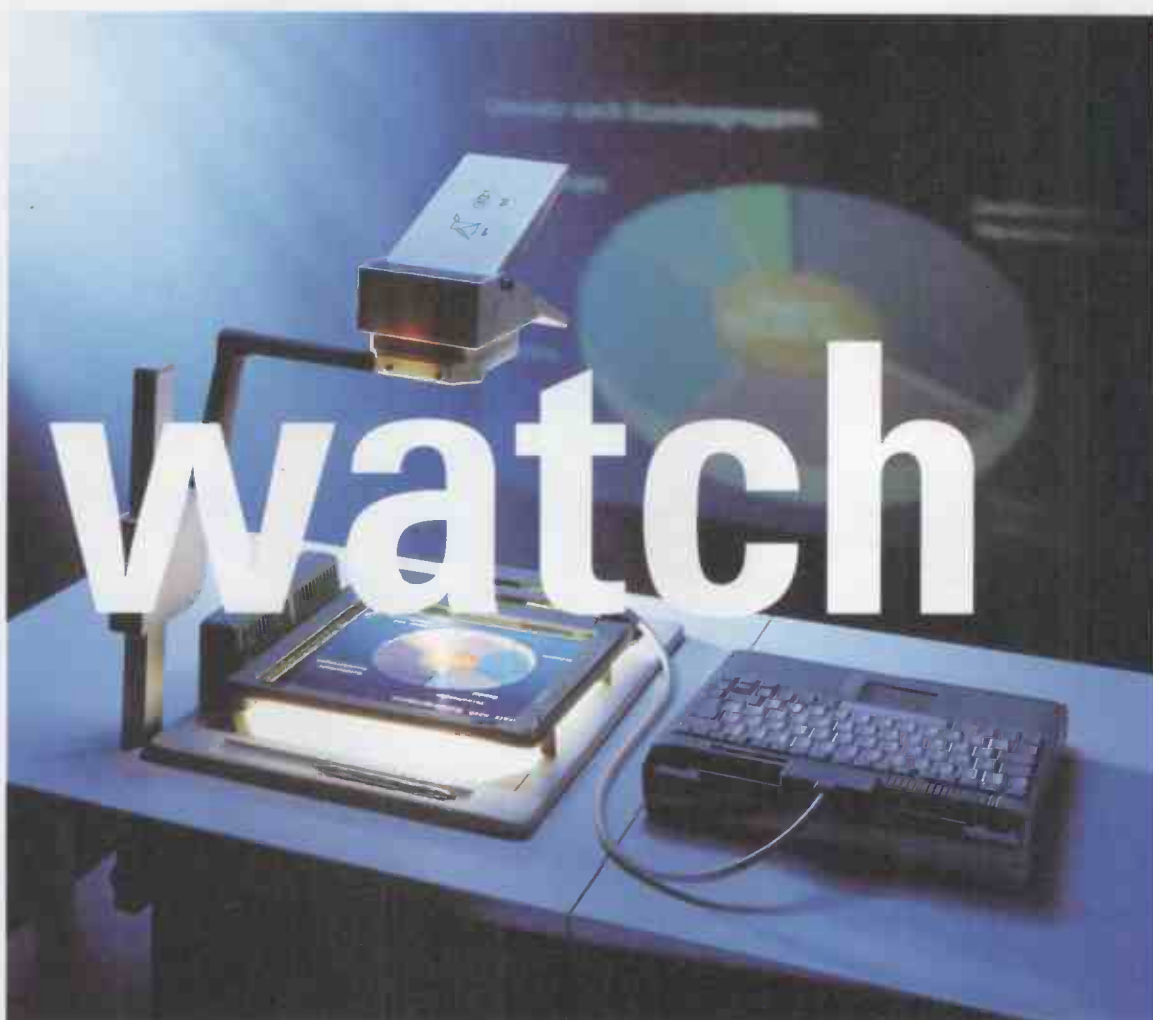
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French Pixel magazine, No 28, 1996:

"ViewSonic's PT770 is a 17" monitor with an aperture grille mask. This monitor is ideal for those who need high definition and razor sharp images."

Byte magazine, America, April 1996:

"The User's Choice Award for this year goes to the ViewSonic Professional Series PT810...

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Mac Resolution (Max.)	1600 x 1200	1600 x 1200
Recommended Resolution	1600 x 1200 @ 73Hz	1280 x 1024 @ 77Hz

Dependent on model, TCO'92, EPA Energy Star™, MPR-II certified, PC and Mac compatible. © 1996 ViewSonic Europe. All rights reserved. In the interests of continuing product improvement, specifications are subject to change without notice. Features indicated may not apply to all products. All products and trademarks are brand names of their respective companies. The three bird logo and SonicTron™ are registered trademarks of ViewSonic Corporation. Microsoft, Windows and the Windows logo are registered trademarks of Microsoft Corporation.

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Freephone 0800 833 648. Fax: 01293 643910.



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Awards and features relate to the ViewSonic product range and not necessarily to the products shown here.

Software

Multimedia encyclopaedias

There are lots of them and some are more famous than others. But how do you choose between them? Paul Begg swots up on the range of encyclopaedias available.

Encyclopaedias are one of the most hotly-contested areas of multimedia publishing and there are encyclopaedias to suit every need and every pocket, from Britannica CD 2.0 which costs £75 to Webster's Concise Interactive Encyclopaedia at £12.99.

There are advantages and disadvantages to each. The Grolier one has probably got the most solid content, but has a very strong American bias. The Hutchinson Multimedia Encyclopaedia is produced in the United Kingdom and has a British orientation, but the entries are short. Encarta bridges the gap, being based on an American encyclopaedia but having been anglicised and having had the content beefed up.

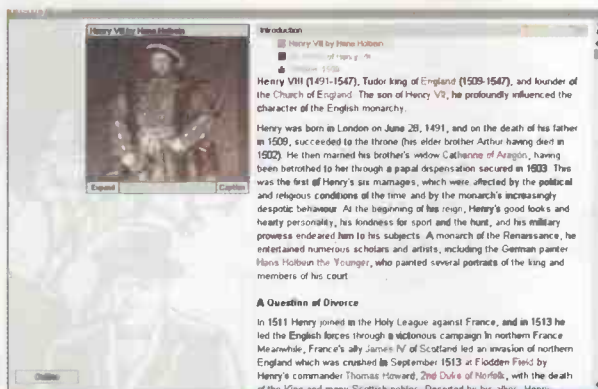
Compton's Interactive Encyclopedia

While none of the encyclopaedias are aimed specifically at children, all have been produced with children in mind, as frequent references to the National Curriculum illustrate. Most target the post-eleven age group, but Compton's is distinguished by also catering for a lower age range. The emphasis of Compton's is on fun, which begins with an introductory tour by Patrick Stewart (Jean Luc Picard from *Star Trek: The Next Generation*), and even features an astronomy game called Star Quest.

The "fun" is both good and bad. It encourages children to explore the encyclopaedia and learn in the process, but is bad because you generally turn to an encyclopaedia for information, and the fun can be diverting. This also makes the encyclopaedia less useful for school use.

But don't think the Compton's is a slouch on content. It is fairly solid. There are 37,000 articles, more than 100 videos, animations, slide shows, and presentations, 8,000 photos and illustrations, and nearly 17 hours of sound and music. You can access timelines of both US and world events, an up-to-date interactive atlas, and a dictionary and thesaurus.

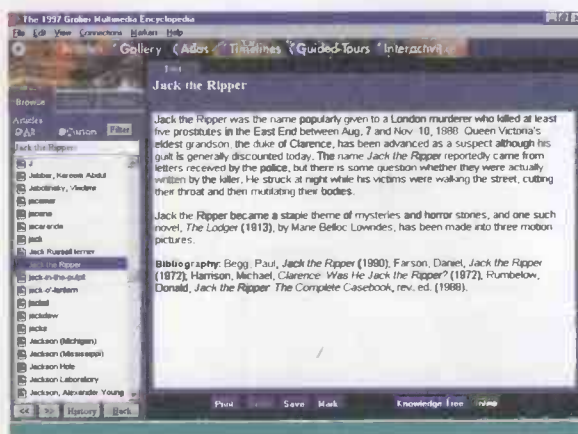
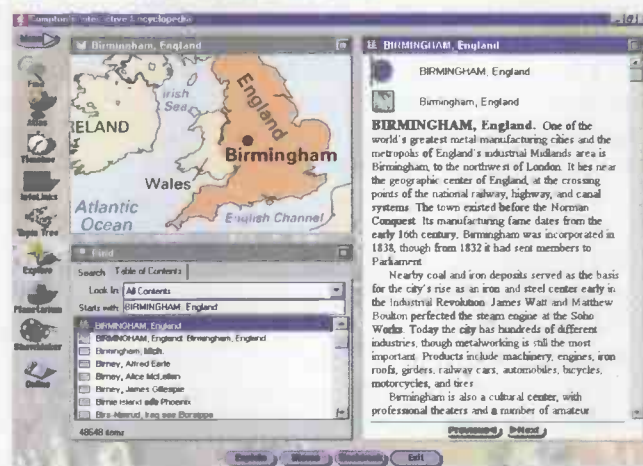
Compton's has direct links to relevant



Above The Encarta 97 screen is nicely laid out

Right Compton's: Birmingham UK — with a map

Below Grolier: Probably the best encyclopedia after Encarta — even if it does mention me



web sites. The Monthly Updater lets you download updates to existing articles and web links, and new articles. If you are on AOL you can join the Compton's NewMedia Forum and communicate with people who can help you with your school projects and work.

Encarta 97 Encyclopaedia World English

Edition

Encarta is unquestionably the best of the popular encyclopaedias. Microsoft has thrown money at Encarta and not only beefed up the content, but undertaken such extensive localisation that the World English Edition is effectively produced in Britain.

To undertake the content improvement and the localisation, Microsoft turned to British publisher Websters — not to be confused with Merriam Webster, the American publishing house — which has treated Encarta as a serious publishing operation.

The localisation is excellent, as is illustrated not only by entries for events like

Monmouth's Rebellion and a host of scene-setting essays, but by entries for the Goons, Tony Hancock and the Ealing movies too. Entries are linked to the National Curriculum, many articles and media elements having been selected with schools in mind. In particular, Encarta enjoys a number of broad introductory

p100 >

Software

articles and features relating specifically to schoolwork. There are links to educational web sites.

Particularly impressive has been Microsoft's, or rather Websters', determination to properly check out web sites, making sure that the content is solid and reliable.

1987 Grolier Multimedia Encyclopaedia

The Grolier Multimedia Encyclopaedia is the best alternative to Encarta and, in some ways, a superior product. It is slightly bigger, the entries are solid and clearly written, and there is invariably a bibliography of further reading and guidance to associated entries. The main screen is neat, tidy and has access to all the features of the encyclopaedia.

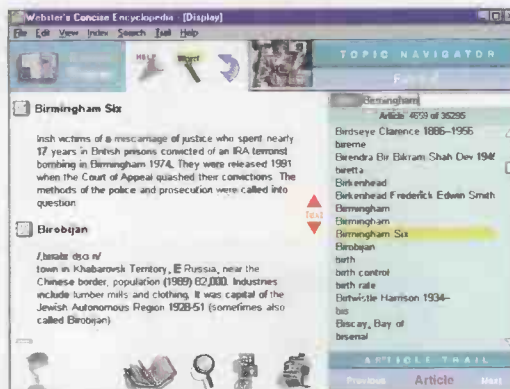
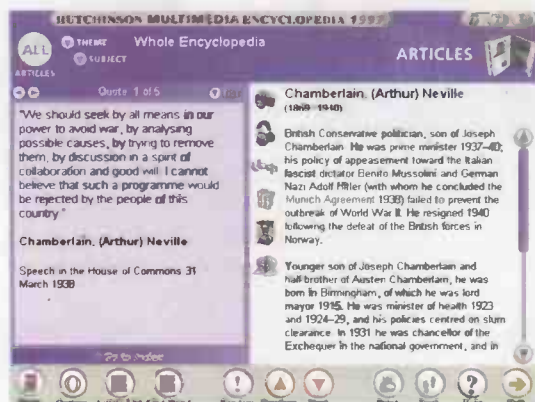
The downside is its American bias. Even the bibliographies cause problems when the suggested books are American (because they may not be available in the UK). On the other hand, you will find entries for people like Tony Blair and King Arthur and for historic periods like the Tudor dynasty.

Like other encyclopaedias, Grolier has online access, but it is limited to approximately one third of the articles. These have links to related internet sites or Forums on CompuServe.

Hutchinson Multimedia Encyclopaedia 1997

From the British company Attica, the Hutchinson Multimedia Encyclopaedia 1997 has the benefit of being produced in Britain — it is still the only multimedia encyclopaedia of British origin. It also supports the UK National Curriculum but its

Hutchinson's: here you can hear Neville Chamberlain speak



Websters: It's British, has a nice interface and an unbeatable price

claim to being British produced carries less weight in the light of Encarta's localisation.

New to the 1997 version are internet links, which let you bring the encyclopaedia up to date and access over five hundred recommended web sites.

In addition to the encyclopaedia itself, which has more than 40,000 articles, thirty new videos and four and a half thousand photographs and illustrations, there is a dictionary of difficult words, a world atlas, a quiz, and sets of questions specifically aligned to the National Curriculum.

The interface has been slightly redesigned and performance has been improved, but the content still fails to satisfy. The Hutchinson is more akin to a concise dictionary. But let this not be a serious criticism, for there are times when all you want is a handy and quick reference.

Websters Concise Interactive Encyclopaedia

The Webster's Concise Interactive Encyclopaedia costs only £12.99 (incl VAT)! There's a catch, but it is one with which you might feel able to live. It is in fact the 1994 edition of the Hutchinson Multimedia

Encyclopaedia. So, if you can live with an encyclopaedia that isn't bang up to date, then the Webster's must be the multimedia bargain of the year.

It includes 34,000 articles, 30 minutes of video, 150 audio clips, a Timeline, and a World Atlas. There's no access to online resources, and the entries are brief to the point of being terse, which limits its use. It has a pleasant interface, is relatively easy to use, and was compiled in the UK with a UK bias.

Conclusion

The encyclopaedia of choice is Encarta 97 World English Edition. Microsoft has chosen wisely in Websters as its content provider: it ties in well with the needs of the classroom and the requirements of the National Curriculum.

The alternative choice, despite the American bias, is the Grolier Multimedia Encyclopaedia. However, the Webster's Concise Interactive Encyclopaedia is our second choice. It has defects, notably not being up to date, and it isn't an alternative to Encarta or Grolier. However, not every home (or school) can afford £50 for an encyclopaedia, so when price is a consideration, the Webster's is a bargain.

PCW Details

Comptons Interactive Encyclopaedia

Price £39.99

Contact The Learning Company (formerly Softkey) 0181 246 4000

Good Points Aimed at younger children.

Bad Points American content.

Conclusion It could and maybe should be a front runner, but isn't.

Encarta 1997 World English Edition

Price £49.99

Contact Microsoft 01734 270001

Good Points Localised, good content, approved online recommendations.

Bad Points Nothing really. Encarta just gets better and better.

Conclusion Buy it.

Grolier Multimedia Encyclopaedia

Price £49.99

Contact Grolier Interactive 01865 264 800

Good Points Good, solid content.

Bad Points Heavy American bias.

Conclusion Needs localisation, but still your best alternative.

Hutchinson Multimedia Encyclopaedia 1997

Price £39.99

Contact Attica 01908 570113

Good Points British, linked to the National Curriculum.

Bad Points The entries brief to the point of being terse.

Conclusion It needs a price drop to compete.

Webster's Concise Interactive Encyclopaedia

Price £12.99

Contact The Learning Company (formerly Softkey) 0181 246 4000

Good Points British, concise, and at a superb price.

Bad Points Out of date, no internet links.

Conclusion At £12.99, this is a superb bargain.

Britannica CD 2.0

Price £755 (approx.)

Contact Encyclopaedia Britannica International 0181 669 4355

Good Points Probably the best encyclopaedia, though some of the articles are heavy reading.

Bad Points Very expensive.

Conclusion Not reviewed here as it stands in an expensive league of its own. You can access it online at www.eb.com for an annual fee of £112.50.

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- STB Virge VX 3D 4MB VRAM Graphics Accelerator
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- Tower Case
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- MS Windows 95
- MS Office Professional 95
- MS Encarta 96 (US Version)

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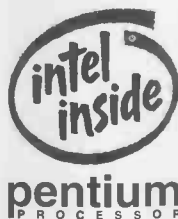
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*Source: IDC



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Solo 2100 S5-133

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Recommended Best Buy,
PC Direct, November 1996

P5-133

"Overall, this is a well-constructed machine, with masses of expansion potential, a good monitor and fair keyboard, ample software bundle and exemplary performance. It wins a well-deserved PC Plus Gold Award."

PC Plus, September 1996

P5-200 XL

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PC Pro, August 1996

P5-133 Multimedia

"Outstanding performance... A real hot-rod of a PC, at a good price."

Personal Computer World, August 1996

P5-166

"...the Gateway had to come out on top for pure speed and excellent price."

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Personal Computer World, June 1996

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Optimum configuration	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Free telephone support for hardware and software for as long as you own your system	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Systems made to order	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Systems ready to run	<input checked="" type="checkbox"/>	<input type="checkbox"/>
30-day money-back guarantee (shipping costs not refundable)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3 year limited warranty for desktops	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1 year limited warranty for portables	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Excellent reputation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Full range of systems	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Award-winning and acclaimed in the PC press	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Availability of business leasing options, service upgrades and extended warranties	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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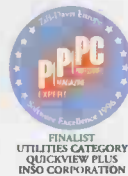
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PC Pro

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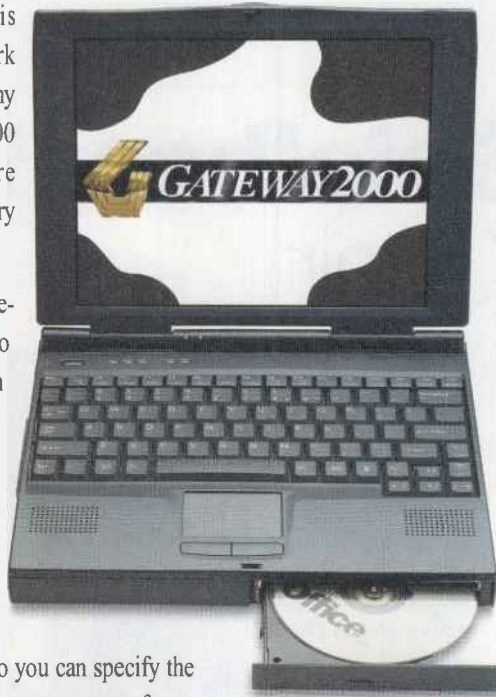
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<http://www.uk.gw2k.com>

■ Software

Steven Spielberg's Director's Chair

"It's a wrap!" Grab your clapperboard and megaphone and get down to the set. With Steven Spielberg as your mentor, you can't fail to produce a box office smash.

I defy any film aficionado not to have harboured a secret desire to get out of their cinema seat and into the director's chair. This CD panders to those ambitions: sets us loose with thousands of fictional dollars, some of the best cast and crew in the world, and tells us to go make a movie.

Steven Spielberg more than just lends his name to this project. He appears frequently, popping up on video to offer help and advice and to explain the whole confusing business of movie directing, from writing the script to directing the actors, adding sound effects and music, to premiering the final film.

You are given a basic plot synopsis — a prisoner is on death row after being falsely accused of murdering his rich employer. His girlfriend tries to find the evidence needed to free him and to nail the real perpetrators. You have some great Hollywood names to help you out: Quentin Tarantino plays the prisoner, Jennifer Aniston, from the TV show "Friends", is his girlfriend, while magicians Penn and Teller also get caught up in the action.

The first step is to go off and write the script. To help you, Ted and Terry appear and gleefully tell you they have written the script for Aladdin. You are offered the chance to collaborate with the writers or to let them write the script themselves. You cannot just type in your own script, as Tarantino is not on hand to act whatever you write. All you can really do is to pick and choose from the footage available, guide the writers' hands, reject certain versions and opt for something more along the lines of how you see the story developing. You have limited choice the first time you make the movie, but after that you get more chance to pick your scenes.

You then go off to shoot the film. When

Steven Spielberg is on hand to dispense good advice, and his PA will show you how to do the more technical stuff like using the editing desk



you first start, you are only allowed to do a take from the master shot — that is, the wide view of the whole scene. As you progress and gain experience, you are let loose on close-ups and different angles.

However, you still have problems to deal with — wardrobe haven't got the costumes ready, the hairdresser is still at work on your stars, and the lighting guy is telling you it will take him another hour to rig up the right effects. Also, the studio is hassling you about budget and schedules, so you have to be on the ball and ready to make tough decisions.

Having put together your masterpiece, you have to edit it and add sound effects and music. This is probably the best part of the disk: it's where you get to make or break your film, and where you have the most control over the finished product. If you are unhappy about the way a scene has been written, this is where you can put it right by chopping it about to make

something new. And, of course, adding the right music can turn your effort from a raw piece of footage into a real film.

Finally, you process the film and premier the movie. This is where you will need not only nerves of steel, but also a large amount of free hard disk space — up to

28Mb of free space, in fact, as the relevant video clips are read off the CD, onto your hard disk, and the various sound tracks added. Add this to the 12Mb of free space needed to install the application, and you are up to a heavy toll on your hard disk. However, the other requirements are not out of the ordinary for a CD-ROM — a DX2/66, 8Mb of RAM and a double-speed CD-ROM drive.

Adele Dyer

PCW Details

Steven Spielberg's Director's Chair

Price £49.99

Contact Random House 0171 973 9000

Good Points A great way to learn the art of film-making.

Bad Points You will need a lot of free disk space.

Conclusion Utterly absorbing.

★★★★★

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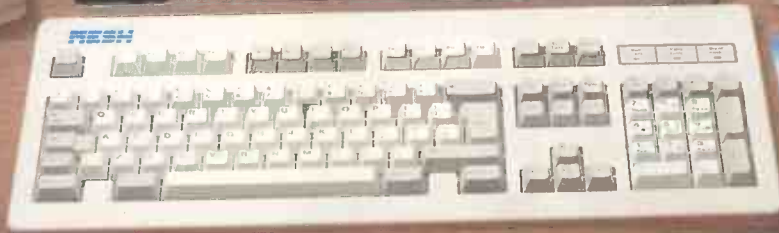
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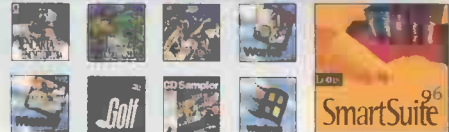
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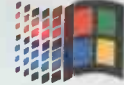
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■ Software

DK Castle Explorer

Lower the drawbridge or, if you can discover where it is, take the secret tunnel.

Ever wondered what it was like to live in a 14th century castle? If so, Castle Explorer is the answer to all your questions. You can enter the castle as a page and find your way around, looking at whatever catches your eye. Or, if you prefer, you can go in as a spy, disguised either as a maid or a knight in shining armour, and hunt for the Baron's escape tunnel.

Both are equally entertaining. The animation is detailed and the sound effects realistic. You have a chance to see the characters in person, as Castle Explorer is one of the first CD-ROMs from Dorling Kindersley to



feature video clips of the characters.

Scrolling around the castle and learning things for yourself is probably the best way to approach this CD. When you click on a particular scene in the building, a description

The castle has many interesting areas to visit

about it appears on the screen. These are taken from relevant pages in six books about castle life (also included on the CD-ROM) and they are generally a good read. You can even click on stonework to dissolve it or lift sections of the roof to examine the rooms below. On the whole this is a jam-packed CD, full of interesting information.

Etelka Clark

PCW Details

Price £29.99

Contact DK Multimedia 0171 753 3488

Good Points The effects are outstanding.

Bad Points Being a spy proves to be a bit confusing.

Conclusion You won't be disappointed.

★★★★

Barbie Fashion Designer

What should Barbie wear on her "dream date" with Ken? You can help her decide.

There is a huge market surrounding Barbie. Not only can you have the dolls themselves and clothes to dress them in, but a whole load of paraphernalia to go with them, including houses, furniture, cars, sports equipment and, of course, a ready-made boyfriend, Ken.

Mattel, maker of Barbie, has come up with a series of CD-ROMs based on the doll's activities. The idea is to interest girls in computers, as they have traditionally left learning about PCs to their brothers.

The CD will appeal to any small girl that likes to play dressing up. It contains a whole wardrobe of clothes for Barbie that can be mixed and matched for any



occasion, whether it be a "dream date" (as the voiceover puts it) with Ken, a day in the office or a wedding gown. You can add patterns to the basic clothes and colour them in. The real fun starts as Barbie models the clothes on the catwalk.

Finally, when you have designed Barbie's essential wardrobe for the season,

Getting Barbie ready for her big day

you can actually make the clothes by printing them out on special fabric paper (supplied with the CD) and fixing the seams with little self-adhesive tabs.

Not many of the activities have anything to do with education, but then, neither does the original airhead herself, Barbie. As the idea is simply to get girls using a PC, I suppose this could have some merit. Otherwise, it is simply a bit of harmless froth. Now who does that remind you of?

Adele Dyer

PCW Details

Price £34.99

Contact JM Interactive 01703 650759

Good Points Mindless fun.

Bad Points Draws you into Barbie's politically suspect world.

Conclusion Little girls will probably love it.

★★★

The audio experience from our new Sound Blaster is so real that, when you find out what you've been missing, you'll certainly know what hit you.



With 3D Positional Audio, suddenly you can hear the metallic click of the shotgun's trigger over your left shoulder.

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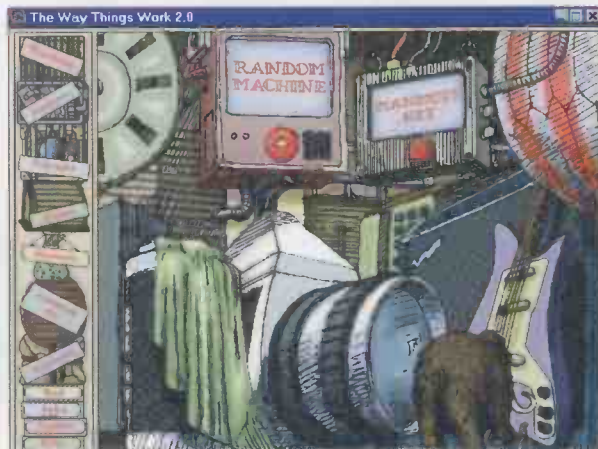
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■ Software

The Way Things Work 2.0

Video, animations, clear explanations and the return of the woolly mammoth.

The Way Things Work was one of Dorling Kindersley's (DK) best known and earliest CDs. DK has now revamped the product, to compete head-on with some of the better children's CDs which have since come on to the market, and the work the company has put into the venture really shows. The entire presentation is drawn in cartoon style, with plenty of animations of how things work, as well as DK's woolly mammoth — a familiar character from the earlier version. The author even makes a personal appearance to explain things: he appears in a video which is cleverly integrated into the cartoon background, so as he walks around the screen he will disappear into doorways and behind buildings and reappear on the other



side. Woolly mammoth, meanwhile, pops up with equal regularity, with lots of tiny snatches of animation to amuse you, or in little stories to illustrate certain principles. As always, it is the explanations themselves which are by far the strongest part of this product. Everything is explained, from hot air balloons to pianos, to microwave ovens. There are plenty of

An interesting and entertaining way to learn

diagrams and textual explanations added to the animations; although the latter are voiced with American accents, they are particularly good at showing, for example, exactly how the effect of one action can produce another, and how things work in practice. The textual explanations are well-linked to others, so if you do not thoroughly understand something, there is no need to trawl through indexes or glossaries to find what you are looking for.

Adele Dyer

PCW Details

Price £39.99

Contact Dorling Kindersley 0171 753 3488

Good Points Great animations. Faultless explanations.

Bad Points The American accents are offputting.

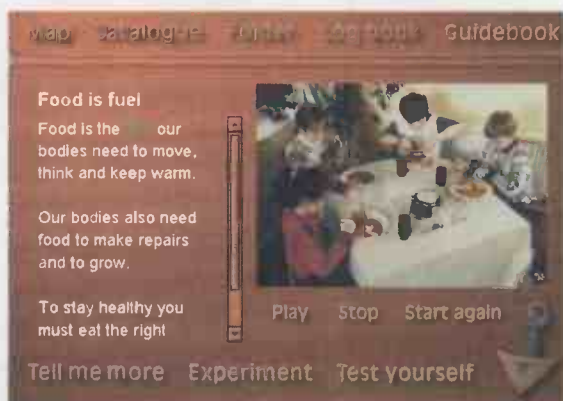
Conclusion A fascinating CD.

★★★★★

YITM Science Explorer

Educational experiments, games and quizzes to do at school.

Although Science Explorer is billed as a virtual museum through which children can walk and learn as they go, this is a little misleading as to the real contents of the disk. The virtual museum does feature in it but only in so far as you can view the exhibits from a distance: you cannot approach them for closer inspection, and if you click on them for more information they remain static. The actual information on the CD is tucked away in a far less interactive section, which is almost entirely menu-driven. The easiest way to get at anything you want to know about is via the catalogue, which is simply a list of all the



general headings on the CD.

The interface is not excitingly designed, neither is it particularly intuitive to use. A menu-driven system may be better at teaching children how to use traditional software but the interface is not typical to Windows, so this point is somewhat lost.

Food for thought, but it could be more filling

Once you enter, the information is good as far as it goes but is limited. Compared with, say, *The Way Things Work* (above), the information here is desperately simplistic and rather patronising.

The interesting sections in this product are the little experiments, games and quizzes it offers. These are great fun and make the whole thing worthwhile.

Adele Dyer

PCW Details

Price £34.99

Contact YITM 0113 246 1528

Good Points Lots of experiments and games.

Bad Points Rather unimaginative.

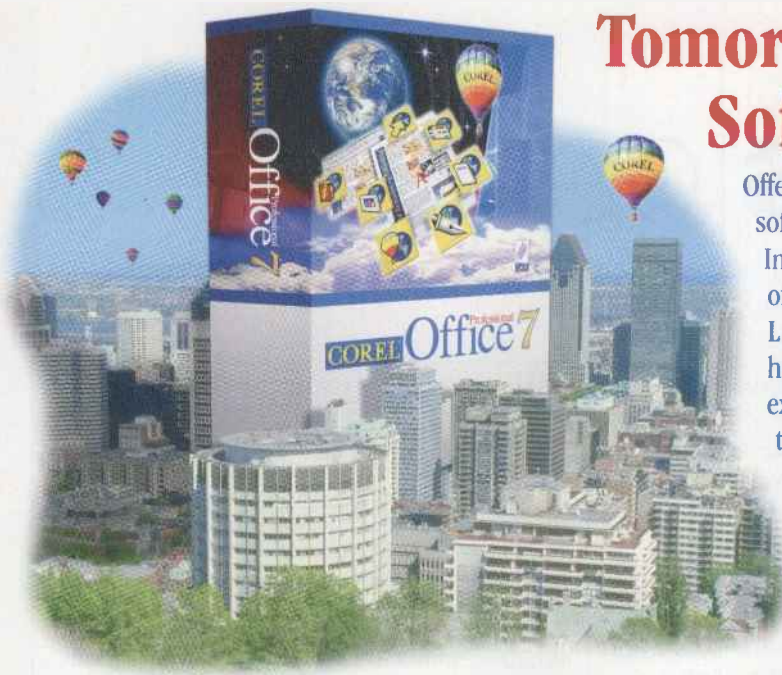
Conclusion Behind its time.

★★

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Dress code

Imagine the day when your mind-operated PC goes everywhere with you as an item of clothing... it may be sooner than you think. George Cole reports.

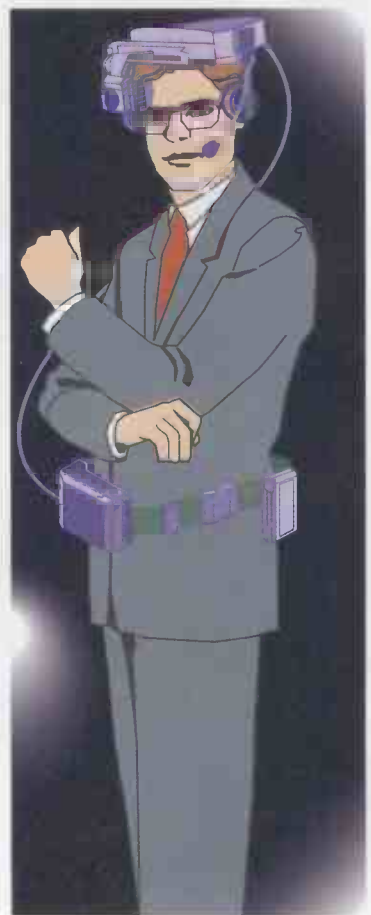
When the first carriage clocks appeared, few people imagined that we would ever walk around with one strapped to our body. Yet today, the wrist-watch is a part of everyday life. As computer technology spawns smaller, more powerful and more sophisticated devices, have you ever wondered whether we will soon be wearing our computers rather than putting them on a desktop? That day may be closer than you imagine. Wearable computers have attracted much attention in recent years, with various organisations racing to develop the computer you put on before leaving your home or office.

The Massachusetts Institute of Technology (MIT) Media Lab says the potential market for the wearable PC is vast. There is a wide range of people who would find such a device useful: from the disabled (for communication or accessing information), to stock brokers (24-hour stock quotes and online trading), estate agents, commuters (reading online newspapers), rural doctors... the list seems almost endless.

Many people require access to data while on the road and although a notebook PC can often fulfil this

requirement, there are times when hands-free operation would be very useful. Wearable computers could be used for standard applications such as word processing, but many could also be networked or connected to the net using cable, infra-red, wireless or satellite links.

Today, the typical wearable computer consists of a belt-mounted CPU and head-mounted display. A handful of companies have launched wearable computers aimed at industrial and



MIT lets the shoes do the talking

The Media Lab at the Massachusetts Institute of Technology (MIT) has developed what some view as the ultimate wearable PC: the computer that sits inside a running shoe. The shoe computer (sponsored by Reebok) may sound like something out of a comedy sketch, but it isn't. The prototype computer fits inside a shoe like an insole and is powered by human and battery power.

The act of walking generates about 60W of power (enough to power a light bulb), mostly in the form of heat and mechanical energy. MIT believes that up to 17W of this energy could be used to power the shoe computer. The researchers also believe that by shaking hands, users could exchange information between two shoe computers: the hands could complete an electrical circuit, allowing signals to be transferred between both computers.

The Media Lab is involved, too, in many other aspects connected with wearable computers. For example, it is investigating various types of user interface, display technologies, operating software, and future applications such as VR. It is also adapting its face recognition system Photobook for wearables. The system enables 8,000 facial images to be scanned within one second and could be used by the police, reporters, politicians and the visually disabled (with an audio interface).

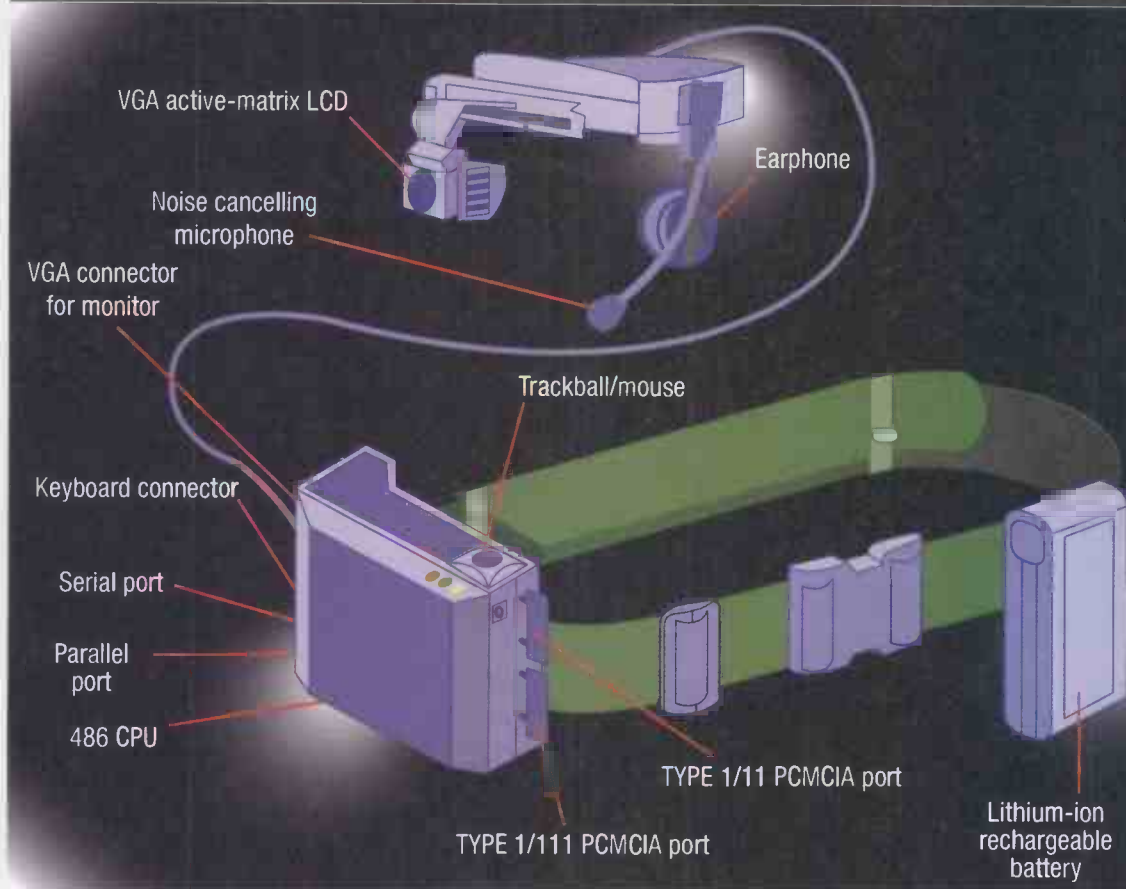
The Media Lab's web site on wearable computers is an excellent start for anyone interested in the work taking place. You'll find it at www.media.mit.edu/projects/wearable/

military markets. The Mobile Assistant, by Xybernaut, is a typical example of the state of wearable computer technology today. It uses a head-mounted display with a computer and battery pack worn on a belt. It is designed for hands-free operation and can be voice-controlled.

Xybernaut was formed in 1990 (then known as Computer Products and Services, CPSI) and its main work involved creating electronic manuals for military, intelligence and government agencies. The company noticed how maintenance technicians tended to operate in pairs: one working on machinery while the second held a technical manual and shouted out instructions. Xybernaut believed it would be more flexible if one operator could have all the technical information to hand.

Notebook PCs were considered, yet some repair tasks involve using two hands and often there is simply no space for a computer. Xybernaut spent six years and hundreds of thousands of dollars developing the Mobile Assistant. The device has a lightweight (226g) head-mounted display with a small LCD eye-piece, an earphone and a microphone. The LCD screen display is mono but later versions will offer colour. Special optics make the eye-piece image appear to float in front of the screen and, according to Xybernaut, the display size is roughly equivalent to that on a 15in desktop monitor.

The typical, wearable PC



■ Head-mounted display

Typically, a 1in active matrix LCD screen offering VGA graphics, which may be mono or colour. The LCD screen sits several inches in front of one eye, allowing the user to continue to see the outside world, thus preventing them from becoming disorientated. Special optics are used to create the illusion of a much larger image (typically 15in), being viewed some 18in in front of the eye. Some units include a head-mounted camera for teleconferencing or tele-medicine. Computers operated by voice recognition software often use a noise-cancelling microphone: noise-cancelling signals are used to improve the accuracy of the voice recognition software. As the head-mounted unit is lightweight (about 250g), it can be comfortably worn for hours on end.

■ The CPU Unit

About the size of a paperback book and weighing a little over

The PC base unit is the size of a paperback book, weighs 1.25Kg and is powered by a lightweight, rechargeable lithium-ion battery, which gives several hours use. The Mobile Assistant is rugged enough to withstand a fall of about one metre. In the first generation Mobile Assistant, the PC used a 486 chip, 4Mb of RAM and a 340Mb hard disk. It also came loaded with MS-DOS or Windows operating software and speech recognition software. The base unit had connections for a keyboard (full-size or wrist-mounted), a printer and CD-ROM drive, plus PC Card slots.

The Mobile Assistant is not cheap: the first generation model costs between \$10,000-12,000, the second

1Kg, the CPU is attached to a belt worn around the waist. Most wearables use 486 or Pentium processors and offer between 4Mb and 8Mb of RAM (usually expandable) and a 500-1,000Mb hard drive. The computer is pre-loaded with Windows 3.1, or 95, as well as speech recognition software.

The CPU has input/output sockets for standard serial, parallel and keyboard peripherals, plus barcode readers, mouse, CD-ROM drive, printer etc. PC Card slots enable many features (e.g. RF communications and Global Positioning Systems) to be added to the wearable PC.

■ Battery Pack

Attached to a belt, the battery may be a rechargeable Nickel-Metal Hydride (providing about two to three and a half hours' use), or Lithium-Ion (about four to four and a half hours' use).

generation version costs around \$6,000.

In a test, two army repair groups were each given 12 tanks to fix. One group used a Mobile Assistant and a control group used technical manuals. The groups were allocated the same amount of time. At the end of the test, the Mobile Assistant group had repaired all its tanks, while the control group had fixed none. And when the control group was given the Mobile Assistant software to use it, too, repaired all its tanks.

In another test, a utility company discovered that the time taken to diagnose and repair a gas burner was reduced from three hours to only 15 minutes in one instance, when using a Mobile Assistant. The US army is

If you want to get a head...

Looking to the future, some foresee a time when wearable computers will be linked directly to the brain. The idea is that electrodes could be implanted into various parts of the brain (such as the visual cortex, which is responsible for sight). So-called neural interfaces are not science fiction: a number of deaf people already use cochlear implants (electrodes placed in the inner ear) to restore some of their hearing. But at present, our knowledge of brain function is so small it will take many years before we can plug a wearable PC into the brain.

Another possibility is thought control. This is not as fanciful as it seems. At the department of medical informatics at the Graz University of Technology in Austria, Professor Gert Pfurtscheller is leading a team of

researchers whose work could ultimately result in thought-controlled devices. He is concentrating on a part of the brain known as the motor cortex, which is responsible for movement. Whenever we think about making any movement, it sets off a burst of electrical activity in the motor cortex. What makes the notion of thought-controlled systems a distinct possibility is that the motor cortex produces control signals whenever we think about *making* a movement but do not actually carry it out. The brain signal information could be fed to a computer, analysed and the resulting command sent to an electronic switch. Some Japanese companies, including NEC and Matsushita, have also conducted research into thought-controlled devices. But thought-controlled wearable PCs are still a long way off.

currently testing the unit for repairing AH-64A Apache helicopters.

A stitch in time...

A most appealing feature of the device is the ability to use multimedia documents with sound, text, graphics and video, almost anywhere *and* in a hands-free environment. Although the creation of voice-controlled multimedia programs can be expensive and difficult, a development by UK company, Microcosm, should improve things.

The Microcosm for Windows software allows software developers to electronically "stitch together" all types of media and create links between them. The traditional methods of creating hypermedia links often involves altering the media so that they can be joined together. All this creates extra work and often degrades the media in the process. Xybernaut has licensed Microcosm for Windows, for program development: "One of the things it will enable us to do is attach numerical names to different media. For example, at the moment if you want to call up a page on, say, a pneumatic lift assembly, you have to use the complete word. Soon, you'll be able to simply ask for 'number three' or whatever," says Xybernaut spokesman, Chris Chinnock.

Several other US companies have launched wearable computers, though none cost less than \$5,000 and all are aimed at specialist or niche markets rather than mass consumers. InterVision's Systems Six uses a head-set display and a PC which clips on to your waist. The computer has a 486 processor and weighs about 1Kg.

Symbol Technology has developed the WS 1000 computer scanner. The user wears a small ring scanner, weighing 48g. This is connected to a wrist PC that weighs 270g. It is designed for warehouse and distribution staff and allows them to scan goods by running the ring across the item. The data is passed to the wrist PC, which in turn transmits the data via a radio link to the company's main computer database.

Rockwell's Trekker Mobile Information System costs about \$1,300 and weighs less than 1.5Kg. It's a

Windows-based machine with a 486 processor, 540 Mb hard drive, up to 16Mb of RAM, two PC Card slots and ports for an optional keyboard as well as serial and parallel peripherals. The unit is attached to a VGA head-mounted display, consisting of a 2.54cm² eye-piece, which is worn on a head-band. The computer can be controlled by voice recognition technology or a mouse, mounted on the PC and thumb-operated.

Much of the work involved with wearable computers is in designing a suitable interface. Voice recognition technology is favoured by many companies because it keeps the hands free. But there are problems. Voice recognition systems require lots of processing power which in turn reduce battery life. The systems also need to be trained to recognise the speaker's voice, which can take some time. There's the question of privacy, too, and the fact that using a voice recognition system within a group of people would be as conspicuous as using a mobile phone (and probably just as annoying).

Handwriting recognition systems are not favoured as they require the use of an electronic pen or stylus and are thus unsuitable for hands-free operation.

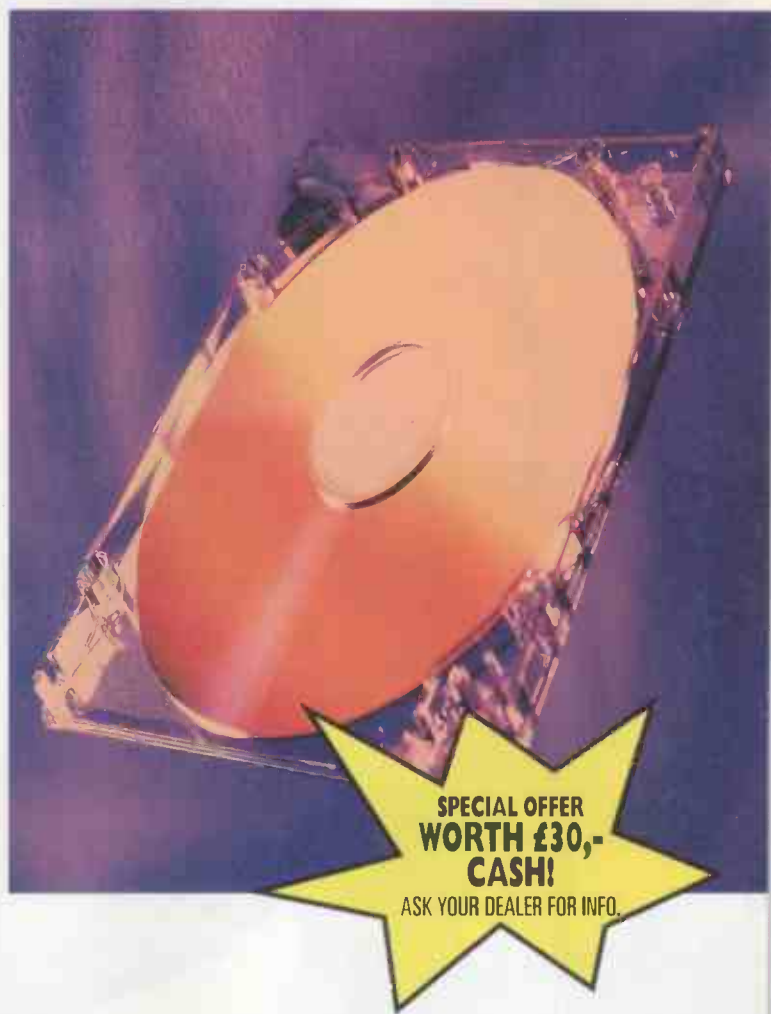
Even though keyboards can't be used for hands-free working, they do have their supporters. Miniature keyboards that can be strapped to a wrist are a possibility. The wearable PC sounds attractive, but is still expensive. Chinnock admits that wearable computers are: "Not a panacea for all. In some situations you'll set up a laptop, while in others you'll find it better to use a wearable PC. People will only buy something if they can justify the costs." Even so, many are wondering how long it will be before wearable computers become as ubiquitous as the wristwatch, pager and mobile phone. ■

PCW Contacts

MIT www.media.mit.edu/projects/wearable/
 Symbol www.symbol.com
 Xybernaut www.xybernaut.com
 InterVision www.intervisionsystems.com/
 Rockwell www.cacd.rockwell.com

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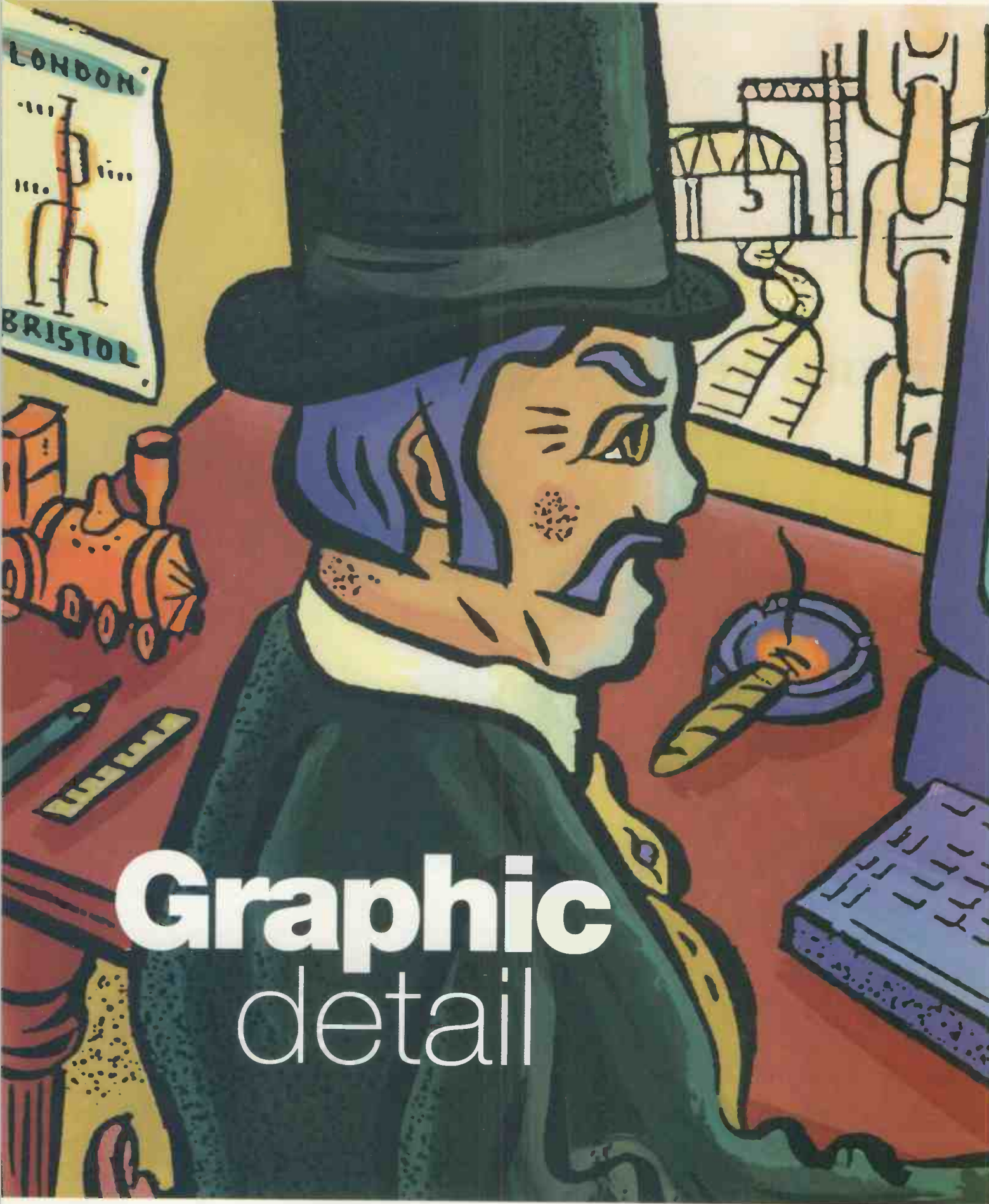
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Graphic detail

Closer to technical drawing than illustration, CAD software offers a high degree of accuracy without the excesses of art packages. The choice is bewildering — Tim Nott helps you simplify it.

CAD software constitutes some of the most complex applications available for the PC, and, in terms of choice, some of the most bewildering, with prices varying from under £100 to over £3,000. At its simplest, CAD is like illustration software in that objects are stored as vectors — like a blue circle, centre xy or radius r . Although CAD lacks the artistic baggage of packages such as CorelDraw, it offers a much higher degree of accuracy. Most newcomers to CAD will have experience in technical drawing, and the release from sheer drudgery is phenomenal. Features such as symbols, arrays and offsets (see page 141) make short work of repetitive tasks. Trimming, filleting and chamfering obviate much drawing and erasing of construction lines. Associative dimensioning creates all those little arrows and numbers automatically.

So what do you look for in a CAD package? It depends very much on what you want to draw. For highly complex and specialised tasks, customisation and automation is a must. This can vary from simple macros to full-blown third-party developer add-ons — open architecture are the key words here. Furthermore, a major building or civil engineering project can outlast many generations of software upgrades, so the confidence that support and development will still be around in years to come is important.

2D or 3D? Again, it depends what you're drawing. The advantages of 3D modelling is that you can view — and work on — a drawing from any angle. This makes it easier to deal with potentially problematic things such as ducting layouts. You can also generate rendered views that will impress your clients. On the other hand, especially for routine jobs, it involves a lot more work and a far longer learning curve.

The good news is that serious 3D is getting cheaper. There are three new products in the £150-£700 range reviewed here.

At any level, what makes a CAD application good is the interface. How easy, how quick is it to place a point exactly on another, or tap in precise numeric co-ordinates? This is the bottom line of CAD work, and a mouse click or keystroke saved per command can add up to hours over a day's work.

CAD Contents

- 121 AutoCAD 13c4
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- 124 DesignCAD 3D v8.0
- 126 MicroGDS Professional 5.0
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- 129 XCad
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CorelVisual CADD
- 136 Drafix CAD Professional 4
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JargonBuster
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- 144 Performance results

Illustration: MARK HUDSON



Now it's easy to change your image – with ArtPad II™

Good retouching requires an artist's touch – so why use a mouse that's quite literally as thick as a brick and about as sensitive? It's so much easier – and much more fun – to make subtle changes or create realistic effects with an ArtPad and Pen.

Small and compact, the ArtPad II is a fiendishly clever computer input device that includes a pressure-sensitive stylus called the UltraPen Eraser. This can be used to replace the mouse on any software program for Mac or PC.

Using the UltraPen is just like holding a pen or pencil with an eraser at the end, so you can point, click, sketch, paint, write, retouch, erase, delete... in short, work in a naturally more creative way.

It has no batteries or cords to tie you down and adds pen-point accuracy and the sure touch of a fine-art tool to the

power of your graphics software. So whenever you're retouching scanned images you get the best of both worlds – art and technology combined to help you add shadows and colour, blend in spots and scratches, create composites or any special effect you want using the most advanced stylus ever made.

At around £135 plus VAT, nothing on the market can touch the ArtPad II and UltraPen Eraser, especially as that price includes a free copy of Fractal Design's Dabblers 2.0 SE. Worth around £50, Dabblers is quite simply one of the most amazing painting and animation creation and editing software packages around.

Get your hands on it. Contact your local reseller to try out ArtPad II. One touch and you'll remember just how creative you can be!



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AutoCAD 13c4

The undisputed world leader, AutoCAD has been around for sixteen years. The c4 suffix denotes a full 32-bit upgrade from Release 13, which runs on Windows 3.1 with 32s extensions, Windows 95 and Windows NT. A DOS version is also included on the CD, and the full installation takes up 70Mb. The first attempts at dragging AutoCAD into the Windows environment were not an unqualified success, with version 12 cramming 36 buttons into one big, messy, floating toolbox. Release 13 smartened things up considerably, with multiple configurable floating palettes, and c4 takes this into the 32-bit world of long filenames and other Windows 95 comforts.

As with the earliest versions of AutoCAD, the heart of the matter is a command-line interface which works in parallel with the menu and button commands. You can still carry out practically any command without touching the mouse or digitiser. Type "L <return> 2,3 <return> 4,5 <return>" and you'll draw a line between those two Cartesian points. Add a third co-ordinate and you'll get a line in three dimensions. Put an "@" before the second set of co-ordinates and the point will be placed relative to the first point rather than absolute to the drawing. Although this command-line interface may seem rather retrospective, it does have certain advantages, the most compelling of which is that the keyboard is always "live": you can mix and match with the menus, buttons and keyboard without having to focus on an input box to type in numeric values. By default, the command-line window, which also serves as a prompter, occupies three lines at the bottom of the screen, but you can enlarge it, or scroll back to see a history of commands.

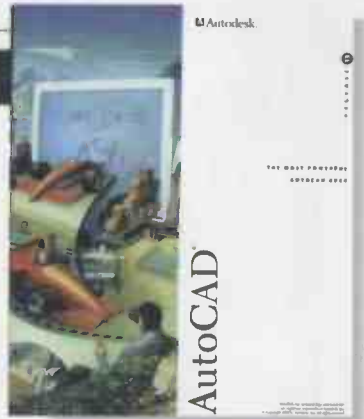
Although not even its best friends would call AutoCAD easy to learn, the interface improvements over release 12 have brought it a long way, with Tooltips, hint lines and context-sensitive help. There's also a series of online tutorials ranging from the basics of 2D drawing to more complex operations such as revolving a 2D profile to create a solid. In other respects, it's remarkably lacking in features that Windows users take for granted, such as the ability to load more than one drawing at a time. Most budget applications can manage the Windows MDI (Multiple Document Interface), but with AutoCAD you need to run multiple instances of the program.

Certain activities, such as setting up perspective views in the non-

standard multiple viewports, are still awkward and time consuming. However, this disregard for Windows conventions comes into its own in "Paper Space". The idea of this is that you create a drawing sheet which is permanently in top view, hence titles and notes stay flat on the page. In this sheet you can create custom viewports, each showing the model from a different angle or zoom level, and plot the result as a single drawing. You can also slice through a model to generate a cross-sectional view for inclusion on a plotted drawing.

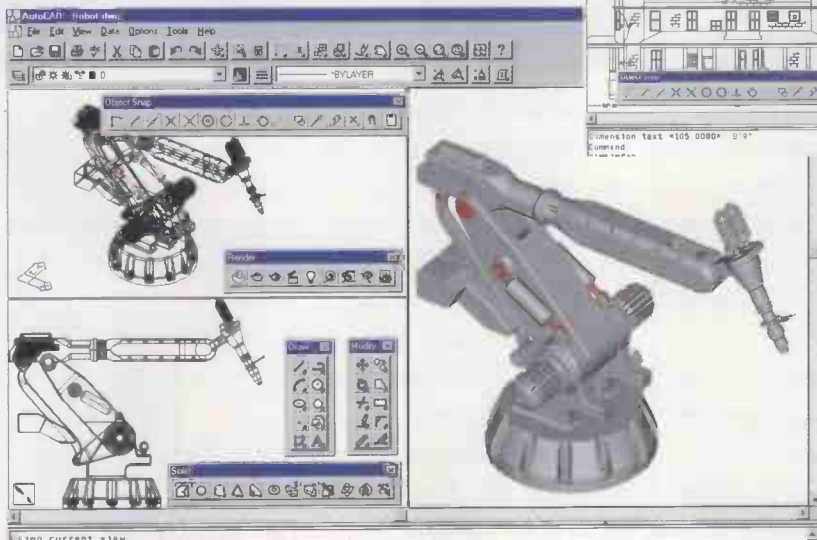
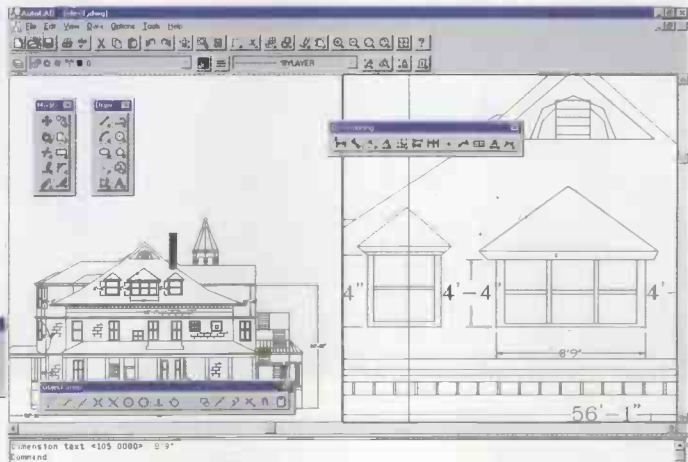
The 3D facilities are excellent, with the basic primitives such as blocks, spheres, cones and cylinders complemented by more esoteric options such as defining a curved surface from a series of arcs — e.g. a car body panel, or "sweeping" a profile along a complex path — e.g. a ducting or pipework layout. There's a full set of Boolean operations and commands to fillet and slice 3D edges or objects. There's built-in rendering, with a rather meagre library of materials, although the results are of a good quality. If you want more, you'll need AutoVision Release 2c4, a photorealistic rendering and animation software package designed specifically for Release 13. Although it's included on the CD-ROM, you'll need to pay another £495 for the authorisation code to unlock it.

Heavy-duty CAD is used in fields as diverse as printed circuit design and civil engineering, and users' requirements vary wildly, which is where AutoCAD's open architecture comes in. Automated and custom solutions can be added on at all levels, starting with simple macro-style scripts of commands and going on through the AutoLisp programming language to bespoke applications written in C++, Visual Basic or the object-based AutoCAD Runtime Extensions (ARX). Over 4,000 add-ons are already available, and there is no shortage of developers eager to create more.



Right AutoCAD in 2D — zooming in on dimensions

Below Rendering AutoCAD's robot in 3D model space



PCW Details

Price £3150 (plus VAT); (upgrades £495 (plus VAT) or free from previous Release 13)

Contact Autodesk 01483 303322

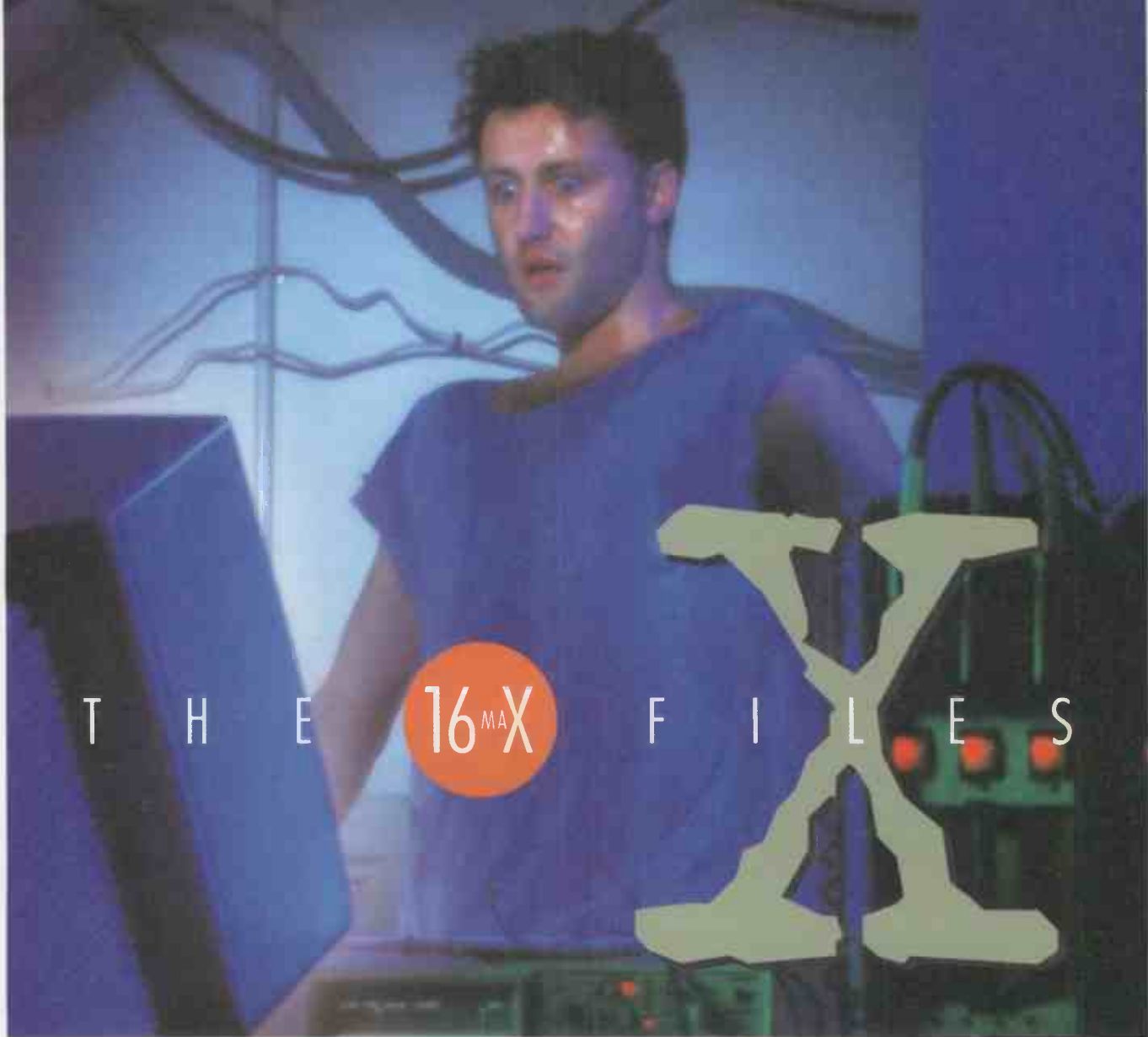
Good Points Good drawing aids, excellent development tools and an industry standard.

Bad Points Its long history brings a lot of baggage and limitations for a Windows 95 product.

Conclusion No-one ever got sacked for buying AutoCAD, but it's no bargain for the smaller user.

★★★★

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SOLUTIONS



HITACHI

CorelCAD

This is a brand-new Windows 95 3D application, not to be confused with Corel Visual CADD, a 2D package acquired from Numerica. In true Corel tradition, there's a lot here. As well as CorelCAD itself, the two CDs include Dream 3D, Print Space, a Multimedia Manager, a Script Editor, plus the usual Corel bounty of fonts, symbols, samples and clip-art. Not counting the samples and symbols, you'll need anything from 40 to 100Mb of disk space and an absolute minimum of 16Mb of RAM; 32Mb is recommended.

The interface sports the familiar CorelDraw look, with the main drawing tools grouped into flyouts at the left of the screen, colour palette at the bottom, more toolbars at the top and floating "roll-ups" for other options. You can open multiple drawings and, for displaying multiple viewports on a single drawing, there's an excellent view manager offering seven preset combinations plus whatever custom layouts you have saved.

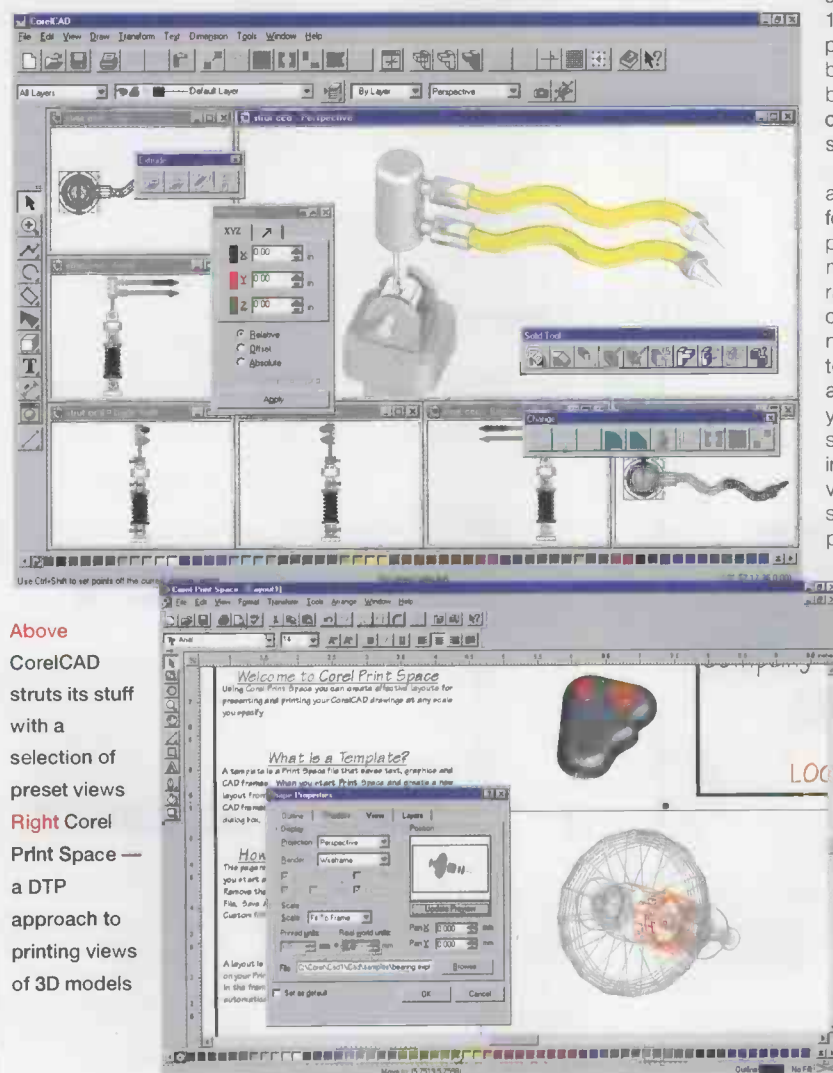
To get started, there's a book-based tutorial complemented by a series of sample drawings which take you all the way from simple 2D drawing to 3D Boolean operations. There's a good range of 3D primitives which are easy to draw. A box, for example, is started by dragging a rectangle (in perspective or isometric view) and then holding down Shift + Control. This freezes the base in the XY plane and lets you drag the height in the Z plane. Most input will need more precision, and here the input roll-up is used to enter numeric coordinates. This isn't as convenient as AutoCAD, GDS or MicroStation as you have to focus on the roll-up by pressing the Insert key (or clicking the roll-up) then Tab between the X, Y and Z fields. There is, however, a good

range of snaps: the left button sets a "one-off" from the toolbar flyout, and the right button sets running snaps. As a reminder, snap points "light up" as you pass the cursor near them. Another great comfort is a multi-level Undo list.

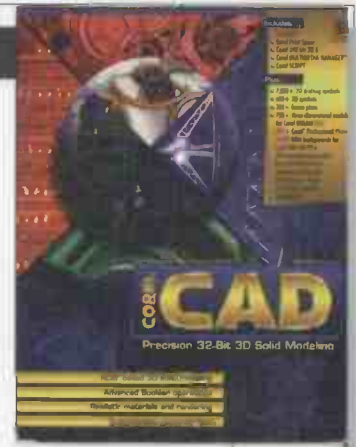
The 3D editing tools are also excellent, with various versions of extrusion, including spirals, and an exceptionally good filleting tool. Drawing a table top, for example, you might want to round the edges — something most 3D packages can do. Here you can also define what happens at the corners: they can be mitred or rounded over. Boolean operations are well-supported and, unlike some packages, you can subtract objects that are totally enclosed within others to create, for example, a hollow sphere. Having created a solid model, there's an impressive, if rather slow, range of rendering options, including Phong, Gouraud and full ray-tracing.

We did encounter a few problems: input boxes would suddenly disappear, and we had great problems constructing spirals until realising that the help file was incorrect, giving "distance between each revolution" instead of "total distance". At times, activity seemed very slow, although this may improve with more than the 16Mb minimum memory. In common with other Corel products, Corel Script allows you to record, play back and edit macros. Samples provided include a border and title block generator and a utility to create animations using Corel PhotoPaint (available separately).

Moving on to Print Space, this is a separate application letting you assemble views of a drawing for printing — very much like AutoCAD's paperspace mode, but rather easier to use. It's very much like a DTP application in that you have a range of drawing and text tools, including spelling checker and thesaurus, to create a layout, title and notes. Like a DTP application, you create "frames" to contain graphics which, in this case, are stored as OLE links. Having inserted a CorelCAD object, you can then use the "Properties" command to select any standard or custom view of the drawing, including rendered views. You can place multiple views of the same, or different, drawings onto the same sheet for printing. It's a brilliant idea, though in practice it can be very slow — especially with perspective views — and we found on occasion the OLE links would break, resulting in empty frames. Finally, for those who want to go further than CorelCAD's built-in rendering, Dream 3D lets you build complex scenes incorporating objects constructed in CorelCAD.



Above
CorelCAD
struts its stuff
with a
selection of
preset views
Right Corel
Print Space —
a DTP
approach to
printing views
of 3D models



•PCW Details

Price £695 (plus VAT)

Contact Corel 0800 973189

Good Points Friendly interface, vast supply of extras.

Bad Points Slow and slightly buggy on the test PC.

Conclusion Likeable and well-featured, but needs powerful hardware.

★★★

DesignCAD 3D v8.0

This is the flagship of a four-member fleet, with 2D and 3D versions in both 16 and 32-bit. It comes from BVG, a firm specialising in computer training, and each version comes with two video cassettes. While these are adequate on the very basics, it soon becomes apparent that the presenters are completely out of their depth on the principles involved. They don't seem to realise when they've made mistakes, and not until we get near the end of tape two do we discover how to set points numerically — an absolute CAD essential. You're actually far better off working through the printed manuals, which do much better justice to the program and explain the trickier 3D concepts, which the videos make no attempt to do.

The interface comprises a set of toolbars: a fairly standard Windows command bar offers the usual file and clipboard facilities. Other bars show layer and co-ordinate information, colours and linestyles, and provide access to the drawing and snap tools. You can drag the bars anywhere on the screen, dock them at the edges or hide them completely to free up work space, and can create your own. Working in 3D, the working area defaults to four Windows — a main perspective view with top, front and side ranged to the left. You can override this with standard Windows controls, and have several drawings open at once.

There's a healthy selection of 2D and 3D primitives, including polygons, hemispheres and cones, plus the facility to create surface from three or four joined curves or a succession of open ones.

Extrusions are limited to straight lines and arcs, so you can't, for instance, create spirals this way. Entering numeric co-ordinates — once you've unearthed this information from the manual — is much easier than the video would have you believe, as rather than go through the menu, you can type a colon, semi-colon or apostrophe to get input boxes for absolute, relative polar, or relative Cartesian co-ordinates respectively. Having the three boxes separate may seem unnecessary, but it's far quicker to hit the correct key than it would be to click on an option in an all-purpose box.

At other times, the interface can be downright annoying. There is no button, for example, to snap to the centre of a circle — you need to pull down the menu and choose "centre of gravity". Nor can you designate "running" snaps — you have to issue an explicit snap command before each point. You can, however, invoke "gravity" snap, which snaps to the nearest existing point, by using the right mouse button. This seems rather a

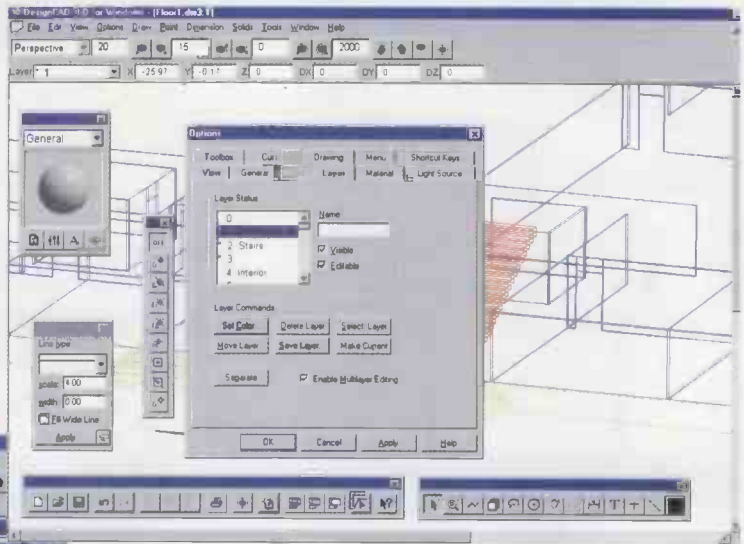
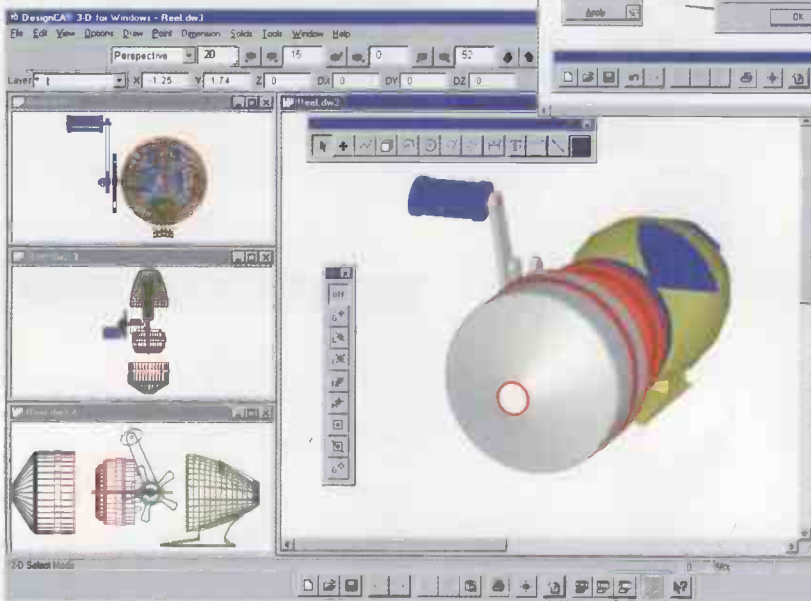
waste, as the interface cries out for a Windows 95 context menu. There's no explicit "offset" command either, which makes it rather irksome to achieve very basic constructions such as drawing concentric circles, and it isn't possible to subtract a surface or solid that is totally enclosed within another. Selecting objects in 3D view can also be something of a struggle, and although there is a "repeat last action" command — another absolute essential — you won't find it in either the online help or manual indexes. In other respects, it conforms well to Windows 95 standards: a welcome touch is that all the options are presented in a tabbed dialogue box.

Rendering is simple but good, and you can create slide shows of rendered (or wire-frame) views to produce simple animations: select key views and the program will interpolate the intermediate steps. There's both a recorder and a BasicCad macro language, with a small number of samples, and a complete programming reference guide in the help files. Importing a 3D AutoCAD file was fast and accurate, and whereas it took far longer to export a DesignCAD file to AutoCAD's native .DWG file, the results were similarly impressive. There's a fairly primitive implementation of non-printing attributes which is confined to simple text labels, and a 700+ piece library of 2D and 3D symbols. Further libraries are available for purchase.

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Below 3D modelling and rendering at a knock-down price



Above DesignCAD gains points for its Office-style options

PCW Details

Price £149.95 (3D), £79.95 (2D) (plus VAT) for either Windows 3.1 or 95 versions

Contact Burgess Video Group 01874 611633

Good Points Compact footprint, low cost, impressive feature set.

Bad Points Some rough edges to the interface — and some very rough videos.

Conclusion Excellent value for money.

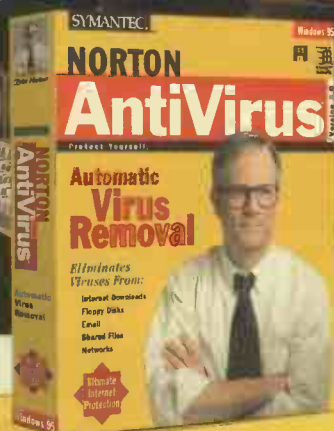
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MicroGDS Professional 5.0

The third and last of the four-figure-price applications, MicroGDS again runs on Windows 95, NT or 3.1 with the Win32s extensions. The standard Windows 95 installation took around 46Mb and added an exuberant 22 items to our Start menu. MicroGDS places great emphasis on group work: drawings can be organised into projects, and a drawing file manager is used to maintain consistency of layers and styles. In single-user mode, creating or opening files is done with the standard Windows dialogues.

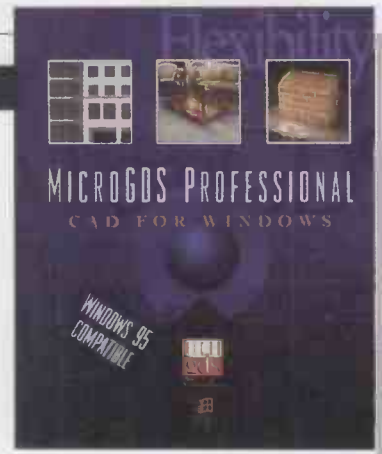
Like MicroStation, you can have multiple views of a drawing, with each window having its own set of view controls. Unlike MicroStation or AutoCAD, this extends to being able to open more than one drawing. There's an annoying tendency, however, for the views to show large "grey areas" beside the drawing, rather than fill the entire available space. This appears to happen because new drawings default to the current printer or plotter settings, and is contrary to the accepted CAD norm that you work in a virtual space until you decide to produce hard copy and set up the scale and sheet size accordingly. Another unusual touch is the use of scroll bars to zoom and rotate a 3D view, which works well. A range of standard moveable toolbars provide access to the drawing and editing commands.

User-friendliness is not a strong point. There are no tutorials: to learn this somewhat idiosyncratic application, you have to wade through the reference manual, or access the rather curt Procedures section of the Help file. It's a tough but rewarding experience, as there are some excellent touches, including excellently-implemented snaps with a "smart" cursor that changes to show the current snap point. There's a good range of trimming, joining and extending tools, and excellent one-click filleting and chamfering. Although there's no direct way to construct spline curves, a "smooth" tool will convert a series of straight line segments to curves, by using either their ends or midpoints as control points. Conversely, the "facet" tool will convert a curve or arc to straight segments. Another bonus is the facility to mix measurements. If you're drawing in millimetres, and enter a specific imperial measurement, it's automatically converted and displayed at the correct size. Other commands are not so well implemented: despite poring through the manual and help file, I was unable to find how to "mirror" an object — an essential time-saver for creating symmetrical entities — without deleting the original. Using the "Copy" options to attempt the same task produced a "Topic not found" message from the Help button.

The primitives available are, in a word, primitive. If you want to draw a regular polygon, for example, you have to resort to a Visual Basic add-on, and the only way of creating 3D objects is by manipulating 2D ones. To create a cylinder or block, for example, you need to first draw a circle or rectangle in 2D and then "extrude" it along the

third dimension. Things get better with rendering, with ray tracing, wrapped textures, bitmap backgrounds and a variety of special effects such as "fog" for enhancing the illusion of distance. Once again, though, working through the rendering manual is hard work, with no exercises or examples to help. Another Visual Basic add-on provides the facility to create walk-through animations, although, as the documentation admits, "The application is not intended as a fully working program, more as an example of the type of problem which can be solved using the CadLink DLL. As such, the program is not supported by GDS Corp".

There is no built-in macro or script facility, but the Application Programming Interface (API) can be accessed from most Windows programming languages and, as mentioned previously, some sample add-ons are provided in Visual Basic. OLE 2 is supported, so you can, for example, incorporate a spreadsheet table in a drawing. Dynamic Data Exchange is also supported so you can extract numeric data from a drawing and paste a link into another application such as a spreadsheet or word processor. If the object is altered, the links are automatically updated. However, this is of limited use as it only works for calculated values such as area or perimeter: you can't, for instance, link the length of a cable or pipe.



Above right MicroGDS — multiple files, but too many grey areas

Right Powerful stuff, but tough going for the learner



•PCW Details

Price £2495 (plus VAT)
 Contact Graphic Data Systems 01483 725225
 Good Points Good workgroup facilities, can open multiple drawings.
 Bad Points Poorly-featured for the price, and the lack of tutorials makes it user-unfriendly.
 Conclusion No match for AutoCAD or MicroStation.

★★

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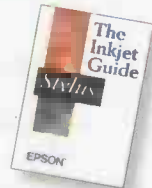
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MicroStation 95

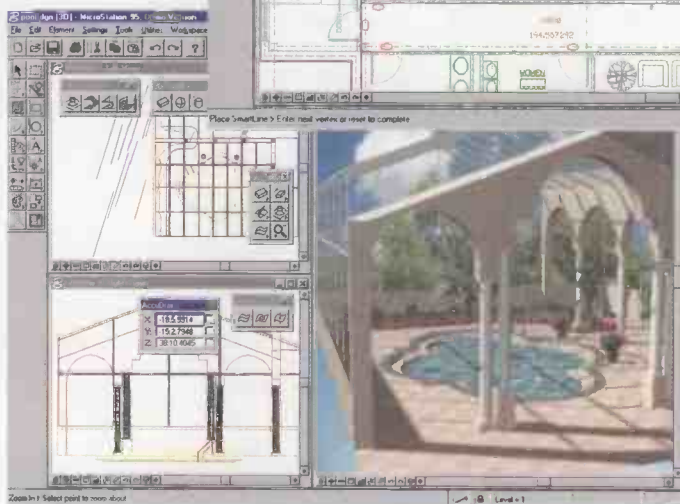
Previous versions of MicroStation were not true Windows applications. You had the choice between using the "Windows Connection" for an approximation to a Windows 3.1 look and feel, or the native Motif interface which was rather, but not quite, like Windows 95. This release is Windows 95 all the way, although it also runs on NT and 3.1 with the Win32s extensions. The three CDs also include DOS, OS/2 and Alpha NT versions of the program, and a typical Windows 95 installation takes up 66Mb.

Unlike AutoCAD there are no online tutorials, but the five-inch stack of manuals includes a tutorial workbook which takes you right from the basics of 2D design to the complexities of 3D rendering. Despite the claims to Windows 95 compatibility, MicroStation doesn't use the standard File Open dialogues: the first time you run the program, it takes some trial and error to realise that you have to pull down the File menu of the MicroStation Manager dialogue box to create a new file, which you must name before you can start drawing. After that, everything becomes more familiar, with dockable toolbars and MDI windows. The main drawing tools have "tear-off" flyouts, so you can drag the entire set of dimensioning tools, for example, wherever you want on the screen. Each drawing window — you can have up to eight — has its own set of view controls, including a very intuitive "rotate" button for 3D views, but as with AutoCAD you can only work on one file at a time.

There are some clever, if rather unorthodox, touches in using the mouse: single-click on the line tool, and you can keep drawing lines until you pick another tool. Double-clicking produces a "one-off" line, then returns you to selection mode. Pressing both mouse buttons produces a "tentative" point which you can confirm or reject. Other innovations include Smartlines, which round (or bevel) their corners as you go instead of having to do this later with the filleting tools. The Accudraw feature takes some getting used to but, once mastered, is a great time saver. A dotted box appears around the last point entered, and the "rubber band" line you are drawing snaps to 90 degree directions. At any time you can type in numbers and the Accudraw box anticipates whether you are specifying distance or direction.

For most tools, a separate settings window opens. Although this is useful for specifying, say, the colour or thickness of a line, some of the options, such as the different ways of drawing a circle, would be better catered for by having separate buttons in the fly-out. Other interface elements show a disregard for Windows conventions: toolbars are listed in the Window menu, many dialogue boxes don't have an OK

Stunningly-rendered visualisations



Personal Computer World
Editors Choice

button, and, to bring a cascaded window to the top of the pile you have to click the title bar — not anywhere in the window, as normal.

The 3D facilities are excellent, with a good range of primitives, surfaces and trimming and filleting tools. Superb rendering includes the facility to incorporate bitmaps both as background and foreground; the latter means that images of human figures or trees, for example, can be mapped onto a transparent drawing object as "cut-outs" for added realism. A built-in animation generator will create "walk-throughs" and save the result as a .FLI file which can be played back in its own window with the Movies utility. Similar techniques can be used to create solar studies: enter the time and place, and watch the shadows cast by your building over the day. A new development, QuickVision, promises software-only real-time manipulation of rendered views. This was not included in the review software but will be free to registered users.

Like Autodesk, Bentley is fully aware of the need for customisation and vertical solutions, and programming interfaces include MicroStation Basic, OLE Automation, and MicroStation Development Language (MDL). Through the MicroStation Openspace scheme, Bentley has pledged to invest in — or acquire — third party developers to create "Spaces" (user-specific add-ons) for every key application area — architecture, plant design, terrain modelling, civil engineering and so on.

MicroStation 95

MicroStation's Smartlines and Accudraw at work

PCW Details

Price £3495 (plus VAT)

Contact Bentley Europe 01344 412233

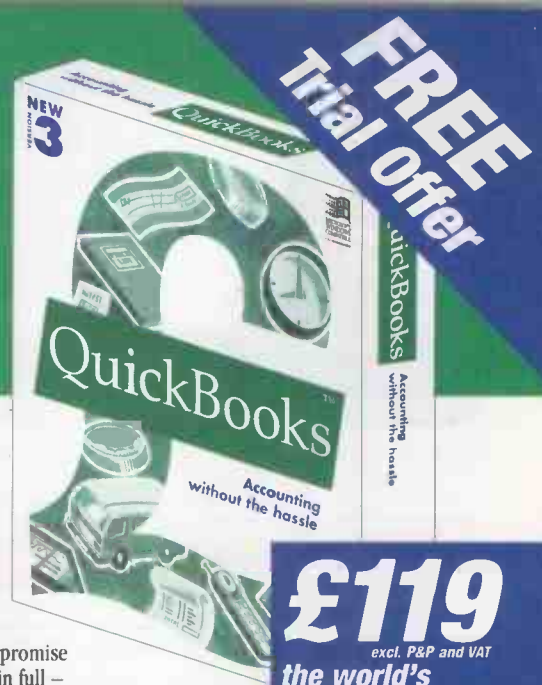
Good Points Very well-equipped, stunning rendering.

Bad Points Eccentric implementation of Windows 95 interface.

Conclusion Being number two, Bentley tries harder.

★★★★★

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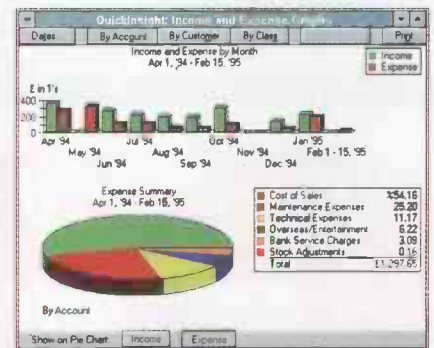
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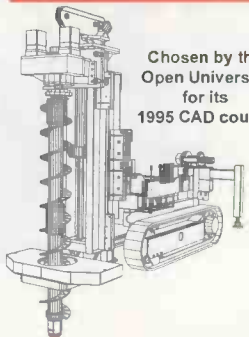


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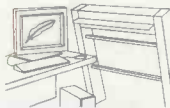
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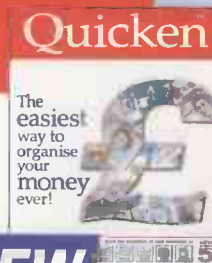
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XCad 3.1

Another 32-bit, 3D product, XCad runs under Windows 95, NT or 3.1 with Win32s extensions. Somewhat more modest than the competition in its requirements, it's claimed to run in 4Mb on a 386 PC, and the standard installation took up 11Mb. A simple, uncluttered interface consists of top button bar containing the usual file commands, undo and redo, layers, linetypes and on/off buttons for the grid, snap tools and other aids. The drawing tools are contained in a floating toolbox, with a wealth of fly-out options. Other palettes include the snap controls, co-ordinate input, a small "global" overview for zooming and panning, and a set of controls for rotating the 3D viewpoint. As with AutoCAD and MicroStation, you are limited to one file at a time, but you can display up to eight views simultaneously.

Inputting points via the co-ordinate box is a fiddly business: you either have to double-click on the relevant X, Y, and Z field, or use the function key shortcuts. As you type in each value, say for the start and end points of a line, the relevant coordinates are "locked". The good side to this is that you can anchor a point in one or two dimensions and stretch the third with the mouse, but the down side is that you have to unlock the boxes to draw the next point. Some activities, such as drawing a 3D block, are done far more sensibly. Having defined two dimensions, you are prompted to enter the third directly into the command area, without having to click or otherwise change focus. The snap controls are also limited in that you can only have one active at a time. You can't, for example, snap to whichever is nearer out of the end and midpoint of a line. Unlike most drawing programs, there is no "Select" mode: each drawing tool stays active until you pick another, and to transform or delete an object you perform the command, then choose the object.

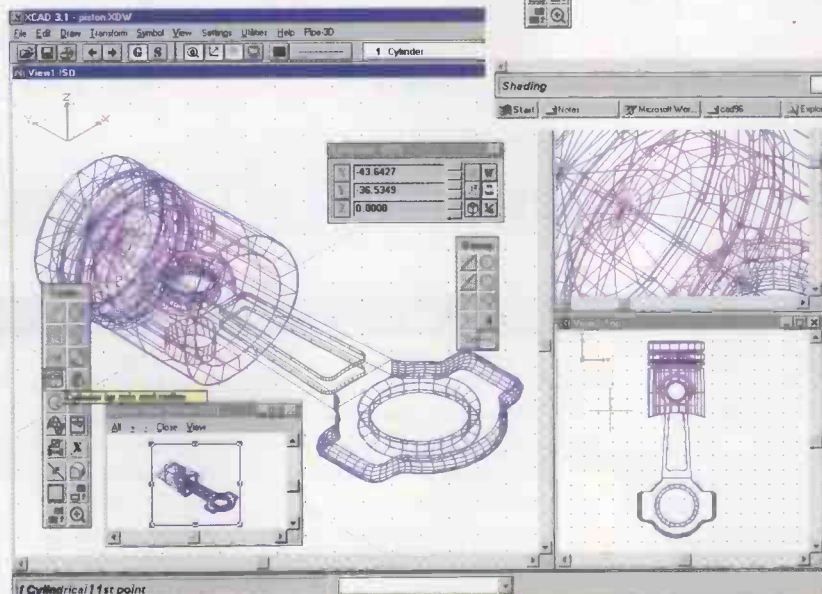
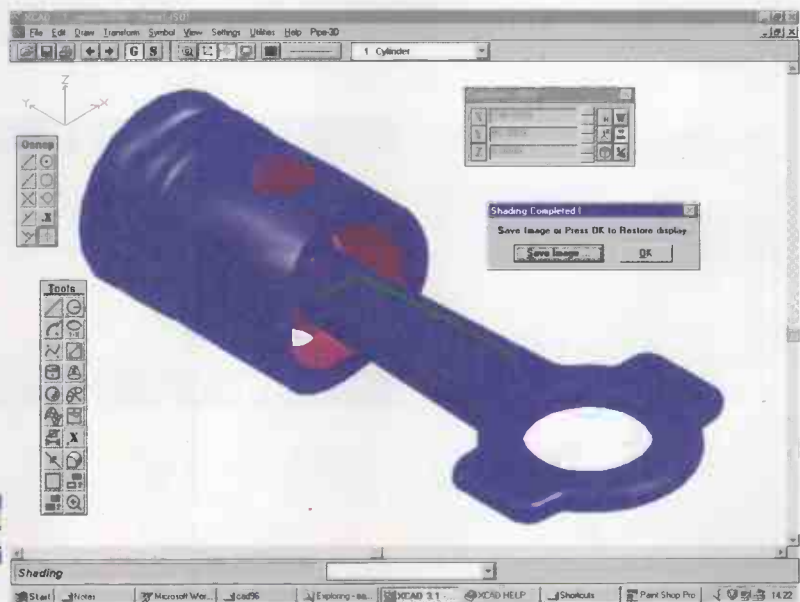
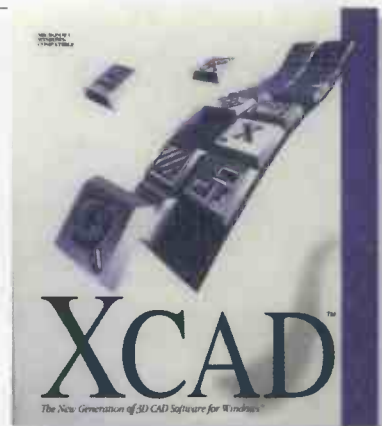
The main toolbox is spectacularly well-equipped. The fly-outs offer ten ways of drawing lines, eight ways of drawing a circle, and twelve of defining a surface, as well as a good selection of 3D primitives including cone, torus and full or partial sphere. There are also some sophisticated ways of joining surfaces or solids, such as "blending" shapes to create smooth transitions. The co-ordinate box does have its better points, such as a button to switch between the three main work surfaces, to draw circles, for instance, in the XY, YZ or XZ planes. You can also define user planes. Say you wanted to draw some skylights on a pitched roof: you can define the slope of the roof as a user plane and draw straight onto it, rather than have to work out the X, Y, and Z co-ordinates of each point.

Rendering was spectacularly fast and, although lacking the sophistication of Corel or MicroStation, it

has a choice of light sources, materials and background bitmaps. There's a macro recorder which records only commands, not parameters. This might seem limiting but is actually rather good, as you can record a complex series of commands to create a shape, then replay the macro to input different values. To take a simple example, if you start the recorder and create a tube

by copying two concentric circles along their Z-axis, then join them to form the outside, inside and end surfaces, you can play the macro back and input new values for the diameters and length to create a different tube. For more advanced customisation there's the XDL development language and compiler to add new menu commands: samples include a tool for creating 3D pipe layouts, specifying diameter and minimum bend radius, and a gearwheel generator.

When we last looked at XCad it was still in beta and rather unstable. This version seems solid enough, although not all the Windows 95 features, such as the File Open/Save dialogues, are implemented. A new version, 4.0, is promised shortly.



Above Fast rendering — the XCad piston in solid view

Left XCad — surface sophistication in a low platform product

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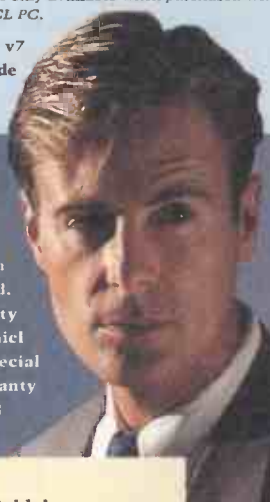
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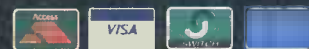
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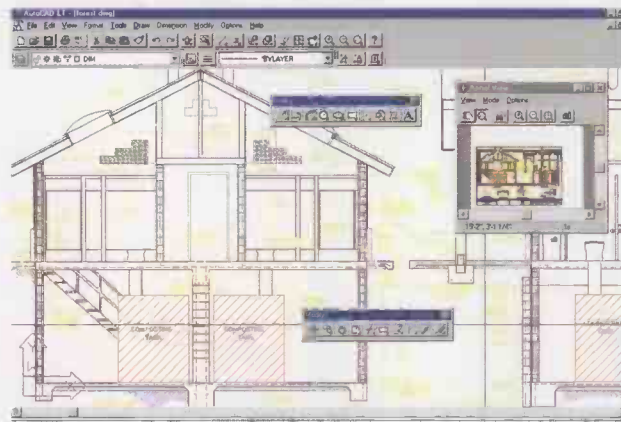


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AutoCAD LT

AutoCAD LT is a rather strange hybrid. It has practically all the two-dimensional drawing commands of its big brother, but the only 3D constructional command is drawing simple lines. You can, however, load 3D drawings, view them from any angle in multiple viewports, and combine views for plotting in "paper space", just as you can with release 13. You can remove hidden lines and shade a model, but you don't get the full rendering capabilities.

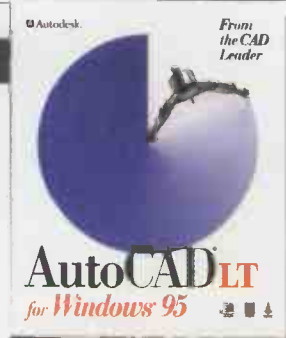
Since its initial release, it has been brought up to date with this Windows 95 version and has a very similar look and feel to the major product, with similar toolbars, viewport controls and an aerial view window for navigating large drawings. Standard features now include long filenames, OLE, MAPI email support, ToolTips, "how-to" panels and a spelling checker. In some respects it has



leapfrogged release 13: you now, for example, get a "Wizard" to help set up new drawings and a "property painter" to copy multiple attributes between objects. An excellent online tutorial covers the same ground as the 2D sections of AutoCAD proper, and there's an orientation guide for those making the great leap from the traditional drawing board.

There are no symbol libraries supplied, but there is a rather less useful collection of WMF-format clip-art. You don't get the development and customisation capabilities either, apart from editing the menus and toolbars or running simple scripts of commands. Although expensive for a 2D drafting package, the marketing philosophy is that at less than a sixth of the price of the full release 13, it provides companies already committed to AutoCAD with a totally compatible mid-range product for those, such as managers or trainees, who need the AutoCAD basics without the full panoply of the major product.

Draw in 2D, view in 3D
— Autodesk's £595 solution



•PCW Details

Price £595 (plus VAT)

Contact Autodesk 01483 303322

Good Points Can view, but not edit, AutoCAD 3D drawings.

Bad Points Expensive for a 2D drawing package.

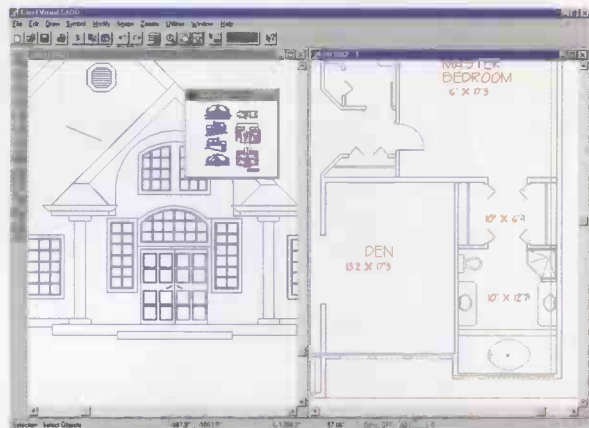
Conclusion Useful for firms that already have the full AutoCAD release, but poor value as a standalone package.

★★

Corel Visual CADD

Formerly developed by Numera, this is a 2D package historically unrelated to the 3D CorelCAD. It is, however, a true Windows 95 product and bears the "Microsoft Office Compatible" logo. A simple interface consists of just two fixed bars. The speedbar, at the top of the screen, has file, clipboard, undo, layers, zoom and linestyle controls. All the drawing and editing tools are in another fixed bar to the left which expands into flyouts of related commands. As in previous versions, you can open multiple files and, thankfully, the limitation of a single viewport per file has been lifted.

Data entry is fast and easy: if you want to specify points from the keyboard, you just type them in without having to focus the input, and simple two-letter codes (or a click on the status bar) switch between absolute and relative modes. Diehard CLI addicts can dispense with the toolbox by typing other two-letter commands such as "li" to start



The other Corel — 2D CADD with some neat tricks

a line. Object snaps can be selected from the right mouse button menu, as can options such as "tracking": if you want, say, to draw a hole 50mm up and 70mm across from the corner of a bracket, turn on tracking to draw the construction lines to the point, turn off tracking and draw the circle — the construction lines automatically disappear. This right-button menu also lets you close a shape, end drawing or undo the last segment of a line. Another neat trick is being able to work in "ortho" mode but being able to instantly alter the origin direction — think of drawing a plan of a row of houses on a street running diagonally.

It is being marketed by Corel and distributed through FastCAD, with UK symbol libraries available as extras. Most of the bundled symbols are US/Imperial based. As with the major products it sports an open architecture, and a help file explains the Application Programming Interface which can be accessed by third-party developers using languages like C++, Visual Basic or Delphi.

•PCW Details

Price £349

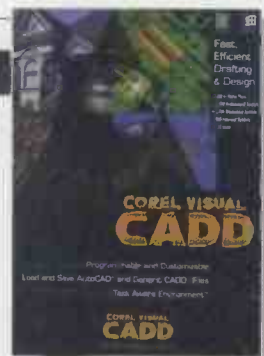
Contact FastCAD Europe 01923 495496; Corel 0800 973189

Good Points Well-designed drawing interface and open architecture.

Bad Points Expensive for a 2D package.

Conclusion Serious 2D CAD, but faces tough competition from both ends of the market.

★★★



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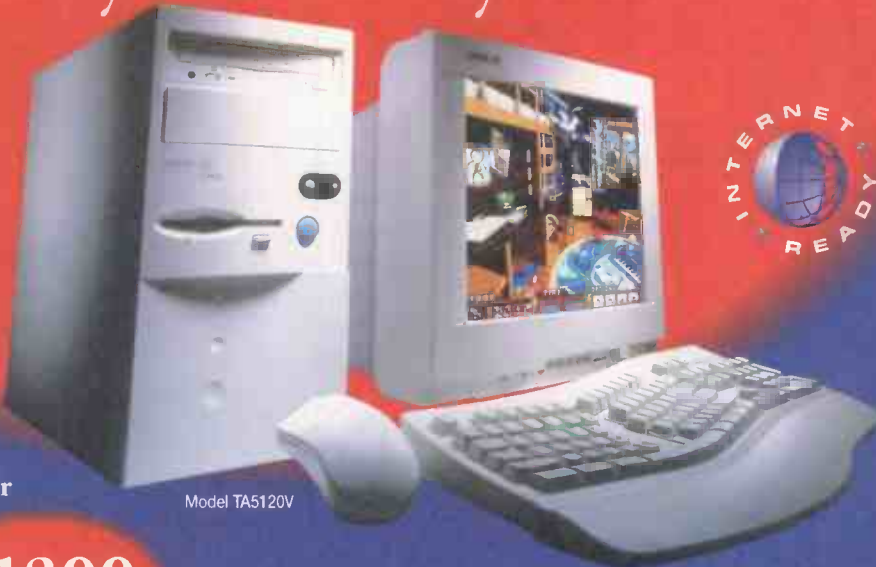


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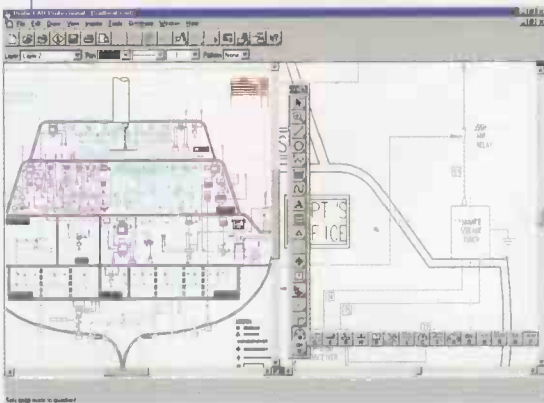
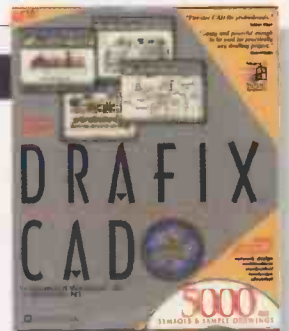
DrafixCAD Professional 4

Drafix Professional is a 2D-only drafting program and comes with all the Windows 95 bells and whistles such as email support, right-button context menus, and even a tip of the day. As well as having standard MDI windows on the same or different file, you can also split each one into two or four panes, each with its own zoom level and scroll bars. A bar for linestyles, layers and patterns can be docked either at the top or bottom of the screen, as can the co-ordinate bar. The drawing tools and general toolbar can be placed anywhere. You can also have a scrolling palette of library symbols. Although the buttons are tiny, a full description of each appears on the status line.

There are fifteen ways of entering a point in Drafix, with a variety of snap modes, constraints and keyboard input methods. You can access all of these from two flyouts on the main toolbox but this soon becomes extremely irksome, especially as snaps

are mutually exclusive. If you have "endpoint" set, for example, you can't place a point anywhere else on the drawing — the usual method of having a snap "catchment area" isn't implemented. Things get better when you learn the single-letter keyboard codes, and with practice you can fly around from endpoint (E) to intersection (I) or enter absolute, relative or polar co-ordinates from the keyboard using the A, R and P prefixes.

The "Professional" title isn't just market-speak. A serious database feature means you can define and export non-visual attributes of an object, along with properties such as length or area. This means you could create "Unit cost" and "Supplier" fields to objects, export the results to a spreadsheet, then calculate, for instance, the total area and cost of floor covering, or the total length of network cable. There's also a fully-documented macro language, and a CD-based library of over 5,000 symbols covering architecture, mechanical and electrical engineering, networking, home and office furniture, and landscaping — again, all documented in a printed manual.



Extremely competent budget 2D — even cheaper without the pro trimmings

PCW Details

Price £195 (plus VAT)

Contact Roderick Manhattan 0181 875 4444

Good Points Fast, with advanced macro and database capabilities.

Bad Points Inflexible snap modes take getting used to.

Conclusion Solid-value 2D drafting.

★★★★

TurboCAD 2D/3D

The title is a trifle misleading as this is two separate products. The 3D side was formerly known as 3D Design Plus and seems little changed from 1994, with a rather strange interface, a good range of primitives, shading and animation, but rather poor drawing aids. Still, it's fun to experiment with and certainly the cheapest 3D available. The 2D side is a completely different and far better application, with a standard Windows 95 interface.

The range of drawing tools is good, and the editing and trimming tools even better. Particularly impressive is the one-shot way you can trim the intersections of double lines, to give "open" tees and crosses: anyone who has struggled to tidy up window glazing bars will appreciate this. The right mouse button, so often relegated to an "enter" or "cancel" key in CAD, is fully Windows 95 equipped and works well with the snap bar — you can have multiple running

a "one-off" from the context menu.

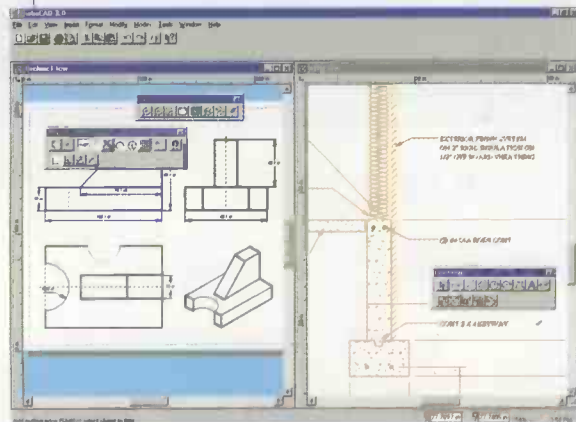
You can mix and match mouse and keyboard entry by typing Control + E to get to the edit bar — to define a line, say, by direction and length, or Control + R to specify Cartesian co-ordinates. The \$ and @ symbols can be used to toggle relative and absolute co-ordinates, saving a mouse click.

You can open multiple files but, somewhat oddly, not have multiple windows open on the same file, although you can save named views. There's a good range of bundled symbols with drag-and-drop entry, but these are somewhat marred by having no idea of scale. Whether you're drawing full-size or at a scale of 1:50, dragging in the kitchen sink, for example, gives an entity 0.3 inches wide, which makes for a lot of laborious rescaling.

Finally, you get a Basic-style scripting language, documented in the help file, and some sample macros — one of which crashed TurboCAD.

snaps active — to connect, say, the centre of a circle to the endpoint of a line, and override these for

Multiple files and neat editing tools make this the best TurboCAD yet



PCW Details

Price £69.95 (plus VAT)

Contact IMSI 0181 581 2000

Good Points Excellent budget 2D drawing with a greatly improved interface.

Bad Points The 3D facilities are poor and unintegrated.

Conclusion Excellent entry level — but keep the 3D "just for fun".

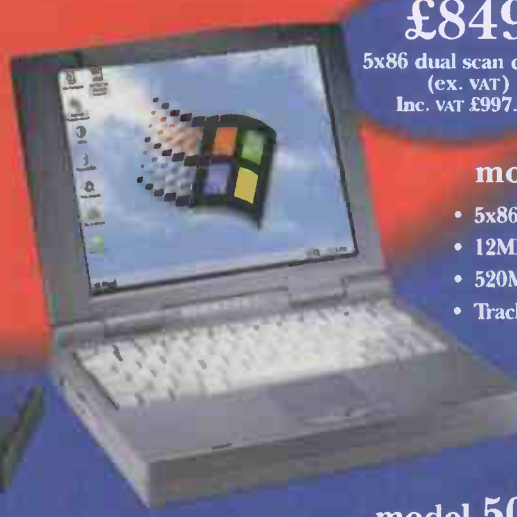
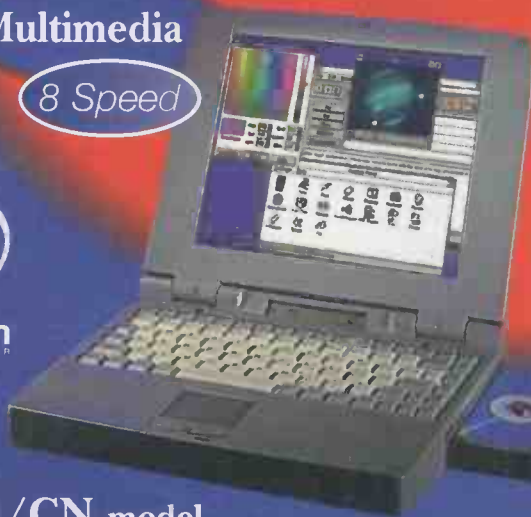
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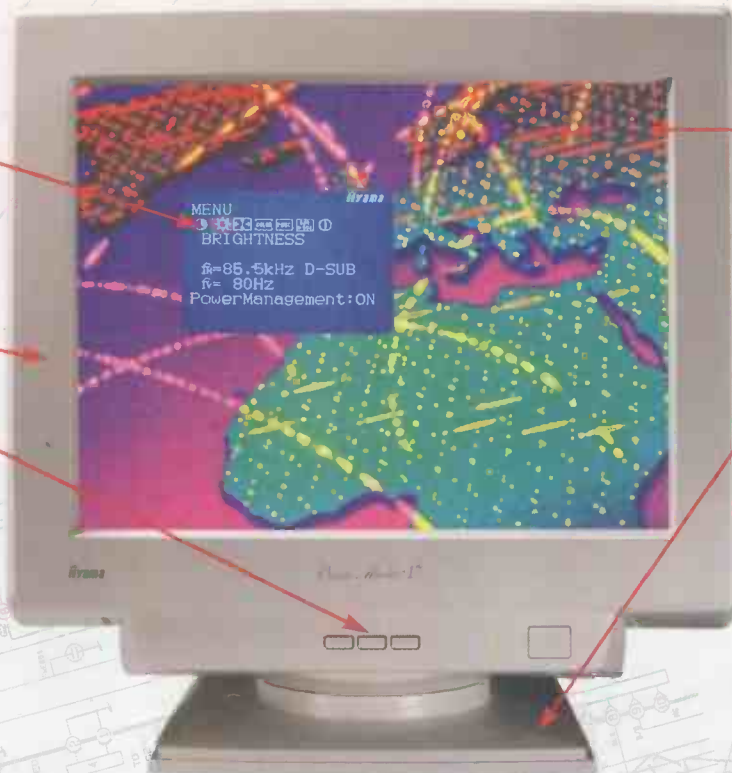
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Editor's Choice

With prices ranging by a factor of 50, the concept of an overall best buy is rather ridiculous. It's much more relevant to consider needs first. If you're buying for a large architectural or engineering practice, with projects spanning several years, then you'll be looking not just for sheer drawing power, but also the confidence that the product will continue to be developed and supported in years to come. The high price of the three top-end products is then mitigated by the sheer momentum of the installed user base. Although AutoCAD, with a claimed 1.5 million users worldwide, is undoubtedly the leader, we found MicroStation more capable and, despite a rather vague idea of the Windows 95 interface conventions, more elegant. We felt the third top-end contender, MicroGDS Professional, although cheaper, didn't come up to the standard of the other two. Consequently, as a money-no-object Editor's Choice, MicroStation takes the prize.

Dropping down to entry level, mere mortals — ranging from smaller design or engineering practices to one-man bands — have first to ask the crucial question, "Do I need 3D?" If not, then we'd plump for either version of Drafix. If you don't need the macro language, then £69 will buy you Drafix QuickCAD, an excellent introduction to the business of computer draftsmanship. If you do need 3D on a budget, then DesignCAD 3D offers astonishing value for money.

In the 3D middle ground, things get a lot more difficult. We'd love to nominate Corel CAD as man of the match but for the fact it's just too, too slow. XCAD is fast and well-equipped, but we'd like to see the full Windows 95 version (in development at time of writing) before committing ourselves. Which takes us neatly back to DesignCAD 3D: highly commended, and unbeatable value.



Other products available

We simply don't have room to cover every single product on offer, but here is a brief guide to the rest.

Autosketch 2.1 (Autodesk 01483 303322, about £79). Brilliant budget 2D drafting with button bars that can replace all the menus. Way ahead of its time when launched, but now looking rather neglected by the company.

MicroStation Powerdraft 5.5 (Bentley 01344 412233, £1895). Sibling to MicroStation, featuring the same Accudraw and Smartline technology, but with greatly-reduced 3D capabilities.

Drafix QuickCAD 4.0 (Roderick Manhattan 0181 875 4444, £69). Same features as Drafix CAD Professional, less the macro language, symbols and customisation, but with a three-level interface to make life easier for beginners.

EasyCAD Windows 4.5 (FastCAD 01923 495496, £149). Entry level 2D with an antique interface — drawing tools can only be accessed from the menus or command line. Fast and well-equipped, however.

TommySoft CAD (Thompson Partnership 01923 246427, shareware). Windows 3.1 2D drafting originating from Germany. Truly bizarre interface features mystifying cascading toolboxes, but fans claim it to be powerful.

DeltaCAD (Midnight Software US 1-800-242-4775, shareware). Simple 2D package featuring an unusual, but rather cute, tabbed toolbar. Featured on our cover CD in September.



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Hardware

The bad news is that for serious CAD work you need the best of everything. Lots of memory to store huge 3D models (the robot arm in the AutoCAD screenshot, page 121, is an 8Mb file) and as fast a processor as possible to cope with the vast throughput of floating-point arithmetic.

We ran our tests on a 16Mb P100, which should be regarded as an absolute minimum for anything but the most elementary work. At any level, however, a fast display card is essential if you want to avoid agonising delays while the screen is redrawn. Unless you're doing high-quality rendering, 256 colours is ample — more will slow down redraws — but a minimum resolution of 1024 x 768 will save a lot of time zooming and panning.

Don't stint on the monitor either: key qualities here are flicker-free (a non-interlaced refresh rate of 75Hz or better), low distortion (you want straight lines to look

straight) and high resolution (at least 1024 x 768 on a .26mm dot pitch, 17in display).

For input, the traditional digitising tablet is only really necessary if you have a longing for the days of tablet-mounted command overlays or want to convert paper drawings; even then, it's probably easier to get the latter scanned by a bureau and stick with a low-cost, low-footprint mouse. For large-size quality output, you'll need a plotter: A1 inkjets start at about £1,200, and A0 at about £1,800. For smaller drawings any kind of graphic-capable printer is fine: an A3 inkjet can be had for under £400, and a wide-carriage dot-matrix will take A2 portrait. Bear in mind that some packages, especially the budget applications, will let you tile a large drawing onto several printer pages. Swallow your pride, tape them together, and take them to a bureau which has a giant-size copier.

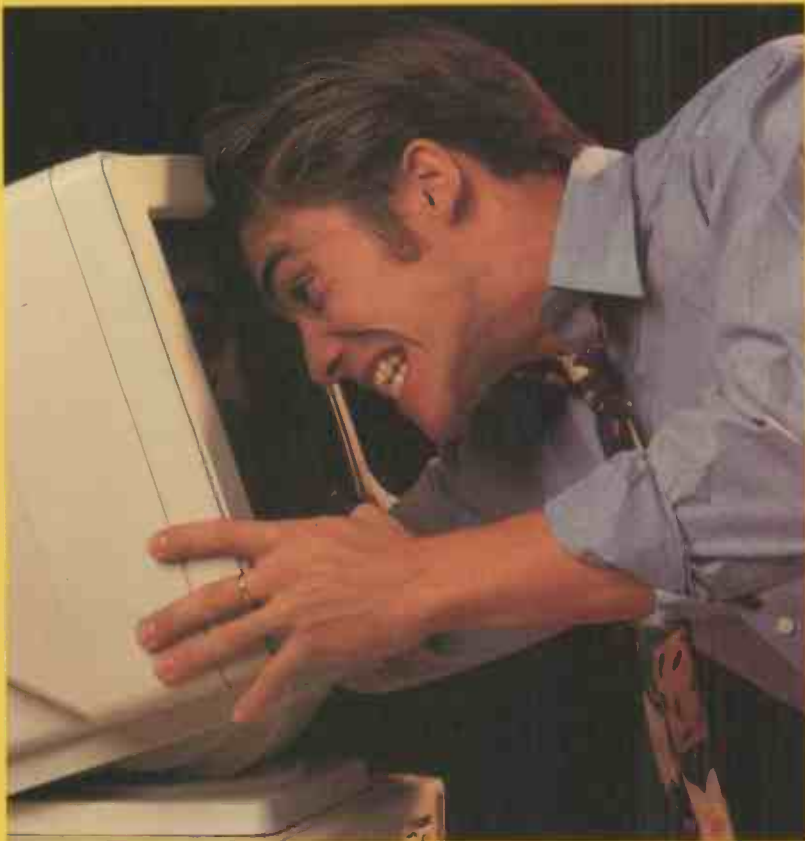


You'll need a flicker-free, high-resolution, low-distortion monitor to make the most of CAD software

Jargon-buster

Array	Multiple copies — either in a rectilinear grid, such as windows on an office block, or in a circle, such as spokes on a wheel.	NURBS	hidden, shown or protected from change.
Associative dimensioning	Dimension lines and numbers, updated when the associated object is resized.	Offset	Non-uniform rational b-splines: the way complex curved surfaces are stored. Reproduces a shape a set distance inside or outside the original. For example, the inner profile of a complex wall from the outer.
Attributes, non-graphic	Non-printing information that can be stored in a drawing file, such as the price and supplier of a component.	Ortho mode	Constraining the drawing cursor to 90-degree angles.
Boolean operations	Combining shapes by adding, subtracting or intersecting — e.g. "drilling" a hole.	Polyline	A set of connected line and curve segments treated as a single object.
Chamfering, filleting	Creating an angled or rounded corner at the junction of two lines or surfaces.	Primitive	A shape — circle, line, cylinder or sphere, for instance — drawn with a single command.
Co-ordinates	Absolute co-ordinates refer to the distances from the origin (zero point) of a drawing. Relative co-ordinates refer to the last point entered.	Rendering	Giving a snapshot view of a wireframe model realistically-shaded surfaces.
DXF	Drawing eXchange Format: an open file format, developed by Autodesk for exchanging drawings between applications.	Snap modes	A vital drawing aid that lets the user place points precisely related to other objects, such as the end or midpoint of a line, the centre or tangent of an arc.
Hidden line	A line in a 3D wireframe, such as the back edge of a cube, that can be temporarily removed to give a more realistic view.	Symbols (blocks, cells)	The CAD equivalent of clip-art: standard components such as bolts or window frames that can be stored for re-use in a library.
Layer	A way of sorting objects in a drawing. For example, a building's pipework can be assigned to its own layer, and then	Working Plane	The "slice" through a 3D model in which the cursor is currently moving.

No...they don't come with airbags



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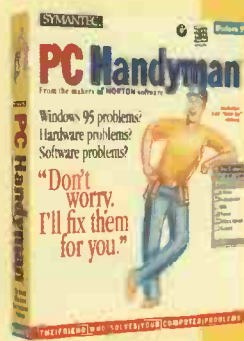
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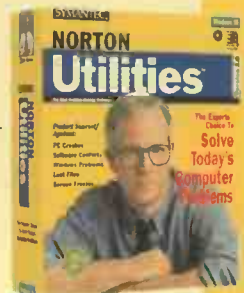
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Table of features

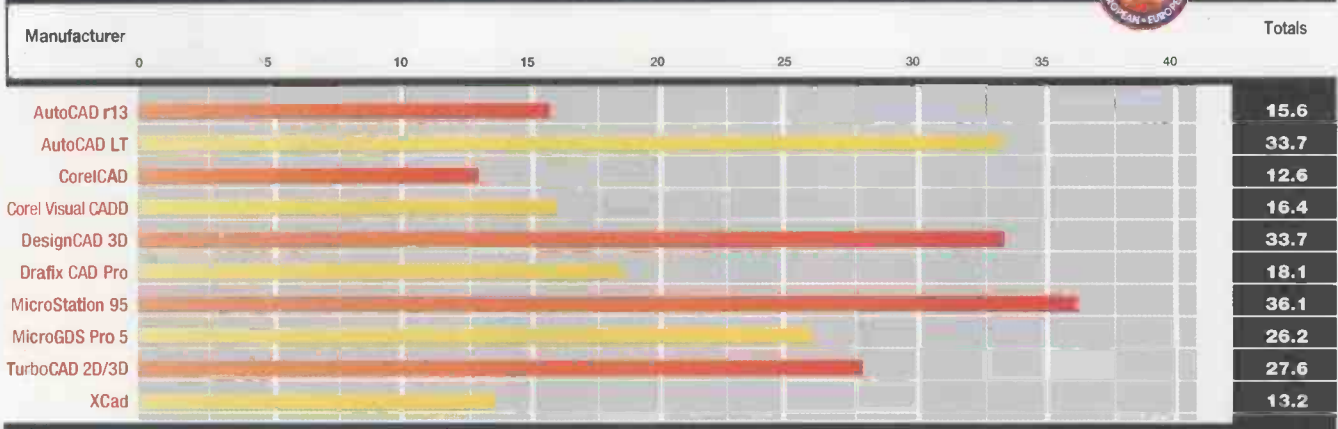
					
Product	AutoCAD r13	AutoCAD LT	CorelCAD	Corel Visual CADD	DesignCAD 3D
Contact	Autodesk	Autodesk	Corel	FastCAD	BVG
Telephone	01483 303322	01483 303322	0800 973189	01923 495496	01874 611633
Price (excl VAT)	£3,150	£595	£695	£349	£149.95
Platform	DOS, Win 3.1, 95, NT	Win 95	Win 95, NT	Win 95	Win 3.1, 95 (separate versions)
Min. processor	486	486	486	386	386
Min. RAM	16Mb	16Mb	16Mb	8Mb	4Mb
Disk space - standard installation	70Mb	30Mb	100Mb	18Mb	13Mb
2D/3D	3D	2D + 3D viewing	3D	2D	3D
Multiple files	○	○	●	●	●
Multiple views on same file	●	●	●	●	●
Tutorials	●	●	●	●	●
Number of layers	No limit	No limit	No limit	1024	256
Macro language	●	●	●	●	●
Development API	●	○	○	●	○
Non-visual attribute export	●	●	○	●	○

Table of features

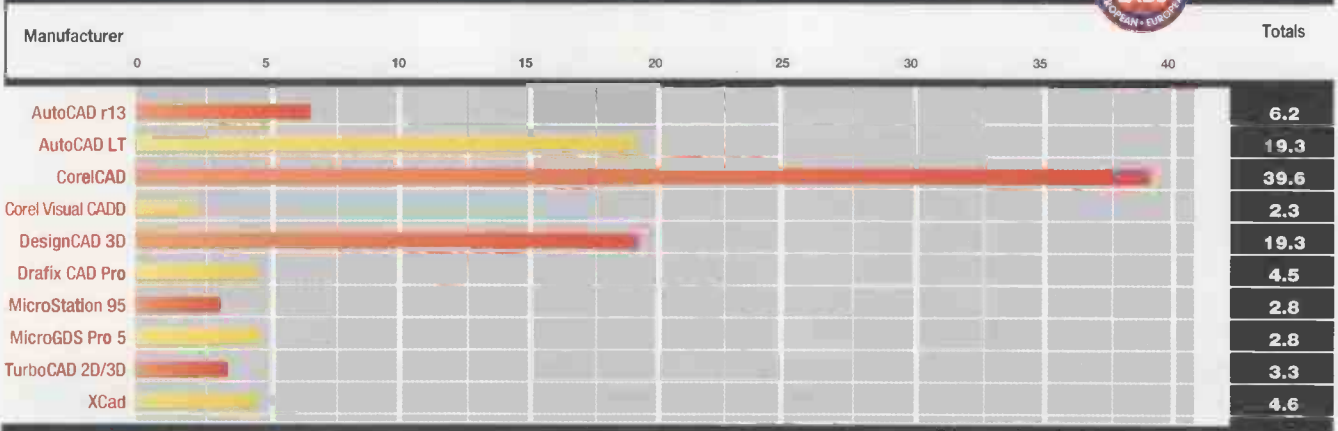
					
Product	Drafix CAD Pro	MicroStation 95	MicroGDS Pro 5	TurboCAD 2D/3D	Xcad
Contact	RMG	Bentley	GDS	IMSI	Digital Multimedia
Telephone	0181 875 4444	01344 412233	01483 725225	0181 581 2000	0181 893 4000
Price (excl VAT)	£195	£3,495	£2,495	£69.95	£495
Platform	Win 95	DOS, OS/2, Win 3.1, 95, NT	Win 3.1, 95, NT	Win 3.1, 95	*Win 95
Min. processor	486	486	486	386	386
Min. RAM	4Mb	16Mb	16Mb	4Mb	4Mb
Disk space - standard installation	8Mb	66Mb	46Mb	8Mb	11Mb
2D/3D	2D	3D	3D	2D and 3D (separate apps)	3D
Multiple files	Y	N	Y	Y	N
Multiple views on same file	Y	Y	Y	N	Y
Tutorials	Y	Y	N	Y	Y
Number of layers	256	63	1024	Not documented	4000
Macro language	Y	Y	N	Y	Y
Development API	N	Y	Y	N	Y
Non-visual attribute export	Y	Y	Y	N	N



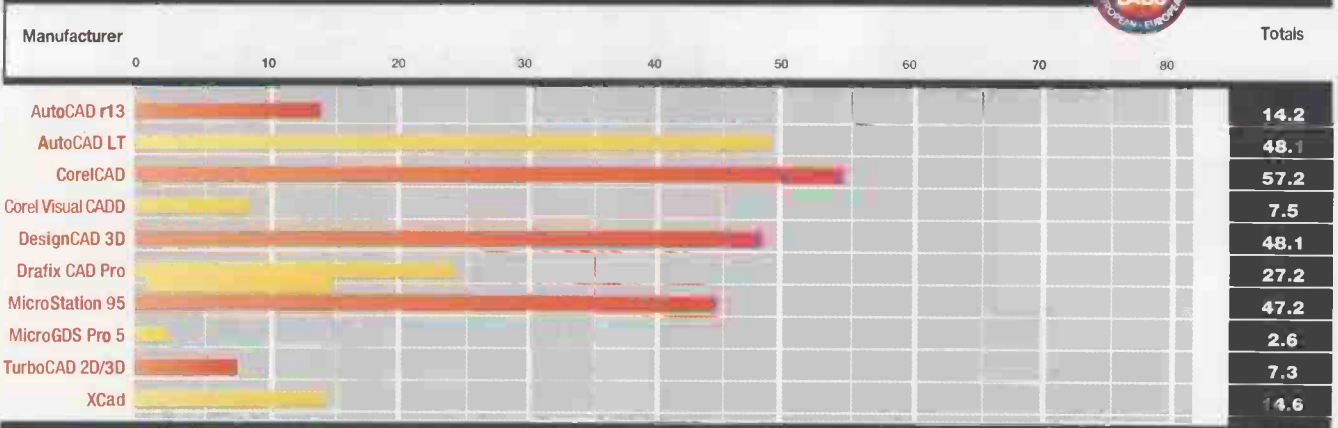
Speed - import 2D DWG



Zoom out

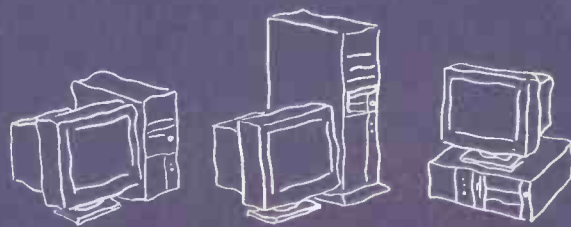


Rotate



Finding a level playing field to compare performance limited us to two dimensions. We first took a standard DXF file, and timed how long it took to import and display. Microstation, XCad and TurboCAD all refused to import the file, so we used a native AutoCAD release 12 file, which gave the two Autodesk products

an advantage. We then timed how long it took to redraw the entire display after zooming out from a detail. Finally, we rotated the drawing by 90 degrees; not just a change of viewpoint, but a true rotation (and recalculation) of every entity in the drawing. Times are given in seconds.



MJN

Whatever you want - MJN have the answer

"MJN is one of the best value systems on the market today"

PC Advisor



Quality Is The Key To Our Success

Quality is the driving force within MJN. We use the highest quality components available and all new PC systems are designed to comply with CE safety and emission standards. MJN service, support and systems are all certified to the ISO 9002 quality standard.



Certificate No. FS 28122
BS EN ISO 9002:1994

Choice Of Expandable Case Styles

MJN systems feature a choice of ergonomically designed cases with small footprints and massive expansion potential. These include a seven bay desktop, seven bay midi tower and nine bay full tower with heavy duty CE approved power supplies.

Backed By Superb Service And Support

Our highly qualified, knowledgeable sales staff can provide you with the advice on your specific requirements and recommend the solution that fulfils your individual needs. They are backed by teams of trained support staff to quickly resolve any problems should they occur.

Extensive Range Of Software Options

The superb Lotus software suite (Lotus SmartSuite 96 for Windows 95) comes as standard with many of the systems. The software is pre-loaded ready for use with on-line documentation. We also provide a fabulous range of bundled multimedia titles with Multimedia systems.



MJN multimedia systems come complete with Lotus SmartSuite 96 and the Infopedia 96 UK encyclopaedia and 7 essential reference books on CD.

MJN desktop systems are available in an ergonomic seven bay desktop case.

All systems feature latest Intel® Pentium® processor based motherboards with socket 7 upgradeability, ultra fast 64-bit PCI graphics, large enhanced IDE hard disks, fast eight speed CD-ROM drives with 16-bit sound and Lotus SmartSuite 96 together with other programs

Multimedia (MM) systems also include superb multimedia titles such as Infopedia multimedia encyclopaedia and BodyWorks together with stereo speakers and PC joystick.

Our best buy P120 multimedia system comes with an incredible 16Mb EDO RAM, 28.8 modem, large 15" screen and full-feature eight speed multimedia at just £999+VAT (=£1173.83 inc VAT).



MJN P120 CD desktop

- Intel 120MHz Pentium® processor
- Plug & play motherboard with Intel socket 7
- 16Mb EDO RAM, (max 128Mb)
- 1Gb enhanced IDE hard disk
- 256k Pipeline burst mode cache
- Eight speed IDE CD-ROM drive
- Integrated 16-bit stereo sound
- 3.5" 1.44Mb floppy drive
- Enhanced parallel, PS/2 mouse and 2 high speed serial ports
- High performance 64-bit graphics accelerator on board with video acceleration (uses 1Mb of system RAM)
- Software MPEG capability allowing playback of MPEG videos
- 14" crisp sharp 0.28dp NI SVGA screen
- 105 Windows® 95 keyboard and mouse
- Expandable desktop case with 7 drive bays

Software

- Microsoft® Windows 95 with CD & manual
- Lotus SmartSuite 96 for Windows® 95 including, Word Pro 96, Freelance 96, Approach 96, 1-2-3, Organizer, SmartPics graphics pre-loaded
- GSP Pressworks and Designworks drawing and DTP suite pre-loaded
- GSP Homewise and GSP Money pre-loaded

£1009.33 inc. VAT

£859 +VAT

MJN P120 MM desktop

Multimedia model with joystick, speakers, and five CD multimedia titles £1056.33 inc. VAT
£899 +VAT

MJN P120 MM Best Buy

- Intel 120MHz Pentium® processor
- Plug & play motherboard with Intel socket 7
- 16Mb EDO RAM (max 128Mb)
- BAPT 28.8 external fax/data modem
- 1Gb enhanced IDE hard disk
- 256k Pipeline burst mode cache
- Eight speed IDE CD-ROM drive
- Integrated 16-bit stereo sound, PC joystick and twin stereo speakers
- 3.5" 1.44Mb floppy drive
- Enhanced parallel, PS/2 mouse and 2 high speed serial ports
- High performance 64-bit graphics accelerator on board with video acceleration (uses 1Mb of system RAM)
- Software MPEG capability allowing playback of MPEG videos
- 15" crisp sharp 0.28dp NI SVGA screen
- 105 Windows 95 keyboard and mouse
- Expandable desktop case with 7 drive bays

Software

- Microsoft Windows 95 with CD & manual
- Lotus SmartSuite 96 for Windows 95 including, Word Pro 96, Freelance 96, Approach 96, 1-2-3, Organizer, SmartPics graphics pre-loaded
- GSP Pressworks and Designworks drawing and DTP suite pre-loaded
- GSP Homewise and GSP Money pre-loaded
- Infopedia 96 UK multimedia encyclopedia CD
- BodyWorks v5 CD
- WinTutor 95 CD
- Shareware games pack CD

£1173.83 inc. VAT

£999 +VAT

Screen and Speaker Upgrade Options

- 14" .28dp NI to 15" NI screenplus £82.25 (£70+VAT)
- 15" NI to 17" NI screenplus £270.25 (£230+VAT)
- 4w to 15w speakersplus £23.50 (£20+VAT)
- 4w to 70w speakersplus £58.75 (£50+VAT)
- 28.8 BAPT external fax/data modemplus £94 (£80+VAT)

Other Options

Please call for details

Quickshot PC microphone, MJN mouse mat, MJN total cover 3 year warranty, Lotus back-up CD

Printers

HP DeskJet Mono, HP DeskJet Colour, Epson Stylus Color 200, Epson Stylus Color 500, Facit Laser Printer

Both VAT inclusive and VAT exclusive prices shown.



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MJN Technology Ltd, Granville House, Blackburn Rd, Simonstone, Burnley, Lancs, BB12 7GT.

Tel. 01 282 777 555. Fax 01 282 77 08 44. Business user prices shown. Consumer enquiries welcome. All prices exclude delivery (£25+VAT=£29.38) for UK mainland excluding Scottish highlands, and VAT (17.5%). Software applications are provided on CD or pre-loaded with on-line documentation. Screen sizes shown are CRT sizes as per industry practice. Pack shots shown for purposes of illustration only. Goods are normally despatched within 10 to 14 days. All orders will be fulfilled within 28 days unless otherwise notified. Specifications, prices and availability are subject to change without notice. Products sold subject to our conditions of sale copies of which are available on request. The peripherals and upgrades listed are sold only with the purchase of an MJN system. Intel Inside and Pentium logos are registered trademarks of Intel Corporation. E&OE.

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"A Fast Well Equipped PC - A Great Choice For Experts and Beginners alike"

Computer Buyer



A Quality Range Designed By You

Extensive research into our customer requirements highlighted the most important features they would like to see within their PC systems. These included more choice, higher performance, quality components and easy upgradeability - all of which we incorporated at the most competitive prices and with the highest quality of service and support.

Optimised For Windows 95

All Windows 95 systems feature 16Mb or 32Mb EDO RAM and are built utilising components which are optimised for the smooth and rapid operation of Windows 95.

Future-Proof Upgradeability

All MJN systems can be upgraded to Intel Pentium 200MHz processor. Our systems are also designed to ensure easy upgradeability of RAM, graphics and storage devices.



Highest Performance Components

The motherboards, graphics adaptors and hard disks used in these systems are amongst the highest performance components available. Our high performance systems feature the latest Intel 430HX chipset with 512k burst mode cache, EDO RAM and fast 64-bit PCI graphics cards with synchronous 'SDRAM' or 'SGRAM'. Many of our most popular models feature the latest Intel shared memory bus architecture which allows powerful 64-bit on-board graphics accelerator to use 1Mb of fast 64-bit main RAM as graphic memory. This can be increased to 2Mb to give higher resolution/ more colours, using the software setup at no extra cost - particularly useful with 16Mb systems.

The Best Value in the UK

MJN's manufacturing strength, direct relationship with the world's leading component manufacturers and direct supply to customers without dealer outlets enables us to offer the highest quality systems at unbeatable prices.

MJN MJN Midi-tower systems are available in two best selling configurations.

The popular P133 model includes 16Mb EDO RAM, 256k pipeline burst cache, 1Gb hard disk, 28.8 modem and full-feature eight speed CD multimedia at £999 +VAT (£1173.83 Inc. VAT). This system is also available with a 15" screen for just £1069 +VAT (£1256.08 Inc. VAT).

Our new high performance P166+ model features one of the fastest processors

available, the IBM/Cyrix/ST 6x86 P166+ and is simply unbeatable in terms of performance, specification and price.

It comes with a massive 32Mb EDO RAM for smooth multi-tasking, 2.0Gb fast EIDE hard drive, eight speed CD-ROM, 33.6 V34 modem and crisp sharp 15" NI screen. All this at a sensational £1189 +VAT (£1397.08 Inc. VAT)

Both systems come with Lotus SmartSuite 96 and a range of other programs and CD multimedia titles as listed below.



MJN P133 MM midi tower

- Intel 133MHz Pentium® processor
- Plug and play motherboard with Intel socket 7
- 16Mb EDO RAM (max 128Mb)
- 256k Pipeline burst mode cache
- 1Gb enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- 28.8 BABT internal fax/data/Internet modem (limited offer)
- Integrated 16-bit stereo sound
- 3.5" 1.44Mb floppy drive
- Enhanced parallel, PS/2 mouse and 2 high speed serial ports
- High performance 64-bit graphics accelerator on board with video acceleration (uses 1Mb RAM)
- Software MPEG capability allowing playback of MPEG-1 videos
- 14" crisp sharp 0.28dp NI SVGA screen
- 105 Windows® 95 keyboard and mouse
- Expandable midi tower case with 7 drive bays

Software

- Microsoft® Windows 95 with CD & manual
- Lotus SmartSuite 96 for Windows 95 including, Word Pro 96, Freelance 96, Approach 96, 1-2-3, Organizer, SmartPics graphics pre-loaded
- GSP Pressworks and Designworks drawing and DTP suite pre-loaded
- GSP Homewise and GSP Money pre-loaded
- Infopedia 96 UK multimedia encyclopaedia CD
- BodyWorks v5 CD, WinTutor 95 CD
- Shareware games pack CD

£1173.83 inc. VAT

£999 +VAT

MJN P133 MM midi tower 15"

Multimedia model with joystick, speakers, and five CD multimedia titles £1256.08 inc. VAT
£1069 +VAT

MJN P166+ MM midi tower

- IBM/Cyrix/ST 6x86 P166+ processor
- Plug and play motherboard with Intel socket 7
- 32Mb EDO RAM (max 128Mb)
- 256k Pipeline burst mode cache
- 2.0Gb enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- 33.6 V34 BABT internal fax/data/Internet modem (limited offer)
- Integrated 16-bit stereo sound
- Twin stereo speaker system
- Quickshot joystick
- 3.5" 1.44Mb floppy drive
- Enhanced parallel, PS/2 mouse and 2 high speed serial ports
- High performance 64-bit graphics accelerator on board with video acceleration (uses 1Mb RAM)
- Software MPEG capability allowing playback of MPEG-1 videos
- 15" crisp sharp 0.28dp NI SVGA screen
- 105 Windows 95 keyboard and mouse
- Expandable midi tower case with 7 drive bays

Software

- Microsoft Windows 95 with CD & manual
- Lotus SmartSuite 96 for Windows 95 including, Word Pro 96, Freelance 96, Approach 96, 1-2-3, Organizer, SmartPics graphics pre-loaded
- GSP Pressworks and Designworks drawing and DTP suite pre-loaded
- GSP Homewise and GSP Money pre-loaded
- Infopedia 96 UK multimedia encyclopaedia CD
- BodyWorks v5 CD
- WinTutor 95 CD
- Shareware games pack CD

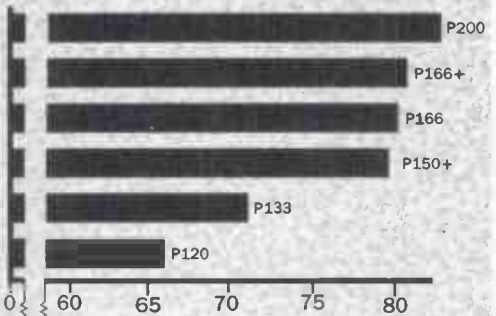
£1397.08 inc. VAT

£1189 +VAT

Processing Power

Models are available with Intel Pentium® or the higher performance IBM/Cyrix/ST 6x86 processors. Relative performance of the processors is shown by Ziff-Davis Winstone 96 benchmarks. For entry level we recommend P120 or P133 systems. For general home and business use we recommend the more powerful P150+ or P166 systems. For Power users we recommend P166+ or P200 systems. In general systems with faster processors are also well specified usually featuring more RAM, faster modem and larger screens. All the systems featured include Intel socket 7 and are upgradeable to Intel Pentium 200 processors. Pentium Pro systems are not recommended unless you are running Windows NT as these may be actually slower than Pentium systems when running typical Windows 95 programs.

Relative processor performance based on Ziff Davis Winstone 96™ as certified by MDR labs.



MJN Business Solution Rental is available to business users, subject to status, who have traded for 3 years or more. All rental figures are given ex VAT, and are collected quarterly over a 3 year term. Full details of finance facilities are given on order. Terms and conditions will be sent to you before you sign.

All the MJN multimedia systems come with the best CD multimedia titles and Lotus SmartSuite 96 software. Software is pre-loaded or on CDs. Pack shots are shown for illustration only.



Telephone

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Tel. 01 282 777 555. Fax 01 282 77 08 44. Business user prices shown. Consumer enquires welcome. All prices exclude delivery (£25 +VAT = £29.38) for UK mainland excluding Scottish highlands, and VAT (17.5%). Software applications are provided on CD or pre-loaded with on-line documentation. Screen sizes shown are CRT sizes as per industry practice. Pack shots shown for purposes of illustration only. Goods are normally despatched within 10 to 14 days. All orders will be fulfilled within 28 days unless otherwise notified. Specifications, prices and availability are subject to change without notice. Products sold subject to our conditions of sale copies of which are available on request. The peripherals and upgrades listed are sold only with the purchase of an MJN system. Intel Inside and Pentium logos are registered trademarks of Intel Corporation. E&OE.

"MJN Produced The Fastest Performing Machine"

PC LAN



"you can put the exceptional performance down to the fact that the machine uses good quality brand-name components"

What Personal Computer

Buy MJN with confidence

Fast processors

All systems use fast Intel Pentium® processors or 6x86 processor manufactured by IBM/Cyrix/ST

Advanced motherboards

Latest plug & play motherboards with Intel socket 7 for future upgradeability

Advanced 64-bit graphics

Many of our systems feature advanced 64-bit accelerator graphics on board with fast windows acceleration and video acceleration. The 64-bit graphics use 1Mb of system RAM and can be BIOS selected to use 2Mb RAM in 16Mb systems. Our top of the range systems feature upto 4Mb 'SDRAM' or 'SGRAM' graphics.

32Mb RAM and burst mode cache

All our multimedia systems now include at least 16Mb EDO RAM with many featuring 32Mb This together with fast pipeline burst mode cache gives superb performance when running Windows 95. Windows 95 runs slowly on all 8Mb systems.

Fast CD-ROM drives & modems

Fast eight speed CD-ROM drives with top quality sound cards are now standard in all systems. Most of our systems now also include fast 28.8 fax/data/Internet modems.

Top quality business software

Lotus SmartSuite 96 for Windows 95 is the latest and best version of this superb software suite that includes everything you are likely to need for business use. We also include top quality educational and leisure software.

Personal Finance

All systems are available on Personal Finance APR 19.8%. Please call for details. Be sure you can afford the payments before entering into a credit agreement.

6MJNFT6A

All the MJN multimedia systems come with the best CD multimedia titles and Lotus business software including SmartSuite 96. Software is pre-loaded or on CD, pack shots are shown for illustration only.



MJN multimedia performance systems come in truly expandable 7 bay midi tower or 9 bay full tower cases.

Our P166 midi tower model is the ultimate in terms of performance, specification and price. It comes with the latest Intel 430HX chipset with 512K pipeline burst cache, a massive 32Mb EDO RAM for smooth multi-tasking, 2.0Gb fast EIDE hard drive, eight speed CD-ROM, superb 3D wavetable soundcard and crisp sharp 15" NI screen. This system also includes ATI 'SDRAM' based graphics card with sparkling Windows 95 performance and is available at £1299 +VAT (£1555.70 Inc. VAT)

The P200 full tower model includes a 4Mb 'SGRAM' graphics card plus a 28.8 modem at just £1599 +VAT (£1878.83 Inc.VAT) Both systems come pre-loaded with Lotus SmartSuite 96 and a range of other programs and CD multimedia titles as listed below.

Our 'Best Buy' model has to be the P166+ midi-tower which at almost £300 less than the P200 produces comparable performance and includes a faster 33.6 modem.

MJN P166 MM midi tower

- Intel 166MHz Pentium® processor
- Plug and play motherboard with Intel socket 7
- Latest Intel 430HX chipset
- 32Mb EDO RAM (max 128Mb)
- 512k Pipeline burst mode cache
- 2.0Gb enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- 3D Wavetable sound card
- Twin large 15w stereo speaker system
- Quickshot joystick
- 3.5" 1.44Mb floppy drive
- Enhanced parallel, PS/2 mouse and 2 high speed serial ports
- ATI 64-bit 2Mb synchronous 'SDRAM' graphics with 2Mb video RAM and software MPEG
- 15" crisp sharp 0.28dp NI SVGA screen
- 105 Windows 95 keyboard and mouse
- Expandable midi tower case with 7 drive bays

Software

- Microsoft Windows 95 with CD & manuals
- Lotus SmartSuite 96 for Windows 95 including, Word Pro 96, Freelance 96, Approach 96, 1-2-3, Organizer, SmartPics graphics pre-loaded
- GSP Pressworks and Designworks drawing and DTP suite pre-loaded
- GSP Homewise and GSP Money pre-loaded
- Infopedia 96UK multimedia encyclopaedia CD
- BodyWorks v5 CD
- WinTutor 95 CD
- Shareware games pack CD

£1555.⁷⁰ inc. VAT

£1299 +VAT

MJN P166+ Best Buy Model

As above but with

- Faster 6x86 P166+ processor from IBM/Cyrix/ST
- FREE 33.6 V34 BABT modem (limited offer)

£1585.⁰⁸ inc. VAT

£1349 +VAT

MJN P200 MM Full Tower

- Intel 200MHz Pentium processor
- Plug & play motherboard with Intel socket 7
- Latest Intel 430HX chipset
- 32Mb EDO RAM (max 128Mb)
- 512k Pipeline burst mode external cache
- 2.0Gb enhanced IDE hard disk
- PCI 64-bit graphics with 4Mb 'SGRAM'
- Eight speed IDE CD-ROM drive
- 28.8 BABT approved external fax and data modem with fax and Internet software
- 3D Wavetable sound card
- Powerful 70w twin stereo speaker system
- Quickshot joystick
- 3.5" 1.44Mb floppy drive
- Enhanced parallel, PS/2 mouse and 2 high speed serial ports
- Superb 15" 0.28dp NI SVGA screen
- 105 Windows 95 keyboard and mouse
- Expandable full tower case with 9 drive bays

Software

- Microsoft Windows 95 with CD & manuals
- Lotus SmartSuite 96 for Windows 95 including, Word Pro 96, Freelance 96, Approach 96, 1-2-3, Organizer, SmartPics graphics pre-loaded
- GSP Pressworks and Designworks drawing and DTP suite pre-loaded
- GSP Homewise and GSP Money pre-loaded
- Infopedia 96 UK multimedia encyclopaedia CD
- BodyWorks v5 CD
- WinTutor 95 CD
- Shareware games pack CD

£1878.⁸³ inc. VAT

£1599 +VAT

"An Excellent and Cost Effective System"

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MJN Pentium® processor based workstations include a minimum of 16Mb RAM, 1Gb hard disk and crisp sharp 0.28 dp screen and are the ideal systems for business, corporate and educational users. They are suited to both network and stand alone applications. These systems can be tailored to your requirements with appropriate software, operating system and network configurations.



pentium
PROCESSOR

MJN file servers are available with a range of configurations which can be tailored to your individual requirements.



MJN P120 W desktop

- Intel® 120MHz Pentium® processor
- 16Mb RAM
- 256k Pipeline burst mode cache
- 1Gb enhanced IDE hard disk
- 3.5" 1.44Mb floppy drive
- 64-bit PCI integrated graphics (uses 1Mb RAM) and 16-bit sound
- 14" SVGA 0.28dp NI colour screen
- 105 keyboard and mouse
- Desktop case with 7 drive bays
- Select required operating system and options

£915.33
inc. VAT

£779
+VAT

MJN P120 W performance midi tower

- Intel 120MHz Pentium® processor
- Latest Intel 430HX chipset
- 512k Pipeline burst mode cache
- 16Mb EDO RAM (Max 128Mb)
- 1Gb Enhanced IDE hard disk
- 3.5" 1.44Mb floppy drive
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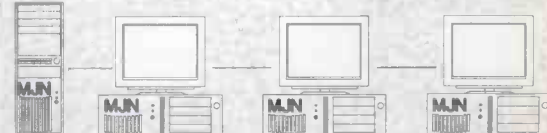
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Pick of the bunch

The choice of budget laser printers is now so wide that it really is hard to see the wood for the trees. Eleanor Turton-Hill chooses twelve to tempt you.

As the market for laser printers has developed, competition between manufacturers has become increasingly fierce, especially in the production of budget models. Prices have gone down and down as manufacturers have found new ways of cutting costs. Generally, this process has been good for the consumer. Prices are lower and there's a much larger choice of budget products available. Output quality has improved, with 600dpi resolution becoming more standard, and build has become smaller, making them more suited to home use. In short, the printer market has followed the familiar industry pattern. Continual advancements in technology combined with increased market competition have created a better deal for the consumer.

The downside is that the increased number of products available makes a buying decision more difficult. There's an endless variety of features and options to choose from. Each model has a slightly different balance of components: some are optimised for high-speed Windows printing, some are networkable, while others are for purely personal use. Only some models provide a Mac interface, and only some allow printing from native DOS applications. The choices go on and on...

Here, we've gathered together 12 budget laser printers with street prices ranging from about £210 to £365. The features offered in each model vary considerably, and often there's little correlation between overall functionality and price. We've shown exactly how manufacturers can cut corners in printer design, carefully assessing the features of each

model to give you a clear idea of which one best suits your needs.

There are many different ways of cutting the cost of a printer. The most obvious way is to use a slower engine, but some manufacturers skimp on other basic components including memory, PostScript options, network compatibility, and paper handling features. Others have chosen to use GDI (Graphical Device Interface) technology which cuts down the cost of production even further, using an innovative printing method which greatly simplifies design. GDI technology has brought the price of lasers down considerably over the past two years, but in many ways, it has also served to confuse the consumer.

Different printer manufacturers implement GDI technology in different ways, each method having its own advantages and disadvantages. Four of the printers reviewed here use the Microsoft Windows Printing System, a standard set up to create a universal architecture for GDI printers. Other models use a combination of GDI technology and traditional architecture, allowing fast printing from Windows as well as support for native DOS applications. Others do not use GDI technology at all, instead following the traditional printer architecture with their own internal electronics and memory.

The winners in this round-up have been selected for their overall value for money. Each printer has been put through its paces in our labs where tests are carried out on performance, output quality and usability. The results have then been weighed up against upgrade options, available interfaces, and overall design advantages.

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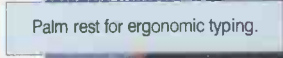
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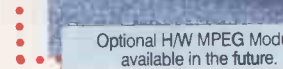
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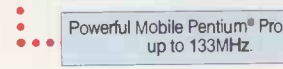
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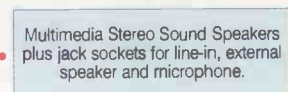
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Brother HL 730

Brother was one of the first companies to combine GDI technology with traditional design, allowing fast printing from Windows as well as support for native DOS applications. The first budget laser to use the idea was the HL 630. This one, the HL 730, is basically the same 6ppm model, but with some design changes and an improved engine.

The driver provides accurate bi-directional feedback and printing is fast on all sorts of documents, including graphic images and photographs. This is partly because of the compression technology incorporated into the software for speeding up the printing process. When printing very large files, this technique does require a certain amount of free hard disk space so that a spool file can be created before the job is sent down to the printer.

The 730 is not really suited to cramped environments as its large



flat design demands plenty of desk space, especially with the output tray jutting forward. The whole printer is built like a ski slope with the input hopper high up at the top rear of the machine. The driver software has a built-in duplexing utility which guides the user through the process of printing first one side and then the other side of the paper.

The HL-730 produced excellent scores on our tests both for quality and speed, and, in general, it was a real pleasure to operate. There were no problems with the drivers, paper feeding or stacking. It's also versatile, supplying both a Mac driver and support for native DOS applications using LaserJet IIP emulation. In both these modes, however, the maximum resolution falls to 300dpi.

•PCW Details

Price £270
 Contact Brother 0161 330 6531
 Good Points Fast, stunning-quality output.
 Bad Points Big.
 Conclusion Excellent value for money.
 ★★★★★

Canon LBP-465

Canon produces a whole range of printers using both inkjet and laser technology. This model, the LBP-465, is the new budget 4ppm model in the laser range. It conforms to Microsoft's Windows Printing System and can function only from Windows. PCL 4 emulation is provided for printing from DOS applications, but this will only work from a DOS box in Windows.

Setting up was relatively painless, partly because a Quick Start Card is provided with the printer explaining how to install the toner cartridge. The design helps, as the whole front of the printer opens out, making the machine's innards clearly visible. The driver software comes on three disks and the installation routine configures the printer automatically as the default.

Design-wise, this printer has one major disadvantage, especially if you're short of desk space. The output, instead of stacking vertically, simply churns straight out onto the desk in front. To operate



effectively, this printer really needs a desk of its own — something which is often not practical in small offices.

Canon's wide experience in the printer market is evident in many other aspects of the design of this model. The documentation is well-constructed, making most operations easy for new users. Output quality is also excellent, producing stunning 600dpi documents. That's a significant improvement on the LBP-460, this model's predecessor, which only managed 300dpi.

At the time of writing, this printer is not yet available on the market, but it has an expected street price of about £299, a little expensive considering the design annoyances and lacklustre performance results.

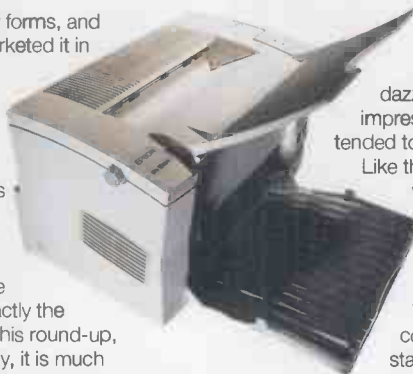
•PCW Details

Price £299 (expected street price)
 Contact Canon 0121 680 8062
 Good Points Excellent quality output.
 Bad Points Design annoyances, slow.
 Conclusion Not the best deal in this round-up, but the street price may well fall.
 ★★★

Epson EPL 5500W

GDI technology now takes many forms, and printer manufacturers have marketed it in different ways. Some have combined GDI with the traditional architecture, others have opted for Microsoft's WPS system; but most have decided on one definitive design for the budget model in their range. Epson has decided to market three different models, one using the WPS, one using traditional architecture, and one using PostScript.

Here, we've tested the EPL 5500W, the WPS model. Superficially, this appears exactly the same as the Lexmark Optra E included in this round-up, but because this one uses WPS technology, it is much cheaper. The two models both use the same printer engine, from Minolta. Under test this printer performed well, giving reasonably high scores on all document types. The speed difference with the Lexmark, particularly on bitmap and graphic images, is interesting. Both printers use the same engine, but this Windows printer produces much higher



scores because data is transferred from the PC to the printer more efficiently.

The quality tests also produced good, but not dazzling, results. Photographic images were particularly impressive, but large blocks of grey within a graphic image tended to suffer from slight banding problems.

Like the Lexmark, the Epson was easy to set up with the whole top of the machine opening out to give a clear view of the inside. HP LaserJet Series II emulation is provided for printing from DOS applications within Windows, but, consistent with the standard architecture, it's not possible to print from native DOS applications. The documentation is well written in plain English and packed full of simple diagrams to help new users.

•PCW Details

Price £245
 Contact Epson 01442 61144
 Good Points Good performance.
 Bad Points Slight banding problems on some types of graphic image.
 Conclusion Reasonably-priced WPS printer. Neat design.
 ★★★

HP LaserJet 5L

This budget printer from HP has been on the market for about a year. It's a 600dpi model with an engine speed of 4ppm. Design-wise, it is unusual. It is built with vertical paper hoppers placed one in front of the other, with input at the back and output at the front. Plastic paper supports slide out at the front and back, 100 sheets in each.

The technology used in this printer follows traditional wisdom, with PCL5e used as the control language and 1Mb of RAM installed as standard. GDI technology is not used at all, at least not in the usual sense of the term, but the Windows driver is host-based and uses bi-directional handshaking to speed up the printing time. Unfortunately, this technique did not produce stunningly good performance on all parts of our tests. Text printing produced reasonable scores, but bitmap and graphic images were pitifully slow. In terms of operation this machine was fairly hassle-free and there



were no paper feeding or stacking problems. A lever at the bottom of the printer allows you to change the paper path from the output bin to a lower position in which finished documents are deposited on the table in front of the printer. The paper path is straighter this way, which is useful for duplex printing or envelope printing.

The poor performance scores were compensated for by excellent-quality text and graphics churned out at true 600dpi resolution. Still, this model seems a little overpriced for what you get, especially when compared to the slightly cheaper Brother HL 730, a 6ppm printer providing much faster output on all file types.

PCW Details

Price £286
 Contact Hewlett-Packard 0990 474747
 Good Points Good-quality output.
 Bad Points Slow on bitmap and graphic images. Documentation could be improved.
 Conclusion Innovative technology used by other manufacturers has left HP's LaserJet 5L looking outmoded.
 ★★★

Kyocera FS-400

Kyocera is famous for its environmental and cost of ownership campaign which argues that the real cost of a printer lies in its long-term maintenance, rather than its initial price tag. Most of Kyocera's printers are aimed at the higher-end corporate market, but this one is the budget model, offering 4ppm 300dpi printing.

Lined up against the other printers in this group, the FS-400 sticks out in one important respect. It does not use GDI technology, but instead relies on the traditional printer architecture. In design, this printer is a simple cube-shaped block with a 100-sheet draw at the front for input paper. Output is delivered on the top of the machine which works reasonably well, but stacking gets precarious after about ten sheets.

The driver supplied with this printer gives no bi-directional feedback, so any processing problems must be dealt with in the old-fashioned way from the control panel on the printer itself. There's an



"attention" indicator which lights up when something has gone wrong, accompanied by a garbled message on the LED such as "Opt. I/F Error ##". If you lose your manual, you're stuffed!

Under test, this printer's 300dpi quality was surprisingly good. The resolution is beefed up to 300 x 1200dpi using Kyocera's Image Refinement technology, making a noticeable difference to text and graphics, but photographic images were still lacklustre and dogged by fine banding. For speed, the FS-400 performed reasonably well on text, but bitmap and graphic images were unbearably slow. There's only 1Mb of memory installed as standard, expandable to 5Mb using industry-standard SIMMs.

PCW Details

Price £310 (street)
 Contact Kyocera 01734 311500
 Good Points Neat design. Good upgradability options including an extra paper tray, PostScript, and an Ethernet interface.
 Bad Points Very slow.
 Conclusion Old-fashioned technology. Difficult to operate.
 ★★

Lexmark Optra E

This Lexmark has been around for about a year now. It's a 6ppm budget printer and looks almost exactly the same in design as the Epson EPL 5500 W.

Both printers use the same engine made by Minolta and both use the same consumables, with the drum and toner cartridges being interchangeable.

Setting up was pretty simple because the whole of the top of the box opens up revealing the machine's innards: everything is clearly visible. The input and output paper trays fold out from the bottom and top of the main box, and the machine design is generally quite compact.

The technology used is based on the traditional design, with 1Mb of memory installed as standard and PCL5e as the printer language. The basic driver provides no bi-directional help, but an extra utility called MarkVision is bundled to provide feedback to the user. This software is the same that is now shipped with Windows NT 4.0



and it worked well under test, producing accurate status information from the machine.

When printing from native DOS applications, troubleshooting must be carried out in the old-fashioned way using the control panel on the machine itself. This consists of six indicator lights and one button and is fairly self-explanatory for simple problems such as paper jams or loading more paper, but those involving various sequences of flashing lights are explained in the manual.

Under test, this machine produced reasonable, but not stunning-quality results in 600dpi resolution, and performance scores were fast for text but unacceptably slow for graphic and bitmap documents.

PCW Details

Price £365
 Contact Lexmark 01628 481500
 Good Points Nice, compact design.
 Bad Points Slow for bitmap and graphic images.
 Conclusion Overpriced.
 ★★

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- ◆ 15" SVGA colour monitor (resolution: 1280x1024 @ 60Hz)
- ◆ Quad-speed CD-ROM drive, Sound Blaster 32 Value card, 2 external loudspeakers
- ◆ 256K pipeline burst cache memory
- ◆ Desktop case

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- ◆ 512K pipeline burst cache memory
- ◆ Mini-tower case

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Lease rental (business users): £224.77 down,
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Winputer Shaper

Perfect for running MegaCAD, award-winning software distributed exclusively by Hi-Grade.

- ◆ Intel Pentium chip, 166MHz clock speed
- ◆ Intel 430VX PCIset
- ◆ 16Mb RAM, expandable to 128Mb
- ◆ 2.1Gb hard disk
- ◆ Iiyama 17" SVGA colour monitor (1280X1024, 3 years' on-site warranty)
- ◆ ET6000 128-bit SVGA graphics card (2.25Mb MDRAM, W/XING v3 MPEG software)
- ◆ 8-speed CD-ROM drive
- ◆ MegaCAD-LT 2D design program
- ◆ 256K pipeline burst cache memory
- ◆ Mini-tower case

£1,575 (plus VAT = £1,850.63)

Financing (personal customers, 14.9% APR):
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Lease rental (business users): £161.28 down,
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Notino Mover

Excellent value for money for users who need to work and communicate as they travel. Like all models in the Notino MT range this machine comes with a fast Pentium processor, full multimedia facilities and a high-resolution TFT display. Other features include an infra-red communications port and an AC adaptor that charges the battery while the Notino is working.

- ◆ Intel Pentium chip, 133MHz clock speed
- ◆ 16Mb EDO RAM, expandable to 32Mb
- ◆ 256K pipeline burst cache memory
- ◆ 1.0Gb 2.5" removable hard disk
- ◆ 10.4" TFT colour LCD display
- ◆ PCI SVGA card (2Mb VRAM)
- ◆ 6-speed CD-ROM drive
- ◆ 2 PCMCIA type 2 slots
- ◆ V34 fax/modem
- ◆ 1.44Mb floppy drive, replaceable with MPEG module
- ◆ FM synthesiser 16-bit stereo sound card (compatible with Microsoft sound system and Sound Blaster)
- ◆ Built-in twin speakers and microphone
- ◆ Infra-red communications port (IrDA-compliant SIR file transfer)
- ◆ Built-in trackpad and joystick
- ◆ Removable, rechargeable Ni-MH 23W battery
- ◆ Auto-switching 50W AC/DC adaptor
- ◆ DOS 6.22 + Windows 3.11 or Windows 95

Enhanced IDE/EPP/ECP controller
1 serial port, 1 parallel port
Keyboard connector, external monitor connector
Removable, rechargeable Ni-MH 23W battery (50 minutes' duration, optional pack adds 1.5 hours)
Weight: 3.5kg (7.7lb)

All Notino models come with a 3-year maintenance warranty and 4-day guaranteed turnaround during first year

£2,124 (plus VAT = £2,495.70)

Financing (personal customers, 14.9% APR):
£249.57 down, 24 months x £107.90 (inc. VAT)
Lease rental (business users):
£217.50 down, 33 months x £72.50 (ex. VAT)

Notino Listener

The Listener incorporates, the latest Talk software from Responsive Systems/Kurzweil, which enables you to dictate to your PC at up to 60 words per minute. The special Talk Mic lightweight microphone headset cuts out all extraneous noise and allows the Notino to concentrate on your voice alone. The software has a vocabulary of 200,000 English words.

Specifications same as Notino Mover except:

- ◆ 32Mb EDO RAM
- ◆ 12.1" TFT colour LCD display
- ◆ 6-speed CD-ROM drive
- ◆ FM synthesiser 16-bit stereo sound card (compatible with Microsoft sound system and Sound Blaster)
- ◆ Microsoft Windows 95 on CD-ROM
- ◆ Talk software by Responsive Systems/Kurzweil
- ◆ Responsive Systems Talk Mic microphone

£3,099 (plus VAT = £3,641.33)

Financing (personal customers, 14.9% APR):
£364.13 down, 24 months x £157.44 (inc. VAT)
Lease rental (business users):
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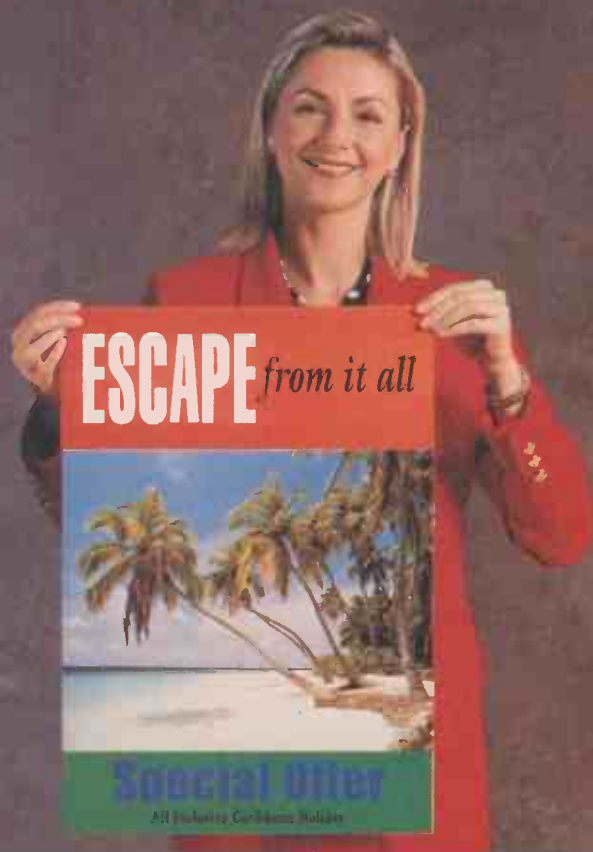
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NEC SuperScript 860

NEC was one of the first printer manufacturers to bring GDI technology to market. The first example was the SilentWriter SuperScript 610, a personal budget laser; this has now disappeared from NEC's range without a replacement model. Instead, NEC has launched the SuperScript 860, a slightly higher-end 8ppm printer with true 600dpi resolution.

Like the model from Brother, this printer uses a combination of GDI and traditional technology which allows it to take advantage of GDI code direct from Windows as well as being able to print from native DOS. Unlike the pure GDI printers, it has its own memory and internal electronics.

The driver provides accurate bi-directional feedback and there's a status monitor which sits permanently on your task bar showing the printer's current actions. The driver is an impressive piece of software incorporating Adobe Print Gear (see page 164).



Documents can be tiled so that a single A4 page is magnified over four or six pages. It's also possible to reduce the size of documents, thereby creating A5-size booklets.

In design this printer is not exactly a space-saving option and its large, flat footprint really demands a desk of its own. Also, its fast print speed makes it capable of supporting larger workloads, attached either to one PC or to a small network.

Under test, the SuperScript 860 was stunning both in performance and output quality, putting it way in front of any other printer included here. Its street price is around £360, more expensive than most of the personal lasers included here and aimed at a slightly higher-end market, but still representing extremely good value for money.

PCW Details

Price £360
 Contact NEC 01753 831944
 Good Points Fast. Stunning quality.
 Bad Points DOS printing using LaserJet IIP emulation achieves only 300x300dpi.
 Conclusion Bargain.
 ★★★★★

OkiPage 4W

This budget LED printer is one of the smallest in this round-up, measuring about the size of a biscuit tin. It's a GDI printer and was launched in June 1996 claiming to produce 600dpi "class" resolution at four pages per minute. The resolution is actually achieved using Oki's MicroRes technology which electronically produces dots in between the LEDs. Technically, this is not true 600dpi resolution, but it produces better results than some of the edge enhancement techniques used in some of the 300dpi models included here.

Input and output trays both sit vertically towards the back of the box, so each sheet of paper in a print job goes through a tight u-bend. There is a straight paper path provided at the front of the printer for processing envelopes, card and other media. The driver provides a variety of templates for envelope printing which are placed straight into the Page Setup of your



application software.

The driver also provides bi-directional feedback, responding appropriately when the paper or toner have run out. Like other GDI printers here, this one provides HP LaserJet IIP emulation for printing from a DOS box in Windows. Documentation is provided by three manuals in six different languages — not ideal for the first-time user.

Output quality on text was excellent under test but photographic images were slightly banded and patchy. As for the performance results, this printer proved much slower than expected despite the implementation of data compression techniques designed to speed up the printing process. The main advantages of this printer are its size and price. Otherwise, there's nothing that really distinguishes it from the crowd.

PCW Details

Price £220 (street)
 Contact Oki 01753 819819
 Good Points Small and light. Good for envelope printing.
 Bad Points Slow.
 Conclusion Nice driver software, nice price. Otherwise, unremarkable.
 ★★★

Panasonic KXP6100

This Panasonic has been on the market since March 1995, and its design was something of an innovation at the time. The KXP6100 is the ultimate space saver — a tall, upright machine with an input tray jutting out of the side of the body and an output tray leaning sideways from the top. It's also very portable, weighing just over 14lbs — a useful feature if you're likely to move your printer from one PC to another.

This printer was one of the original GDI models providing fast printing from Windows as well as PCL 4.5 emulation for printing out of a DOS box. It has a snooze mode where it powers down during periods of inactivity, and then springs to life on detection of the next print job. There's a slight delay while the printer warms up before producing the first sheet, a problem which some of the more recent models have now overcome. However, this printer's excellent scores on the performance tests show that the



slight waiting period does not effect the overall "page per minute" figure.

The major downside of this model is its low resolution capability which is set at 300 x 300dpi. Beware of the advertising blurb which claims that this printer achieves a 600dpi class resolution. "Class" is the operative word here, as the final result actually achieved is 300dpi with added edge enhancement technology. However, the results from our quality tests were quite respectable for text and documents using simple graphics. On

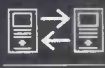
close inspection, photographic images displayed slight horizontal ridging. The bi-directional driver software responded well under test, and the documentation is sensibly uses jargon-free language to help the uninitiated.

PCW Details

Price £210 (street)
 Contact Panasonic 0550 404041
 Good Points Fast. Space-saving design.
 Bad Points Room for improvement on the dpi level.
 Conclusion Despite a few niggles, it's still an absolute bargain.
 ★★★



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More features to investigate are: The sophisticated PCL driver for Windows 3.1™ and Windows 95™, 2 MB of memory, upgradeable to a total of 18 MB.



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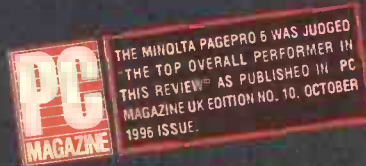


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Sharp JX-9210

This Sharp model, like the Canon, uses Microsoft's Windows Printing System, 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.

In terms of design, this printer has several advantages over Canon's model. First, it stacks finished documents in a vertical paper tray, so the machine is self-contained and can sit neatly on the desk next to your PC without making a mess. Two antennae-like pieces of plastic at the back of the printer open out to form an input stacker which holds a maximum of 100 sheets.

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 by a flap at the bottom. When the flap is opened, output is automatically diverted to a straight path, with documents appearing face up at the front (another advantage over the Canon).

Setup and configuration is made easy by the WPS drivers which use bi-directional feedback, allowing you to perform a "test" print at the end of installation. Installing the cartridge is also a cinch as the whole of the printer's front panel opens out, allowing an easy view of the inside.

Results on the quality tests were excellent, with finished documents producing crisp 600dpi text from Windows.

Overall, this is a well-designed printer. The actual desk-space footprint is quite large, but it is nevertheless tastefully put together and good value for money.

PCW Details

Price £209 (street)
Contact Sharp 0161 205 2333
Good Points Well-designed. Excellent output quality.
Bad Points Slow.
Conclusion Good all-rounder for a small or home office. Nice price.
★★★★

Star WinType 4000

Star's WinType 4000 is tank-like in design with winged paper trays folding out from its top on the left and right. It's a heavy printer weighing a massive 16.5lbs, and it's hardly a space-saving option if you're working in a cramped environment.

This model was launched in December 1994 and, in many ways, it is now showing its age. Its resolution capability, for example, is still 300dpi. This is improved with edge enhancement technology to 300 x 600dpi, which makes a big difference to text quality, but photographic images still appear grainy, lacking the smooth grey tones achieved by true 600dpi models.

During setup, this printer caused some initial problems. The driver behaved erratically, causing errors in Windows 95 and refusing to provide any bi-directional feedback. Further investigation revealed that the driver sent with the printer was an old



version. Its replacement greatly improved things and feedback from the printer to the machine began to work correctly.

Printing can be achieved in three modes on this model: GDI, PCL4, and PS (levels 1 and 3). This sounds impressively versatile, but the WinType 4000 is a GDI printer providing PCL4 emulation from a DOS box only, and PostScript printing via emulation software supplied with the printer.

Unfortunately, both performance and quality tests were plagued with erratic paper-feeding problems, and performance results were poor considering the lower resolution of this printer compared to others included here. In fact, it's difficult to think of anything positive to say about the WinType 4000. Its inferior resolution capability combined with its cumbersome box size put it out of the running for any recommendations in this round-up.

PCW Details

Price £220 (street)
Contact Star 01494 471111
Good Points PostScript emulation software is a useful facility.
Bad Points Bulky design. Paper-feeding problems. Mediocre output quality.
Conclusion Unimpressive.
★

Tally T9108

Mannesmann Tally" has now become "Tally", after the company was bought out by Legal and General Ventures in July 1996. This model, the T9108, pre-dates the name change, so it's still got "Mannesmann" written on its side and on all the documentation.

This printer is simple in design, just a cube-shaped box with an input tray in the form of a draw at the bottom, and output being deposited into a paper tray indented into the top of the box. There's also a manual feed slot at the front of the printer for processing transparencies, labels and cards.

The T9108 is designed as a Windows Printing System machine complete with drivers providing bi-directional feedback, and PCL 4.5 emulation is provided for printing from DOS applications within Windows.

Setting up was fairly hassle-free. A lid opens out at the front, and



the developer cartridge slides easily into the printer's body. Documentation is thorough, and a Quick Reference Guide explains the setup routine in simple language with the help of illustrations.

Under test, this machine performed somewhat erratically.

Quality results produced at 600dpi were impressive for all file types including photographic images, but speed was a problem. Considering this printer claims a raw engine speed of eight pages per minute, performance scores were poor, especially on bitmap and graphic images.

Generally, this printer behaved itself well, and there were no problems with paper jams or stacking. The straightforward design is well-suited to

cramped environments, as there are no protrusions or fold-out trays. However, the high price of this model is not really justified, especially when considering its poor performance results.

PCW Details

Price £349
Contact Tally 0118 978 8711
Good Points Neat design.
Bad Points Poor performance scores.
Conclusion Overpriced.
★★

Page description languages

In 1985 Adobe announced PostScript Level 1, arguably the first page description language to work with device-independent vector information (see page 176).

PostScript Level 1 appealed to the high-end publishers thanks mostly to the fact that proofs made on a 300dpi laser would be laid out identically to those on 2400dpi image setters used to make film.

High-end publishing features coupled with graphics snobbery, particularly on the Mac, and the fact that Adobe is the only official licensor, made PostScript-equipped devices ultimately desirable and consequently expensive.

Hewlett-Packard saw a gap in the market and came up with its own device-independent-ish page description language based on its Printer Command Language, PCL, of the seventies. Skipping through the evolutionary process to the recent PCL 5e, developed for the LaserJet 4, sees a similar feature set to PostScript.

HP's marketing has been entirely different to Adobe's, opting for the mass cloners rather than the exclusive licensing. Similarly to the IBM AT concept, there are now many printers equipped with clones of PCL 5e costing much less than their PostScript-licensed counterparts.

The problem with having so many PCL clones around is that you cannot guarantee 100 percent identical prints on all printers. This is not a problem unless

you intend use high-resolution bureaux and want an exact proof before you send files. Only PostScript can offer you a complete guarantee.

PostScript Level 2, released a few years ago, offers device-independent colour, data compression for faster printing, and improved halftone algorithms, memory and resource management.

Adobe announced PostScript Level 3 at the end of September 1996 and expects equipped printers to be available in early 1997. Details were limited at the time of going to press, but included inevitable references to the internet.

The printing world was shocked by Adobe's first quarter 1996 results. It was revealed that from the second half of 1997, Hewlett-Packard will not incorporate Adobe PostScript software in its LaserJet printers. From that time on, HP will offer PostScript-compatible printers using clone software, although end-users will still be able to buy and fit official Adobe PostScript SIMMs from third parties.

HP believes its own printer control languages are sufficient for the typical office environments where it sells in volume. Adobe's results came just one month before HP's own announcement of its latest printer control language, PCL 6. To be first implemented on the forthcoming LaserJet 5, 5N and 5M workgroup printers, PCL 6 is a complete rewrite, using object-orientated code.

The more efficient code, combined with faster processors and dedicated hardware acceleration of these new LaserJet 5 printers, results in time-to-first-page speed increases of up to 32 percent over the LaserJet 4(M)+ printers they replace.

Licensing PostScript software to HP LaserJet products alone accounted for approximately five percent of Adobe's \$762.3 million 1995 revenue. Adobe is fighting back at PCL with its brand new PrintGear technology, designed specifically for the lucrative small and home office (SoHo) market.

Adobe discovered that 90 percent of typical SoHo documents can be described by a small number of basic objects. Adobe consequently designed a dedicated 50MHz image processor to specifically handle these RISC-like tasks, which is claimed to offer large speed increases over traditional printer processors and be cheaper, too.

A printer equipped with Adobe PrintGear, such as NEC's SuperScript 860 reviewed here, features the dedicated processor and a sophisticated software driver, and offers options including tiling, up to 16 thumbnail pages per single sheet, two-sided printing, booklet printing and watermarking. Adobe PrintGear also supports DOS printing, and is suitable for colour printers and inkjets along with mono lasers.

Gordon Laing

GDI explained

Interestingly, the Windows graphical device interface, GDI, which scales and rasterises vector objects on-screen, could actually drive a printer by itself. However, a Windows GDI printer will operate under Windows only. No DOS printing, unless it's running in a Window, and then only with early PCL emulation.

There are many advantages to a GDI printer. The first and most obvious is the time saved by not converting the GDI information into an emulation such as PostScript. The second is one of cost.

Traditionally, the printer would have a whole load of in-built electronics to process the description into dots. Rasterisation of the GDI information takes place within the PC, resulting in a cheaper printer.

GDI technology has brought the price of lasers down considerably, but different printer manufacturers implement GDI technology in different ways, and this has caused some confusion over the advantages/disadvantages of the GDI approach. Of the 12 printers reviewed here, four use the Windows Printing System, a standard developed by

Microsoft to create a universal architecture for GDI printers.

The Windows Printing System works slightly differently to the pure GDI model. It enables the Windows GDI language to be converted to a bitmap while printing; the basic idea being to reduce the heavy dependence of the printer on the PC's processor. 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.

Gordon Laing & Eleanor Turton-Hill

IT'S NOT IF, IT'S WHEN

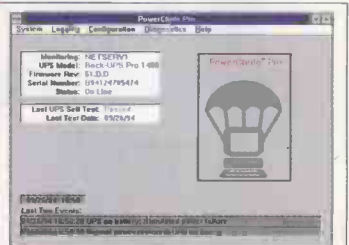
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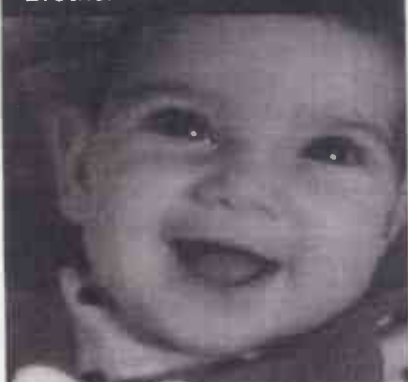
Personal Computer World • January 1997 • 165

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LASER PRINTER QUALITY TESTS

Brother HL 730



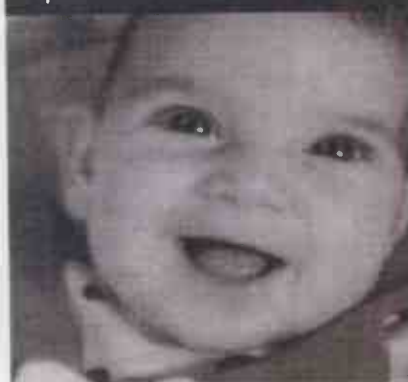
Circl Circles

Canon LBP-465



Circl Circles

Epson EPL 5500 W



Circl Circles

HP LaserJet 5L



Circl Circles

Kyocera FS-400



Circl Circles

Lexmark Optra E



Circl Circles

NEC SuperScript 860



Circl Circles

OkiPage 4W



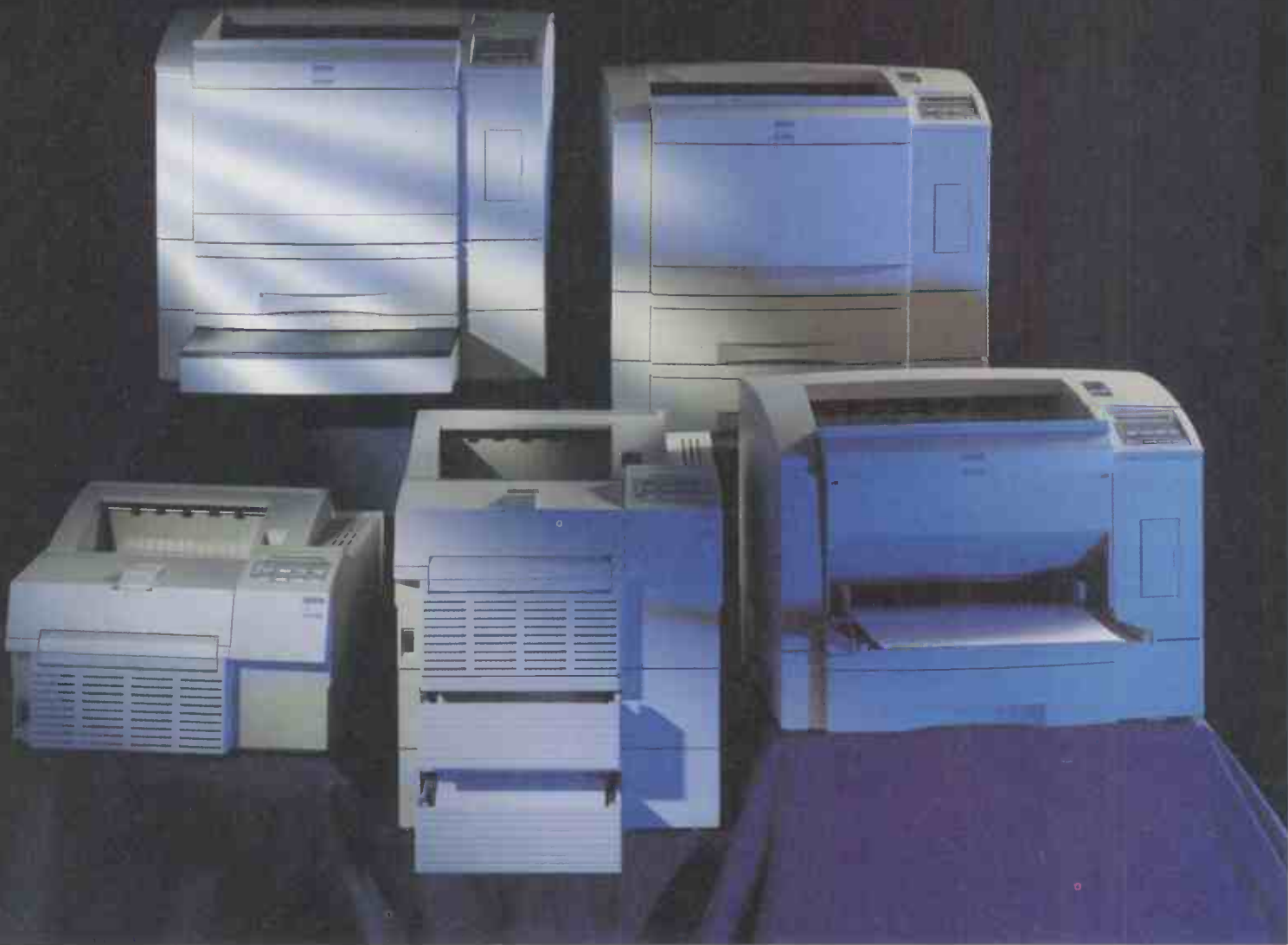
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LASER PRINTER QUALITY TESTS

Sharp JX-9210



Circl Circles

Star WinType 4000



Circl Circles

Tally T9108



Circl Circles

Quality of output

Several factors have an influence on the quality of your output, but the major one is the resolution capability of your printer. Until recently, 300dpi (dots per inch) was the best you could expect from an office printer, but now the market is littered with 600dpi printers. These will give you significantly better results, particularly when printing scanned images or graphics. At 600dpi, four times the number of dots are produced per inch of paper, resulting in a smoother tone gradation and a final image which looks pretty much like a black-and-white photograph.

Another factor which will affect the quality of your printer output is the use of edge enhancement techniques. These are used by some 300dpi laser printers to adjust the arrangement of dots on the page, so that stepped edges are smoothed out, making the resulting print appear to have a higher resolution. This works by modulating the power of the laser to fill in the dots at the edges of characters with smaller dots, so as to produce crisper-looking text and smoother images. This is worth looking out for in the lower-end 300dpi models

but remember to compare the price with a true 600dpi printer — the price margin between the two is now negligible.

Paper

High-resolution printers are all well and good, but the quality of their output is restricted by the quality of paper you use. The jagged edges of unenhanced 300dpi print are visible when using ordinary copier-grade bond paper. At 600dpi or enhanced 300dpi, the quality improves, but any higher resolution than this will not be noticed unless you invest in a higher quality of paper.

Having said all this, laser printers are not affected by paper quality to the same extent as inkjet printers. The way that inkjets fire ink directly at the paper means that poor-quality absorbent paper leads to visible feathering of characters. On laser printers, the print quality never suffers quite to this extent, but smoother paper will noticeably improve resolution especially when using very high dpi levels.

Using poor-quality paper does have other side effects when used in laser printers. The drum inside the printer can become scratched, rapidly wearing out the

surface and leading to deterioration in print quality and, ultimately, replacement of the drum. Follow the manual's guidelines as regards paper quality and weight, which is usually recommended as 75g copier paper which costs about £2.50 for 500 sheets. Higher-quality paper at 80 or 90g costs more than twice this amount for a smoother print.

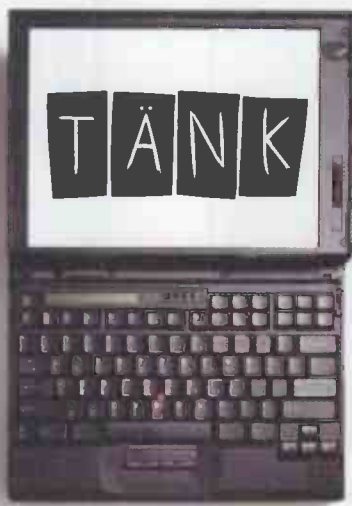
The way that paper is stored is also quite important, as extreme heat or humidity can affect the way in which it feeds through the printer. Curled or damp paper soon causes paper jams and seizes up the system.

There are other considerations when it comes to paper. If you do a lot of printing on heavyweight paper or card, then you should take note of the way that the paper passes through the printer. The normal paper path involves turning the sheet through an S-shaped bend, but many lasers include a straight-through path which prevents the paper from curling as it travels through the machine. Others provide an envelope feeder which will allow you to stack and feed multiple envelopes so that you don't have to manually feed them one at a time.



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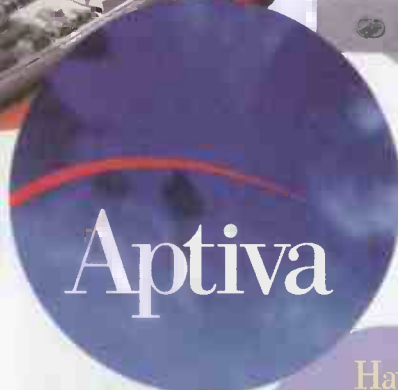


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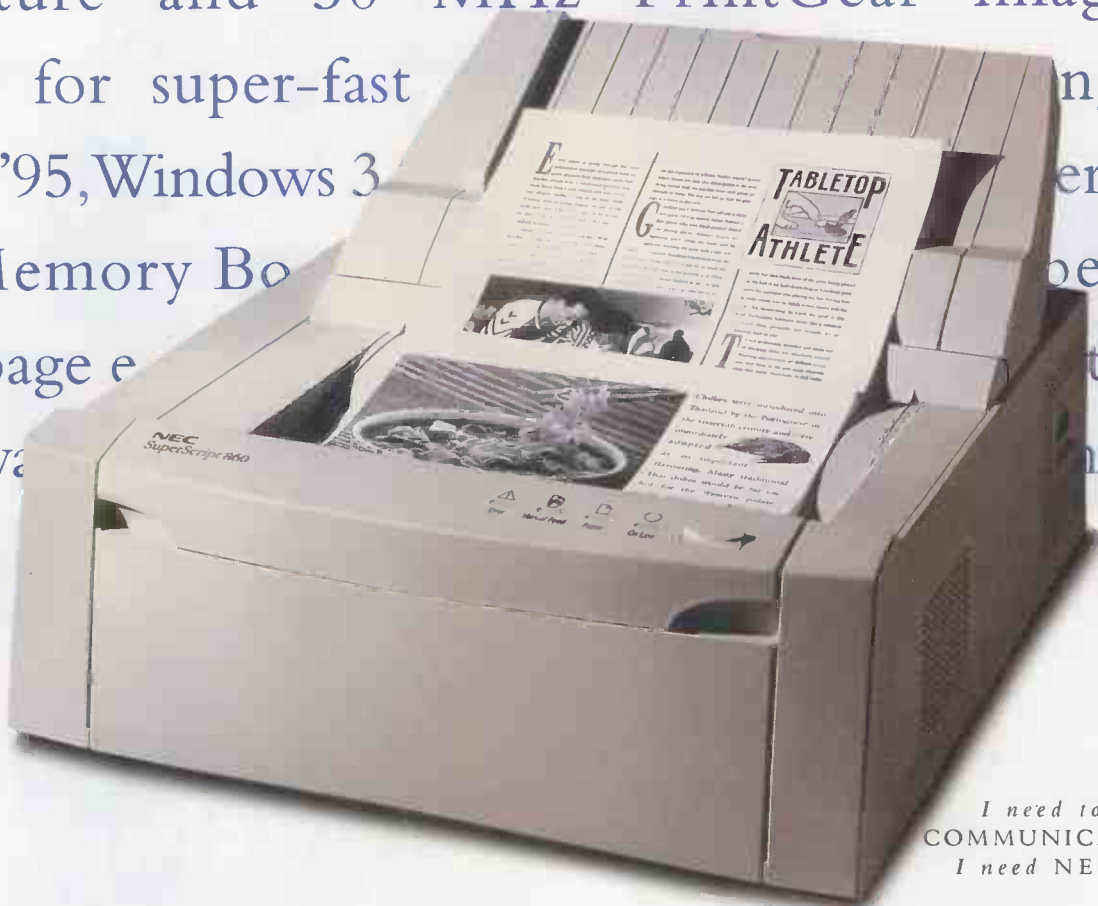
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NEC

Table of Features



Manufacturer	Brother	Canon	Epson	Hewlett-Packard	Kyocera	Lexmark
Model name	HL-730	LBP-465	EPL 5500W	LaserJet 5L	FS-400	Optra E
Street price	£270	£299	£245	£286	£310	£365
Tel no	0161 330 6531	0121 680 8062	0800 289622	0990 474747	01734 311500	01628 481500
Fax no	0161 931 2205	0121 693 5070	01442 227227	0171 735 5565	01734 311108	01628 481886
Warranty	12 months (OS)	12 months (OS)	12 months (RTB)	12 months (RTB)	12 months (RTB)	12 month (OS)
Technical Features						
True DPI level	600	600	600	600	300	600
PCL level	4	4*	4*	5e	5	5e
GDI/WPS	GDI	WPS	WPS	None	None	None
Native DOS printing	Yes	No	No	Yes	Yes	Yes
Standard memory	0.5Mb	256	0.5Mb	1Mb	1Mb	1Mb
Maximum memory	2Mb	N/A	N/A	9Mb	5Mb	5Mb
Size in mm (w x h x d)	366x250x353	336x249x319	352x217x407	336x371x312	353x173x350	348x298x378
Weight	14.3lb	15.4lb	11.0lb	15.7lb	16.6lb	11lb
Raw engine speed	6ppm	4ppm	6ppm	4ppm	4ppm	6ppm
Paper Handling						
Input capacity	200	100	150	100	100	150
Output capacity	100	no output tray	100	100	100	100
Manual paper path	Yes	Yes (mp tray)	Yes	Yes	Yes	Yes
Interface options						
Apple LocalTalk	Yes	No	No	No	Yes	No
Ethernet	Yes	No	No	No	Yes	Yes (external box)
Serial port	Yes (optional)	No	No	No	Yes	Yes

Table of Features



Manufacturer	NEC	Oki	Panasonic	Sharp	Star	Tally
Model name	SuperScript 860	OkiPage 4W	KX-P6100	JX-9210	WinType 4000	T9108
Street price	£360	£220	£210	£209	£220	£349
Tel no	0645 404020	01753 819819	0500 404041	0800 262958	01494 471111	01734 788711
Fax no	0181 235 4927	01753 819899	01789 200290	0161 205 7076	01494 473333	01189 791491
Warranty	12 months (RTB)	12 months (OS)	12 months (OS)	12 months (RTB)	12 months (OS)	12 months (OS)
Technical Features						
True DPI level	600	300	300	600	300	600
PCL level	4	4*	4.5*	4*	4*	4.5*
GDI/WPS	GDI	GDI	GDI	WPS	GDI	WPS
Native DOS printing	Yes	No	No	No	No	No
Standard memory	1Mb	128Kb	256Kb	512Kb	256Kb	1Mb
Maximum memory	4Mb	N/A	N/A	N/A	N/A	16Mb
Size in mm (w x h x d)	370x125x382	310x150x191	132x287x378	299x185x291	235x330x265	360x176x364
Weight	19.8lb	8.4lbs	14lbs	10lbs	16.5lbs	19.8lbs
Raw engine speed	8ppm	4ppm	6ppm	4ppm	4ppm	8ppm
Paper Handling						
Input capacity	200	100	100	100	100	150
Output capacity	50	30	50	50	50	100
Manual paper path	Yes	Yes	Yes (mp tray)	Yes	Yes (mp tray)	Yes
Interface options						
Apple LocalTalk	No	No	No	No	No	no
Ethernet	No	No	No	No	No	Yes
Serial port	No	No	No	No	No	Yes

Key: * PCL emulation from a DOS box in Windows only

mp tray Multipurpose input tray

RTB Return To Base

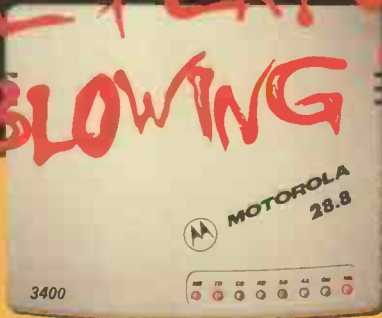
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Laser printers and the environment

Laser printers have always been unenlightened creatures when it comes to environmental considerations. They chum out nasty gases, use up lots of power and periodically spit out used cartridges which are dumped in landfill sites.

The technology used in laser printers makes ozone an inherent byproduct of the printing process. Some printers contain filters which are designed to limit ozone concentration to levels below standards which have been established by various bodies such as the American Conference of Governmental Industrial Hygienists. After a certain number of pages have passed through your printer (usually about 150,000) the filter should be replaced by an authorised service engineer. The ozone level emitted by your printer can be affected by where and how you keep it. Areas with large concentrations of dust, small, enclosed offices or poorly-ventilated rooms will result in high ozone intensity.

Power-saving abilities are also

becoming important in laser printer design. An independent US body, the EPA, has stipulated that, in order for a printer to gain Energy Star Compliance, it must dramatically reduce its power consumption when not being used. The power saver usually works by only warming up the printer when you send a job to it. If the printer is left idle for a certain period of time, the printer's power consumption is reduced. This period of time can usually be altered by the user, and if you are in a real hurry to print the first page more quickly, the power saver can be turned off altogether.

Laser printers produce radiation and often claim to conform to Class B limits, which means they satisfy European safety standards. What this means is that there is never any human access to radiation above a prescribed level during normal operation. Normal operation includes any kind of user maintenance carried out according to directions in the manual, and there is usually a serious warning somewhere in your printer documentation reminding you that anything you do with

your printer outside of these boundaries may result in hazardous radiation exposure.

Most lasers use cartridge technology based on an organic photoconductive (OPC) drum which is coated in light-sensitive material. During the lifetime of the printer, the drum needs to be periodically replaced as its surface wears out and print quality deteriorates.

The cartridge is the other big consumable item in a laser printer. Its lifetime depends on the quantity of toner it contains. When the toner runs out, the cartridge is replaced. Sometimes the toner cartridge and the OPC drum are housed separately but, in the worst case, the drum is located inside the cartridge. This means that when the toner runs out, the whole drum containing the OPC cartridge needs to be replaced, which adds a considerable amount of money to the running costs of the printer and produces large amounts of waste.

Some printer manufacturers have tried to improve this situation by making drums more durable and eliminating all consumables except for toner. Kyocera, for example, has produced a "cartridge-free" printer which makes use of an amorphous silicon drum. The drum uses a robust coating which lasts for the lifetime of the printer, so the only item requiring regular replacement is the toner — and even this comes in a package made from a non-toxic plastic designed to be incinerated without releasing any harmful gases. The Kyocera FS-400 reviewed here (page 157) uses a long-life drum which lasts for 100,000 pages — about four times the lifetime of other drums in personal lasers.

The idea behind Kyocera's design is to make savings in the running costs of the machine. The point is that if you want a printer for heavy office use, it may be worth your while spending slightly more initially in order to save money in the long-term. The running costs of a laser printer can be considerable, and it is worth looking into this before investing your money in something which superficially looks like good value.

Eleanor Turton-Hill

Some printers produce more waste than others, so consider toner and cartridge replacements when buying



Mechanics: how a laser printer works

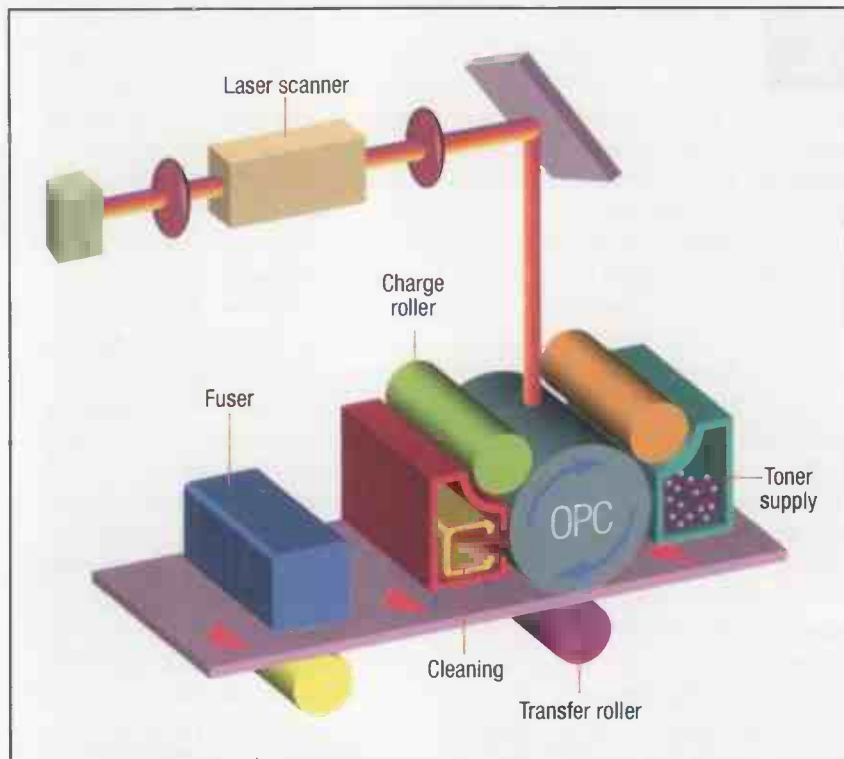
It is important to realise that a laser printer draws a dot at a time, moving down one line at a time like a TV picture: it cannot back up on itself. The printer has to decode the whole page description before it can start printing. With the whole page in memory, the mechanical process can begin.

The laser is used to draw on a photocopier drum. It takes the image from the memory and, as it tracks from left to right, the laser is turned on and off. Moving the whole laser would be a major mechanical task and is unnecessary. All that has to be moved is the light, and this can be done with mirrors. The printer has a small eight-sided drum and as this spins, the laser tracks across the photocopier drum. You can see a similar principle if you look at a mirror ball at a disco. The lights bounce off the ball onto the floor, track across the floor and disappear as the ball revolves. In the printer, the mirror drum spins incredibly fast and is synchronised with the laser turning on and off. A typical laser printer will have to perform millions of switches every second.

LED printers are a cheaper alternative to conventional lasers, where the single laser and directing mirror are replaced by a fixed line of LEDs. A 300dpi LED printer will have 300 LEDs per inch, over the required page width; if eight inches is the printable width for a typical A4 LED printer, that would total 2,400 LEDs in a row.

The advantage is that a row of LEDs is cheaper to make than a laser and mirror with lots of moving parts. The disadvantage is that the horizontal resolution is absolutely fixed, and while you can apply some resolution enhancements, none of them will be as good as the possible resolution upgrades offered by some true lasers, described earlier. This aside, LEDs effectively work as lasers and from this point on in the text, both will be referred to as lasers.

The laser works like a stick drawing in dirt; the dirt is a static charge on the drum. Where the laser is turned on, it hits the drum and knocks the charge off. Where it is turned off, the charge remains. Inside the printer, the drum rotates to build one line at a time; clearly, this has



to be done very accurately. The smaller the rotation, the higher the resolution of the printer down the page. Similarly, the faster the beam is turned on and off, the higher the resolution across the page. An on-off switch is much easier to engineer than an accurate step, so resolution enhancement using this technique will only improve the horizontal resolution, and then only on true laser printers.

As the drum rotates to present the next area for laser treatment, the written-on area moves into the laser toner. Toner is a very fine dust, usually jet black for traditional monochrome printing but available in cyan, magenta and yellow for colour printing. The image builds up on the drum as the toner is attracted to it. As the drum rotates, it is pressed against the printing paper which is fed in by a set of rubber rollers. The toner rubs off onto the paper, but a page of dust isn't going to last long, so the paper passes under a heated roller to melt the toner on.

Toner is specially-designed to melt very quickly. If you spill some, you should not try to clean it with hot water or you will make a worse mess. Cold soapy water is best. A vacuum cleaner is a very bad idea because the toner is finer than the holes in

the cleaner bag and you end up spreading the fine dust. Most modern printers build the drum and the toner into a sealed cartridge so you shouldn't need to mess with the powder.

The page, having been smeared with toner and heated, then slides out of the printer. The drum rotates and has to be cleaned. There are two forms of cleaning, physical and electrical. With the first, the toner which was not transferred to the paper is mechanically scraped off the drum and the waste toner collected in a bin. Electrical cleaning takes the form of covering the drum with an even electrical charge so the laser can write on it again. This is done by an electrical element called the corona wire. Both the felt pad which cleans the drum and the corona wire should be changed regularly.

Refilling cartridges is a good way to save money, but the cleaning pads will wear the drum and you cannot expect the same quality as you get with a new drum. Some manufacturers only guarantee their machines and high-quality output when you're using their own brand of toner, such as Hewlett-Packard's Microfine toner for its 600dpi lasers.

Gordon Laing

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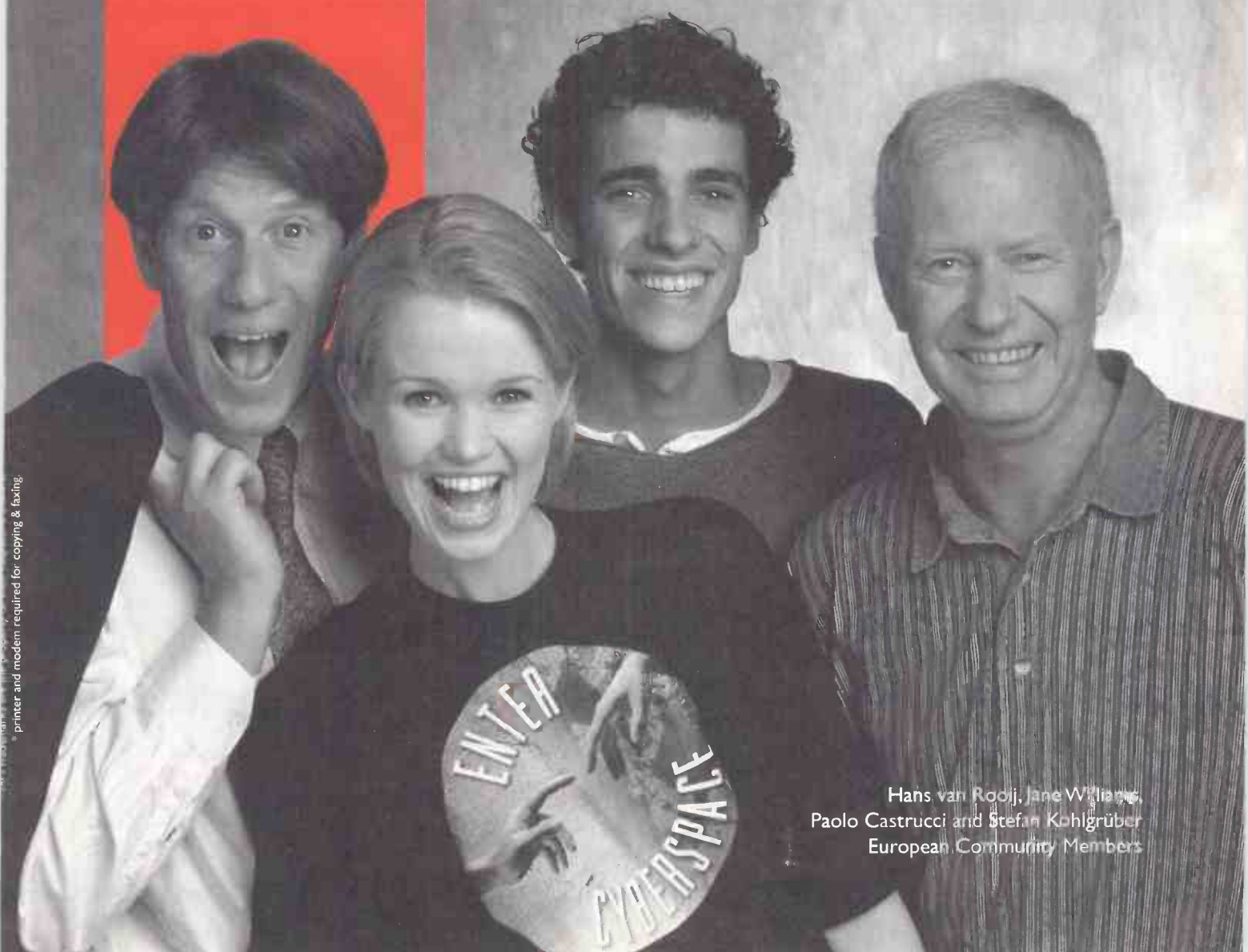
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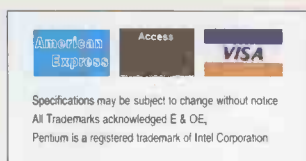
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P166

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PHILIPS



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Overall



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TURN TO THE NEXT PAGE FOR A SELECTION OF PRODUCTS AND PRICES

VNU Labs Report



This laser printer round-up has differed from previous years for one good reason: there's been a general drift towards Windows 95 since the last laser test — and that means that many printer drivers have altered significantly. More models than ever are using the Windows Printing System, or other non-Microsoft adaptations of the earlier Destiny GDI system for printing under Windows. For these reasons, the old Windows 3.11 printer tests have needed a certain amount of reworking for this feature.

The basic performance-testing files used have not changed much since the previous incarnation of the tests: a gauge of text-printing speed for simple documents is obtained by sending ten copies of a five percent covered page in plain ASCII through the printer driver from Windows. Graphics speed has always been easy to measure accurately, but harder to explain. Most images from graphics programs like CorelDraw and PowerPoint are broken down into both

vector-based and bitmapped components for printing. Printing an arbitrary graphical image will produce a speed figure that tells you little of the printers' comparative strengths and weaknesses. VNU Labs tests send both a "pure" bitmap and a vector file to the printer, so as to pick out any printers that are especially poor at either kind of graphical processing. Outstanding results are noted in individual reviews: the graphed figures for graphics performance are weighted geometric mean figures including both tests.

Quality measurement pages, containing a succession of stepped line squeeze tests, graduated greys (the nearness-to-black test), diminishing font sizes, and photographic images printed in both normal and inverse (black background and white figure) are sent to each of the printers from reference PostScript files, using the printers' supplied drivers. The PostScript files are read into CorelDraw for printing. This is one major difference between the updated and previous printer tests. The previous incarnation of the print

quality test required a PostScript interpreter like GhostScript or ZScript in order to turn the test files into hardcopy output. Both of these programs are often found to conflict with certain Windows printing system drivers under Windows 95.

One noticeable change in low-cost laser printers is that much of the processing load is carried by the host PC. An IBM PC model 340 is used throughout as the driving system for the printer tests. Its specifications are as follows: P5 133MHz CPU, 16Mb RAM, Windows 95 installed on primary partition.

Overall performance scores are obtained from both overall graphics and text speed figures, using a weighting of 1.3:0.7. This reflects the fact that much printing nowadays includes complex typefaces and "incidental" graphical content. But this is not true of everybody's printing habits, so you should also read the individual scores and match the textual and graphical benchmarks against your own documents.

Julian Evans

The quick brown fox jumped

The quick brown fox jumped

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The quick brown fox jumped over the lazy dog.

The quick brown fox jumped over the lazy dog.

The "nearness-to-black" test (below) assesses contrast of printed output. When printing inverse text (centre), this is vitally important

20	36
21	37
22	38
23	39
24	40
25	41
26	42
27	43
28	44
29	45
30	46
31	47

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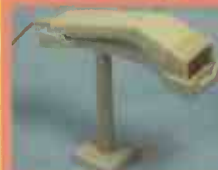
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It's almost three years since the first GDI printers appeared. The new technology had a massive impact on the printer market, bringing prices down and creating new competition between manufacturers. NEC's SilentWriter 610 was one of the first of this new breed of printer using Graphical Device Interface code direct from Windows. The technology has been developed and refined since NEC's original GDI laser, and in this round-up there's a whole variety of different implementations.

The traditional laser design still persists. Out of twelve printers included here, three have been built using traditional architecture: the Kyocera FS-400, the HP LaserJet 5L and the Lexmark Optra E. Instead of taking GDI code direct from Windows, these three printers use a printer control language. They have their own internal electronics and memory and are not dependent on the host PC for processing. Because these printers are not using Windows GDI code, they can print from native DOS applications. The downside of the design is its poor performance on bitmap and graphics files which shows on our test results.

GDI offers many advantages over the traditional model and there are many good technical reasons for its use. Windows provides all the software mechanisms required to display text using all manner of different fonts, typesizes, sizes and orientations, as well as displaying bitmap and vector graphics. Using GDI code direct from Windows, the intermediary translation process which most printers use is cut out of the printing process. This speeds up the printing considerably. For manufacturers, the great advantage of the GDI printer is that it is less complex and, more to the point, cheap to manufacture. It uses the sophistication of the machine already on your desk rather than incorporating intelligence of its own.

Early implementations of GDI technology had their disadvantages, the main one being their heavy dependence on the host processor. In this architecture, the GDI language is converted into a bitmap on the computer, and the bitmap is then sent to the printer. The speed of a print job in this case depends upon the speed of the processor. A fast processor will produce fast printing, but the reverse is also true. Of the printers included here, the OkiPage 4W, the Panasonic KX-P6100 and the Star WinType 4000 still use this early technology, which explains their incredibly low street prices. If you have a reasonably powerful PC (at least Pentium class) with enough RAM (preferably 16Mb minimum) your system will be largely unaffected by this resource dependence, in which case such early GDI models represent an

excellent deal. Of the three reviewed here, the Panasonic KX-P6100 is the best

design and produced excellent scores on our performance tests. Bear in mind that it is limited to a resolution of 300dpi and is not capable of printing from native DOS applications.

Other GDI printers here use the Windows Printing System which works differently from the process described above. It enables the Windows GDI language to be converted to a bitmap while printing. Under this system, the image is being rendered during the printing process which

reduces the amount of

processing power required from the PC.

These printers are slightly more expensive than the pure GDI designs but use your resources more efficiently and offer higher 600dpi resolution.

Of the four WPS printers reviewed here, the Sharp JX-9210 is the one that excels, offering the best value for money. For

this, it wins a Highly Commended award. Its compact design combined

with its excellent 600dpi-quality output put this printer head and shoulders above other WPS lasers. At the time of writing, we found

street prices as low as £209.

When it comes to technical innovation, there are two printers in this round-up which deserve special mention: the NEC SuperScript 860 and the Brother HL730. Both models use a combination of traditional design and GDI technology, providing fast printing under Windows without sacrificing compatibility with native DOS applications. NEC's SuperScript 860 gets our second Highly Commended award. Having now dropped the original SuperScript 610 from its product range, the company has introduced this more powerful model with a raw engine speed of eight pages per minute, fast enough to support a small workgroup. A drastic price reduction at the time of writing put the SuperScript 860 down to £360, making it an excellent deal for the small business or workgroups.

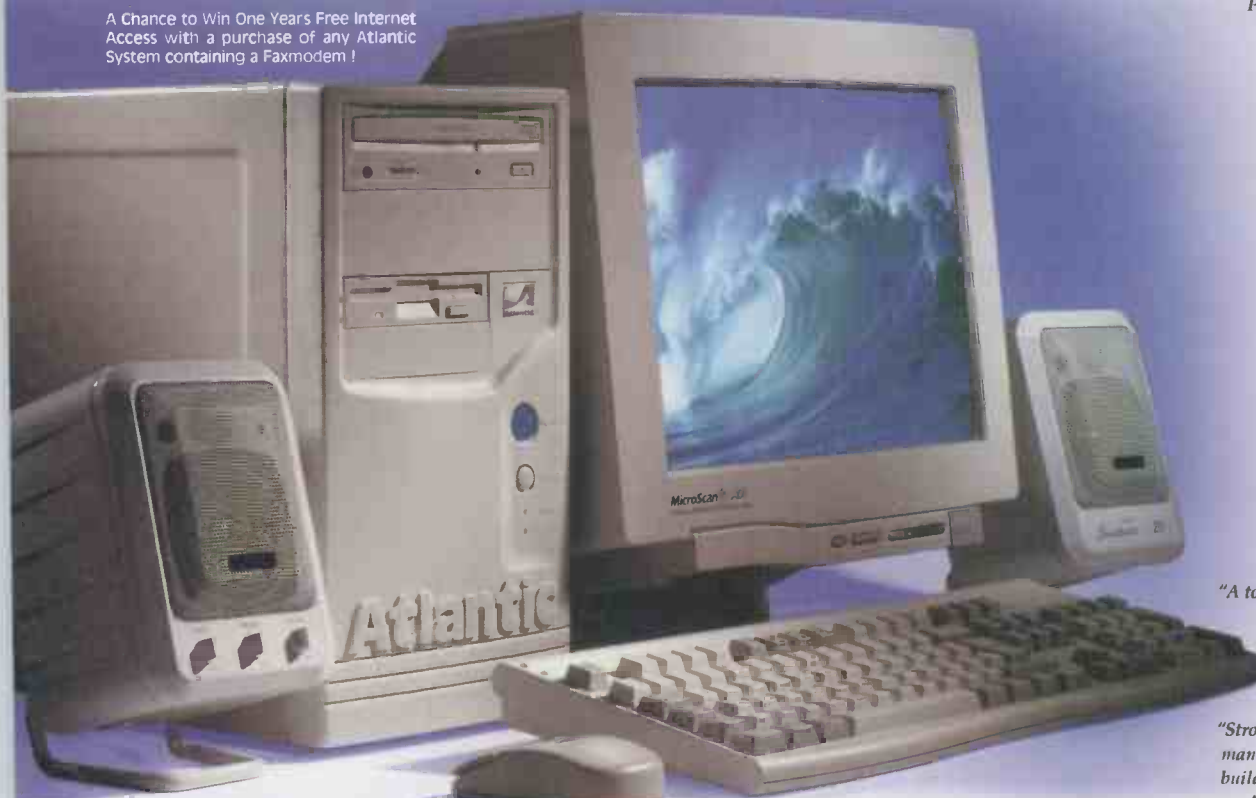
The Brother HL-730 gets our Editor's Choice award in this year's laser printer group test. At a street price of just £270, the Brother provides six pages per minute raw engine speed with fast GDI performance under Windows, without sacrificing DOS or Macintosh compatibility. It also comes with a driver which is not just bi-directional, but also incorporates compression and memory management techniques enabling large files to be printed using a small amount of memory. The Brother HL-730 design offers the most innovative use of technology in this year's round-up.



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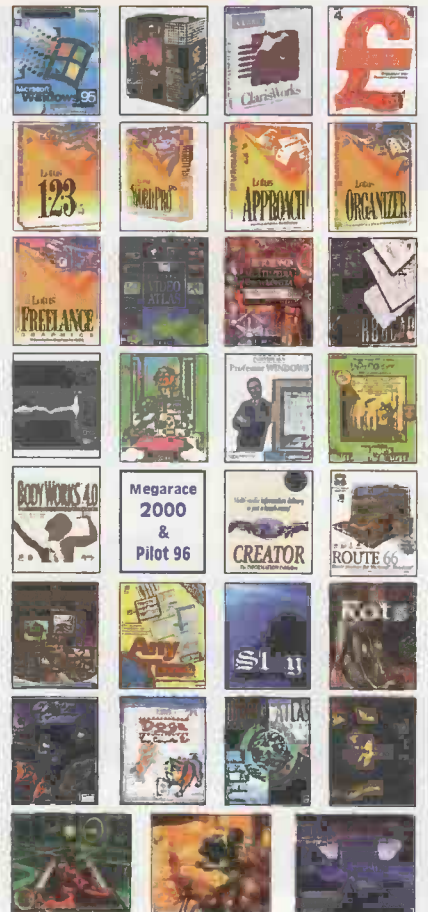
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CorelDraw! 4, Claris Works 95, Quicken 4 Accounts, Lotus Smartsuite 96 (WordPro 96, Approach, Organizer, 1-2-3, Freelance Graphics & Smartcenter), Hutchinsons Multimedia Encyclopedia 96, ITN Video Atlas of Europe, TurboCad, Pipex Dial - Free Internet Trial, Maths Workshop, Professor Windows 95, Arthurs Teacher Trouble, Bodyworks, Megarace 2000, Creator, Pilot 96, Route 66, World Book Multimedia Encyclopedia, AnyTime Organiser, Slay, Rats, World Atlas, Dogz Cyberspeed Assault Rigs, Mech Warrior 2, Wipeout & Netscape Navigator.

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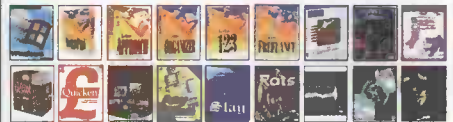
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- **Software on CD-ROM: -**



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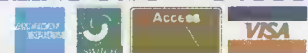
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High five

Adele Dyer sorts the fact from the hype as five PCs from high-street manufacturers compete on a bangs-per-buck basis.

You must have seen the ads. Intel's push for the consumer buck is now an annual event, luring the wary home user to part with his, or now more commonly, her hard-earned cash to buy a PC. It will, of course, have to have a Pentium inside that drives a CD-ROM drive so you can play Monopoly, and connect to the internet to play against anyone in the world. Meanwhile, Radio Rentals is urging you to invest in an Aptiva, and IBM is doing the same with its Japanese operating theatre advert.

We have taken five of the most common brands peddled on the high street and separated fact from hype. They do not conform to any strict criteria; they simply represent the most popular PCs these manufacturers produce. They are all well-powered machines with 16Mb of RAM and just about everything you could want to do at home bundled in. They all have V.34 modems and are all groaning with free software. Some have 3D graphics, some have sub-woofers and some even throw a joystick into the equation.

In other ways, however, they are very different machines, so we looked for the best overall value for money, taking into account the hardware and software bundles and the performance relative to the power of the machine.

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PC Photography by David Whyte

Personal
Computer
World
**Editors
Choice**

Apricot MS540

Apricot has completely rethought its strategy with this machine, breaking down the three main uses for the PC in the home as games, education and internet access. The hardware and software spec is therefore based strictly around these three.

The components are impressively comprehensive as the Apricot comes complete with the various parts of an AWE-32 sound card and a sub-woofer for blow-you-away sound, the ATI Rage 3D graphics chip and an internal V.34 modem. There are two USB ports. For the couch potatoes among you, there is a remote control.

The interesting part of the equation, however, is the pre-loaded Easy Manager II package which controls internet access, email, the power management features and the pre-loaded games and CD-ROM titles. For email, Easy Manager II provides the sole interface. It is the easiest email package I have seen, but some may find it feels a little toytown-ish. The games and CDs can be accessed via a launcher, which will restart your machine under MSDOS mode for DOS games. You can, of course, bypass Easy Manager if you prefer.

Internet access is offered via InfoTrade, which is owned by Mitsubishi. The advantage of choosing this service provider is you can set up within three clicks — the software is pre-loaded and you just have to fill in your alias, serial number and credit-card details.



To prevent theft, Apricot has added an impressive level of security. There is the normal password protection, but the BIOS is also branded to flash up who the machine belongs to on startup. A "Sensonic" screech alarm has been added, so if the machine is moved more than a predefined amount, an ear-piercing 100dB scream is let out.

The power management features are easy to set up and allow the machine to be put into what Apricot calls "deep green mode", i.e. all but powered off, but still ready to restart if a fax is received, or to activate the alarm if the machine is moved.

Monitor:
The 15in Mitsubishi monitor bundled with this PC does not do it justice, suffering from moiré and flicker. The

controls are limited and the whole thing has a strangely dated feel.

PCW Details

Price £1,956.59 (plus VAT); £2299 (incl VAT)
Contact Mitsubishi Electronic PC Division
0800 7173549
Hardware Bundle Mitsubishi speakers, sub-woofer.
Software Bundle See features table (page 192).
Warranty Terms Depends on supplier.
Technical Support In-Touch web site support. Telephone support dependent on supplier.
Good Points Security. Good sound.
Bad Points Dreaded riser card construction.
Conclusion A good machine both for beginners and more experienced users.
Software Bundle ★★★★★
Build Quality ★★★★★
Overall Value ★★★★★

AST Advantage! 7303

AST had one user in mind with the 7303 — the games player. The striking components in this PC compared to others in the AST range, therefore, are the sound and the graphics capabilities. Included in the deal on the sound front are a sub-woofer and speakers, which effectively provide 3D sound and are ideal for the immersive Doom experience. A Logitech Wingman Extreme joystick is bundled for gamers, while the 3D S3 VIRGE chip lets you get the most out of the new breed of 3D games.

The other element in this machine, as with all the consumer PCs we have seen this year, is the bundled internal modem. This is a Miro card which uses IBM's excellent Mwave chip. As a result, the bundled software is a good mix of comms, games, education and office applications.

Under the lid, AST has opted for the familiar riser card layout. For anyone who intends to upgrade their PC in future, this is a real pain to work around. The only slot to be filled is taken by the modem and one backplate is blocked by the sound connections, which in turn blocks one of the free PCI slots. Everything else is on the motherboard, including the Yamaha sound chip and the S3 graphics chips. However, this does not mean there are a vast number of free slots available, there being only one free PCI and one free ISA slot. Start filling these up with a SCSI card and a peripheral interface



card, and you're in trouble.

Also on the motherboard are two USB (universal serial bus) connectors. These are separate, not placed one on top of the other as in other machines. AST is one of the few manufacturers to be implementing USB on its motherboards, along with Compaq, IBM and Apricot. Most motherboards have had USB capability built onto them for several months, but few manufacturers have had the courage of their convictions to implement the connection. The first USB peripherals are expected to arrive in this country in February.

Monitor:
Despite initial appearances, the monitor was actually quite good. It was set up to run at 800 x 600 non-interlaced at 60Hz and defaulted at 1,024x768 to run at 43Hz interlaced. The resulting flicker was appalling, but was quickly rectified by upping the refresh rate to 85Hz at 800 x 600 in 256 colours. However, the moiré was still shocking.

PCW Details

Price £1,799
Contact AST 0990 611611
Hardware Bundle LCS speakers, Wingman Extreme joystick.
Software Bundle See features table.
Warranty Terms Retailer specific.
Technical Support Free telephone and fax support.
Good Points Fast; great for a games player.
Bad Points Cramped inside.
Conclusion A very reasonable price for a good machine.
Software Bundle ★★★★★
Build Quality ★★★★★
Overall Value ★★★★★

Table of Features



Manufacturer	Mitsubishi Electric PC Division	AST	Compaq	IBM	Packard Bell
Model Name	Apricot MS540	Advantage! 7303	Presario 4712	Aptiva 392	9005D
Tel No	0800 212422	0990 611611	0990 134456	0990 727272	01753 831914
Fax No	0121 717 3549	01756 702888	1813323409		01753 832400
Price (incl VAT)	£2299	£1799	£2127	£2339	£1799
Basics					
Processor	Intel Pentium 166	Intel Pentium 133	Intel Pentium 166	Intel Pentium 200	Intel Pentium 133
PCI only slots	1	2	2	1	1
ISA only slots	3	2	2	6	2
Shared PCI/ISA slots	1	0	1	1	1
Motherboard	Mitsubishi	Intel Ruby	Compaq	IBM	Thousand Oaks
Chipset	Intel 430HX	Intel 430HX		Intel 430VX	Cirrus 5446
No. of 3.5in bays	2	3	1	4	1
No. of 5.25in bays	1	2	2	2	0
Hard disk size	2.5Gb	1.6Gb	2.5Gb	2Gb	1.2Gb
Hard disk interface	EIDE	EIDE	IDE	EIDE	EIDE
RAM and L2 Cache					
RAM supplied	16Mb EDO	16Mb EDO	16Mb EDO	16Mb EDO	16Mb EDO
Secondary cache (Kb)	256Kb Pipeline Burst	256Kb Pipeline Burst	0	0	256Kb Pipeline Burst
Price for 8Mb RAM upgrade	£70	£100	£75	Dependent on retailer	N/A
Price for 16Mb RAM upgrade	£140	£160	£145	Dependent on retailer	N/A
Multimedia					
CD-ROM manufacturer	Sony	Sanyo	Mitsumi	Various	NEC
CD-ROM speed	8X	8X	8X	8X	8X
Sound card manufacturer	Creative Labs	Yamaha	ESS	IBM	Packard Bell
Sound card model	SoundBlaster Vibra 16 + wavetable	OPL35A	ESS	IBM Mwave	Rocky 2.5
Graphics					
Graphics card	ATI 3D Rage	S3 Virge	Compaq	ATI 3D Rage	Cirrus Logic GD 543X
Graphics card RAM/max RAM	2Mb / 2Mb on board	2Mb DRAM	1Mb / 2Mb	2Mb / 4Mb	1Mb / 2Mb
Graphics card max refresh rate @ 1024 x 768 x 256	150Hz	85Hz	75Hz	150Hz	76Hz
3D capable?	●	●	○	●	●
Monitor manufacturer	Mitsubishi	AST Vision	Compaq	IBM	Packard Bell
Monitor size (in)	15	15	15	17	14
Monitor maximum refresh rate at 1024 x 768 (Hz)	60Hz	75Hz	75Hz	75Hz	87Hz
Other Information					
OS supplied	Windows 95	Windows 95	Windows 95	Windows 95	Windows 95
Office suite	MS Works or Lotus SmartSuite	MS Works 4.0	MS Works for Windows	MS Works,	Corel WordPerfect Suite
Games supplied	Actua Soccer (3D), Fade to Black, Crusader No Remorse, Mech Warrior II (3D)	Descent II, Actua Soccer, Omnimedia's Greatest Toyshop on Earth, The Muppets, Dogz, Whiplash, Quicken 5.0,	PGA Tour 96, Magic Carpet, CompuServe, AOL	Lotus Smartsuite 96, Mech Warrior II 3D, Actua Soccer 96	Eccho the Dolphin, Sim City Deluxe, Ciunet, Bridge, Checkers
Other software	MS Money, Mindscape PrintMaster Gold, AA Days Out in Britain & Ireland, DiscoverWare Learn Windows 95, Words & Madelaine, Hutchinsons MM Encyclopedia 96, Garden Designer II, Typing Tutor, Apricot free internet access, Sesame Street		Quicken 4.0, MS Encarta 96, CorelDraw, CompuServe	MS Encarta 96, World's Greatest Monuments, BodyWorks, Creative Writer, Caesar II, The Lost Mind of Dr Brain, Strategy Games of the World, Battle Beast, Wall Street Money, Navigator 2.0, IBM Internet Connection Phone, CompuServe, Communications Centre, IBM Antivirus, Torrens Passage, Audio Station	MS Works, Quicken 5.0, Corel 4.0, Encarta 96, MS Publisher, Asterix Learn French and Spanish, MS Money, Elle 2000 recipes, MS Oceans, Batman Cartoon Maker, Casper, Comic Zone, Sammy's Science House, Soft Karaoke, Trudy's Time and Place, McAfee AntiVirus Scan, Thinkin Things 2
Speakers	Mitsubishi Electric speakers	LCS 1025 + bracket	JBL Pro	IBM	Packard Bell Phase II
Subwoofer	●	○	○	●	○
Modem	V.34 modem	V.34 modem	33.6 fax modem	IBM 28.8 fax modem	Rocky 28.8 fax modem

● Yes ○ No

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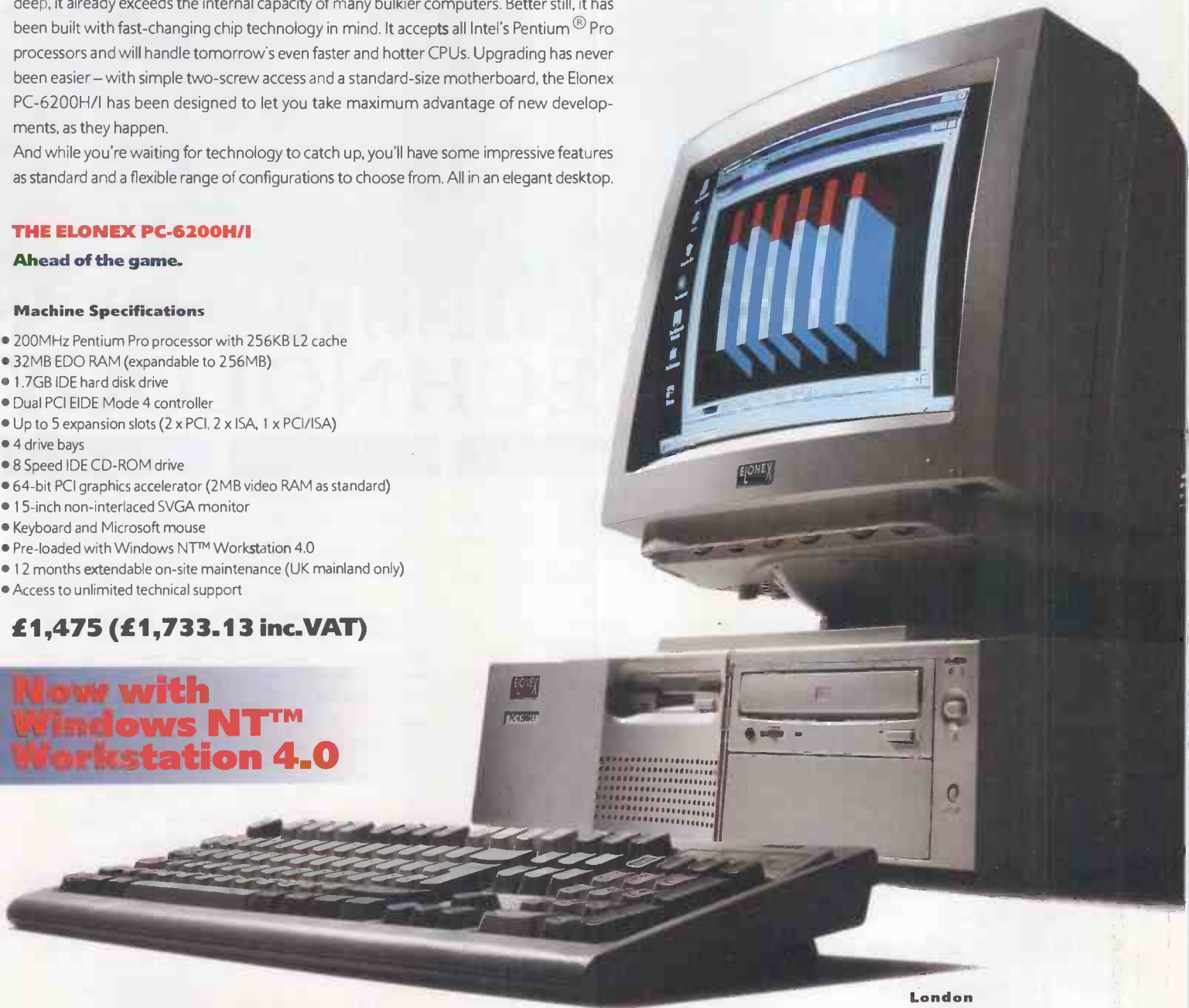
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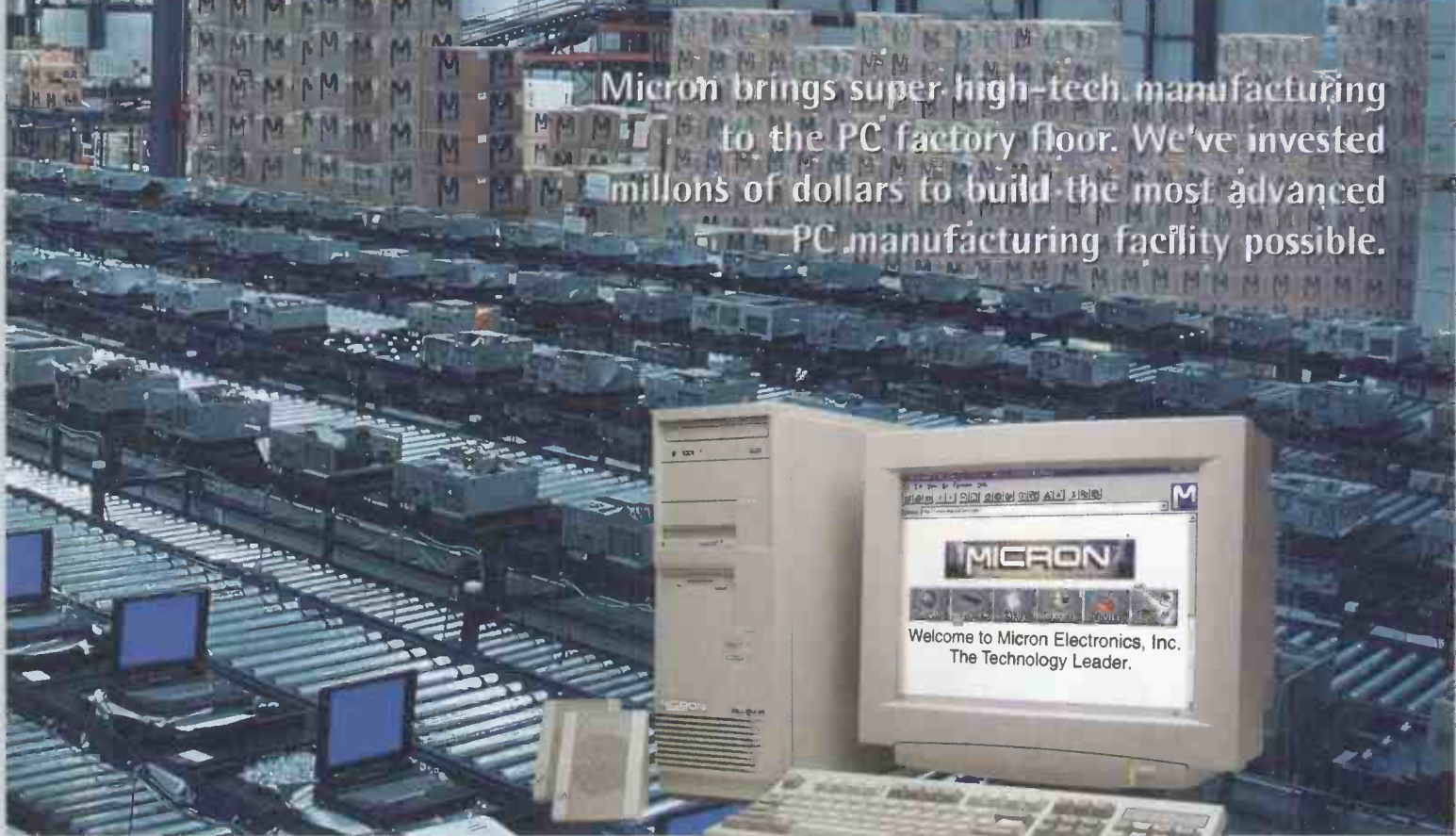
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- PCI graphics accelerator, 1MB EDO memory
- Pick-a-Point™ dual pointing devices integrate both pointing stick and touchpad
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- Weight: 6.9 lbs. †

- Nylon carrying case
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- Works 4.0 for Windows 95
- Kensington™ security lock ††
- 24-month return to base warranty

† 6.9 lbs. includes 3.5" floppy and one battery
 †† Lock secures both Millennia Transport and MicronDock™

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- 2nd intelligent modular lithium-ion battery

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- 256KB pipelined burst cache, flash BIOS
- 16MB EDO RAM
- 1.2GB EIDE hard drive
- 8X EIDE CD-ROM drive
- 3.5" floppy drive
- 16-bit stereo sound & speakers
- 28.8 fax/modem, speakerphone, voice mail
- Microsoft® Phone telephony software
- PCI 64-bit 3D video, MPEG, 2MB EDO
- 15" SVGA monitor, 28dp
- Tool-free minitower or desktop
- Microsoft® Mouse, 105-key keyboard
- Microsoft Windows® 95 & MS® Plus! CD
- Microsoft Home Pack includes: Works 4.0 for Windows 95; Encarta® 96; Publisher Deluxe for Windows 95; Music Central™ 96; Wine Guide; Arcade 1.0; Scenes-Sports Extremes Collection; Cinemania® 96; Julia Child Home Cooking; Best of Windows Entertainment Pack; CD Sampler (includes Fury® game demo)
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- 16MB RAM
- 2GB SCSI-2 hard drive
- 15" Iiyama 8515

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- 32MB RAM
- 4GB SCSI-2 hard drive
- 17" Nokia 447E monitor

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Compaq Presario 4712

Compaq has put some hard thought into the business of producing consumer PCs in the last couple of years. In 1995, it launched a separate division devoted to the home market, recognising it as a huge growth area. The resulting PCs are now looking quite impressive.

On first sight, one thing catches your eye — the buttons on top make you wonder if Compaq has built in some undreamed-of piece of hardware. In fact, they control the answer machine, speakerphone, audio CDs, sleep mode and the on-screen help. A light will flash if you have any new messages waiting on either email or on the answering machine. This is very much like Apricot and Packard Bell's remote control access, but the help button is especially useful — if you get into trouble, you simply have to hit one button.

Inside, the build is also interesting. The riser card for the expansion slots is in a whole self-contained unit which can be easily pulled out to make fitting a card easier. It has plenty of expansion room, with two ISA only, two PCI only and one shared slot. All the sound connections are on the motherboard, so there is no need to lose a slot to a port card.

Compaq has two USB ports on this machine, and was in fact one of the first manufacturers to adopt the



standard. Also ahead of the pack, the modem conforms to the V.34 extension and so has a top speed of 33.6Kbps.

In other ways, however, the Compaq is less glaringly up to date as other PCs in this test. Compaq is still using the old Triton chipset, not the newer Triton II, and if you want the performance gain of L2 cache, you will have to pay an extra £38 to get 256Kb. 3D graphics are offered on only one of its models; the video chip on most models is an S3 Trio 64+, hidden under a "Compaq component" sticker.

Monitor:

The Compaq's 15in monitor is quite acceptable. It is able to run at 1,024 x 768 with little moiré or bleeding, and is generally free from flicker. However, it does have one tiny drawback — it jumps about badly when it

redraws the whole screen or even when it just draws a new window.

PCW Details

Price £2,127
Contact Compaq 0990 134456
Hardware Bundle JBL Pro speakers.
Software Bundle See features table.
Warranty Terms 1 year on site.
Technical Support Fax support.
Good Points Build quality, modem speed.
Bad Points No cache, hence less than impressive performance.
Conclusion Good machine, but expensive.
Software Bundle ★★★
Build Quality ★★★★
Overall Value ★★★

IBM Aptiva P200

The last time we saw an Aptiva, we weren't particularly impressed. Since then, IBM has made several improvements. The machine we review here is the model that will be in the shops this Christmas. In the New Year, it is due to be replaced by the new Stealth machines. For a sneak preview of these, see First Impressions (page 70).

The most immediately-striking feature of this Aptiva is the new ATX motherboard. This has some flashy little touches, being able to switch itself off when you shut down the machine. There is also the Rapid Resume feature, which will put the PC to sleep if you leave it alone for too long. This feature is the same as the standby mode on notebooks and Apricot's "deep green mode", and is useful if you want to leave it on to receive incoming faxes.

When you switch it on, the IBM branding is ridiculously in-your-face. There are what seems like hundreds of little Aptiva icons, leading you to various IBM utilities, most of them designed to take the stress out of maintaining and understanding your PC. The Aptiva guide, for example, takes you through the basics (the very, very basics) of how your machine works, while another particularly meaningless but strangely appealing utility makes your icons jiggle about on the desktop.

Inside, the design is yet again a riser card arrangement, but this time the card is parallel to the motherboard.



Why this should be necessary in a mini-tower case is anybody's guess. On this card are a massive six ISA slots but only two PCI slots, again a rather backward-looking feature. To compensate, the modem does use IBM's rather excellent Mwave chip.

The time has come to do as IBM did a few years back with the ThinkPad range and rethink the whole approach. The new Stealth machine seems to show evidence of a rethink, so if you can hang on until next year, it might be worth waiting for the Stealth.

Monitor:

The G70 17in monitor does not have the largest actual viewing area of the 17in monitors we have seen, but has some compensations. The colour is good, it is almost free of flicker and moiré, and it can be driven up to 1,280 x 1,024 in 256 colours at 75Hz.

PCW Details

Price £2,339
Contact IBM 0990 727272
Hardware Bundle IBM speakers and sub-woofer.
Software Bundle See features table.
Warranty Terms 1 year on site, extended to 3 or 5 years.
Technical Support Free telephone & fax support.
Good Points ATX motherboard, monitor, software bundle.
Bad Points Feels outdated, as if it is trying to keep up but only hobbling along behind.
Conclusion Shows promise, but fails to deliver.
Software Bundle ★★★★
Build Quality ★★★
Overall Value ★★★



pentium
PROCESSOR

All-round visibility is only half the story.

When we sat down to design the Olivetti Echos Pro 150X, we looked at notebook screens from every angle. The result: now you can too.

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Typing fast on the average notebook keyboard can be a messy operation – more dirty than qwerty. In fact, inaccuracy can reduce a wholesome 40 words-per-minute down to a butter-fingered 20. That's why we've given Echos Pro *independent suspension*. Dual guide-runners attached to the edge of each key ensure even distribution of pressure. Which means wherever, and however, you strike the key – you strike it right, emphasised by a satisfying *click* perceptible only to your fingertip.



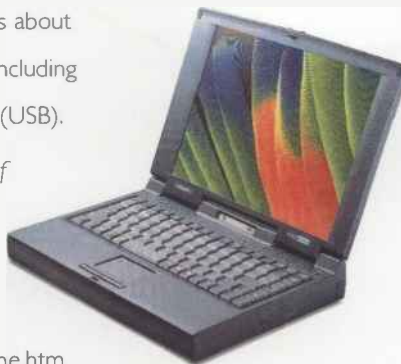
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Slot Echos Pro into its elegant multimedia docking station and – instantly – you have a full-blown desktop. Three whisper-quiet microfans keep noise down to a minimum so you can relax to the strains of your favourite music.

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Internet: <http://www.olivetti.it/opc/welcome.htm>



Echos Echos Pro

Processor

- Intel Pentium®:
- 150MHz (Echos Pro)
- 133MHz (Echos/Echos Pro)
- 120MHz (Echos)
- 100MHz (Echos)

Memory

Main

- 8MB or 16MB

Expandable to

- 40MB (Echos) or 128MB (Echos Pro)

Video

- 1MB or 2MB

Cache

- 256KB L2

Removable Disk Drives

- 2.0GB (Echos Pro)
- 1.3GB (Echos Pro)
- 1.2GB (Echos)
- 1.0GB (Echos)
- 810MB (Echos)
- Optional 1.3GB additional hard disk (Echos Pro)¹

Swappable CD-ROM

- 8 speed (Echos Pro)
- 6 speed (Echos)

Architecture

- PCI

Cursor Control

- TouchPad™

Display

- 12.1" TFT XGA (Echos Pro)
- 12.1" TFT SVGA (Echos Pro)
- 12.1" DSTN SVGA (Echos Pro)
- 11.8" TFT SVGA (Echos)
- 11.3" TFT SVGA (Echos/Echos Pro)
- 11.3" DSTN SVGA (Echos)
- 10.4" TFT SVGA (Echos)
- 10.4" DSTN SVGA (Echos)
- Up to 16M colours (VGA mode)

Interfaces

- 2 type II or 1 type III PC card slots
- Serial, parallel, keyboard/mouse, RGB infrared, video out (Echos Pro) mike in/speakers out
- Mini docking station (Echos)
- Port replicator (Echos Pro)
- Docking station (Echos Pro)

Battery

- NiMH (Echos/Echos Pro)
- Lithium-Ion (Echos Pro)
- 2 hours fully op (Echos)
- Up to 4 hours fully op or 3 days standby (Echos Pro)²

Size/weight

- 286 x 228 x 49mm (Echos)
- 310 x 230 x 47.5mm (Echos Pro)
- 3 1/3 2kg (Echos)
- 3 2kg (Echos Pro)

Software

- Windows 95 or Windows® for Workgroups 3.11

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Packard Bell 9005D

The name of Packard Bell has long been synonymous with consumer PCs. As such, the main feature of any Packard Bell machine is its Navigator interface. (This should not, of course, be confused with the Netscape product.) It is a means of operating the PC without ever having to come into contact with anything as tricky as an operating system. Navigator sits on top of Windows 95 and you can opt to go back into Windows, but on boot-up Navigator will, very slowly, launch automatically.

Navigator allows easy access to all the applications on the PC, breaking them down into areas according to how they think the PC will be used. There is a kids' section, a work section, and an area devoted to manuals and on-line help. Planet Oasis has been added, which allows limited internet access to approved, family-friendly sites. Navigator is a good idea if you want to keep meddling fingers away from the system before they start deleting necessary files or if you want a really easy PC to start learning on, but I would question the educational value of having a PC and not learning to use the operating system properly.

Inside the machine, the riser card system doesn't allow for much expansion room, especially as the only free PCI-only slot is uncomfortably tight up against the central bar holding the riser card in place.



Although this was one of the cheapest machines in the test, many of the optional extras offered in the other Packard Bell models were not included in this deal. The MediaSelect and Remote control, which both control the multimedia elements of the machine, are not included in the price, although we were sent these for test. Nor were the radio tuner and the modem, while the graphics chip we saw was not the promised 3D model but a much older Cirrus Logic chip.

Monitor:

All of Packard Bell's models come with a 14in monitor which is smaller than we would recommend. A 15in monitor may not sound much bigger, but that slight increase in viewing area makes quite a difference. Although this monitor could be driven at 1,024 x 768 in 256 colours at 75Hz, in reality it would only do 800 x 600 in 256 colours at 60Hz, a far from respectable performance due to the poor graphics chip.

PCW Details

- Price £1,799
- Contact Packard Bell 01753 831914
- Hardware Bundle Phase II speakers.
- Software Bundle See features table.
- Warranty Terms 1 year on site; 2nd & 3rd year optional.
- Technical Support No free phone or fax support.
- Good Points Speakers, large software bundle.
- Bad Points Poor graphics, limited hardware bundle, very slow.
- Conclusion A cheap machine, without a modem, 3D graphics or sub-woofer. If these were included, it would be a comparable price to others here.
- Software Bundle ★★★★★
- Build Quality ★★
- Overall Value ★★★

Universal Serial Bus

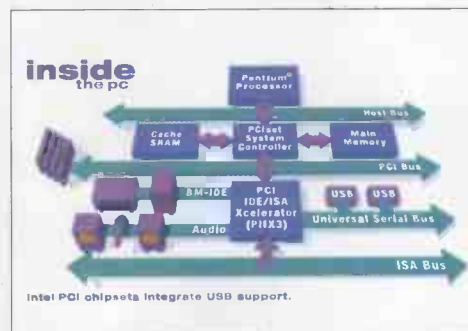
USB has one aim — to make it easier for you to connect peripherals. As it exists today, the PC can easily become choked with connections. You could have a printer on the parallel port, a mouse and a modem on the serial ports. You may add an interface card to connect your scanner and possibly a different interface card for an external tape drive. If you then plug in your speakers and your joystick to the sound card, and plug all your peripherals into a power supply, pretty soon you are left with electric spaghetti.

USB simplifies things by giving you just one connection via which you can connect up to 127 peripherals, including everything from keyboards, mice and modems to scanners, printers and external tape drives. The first USB peripherals are expected in this country in the first few months of 1997. We are already seeing USB ports appearing on PCs; in fact, four of the five PCs in this test have the connection ready.

USB is supported by specific chipsets on Pentium and Pentium Pro PCs; software drivers will be included in Windows 95 and Windows NT. Each peripheral is automatically managed by the PC. The PC senses which peripherals are connected, even if they are connected while the system is running so peripherals can be hot-docked. The PC will also manage the resources, from drivers to bus resources for each peripheral, while the peripheral can take its power directly from the PC itself.

Full-speed USB bandwidth of a stonking 12Mb/sec will support such things as external CD-ROM drives and telephony devices, as well as providing ISDN and PBX interfaces. Meanwhile, low-speed bandwidth of 1.5Mb/sec will support low-end devices like mice and keyboards.

The system works like a daisychain on a series of hubs. To each USB hub, up to seven peripherals can be attached. This can include a second hub up to which another seven peripherals can be attached and so on.



How USB connects inside your PC, and how the peripherals connect outside. Pictures courtesy of Intel

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Intel MMX chips

You may well be asking yourself what to buy this Christmas, but there is one rather more fundamental question which you ought to consider. Is it actually the right time to buy a PC at all?

Intel has finally announced its long-awaited MMX chips which will be available from the beginning of next year, just two weeks after a nation of excited first-time PC owners have unwrapped what they believe to be the last word in computing power.

MMX chips include an extra 57 instructions, 32Kb of L1 cache (as opposed to 16Kb on current Pentiums and Pentium Pros), larger registers and parallel processing. The 57 new instructions are primarily designed to make multimedia applications run faster. Applications will be optimised to run on MMX processors, but will recognise old-style Pentiums and will offer them code they can cope with.

However, it is the changes to the cache and the registers which will make the most difference to performance. The benefit of the increased size of the level one cache is obvious, as the processor can store more data close to hand without having to store in the more inaccessible level two cache or in RAM. The eight MMX 64-bit registers will each be able to hold eight bytes of data, and all eight bytes will be processed in parallel per clock cycle when running MMX-enhanced code. Current



The new MMX chip will have the same array of pins as the current Pentium chips and so will fit in the same sockets

processors have general 32-bit registers which can only hold one byte at a time, and only one byte can be processed simultaneously.

The applications most likely to be affected are graphics-heavy packages, especially those where 3D rendering is a factor. Adobe's Photoshop 4 already supports the new hardware, while a host of multimedia CD titles are currently under development and will be shipped with MMX machines. PCW had a sneak preview of one, the Space Station Simulator from Maris, a virtual reality trip around NASA's planned space station, and we were

duly impressed. The 3D rendering of the station is impressive, as you undertake your own space walk around the outside or investigate the various laboratories inside.

The first MMX Pentiums will be available at the beginning of January and prices will not be available until then. However, it will be no surprise to you if we say you can expect to pay a premium for the new technology. Pentium Pro will also get the MMX makeover in the near future, and there are distant plans for MMX upgrade chips.

What else to consider when buying a PC

If you decide the bargains on offer this Christmas are worth going for, it is as well to keep a sharp eye peeled for the kind of peripherals you are getting with your PC. After all, if you want to play games and the speakers crackle and the monitor flickers, there is no point at all in having a chip that can run a game at a high speed.

The monitor is probably the most important decision you can make when buying a PC and one which is frequently ignored, especially judging by the poor assortment of contenders in this test. We would not recommend you buy anything smaller than a 15in screen. It may seem on paper as if there is not much difference between 14in and 15in, but in practice that extra inch can make all the difference. If you can afford it, we would recommend a 17in screen. Again, you may say that size isn't everything, but believe a girl who knows when she says it is. The most obvious reason is that you can get more on the screen, and this makes it much easier on the eye. Whatever size your monitor, and whatever resolution to choose to run it in, you should ensure that the refresh rate will be over 70Hz non-interlaced. Anything less than this and you will notice the monitor flicker.

Obviously, your monitor is only as good as your graphics chip and you should ensure they are both able to run at the resolution and refresh rate you require. 3D graphics chips are not all they are cracked



up to be (see this month's round-up for details, page 210), but the quality of graphics chips does vary. Another factor to consider is the amount of video RAM provided with the system. For the best performance we would recommend at least 2Mb of video memory. This will not only let you run at higher refresh rates, but at higher resolutions and in more colours.

When looking for speakers, get the best deal you can. Listen to them to judge what sort of hiss and crackle they give. They should be externally powered, as these are generally more powerful. They should also be well shielded or they will interfere with your monitor, making the screen wobble.

Again, your speakers can only be as good as the chip converting the digital signal from your PC to analogue sound. All the machines

here feature 16-bit sound chips, and the Apricot actually includes wavetable sound and all the connectors you would expect on a Creative Labs AWE-32. These include a digital output mode.

The IBM, meanwhile, uses IBM's own very clever Mwave chip. As a digital-to-analogue converter, or DSP (digital signal processor), it is able to deal both with sound and data conversion. As a result, the sound and modem functionality can all be done on one card. It can even deal with both simultaneously, so you can have music as you download.



Editor's Choice

There is only one way to choose a PC — decide what you want to do with it, and then decide on the components that will best suit your needs. Not everyone will want the ultimate games machine, but an avid games player may not be interested in the wealth of children's educational titles that come bundled with these PCs.

As these PCs all have different processor speeds, we haven't chosen the winner purely from the benchmark tests, although these obviously play a part. Also, we have judged

the machines' performance against other PCs of the same spec we have tested in the past. However, it is price, and the software and hardware bundles included in the

deal that have as much as anything swayed the balance here.

There is one clear winner from this test, the Apricot MS540. It might not be the cheapest of the machines on offer, but it is fast and is jam-packed with excellent components and extras. The huge software bundle, Easy Manager II and sub-woofer demonstrate both attention to detail and real value for money, as do the 3D graphics chip and the best of the sound cards on offer.

As a runner-up, we have gone for the AST. It is very much slanted towards playing games, but as such has some very good extras such as the 3D graphics chip with 2Mb of DRAM. While 3D chips may not be important to non-games players and are not even that great at 3D rendering, they do at least offer good 2D performance. The build quality is excellent and, combined with the price, this sets it apart from some of the other machines in this test.

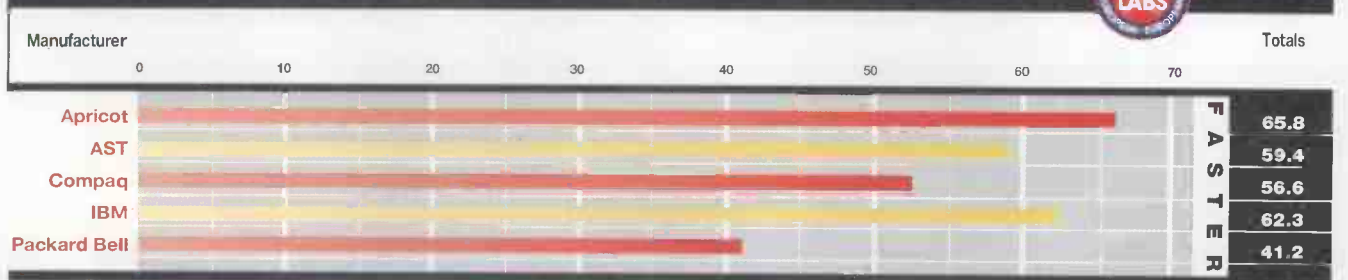


Test results

Benchmark scores

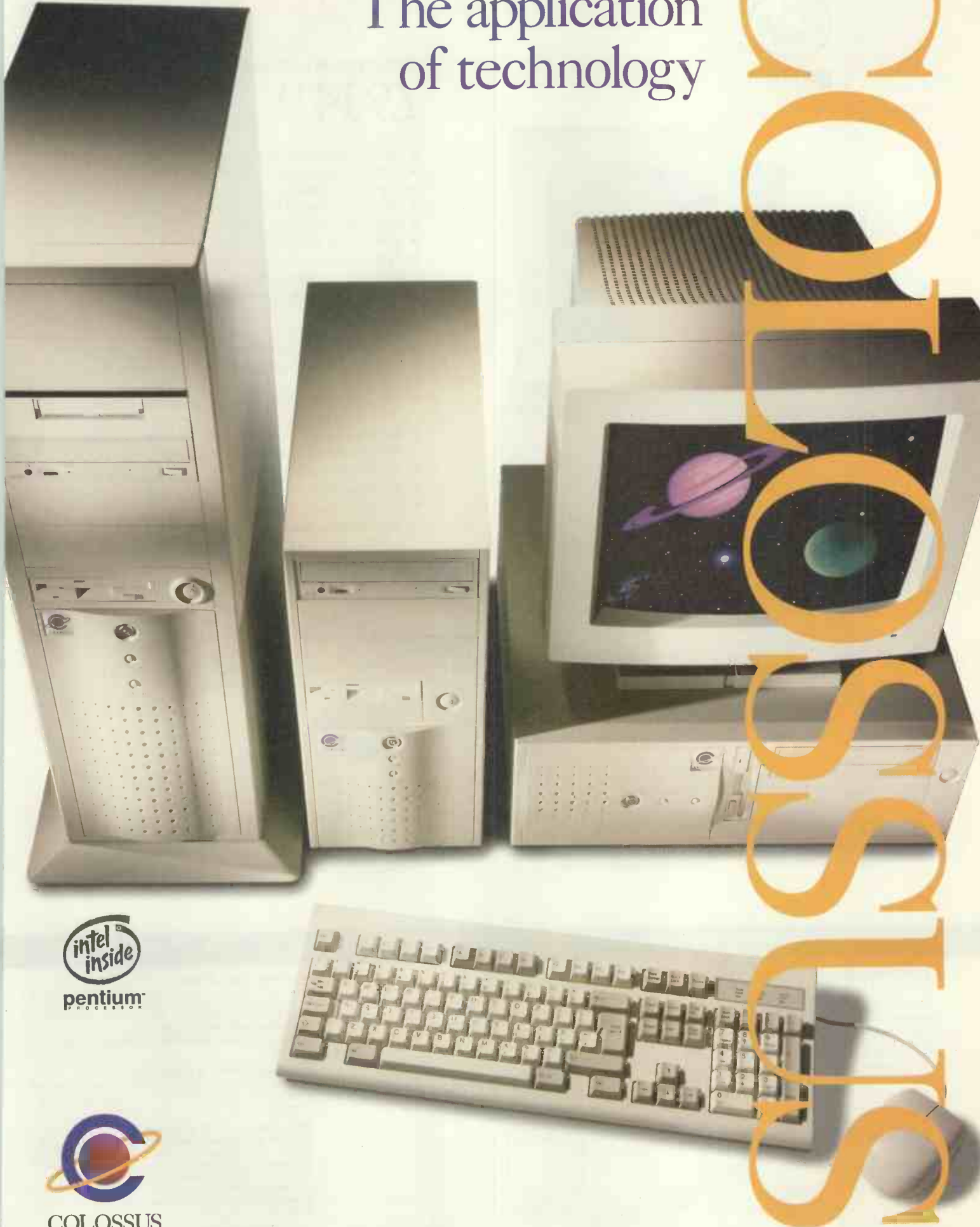


Doom II scores



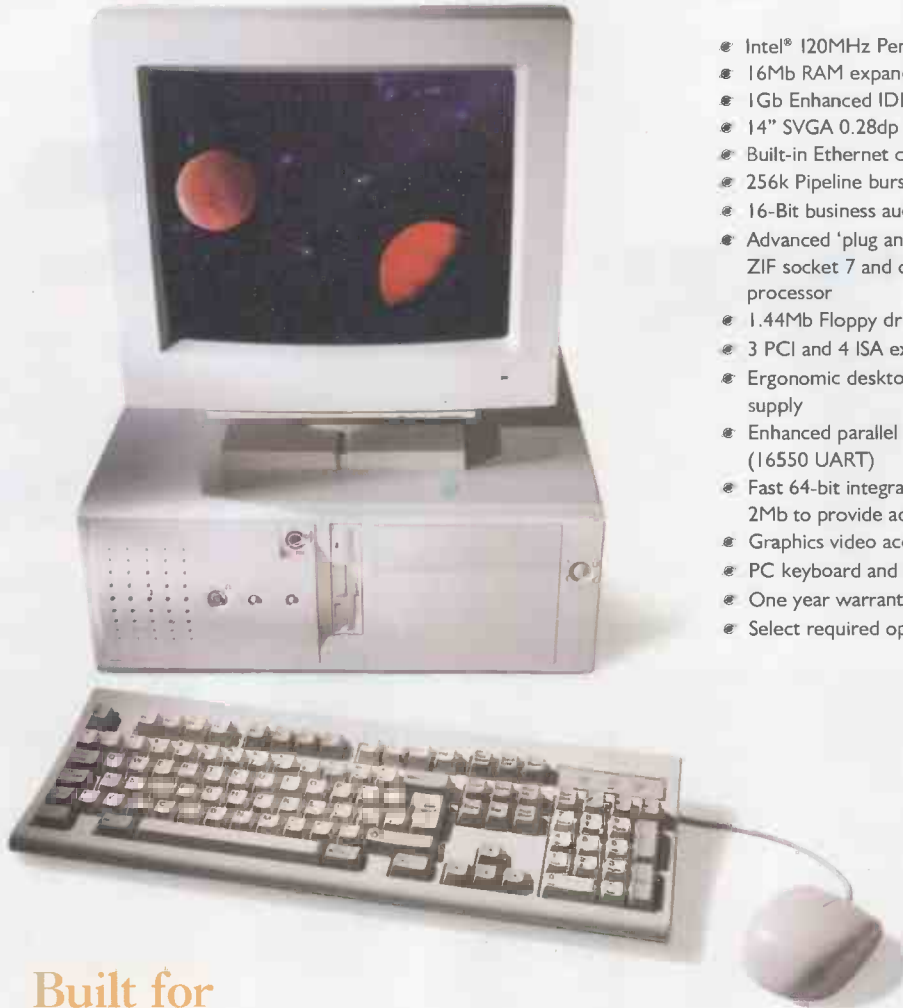
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Colossus NetStation P120

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- Intel® 120MHz Pentium® processor
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- 1Gb Enhanced IDE hard disk
- 14" SVGA 0.28dp NI colour screen
- Built-in Ethernet combo network card
- 256k Pipeline burst mode cache
- 16-Bit business audio (No speakers)
- Advanced 'plug and play' motherboard with flash BIOS, Intel ZIF socket 7 and chip upgradeability to 200MHz Pentium processor
- 1.44Mb Floppy drive
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- Graphics video acceleration
- PC keyboard and Microsoft compatible mouse
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- Select required operating system and software

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Business users need solid versatile PC platforms with built-in connectivity, upgradeability and low running costs to ensure minimum overall costs of ownership.

The Colossus NetStation P120 provides all these in a system featuring the latest technology and an excellent specification on offer at a very special business user price!

Networking

Workstations

The Colossus NetStation is our most popular workstation, however, the entire range of Colossus 'SBF' business systems can be tailored to individual user requirements. A range of fast 16-bit and PCI ethernet cards are offered depending on user requirements.

Servers

Colossus have developed a range of fault tolerant file servers for mission critical applications. Housed in a large tower case, these servers have multiple power supply options and huge expandability. A range of models are available from simple print servers to RAID level 5 multi-platform systems which combine both high speed data access with on-the-fly repair without losing data. The Colossus Power Server can be configured under many platforms including Intel based Pentium processors.

Network Consultancy

Small peer to peer networks can run under Windows 95 (or Windows for Workgroups) without any other operating system. Large scale network integration is usually user dependent using backbones such as Novell, WindowsNT, AIX and Solaris. Our in-house consultants are available and will advise on the best solutions.

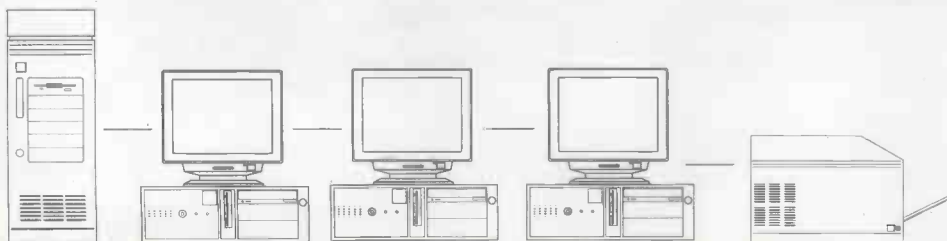
Colossus Service & Support

All Colossus systems come complete with comprehensive hardware support and all models include a 12 month warranty which can be extended to 3 years.

Buy Colossus with confidence

Colossus is the UK's leading manufacturer of high performance PC systems. Colossus systems are manufactured using top quality, high performance premium components that are demanded by today's business users. A Colossus system is designed to be future-proof, upgradeable, reliable and productive thus reducing the overall cost of ownership. No wonder Colossus is one of the UK's fastest growing PC brands.

You can buy Colossus systems direct or from one of our fully authorised partners.



Colossus SBF Business Systems

Colossus Business Systems "Specifically Built and Formulated" (SBF) to your individual requirements

Colossus Value Range P100 1Gb Desktop

£950.58⁵⁸ inc.VAT £809⁹ +VAT

- Intel® 100 to 200MHz Pentium® processor
- 16Mb RAM expandable to 128Mb
- 256k Pipeline burst cache
- 1Gb (or higher) hard disk
- SIS 'High performance' chipset
- Integrated 64-bit PCI graphics (uses 1Mb of RAM) and 16-bit sound
- 14" SVGA .28dp screen
- 7 Bay desktop case
(8 bay midi tower optional extra)
- Microsoft® Windows® 95
(or MSDOS 6.22 & Windows for Workgroups 3.11)

All standard features such as 1.44Mb floppy drive, two fast serial and parallel ports, three PCI and four ISA slots, keyboard and mouse.

	Inc VAT	Ex VAT
P100	£950.58	£809
P120	£985.83	£839
P133	£1079.83	£919
P150	£1267.83	£1079
P166	£1573.33	£1339
P200	£1996.33	£1699

1.6Gb models ___ +£47.00 Inc VAT= £40+VAT
2.0Gb models ___ +£94.00 Inc VAT= £80+VAT
Midi tower models+£11.75 Inc VAT= £10+VAT

Colossus Performance Range P100 1Gb midi tower

£1091.58⁵⁸ inc.VAT £929⁹ +VAT

- Intel 100 to 200MHz Pentium processor
- 16Mb EDO RAM expandable to 128Mb
- 1Gb (or higher) hard disk
- Intel 430HX chipset
- 512k Pipeline synchronous burst mode cache
- ATI 64-bit PCI graphics card with 2Mb S DRAM video RAM
- 14" SVGA .28dp screen
- 7 Bay midi tower case
(9 bay full tower with 4Mb VRAM optional)
- Microsoft Windows 95
(or MSDOS 6.22 & Windows for Workgroups 3.11)

All standard features such as 1.44Mb floppy drive, two fast serial and parallel ports, three PCI and four ISA slots, keyboard and mouse.

	Inc VAT	Ex VAT
P100	£1032.83	£879
P120	£1068.08	£909
P133	£1162.08	£989
P150	£1350.08	£1149
P166	£1655.58	£1409
P200	£2078.58	£1769

1.6Gb models ___ +£47.00 Inc VAT= £40+VAT
2.0Gb models ___ +£94.00 Inc VAT= £80+VAT

Colossus Pro NT Range Pro 180 NT/W

£1585.08⁰⁸ inc.VAT £1349⁹ +VAT

- Intel 180Mhz Pentium Pro Processor
 - 16Mb EDO RAM
 - 1Gb EIDE Hard Drive
 - Latest Intel 82440FA Advanced Chipset with ATX Motherboard
 - ATI PCI 64-bit Video with MPEG and 2Mb 'SDRAM'
 - 14" SVGA 0.28dp NI Screen
 - ATX Midi-Tower Case
 - Microsoft Windows NT Workstation 4
- All standard features such as 1.44Mb floppy drive, 3.5" diskette drive, 105 Windows keyboard, PS/2 mouse, standard ports including Serial, PS/2 mouse & parallel.

	Inc VAT	Ex VAT
Pro 180	£1585.08	£1349
Pro 200	£1820.08	£1549

2Gb models ___ +£94 Inc VAT= £80+VAT
3Gb models ___ +£211.50 Inc VAT= £180+VAT

Colossus SBF Business System Options

- Screen upgrade to 15" ___ +£82.25 Inc VAT=£70+VAT
- Screen upgrade to 17" +£352.50 Inc VAT=£300+VAT
- 16-Bit ethernet card ___ +£47.00 Inc VAT=£40+VAT
- 32-Bit PCI ethernet card ___ +£117.50 Inc VAT=£100+VAT
- Adaptec 2940 PCI SCSI controller ___ +£235.00 Inc VAT=£200+VAT
- RAM upgrade per 8Mb ___ +£70.50 Inc VAT=£60+VAT
- EDO RAM upgrade per 8Mb ___ +£76.38 Inc VAT=£65+VAT
- 800Mb Tape back-up ___ +£117.50 Inc VAT=£100+VAT
- 3.2Gb Tape back-up ___ +£258.50 Inc VAT=£220+VAT
- Int. 14.4 BAPT fax/data modem ___ +£58.75 Inc VAT=£50+VAT
- Ext. 28.8 BAPT fax/data modem ___ +£94 Inc VAT=£80+VAT
- Quad speed CD-ROM ___ +£58.75 Inc VAT=£50+VAT
- Eight speed CD-ROM ___ +£94 Inc VAT=£80+VAT
- 16-Bit sound card ___ +£35.25 Inc VAT=£30+VAT
- Orchid NuSound PnP 1024K wavetable sound card ___ +£94 Inc VAT=£80+VAT
- 4W speakers ___ +£11.75 Inc VAT=£10+VAT
- 15W speakers ___ +£35.25 Inc VAT=£30+VAT
- 70W speakers ___ +£70.50 Inc VAT=£60+VAT

Colossus 'Best Buy' CD Business Systems

High performance systems with 16Mb RAM, pipeline burst cache, fast CD-ROM drives, business sound (no speakers as standard) and Windows 95 business software bundle.



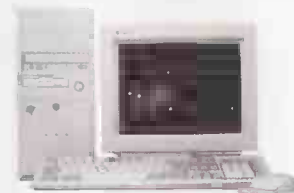
Colossus P120 CD MT
£1056.33³³ inc.VAT £899⁹ +VAT

- Intel 120 MHz Pentium processor
- 16Mb RAM expandable to 128Mb
- 28.8 BAPT Modem
- 256k Pipeline burst cache
- 1Gb Enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- Integrated 16-bit stereo sound card
- 1.44Mb Floppy drive.
- Midi tower case
- 64-Bit integrated graphics
- 14" SVGA NI 0.28dp colour screen
- 105 Windows 95 keyboard
- Microsoft compatible mouse
- Microsoft Windows 95 with manuals & CD
- Lotus Windows 95 pre-loaded software suite



Colossus P133 CD DT
£1244.33³³ inc.VAT £1059⁹ +VAT

- Intel 133 MHz Pentium processor
- 32Mb EDO RAM expandable to 128Mb
- 256k Pipeline burst cache
- 2Gb Enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- Integrated 64-bit stereo sound card
- 1.44Mb Floppy drive.
- Desktop case
- 64-Bit integrated graphics with video acceleration
- 14" SVGA NI 0.28dp colour screen
- 105 Windows 95 keyboard
- Microsoft compatible mouse
- Microsoft Windows 95 with manuals & CD
- Lotus Windows 95 pre-loaded software suite



Colossus P166 CD MT
£1455.83⁸³ inc.VAT £1239⁹ +VAT

- Intel 166 MHz Pentium processor
- 32Mb EDO RAM expandable to 128Mb
- 512k Pipeline burst cache.
- 2Gb Enhanced IDE hard disk
- Eight speed IDE CD-ROM drive.
- Wavetable sound card
- 1.44Mb Floppy drive.
- Colossus midi tower case
- Intel 430HX chipset
- High performance ATI graphics card with 2Mb dedicated SDRAM
- 14" SVGA NI 0.28dp colour screen
- 105 Windows 95 keyboard
- Microsoft compatible mouse
- Microsoft Windows 95 with manuals & CD
- Lotus Windows 95 pre-loaded software suite



Colossus 'Best Buy' CD Business System Options

- Screen upgrade from 14"
 - 15" SVGA .28dp NI ___ +£82.25 Inc VAT=£70+VAT
 - 17" SVGA .28dp NI ___ +£352.50 Inc VAT=£300+VAT
 - 17" iiama 8617E ___ +£458.25 Inc VAT=£390+VAT
 - 17" iiama 9017E ___ +£517.00 Inc VAT=£440+VAT
 - 20" SVGA .28dp NI ___ +£975.25 Inc VAT=£830+VAT
 - 21" iiama 8221E ___ +£1222.00 Inc VAT=£1040+VAT
 - 21" iiama 9021E ___ +£1339.50 Inc VAT=£1140+VAT
- Speaker options
 - 4W stereo ___ +£11.75 Inc VAT=£10+VAT
 - 15W Stereo ___ +£35.25 Inc VAT=£30+VAT
 - 70W Stereo ___ +£70.50 Inc VAT=£60+VAT
- Other options
 - 28.8 external fax/data modem ___ +£94 Inc VAT=£80+VAT
 - 6 Multimedia CD titles ___ +£35.25 Inc VAT=£30+VAT



Telephone

01 707 25 88 99

Colossus Computer Corporation Ltd. Colossus House, Travellers Lane, Welham Green, Hertfordshire. AL9 7DA

Northern Sales Office

01 282 77 00 88

Facsimile

01 707 26 74 00

Sales lines are open Monday -Friday 9.00am -6.00pm

Business user prices shown. End user enquiries welcome

Colossus systems may be available from Colossus Authorised Dealers with different specifications, bundled software and pricing than those shown here. Prices shown with VAT at 17.5% and also without VAT. All prices exclude courier delivery. Delivery:- Systems £25+VAT (£29.38). Lasers and large items £15+VAT (£17.63), software and small items £10+VAT (£11.75). 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. In line with industry standard practice, screen sizes are shown as the CRT size. Actual viewing area may be approx 1" less. Mail order only. No collections please. Goods are normally despatched within 10 to 14 days. All orders will be fulfilled within 28 days unless otherwise specified. Software is pre-loaded, back-up CD and manuals are available as options. Intel Inside and Pentium processor logos are trademarks of Intel Corporation. All trademarks are acknowledged. E&OE.

Colossus 'Best Buy' Multimedia

Colossus PI20 CD MT

£1056.³³
inc.VAT

£899 +VAT

- Intel® 120MHz Pentium® processor
- 16Mb RAM expandable to 128Mb
- 1 Gb Enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- BABT approved 28.8 fax/data/Internet internal modem
- 256k Pipeline burst mode external CPU cache
- Software MPEG for viewing MPEG-I videos
- Intel Socket 7 and advanced 'plug and play' motherboard
- Support for flash BIOS and EDO RAM
- Fast PCI enhanced IDE mode 4 hard disk controller
- 3 Free PCI and 4 ISA expansion slots
- Two 16550 compatible UART driven high speed serial ports
- EPP and ECP capable enhanced bi-directional parallel printer port
- PS/2 Mouse port
- 64-Bit integrated graphics with video acceleration optimised for Windows® 95, switchable to use 2Mb RAM for video
- Integrated 16-bit stereo sound card
- 3.5" 1.44Mb Floppy drive
- Colossus 7 bay midi tower case with 210W CE approved power supply and CPU cooling fan
- 105 Windows 95 keyboard & Microsoft® compatible mouse
- 14" SVGA colour screen (with 15" and 17" options available)
- Various speaker options available
- Microsoft Windows 95 with manuals and CD, Lotus Windows 95 pre-loaded software suite with 1-2-3, Word Pro, Approach, Organizer and SmartPics, GSP Pressworks and Designworks suite
- 1 Year warranty extendable to 3 years

PI20 Best Buy: with 14" NI .28dp screen, 4W stereo speaker system & 6 CD multimedia titles _____ +£40+VAT extra (£47)



Colossus PI20 Performance MT

£1173.⁸³
inc.VAT

£999 +VAT

- Intel 120MHz Pentium processor
- 16Mb RAM expandable to 128Mb
- 1 Gb Enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- 256k Pipeline burst mode external CPU cache
- BABT approved 28.8 fax/data/Internet Internal modem
- 15" NI.28dp low radiation SVGA colour screen
- Software MPEG for viewing MPEG-I videos
- Intel Socket 7 and advanced 'plug and play' motherboard
- Support for flash BIOS and EDO RAM
- Fast PCI enhanced IDE mode 4 hard disk controller
- 3 Free PCI and 4 ISA expansion slots
- Two 16550 compatible UART driven high speed serial ports
- PS/2 Mouse port
- EPP and ECP capable enhanced bi-directional parallel printer port
- 64-Bit integrated graphics with video acceleration optimised for Windows 95, switchable to use 2Mb RAM for video to increase resolution/colours
- Integrated 16-bit stereo sound card
- 3.5" 1.44Mb Floppy drive
- Colossus 7 bay midi tower case with 210W CE approved power supply and CPU cooling fan
- 105 Windows 95 keyboard & Microsoft compatible mouse
- 4W Stereo speaker system (various options available)
- Microsoft Windows 95 pre-loaded with manuals and CD
- Lotus Windows 95 software suite with 1-2-3, Word Pro, Approach, Organizer and SmartPics
- GSP Pressworks and Designworks pre-loaded suite
- 6 CD multimedia titles
- 1 Year warranty extendable to 3 years

Built for performance

There are three primary criteria on our agenda when we design our PCs at Colossus

1. Performance
2. Performance
3. Performance

so, its not surprising that in What PC magazine group performance tests, the Colossus PI00 multimedia system was rated number one performance PC.

Our new PI20 MT is even faster and comes standard with 16Mb RAM, eight speed multimedia and 28.8 fax/data/Internet modem at just £899 + VAT (£1056.33 Inc VAT).

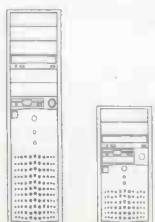


Expandable Case Designs

Our systems feature our new re-designed case styles with small footprints yet incredible expansion potential. All feature security locks, reset button and heavy duty 210W or 230W CE approved power supplies.



Desktop case has standard footprint, yet seven drive bays (three 5.25" accessible, one 3.5" accessible and three 3.5" internal) 16.8" W, 16.53" D, 5.74" H

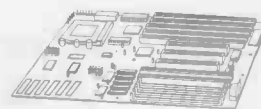


Midi tower case is the most popular and features seven drive bays (three 5.25" accessible, two 3.5" accessible and two 3.5" internal) 6.69" W, 16.14" D, 14.96" H

Full tower case used in our high performance systems features larger power supply and nine bays (Six 5.25" accessible, one 3.5" accessible and two 3.5" internal) 7.56" W, 18.19" D, 24.4" H

High Performance Motherboards

In the heart of our most powerful systems lies the highest performance motherboards available.



- Latest Intel 430HX chipset with ZIF (Zero Insertion Force) Socket 7 (permitting access to Intel's upgrade path)
- 512k Pipeline burst mode cache with support for flash upgradeable BIOS and faster EDO RAM (only useful if pipeline cache is fitted)
- Full implementation of standard performance components such as enhanced IDE fast mode 4 interface, 16550 fast serial ports, advanced parallel ports
- Memory to PCI bus transfer rate of up to 100Mb/s
- Fully 'Plug and Play' compliant PCI bus with high levels of integration.

64-Bit PCI graphics are integrated on our entry level systems which also feature high performance SIS chipset. The graphics on these systems use 1Mb of system RAM.

Ultimate 64-bit Graphics

Our popular systems feature fast 64-bit integrated graphics with truly excellent levels of performance through 64-bit CPU access to graphics data. This superb graphics system also provides fast 2D Windows acceleration, video acceleration for video playback, with software MPEG-I and on 16Mb systems can be switched to use 2Mb RAM for video giving higher resolution/more colours at no extra cost.

Our top of the range models feature Matrox Millennium MGA graphics with 4Mb 'WRAM' or ATI Rage 3D, with 4Mb SGRAM providing excellent performance, 1600x1200 resolution, 3D and video acceleration. The new ATI Synchronous RAM 'SDRAM' based graphics cards provide even greater performance and superb quality software MPEG video acceleration.

s3 Trio 64V+ / s3 Virge 3D 'EDO RAM'

s3 Vision 968 'VRAM'

Matrox MGA Millennium 'WRAM'

ATI 264VT synchronous 'SDRAM'/SGRAM'

Relative Win95 performance in Colossus systems with Intel 430HX chipset.

4COLMS2C

Colossus P133 Multimedia Desktop

£1291.³³ inc.VAT £1099 +VAT

- Intel® 133MHz Pentium® processor
- 32Mb EDO RAM expandable to 128Mb
- 2Gb Enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- 256k Pipeline burst mode external CPU cache
- Software MPEG for viewing MPEG-1 videos
- 14" NI .28dp low radiation SVGA colour screen (with 15" and 17" options available)
- Intel Socket 7 and advanced 'plug and play' motherboard
- Support for flash BIOS and EDO RAM
- Fast PCI enhanced IDE mode 4 hard disk controller can control up to 4 drives
- 3 Free PCI and 4 ISA expansion slots
- 2 16550 Compatible UART driven high speed serial ports
- PS/2 mouse port
- EPP and ECP capable enhanced bi-directional parallel printer port
- Integrated 16-bit stereo sound card
- 3.5" 1.44Mb Floppy drive
- 64-Bit integrated graphics with video acceleration optimised for Windows® 95, switchable to use 2Mb RAM for video to increase resolution/colours
- Colossus 7 bay desktop case with 210W CE approved power supply and CPU cooling fan
- 105 Windows 95 keyboard & Microsoft® compatible mouse
- 4W Stereo speaker system (various options available)
- Microsoft Windows 95 with manuals and CD
- Lotus Windows 95 pre-loaded software suite with 1-2-3, Word Pro, Approach, Organizer and SmartPics
- GSP Pressworks and Designworks pre-loaded suite
- 6 CD multimedia titles
- 1 Year warranty extendable to 3 years



Colossus P133 Performance Desktop

£1408.⁸³ inc.VAT £1199 +VAT

- Intel® 133MHz Pentium® processor
- 32Mb EDO RAM expandable to 128Mb
- 2Gb Enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- 256k Pipeline burst mode external CPU cache
- BABT 28.8 fax/data/Internet external modem
- 15" NI .28dp low radiation SVGA colour screen
- Software MPEG for viewing MPEG-1 videos
- Intel Socket 7 and advanced 'plug and play' motherboard
- Support for flash BIOS and EDO RAM
- Fast PCI enhanced IDE mode 4 hard disk controller can control up to 4 drives
- 3 Free PCI and 4 ISA expansion slots
- 2 16550 Compatible UART driven high speed serial ports
- PS/2 mouse port
- EPP and ECP capable enhanced bi-directional parallel printer port
- Integrated 16-bit stereo sound card
- 3.5" 1.44Mb Floppy drive
- 64-Bit integrated graphics with video acceleration optimised for Windows® 95, switchable to use 2Mb RAM for video to increase resolution/colours
- Colossus 7 bay desktop case with 210W CE approved power supply and CPU cooling fan
- 105 Windows 95 keyboard & Microsoft® compatible mouse
- 4W Stereo speaker system (various options available)
- Microsoft Windows 95 with manuals and CD
- Lotus Windows 95 pre-loaded software suite with 1-2-3, Word Pro, Approach, Organizer and SmartPics
- GSP Pressworks and Designworks pre-loaded suite
- 6 CD multimedia titles
- 1 Year warranty extendable to 3 years

Built with 32Mb RAM

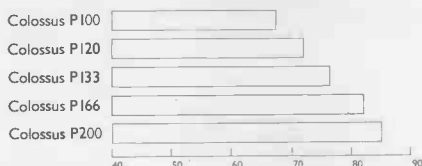
For optimum performance in Windows 95, you need a minimum of 16Mb RAM. Even our entry level systems now include 16Mb or more RAM as standard together with pipeline burst cache. For the best performance with smooth multi-tasking we recommend 32Mb RAM.



Fastest Processors

All Colossus systems use only genuine Intel Pentium processors. All our motherboards feature Intel socket 7 which will take processors from 75MHz to 200MHz. Systems using intel's new Pentium Pro processor are currently more suited as file servers or for 32-bit software such as Windows NT and are actually slower than Pentium processor based systems when running typical Windows 95 applications. We also offer Pentium Pro Systems bundled with Windows NT 4.0.

Relative Windows 95 performance



Based on Ziff-Davis Winstone 96

Pipeline Burst Mode Cache

The case for pipeline burst mode cache could not be stronger. Having pipeline burst mode cache is far more important than having just EDO RAM which only produces a marginal increase in performance. All our best buy systems include 256k or 512k pipeline burst mode cache

32Mb System RAM

Amount of system RAM is more important than type of RAM. If you are on a tight budget, we strongly recommend 16Mb RAM in preference to a faster processor. Windows 95 usability tests show better productivity and performance with 32MB RAM and we strongly recommend this in systems with a P133 or faster processor

Business Software

Most of our best buy models come with an excellent range of top quality business software. Please check system specification for details of which software is bundled.

Lotus Windows 95 software suite with on-line documentation is pre-loaded on most systems and includes

- Lotus Word Pro 96 for Windows 95
- Lotus Approach 96 for Windows 95
- Lotus 1-2-3 v5 for Windows
- Lotus Organizer v2.1 for Windows
- Lotus SmartPics graphics
- GSP software suite including Pressworks desktop publisher, Designworks graphics package



Business software from Lotus



Multimedia CDs including BodyWorks 5

SCOLDP3B

Colossus PI66 System 96 1B

£1585.⁰⁸ inc.VAT £1349 +VAT

Midi tower

- Intel 166MHz Pentium processor
- 32Mb EDO RAM expandable to 128Mb
- 2.0Gb Enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- 512k Pipeline burst mode external CPU cache
- ATI 64-bit PCI graphics with 2Mb fast 'SDRAM' video RAM, video acceleration and optimised for Windows 95
- 'Plug and play' wavetable 3D sound card
- 15" NI .28dp low radiation SVGA colour screen
(other options available)
- Intel socket 7 and advanced 'plug and play' motherboard
- Intel 430HX chipset with support for Flash BIOS and EDO RAM
- Fast PCI enhanced IDE mode 4 hard disk controller can handle up to 4 drives
- 3 PCI and 4 ISA expansion slots
- 2 16550 compatible UART driven high speed serial ports
- PS/2 mouse ports
- EPP and ECP capable enhanced bi-directional parallel printer port
- 3.5" 1.44Mb Floppy drive
- Colossus 8 bay midi tower case with 210W CE approved power supply and CPU cooling fan
- 105 Windows 95 keyboard & Microsoft compatible mouse
- 15W Stereo speaker system
- Microsoft Windows 95 with manual
- Lotus Windows 95 pre-loaded software suite with 1-2-3Word Pro, Approach, Organizer and SmartPics
- GSP Pressworks and Designworks pre-loadedsuite
- 6 CD multimedia titles
- 1 Year warranty extendable to 3 years

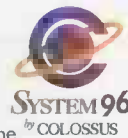


Colossus P200 System 96 4

£2113.⁸³ inc.VAT £1799 +VAT

Full tower

- Intel® 200MHz Pentium® processor
- 32Mb EDO RAM expandable to 128Mb
- 2.0Gb Enhanced IDE hard disk with 256K cache
- Eight speed IDE CD-ROM drive
- BABT approved 28.8 fax/data/Internet external modem
- 512k Pipeline burst mode external CPU cache
- 64-Bit PCI graphics with 4Mb 'WRAM' or 'SGRAM' video RAM, video acceleration and optimised for Windows® 95
- 'Plug and play' wavetable 3D sound card
- 3.2Gb tape back-up system
- 15" NI .28dp low radiation SVGA colour screen
(other options available)
- Intel Socket 7 and advanced 'plug and play' motherboard
- Intel 430HX chipset with support for flash BIOS and EDO RAM
- Fast PCI enhanced IDE mode 4 hard disk controller can handle up to 4 drives
- 3 PCI and 4 ISA expansion slots
- 2 16550 Compatible UART driven high speed serial ports
- PS/2 mouse ports
- EPP and ECP capable enhanced bi-directional parallel printer port
- 3.5" 1.44Mb Floppy drive
- Colossus 9 bay full tower case with 230W CE approved power supply and CPU cooling fan
- 105 Windows 95 keyboard & Microsoft compatible mouse
- Powerful 70W stereo speaker system
- Microsoft Windows 95 with manuals and CD
- Lotus Windows 95 pre-loaded software suite with 1-2-3, Word Pro, Approach, Organizer and SmartPics
- GSP Pressworks and Designworks pre-loaded suite
- 6 CD multimedia titles
- 1 Year warranty extendable to 3 years



Colossus PI66 System 96 1C

£1702.⁵⁸ inc.VAT £1449 +VAT

Midi tower model as above but with 28.8 BABT external modem and powerful 70W speaker system.

Built for Windows 95

'System 96 by Colossus' truly unlocks the power, compatibility and the versatility of Windows® 95. Our full tower systems are built on a solid performance foundation that includes the fastest Intel 430HX based motherboards, 4Mb 'SGRAM' or 'WRAM' graphics, 28.8 modems, 32Mb EDO RAM with 512k burst cache, 3.2Gb tape back-up and eight speed multimedia with wavetable 3D sound.



Leisure/Multimedia Software

In order you may enjoy the multimedia capabilities of these systems immediately, we include a range of CD multimedia packages which include:

- WinTutor 95 multimedia tutorial
- Infopedia full-feature encyclopaedia
- BodyWorks 5 educational/medical package
- French, German & Spanish language tutor
- Quicken v4 multimedia CD finance pack
- Shareware multimedia CD

High Capacity Storage

- Hard disks: All our systems feature the latest enhanced IDE hard disks with on board cache. Capacities are available from 850Mb to 2.5Gb. The performance of these disks when linked to the E IDE controller on our motherboards are comparable to SCSI II based systems.
- CD-ROM: All systems feature a fast IDE eight speed CD-ROM drive with data transfer rate approaching 1200Kb/ sec.
- System 96 P200 full tower models come with 3.2Gb tape back-up as standard.

Unique Sound Capability

All our popular multimedia systems feature quality integrated 'plug and play' 16-bit sound with low noise to signal ratio. System 96 features the latest wavetable 'plug and play' sound card with the following features

- Hardware wavetable synthesis and MIDI support
- 3D Spatializer audio technology giving 'surround sound'
- 1Mb wavetable in compressed ROM
- Up to 32 simultaneous voices, 190 instrument sounds and voice recognition
- 5 sound channels (4 stereo and 1 mono)
- Fully 'plug and play' compliant with CD quality sound compatible with Soundblaster, MPC II/III, Roland MT-32 and MPU-401
- Speakers may be upgraded to 15W for £20+VAT (£23.50) or 70W for £50+VAT (£58.75)

Fast 28.8 Modems

Most of our systems come with high performance 28.8 internal or external modems with associated software.



Superb Screens

All systems come with high quality crisp sharp screens with 0.28 or lower dp, low radiation and non-interlaced fast flicker free refresh rates giving a superb image. Our systems are also available with excellent VisionMaster screens manufactured by Japanese high end monitor specialists Iiyama Ltd.

- 17" Iiyama MF8617E: Upto 1600 x 1200 at 69Mz, 1280 x 1024 at 80Hz refresh. FST 0.26mm dot pitch tube. Horizontal Sync 27 to 86KHz.
- 17" Iiyama MT9017E: Upto 1600 x 1200 at 72Mz, 1280 x 1024 at 85Hz refresh. DiamondTron 0.25mm aperture grille tube. Horizontal Sync 27 to 92KHz.
- 21" Iiyama MF821E: Upto 1600 x 1200 at 75Mz, 1280 x 1024 at 90Hz refresh. FST Enhanced dot pitch 0.22MM Horiz, 0.16mm vert, 0.27mm shadow mask 0.28 diag phos. Horizontal Sync 24 to 94KHz
- 21" Iiyama MT9021E: Upto 1600 x 1200 at 75Mz, 1280 x 1024 at 90Hz refresh. DiamondTron 0.30mm aperture grille tube. Horizontal Sync 24 to 94KHz.

The screen with the system can be easily upgraded as shown below

14" to 15" + £70+VAT =	£82.25
15" to 17" + £230+VAT =	£270.25
17" to 20" + £530+VAT =	£622.75
17" to 17" MF8617E + £90+VAT =	£105.75
17" to 17" MT9017E + £140+VAT =	£164.50
17" to 21" MF821E + £740+VAT =	£869.50
17" to 21" MT9021E + £840+VAT =	£987.00



6COLTS3A

Colossus Notebook Range



The new Colossus range of notebooks are the direct result of our technology partnership with Texas Instruments, one of the worlds leading manufacturers of advanced notebooks. Take a closer look at the advanced specifications.



Colossus NBI 20-8

£1408.⁸³ inc.VAT £1199 +VAT

- Intel 120MHz Pentium® processor
- PCI bus architecture
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- Built-in stereo sound card, speaker and microphone
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- 12 Months Warranty.
- Weight 2.94Kg; Size 30.2 x 24.1 x 4.78 cm



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- 16k Internal cache
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- PCMCIA two type II or one type III slots
- Serial infra-red port for wireless connection
- EPP/ECP parallel; 16550 serial; external SVGA; PS/2 keyboard/mouse & expansion bus ports
- 12.1" Dual scan; SVGA 800 x 600; 256 colour screen
- 1Mb PCI graphics with video acceleration
- Simultaneous display with external SVGA screen
- Long life NiMH battery with switchable A/C adapter
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- Simultaneous display with external SVGA screen
- Long life NiMH battery with switchable A/C adapter
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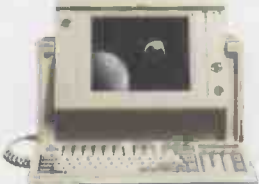
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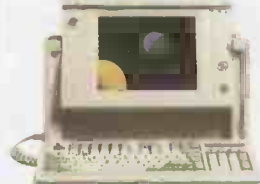


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Into a new dimension

Graphics card manufacturers are giving the home user a taste of 3D technology. Dylan Armbrust puts 12 cards on the spot to see how it works.

One of man's great desires is to portray the three dimensions of reality onto a two-dimensional surface. Great artists like Da Vinci and Michaelangelo sought to portray life and perspective as closely as possible. Today, that desire is as strong as ever, and the technological push to accomplish this in computing has just begun to touch the home market.

The new buzzword in the PC industry is "3D", conjuring up images of virtual reality or CAD, and the concept has now reached the mass market. Everyone is talking about it, and, better yet, graphics card manufacturers are making it a possibility. At the beginning of last year, manufacturers were talking about the new 3D graphics revolution. Microsoft had bought the pioneering 3D software house, Rendermorphics, and was creating a 3D API, Direct 3D (D3D), under its DirectX umbrella to give games and graphics card manufacturers a common standard to work to. The spin-off from this is with us now.

Microsoft has released its DirectX standard, the most recent version of which is DirectX 3.0 (available since last October), and all and sundry graphics card manufacturers have released 3D-capable cards. Some, like ATI and

Matrox, have come up with 2D/3D cards and designed their own silicon. Others, like STB and miro, have chosen the ubiquitous S3 for their controller chips, while VideoLogic and Orchid have eschewed the 2D/3D solution and aimed directly for the sweet spot of the market — the dedicated gamer.

On the games front, it was said, only six months ago, that there would be between 30 and 50 D3D games on the shelves by Christmas, yet at the time of going to press only two had been released. The delay of the DirectX 2.0 release by Microsoft caused a shortage of 3D games this past autumn when most of the graphics cards were launched. This meant that the majority of card manufacturers have had games "ported", or written for, their own hardware to make use of the new 3D technology, and that is why you'll see many of the cards with their own games bundle.

But the real question that remains is whether the technology works, and what the consumer can use it for. In this group test we put twelve 3D cards through the labs to see just how good this new technology is and where it's going. We take a look the hardware, the drivers, and overall performance across a range of tests to see where everybody stands.

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3D Graphics Cards Contents

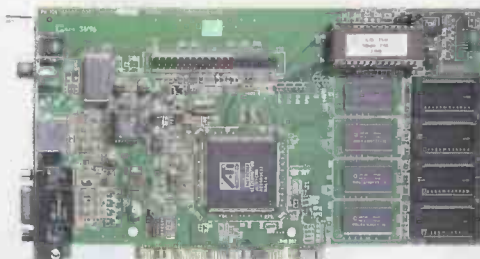
- 212** ATI Pro Turbo PC2TV
ATI 3D Xpression
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Creative Labs
3D Blaster PCI
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Elsa Victory 3D
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ATI Pro Turbo PC2TV

The first of our 3D graphics cards comes from one of the big players in the market. ATI was one of the first companies to launch a 3D-capable card with its Rage chip. It has now moved on to the 3D Rage II, incorporating it into the Pro Turbo PC2TV card. This is one of those all-in-one cards. It handles standard 2D graphics and 3D graphics, and it's also able to output its display signal to a TV. This is great for the kids who want to see their game action on a much larger screen, like a 32in TV, rather than settle for the usual 14in or 15in PC monitor.

The half-length card comes with a minimum of 4Mb of SGRAM (Synchronous Graphics RAM) and can be upgraded to a maximum of 8Mb. The blanking plate has three connectors: D-sub, S-Video and an RCA composite Video-out for the TV. ATI was one of only two card manufacturers in the group (miro being the other) to have this feature.

Its 3D capability fared well on the Intel Media benchmark, posting the highest scores in both the 800 x 600 and 1,024 x 768 resolution



newer drivers using DirectX 3.0 hadn't yet been released. This was no excuse, however, for the fact that when running MTM in a high resolution and colour depth, the desktop would return to 640 x 480, thus disrupting the desktop icon layout.

tests. However, the results were different when run in the Microsoft D3D tests, where it came last. It did manage to run the D3D game, Monster Truck Madness (MTM), where the hardware acceleration was put to use, but the gameplay was a bit choppy. Most of this is down to the drivers which were authored under DirectX 2.0, as the

PCW Details

Price £179 (expected)
 Contact ATI 01235 833666
 Good Points Composite and S-Video out for TV display.
 Bad Points Returned desktop to lower resolution after running game from higher-resolution setting.
 Conclusion An average 3D card, but its 2D capabilities are excellent.

★★★

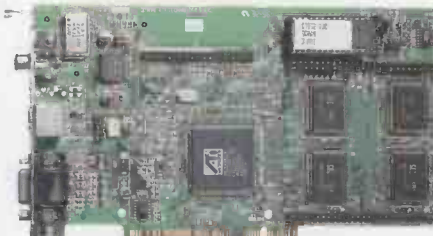
ATI 3D Xpression PC2 TV Plus

The second of ATI's 3D contingent, the 3D Xpression PC2TV Plus is its cheaper card. At an expected starting price of £119, it's the second best buy of the group.

The difference between the Pro Turbo and the 3D Xpression is the use of cheaper and less optimal SDRAM (Synchronous DRAM). This didn't seem to have an impact on the Intel score where it was a runner-up, but the ATI fell down on the Microsoft D3D test, which it failed to complete. According to the D3D test there wasn't enough memory on the card to complete it, which wasn't the case with other 2Mb cards.

Aside from the difference in memory, the 3D Xpression comes with the same features as the Pro Turbo. It makes use of the 3D Rage II chip, and boasts composite and S-Video output for TVs as well.

Our review unit came with 2Mb of SDRAM but 4Mb cards are available. With a 170MHz RAMDAC, the card can support a vertical refresh rate of 200Hz at 600 x 480 to 60Hz at 1600 x 1200 (using a 4Mb configuration) but these figures are limited to 2D rendering only. The



chip) which make optimal use of the chip's architecture. ATI bundles Mech Warrior II, Wipeout and Assault Rigs. The gameplay of MTM was about the same as the Pro Turbo, but not as stilted as the Matrox. Again, we ran it using ATI's version 3.0 drivers using DirectX 2.0 so this was bound to have an impact.

maximum resolution attainable for 3D rendering is 800 x 600 at 8 or 16-bit colour depths, depending upon whether there's 2Mb or 4Mb of memory respectively. The 2D engine is fine and the Integrated display utilities excellent. Both the 3D Xpression and the Pro Turbo come with specially "ported" games (games specifically adapted for the card's graphics

PCW Details

Price £119 for 2Mb (expected); 4Mb card price TBA
 Contact ATI 01235 833666
 Good Points Same features as Pro Turbo, but cheaper.
 Bad Points Still some glitches in the drivers. D3D game acceleration disappointing.
 Conclusion Average, but expected price is competitive.

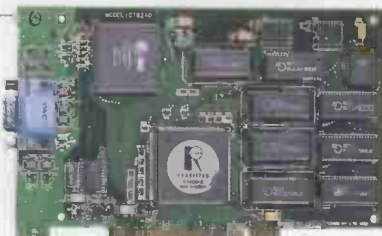
★★★

Creative Labs 3D Blaster PCI

The last time we looked at a 3D Blaster it was Creative Labs' VL Bus version, and there was no definitive test we could run, let alone a VL Bus PC we could run it on. With the 3D Blaster PCI version, we can see what Creative has to offer.

The 3D Blaster comes with 4Mb of EDO DRAM and the Rendition Verite 1000 graphics chip. The card is a 2D/3D solution, like most of its competition, and its market is aimed squarely at the home. It had one of the most extensive game bundles of the lot. With Quake, Tshinden, Rebel Moon and Flight Unlimited all specially ported to the card, it stands out from the other game offerings. Its 2D capability was about average but the Blaster Control utilities impressed. A simple click on the icon allows for quick change of display settings, with the added bonus of Blaster Control rescue to help resync monitors after a refresh change.

The 3D capability was more difficult to gauge. It ran the Monster Truck Madness D3D game well with all the texture and detail settings turned on. But when we decided to change some settings while



component, but this shouldn't have had that much of an effect on MTM. On the Intel test it came in the bottom quarter of the pack with a scores in the low 90s, while on the Microsoft D3D test it managed to place an impressive second overall, but 3D hardware acceleration only registered in 16-bit colour depth.

playing the game, it would default back to software rendering and revert to a slow, choppy game until we reloaded it. It would also default back to a 640 x 480 desktop if we ran in any resolution and colour depth above 800 x 600 in 16-bit colour.

Again, we were forced to use its drivers without the updated DirectX 3.0

PCW Details

Price £169
 Contact Creative Labs 01245 265265
 Good Points Good handling of D3D game.
 Bad Points Drivers need to be fine-tuned for 3D gameplay.
 Conclusion Good all-round graphics card, but wait for the new DirectX 3.0 ready drivers.

★★★

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3D Blaster

PCI

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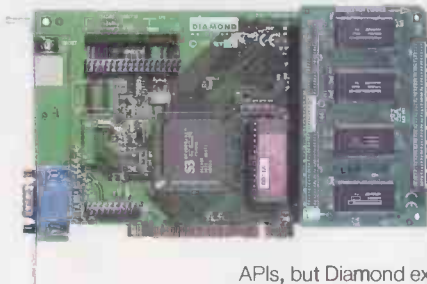
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Diamond Multimedia Stealth 3D 3000XL

The Stealth 3D 3000XL is slightly different from the rest of the pack. It is being marketed, and priced, for high performance users. It has 4Mb of VRAM and, like many cards in this group test, makes use of the S3 VirgeVX chip.

There's only one ported 3D game (Descent II) in the box but Diamond has included Compton's Encyclopaedia and Asymetrix 3D FX. The 4Mb VRAM card has a 220MHz integrated RAMDAC which will support up to 1600 x 1200 resolution at 75Hz. Diamond also offers a 2Mb solution for those with less demands and less money.

Its score on the Intel Media benchmark came out on the low end, but it managed to score above-average marks in the D3D tests. This was particularly noticeable in its running of the D3D game, Monster Truck Madness. The game readily made use of hardware acceleration and the game flow was reasonably smooth, even with all the texture and detail set to maximum. But, like the Creative 3D Blaster, once the game was interrupted it lost its smoothness and reverted back to poor



detail and gameplay.

The 2D component showed itself to be particularly good, but this area is Diamond's forté. The drivers integrated in the Control Tools display utilities also showed their strength, especially with the multiple desktops option and pop-up menus. The drivers we received included the older DirectX 2.0

APIs, but Diamond expects to have updated versions by the time this review is published.

The card we received had only a standard D-sub monitor connector, but a TV connector, similar to the ones ATI and miro have, should be integrated into the 3D Stealth by the time we go to press.

•PCW Details

Price £179 for 2Mb; £215 for 4Mb
 Contact Diamond Multimedia
 01189 444400
Good Points Solid all-round performer, strong in 2D.
Bad Points 3D driver component a bit flakey.
Conclusion Strong on 2D, above-average 3D and five-year warranty make it competitive.
 ★★

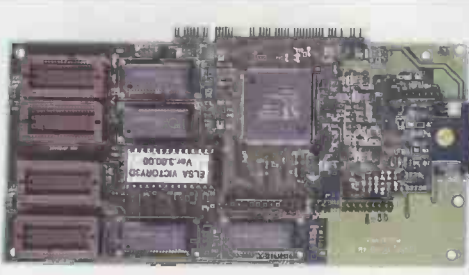
Elsa Victory 3D

This German company has yet to fully crack the UK market and it looks like it still has a lot of work to do if it expects to with the Victory 3D. The Victory was one of the six S3 Virge-based cards in the group. It carries 2Mb or 4Mb of EDO DRAM, but our review model came with 2Mb.

The S3 Virge chip includes a 220MHz RAMDAC to provide up to 1280 x 768 resolution in 8-bit colour at 76Hz. Oddly, we found we couldn't adjust the refresh rate above a flickery 60Hz when operating at a resolution of 1024 x 768 in 16-bit colour. No matter what we did, it wouldn't change. This is bad.

The performance of the Elsa disappointed on many occasions. We couldn't get Monster Truck Madness to recognise that a 3D hardware acceleration card was present, so gameplay was abysmal. It finished middle of the pack on most of the tests, like the other S3-based cards, but it did come up short in its 2D component.

Again, the card faced problems when confronted by D3D. When



running these tests, we could only get it to function if it operated with the mono rasterisation turned on instead of RGB rasterisation like the rest of the cards.

The games bundle consists of the S3-ported games Battle Race and Terminal Velocity, which we found ran well. Also

included is a 3D web VRML plug-in, called VR Scout, to exploit 3D web sites.

The Victory 3D has a good set of display utilities in the form of WinMan, which offers the usual zoom, virtual desktop and other functions.

•PCW Details

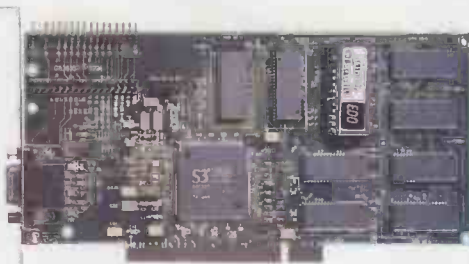
Price £189 for 2Mb; £249 for 4Mb
 Contact Force 2 International
 01844 261872
Good Points Nice-looking utilities.
Bad Points Overpriced, and drivers too flakey.
Conclusion Drivers need serious work, and for what it offers, it's overpriced.
 ★

Hercules Terminator 3D

Hercules is an odd company. Once true to its name, it dominated the market, but alas, this is no more. It does, however, appear to be making a comeback of sorts.

The Terminator 3D is one of the weapons it plans on using to do this. It's an S3 Virge chip-based card that comes with 2Mb or 4Mb of EDO RAM: our unit came with 4Mb. This S3 model came with an integrated 135MHz RAMDAC, so its refresh and resolution capability was more limited than that of the Diamond with a 220MHz RAMDAC.

Hercules didn't provide us with a driver capable of running any D3D games. In fact, it completely abandoned DirectX 2.0-based drivers, based on its opinion that they were buggy. Hercules has adopted the new DirectX 3.0 API instead — an honest approach, but unfortunately we were left to use generic S3 Virge drivers to get the card to run in our 3D tests. As a result, we can't accurately say how good or bad the Terminator is, but judging by our results, it seems to be exactly what you'd expect an



S3-based card to be: average.

However, we did use Hercules' drivers in our 2D test and it performed very well, especially at 800 x 600 in 24-bit colour. Hercules has optimised the driver for true-colour operation, which is good news for those who don't like to pay a

performance penalty when operating in this mode. Hercules expects to have new drivers incorporating the DirectX 3.0 API by the time we go to press.

On the games front, the Terminator 3D comes with Descent II.

•PCW Details

Price £111 for 2Mb; £142 for 4Mb
 Contact Imago Micro 01635 861122
Good Points Showed excellent 2D performance; lowest-priced of the lot.
Bad Points Same D3D game faults as Creative and Diamond.
Conclusion Strong on 2D, hopefully as good on 3D. Looks like a good buy.
 ★★

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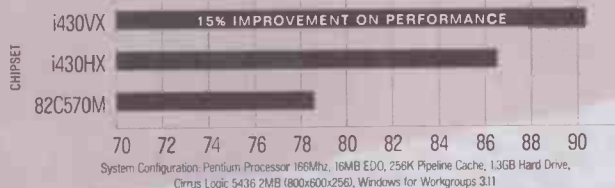
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What is 3D graphics all about?

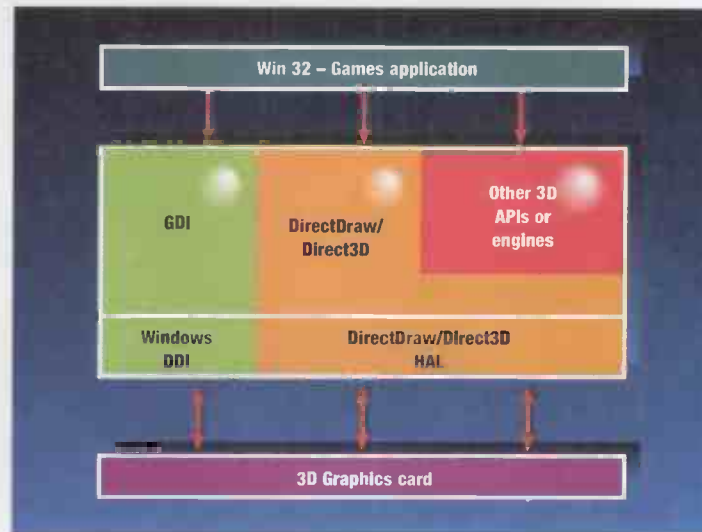
To accomplish 3D computer graphics you need two things: lots of computer muscle and memory. Only since the advent of the higher-clocked Pentiums has 3D been feasible. But even with these in place, it still isn't enough to cope, and that's where the 3D graphics card comes in. The graphics chip, whether it's dedicated to 3D or a dual-purpose 2D/3D chip, removes the bulk of the load off the CPU and performs the rendering of the image itself. All of this rendering, or drawing, is accomplished through the graphics pipeline.

The 3D graphics pipeline consists of two major stages: geometry and rendering. The geometry stage, performed by the CPU, handles all polygon activity and converts the 3D spatial data into pixels. The rendering stage, handled by the 3D hardware accelerator, manages all the memory and pixel activity and prepares it for painting to the monitor.

In the geometry stage, all 3D images are broken down into polygons. Each polygon is analysed and assigned various characteristics. Objects are defined for their co-ordinates and combined into a single co-ordinate system called a World Space Co-ordinate. Any elements which fall outside the display window are clipped or discarded.

User input (i.e. playing) within the World Space causes the object to move. As it moves, its geometry must be revised and recalculated. This is known as Transformation and involves changes to the X, Y and Z (or depth) direction. A good example is Duke Nukem 3D: as the hero (the player) runs through a door and turns left into a room, the whole scene changes; as he moves closer to the door it must get bigger, and as he turns left a whole new room scene must be created, giving the illusion of depth. Added to this are changes in camera (view), lighting, texture and colour of the objects, all of which must be calculated or recalculated. After all these calculations have been made, the CPU hands the processing tasks to the 3D hardware accelerator. This is known as the set-up stage and it's the last stage before rendering (drawing).

In the rendering stage, performed by the hardware accelerator, the 3D engine draws the pixels. The bottleneck here is memory access — how fast the pixels read and write to the display memory (frame buffer). There are thousands of polygons for each frame of a scene, and these must be updated and transmitted through the memory at least 30 times a second, to give the illusion of movement. This transfer to the frame buffer is known as frame rate and is measured in frames per second (fps). From there, the frames are transmitted to the RAMDAC (Random



Access Memory Digital-to-Analogue Converter) and converted into an analogue signal for the monitor where, after much mathematical manipulation, the action takes place.

What is DirectX and Direct3D (D3D)?

DirectX is an integrated set of programming tools developed by Microsoft to help developers create a whole range of multimedia applications for the Windows 95 platform. It

covers almost all aspects of multimedia content.

The main components, or Application Programming Interfaces (APIs), consist of DirectDraw for accelerated 2D graphics, DirectInput for joysticks and other related devices, DirectSound for audio, DirectPlay for network connectivity (especially for internet games) and Direct3D (D3D) for real-time 3D graphics. D3D is the most important API for 3D game producers and 3D-capable graphics card manufacturers. The key to D3D is that it allows the game developer to author games independently of the PC's hardware (in this case, the graphics card). Unlike games consoles such as the Sega Saturn, which has a consistent hardware platform and is thus easy to write games to, PCs are notoriously inconsistent in their hardware make-up.

D3D has removed this variable with the introduction of a Hardware Abstraction Layer (HAL), thereby making the software device independent. The HAL provides an interface to capabilities that are widely implemented in 3D graphics hardware and allows the manufacturers to produce drivers which link the HAL to the hardware. This allows the D3D applications to exploit the hardware features without having to be authored for that particular device.

In theory, this is a brilliant idea: games producers could make D3D games and they should run on any 3D-accelerated graphics card. But regrettably, this isn't the case at present. Due to long delays in the original release of DirectX and some bugs in the subsequent releases, a situation arose where the hardware vendors had 3D-capable hardware but there wasn't any software to use it. At the time of going to press, only two D3D games had been released, whereas previously, up to 30 had been expected before Christmas. This led to the current situation and a step back to device-dependent games ported for the specific hardware on the card — that's why you see the current crop of 3D cards with their own games bundle.

With the latest release of DirectX version 3.0, all this is supposed to change, but not until after Christmas. Expect to see fully DirectX 3.0-compatible drivers for all hardware vendors by Christmas and the anticipated wave of D3D games early next year.

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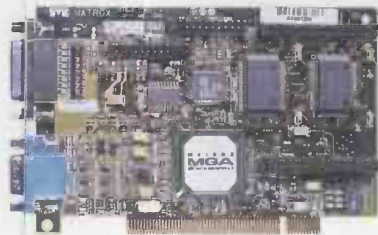


Games included in retail pack only

Matrox Mystique

When we first looked at this card a few months ago, we didn't have any 3D tests and nothing against which to compare it, so we really didn't know how good it was. But now we do, and sadly, the Mystique, Matrox's spearhead into the consumer market, comes up appallingly short. The trouble started when we tried to install the card. Windows 95 recognised it on the first go but it wouldn't load the drivers properly. After five attempts and a couple of lock-ups, we managed to install the card by loading an older set of drivers (v 3.14) first and then installing the newer (v3.16) drivers afterwards. If we had such problems, we wondered how a buyer without a driver library would fare.

On the performance side, too, the Mystique comes up short. Very short: it came last in the 2D test, in the bottom half of the Intel 3D test, and it would only run the Microsoft D3D test at a resolution of 800 x 600 in 16-bit colour and nothing higher. Judging by the polygon throughput the Mystique scores unexpectedly low, especially when



compared with the lower-rated S3 chips. The D3D game, Monster Truck Madness, barely chugged along, even with the settings set to minimum, and it practically ground to a halt when set to full-screen and maximum detail.

The card itself contains the Matrox MGA-1064SG chip and 2Mb of SGRAM, although you can upgrade to 4Mb. There's an MPEG

decoder option available and video-in/out will soon be a standard feature on the blanking plate, just like the ATI.

The games bundle consists of ported Mystique versions of Scorched Planet, Destruction Derby 2, Mech Warrior II, plus a 3D web browser and MPEG software.

PCW Details

Price £120 for 2Mb; £160 for 4Mb (both plus VAT)
 Contact Matrox UK 01793 441100
 Good Points Good games bundle.
 Bad Points Drivers didn't load properly. Performance is very disappointing.
 Conclusion The offspring of the beloved Millennium is an errant child. Let us hope they get the drivers right next time.
 ★

miroMEDIA 3D

miro products are a bit like a determined but old and tired boxer in the ring with a new, young champion. They try to compete but they always fall down in the end: you knew they shouldn't have been there in the first place.

The same can be said of the miroMEDIA 3D — it was trouble from the beginning. Loading the drivers proved to be a convoluted process. Windows 95 identifies the card, but one must make use of the miro Setup manager to install the components. This is good for beginners, but it could confuse those familiar with the standard driver installation routine. Oddly, once we went through the setup routine, we found that two drivers, both for the miroMEDIA 3D, had been installed but only one of them worked. Why install two drivers if only one works?

Then we moved on to the testing. When we began to run our tests, we discovered that the 3D hardware acceleration component



wasn't being recognised. miro informed us that there were no DirectX API's in these drivers, and therefore no D3D, so it wouldn't run in our tests. The company is releasing updated drivers by early December. We did try a generic S3 Virge driver, but it failed to work with the card.

Miro has included in its package a set of Simuleyes glasses that offer visual 3D action when run with particular games, in this

case Descent II. But the whole thing seems a bit gimmicky.

By the way, watch out for spelling mistakes in the manual and in the software utilities on the desktop, as it's a reliable sign of quality control. miro has given the option "Always on top".

PCW Details

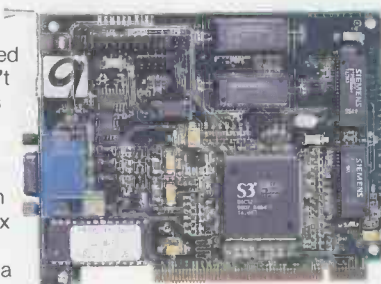
Price £140 for 2Mb
 Contact miro 01494 510250
 Good Points Sadly, none.
 Bad Points Too expensive with nothing to offer.
 Conclusion This card just isn't in the running.
 ★

Number Nine Reality 332FX

The Reality 332FX is yet another S3 Virge chip-based card. The 332FX is Number Nine's low-end consumer graphics card aimed at the home user and its performance doesn't quite match the reputation of the company's better-known high-end cards.

The 332FX is a pretty basic 2D/3D card that only comes with 2Mb of EDO RAM. It can handle resolutions and refresh rates from 640 x 480 in 32-bit colour at 115Hz to 1280 x 1024 in 8-bit colour at 75Hz, which is pretty standard for most of the S3 Virge cards with a 135MHz RAMDAC. There are no extra connectors, such as TV-out, but it does have the standard VESA connector if needed.

We ran our tests using their version 1.21 beta drivers and found the results to be fairly reasonable on the Intel Media benchmark, placing it a respectable fourth. However, it wouldn't run the Microsoft D3D test at 1024 x 768 in 16-bit colour due to lack of memory. When running in 800 x 600 in true colour we found the scores to be below



par. Its 2D capability was respectable, coming in only half a point behind the Diamond Stealth 3000XL.

The 332FX comes bundled with Terminal Velocity, Havoc, and Screamer, all ported to the S3 chip. In addition, Number Nine includes the Asymetrics 3D web browser.

One of the stronger aspects of the 332FX was the Hawkeye utilities. The easy-to-use interface allows you to change refresh rates, zoom and operate using a

virtual desktop.

Its five-year warranty and 24-hour technical support give the 332FX a good leg-up over some of the other S3-based cards. New drivers are due by early December.

PCW Details

Price £125 for 2Mb
 Contact Number Nine 01707 827926
 Good Points Good games bundle, fair price.
 Bad Points Performance under par.
 Conclusion A purely average card.
 ★★★

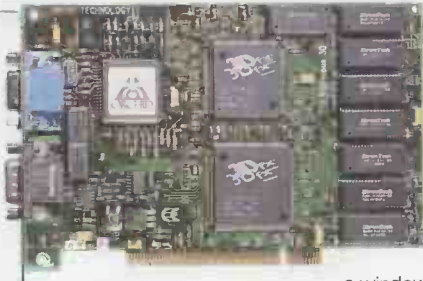


Orchid Righteous 3D

The Orchid is one of two dedicated 3D graphics cards in this group test. The serious gamer who wants the best performance and doesn't want to settle for 2D/3D solution is its market. It can also be looked at as the perfect add-in card, as there is no need to throw away your old graphics card: the Righteous works in conjunction with it.

Installing the card was as easy as pie. We just seated the card into the PCI slot, attached the loop-through cable to the existing graphics card and turned on the PC. Windows 95 detected the Righteous and driver installation went without incident.

The Righteous comes with 4Mb of EDO RAM and makes use of the 3DFX Voodoo graphics chip. It displays only in 640 x 480 resolution in 16-bit colour but it offers a refresh rate selection utility. It works by bypassing your regular graphics card when it detects any 3D API-based games. This includes its own ported games as well as those using D3D, Criterion's Renderware, and Gemini's OpenGVS. Once the



API is detected, it literally clicks in as the operating graphics card and displays the image.

Performance is outstanding. It ran Monster Truck Madness smoothly and glitch free, with all textures and details on maximum. On the Microsoft D3D test it out-scored all except the VideoLogic Apocalypse 3D by almost two to one. There is no score for the Intel benchmark because it will only run in a full-screen

environment, not a windowed one. It has the largest game bundle, including Fatal Racing, Descent II, MechWarrior II and Actua Soccer, all ported to the 3DFX chip. There are trial versions of the D3D games Monster Truck Madness and Hell Bender, plus Criterion's Renderware version of Scorched Earth.

PCW Details

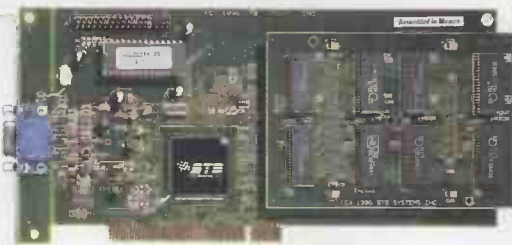
Price £199 (plus VAT)
 Contact Orchid 01256 479898
 Good Points Fast fast fast.
 Bad Points Pricey.
 Conclusion If you want fast, 3D gameplay, take a look at this.
 ★★★★★

STB Velocity 3D

The Velocity 3D was the last of the S3 Virge-based cards we looked at. STB has been around for a while and, like Hercules, tends to hover in the middle of the pack, both in terms of profile and performance.

The Velocity 3D we received came with 4Mb RAM. It is also available with a whopping 8Mb, comprising 4Mb of EDO VRAM and 4Mb of EDO DRAM. The chip is actually the S3 VirgeVX chip with integrated 220MHz RAMDAC. It's capable of refresh rates of 160Hz at 640 x 480 up to a solid 80Hz at 1600 x 1200 resolution, even though there are few monitors available that will support 160Hz.

When trying to run the D3D game, Monster Truck Madness, we encountered similar problems to that of the other S3-based cards. The game had problems recognising the 3D hardware acceleration, it ran poorly, and returned to the desktop to 640 x 480 even if it had started in a higher resolution. It fared poorly on the Microsoft D3D



test, particularly on the polygon rate throughput. On the 2D tests it bettered both the Elsa and the miro, but remained firmly in the middle of the pack. Driver weakness is the key here, and, of course, STB hadn't had its DirectX3.0-ready drivers ready to go during our review.

They should be released as this goes to press.

The games pack is a bit slim and uncertain at the time of writing, with Mech Warrior II and Earth Seed 2 among the potential offerings. However, STB has excelled the rest by offering a ten-year warranty and technical support.

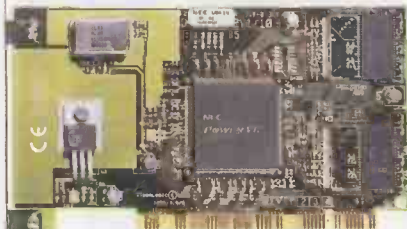
PCW Details

Price £135 for 4Mb; £199 for 8Mb (both plus VAT)
 Contact STB Systems 0181 897 1003
 Good Points Excellent warranty. Fair price, especially for 8Mb.
 Bad Points Drivers and performance under par.
 Conclusion A good offer at a good price, but the D3D driver aspects need work.
 ★★★

VideoLogic Apocalypse 3D

The Apocalypse 3D comes from UK-based VideoLogic and it includes the long-awaited PowerVR PCX1 chip. Like the Righteous, the Apocalypse 3D is a dedicated 3D rendering card aimed at the those who want the best gaming experience they can get.

The card, like the Righteous, sits in a PCI slot but no analogue loop-through cable is required. In fact, the card itself has no connectors on it at all: the interface with the graphics card runs digitally through the PCI bus. Aside from the PowerVR chip, the card comes with 4Mb of SDRAM. The Apocalypse needs to work with a graphics card with 2Mb of memory or more, as we discovered when testing it out on our benchmark PC. It's capable of handling 32-bit colour at 640 x 480 up to 8-bit colour at 1280 x 1024, which gives it a greater colour and resolution range than the Righteous 3D. We ran the ported version of MechWarrior II to test it out and the results were impressive. Detail and colour were rich at



1024 x 768 and the gameplay was still fluid.

Once the card was in place, installation was easy. Windows 95 detected the card and installing the drivers went normally. VideoLogic turned out to be miles ahead of the competition in that its drivers actually

included the new DirectX 3.0 API. The Intel test uses the DirectX 2.0 API and this makes a like-for-like comparison difficult. Unfortunately, the same is true with Monster Truck Madness. Regardless, the Apocalypse 3D scored third on the Intel test, with only a third of a point separating it from the top.



PCW Details

Price £149 for 4Mb
 Contact VideoLogic 01923 260511
 Good Points Handles high resolutions and colour depths in 3D gameplay.
 Bad Points Didn't run Monster Truck Madness well.
 Conclusion A card meant for serious gamers, and the ported games run very well.
 ★★★★★

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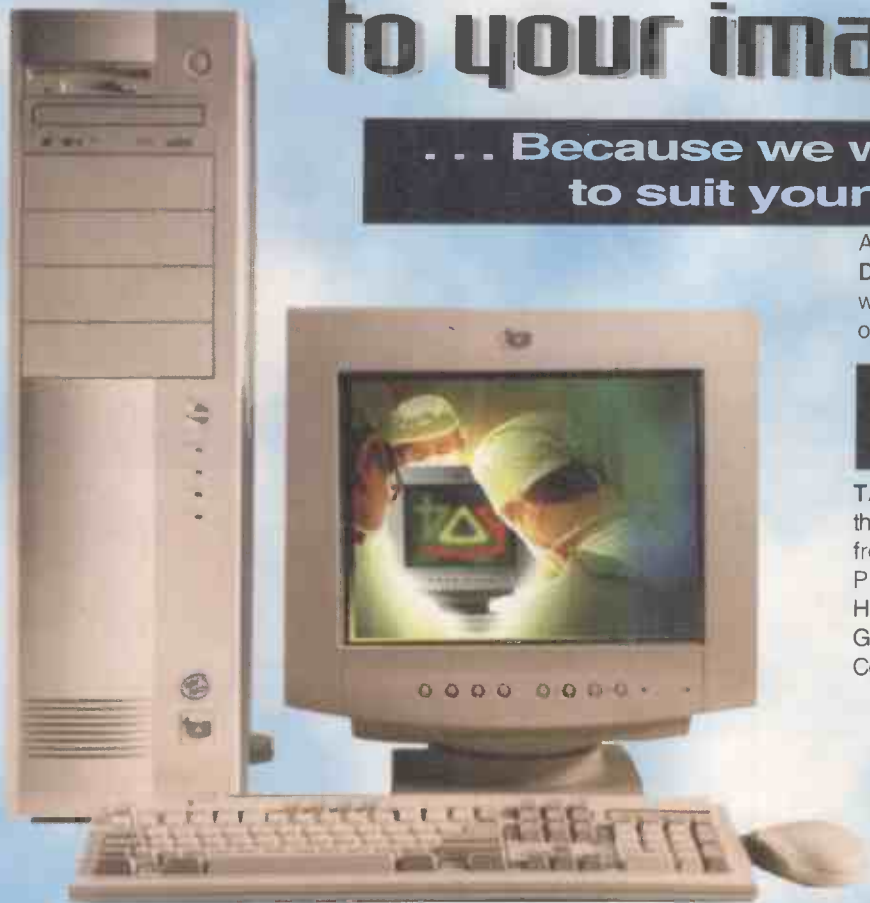
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- PCI (75MHz-200MHz) pipeline motherboard with 256K pipeline burst mode cache expandable to 512K
- 4 PCI & 4 ISA slots (1 shared)
- Intel VX chipset
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- 3.5" diskette drive
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- 2Mb EDO 64 Bit Graphics Accelerator card
- 1 parallel port, 2 serial (16650 UART) ports
- 14" .28DP NI MRP-II colour SVGA display
- Eight speed internal CD-ROM drive
- 16 Bit sound card
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- MICROSOFT WINDOWS 95 & MICROSOFT WORKS
- INTERNET READY SOFTWARE
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- 1.2Gb Enhanced IDE hard drive
- 2Mb EDO Graphics Accelerator Card
- 1 parallel port, 2 serial (16650 UART) ports
- 14" .28DP NI MRP-II colour SVGA display
- Eight Speed Internal CD-ROM Drive
- Enhanced keyboard & MS compatible mouse
- Available in desktop or mini tower case
- MICROSOFT WINDOWS 95 & MICROSOFT WORKS
- INTERNET READY SOFTWARE
- 2 YEAR WARRANTY

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Hewlett Packard Laserjet 5L	£309 + VAT
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Delivery cost for most systems is £20 +VAT. All prices exclude VAT @ 17.5%. E & OE. All prices correct at time of going to press. If any purchaser is able to prove a system of similar specification is advertised nationally at a lower price than ours, we will undertake to refund the difference. This does not affect your statutory rights. TAG PC Technology prices and specification are subject to change without notice. All sales are subject to TAG PC terms and conditions, a copy of which is available on request. FREE loan equipment is only for the first year. Photographs shown for illustration purposes only. Tag Entro and Entromedia illustrations are shown with 15" monitor and system case upgrade. All trademarks acknowledged. The Intel inside logo, Intel 486, Pentium, Pentium Pro are Registered Trademarks, and the Pentium Processor and Pentium Pro Processor logo are Trade Marks of Intel Corporation.

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- 3.5" diskette drive
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- 32Mb EDO RAM expandable to 128Mb
- 3.5" diskette drive
- 2.1Gb Enhanced IDE hard drive
- ATI 2Mb Video Xpressions Graphics Accelerator Card
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- Eight speed internal CD-ROM drive
- Enhanced keyboard & MS ergonomic mouse
- Available in desktop or mini tower case
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- INTERNET READY SOFTWARE
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- 3.2Gb Internal Tape Streamer
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Games



◀ MechWarrior 2

The year is 3057 and the Regular Army League has split into two warring factions, known as Clans. You are a clan member piloting a high-tech Battlemech. Your job is to blow up the enemy clan's BattleMechs, advance in rank and win the day. The 3D textures are impressive, particularly when running at a resolution of 1024 x 768 on the VideoLogic Apolalypse 3D, and the simultaneous sound of spoken computer reports, mechanical humming and the muffled pounding of your armoured feet made this game a popular and obvious choice for the 3D graphics card. Bundled with ATI, Matrox, Orchid, STB and VideoLogic's 3D graphics cards

▶ Monster Truck Madness

A real hillbilly hoot. One of the first, and only, 3D games using Microsoft's new Direct 3D engine, it's meant to give you a real 3D experience across all 3D hardware platforms — provided the graphics card has DirectX enabled drivers. You can race in a Drag, Rally, Circuit, or Tournament setting. Even with a 3D accelerator card, the detail has a maximum resolution of 640 x 480 and should be run in 256 colours for optimum performance. One of the weaker 3D games of the bunch. Price £44.99 (incl VAT). Contact Microsoft 0345 002000



▶ Scorched Planet

You are Mr Gibson, former top-flight pilot but now a washed-up and drunken supply ship captain, who is forced back into the pilot's seat to save Daytor 5 from the mean and nasty Voraxions. Using a Type 16 morphing vehicle you must drive or fly and save as many people as possible. The game looks forbidding but the detail and texture mapping is impressive, especially when run in its high-res mode of 800 x 600. This 3D game veers from the norm, making use of Criterion's own 3D API, Renderware, to give that 3D experience. It is also ported to the Matrox Mystique and compatible with the Righteous 3D and the 3D Blaster PCI. Price £39.99. Contact Criterion 01483 406200

▶ Quake

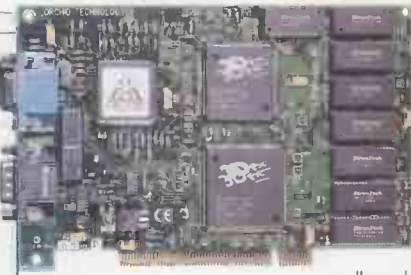
Quake is the new slash-n-blast from the people who brought you Doom. Tackle the evil alien hordes or go head to head with a network mate, with a huge array of weapons, in an attempt to restore peace to the galaxy. Quake combines excellent 3D graphics (specially-ported in this case to the Rendition Verite chip) with high-resolution graphics ability that maximises its visual impact. Creative has done well to bag this one



Editor's Choice

After much time and effort spent in the labs, it became clear to us that the 3D graphics card industry is still at a very immature stage. At the time we were performing our tests, we found that the whole industry seemed to be a hotch-potch and this was reflected by the participants in the group. Of the 12 manufacturers, only one, VideoLogic, had incorporated DirectX 3.0 into its drivers. Two candidates sent us cards but didn't include D3D-capable drivers: we had to use generic drivers for these. Of the rest, all had drivers that incorporated the DirectX 2.0 API even though this version is now effectively dead because Microsoft released DirectX 3.0 at the beginning of October, causing everyone to scramble to make the Christmas sales season.

As a result of the delays in the release of DirectX, few games have been launched. Six months ago we were told to expect anywhere between 30 and 50 D3D-capable titles before Christmas. At the time we went to press only two, Monster Truck Madness and Hellbender, had been released and they



were from Microsoft. As a result, the best



3D game experience at the moment can really only be attained via ported versions of the games included with the graphics cards. This is not a good state of affairs, especially if you want a wide 3D gaming experience. All eyes are looking towards the middle of next year before this market comes into its own.

However, we did manage to come up with an Editor's Choice — the Orchid Righteous 3D. This dedicated graphics card outperformed all, in both ported and D3D games, and was easy to install. It also included the largest games combination of the lot.

Our Highly Commended award goes to the Orchid's direct competitor, VideoLogic's Apocalypse 3D. Although not as fast as the Righteous, it nevertheless gave it a good run for its money. Its strength lies in the ability to cope with high resolutions and colour depths, and hence more vivid and textured 3D rendering than the rest of the group. Furthermore, it's a good deal at the price.

Intel Media Benchmark Tests (raw score)

Microsoft D3D Polygon Test

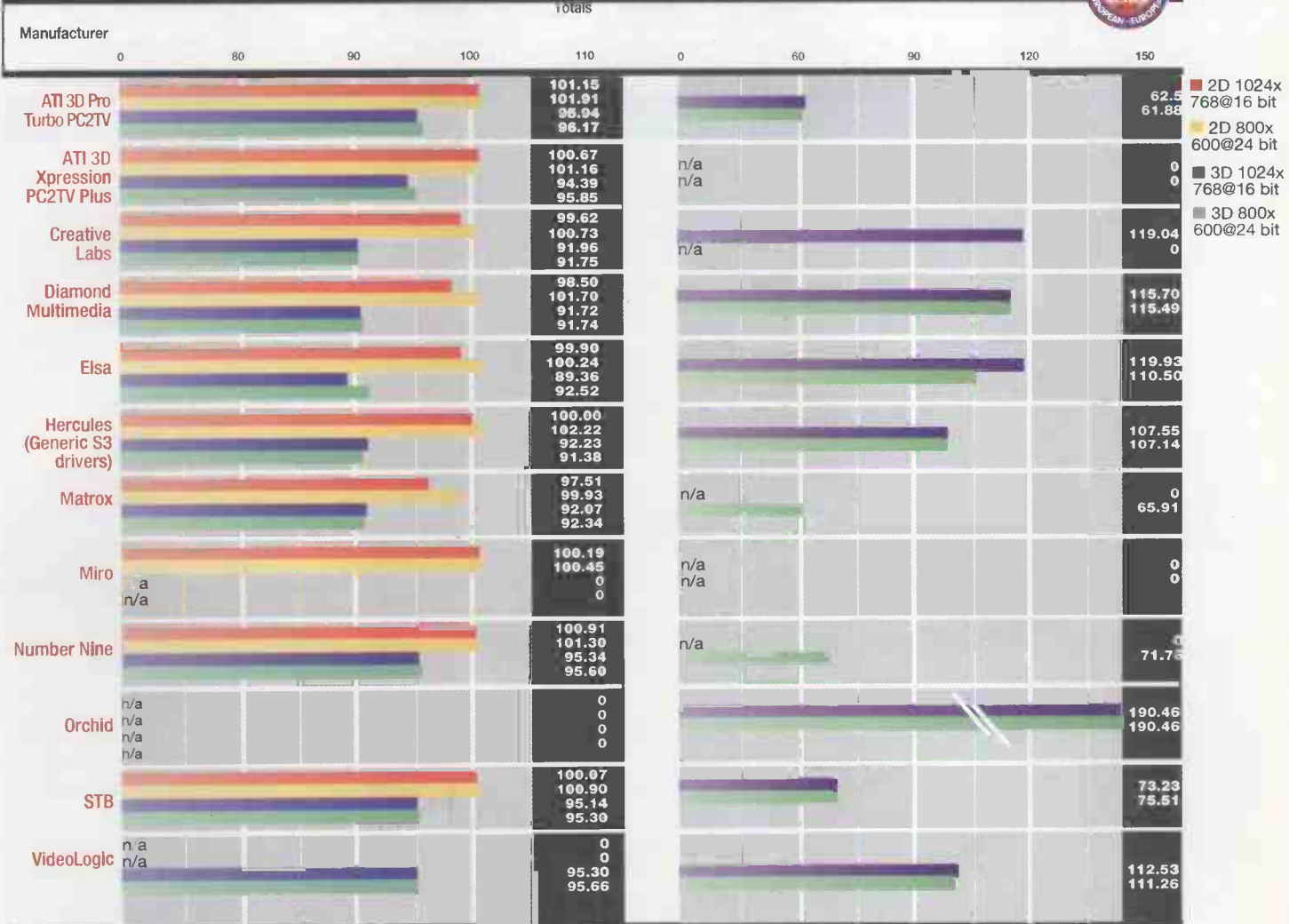


Table of Features						
Manufacturer	ATI	ATI	Creative Labs	Diamond Multimedia	Elsa	Hercules
Model	3D Xpression PC2TV Plus	3D Pro Turbo PC2TV	3D Blaster PCI	Stealth 3D 300XL	Victory 3D	Terminator 3D
Telephone	01235 833666	01235 833666	01245 265265	01189 444400	01844 261872	01635 861122
Fax	01235 833668	01235 833668	01245 706501	01189 444401	01844 216737	01635 868188
Price (with 2Mb or 4Mb) ex VAT	2Mb-£119 4Mb-TBA	4Mb-£179 expected	4Mb-£169	2Mb-£155, 4Mb-£185	2Mb-£189 4Mb-£249	2Mb-£111 4Mb-£142
RAM type	SDRAM	SGRAM	EDO DRAM	VRAM	EDO DRAM	EDO DRAM
Max RAM	4Mb	8Mb	4Mb	4Mb	4Mb	4Mb
Processor (graphics accel. chip)	3D RAGE II	3D RAGE II	Rendition Verite	S3 VirgeVX	S3 Virge	S3 Virge
RAMDAC (MHz)	170	200	170	220	135	135
VESA	●	●	○	●	●	●
Other (int/ext)	TV out, VCR, S-Video SCART	TV out, VCR, S-Video SCART	○	TV out	○	hardware MPEG
Max bit depth @ min res	32-bit @ 640 x 480	32-bit @ 640 x 480	24-bit @ 640 x 480	32-bit @ 640 x 480	32-bit @ 640 x 480	24-bit @ 640 x 480
Min bit depth @ max res	8-bit @ 1600 x 1200	8-bit @ 1600 x 1200	16-bit @ 1280 x 1024	16-bit @ 1600 X 1200	8-bit @ 1200 x 1024	8-bit @ 1280 x 1024
Max refresh @ min res	200Hz @ 640 x 480	200Hz @ 640 x 480	120Hz @ 640 x 480	160Hz @ 640 x 480	160Hz @ 640 x 480	120Hz @ 640 x 480
Max refresh @ max res	60Hz @ 1600 x 1200	75Hz @ 1600 x 1200	75 @ 1280 x 1024	75Hz @ 1600 x 1200	76Hz @ 1280 x 1024	75Hz @ 1280 x 1024
Refresh rate select util	●	●	●	●	●	●
Virtual desktop	●	●	○	●	●	●
Zoom	●	●	○	●	●	●
Windows 95 drivers	●	●	●	●	●	●
Windows 3.1x drivers	●	●	●	●	●	●
Warranty (years)	6	6	1	5	3	5
Free tech support/years	●, unlimited	●, unlimited	●, unlimited	●, unlimited	●, unlimited	●, 5
Bundled games & other	Mech Warrior II	Mech Warrior II	Quake, Toshinden	Descent II	Battle Race	Descent II
	Wipeout	Wipeout	Rebel Moon	Compton's Encyclopedia	Terminal Velocity	MPEG software
	Assault Rigs	Assault Rigs	Flight Unlimited			
			Software MPEG	3D authoring software		
Game ported to the card	●	●	●	●	●	●

Table of Features						
Manufacturer	Matrox	Miro	Number Nine	Orchid	STB	VideoLogic
Model	Mystique	miroMEDIA 3D	Reality 332FX	Righteous 3D	Velocity 3D	Apocalypse 3D
Telephone	01793 441100	01494 510250	01707 827926	01256 479898	0181 897 1003	01923 260511
Fax	01793 441199	01494 510070	01707 828080	01256 64222	0181 897 1006	01923 270188
Price (with 2Mb or 4Mb) ex VAT	2Mb-£120 4Mb-£160	2Mb-£140	2Mb-£125	4Mb-£199	4Mb-£135 8Mb-£199	4Mb-£149
RAM Type	SGRAM	EDO DRAM	EDO DRAM	EDO RAM	4Mb EDO/VRAM	SDRAM
Max RAM	4Mb	2MB	2Mb	4Mb	8Mb	4MB
Processor (graphics accel. chip)	MGA-1064SG	S3 Virge	S3 Virge	3DFX Voodoo Graphics	S3 VirgeVX	NEC PowerVR PCX1
RAMDAC (MHz)	170	135	135	N/A	220	N/A
Feature connectors						
VESA	●	●	●	N/A	●	N/A
Other (int/ext)	H/ware MPEG, Vcl in/out, tv tuner	TV out, S-video	N/A	N/A	No	N/A
Max bit depth @ min res	32-bit @ 640 x 480	24-bit @ 640 x 480	32-bit @ 640 x 480	16-bit @ 640 x 480	24-bit @ 640 x 480	32-bit @ 640 x 480*
Min bit depth @ max res	8-bit @ 1600 x 1200	8-bit @ 1280 x 1024	8-bit @ 1280 x 1024	16-bit @ 640 x 480	8-bit @ 1600 x 1200	8-bit @ 1280 x 1024*
Max refresh @ min res	200Hz @ 640 x 480	100Hz @ 640 x 480	150Hz @ 640 x 480	120Hz @ 640 x 480	160Hz @ 640 x 480	
Max refresh @ max res	75Hz @ 1600 x 1200	70Hz @ 1280 x 1024	75Hz @ 1280 x 1024	120Hz @ 640 x 480	80Hz @ 1600 x 1200	(Extras/Drivers)
Refresh rate select util	●	●	●	●	●	N/A
Virtual desktop	●	●	●	N/A	●	N/A
Zoom	●	●	●	N/A	●	N/A
Windows 95 drivers	●	●	●	●	●	●
Windows 3.1x drivers	●	○	●	●	●	○
Warranty (years)	3	2	5	2	10	5
Free tech support/years	●, 3	●, 2	●, 5	●, unlimited	●, 10	●, unlimited
Bundled games & other	Destruction Derby	Descent II	Terminal Velocity	Mech Warrior II	Earth Seed 2,	Mech warrior II
	Mech Warrior II	Terminal Velocity	Havoc	Descent II,	Mech Warrior 2	Ultimate Race
	Scorched Planet		Screamer	Actual Soccer,		
	MPEG software		Asymetrics 3D Web	Fatal Racing,		
	3D web browser			plus more		
Game ported to the card	●	●	●	●, except trial ver.	●	●

*Depends on graphics card ● YES ○ NO



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WHAT PC? AND SOFTWARE

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Review in December 1996 issue



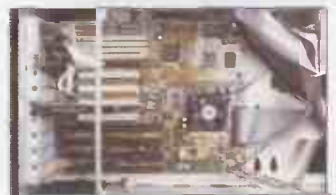
One of the fastest processors around, a sensible amount of RAM, a decent hard disk and a good graphics card all for under a grand.
Recommended Review in September 1996

Personal Computer World

A well-built machine assembled from a wisely-chosen set of components to deliver high-end performance at mid-range cost.
Review in October 1996 issue



A fast yet affordable system capable of running demanding applications, the Power Tower is well-built and has a fairly complete specification. Home users might want to add a sound card and graphics professionals a bigger monitor, but this PC is suited to both users. At this price it is certainly worth looking at.
Review in October 1996 issue



Deluxe Tower Case
(Designed with detailed attention, pullout base)



Computer Systems

Dotlink Power Tower

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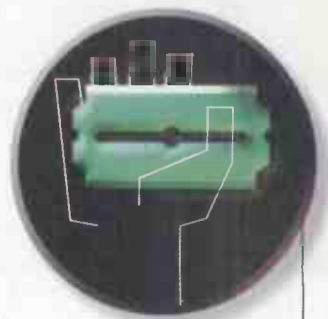
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How do they do that?

As more and more people jump on the web bandwagon, fewer and fewer know how the internet really works. Ian Wrigley has the answers.

You probably already use the internet — or if you don't, you're at least considering it. But do you know how it actually works? Sure, you can spend months or even years without knowing or even caring, as long as it does the job. But having some idea of what is happening in the background while you're working can only help, and at times, especially when you are configuring a new machine to connect, or when you are trying to troubleshoot something that's not working properly, it can be downright invaluable. So here's a little insight into what actually happens when you hit that "connect" button, or launch Microsoft Internet Explorer.

I can't get right down to the nitty-gritty, as that would require the entire magazine and more, but at least you will end up with a better understanding of what's actually happening and why some of those annoying error messages appear just when you don't have the time to deal with them.

Following protocol

The internet is a network. Big, yes, but it's still basically a network and that means each of the computers connected on that network must, at the lowest levels, speak to each other using the same "protocol".

The protocol is the way in which data is divided into small chunks, called packets, and sent over the network. When you transfer a file from one machine to another, for instance, the entire file is not sent at

once. That would be foolish, since a tiny corruption occurring somewhere between your machine and the recipient would effectively ruin the whole transfer and you would have to start again. Instead, when you transfer a file, your PC, Unix workstation, Mac or whatever splits it up into small chunks and sends each chunk separately. The recipient's computer can

“The internet is a network. Big, yes, but it's still basically a network”

then assemble the chunks into the right order. If one chunk is damaged, it can ask your computer to re-send it and, since each chunk is only around 1,500 bytes in size, the re-send does not take very long.

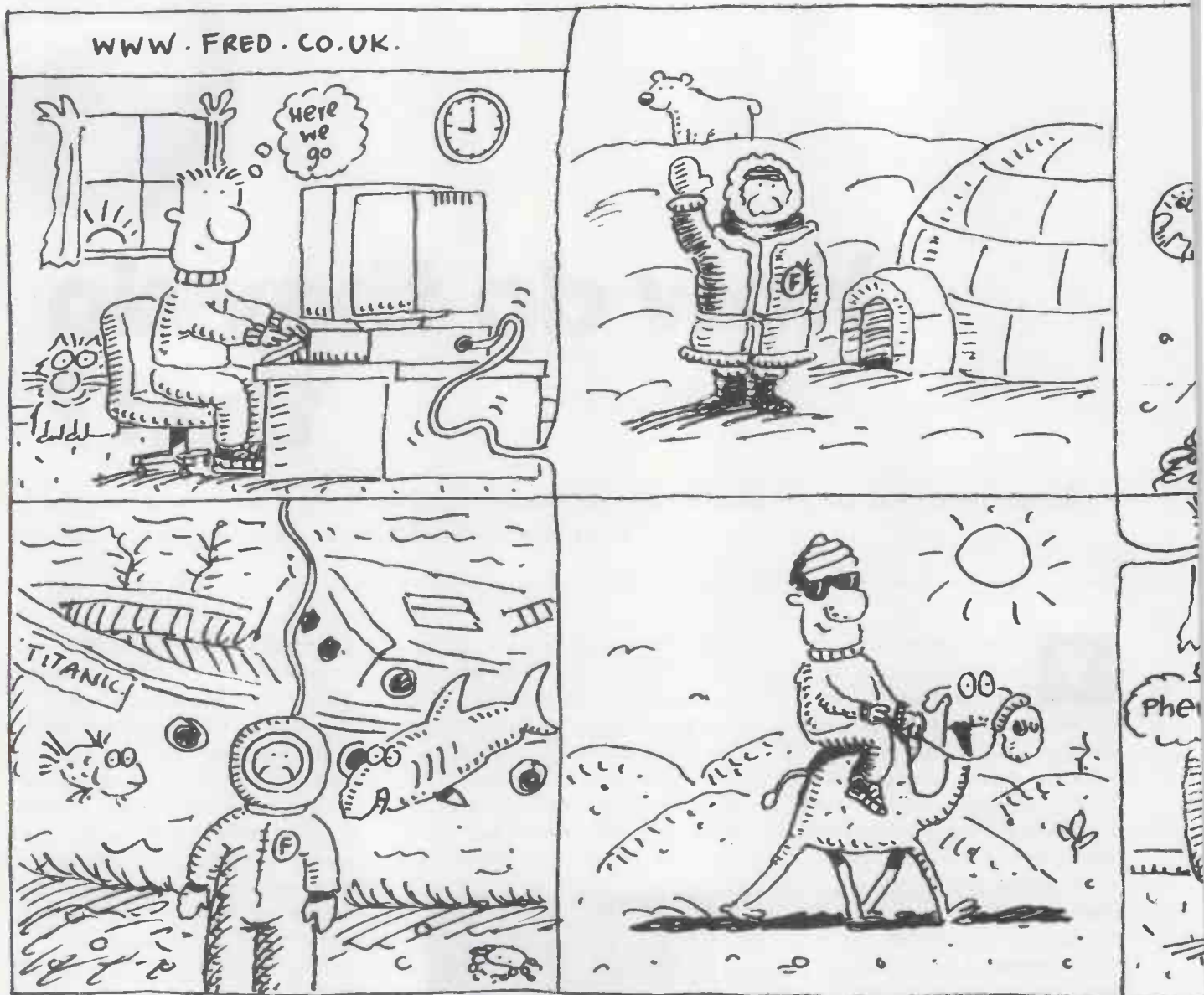
The protocol determines how the data is actually split up, what conventions the two computers use to talk to each other, and so on. Different networks use different protocols. For example, if you have a machine which connects to a Novell NetWare server, the protocol used is called

IPX; while a Windows machine might use NetBEUI, or any of a wide range of other protocols. Unix computers talk to each other using the TCP/IP protocol (it stands for Transmission Control Protocol/Internet Protocol). Since the internet was originally made up mainly of Unix machines, TCP/IP is the protocol that the internet uses. So if you want your computer to connect to the net, it needs to be able to "speak" TCP/IP. (For more details, see the box, "Talk the right language", on page 237.)

There is a problem with TCP/IP. (Actually there are many, but let's just discuss one for now.) The protocol is designed for computers, not humans. Computers discuss things in terms of numbers rather than words, so each TCP/IP computer is given a numerical address which identifies it to the others on the network. This is known as its IP address. Think of the address as a phone number: it must be unique, as two people can't have the same number. If you know their number, you can get in touch with the person. Exactly the same happens with the IP addresses of computers.

Unfortunately, these addresses tend to be hard to remember. They are in a form aaa.bbb.ccc.ddd, so to connect to a certain computer you need to remember four, three-digit numbers. Given that most of us can hold only a dozen or so phone numbers in our memories at once, it's not surprising that an alternative to all these numbers has been created. Continuing the telephone metaphor, this method can be considered

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as being similar to the phone book. The method, known as the "domain name system" (DNS), is a way of mapping more easily-remembered names such as `wideworld.co.uk` to a more complex IP number like `194.70.234.1`. With DNS in place, you can now tell your computer that you want to connect to `www.vnu.co.uk`, or whatever. It goes away and looks up the numerical address in its "phone book".

DNS is rather more complex than a standard phone book. This is because it is not one centralised directory, but many thousands of local, smaller directories, each holding a small subset of the total information. If you are familiar with the net, you'll know that addresses are in the form `computername.domain.biggerdomain`.

For instance, consider `fred.vnu.co.uk`. This means that the computer is called "fred", and it's in the "vnu" domain, or

Population explosion

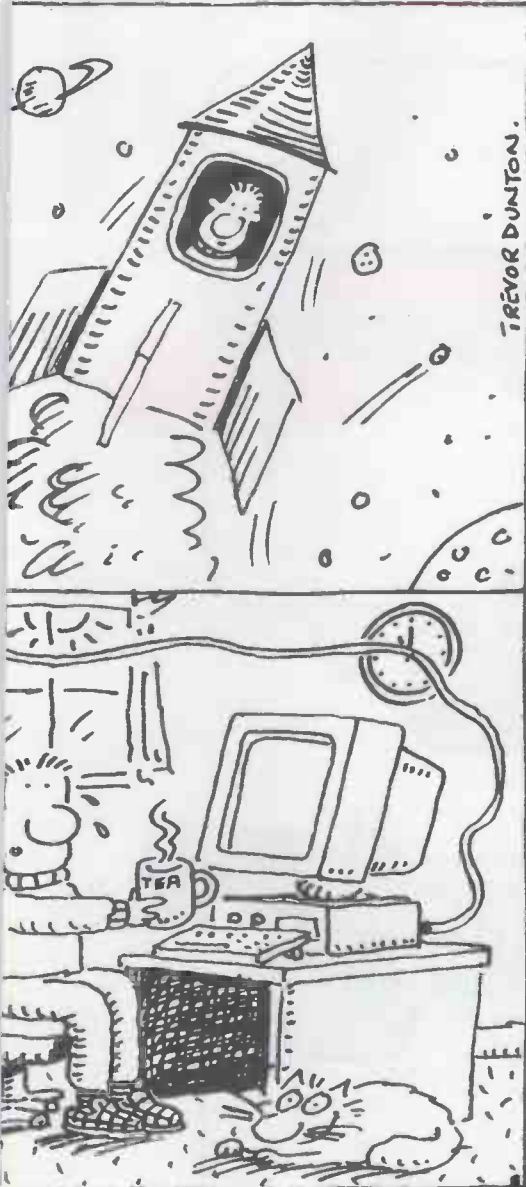
The two major problems facing the internet right now are both related to its new-found popularity. It's incredible to think that five years ago, the only people using the net were academics, researchers and a few die-hard hobbyists; yet now it's become an incredibly pervasive part of culture.

If anything "defines" the nineties, it's probably the internet. More specifically, of course, it's the web — since that is the technology which really made the internet catch on in the mass market and is, in fact, what most people mean when they refer to the internet as a whole.

But this massive growth has caused problems. The first is, quite simply, that the infrastructure — the cables linking sites, at the most basic level — is struggling to deal with the extra load. It is coping, but only just. Part of the problem is that until very recently, most of the infrastructure in most countries

(including the US and the UK) was controlled by academic institutions, so there were problems in terms of what was "acceptable traffic"; was it okay to allow commercial organisations to use the lines for their own, clearly non-academic, traffic?

Fortunately, the situation is rapidly changing as the large telecommunications companies around the world see the financial benefits in making sure the internet can cope with increasing traffic. BT, for instance, has just installed a new transatlantic line to the US with a massive amount of capacity. And Demon Internet, the UK's largest ISP, has itself bought 45Mb of transatlantic bandwidth. In the US, where most of the bottlenecks occur, the major telecommunications companies are vying with each other to install increasingly faster connections, so bandwidth is likely to become less of a problem as time goes by.



TREVOR DUNTON.

collection of machines. This is in the "co" set of machines, which itself is a subset of the uk collection of machines. This latter collection is known as a top-level domain, since it's the last thing on the list. There are only a few top-level domains, such as "com" (US commercial companies), "edu" (US educational establishments), "au" (Australian machines), "uk" (machines in the UK) and "ie" (machines in Ireland).

The whole story

To see how the whole thing works, let's look at an example. Let's say my Unix box, which has its DNS software running, wants to talk to a machine at PCW's publisher in order to transfer the file containing this article. I tell my computer that I want it to connect to fred.vnu.co.uk. But my computer has never come across any domains before as I have only just bought it and plugged it in. So as part of the configuration, I've told it about the half a dozen or so computers that know about top-level domains.

It goes out to one of these and says, in effect, "Where do I find out about machines in the uk domain?" One of these top-level servers will reply, giving the address of the computer which knows about the uk domain. So my machine goes off to that new computer and asks, "OK, you know about 'uk', where do I find out about 'co.uk'?" Having been told, it then goes off to yet another computer. Here, it is told where the machine that knows all about vnu is located and finally that machine gives my poor over-worked computer the address of fred.vnu.co.uk. Once my machine knows this, it will store the information locally, so for a while it will not have to repeat the whole rigmarole next time I want to connect. And, indeed, it will also have stored the addresses of the other machines it encountered on the way. So, the next time I want to know about a machine in the co.uk domain, it can immediately ask the relevant server.

The beauty of all this is that there does not need to be a central repository of all information. And with many hundreds of thousands of domains in existence, that is a good thing. Such a repository would be out of date and totally overworked from the moment it was set up. Instead, information for vnu.co.uk can be stored locally; probably on a machine actually controlled by VNU's system manager, and can be updated whenever any changes are made.

The other worry for those who look after the internet's more mundane aspects is the lack of spare IP addresses. When the internet was first conceived, the range of IP addresses available was considered to be more than sufficient to cope with future growth potential. However, it's now clear that we are in serious danger of running out of spare addresses in the near future. For that reason, schemes such as "IPv6" have been proposed to alleviate the problem (see Oct '96 PCW, p241). This will give plenty more IP addresses, but could cause headaches for system administrators and those in charge of making sure that packets actually go where they are intended to.

Only time will tell whether or not we can make the change successfully, but there is an awful lot of commercial interest in getting it right. The situation is looking positive.

p237 >

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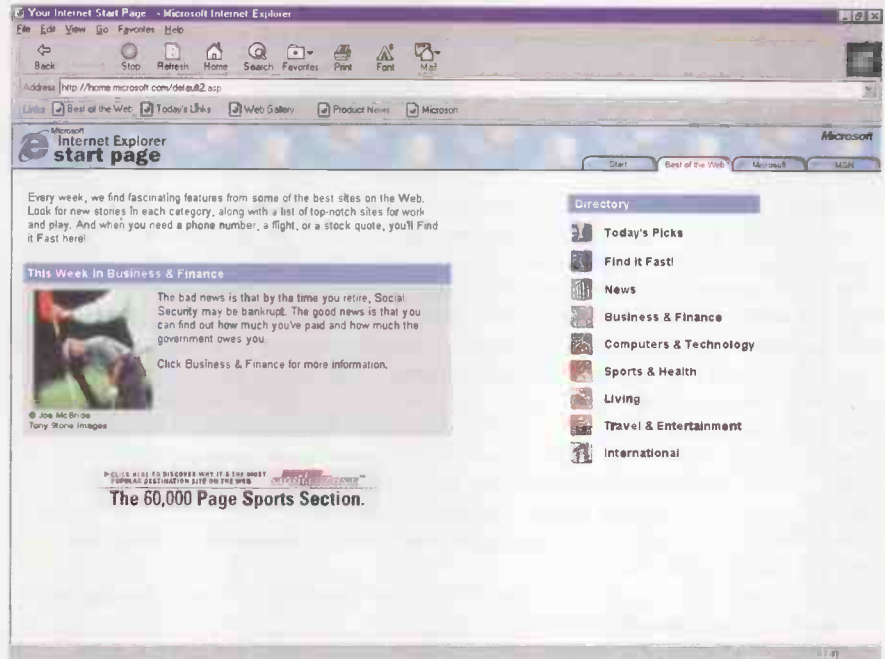
The World Wide Web is the most popular destination on the internet, by far

The problem is, of course, that if just one of the servers on that long chain, through which my computer had to pass, was out of action for any reason, I wouldn't be able to find the right address. So every domain has at least one "secondary" server which contains a duplicate of the information. But even then, things can sometimes go wrong, at which point your software is likely to throw up messages like "could not resolve the domain name" or "no domain exists" when you know perfectly well that it does.

Connecting up

Now let's take a look at what happens when you use a modem to dial up to the internet, whether it's a normal modem or an ISDN terminal adaptor.

The first thing you may well have had to do is to install and configure some extra software. PCs don't use TCP/IP by default, so if you have a PC running DOS or Windows 3.1 you will have installed some extra software to tell it how to "speak" that protocol. Windows 95 PCs already have such software built-in, but even they need configuring (see "Talk the right language", below). For instance, you will need to tell the computer about a domain name server — that is, a computer which can perform that name-into-address rigmarole for you. Normally, this is an address that your Internet Service Provider (ISP) has allocated



to you; it's a machine sitting on the ISP's local network. In fact, you can use any DNS server on the internet, to which you are allowed to connect, but it makes sense to use one as close to your computer as possible since this will save time. Hence, you happily type in the IP address which your provider tells you.

Wait a minute, though. Surely, if your computer is going to be on the internet, it will need its own IP address? Shouldn't your ISP have given you a unique address? Well, some do. Demon Internet, for example, gives each subscriber a unique IP

address. But most use a neat, and internet-friendly, trick known as "dynamic IP allocation". (For more information on why this is a good thing, see the box "Population explosion" on pages 234/235.)

Effectively, what happens is that your ISP has a pool of IP numbers available. When you dial in, the ISP's server automatically allocates a free address and tells your computer, which then knows that this is its address for the rest of the session. When you disconnect, the IP address is freed up and can be used by someone else.

The actual dial-up connection, incidentally, is not that simple either. You can't just "talk TCP/IP" down the phone line. In fact, you use a higher-level protocol, normally PPP (Point-to-Point Protocol). This wraps up the TCP/IP packets, adds some extra information, and transmits them down the phone line. The receiving machine "unwraps" them, effectively turning them back into proper TCP/IP.

It's PPP that deals with things like the automatic allocation of IP addresses. It can even tell your computer the address of the DNS server, so you don't always need to know it in advance. There are a number of different protocols that can be used: SLIP, for instance, used to be more popular, but these days almost all ISPs use PPP as it is more flexible and has rapidly grown to be the most popular dial-up protocol around.

Once you have dialled up, your machine effectively becomes part of the internet. Your ISP is linked in via a dedicated, permanent connection, and you, on the

p238 >

Talk the right language

If you are trying to connect a Unix box to the internet, you have one thing already in your favour: Unix machines talk TCP/IP natively, without the need for extra software. Whether you are running Linux on a PC or Solaris on a high-end Sun workstation, it will be almost immediately ready to connect to the internet, either via a dial-up modem connection or, if you're lucky, via your company's leased-line permanent internet connection. If it's the latter, all you need to do is make sure you have a "legal" IP address — that is, one which has been assigned to your organisation and is unique to your computer — and you're away.

Your system manager will tell you the IP address of the router — the device at your end of the leased line which "routes" the TCP/IP packets out to the rest of the internet — which you need to add to your machine's routing table, then you can immediately connect to any other machine on the net.

If your Unix box needs to connect via a dial-up connection, you will need to get an implementation of PPP. This tends to be fiddly to configure for many Unix systems and there isn't much general advice I can give here. Check the documentation for exact details and, unless you're a Unix guru yourself, the best thing to do is find one and bribe them with beer and pizza to set things up for you. (For your reference: Unix gurus like Guinness and thin crust pizzas, but no little fishies on the pizza!)

Windows 95 also has TCP/IP and PPP built in, so all you have to do is enter the correct settings in the Network Control Panel — your ISP should give you the relevant details. Windows 3.1, however, needs extra software known as "Winsock" in order to connect. This extra software tells the computer how to use the TCP/IP protocol and how to dial up with PPP. Usually, configuration is not too difficult, and if you get the software from an Internet Service Provider, it will normally be pre-configured with the relevant settings.

other end of your modem link, are effectively now just as directly connected. You can talk to other computers and, if

you're running the right software, other computers can talk to you. One of the most likely things you'll want to do is access the

web using a browser such as Netscape Navigator or Microsoft Internet Explorer.

The web is a part of the internet so, deep down, you are communicating using the TCP/IP protocol. However, each of the services on the net — web, FTP, Telnet and so on — uses a different, higher-level protocol which "sits on top" of TCP/IP. Essentially, TCP/IP is in charge of getting the data from one machine to another, but then, the applications running on those machines must, in turn, agree on what form that data will take.

As far as the web is concerned, that protocol is known as HTTP (HyperText Transfer Protocol). It is actually remarkably simple, given the apparent complexity of the web. Essentially, when you access a page, your browser simply says "Hi. This is who I am, and this is the page I want." The server will then return that information using the HTTP protocol to make sure that your browser will understand it when it arrives. Just before it leaves the server, it will be divided up into TCP/IP packets to actually make the journey. At your end, those packets are reassembled by the low-level software in your PC and passed to the browser program as an HTTP message, which it can then deal with. Simple, isn't it?

Glossary

Bandwidth — Roughly speaking, a measure of how fast a connection is, and how many connections of a given speed can use the same cable. Effectively, the bigger the bandwidth of a cable, the faster your connection will be.

Class A/B/C address — IP addresses (qv) are assigned by a single organisation in the United States to ensure that they are unique throughout the world. But you are not assigned a single address, your organisation is assigned a range of addresses: a Class C address gives you 254 different addresses and is suitable for most companies; a Class B gives you many thousands of addresses, but there are not many Class Bs available. A Class A address gives millions of possible IP addresses to choose from, but there are very few (less than a hundred free ones remain), so you won't be assigned one unless you can make an awfully good case for it!

DNS — Domain Name System. The method of mapping a human-friendly address like www.vnu.co.uk to IP addresses that computers need to deal with.

FTP — File Transfer Protocol. A protocol (qv) commonly used on the internet to transfer files from one machine to another.

HTTP — HyperText Transfer Protocol. The protocol used by World Wide Web (qv) browsers and servers to communicate with one another.

IP address — A four-number address, written aaa.bbb.ccc.ddd, which is unique to a given computer; no two computers on the internet have the same IP address. Computers use IP addresses to locate a given device but, since they are difficult to remember, humans tend to use domain names; it's the job of the DNS to map names to addresses.

Packet — When data is transferred, it is split into small chunks, known as packets; each has enough information to tell computers where it's from, where it's going to, and the type of data it contains. When all the packets arrive at their destination, the receiving computer reassembles them to recreate the original data.

PPP — Point-to-Point Protocol. A higher-level protocol which allows computers to send TCP/IP packets (and other protocols) over dial-up lines such as modem connections. (PPP is also often used to transmit data over permanent, leased lines.)

Protocol — An agreed method that computers use to speak to each other.

SLIP — Serial Line Interface Protocol. Another way of transmitting TCP/IP over a dial-up line. These days, however, PPP tends to be the preferred method, rather than SLIP, even though SLIP can be slightly more efficient.

TCP/IP — Transmission Control Protocol/Internet Protocol. The low-level protocol used by Unix boxes, and every computer on the internet, to communicate with each other.

Telnet — A method of logging in to a remote computer over a network.

PCW Contacts

Ian Wrigley (ian@widearea.co.uk) is managing director of web consultancy, Wide Area Communications.

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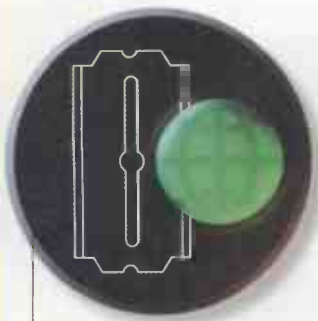
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A good turnout

Jim Smith explains how to control the presentation of your site on a net search engine and tackle the ticklish problem of serving your attractive multimedia pages to the myriad browsers in use on the net — robots and JavaScript are the secret.

Controlling robots

Getting your site into the many internet search engines and indexes is as crucial to its success as decent content and dazzling design. It's a lot easier than it used to be, thanks to the creation of one-stop submission sites such as Submit It (www.submitit.com) which let you enter your details, free, into every major index. There are a few shysters doing the rounds who are junk-emailing web developers, offering to submit sites for a fee, but this is completely unnecessary unless you're exceptionally lazy.

It is less well-known that you can control the way your site then appears within automatically-generated web indexes such as Alta Vista (www.altavista.digital.com) and Lycos (www.lycos.com).

You decide

There's a broadly-agreed META tag which lets you add to the <HEAD> portion of your page, letting you decide the words that the site will be indexed under as well as the description that appears under the URL in sites such as Alta Vista.

You've come across META before in the command used to make a document automatically refresh or point to another document. For example:

```
<META HTTP-EQUIV="REFRESH"
CONTENT="1;URL=http://otherpage.
html">
```

META provides a way of putting extra information about a page (or instructions) into

Fig 1

```
<META name="description"
content="Your description should appear here.">
<META name="keywords" content="words, that, describe, your, site">
```

a browser without having to rewrite HTML when you want to create a new function.

In the case of search engines, META enables us to provide a way of saying "Hey Robot! Look here!" so that we can give it all the information it needs without it having to download the whole site and index that.

The HTML looks like the example in Fig 1. As I've tried to indicate, somewhat crudely, the description should be a normal piece of text that acts as a one-line introduction to your site.

Keywords should be used to provide quick indexing. You can include anything you want here. Words related to the content of the page are ideal but you can also add related topics and terms (even the names of competitors) so that your site appears as well when someone searches for those.

The description and keywords can be up to 1,024 characters, or 200 words, which is plenty of space in which to provide adequate information about your site.

Keep out!

The equal and opposite problem is how to keep unwelcome web-crawling robots off your site. There may be sections of your site which, while not secret or private, do not benefit from being in the public domain: whether it's the canteen menu or human

resources policy documents.

There's also the danger that a badly configured robot could run riot in a part of a site that provides access to a potential



Fig 2

```
# robots.txt for http://www.site.com/

User-agent: *
Disallow: /cyberworld/map/ # This is an infinite virtual URL space
Disallow: /tmp/ # these will soon disappear
```

infinite space: for example, a clickable map or a database entry form.

While most robots now recognise and avoid these, there's still the danger that your site could simply be overwhelmed by a crude web-crawler.

To keep a legitimate robot out, you need to place a document called robots.txt in the top level of your web server's path, right next to the index.html. There are now over 111 robots that will look for this file and behave accordingly. The syntax for excluding robots is like that shown in Fig 2.

The portions following the asterisk are comments. The file can consist of as many records like this as you wish, so long as there is at least one blank line between them.

The "User-agent:" field of the document should give the name of a particular robot (Alta Vista's is called Scooter, for instance) if that certain robot has a habit of doing something unwanted, that the others don't. Or, it can contain a * to exclude all robots, as in the example.

The "Disallow:" fields give the robot a path that it's not allowed to look down: note that you don't need an asterisk to indicate sub-directories and files here; the first part of the path will do. Note how the paths start at root: don't use relative paths even though the robots.txt document starts in root.

If you only want to let certain robots in, you can add an entry in that robot's name with a blank disallow field after an entry disallowing all robots, as in Fig 3.

The robots.txt approach isn't perfect. It doesn't allow people who sublet web space to determine how their part of the server will

Fig 3

```
User-agent: *
Disallow: /

User-agent: Scooter
Disallow:
```

be indexed: they have to ask the person with overall control. However, you could

write a script which automates the creation of robots.txt, although there's no evidence to show that anyone has. But as a way of stopping those pesky software agents from upsetting your server, it's the only choice we have, and autonomous software is likely to become vastly more common on the internet in years to come.

Multimedia

One of the problems associated with serving attractive multimedia pages to the web-browsing masses is that there is no single, standard browser for web developers to write to.

Not only are there myriad browsers but each can be configured differently with different plug-ins, ActiveX controls, and default settings (admittedly, Navigator and Internet Explorer dominate but even they come in different flavours). In short, browsers are bastards.

Until JavaScript, the only way you could modify the page content to match the browser that the client was using, was to write a server-side script that read the SERVER_SOFTWARE environmental variable which the browser passes to the server when it makes its HTTP request.

You've probably seen the outcome of a similar script at sites like BrowserWatch (www.browserwatch.com) which announce your IP address and domain name, browser type and operating system. This has two drawbacks: firstly, it can't handle plug-ins, and secondly, it puts an extra strain on the server which now has to perform some (admittedly trivial) calculation every time someone connects to the site.

Dynamic code

How much better then, to put the dynamic code in the page itself as JavaScript so that the server can get on with serving and leave the client to work out what it wants.

The fact that some browsers will simply ignore <EMBED> tags provides us with

p242 >

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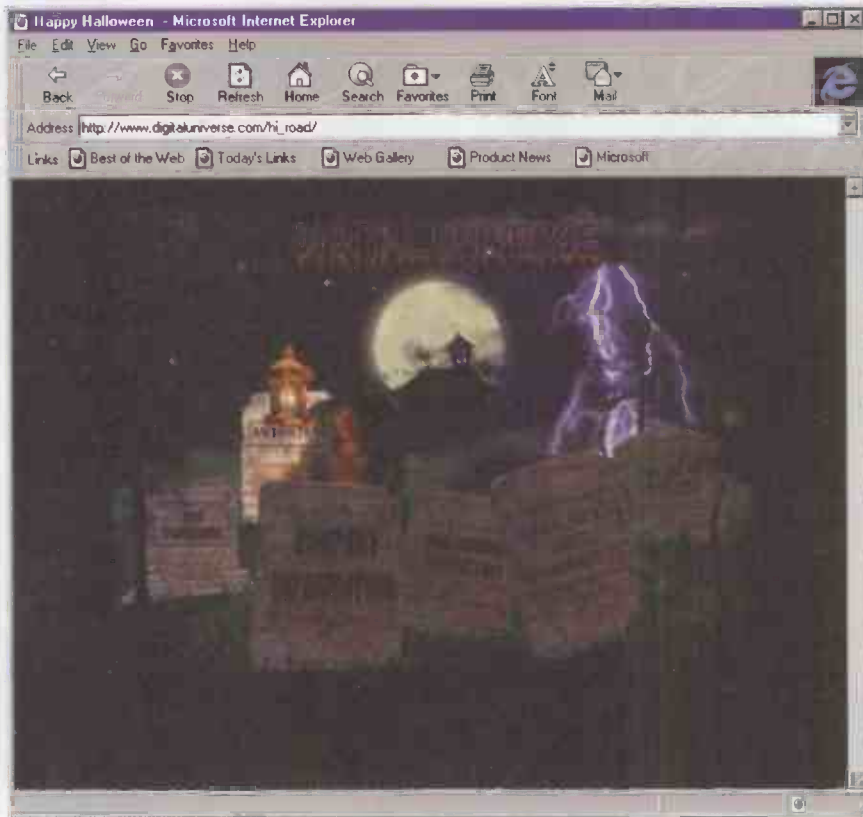
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some sort of workaround, just as `<NOFRAMES>` helps us out of the frames problem. But it's better to remain completely in control of your page by encasing the calls to plug-ins in JavaScript so that the JavaScript applet can conditionally decide whether or not to make the plug-ins appear. This also has the advantage of protecting browsers which object to abnormal HTML tags: as JavaScript is commented out, they merely ignore it. It also allows us to detect browsers which could take a particular plug-in, but don't.

This is remarkably simple for Netscape Navigator 3.0. The version of JavaScript which this browser supports, allows you to query the browser which will then return a listing of the plug-ins it has installed.

The quick and easy way to find out therefore goes like this: find out the name and type of the browser; if it's Navigator 3.0 or above, then ask it whether it has the desired plug-in installed. The code looks like that shown in Fig 4.

Detecting Netscape Navigator 3.0 is simple: we just break the `navigator.appName` and `navigator.appVersion.substring`

A spooky ShockWave plug-in — great fun for surfers, more problematic for web developers

strings down into their components and search through until we find the string Netscape3. If Navigator 4.0 comes out before this article hits the shelves, you'll need to add an "or" (`||`) to this part of the script.

If we find this to be true, we move on to the next part of the script. This sets up a function that will rattle through the listing of plug-ins that the browser will return to us, turning them into all lower case and then parsing the data for the search string. (This part of the script is borrowed from VReam which first posted it on the internet as a way of detecting for its WIRL VRML plug-in. Thanks and acknowledgements are therefore due.)

We get the search string from the next part of the script where we pass it to the function as an argument by creating the variable `shocked` thus:

```
var shocked = testForPlugin
("application/x-director");
```

Fig 4

```
<script language="LiveScript">
var browser=navigator.appName+navigator.appVersion.substring(0,1);

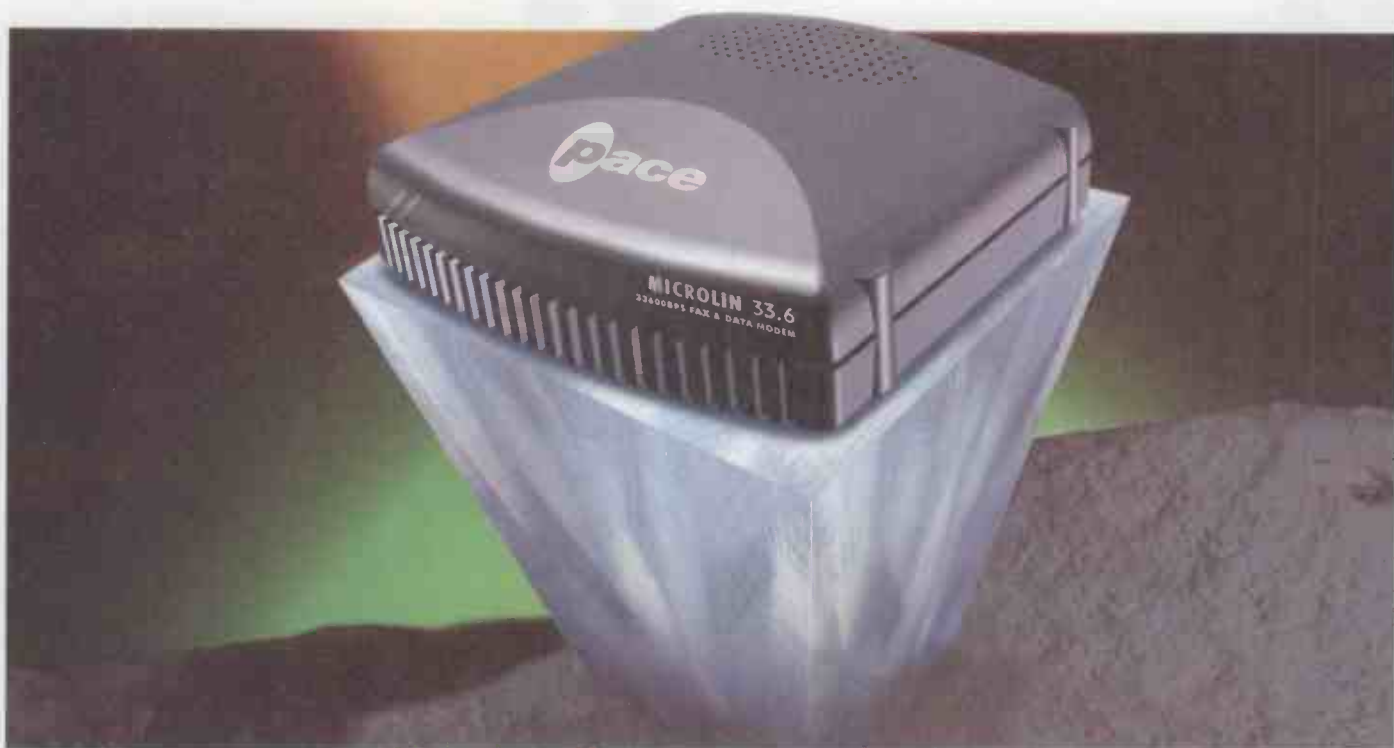
if (browser=="Netscape3"){

    function testForPlugin (Plugin) {
        Plugin = Plugin.toLowerCase();
        var Found = false, i, j;
        for (i = 0; i < navigator.plugins.length; i++) {
            for (j = 0; j <
Math.round(navigator.plugins[i].length); j++) {
                if (navigator.plugins[i][j].type == Plugin) {
                    Found = true;
                    break;
                }
            }
        }
        return (Found);
    }

    var shocked = testForPlugin ("application/x-director");

    if (shocked == true)
        document.write ('<EMBED SRC="test.dcr" width=500 height=150>');
    else document.write ('<IMG SRC="image.gif" width=500 height=150>');
}

// end JavaScript ->
```



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Demon	X	X	✓	£132.50	£132.50	£132.50	£132.50
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Fig 5

```
function probePlugIn(mimType) {
  var havePlugIn = false
  var tiny = window.open (" ". "teensy", "width=1, height=1")
  if (tiny !=null) {
    if (tiny.document.open(mimType) != null
      havePlugIn = true
  tiny.close()
  }
  return havePlugIn
}
```

Note that we're looking for Macromedia's Director plug-in here. Each plug-in is registered within Netscape Navigator as an application type and a MIME type. To find out the types of different plug-ins, type `about:plug-ins` into the location field in Navigator (Mac

take plug-ins either. Thus, the main body of our program goes into the main frame of the frameset. In fact, this frameset needs only one frame if necessary although you might want to take advantage of the frame layout in any case. Now we add to our program the

Fig 6

```
var haveShockWavePlugIn = probePlugIn ("application/x-director")
```

users need only select "About Plug-ins" from the Apple menu). If we find a plug-in, we ask the program to write a line of HTML code that calls a Director movie. If not, the applet writes HTML that calls a standard GIF image.

Not all browsers are equal
That's pretty straightforward but, as you might guess, there's a mighty big "else" hanging from that `if (browser=="Netscape3")` because not all browsers are Navigator 3.0 or better. In fact, not even all copies of Navigator are 3.0 or better, with many people still using version 2.0 which is less demanding of your PC's resources. There's even the odd sighting of ancient beta versions (before 0.9B) in HTTP logs.

So, people will browse with anything and, in order to cater for them, we have to be a bit more devious and replace the main window, with which we've been working, with a frameset. This immediately filters out any old versions of Navigator and Internet Explorer. If they can't read frames, they won't be JavaScript-compatible and probably won't be able to

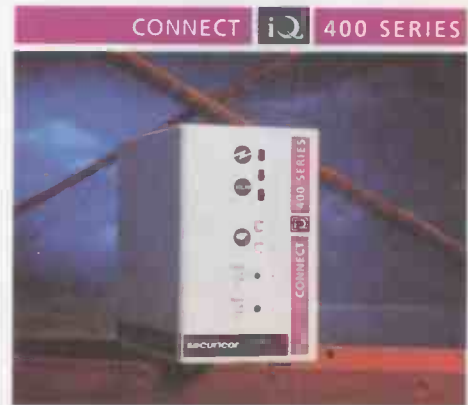
function shown in Fig 5 (this extremely useful piece of code comes from the Que book *Using JavaScript*, which is a godsend for the JavaScript developer). To call this function from the main body of the script, all we have to do is create a variable which passes the MIME type (which we first met earlier on in this article). See Fig 6.

If "haveShockWavePlugIn" is true, we can ask the script to write an `<EMBED>` tag, with a movie in it, to the main page. If not, then write the normal `IMG` tag into the main copy. The drawback of this approach is that it will produce a "Plug-in not found" error, but at least it automates the process.

Thankfully, all future versions of JavaScript will allow you to detect plug-ins invisibly, and even call specific plug-in features from the scripting language, so the days of large hacks like this are numbered.

PCW Contacts

Jim Smith is development manager of Wide Area Communications. You can contact him at www.widearea.co.uk



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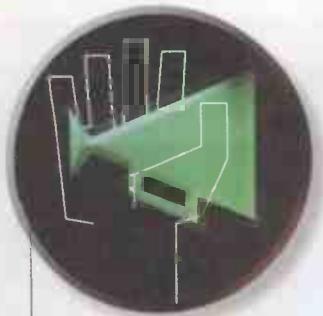
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Around the web world with PJ Fisher.

IBM breaks its price point promise

■ Despite promises that network computers (NCs) would be cheap, low-spec devices, IBM is about to launch a 200MHz Power PC with S3 graphics chip which would appear to undermine such promises.

The NC will come with a choice of OS, including one written in Java, and Microware's OS-9 which will feature a Java Just-In-Time compiler.

The real key is the price. Expected to cost around \$1,000 in the US, it will be up against 133MHz PCs. Meanwhile, the truly affordable NC remains on the drawing board.

www.ibm.com

'Active HTML' on the way

■ The HTML standards committee, the W3C, has taken another battering, this time from Microsoft. At its web developer's conference, Microsoft demonstrated extensions to HTML, codenamed Trident, that enable dynamic events activated by mouse movements.

Microsoft's description is "active HTML". A typical use is for "mouse-over events". For example, mousing over a web hot-spot would cause a sound file or movie to be activated on the web page and Microsoft sees this as a way of furthering the web experience, to more closely resemble that of CD-ROMs.

Trident could also be used to dynamically change the layout of web pages at the click of a mouse. It is expected to appear in future versions of Internet Explorer, most likely version 5.0.

Netscape has unveiled a similar technology called JavaScript Style Sheets. Both technologies are said to use scripting languages which make it far easier to create dynamic web pages than Java or ActiveX, which

many web developers find tricky. However, Microsoft insisted it was not undermining the W3C.

John Ludwig, VP internet platform and tools division, said: "We are not inventing new scripting languages. We are continuing to extend our HTML capabilities and intend to have the best, richest HTML support of any vendor, as we do today.

"We are dead serious about conforming to the W3C. Everything we want to do we take to the W3C, for discussion and approval. We implement all the W3C standards. Multivendor support for new HTML is critical, and the only way to achieve this is by working through the open standards process."

Both technologies have yet to be approved by W3C but both are under consideration. Given recent history, both companies are likely to push ahead without waiting for W3C approval.

www.microsoft.com

www.netscape.com

No net needed for this newshound



■ Global Village has come up with a device that will enable PC owners to keep track of news, sports and stock prices without need of the internet or a modem.

The NewsCatcher is a small, black, pyramid-shaped device that receives radio transmissions from the US paging network, Air Media, and feeds them directly to the desktop.

For \$6 per month, users can choose from headline news, sports, entertainment or business, all taken from internet newswires and sources such as CompuServe. The NewsCatcher unit and software costs \$149 and runs on Windows 95. There are currently no plans for a similar service in the UK.

www.globalvillage.com

www.airmedia.com

Porno spam prompts Safety-Net



Promote Responsible Net Commerce: Fight Spam!

■ Following the heated climate in the UK over child pornography, internet users across the world were victims of a "spammed" email that offered child pornography, appearing to come from an AOL member in Jackson Heights, New York. Spammed email is sent to thousands of people without their permission, often offering goods and services.

The long message described pictures, movies and sound files available in graphic detail and how to obtain them. What is worrying users and law enforcement agencies is how the person, or persons, involved could have accessed so many email addresses.

The subject of porn on the net has been heightened by recent events in Belgium and UK press reports accusing Demon Internet of promoting child pornography on the net. (Demon is now suing for libel.)

In a bid to ward off criticism, the UK ISP industry has financed the Safety-Net organisation which will have a hotline for users to report suspected illegal material being distributed on the internet. EU ministers have also met to formulate methods of combating the distribution of pornography on the internet.

Judith Coley, Director of Corporate Communications at AOL UK, said: "We are helping the law enforcement bodies as

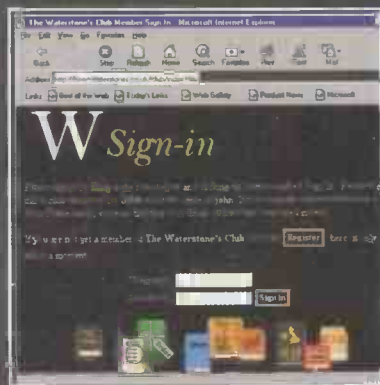
much as we can, but it is in their hands. At this stage, there are so many variants that any speculation is fruitless."

Since the spamming incident, other theories have been suggested, one being that it was a crude attempt by right-wing elements in the US to undermine the open nature of the internet with scare tactics. The other, most likely explanation, is that it was a stunt. Even so, it is one that has backfired, as the incident is being fully investigated by the FBI and the New York Police Department with a view to prosecution.

A web site has been set up dedicated to stamping out spamming on the internet.

www.vlx.com/spam/

Waterstone's aims at bookworms on the web



■ Waterstone's booksellers has gone online with its first web site. The site features written excerpts from newly-released books, and information about their authors.

Visitors to the site can browse book selections and order online. An out-of-print search facility and an online version of the Waterstone's magazine completes the picture. The company hopes its site will become fully interactive with literary debate via email and live chat between authors and readers.

www.waterstones.co.uk

Browser-based business info

■ Financial Times Information has signed a deal with Verity, the search agent developer responsible for the US's acclaimed SuperPages online directory, to create a browser-based business information service. The FT Profile service, traditionally aimed at corporates, is now targeting individual business users.

The service will include personalised news, using Verity's intelligent agents to compile personal "Daily Me"-style profiles. It will also provide "alerting" bulletins on developing news. Nigel Folkes, Development Director of FT Profile, said: "What sets us aside from the web-based

services is that we combine a web-based interface with a high standard of business news that you can't get on the internet."

FT Information gathers from a range of sources, including national broadsheets, the Economist, Reuters Textline, market research databases, and business and trade journals. The new web-based version of the product will be able to deliver ASCII, HTML, PDF files, audio and video.

Subscriptions are available from £99 per month per user, with a £15 surcharge for the personalised AFX newswire.

Jessica Hodgson

Financial Times Information 0171 825 8000

Post-It on your email

■ Wall Data and 3M have together launched an email package that utilises electronic Post-It Notes to send and receive messages. The idea is to make email less "techie" and more familiar to office users.

After installation, an icon appears on the desktop that dispenses blank Post-It

software notes. These can then be affixed to electronic documents or sent to different email systems.

The Rumba Mail package features a pull-down command centre called a "CommCorder" — a graphical access point to all email functions including file attachment

and printing.

Rumba supports many email systems, including ccMail and Lotus Notes. A universal In-Box can be set up to receive email from a number of different systems. Prices start at £26 per user.

Wall Data 0181 476 5000

www.walldata.com

p249 >



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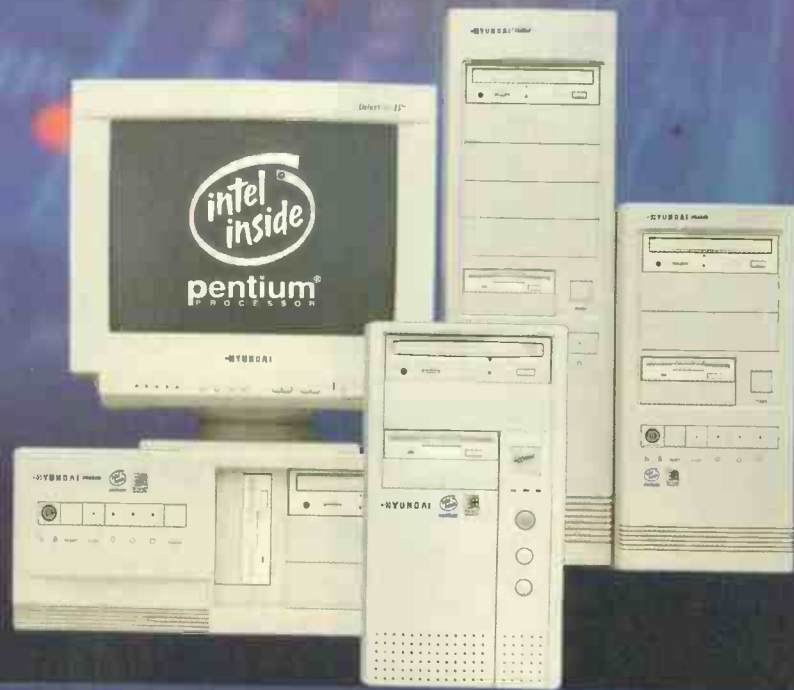
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What a corker!

■ From the United States comes what is claimed to be the world's finest wine site. Based on the existing esoteric print magazine, *Wine Spectator*, the stylish site offers ratings and prices on over 50,000 wines. It is claimed to be the most comprehensive database of wine reviews.

However, if your idea of a fine wine is the £2.99 Hungarian red offer at the supermarket, this site probably isn't for you. The registration process asks the value of your wine collection — starting at a minimum \$1,000!

www.winespectator.com



New look for Internet Studio

■ Microsoft is about to release, next year, an alpha version of its much-altered Internet Studio software (formerly known as Blackbird) and with it the revised web tools strategy. Internet Studio will be a visual programming tool to enable web developers to build active, database-driven web sites. This positions it as the newest member of Microsoft's visual tools family of products.

By contrast, FrontPage 97 will remain a mid-range web tool for non-programmers designed to integrate with the rest of the Office 97 family. FrontPage and Internet Studio components will work together, so both tools can be used to build web sites.

Internet Studio is a "component consumer", whereby it uses software components written in Visual C++, Visual J++ or Visual Basic. For example, a programmer could write a financial analysis component in Visual Basic and then integrate it into a corporate financial analysis web site, along with HTML content designed in FrontPage. Both client-side and server-side active components can be designed in Internet Studio, as well as the new Active Server Pages that Microsoft claims will bring dynamic server-side web content to any browser regardless of platform.

The final version of Internet Studio will be released in the first quarter of 1997.

www.microsoft.com

Superfast business net service

■ A UK company claims to have built its own superfast business internet service, delivering documents, graphics and videos, ten times faster than a 28.8Kbps modem. ODI's Internet 2 is based on ISDN and uses proprietary transmission protocols, but the company claims that users can connect to the rest of the internet whenever

necessary, as the browser software reads HTTP data as well as that based around ODI's own protocols. The service will cost £27.50 per month.

The company is promising TV-quality video over the network, for next month, which will deliver video at 25fps.

ODI 0113 233 0000

www.ondemand.co.uk

Pipex ups the ante

■ UUNet Pipex is expected to double its transatlantic bandwidth capacity to over 90bps by the New Year, upping the stakes in its ISP battle with Demon Internet. At the same time, the company is investing in network improvements across Europe.

Put it on the slate

■ Proving that it really is difficult to make people pay for online publications, Microsoft has had to delay subscriptions to its political magazine, *Slate*, because of "difficulties with the billing system". Whether these are technical or merely a fact of web life, the company refuses to say.

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Just browsing

Installing new browsers, sending email to Mac users, the need for speedy modems, and creating newsgroups are among the problems tackled this month by Nigel Whitfield, our knowledgeable nethead.



Q "I use America Online and I want to use a different web browser, as the built-in one doesn't support most modern features. How do I do this?"

The new version of AOL has a built-in web browser based on Explorer 3, so you may not need to use a different program for your surfing

A. The answer depends on whether or not you also want to be able to access other internet providers, because access to the internet via AOL is slightly different. But in any case you'll need to start by downloading the AOL Winsock file, which you can find by going to the keyword WINSOCK. You'll also find useful information at keyword NETSCAPE.

If you intend to use another internet provider as well as AOL, you should save the AOL Winsock file in a directory of its own, such as c:\aol251\winsock. Otherwise, just make a copy of any winsock.dll file that

use AOL for internet access and others to work with your other provider.

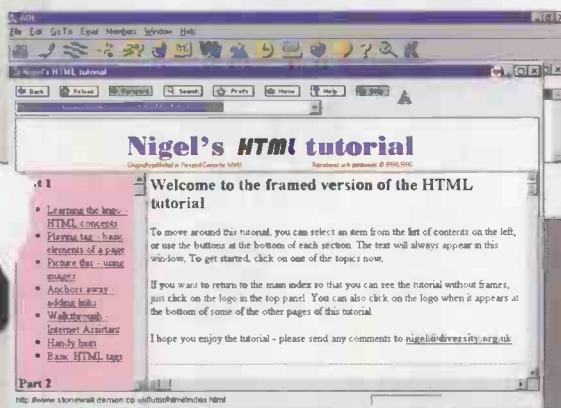
To do this, you need to install applications you want to use with AOL, into the same directory as the Winsock file: c:\aol251\winsock, for example. Make this their start directory, too, and then you'll be able to run them using AOL as your internet connection. Applications installed elsewhere on your system will use the main Windows Winsock file with your other provider. To make them use AOL, you'll have to swap the Winsock files each time you want to switch providers.

It's also worth upgrading to version 3 of the AOL software (which should be available by the time you read this) because it includes the AOL Winsock in addition to a built-in version of Microsoft Internet Explorer. You may not even need to worry about using a different web browser when you want to explore the net.

Opening the gateway

Q. "I have just got myself an account with Demon, and want to set up my Linux machine as a gateway between Demon and my home network. I'd like it to act as a mail server, collecting mail at regular intervals, and as a proxy server that will dial on demand, giving me access to the web from all the machines on my home network. Where do I start?"

A. You should be aware that doing this sort of thing is against the terms of a standard Demon dial-up account. You can do it with a network dial-up account, however, so I



you have in c:\windows and replace it with the file you downloaded from AOL.

For people who only use AOL, that's all you need to do. Install any internet applications, including web browsers, and they'll work fine once you've connected using the standard software. If you're using another provider, with Windows 95 Dial Up Networking for instance, it's a little trickier, but you can arrange for some programs to

will assume that this is what you want. The first thing you'll need is a version of PPP that supports dial-on-demand. There are a few of these around and they work by spotting any traffic destined for the internet, automatically dialling your provider to establish the link and then dropping it after a short period of inactivity. Make sure that you have this working first, before you try to configure anything else.

If you can't find a PPP system which handles demand dialling you can, instead, use a script to bring up your link. Since you want to check mail at regular intervals, you should use the cron scheduler to bring the link up, either by calling your dialling script or by performing a task that requires use of the link to the outside world, like setting the time from a network time server with a command like

```
/etc/ntpdate ntp1.demon.co.uk
ntp2.demon.co.uk
```

which will query Demon's time servers and automatically correct the clock on your system. To have this happen automatically at five minutes past the hour, you'll need a line like this in the root user's crontab file:

```
5 * * * * /etc/ntpdatentp1.
demon.co.uk ntp2.demon.co.uk
```

Since Demon automatically delivers waiting mail when you connect, that's all you'll need to do. If you're using a different provider you might want to arrange to run a script instead — to collect email from a POP3 mailbox, for instance.

A web proxy server is fairly straightforward as long as you have dial-on-demand networking. If you check the web pages of the W3 consortium you'll be able to find links to a number of products. The proxy server I use is the Cern HTTPD Daemon which, although a little long in the tooth, still does the job, and if you can find a binary or compile it on your own system, it will be fairly easy to set up since the sample configuration files contain almost everything you need.

If you can't make dial-on-demand work, you can still achieve something: all you need do is to configure the computers that are using the proxy so the start page on their web browsers is a page on your server.

The page can either have buttons to start and stop the PPP link to your provider, or it could just be a script that brings up the link. It's not quite as elegant as real dial-on-demand and it will misbehave if people choose a different start page in their

browser, but most of the time, users simply will not be able to tell the difference.

Mail-a-Mac

Q. "How can I send a file to a Macintosh user? I've tried sending a MIME attachment from my email program but the person I'm writing to says they can't understand it."

A. If you're using Eudora on the PC, then instead of MIME, you should choose BinHex from the pop-up menu in the compose window. BinHex is understood by most Macintosh email programs, and it's probably the best format to use if you're sending to a Mac user.

Not all encoding and decoding utilities support BinHex, but XferPro is one that does. You should be able to find it on your favourite FTP site. When you've converted a file to BinHex, just paste it into an email message and send it to your friend. You have to make sure you include the line "(This file must be decoded with BinHex 4.0)"

as it's used by many Mac programs to spot a BinHex file and decode it, automatically. All that's needed at the other end, assuming your friend doesn't have an email program that automatically decodes BinHex, is a copy of BinHex 4 or Stuffit Expander. In the latter case, just drop a BinHex file onto the icon to convert it, and in the former, choose "Upload —> Application" from the File menu.

Faster modem

Q. "I'm thinking of upgrading from my current 14,400 modem to a new one. Should I buy one of the new 33,600 models, or wait until the promised faster ones arrive?"

A. It's certainly worth upgrading your current modem and you can expect to see quite an improvement in the speed of access to ftp sites and the web, but don't worry too much about speeds above 28,800 bits per second (bps).

You should make sure you have a fast serial port (see previous Net.answers columns for details of how to check), otherwise the upgrade won't be worth it. In fact, if you anticipate buying one of the "coming really soon" ultra-fast modems, you should look for an intelligent serial card because even a 16550 serial chip may not be fast enough in the future.

It's important to remember that although

p252 >

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the faster speeds that are currently being talked about may sound attractive, they're not all here yet. The fastest speed that's guaranteed to be compatible with other brands of modems is 28,800bps, which is the V.34 standard. Faster modems, sometimes called V.34plus, operate at 33,600bps and while many will talk to each other because they use the same chips, they're not a real standard and they're not supported by all internet providers. But don't let that put you off too much: if a modem supports that speed, it will also work at 28,800 with your current provider.

The faster speed, 56,000bps, isn't worth waiting for so if you want a new modem buy it now, but make sure that it's upgradable with "flash memory". In some cases, that may be enough to make it work at the faster speed, but in other cases it won't. Since the new modems haven't yet been launched, it's not possible to give a definitive answer.

With 33,600 there are no standards for operation at that speed, and there are several vendors making modems that won't talk to each other. If you buy too soon, you may find you're stuck with something that can't be used to its full effect without changing providers.

The best advice is to upgrade but only to a V.34 modem, or one that supports 33,600bps if your provider does. Don't worry about the faster models on the horizon: they'll be expensive and you can expect compatibility problems until the market has settled down.

Setting up a newsgroup

Q. "We'd like to create a newsgroup, called alt.speculation.universe, but we don't know how to do it. Can you help?"

A. The rules for the creation of newsgroups differ, depending on which part of Usenet you want to create them in. For a newsgroup in the alt hierarchy, which is

probably the best place for what you're proposing, you should use the alt.config group to discuss your idea. The first thing to do is to read the group for a few days, at least, and get a feel for the rules and how things are proposed. Even though the "alt" groups were originally intended as an "anything goes" area, things still have to be done in a certain way, otherwise many news servers will refuse to acknowledge the request to create a group.

Unless the creation message is processed properly, your new group won't

Network Time
2.0.1 (US), © Pete Resnick, 1990-1993.
Thu, Oct 24, 1996 5:13:20 pm

Time server
fags-ether

Accuracy to within secs

Time Zone: Use Map Control Panel Setting

Set the time:
 At every startup Every hours
 Wait for MacTCP Using NTP only

When an error occurs:
 Post notification Retry in mins

The time was last set:
Thu, Oct 24, 1996
4:32:52 pm

The Network Time control panel can be used to update your Macintosh system clock from the internet (see "The correct time")

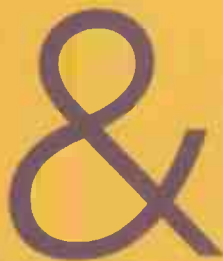
appear on all the servers that could carry it, which means that few people will be able to post a message to it.

If you don't want to go to the trouble of creating a newsgroup, you should consider a mailing list instead. You could start this up on your own system without having to get the approval of anyone except your system's administrator.

The correct time

Q. "My friend's PC automatically corrects the time each time he connects to the internet. How can I do the same thing on a Macintosh?"

A. You need the Network Time control panel, which can ask a computer anywhere



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Taking up from where you left off

Q. "I used to use bulletin boards, and whenever the telephone line failed during a long file download, I could always start again from where I left off by using Zmodem which automatically resumes from the middle of a file. Can I do anything similar with the internet? I've had some long file downloads stop after several minutes and my computer hangs up the phone if there's too long a pause."

A. Yes, you can, depending on the ftp program you're using because not all of them have the necessary functions, especially some graphical ones. There are two commands that can help you out: restart and reget.

The restart command is probably more common. The reget command is simpler — it merely begins to fetch a file starting at the end of the copy that's on your computer's hard drive. So if you're fetching a file called Picture.TIFF and saving it as newpic.tif,

you'd use the command

```
reget Picture.TIFF newpic.tif
```

If the program you're using doesn't support the reget command you'll need to find out how much of a file you have transferred successfully, using the DIR command on DOS, or the Windows Explorer or File Manager. When you know how many bytes have been transferred, use the restart command. In this example I've assumed you have already transferred 12,317 bytes:

```
restart 12317
```

```
get Picture.TIFF newpic.tif
```

In other words, the restart command just tells the remote computer where to start off with the next file that you ask it to send. It's not as easy as using Zmodem from a bulletin board but at least you don't have to start again from scratch if you have an FTP program that supports either of these commands.

Stuck in the post

Q. "I'm trying to set up internet mail on my OS/2 system, using Utmil and sendmail. What do I need to put in the sendmail.cf file to deliver messages correctly? They merely sit in a queue and never reach the rest of the world."

A. To make sure your mail is delivered, you need to make sure the sendmail queue is being run from time to time, which you can do with the command `sendmail -q` when you're connected to the internet. If you run the command when you're not connected,

you will receive error messages from the mail system. If you haven't been able to configure sendmail at all, the best advice is not to bother. The mail system on OS/2 Warp is based on a port of Unix mail programs and it really is too complicated to explain here, and is unnecessary for a single-user computer system.

You can find information on setting up the mail system for multiple users on Demon's ftp site, but if you're the only user retrieving mail via a POP mailbox, you should consider ditching Utmil for something a little more straightforward which doesn't require you to configure sendmail.

One shareware program that you might like to look at is MR2/ICE, which can be found at nick.secant.com/mr2ice.htm. Although it doesn't support MIME, it can be used with add-ons and is much easier to configure than the standard OS/2 mail system. There's also a beta version of Netscape Navigator 2 for Warp, but the version which was available as this column was being written didn't support mail; future ones will. Check www.netscape.com for the latest details.

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. Please note that a personal response to every query cannot be guaranteed.

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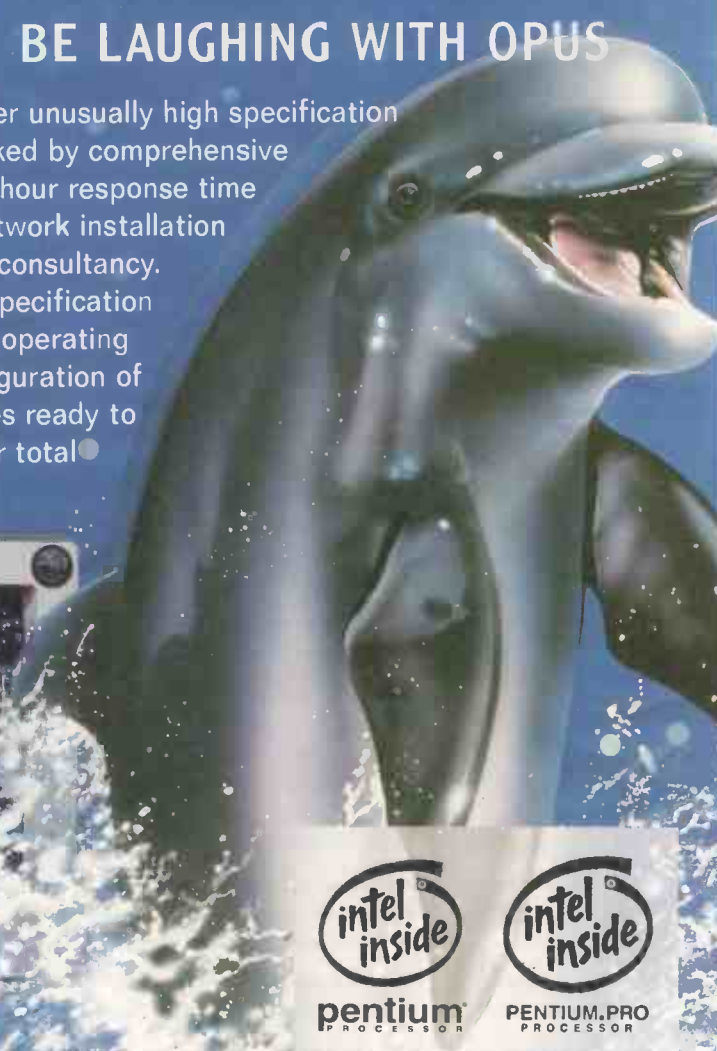
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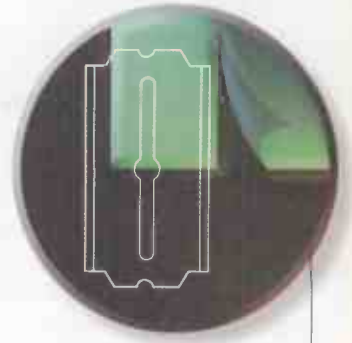


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Books

Learn what's what in JavaScript, peer into the crystal ball of software development or let William Gibson show you a fictional future of advanced technology.

Javascript: The Definitive Guide — Beta Edition

JavaScript is a deceptive addition to popular web browsers because the ballooning number of applets on the trendiest web sites would lead many to believe that it's a stable and well-established language. But this turns out not to be the case. When you consider how the three most popular web browsers (Internet Explorer 3.0 and Navigator versions 2.0.x and 3.0) all support slightly different versions of the language and that Netscape itself has not yet even published a formal language specification, it seems amazing that any of the applets work reliably at all.

Added to this are the various fortifications to JavaScript security which appeared between Navigator versions 2.0.1 and 2.0.2. Ultimately, JavaScript is going to make exciting web pages possible for "non-programmers". There's enough incompatibility around at the moment to drive even hardened code-junkies mad.

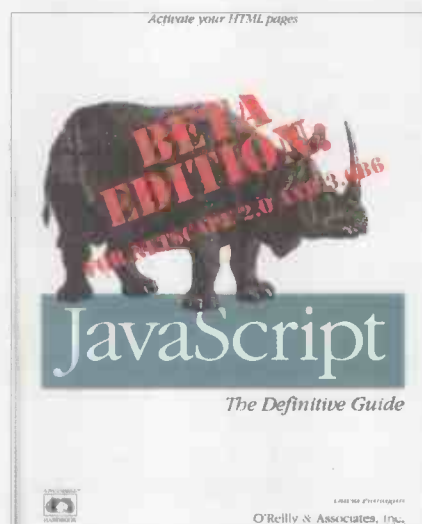
David Flanagan's book keeps you away from the most common bugs and compatibility black spots, while priming you in the writing of useful applets. It assumes a basic grounding in HTML and claims that no previous knowledge of programming is required. HTML authors will build up coding skills as they go along, but reading *JavaScript: The Definitive Guide* alongside another book which talks about writing neat, efficient, code is probably a better way to learn good programming techniques. On the other hand, if you require no more than a couple of `if()` and `for()` statements, the rather dry chapters on Lexical Structure, Variables and Data Types, Operators,

Statements and Objects offer enough information for you to finish the job.

The core of the book lists all the JavaScript functions and methods using a clear format, and covering each object's properties in full BNF syntax for every JavaScript method in the context of HTML and, crucially, platform availability to allow

you to keep your scripts portable. To help you get a headstart on Navigator 3.0 applets, the JavaScript reference section additionally covers those functions present up to Navigator 3.0B6. This book is better finished than the language itself.

Julian Evans



The Future of Software

The computer on your desk today has the potential for almost limitless power. The software running on that machine, however, may still be unchanged in five years' time. Before a shift occurs in the way we interact with our computers, a fundamental change must take place in the software we use. What those changes might be form the central theme of the group of essays in this book.

Interaction and open systems are the keys to advanced software development; but who will set these standards? The likes of Microsoft, it would seem, but that company also needs to make a quantum leap in the way it organises itself, and how it

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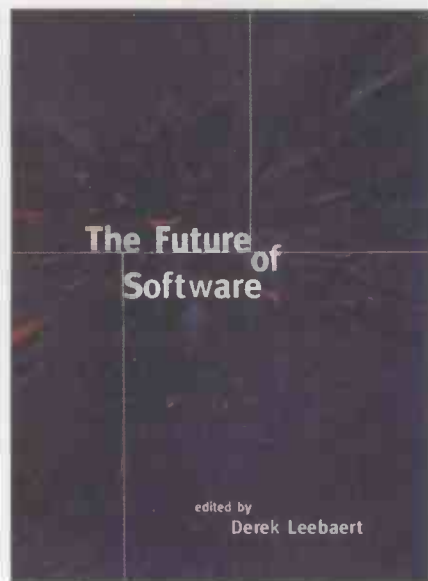
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produces its software in the future. This book hints at how this software will look.

In the West, software applications look identical on countless machines. Word 7, for instance, is the same no matter where you use it. The Japanese however, have an open system. Software is specialised and customised to the end-user's specific needs. We are moving closer to the time when visual programming will mean just that: a way of creating your own custom programs, whenever you like, from pre-programmed units. The Japanese lack of standardisation may well give them a head start in this field.

Many areas of software development are tackled in this book. Fundamental issues are covered, such as the nature of computing power and its move to a complexity matched only by the human brain. Gustave Essig talks of "naturalware": "Natural language and human intelligence are attained through new naturalware design approaches, such as functional knowledge representation. The digital computer may achieve its destiny as the successor to the human brain in both complexity and capability." Great stuff; but the short history of program language development, the future of workgroup computing and why the Japanese feel they are in "software crisis" puts it into perspective. There are also excellent essays on other fundamental issues facing the software industry, like copyright law. One outstanding example looks at workgroup computing and is written as a piece of science fiction.

The future looks bright for all users if we can change some of our basic work



practices and embrace the new millennium as the beginning of a new era in software development. We can perhaps look forward to a future where computers aid our everyday life, simply and efficiently. As Williams and O'Brien point out: "In today's society, information has become the oxygen of the whole process of interaction."

The final word should go to Scott Brown: "We have before us an opportunity that we can either capitalise on or squander." On the other hand, we may still be using the same buggy, flabby, marketing-driven software that today we know and love.

Dave Howell



Idoru

In his book, William Gibson departs somewhat from his usual formula and presents us with what many of his readers may find a disappointing read.

Idoru follows the lives of Laney and Chia. Laney is a media analyst whose synapses have been accidentally re-wired and now allow him to see patterns in the data that we all generate as we move through our lives. He is hired to provide damage control by the organisation that manages Rez, a rock music legend. Rez has announced that he will marry an Iidoru. Nothing wrong with that, until you realise that an Iidoru is nothing more than a software agent.

Chia is the hapless innocent thrown into this alien world and guides us through the melange. A fan of the band, she travels from the Seattle chapter of her fan club to Tokyo to investigate reports that the group's lead vocalist is about to commit this unforgivable act. The rock star fan club becomes almost Triad-like in its organisation and zeal. Gibson has once again taken something mundane and given it a new slant.

Laney's ex-employers, Slitscan, are media hyenas who construct sensational stories intended to reveal the seedier side of celebrity lives. They want Laney back in the fold, following his resignation over the suicide of one of their marks.

Gibson takes emerging technology and projects it into the future. Internet search technology has only recently emerged and Gibson shows us where this technological strand might eventually lead us. There is plenty here for hardened cyberpunks. Gibson still weaves a story that touches on many areas and doesn't over-play the technological elements to the detriment of



the central story. Shadowy organisations, streetwise kids and technology that remains tantalisingly unexplained and out of reach, all add layers to the quality of narrative that we have come to expect from him. Technology is prevalent but is not as conspicuous as in his earlier novels or those of Neal Stephenson, for instance.

For once, his vision is not of a dystopian society, but one where advanced technology is commonplace in people's lives and is accordingly taken for granted by them. Neither as lyrical as *Virtual Light* nor as new and raw as *Neuromancer*, but its subtlety nevertheless confirms Gibson as the master of his genre.

Dave Howell

PCW Contacts

Javascript: The Definitive Guide — Beta Edition

Author David Flanagan

Publisher O'Reilly

ISBN 1-56592-193-3

Price £22

★★★

The Future of Software

Edited by Derek Leebaert

Publisher The MIT Press

ISBN 0-262-12184-0

Price £11.50

★★★★

Idoru

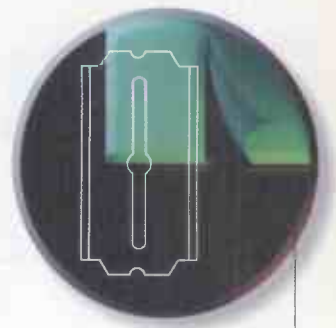
Author William Gibson

Publisher Viking (Penguin Books)

ISBN 0-670-85778-5

Price £16

★★★



Talking loud and clear

"Testing, testing, 1, 2, 3." Tim Frost hails the "new era" of natural speech recognition, where your computer cuts through background noise to obey your instructions.

I learnt typing in my free-time doing A-levels (all the fourth form girls were in the typing class) and, as computing took off, it has proved invaluable. But I suspect that, regardless of how computer literate you are, from high-powered managers to school kids, the majority of you are two-finger typists. No matter how speedy your 200MHz Pentium can process the data, it can't speed up the entering of words and numbers.

Despite its unsuitability for those not trained in its arcane rituals, the typewriter keyboard, designed to slow up typing, is still the only serious physical input device for computers. It might not be user-friendly, but its longevity has been guaranteed by two factors: everyone knows their way around it, and the lack of any real alternative.

There have been flirtations with finger keypads and writing surfaces, but as Apple will readily testify, these have not caught the imagination. It's not difficult to spot what the Holy Grail for human input is: watch any sci-fi movie and they're all doing it — talking to their computer.

A whole raft of companies is developing speech recognition, from the huge multinationals like IBM and Philips to specialist developers like Dragon Systems. And it is rapidly moving out of the era where programs need hours of training and still can only cope with a limited vocabulary spoken very carefully and deliberately. The new era hails "natural speech recognition", a complex mix of sound analysis, language models, sense, grammar and spelling checkers.

The system has to go through all sorts of hoops to take speech and turn it into text, with the main problem being one of keeping

a decent level of accuracy. Any idiot can create inaccurate speech recognition.

The accurate speech recognition system needs to take a long stream of noise you have spoken into the microphone and recognise noises that correspond to a known pattern. This first stage uses statistical methods to match the received sound to a known phoneme, the specific



vocabulary of noises that speech is created with. Having established a set of most probable phonemes, it can create the combinations of letters that this set of noises would normally make — here comes the possibility for errors. Few speakers speak clearly: we drop consonants at the end of words and dialects wreak havoc with English as it is understood by a PC. There has to be cross-checking with an on-board dictionary to confirm a range of words that these phonemes could represent and then choose, statistically, which word is most likely to occur at that point in normal speech. From this stage on, it is a huge

exercise in taking this string of statistically-likely words and seeing if they make credible sentences. If not, try the alternative matches and sound-alikes until there is a string of words that make real sentences and strings of sentences that make sense.

This takes a lot of processing power, and many systems rely on dedicated sub-processors to handle a big chunk of the work. As algorithms and models get more sophisticated, natural speech recognition is moving to software-only solutions that will run on a PC, admittedly a powerful one if you want to do it in Windows.

Some needs for this level of speech recognition are more obvious than others. It is already doing business in pathology labs where note-taking can be rather inconvenient. The legal profession likes it too: save half an hour a day of two-finger typing, at a lawyer's average hourly rates, and make an extra fortune by the end of the week. There is a small but increasing number of 24-hour phone information services that recognise speech rather than simple yes/no instructions. For PC users, the advantage is obvious: the ability to dictate text rather than wear out those index fingers to control the computer via keyboard and mice.

Even when the speech recognition algorithms have been fine-tuned and reduced to regular PC software, there will be barriers to overcome before you can call up your computer from anywhere in the room. There are many layers of analysis and processing needed to separate speech from background noise, and to work out if any of that speech is directed at the computer. Until then, it's on with the headsets, but for many this would be a small sacrifice. ■

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Glass act

Imagine a 3D image that hangs in space while you move around and look at it, like R2D2's video projections in Star Wars. Toby Howard reports on current — and futuristic — developments.

Although we live in a three-dimensional world, almost all our computer pictures are displayed in two dimensions, on flat screens. Imagine if we could create three-dimensional images that actually floated before our eyes, like the holographic video recordings projected by R2D2 in Star Wars. Researchers at Stanford University are bringing the reality closer, with a new display technology where true 3D images float in a cube of glass.

Making convincing three-dimensional images has long been a Holy Grail of artists and engineers. In the 15th century, Albrecht Dürer's studies of the laws of perspective laid the foundation for the creation of flat images that embodied a sense of depth. The technology behind the fifties craze for 3D movies ("See the hideous flying fingers of the swamp monster!") remains popular today. Glasses with green and red lenses enable each eye to see only the appropriate image of the two projected simultaneously on the screen. But the images suffer from cross-talk, so the left eye sees some of the right eye's image, and vice versa. This weakens the illusion, strains your eyes and gives you headaches.

A modern approach uses polarisation instead of colour filtering. Left and right eye images are projected onto a screen through polarising filters, the left image vertically polarised, the right image horizontally polarised. The viewer wears lightweight glasses with lenses being correspondingly polarised. Cross-talk is eliminated and if the system is well-aligned, you can see a full-colour 3D image floating in front (or behind) the projection screen. It is only when you reach out to touch the image that you realise there is nothing there.

3D display technologies are now appearing which allow the viewer to see a stereo image without wearing any special glasses. The principle of these "auto-stereoscopic" displays is still to present the eyes with left-hand and right-hand images, but the geometry of the display is such that each eye sees only the image intended for it. Several research groups are working on

displays which can also track the location and orientation of the viewer's head, using ultrasound or infra-red beams, adjusting the images accordingly.

Although these techniques give exciting results, they are not creating true 3D images. They are presenting us with pairs of 2D images, and it is up to our brains to construct the true 3D scene they represent. Some people are better than others at doing



3D in the movies: (above) The Empire Strikes Back (from the Star Wars trilogy), and (right) Lawnmower Man



this, and some people can't do it at all.

The latest and most futuristic development is the "volumetric display", which generates an authentic 3D image. The image hangs in space while you move around and look around it. This is R2D2 territory.

There are two volumetric systems, known as "swept-volume" and "static-volume". In swept-volume displays, the display screen is flat but it is rapidly rotated to sweep out a three-dimensional volume. If the screen is moved quickly, the eye can't see it; but if particular pixels on the screen are repeatedly switched on, in sync with the rotation, they are bright enough to be perceived as spots of light suspended in space (rather like the streaks of light you see when twirling a sparkler). A version of this technology, shown

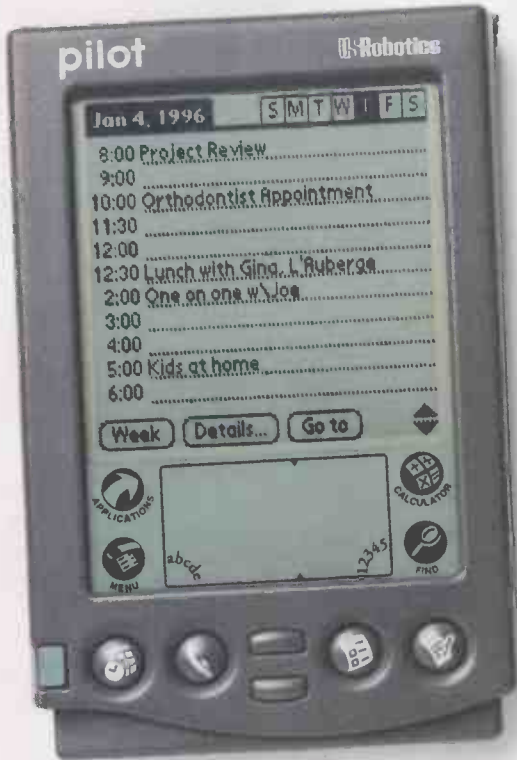
at the Electronic Imaging Symposium, used a rotating helical surface illuminated by a laser. It was known as Felix the Helix.

Many researchers believe the future of 3D displays lies with the static-volume display, which is a transparent grid of 3D pixels, or voxels. An unilluminated voxel is invisible, but when switched on, it appears as a spot of light floating in space. The prototype display recently announced by Elizabeth Downing and her colleagues at Stanford University works on this principle. It uses a block of transparent glass, in which voxels are illuminated when two invisible infra-red laser beams intersect. To create a complete image, the lasers are scanned around the volume, to repeatedly light up all the corresponding voxels, often enough to maintain a stable image. It's a clever technology, based on the physics which is never far away when discussing cutting edge technology: quantum mechanics.

The voxels in the display cube are created by introducing tiny amounts of rare-earth elements into the glass during its manufacture. Each rare-earth ion normally exists in its lowest stable energy state (call it state A). If it is illuminated by laser light of a suitable wavelength, it absorbs

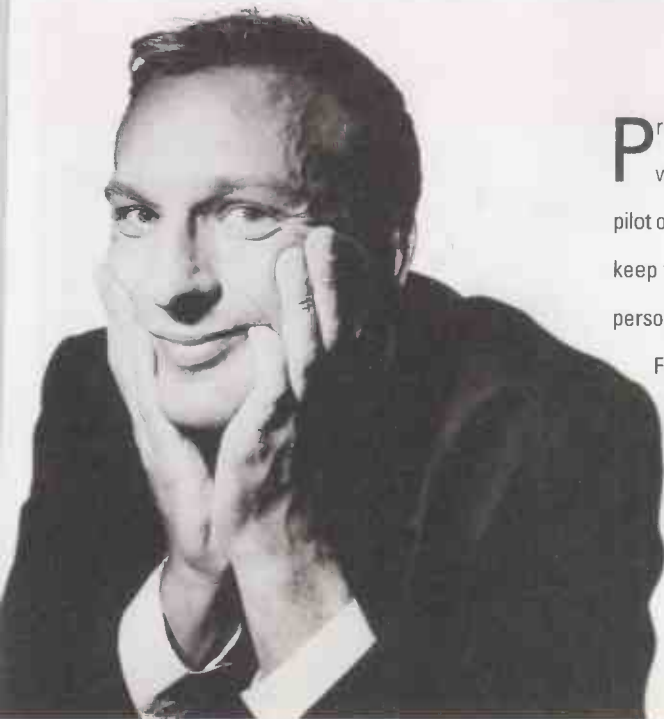
some of the light and jumps into a more excited energy state (B). It will stay in state B for a short time, before decaying back to state A. However, if it receives another jolt of laser light of a different wavelength while it is in state B, it gets even more excited, and enters state C. This is as excited as it can get, and after a few thousandths of a second it drops back to state A, emitting its surplus energy as visible light. The voxel lights up.

The current prototype of the display is tiny (the size of an Oxo cube) and monochromatic, the colour depending on which particular rare-earth element is used. Problems remain but the basis of the technology is proven, and there is a feeling that volumetric displays are on the verge of a breakthrough. ■



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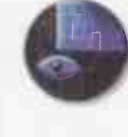
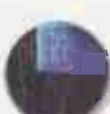
Will you drop your floppy and go for a drive with a difference? Roger Gann helps you choose from among the new drives available.

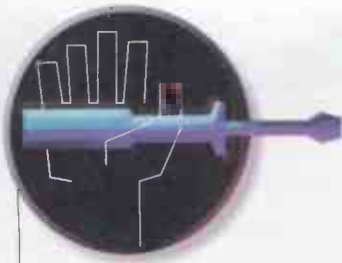
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State of the union

In the final part of our four-part tutorial, Mark Whitehorn covers UNION, insert, update and delete commands.

O ended last month's tutorial by illustrating that while you can have all of the cars some of the time, and all of the people some of the time (in your SQL statement), what you really want to know is: can we have *all* of the people *all* of the time? The answer is "yes" but you need to make use of UNION.

UNION returns all of the records from two queries and displays them, minus any duplicates, in a single table. Thus:

```
SELECT CARS.Make, CARS.Model,
EMPLOYEES.FirstName,
EMPLOYEES.LastName
FROM CARS RIGHT JOIN EMPLOYEES
ON CARS.CarNo = EMPLOYEES.CarNo
UNION
SELECT CARS.Make, CARS.Model,
EMPLOYEES.FirstName,
EMPLOYEES.LastName
FROM CARS LEFT JOIN EMPLOYEES
ON CARS.CarNo = EMPLOYEES.CarNo;
```

produces:

Make	Model	FirstName	LastName
Aston Martin	DB Mk III	John	Greeves
Bentley	Mk. VI	Bilda	Groves
Ford	GT 40		
Ford	Mustang		
Jaguar	D Type		
Shelby	Cobra	Sally	Smith
Triumph	Spitfire		
Triumph	Stag	Fred	Jones

Clearly, the two answer tables that are produced by the separate SELECT statements must be compatible in order for the UNION to combine them sensibly. So:

```
SELECT CARS.CarNo, CARS.Model,
EMPLOYEES.FirstName,
EMPLOYEES.LastName
FROM CARS RIGHT JOIN EMPLOYEES
ON CARS.CarNo = EMPLOYEES.CarNo
UNION
SELECT CARS.Make, CARS.Model,
```

```
EMPLOYEES.FirstName,
EMPLOYEES.LastName
FROM CARS LEFT JOIN EMPLOYEES
ON CARS.CarNo = EMPLOYEES.CarNo;
```

attempts to put text and numeric data into the same field and should fail. (In practice, some RDBMSs will allow this and convert the resulting field to the lowest common denominator, such as text.)

However, the result shown in Fig 1 (page 269) may not be particularly meaningful.

The first example I gave for UNION (combining a LEFT and RIGHT join) serves as an

excellent example. However, it isn't the only way in which it can be used. Suppose that you have another table of sales people who, for whatever reason, are stored in a separate table from the other employees.

Take a look at the following:

SALESPEROPLE			
EmployeeNo	FirstName	LastName	CarNo
1	Fred	Williams	1
2	Sarah	Watson	4
3	James	Hatlitch	6
4	Simon	Webaston	
5	Sally	Harcourt	
6	Martin	Boxer	
7	Trevor	Wright	7

You want to throw a party for all the employees, and to include those sales people with company cars (because they

have volunteered to drive the employees home afterwards).

You can use:

```
SELECT FirstName, LastName
FROM EMPLOYEES
UNION
```

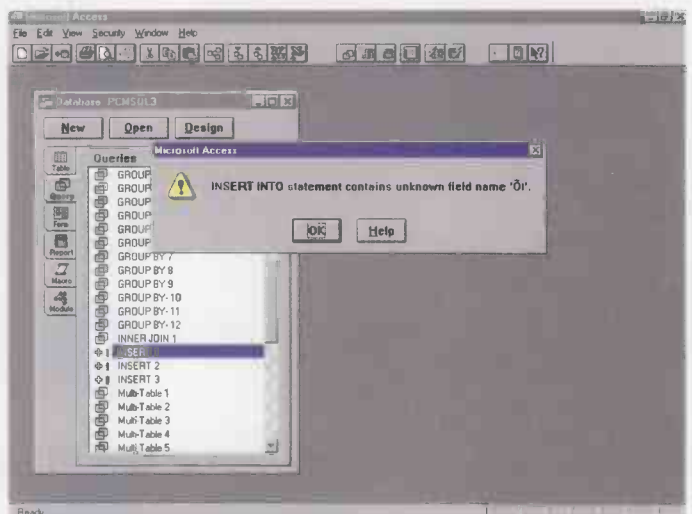


Fig 3 Error message generated when the first INSERT command is used too frequently!

```
SELECT FirstName, LastName
FROM SALESPERSON
WHERE SALESPERSON.CarNo Is Not
Null;
```

to yield;

FirstName	LastName
Bilda	Groves
Fred	Jones
Fred	Williams
James	Hatlitch
John	Greeves
Sally	Smith
Sarah	Watson
Trevor	Wright

You can also use UNION to produce a list of all employees and sales people who have company cars:

```
SELECT DISTINCTROW
```

```
SALESPEOPLE.FirstName,
SALESPEOPLE.LastName, CARS.Make,
CARS.Model
FROM
(CARS INNER JOIN SALESPEOPLE
ON CARS.CarNo = SALESPEOPLE.CarNo)
UNION
SELECT DISTINCTROW
EMPLOYEES.FirstName,
EMPLOYEES.LastName, CARS.Make,
CARS.Model
FROM
(CARS INNER JOIN EMPLOYEES
ON CARS.CarNo = EMPLOYEES.CarNo);
```

FirstName	LastName	Make	Model
Bilda	Groves	Bentley	Mk. VI
Fred	Jones	Triumph	Stag
Fred	Williams	Triumph	Spitfire
James	Hatlitch	Ford	Mustang
Sally	Smith	Shelby	Cobra
Sarah	Watson	Ford	GT 40
Trevor	Wright	Aston Martin	DB Mk III

SELECT summary

Suppose you import a table of data like this:

InvoiceNo	Foo
1	King
2	Baby Blue
3	Royal
2	Crested
5	Humbolt
2	Jackass

into a database and then try to make the field InvoiceNo into a primary key (*the Foo field is simply a shorthand representation of the boring information that would usually be displayed in an invoice*). This should fail because the field contains duplicate values. In this tiny table we can see them, but what if it had 50,000 records? With a little imagination, a query will find the errant records for us.

```
SELECT InvoiceNo, Count(InvoiceNo)
AS NoOfDuplications
FROM INVOICES
GROUP BY [InvoiceNo]
HAVING Count([InvoiceNo])>1;
```

InvoiceNo	NoOfDuplications
2	3

INSERT

Firstly, a brief note about the sample Access database which is provided. It is tempting to open each query as an SQL view, read it, and then look at the answer table by pressing the "Datasheet View button". This works for most of the examples provided but not for the INSERT queries. Press the "Run" button instead.

It is also worth bearing in mind that these

queries will update the base tables, so you should be working on a copy of the database. In addition, remember that the tables have primary keys, so if you run the same INSERT query twice without deleting the additional record, the query will fail to run the second time.

As if all that weren't enough, please also note that I have encountered what appear to be "software anomalies" in using these queries in Access 2.0. The first example of an SQL INSERT statement will only run two or three times. Thereafter, even if the new record is dutifully deleted from the target table, the query will generate the error message shown in the screenshot, Fig 3. This is despite the fact that it hasn't been edited, or even opened for editing. Once this error message appears, the only way to get the query to run again is to delete the existing query, open a new one and type the SQL statement again.

SELECT is undoubtedly the most commonly used SQL statement, but we shouldn't forget the other members of the Data Manipulation Language (DML), INSERT, UPDATE and DELETE.

INSERT is used to add rows to a table. Thus the statement:

```
INSERT INTO SALES
VALUES (8, 1, "Jones", "Sofa",
"Harrison", 235.67);
```

This is not the only allowable construction. Indeed, Access will run this syntactical construction, but if you save the query, Access converts it to:

```
INSERT INTO SALES
SELECT 8, 1, "Jones", "Sofa",
"Harrison", 235.67;
```

Both constructions will add this record to the SALES table shown in Fig 2.

A slightly more verbose form is possible:

```
INSERT INTO SALES ( SaleNo,
EmployeeNo, Customer, Item,
Supplier, Amount )
SELECT 8, 1, "Jones", "Sofa",
"Harrison", 235.67;
```

which has exactly the same result. We can also add to specific fields:

```
INSERT INTO SALES ( SaleNo,
EmployeeNo, Customer, Amount )
SELECT 9, 1, "Jones", 235.67;
```

which adds a single record as shown in Fig 4.

But don't forget closure. Any operation that we perform on a table (or tables) in a relational database must have, as its result, another table. So suppose we write an INSERT statement like this:

```
INSERT INTO SALES
```

```
VALUES
(SELECT
FROM SALES2
WHERE SaleNo > 200);
```

The table SALES2 looks like that shown in Fig 5, and this SQL statement will add the five records for which [SaleNo] is greater than 200 to the SALES table.

Closure is important here because the statement within the brackets:

```
(SELECT
FROM SALES2
WHERE SaleNo > 200);
```

generates a table in its own right which is then INSERTED into SALES.

SQL is not always as standard as it should be. As another example, the syntax for this statement in Access is:

```
INSERT INTO SALES
SELECT *
FROM SALES2
WHERE SaleNo > 200;
```

UPDATE

The UPDATE command allows you to alter the values in fields. The general format is:

```
UPDATE tablename
SET Fieldname(s) = value
WHERE fieldname = value
```

although the WHERE condition is optional. Thus:

```
UPDATE SALES
SET Customer = "Smith";
```

will change Fig 6 to Fig 7.

As you might imagine, this command can be a little devastating in the wrong hands. The WHERE command generally limits its scope. So:

```
UPDATE SALES
SET Customer = "Smith"
WHERE Customer = "Simpson";
```

will act on the same initial table to produce that shown in Fig 8.

It is quite possible to use different fields in the SET and WHERE clauses. Thus:

```
UPDATE SALES
SET Customer = "Smith"
WHERE SaleNo < 5;
```

produces Fig 9.

Other variations are possible, and indeed common. For example:

```
UPDATE SALES
SET AMOUNT = AMOUNT * 1.1;
```

will update all the values in SALES.[Amount] by 10 percent, as in Fig 10. This sort of variant is particularly useful.

DELETE

The DELETE command allows you to alter

the values in fields.

The general format of the command is:

```
DELETE FieldName(s)
```

```
FROM tablename
```

```
WHERE fieldname = value
```

although the WHERE condition is optional.

Thus:

```
DELETE *
```

```
FROM SALES;
```

is a particularly powerful (not to say dangerous) statement since the output table looks like Fig 11. To be more specific, this command deletes the entire contents of the SALES table. *Please be aware of the consequences of any injudicious use of this command.*

More commonly (and less alarmingly) the command is used like this:

```
DELETE *
```

```
FROM SALES
```

```
WHERE [EmployeeNo] = 2;
```

which deletes two records and produces the table in Fig 12. Of course, closure comes into its own and we can write statements like:

```
DELETE *
```

```
FROM EMPLOYEES
```

```
WHERE EmployeeNo IN
```

```
(SELECT EmployeeNo
```

```
FROM SALES
```

```
GROUP BY EmployeeNo
```

```
HAVING COUNT (*) < 2);
```

which is neither friendly nor amiable, but effective in database terms. It deletes all employees from the EMPLOYEES table who have made fewer than 2 sales. The

SALES table is unaffected, but one of our employees disappears from EMPLOYEES.

Bear in mind that this statement will try to remove employees who have performed badly, but the data dictionary may in fact prevent this deletion in order to preserve data integrity. This will depend upon whether Cascade Delete has been set between the two tables. In the sample database, the query will complete.

Summary

SQL is great, and if you spend any time at all with databases, it repays the effort required to learn it. One of the best ways to learn is to practise using it, which is why the sample database has 70 sample queries. However, you might also like to wile away your time on this brainteaser:

■ Question (and a free SQL diagnostic tool)

The two SQL statements below are perfectly legal. Both will run. The question is, which will be sensible? One of them will find all the records where the SaleNo is >200 and order the answer table by EmployeeNo and SaleNo. The other won't.

Q1

```
SELECT *
```

```
FROM SALES2
```

```
WHERE SaleNo>200
```

```
ORDER BY EmployeeNo, SaleNo;
```

or is it...

Q2

```
SELECT *
```

```
FROM SALES2
```

```
WHERE SaleNo>200
```

```
ORDER BY EmployeeNo AND SaleNo;
```

The only difference, to save you wasting time comparing them, is in the ORDER BY statement.

Answer: Q1 is correct and returns the table shown in Fig 13. Q2 returns the table in Fig 14 because it has a very odd construction:

```
ORDER BY EmployeeNo AND SaleNo
```

Despite appearances, this does NOT say "order the records by EmployeeNo and then by SaleNo". Instead, it says "evaluate the expression 'EmployeeNo AND SaleNo' for truth (the answer will come back as -1 [True] or 0 [False]) and then stack the records based on this value." You can prove this by adding the expressions which are being evaluated to the list of information that you want to see. Thus:

```
SELECT SaleNo>200 AS
```

```
['SaleNo>200'],
```

```
EmployeeNo AND SaleNo AS ['Emp AND
```

```
EmployeeNo, SaleNo, Customer
```

```
FROM SALES2
```

```
WHERE SaleNo>200
```

```
ORDER BY EmployeeNo AND SaleNo;
```

produces Fig 15. In all the records, the expression 'EmployeeNo AND SaleNo' happens to evaluate to -1, so the sorting has no effect.

If and when you come across an intractable SQL statement that runs but doesn't give you the answer you expect, then you can use SQL's own ability to show you the results of expressions as a diagnostic tool.

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Figs 1-15

Examples to accompany part four of the SQL tutorial, covering the UNION, INSERT, UPDATE and DELETE commands, and the associated brainteaser.

Fig 1

Car No	Model	First Name	Last Name
		John	Greeves
2	Mk. VI	Bilda	Groves
3	Stag	Fred	Jones
5	Cobra	Sally	Smith
	Aston Martin DB Mk III		
	Bentley Mk. VI	Bilda	Groves
	Ford GT 40		
	Ford Mustang		
	Jaguar D Type		
	Shelby Cobra	Sally	Smith
	Triumph Spitfire		
	Triumph Stag	Fred	Jones

Fig 2

Sale No	Employee No	Customer	Item	Supplier	Amount
8	1	Jones	Sofa	Harrison	£235.67

Fig 3

SaleNo	EmployeeNo	Customer	Item	Supplier	Amount
1	1	Simpson	Sofa	Harrison	£235.67
2	1	Johnson	Chair	Harrison	£453.78
3	2	Smith	Stool	Ford	£82.78
4	2	Jones	Suite	Harrison	£3,421
5	3	Smith	Sofa	Harrison	£235.67
6	1	Simpson	Sofa	Harrison	£235.67
7	1	Jones	Bed	Ford	£453
8	1	Jones	Sofa	Harrison	£235.67
9	1	Jones			£235.67

Fig 2

Sale No	Employee No	Customer	Item	Supplier	Amount
3	2	Smith	Stool	Ford	£82.78
5	3	Smith	Sofa	Harrison	£235.67
213	3	Williams	Suite	Harrison	£3421
216	2	McGreggor	Bed	Ford	£453
217	1	Williams	Sofa	Harrison	£235.67
218	3	Aitken	Sofa	Harrison	£235.67
225	2	Aitken	Chair	Harrison	£453.78

Fig 6 — will change to...

Sale No	Employee No	Customer	Item	Supplier	Amount
1	1	Simpson	Sofa	Harrison	£235.67
2	1	Johnson	Chair	Harrison	£453.78
3	2	Smith	Stool	Ford	£82.78
4	2	Jones	Suite	Harrison	£3,421
5	3	Smith	Sofa	Harrison	£235.67
6	1	Simpson	Sofa	Harrison	£235.67
7	1	Jones	Bed	Ford	£453

...Fig 7

Sale No	Employee No	Customer	Item	Supplier	Amount
1	1	Smith	Sofa	Harrison	£235.67
2	1	Smith	Chair	Harrison	£453.78
3	2	Smith	Stool	Ford	£82.78
4	2	Smith	Suite	Harrison	£3,421
5	3	Smith	Sofa	Harrison	£235.67
6	1	Smith	Sofa	Harrison	£235.67
7	1	Smith	Bed	Ford	£453

Fig 8

Sale No	Employee No	Customer	Item	Supplier	Amount
1	1	Smith	Sofa	Harrison	£235.67
2	1	Johnson	Chair	Harrison	£453.78
3	2	Smith	Stool	Ford	£82.78
4	2	Jones	Suite	Harrison	£3,421
5	3	Smith	Sofa	Harrison	£235.67
6	1	Smith	Sofa	Harrison	£235.67
7	1	Jones	Bed	Ford	£453

Fig 9

Sale No	Employee No	Customer	Item	Supplier	Amount
1	1	Smith	Sofa	Harrison	£235.67
2	1	Smith	Chair	Harrison	£453.78
3	2	Smith	Stool	Ford	£82.78
4	2	Smith	Suite	Harrison	£3,421
5	3	Smith	Sofa	Harrison	£235.67
6	1	Simpson	Sofa	Harrison	£235.67
7	1	Jones	Bed	Ford	£453

Fig 10

Sale No	Employee No	Customer	Item	Supplier	Amount
1	1	Simpson	Sofa	Harrison	£259.24
2	1	Johnson	Chair	Harrison	£499.16
3	2	Smith	Stool	Ford	£91.06
4	2	Jones	Suite	Harrison	£3,763.10
5	3	Smith	Sofa	Harrison	£259.24
6	1	Simpson	Sofa	Harrison	£259.24
7	1	Jones	Bed	Ford	£498.30

Fig 11

Sale No	Employee No	Customer	Item	Supplier	Amount
---------	-------------	----------	------	----------	--------

Fig 12

Sale No	EmployeeNo	Customer	Item	Supplier	Amount
1	1	Simpson	Sofa	Harrison	£235.67
2	1	Johnson	Chair	Harrison	£453.78
5	3	Smith	Sofa	Harrison	£235.67
6	1	Simpson	Sofa	Harrison	£235.67
7	1	Jones	Bed	Ford	£453

Fig 13 — the correct answer

Sale No	Employee No	Customer	Item	Supplier	Amount
217	1	Williams	Sofa	Harrison	£235.67
216	2	McGreggor	Bed	Ford	£453
225	2	Aitken	Chair	Harrison	£453.78
213	3	Williams	Suite	Harrison	£3,421
218	3	Aitken	Sofa	Harrison	£235.67

Fig 14

Sale No	Employee No	Customer	Item	Supplier	Amount
225	2	Aitken	Chair	Harrison	£453.78
218	3	Aitken	Sofa	Harrison	£235.67
217	1	Williams	Sofa	Harrison	£235.67
216	2	McGreggor	Bed	Ford	£453
213	3	Williams	Suite	Harrison	£3,421

Fig 15

'SaleNo>200'	'Emp AND Sale'	EmployeeNo	SaleNo	Customer
-1	-1	3	213	Williams
-1	-1	2	216	McGreggor
-1	-1	1	217	Williams
-1	-1	3	218	Aitken
-1	-1	2	225	Aitken



The wheel thing

Not a creature was stirring, not even a mouse — or even that funny little wheel thing on Tim Nott's new Microsoft Mouse. Many happy hours were spent when he finally sussed it out.

I was very excited this month to receive a sample of the new Microsoft Mouse. This is the one that looks very much like the last. It's vaguely kidney-shaped but with a third thingy to twiddle — part-button, part-wheel, it sits between the two existing buttons.

Somewhat perplexed that the far end of the lead terminated in a PS2 (I think that's what it's called) plug rather than the screw-on 9-pin job that we know and love, I dug an adaptor out of the pocket of an old anorak and fired up the PC.

When Windows got to the bit when its internal checking orders "All those with mice take one step forward", I got the error message "Where do you think you're going, Mr Nott?" or words to that effect. Several changes of adaptor later, it was the same old story. Maybe, I thought, if I install the software first... (and no, I didn't RTFM as there was no FM to R — we press wallahs

don't get that kind of cosseting). But still no joy, so I carried on with my distinctly shabby-looking Mouse Mark 2 and explored all the new Intellimouse goodies on offer apart from the wheel.

This brightened up the day considerably (it was about one o'clock), because I discovered all the labour-saving devices I'd missed since Windows 3.1 days. "Which way is up" is a clear winner. I'm left-handed and although, paradoxically, the asymmetrical MS mouse fits nicely in my left hand and I'm now well accustomed to using my middle digit as the main clicking appendage, I do tend to hold the thing slightly (well, very) skew-whiff.

Likewise, it's great to have "snap-to" back again — the trick that automatically moves the pointer to the default button of a dialogue box. And let's not forget the thing that causes the mouse pointer to disappear from one side of the screen and reappear

on the other. Not much of an aid to productivity, but a superb practical joke.

The next stop was the brand new automatic lightup, as I call it. Waft the pointer over an icon or title bar, and it automatically grabs the focus without having to click. Cool, but for some strange reason often much slower than clicking normally. If you wish, you can also slow the pointer

down automatically over icons and buttons, so I whacked this into gear as well.

Now, having watched someone with motor neurone disease struggle bravely and patiently to position the pointer exactly on a button or icon, I can appreciate the value of this. But it does strike me that Microsoft has gone a little over the top in the degree of the effect. At the slowest speed, it's rather like running across a field and suddenly putting your foot into a deep pit of mud. There you are, mousing away, when suddenly you grind to an abrupt halt. After picking the mouse up and scrabbling it repeatedly across the desk, rather like launching a toy car, the pointer will suddenly take off and whizz across the screen.

There's a happy end to the story, because the proper adaptor arrived and I was at last able to use the new mouse, complete with wheel. This does all sorts of wonderful scrolling, panning and zooming things. And very lovely it is too. But it only works in Explorer, Internet Explorer, and Office 97. The latter was still in beta at the time of writing, and although exciting and fascinating in its own right, wasn't yet at the stage where I'd forsake my existing software to use it for daily work. So, human nature being what it is, I spent many happy hours wheeling around Internet Explorer, then switching to the word processor and twiddling away ineffectually before realising for the umpteenth time "Oh, silly me, it doesn't work here, does it?"

Got those old MSDOS compatibility blues again...

But enough of my problems; how about yours? The "compatibility mode" problem continues to maintain a high chart placing.

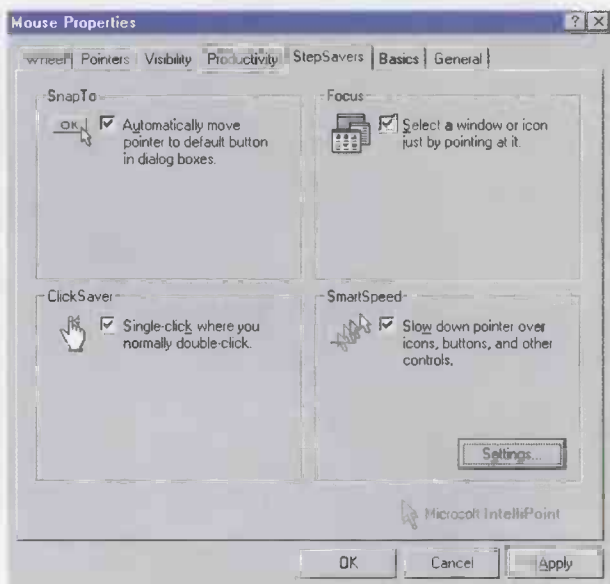


Fig 1 New Intellimouse goodies. All but the wheel work with older mice

A handful of quickies

■ Notepad is fussy about extension names that haven't been registered as Notepad files. Save a file, say, as MYPROG.BAS and you'll find you've actually saved MYPROG.BAS.TXT. Using the "View/Options/File Types" dialogue to register, say, .BAS or .SCR as Notepad files is one way around this, but you might well want to preserve the existing association in order (in these examples) to run Basic listings or scripts. The way around this is to save the file as "MYPROG.BAS", with double quotes around it, which avoids the gratuitous .TXT on the end.

■ Tom Fitzgerald wants to know how to change the "Tips of the day". Start Regedit, search for "Tips" and keeping hitting F3

till you see the tips in the right-hand pane. Double-click on the number of the tip you wish to change and an edit box appears. Speaking of which, thanks also to Nicholas Metcalfe, who sent a complete set of tips culled from Twin Peaks, and Mark Harrop with a set of seventies aphorisms from Brian Eno and Peter Schmidt. Now, that's what I call obsession. But no more themed collections, please, be they

Douglas Adams, Star Trek (especially not) or Coronation Street.

■ Alternative tips are still trickling in, but I need more, so get your imagination and/or plagiarism going. For a pointer to the sort of thing I'm after, see Fig 2 for a very fine "Tip of the Month", stolen from Robert Winstanley's email signature.

■ You can cheat at Hearts in Windows 95, too (see the Windows 3.1 column on page 273 for the full story). Open the Registry and go to Hkey_Current_User/Software/Microsoft/Windows/CurrentVersion/Hearts. Right-click in the right pane and create a new string value with the name ZB and the value 42. As with 3.1, Ctrl+Alt+Shift+F12 will then reveal your opponents' hands. You can also change the default names by adding string values for p1name, p2name and p3name.

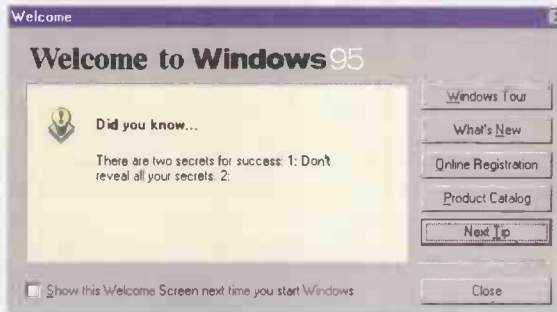
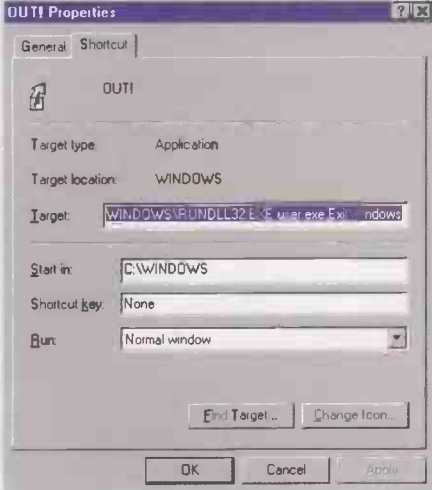


Fig 2 Thank you, Robert Winstanley, for this "Tip of the Day of the Month"

■ Are you sure you want to: shut down the computer?; restart the computer?; restart the computer in MSDOS mode?; close all programs and log on as a different user?; get rid of this annoying confirmation? If your wish is the lattermost, create the following shortcut on the Desktop, Start Menu or folder of your choice. The command line should read RUNDLL32.EXE user.exe,ExitWindows. Note there is no space after the comma or In ExitWindows. You'll get the usual prompts asking if you want to save any open,

Fig 3 A quick getaway from Windows

changed, files. If so, you can cancel the command, too. Apart from that, you're out. Finished. Shut down without further ado.

To briefly recap, this is the one where, seemingly out of the blue, your hard disk performance declines drastically and Control Panel/System/Device Manager shows that your disk controllers have been demoted to "MSDOS compatibility mode".

Mark Hewitt had this problem when installing Windows on an old-ish Elonex P90. Phil Kelly, of Elonex support, pinpointed the problem instantly and precisely. The Neptune motherboard does not support Plug and Play (P&P). But Win95 installs it anyway. Solution? Remove P&P

from Device Manager, restart the PC, then manually "Add new hardware", select PCI Bus. Restart again and all should be well.

David Ingham had a similar problem after assembling his own PC. This time it was an unnamed hero at Microsoft tech support who stayed behind for 30 minutes after close of play to establish that the combination of Award BIOS and Windows 95 PCI-IDE drivers was the problem. New drivers from the motherboard supplier cured the problem. Robert Winstanley upgraded from 3.11, experienced the same

p272 >

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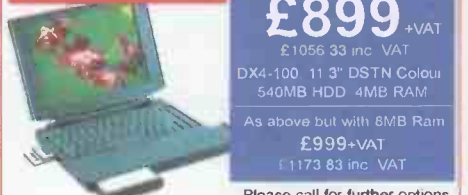
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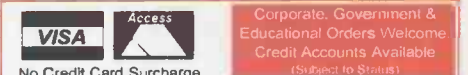
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problem and tracked it to SYSTEM.INI. So look for DEVICE= lines that refer to files with the .386 extension. These are "legacy" devices from 16-bit days and can cause compatibility mode (and other) problems. Try commenting the line out by preceding it with a semicolon.

Order! Order!

Grahame Slope came up with an interesting challenge: "How can I get the shortcuts in my StartUp folder to execute in a particular order?" I really tried on this one. It seems to make no difference how, or in which order, the icons are displayed. Nor does the alphabetical order seem to matter. At one point, I thought I'd cracked it with the creation dates of the shortcuts but this, too, was a red herring. Stranger still, restarting the PC would sometimes load the applications in a different order. Then I remembered the other way: the load= and run= lines in WIN.INI. In conventional wisdom, the first runs a program minimised, the second in a normal window, and the trick is to leave a space between each item. For example:

```
run=notepad.exe charmap.exe
calc.exe
```

This actually worked, at least initially, but it must have been a fluke as re-ordering the same items or adding more didn't run them in the order specified.

Then of course, there's the other, other way, which is far more high-tech and involves editing the Registry to add new string values to:

```
HKEY_LOCAL_MACHINE\ SOFTWARE\
Microsoft\ Windows\
CurrentVersion\ Run
```

So I went there, did that, and needn't have bothered. Sure, the programs ran, but not in any perceivable or consistent order. So moving on to the other, other, other

Bugwatch

Remember the Windows 3.x Calculator bug? Well, you'll be delighted to learn that Windows 95 has one all of its own. Switch to scientific view, and multiply 0.57 by 100. If you don't get 57, that isn't a bug, that's you. Now press the INT key. What this should do is return the integer part of a number — that is, everything to the left of the decimal point. Whoops! Yes, I get 56 as well, with 0.58 and 0.28 giving similar results. There may well be others. In each case the Inverse INT function, which should return all to the right of the decimal point, gives 1. So at least there's some kind of method to the madness.

A glimpse of Christmas stocking



As I write this, the sun is shining and the window (strictly non-™) is wide open. The trees are turning gold and there's a faint smell of woodsmoke from the first log fires of the season. At the top of my page it says "January issue, 1997" so it must be Christmas. And you thought Windows 95 was confusing. Anyway, in accordance with the time-honoured tradition believed to date back to at least 1995, here is my Christmas wish-list.

But first, did last year's wishes come true? These all concerned various tedious aspects of the Windows 95 interface. One wish was that Microsoft Office would take a leaf out of Microsoft Windows' book and put the filename before the application. In fact, I've beefed about this at great length so I won't bore you further, except to say that the beta of Office 97 I saw still doesn't do this but adds the refinement (at least in Word) of putting your name before the application and file name. Just in case you forget it, I guess.

Tiled Windows in Office Binder didn't happen either, and nor did the ability to add files such as Notepad or Paint to a binder. Another wish was to reinstate the JPEG and GIF Quickviewers that appeared in the betas of Win95 but not in the final cut. A little progress here — you can get an enhanced Quickview (for money) or view them in Internet Explorer (free). My last wish was "Please give me the patience and understanding to get to grips with the way Windows 95 saves settings". A little progress here, too: the free Tweak UI gizmo has an option for globally enabling or disabling "save settings", so at least you can stop all the folders you left open from opening again. But it's far too little, too late: saving general and particular folder settings is still largely a matter of guesswork and pot luck whether a folder opens in list view, icon view, with or without the toolbar, and so on. So let's put that as this year's number one.

This year, I wish...

1. Let's have explicit folder menu options for "Save this folder settings" and "Save these settings for all folders below this one". And nipping the Inherent contradictions in the bud, the latter will produce a confirmation dialogue if this includes a previously-saved "one-off". And while we're about it, a separate setting for re-opening (or not) folders, which were open when you quit.
2. Let's have a totally easy and effective way of securing a standalone PC. This, after all, is the age of the family computer. We need to be able to restrict access not just to applications and settings but to folders, too.
3. And can someone explain to me what I have to do to persuade the PCW cover-mounted CD that I already have the Acrobat viewer installed and working?
4. Returning almost to where I started; a patch to make the new mouse wheel work in all applications.

way, I remembered that you can start a Windows program from a DOS prompt. I must admit, I'd never appreciated why you might want to: even if you don't have a shortcut for the program, it's quicker to launch it from the "Run..." command. But it figures that if you can start a Windows program from the DOS prompt, then you should be able to do it from a batch file.

With trembling fingers I put together a batch file in Notepad, each line launching a different Windows application. I created a shortcut to this file in the StartUp folder, and, just to be flash, edited the properties of the shortcut to close the DOS window on exit. I restarted Windows for the umpteenth time that day. And guess what? It works. Certainly, it's slow and kludgy, but preliminary testing shows that the batch commands are processed in the order listed. Obviously the department of obfuscation and bloody-mindedness slipped up there.

While I'm winning, I'll pass on the following ancillary tips. If you want the batch

file to open a folder, or an associated file, use the "Start" command. And if long file or folder names are involved, enclose them in double quotes. Here's an example:

```
c:\windows\calc.exe
"c:\Paint Shop 4\psp.exe"
c:\windows\notepad.exe
c:\windows\charmap.exe
start "c:\Program Files"
start c:\bootlog.txt
```

This starts the Calculator, then Paintshop, Notepad and the Character Map, opens the Program Files folder and opens bootlog.txt in Notepad.

■ By the way, Chris Marriott's SkyMap, mentioned in my *Windows 3.1* column, is on this month's CD-ROM in 32-bit flavour as well, in the same Zipfile: Skymap.zip. Happy stargazing and a happy Christmas, to y'all!

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Multiple mayhem

Multiple configuration options, low level Windows security, and the search for a cure for the dreaded RDS. All dealt with before Tim Nott posts his Christmas wishes up the chimney.

Martin deLoughery emailed me from Bahrain (he must be a devoted reader because PCW costs more than ten quid there) with a warning on multiple configurations, as discussed in my October '96 column.

He writes: "I stopped using the DOS multiple configuration option thing aeons ago. Why? Well, the prime reason is that once you have set the whole thing up, would you be likely, thereafter, to never add another device to your system or do anything that will not require a change to either CONFIG or AUTOEXEC? I think not, and if you like your memory to be optimised (as I do) you will find that MEMMAKER and your nice new multiple-configuration CONFIG and AUTOEXEC will not be cheery bedfellows. Try running Memmaker with your config and autoexec setup for multiple configuration and see what happens."

Certainly, he has a point. However, it should be possible to run MEMMAKER on each individual configuration, save the results as CONFIG and AUTOEXEC.001, 002, 003 and so on, and combine the results into a single, multi-choice CONFIG.SYS and AUTOEXEC.BAT. That's not to say I'd really like to try it, so point taken.

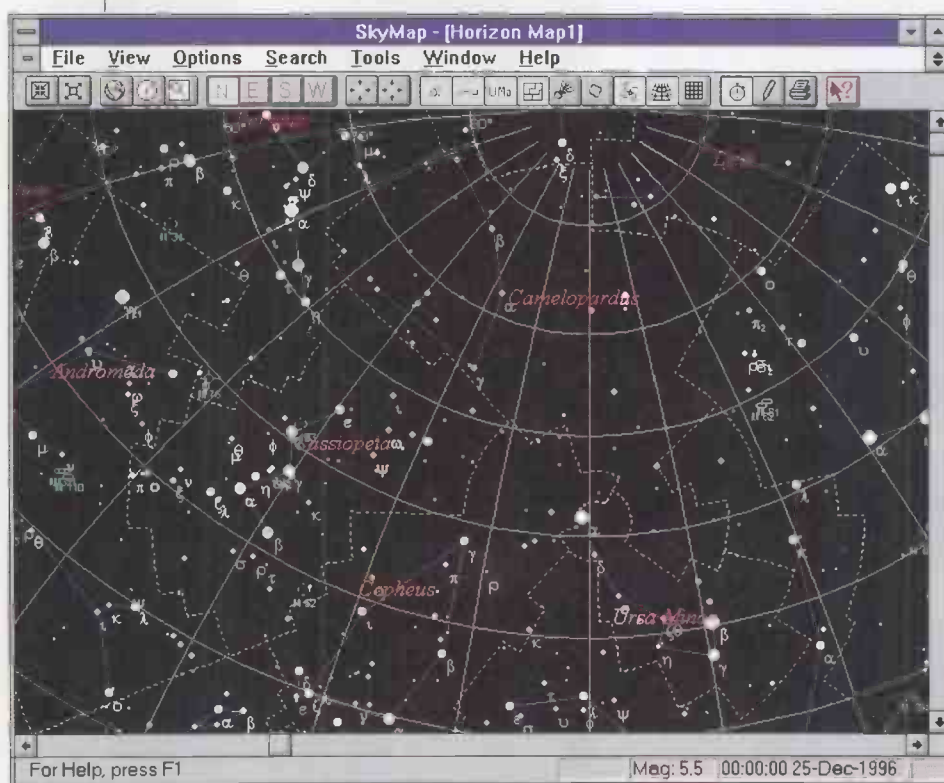
Another observation came from Tim David, who complained that he couldn't get more than nine menu choices, but I think he was just showing off.

Stargazing

"We are all in the gutter, but some of us are looking at the stars." So wrote Oscar Wilde who, with remarkable prescience, also coined "Either that wallpaper goes or I do" shortly before his last and fatal GPF. But I digress.

As star watching seems appropriately seasonal, check out Chris Marriott's SkyMap on this month's cover-mounted CD. Chris, who comes from Culchet in Cheshire, has created a rather splendid planetarium for Windows. Tap in your latitude and longitude and you'll see not just stars in the east, west, south and north, but planets, asteroids, comets and deep sky objects. It's on the CD-ROM as Skymap.zip, which contains 16-bit and 32-bit versions. It's a 30-day shareware evaluation version. The full program shows over 250,000 objects.

■ Registration costs £29.95 (plus P&P and VAT) from the Thompson Partnership on 01889 564601.



A starry starry night from Chris Marriott's SkyMap, which is available on the PCW CD-ROM this month (Skymap.zip)

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If at first you don't succeed — cheat

If you're an honourable and upright citizen, skip this bit. Not to put too fine a point on it, this is how to cheat at Hearts.

Add ZB=42 to the [hearts] section of WIN.INI. (If you don't have a [hearts] section, create one including the square brackets.) Restart Windows. Play Hearts. Hit Ctrl+Alt+Shift+F12 — borrow some fingers if necessary — and watch as all your opponent's cards become visible.

But even having done that, I still find I lose — I don't really mind, but I do find it rather humiliating to be consistently trounced by someone called Terri. So if you're in the same boat, cheer yourself up by changing the default opponent names (on a non-networked machine) by adding entries for p1name=, p2name=, p3name= to the section as well.



Jerking around

On a more positive note, our man in Bahrain has a rather novel use for CHOICE.COM (Hands On Windows 3.1, July '96). Being forced to share a PC with somebody he uncharitably (but probably justifiably) refers to as "the jerk", he first created two directories, "Hisstuff" and "Mystuff", and copied his PROGMAN.INI and *.GRP files into "Mystuff". He then created a custom Program Manager for the jerk, giving more limited access before copying this set of PROGMAN.INI and *.GRP to "Hisstuff".

Using CHOICE with the /N and /T switches to suppress the prompt and timeout to a default, AUTOEXEC.BAT would always copy the jerk's Program Manager settings to Windows, unless he pressed a certain key (but unknown to him) during the crucial few second's pause. "It never

mattered" writes Martin, "what he did to his program groups (lest he should have learned how) and never mattered whether 'Save settings on exit' was turned on, the jerk always got the same screen every time he started Windows. Crude, but at that level, effective security."

Roger Pearson had a problem with Program Manager. It could be minimised or maximised but when restored "...it appears as just a short title bar, and I cannot change its size or position from the top left corner of the screen. I have printed out all the obvious files but cannot find any differences between this machine and another."

This sounds very much as if PROGMAN.INI has been nobbled. Open it in Notepad and you should see a section headed [Settings]. In this will be a key named Window= followed by five numbers.

The first two give the position, in pixels, of the top left corner of the window. The next two give the size, again in pixels, and the last should be 1 for restored, 2 for minimised and 3 for maximised. When you restore Program Manager from either minimised or maximised, it will return to the position and size determined by the first four numbers. If these are unfeasible, you can get the problem Roger describes.

The simplest solution is to delete the entire line, or comment it out by putting a semicolon in front. Program Manager will then resort to something restored sensibly in the middle of the screen.

Recursive Syndrome update

A problem that's proving very popular is the mysterious Recursive Directory Syndrome (RDS), as reported in this column in November. This is where Norman Burnell reported that the contents of C:\GAMES was replicated in C:\GAMES\GAMES and so on *ad nauseum*.

A Mr (or Ms) Butterwick reported: "I also had RDS, along with other things such as not reading a file that it had just verified as being saved, files not existing which File Manager or a DIR reading had shown to be in perfect condition, and CHKDSK reporting thousands of lost clusters or cross-linked files. After numerous checks and tests, it finally turned out to be a faulty motherboard — wish I'd thought of that before trashing a perfectly good hard disk."

Colin Mower had a similar problem, although "...it only existed when I tried to open up my CD-ROM drive in File Manager when there was no CD in the drive. I would get thousands of directories reported as existing on an empty drive! This caused no problems in the running of Windows or DOS, until I tried to back up my hard disk. MSBackup would try and read all of these 'ghost' directories, and complain rather bitterly after about the 200th empty one. I tried everything to resolve this problem, but the only way I got out of it was to re-format my hard disk and start from scratch."

Chris Paget came up with a way of reproducing the problem. "All it takes is ten seconds with Diskedit or an equivalent. Having run Diskedit, go to the root directory, pick a sub-directory and change the cluster number to zero. When you quit, that sub-dir will now point back to the root, and voila! a recursive sub-directory, exactly as described." Unfortunately, he doesn't tell us how to reverse the process. Not having

Dear Santa...



And so to my Christmas wish list. Last year, one moan was directed at multimedia applications which insist you change screen resolution before running. So hats off to Talking Books and Broderbund whose children's titles do this automatically, without having to restart Windows, and then neatly change it all back on exit — but only under Windows 95, alas. However, under 3.1 the titles will run without changing resolution.

Likewise, in response to another moan, there's a refreshing trend for games and entertainment CD-ROMs to copy nothing but an Icon to the hard disk.

Another wish (which made the charts two years running) was that memory prices would drop in accordance with other PC components such as processors and hard drives. I'm delighted (well, not that delighted, as I bought all my current memory before the drop) that this has come true, and after two years of £20-plus, a megabyte of RAM is, at the time of writing, less than £5 although it seems to be creeping up again.

A third wish that came true (or very nearly so) was for a UK version of Encarta. I've had to settle for a "World English" edition but this does a great deal to redress the over-emphasis on US sport, natural history and culture in favour of more important things such as cricket, nightingales and the Archers. And yes, it runs under both 3.1 and 95, but just to show you can't win them all, it installs 4.5-11Mb of files to your hard disk.

Another wish was for a superfast and stable video card. And I think I've found one — a Matrox Millennium that provides 16.7 million colours in up to 1,280 x 1,024 resolution. It seems solid as a rock and, something that's been on my wish list for a long time, lets you change resolution and screen depth without restarting Windows. And that's not just 95 but 3.1, too. And it's fast. In fact, it's too fast, as selecting or dragging text in Word is impossible if the startpoint and endpoint aren't on-screen at the same time: everything scrolls far faster than I can react.

And so to this year's wishes...

1. Can I have an option to slow down scrolling in Word 6 (and 7) please, so I can get my dragging and dropping back under control?
2. Can I ask printer manufacturers to take a rest from developing? I keep reading of colour inkjets that get ever better and ever cheaper. But just when I've set my heart on replacing my six-year-old (but still going strong) Star dot-matrix with the latest technological marvel from Hewlett-Packard (for instance), Epson, Canon or Lexmark — to name but four at random — move the goal posts. And by the time I've found the definitive best buy from that lot, guess what? HP has moved them back again.
3. But if I've really got to force a decision, then can I have an HP 690c, please. And could I possibly have it a bit early so I can produce those amazingly original Christmas cards I've been meaning to do for the past five years?
4. And while we're in an artistic vein I'd like one of those dinky little Artpad graphics tablets with the cordless pen, from Wacom. I had an all-too-brief loan of one and fell deeply in love.
5. Last but not least, a repeat of last year's wish. Keep developing for Windows 3.1!

Tumpy-tumpy-tumpy-tum...
Microsoft discovers the true meaning of culture



Diskedit or a spare PC to hand, I managed to resist the temptation to try this out. This one, I feel, will run and run, but hopefully we might find a solution.

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Driller thriller

Oh, the horror: staring at broken end-pins on one of your drives. When it happened to Dale Strickland-Clark, he got down to some soldering and writing of batch routines for backup.

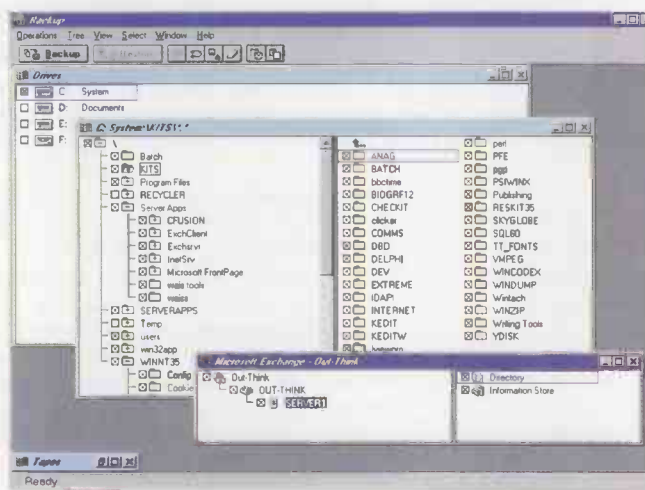
I had a bit of a panic a short while ago. While reassembling my server, having just added a new 2Gb SCSI drive to work alongside the two 1Gb drives already there, I was having some difficulty getting the SCSI cable back into one of the old drives. Just a little bit worried, I decided to pull the drive out and investigate the obstruction. I broke into a cold sweat when I discovered that I'd bent almost flat the two end pins on the drive's SCSI connector. They were so bent, in fact, I knew that if I attempted to straighten them again, they'd break off.

I tried anyway and they broke off, but I gained a little satisfaction from being right. I considered my options. The chances of fixing the pins back on were pretty slim. I did have a backup of the data, and with a new drive installed, I could get away with simply restoring the data onto that drive. However, I had other plans for the new drive, and furthermore, the thought of dumping an expensive bit of kit because two of the cheapest components had broken off bugged me. I decided to try fixing it.

I trimmed away a section of the plastic surround with a tiny circular saw attachment on a modelling drill and exposed the base of the two severed pins. Then, with a small soldering iron, some fine solder and a steady hand, I carefully re-attached the pins to the connector. I can't hope to express the drama of the situation and the relief when, with it all connected together again, my server booted without complaint.

Although I was already fairly conscientious with my backups, this episode brought home the vulnerability of data and the large scope for mislaying it.

Backing up systems is one of those



The standard NTBACKUP that comes in the box with NT is easy to use and provides control over what is backed up down to file level, but only if you run each backup by hand. It's hopeless to automate and won't back up the Registry from other systems over a network. Not recommended for use in production

tedious jobs you postpone at your peril. NTBackup shipped as part of NT is adequate for emergency use, but provides only the barest control over what is backed up and no help with automating the job. Consequently, running the backup is a bit of a chore. The greater the effort required to take a backup, the more likely it is to be skipped on a busy day. I've had a couple of goes at writing batch routines to take some of the pain out of the procedure, but tape cycling was still manual and far too much rubbish was being backed up, taking the data onto a second tape for a full backup.

My backup requirements are modest, with about 10Gb online around the network, the most important slice of that being the 4Gb on the NT Server. Much of the rest is just installed software and it wouldn't be a disaster to have to recreate it from scratch. My Sony DDS tape drive will manage between 6

and 8Gb to a tape, depending on the level of compression achieved.

There are some slight complications, too. Not all the data can be backed up by a simple file-level routine. Send an SQL/Server .DAT file to tape while the database system is running and there's an excellent chance that the data will be unusable. You must at least shut SQL/Server down first. The same applies to Exchange Server and many other server applications.

The example batch routine, BU2.BAT (Fig 1) shows one possible approach to automating a backup procedure using the standard features in NT.

While this routine simplifies running a backup, it doesn't automate it. For this we

Fig 2

```
at 21:00 /every:su "c:\batch\bu2.bat sunday"
at 21:00 /every:m,t,w,t,f "c:\batch\bu2.bat daily"
at 21:00 /every:s "c:\batch\bu2.bat weekly"
```

Fig 1 Automating backup using standard NT

This backup routine uses standard NT commands and none of the new features of NT 4. The Sleep command is found in the resource kit but is optional. The series of Echo commands at the beginning are a handy way of identifying command parameters without introducing case sensitivity and allowing abbreviation of long parameter names. For example, "incremental" can be abbreviated to "inc". A few frequently-used parameter combinations have been given names for convenience, such as "Sunday", "Daily" and "Weekly". This has been implemented by having the batch file simply call itself again with the expanded parameters when one of the combined names is used.

```
@echo off

echo /daily | find >nul /i "%1" && bu2 incremental 4mm append
echo /sunday | find >nul /i "%1" && bu2 incremental 4mm overwrite
echo /weekly | find >nul /i "%1" && bu2 normal 4mm overwrite

setlocal
set tape=na
set butype=na
set append=na

echo /normal | find >nul /i "%1" && set butype=normal
echo /incremental | find >nul /i "%1" && set butype=incremental
echo /differential | find >nul /i "%1" && set butype=differential

echo /small | find >nul /i "%2" && set tape=1
echo /large | find >nul /i "%2" && set tape=0
echo /4mm | find >nul /i "%2" && set tape=1
echo /qtrinch | find >nul /i "%2" && set tape=0

echo /append | find >nul /i "%3" && set append=/a
echo /overwrite | find >nul /i "%3" && set append=

if %tape% == na goto error
if %butype% == na goto error
if .%append% == .na goto error

Echo Backup type %butype% to %tape% %append%

Net stop "Allaire Cold Fusion"
Net stop "World Wide Web Publishing Service"
Net stop mssqlserver

rem -- Link to share on NT workstation
Net use x: \\dale-pc\drive-c

rem -- Link to share on Windows 95 workstation
Net use y: \\heidi-pc\drive-c password

ntbackup backup c: d: x: y: /v /b %append% /hc:on /t %butype%
/tape:%tape% /e /l "c:\temp\backup.log"

Net use x: /delete
Net use y: /delete

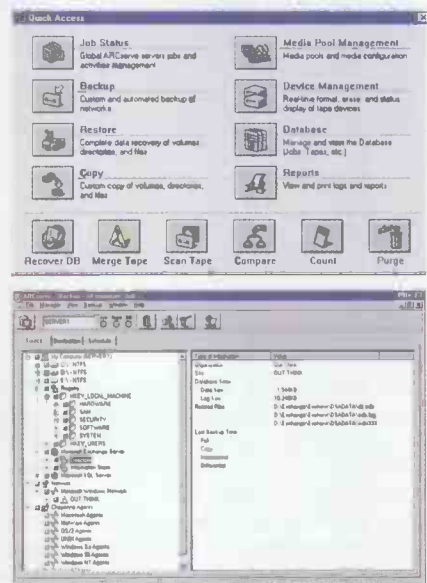
Net start mssqlserver
Sleep 10
Net start "World Wide Web Publishing Service"
Sleep 10
Net start "Allaire Cold Fusion"
```

(continued over...)

can use NT's Schedule service (Fig 2).

These commands entered into a console window will schedule three different types of backup to run at nine o'clock each evening. You then just need to make sure you have the correct tape in the drive each evening.

Before spending too much time attempting to mould NTBACKUP into your ideal backup system, however, it is worth considering the alternatives. There is an



Top You control ARCserve from a comprehensive array of buttons, but not all of the rest of the system is as easy to get to grips with. **Above** With ARCserve, you can back up just about anything you can think of. If it's not handled by the standard package, there's probably an optional *agent* to add support to back it up

extended version of NTBACKUP, called "Backup Exec for Windows NT", from Seagate Software (a company formed from several mergers including Arcadia, the name some people may still associate with this package), and Cheyenne Software has an NT version of its popular NetWare backup package, ARCserve.

ARCserve for NT is a very comprehensive system and there are numerous options to extend its capabilities. In its basic form, it allows flexible control over what is backed up and, with its built-in scheduling, when the backup is run.

But there are some drawbacks. Cheyenne has shunned NT's own tape drivers in favour of its own. This means you have to disable the tape devices to NT, preventing any other standard software accessing them. Re-enabling the tapes requires a reboot of NT. This prevents, for

p278 >

```
pushd temp
findstr /b /i /l /v /c:"Directory" backup.log >"backup summary.txt"
del backup.old
rename backup.log backup.old
start notepad "backup summary.txt"
popd

goto exit

:error
echo Syntax: bu2 daily ^| sun ^|\ weekly
echo Syntax: bu2 {normal^|incremental^|differential}
    {small^|large^|4mm^|qtrin} {append^|overwrite}

:exit
endlocal
```

Books

Inside Windows NT Server 4

Author Drew Heywood
 Publisher New Riders
 Price £46.99 (incl VAT)

No matter how well you thought you knew NT, it's a fair bet you'll soon learn something new flicking through these pages. This is a very readable and extremely informative volume, and covers a huge amount of ground all in good detail. It sticks to explaining things that aren't obvious, avoiding the torture of describing each menu item. Complex subjects, such as security, are illustrated sufficiently clearly for you to wonder why they were ever thought complex in the first place.

If you work with NT Server, start clearing two inches of shelf space now.

Special Edition Using Windows NT Workstation 4.0

Author Paul Sanna et al
 Publisher Que
 Price £46.99 (incl VAT)

With more or less equal weight given to using WordPad and configuring SNMP, it's difficult to identify the target readership of this book. Whoever buys it is going to have to lug around several chapters for which they have no use. That said, it's a book that will take the novice through to a good degree of competency — given sufficient time. The authors (all thirteen of them) clearly wanted to leave no gaps in the subject matter and they have succeeded, even covering Microsoft Internet Mail and Internet News which are not included in NT as standard.

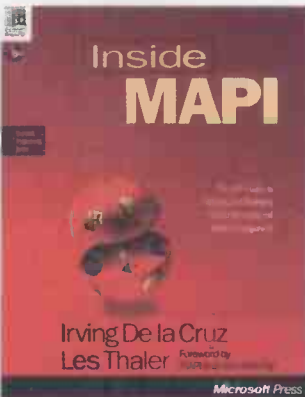
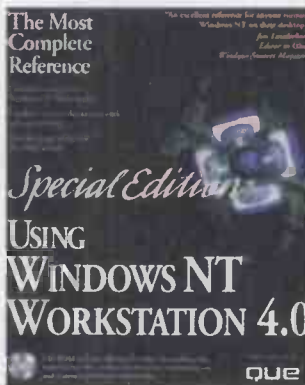
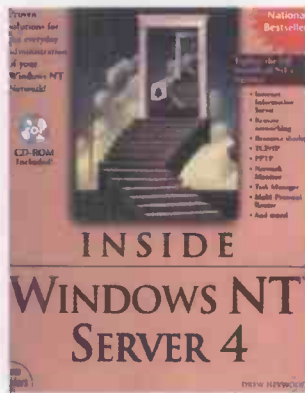
A very comprehensive reference, but slightly spoiled by pointless and obvious detail.

Inside MAPI

Author Irving De la Cruz, Les Thaler
 Publisher Microsoft Press
 Price £37.49 (incl VAT)

If you thought MAPI was a simple API to send and receive messages, you haven't looked recently. The MAPI supported by Microsoft Mail and for which a VBX provided an easy interface for Visual Basic, has been renamed Simple MAPI — and for good reason. The MAPI you'll find in NT and used by Exchange is a very much more complex beastie.

This isn't a book for the faint-hearted. You'll need a good grounding in messaging systems, Microsoft's COM architecture and C++ to get much beyond chapter two. This is Microsoft's definitive reference on the subject so there's lots of code samples to help you get through it, and



example, using the SQL/Server DUMP command to backup database tables, or using NTBACKUP to write tapes to send to other sites (the latest service pack gives ARCserve the ability to read but not write the Microsoft tape format used by NTBACKUP).

Cheyenne has no plans to change this regime, claiming it is to maximise performance. Having seen ARCserve backing up to a Storage Dimensions MegaFlex TapeArray (four DLT4000 tape units of 40Gb capacity each) at nearly 100 megabytes per minute, I'm not in too much of a hurry to argue. But I wonder if the standard NT drivers would be dramatically slower. I'm hopeful of the chance to find out.

Dear Santa...



1. NT has come a long way since its birth, and it might seem a little ungracious to ask for a better user interface so soon after we've already had one, but a) I'd like each folder to remember where I had it on the screen, which view I used and how the icons were arranged; b) I want some MUCH faster ways to get to the folder I'm interested in, both through Explorer and from File Open and Save dialog boxes; and c) Closer integration between console windows and the desktop. For example, I'd like to be able to quickly make a selected folder the current directory in a console window.
2. 1997 is going to be NT's year, but the take-up is going to be hindered by hardware manufacturers being slow or reluctant to bring out peripheral drivers for NT. The Windows Driver Model will address this problem but that's at least eighteen months away. I'd like to see tape drive, scanner, CD-ROM writer manufacturers and others wake up to the potential and write some native NT drivers.
3. The mouse is an ergonomic disaster. It's too far from the keyboard and it doesn't do enough when you get there. The cable snags on everything and notebook manufacturers have universally failed to emulate it in the space available to them. It's time for a rethink. When the ideal solution is invented, it will be wireless or part of the keyboard, it will have at least a button for each finger so you can do more without returning to the keyboard, and it won't need a square foot of desk space to itself. It should also double as a telephone handset so I can just lift it to my ear when it squeaks and have a shaver attachment for when I get up late. Oh, and there will be NT support for it — first.

PCW Contacts

Dale Strickland-Clark is a journalist and consultant on Windows/NT and the internet. He can be reached by email at dale@outthink.demon.co.uk

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All together now

Chris Bidmead claims things are changing for Unix users. Then again, he said the same in 1993... Still, he remains optimistic: 1997 could finally see some Unix togetherness.



One of the things this column asked Santa Claus for last Christmas was for the Unix community to get its act together. Something along these lines — dare I hope

— is actually happening. In February, we saw the coming together of X/Open and the OSF to form The Open Group, followed in September by a declaration of intent from Uniforum to join the amalgamation.

My dentist tells me that amalgam is a metallic mixture that sticks in your teeth and goes hard and almost inert except for trickling out a few, probably poisonous, Hg ions that may actually help keep decay at bay. A not-too-unfair description of the massed forces behind Unix in the past, you might think (I couldn't possibly comment...). But things are changing.

One sign of this change is the way The Open Group is welcoming the Open Unix effort to its bosom. Open Unix is a development of Lasermoon's Linux-FT, now under the aegis of Caldera (more about this at www.caldera.com). And I see that CDE, The Open Group's Common Desktop Environment, has now arrived on Linux. CDE was part of the initial Unix COSE initiative that was proposed in March of 1993, but the fact that it's taken three years is hardly the fault of Linux.

I mentioned the COSE initiative in the first of these columns, written in September of that year, and was somewhat sceptical about it at the time (see panel). Indeed, it wasn't long before COSE began to look like just a knee-jerk reaction against Microsoft's

NT, with little muscle behind it. It would be ironic if Caldera's Open Unix became the focus for The Open Group's so-called Single Unix. Perhaps this threat of rivalry is one reason that SCO has decided to make its own Open Server flavour of Unix freely available to anyone not using it for commercial purposes.

So, I promised to get hold of a copy of the SCO freebie and report back to you. It took rather longer than I anticipated, and the CD and its accompanying pair of boot diskettes arrived too late for evaluation this

But I'm starting to assume that if I can get to it, most of you can get to it too. So my role isn't to relay wedges of publicly accessible material. What you get in this column is my own personal adventure/quest/struggle to get a few particular things done, and generally to make sense of what I call "grown-up computing". I do give pointers to what I think is good and useful information on the net, and occasionally I may summarise. But mostly I take it for granted that cyberspace is something we share.

I realise this may not be true for everybody. But if you're adventurous enough to be running a flavour of Unix, or to contemplate doing so, you're probably adventurous enough at least to be thinking about connecting to the internet. My minimum recommendation: get yourself an email address.

Unless you're one of the lucky few with a fibre cable coming in off the street, you're likely to connect through a serialised network connection called PPP (Point to Point Protocol). In October, I passed on some tips for tracking what's

happening with PPP once you're making connections through it. The month before, I explained in general what PPP is, apropos some problems I'd been having with my own internet connection. Last month, I included some screenshots of GateKeeper, the graphical front-end that drives PPP on my NeXT machine.

If I'd realised I was going to turn the PPP saga into a serial, I'd have been more methodical about it. Notably missing so far is a discussion of how to set about making

COSE in 1993

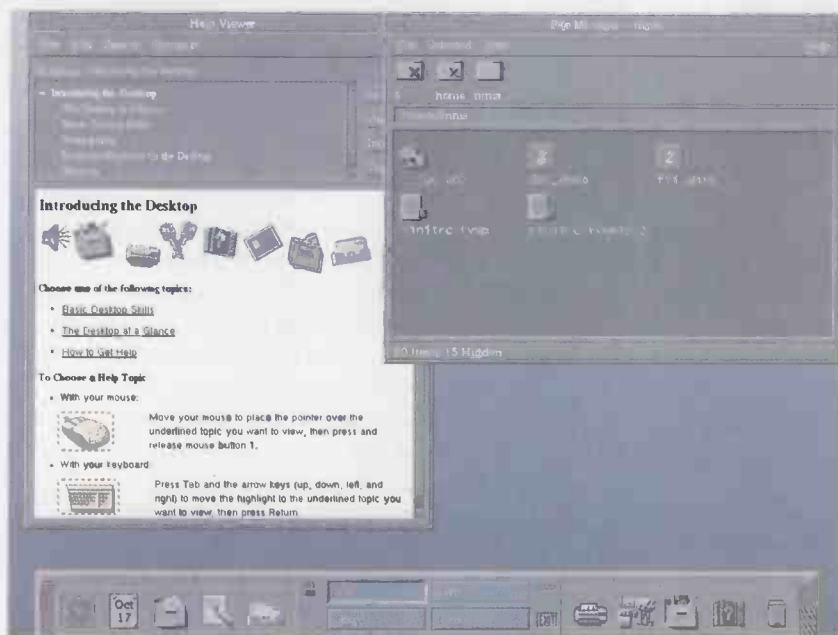
In September 1993 I wrote: "COSE... sounds terrific. You'll be able to sit down at any Unix workstation from any manufacturer and instantly be at home, in the same way that Windows users are today. Better still, applications will run 'right out of the box' on Unices on the same processor, and to move a COSE app across to a different processor will only need recompilation — no tweaking and twiddling with the source code..."

And porcine domesticated livestock will become airborne. Alas, the Unix world has promised various forms of togetherness in the past but has still managed to remain a mass of twisty passages, all different. Fingers crossed.

month. Next month, if all goes well....

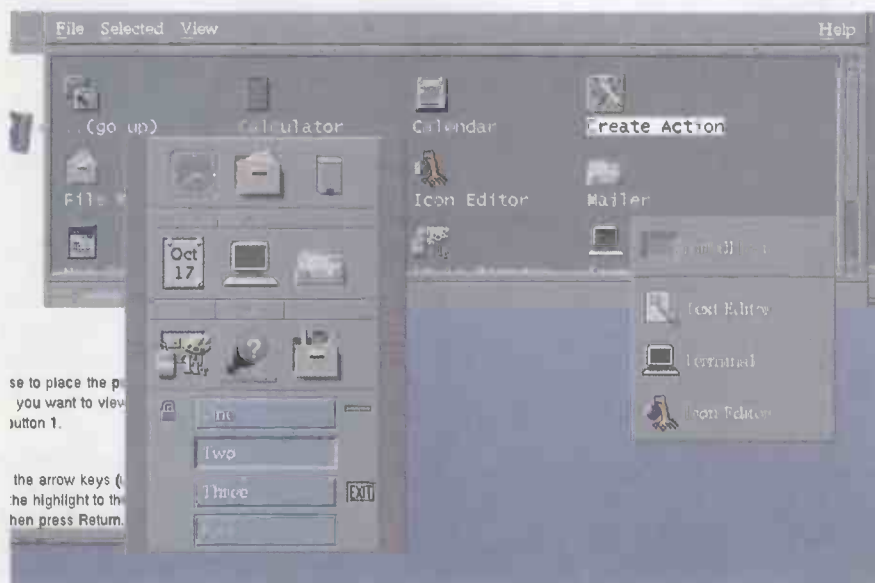
PPP to the internet

A debate among journalists on one of the electronic forums recently discussed the relationship between information that goes out in columns like this, and information that is available on the internet. I could, I suppose, stuff this column with rejigged wisdom culled from the internet; certainly, internet FAQs and newsgroups are a very important source for me. The Truth is Out There (if you can filter it out from the junk



Left The Common Desktop Environment. This is what you see when you first log in to Linux Pro Desktop, available from WGS (www.linuxmall.com). It's uncannily like the AIX desktop — which of course is the point of CDE. The Front Panel (long strip at the bottom) is also a relation of OS/2's Launchpad

Below A closer view, with the Front Panel transformed to a more vertical shape. The panel to the right is a tear-off from the main Front Panel. As with OS/2 the icons are objects, which can be allocated behaviours with simple scripting. For full details, see the WGS home page



the connections through PPP to your internet service provider in the first place.

The arrival on my desk of a shiny new Surfer modem from Psion-Dacom has prompted me to work on PPP afresh. The Surfer comes bundled with software and trial accounts for Pipex, CompuServe and AOL and, as such, represents a real bargain for mainstream computer users. But for those of us who see the so-called mainstream as just a shallow but loud babbling brook, this isn't a lot of use.

Because all the software is for just one operating system, or maybe two — Windows and the Mac — does this mean that Unixen should just give up? Sometimes the answer, alas, is yes. I mentioned PinkSlip a couple of months ago. That's a proprietary protocol that Pipeline uses, which only works with their own (Windows) software. AOL does something similar, which again locks you into AOL's own software, and therefore into Windows. Yes, it's completely crazy, and I gather these companies have seen the error of their ways, but it's going to take a while for them to fix it. So until then, Pipeline and AOL aren't in our frame.

Generally, you'll find ISPs offering a PPP connection, but one of the biggest, the IBM Global Network, still only does the older SLIP (non-)standard. You can cope with SLIP from Unixes like Linux, but I decided to put that aside for the moment and concentrate on PPP, which is fast becoming the all-embracing standard for TCP/IP down a serial line, and it will also cope with other transport

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protocols like IPX.

I find the best way to tackle vendors offering PPP is just to plunge straight in with a modem and a simple utility like tip or cu that lets you talk to your modem. You could try ringing their help desk, although I hope you fare better than I did (see page 282).

Before you can get onto the remote system, you obviously have to make a physical connection by dialling up. Once you're connected, the ISP needs to know a) who you are (username), and b) whether you really are that person (password). There are some more complicated schemes that do further checks (on your hostname, for example) but I haven't come across them. So basically you need to get the name and

the password across somehow.

The "standard way" is an ASCII exchange before you bring up PPP. If this is what the ISP needs (Netcom UK works this way), you can do this manually from any terminal-type program that talks down a serial line to your modem. In what follows, I'm using tip on my NeXT machine. (I notice that the manual for dip on my version of Linux carries this succinct comment at the end: "BUGS: This program does not work very well.")

First, type ATZ and hit carriage return. You should get "OK", which means the connection to the modem is working. Then you dial:

```
<modem initialisation stuff> ATDT
<phonenumber>
```

Assuming you've got the baud rate

right, this should bring up a prompt string that says something like "Login:". Baud rate and initialisation strings used to be a major hurdle in the good old days, but modems at each end of the line seem to have become a lot more intelligent about getting this right automatically. If in doubt, keep it simple.

Then you do the authentication exchange. Typically, this goes:

```
Login: <yourname>
```

```
Password: <yourpassword>
```

where the stuff to the left of the space on each line is the incoming string (from your point of view) and the stuff to the right is your response. Netcom UK requires you respond to Login with:

```
uk, ppp, <yourname>
```

Demon adds a third prompt where it asks you for the protocol "Protocol:" and you respond PPP. One reason for doing this manually is so that you can see exactly what the prompts are.

If this dialogue is accepted, the next thing you'll see (maybe after a cheerful "HELLO", which might require you to pause for a few seconds) is a stream of garbage characters. This is the remote PPP throwing binary at you. At this point, you bring up PPP at your end and the exchange continues in binary. You're connected. Now you can go away and write a script that does this automatically.

Here's a tip: have pppd ready to run in a second shell window. This way you can bring it up quickly — sometimes the ppp at the remote end will sulk if it doesn't connect to you right away. And don't forget (as I did when I first tried exploring this) that the utility is called "pppd" with a "d" on the end (because it's a daemon).

A faster and more secure way of carrying out the connection is with PAP (Password Authentication Protocol). If the ISP is set up to do PAP, you start up PPP the moment the modem tells you you're connected, and leave it to PPP to carry out the authentication. You can still get as far as bringing up PPP manually, but from then on, you depend on PPP to do the rest.

How does PPP know what to do? The PPPs on most of the Unix boxes I've come across derive from the free version originally written by a team lead by Drew Perkins (you should see the name come up when you run pppd). These accept a command line parameter "+ua <filename>", where

<filename> points to a file that contains just two lines, <yourname> on the first line and <password> on the second line. When the ppp daemon sees the +ua parameter, it knows to carry out PAP using the stuff you've put in the filename.

Those are the basics, and at this level, if you treat PPP itself as a sort of black box, they really are that simple. The documentation supplied with your system should be enough to take you to the next stage of automating the whole process with the chat scripting utility. If, for some reason, things don't work, or you are a glutton for PPPunishment, O'Reilly's *Linux: Network Administrator's Guide* includes a whole chapter on the subject.

The main pppd command will also tell you a lot about ppp. Be careful with all that stuff you can put in the command line or in

system. Some of it is nostalgic, but much of it reminds me that Pick is still a force to be reckoned with, even if it does get a pretty low profile in the mainstream computing press today.

Mark Chapman (mark@wwsltd.demon.co.uk) runs an outfit in Tunbridge Wells that specialises in software for Homecare and Nursing Agencies. He's a Pick user — he describes it as his "favourite database". Pick Systems, he tells me, claims to have become more businesslike since the demise of its founder, "which seemed to mean shedding staff by the cartload." Mark, too, remembers a night out he had with Dick Pick. "I thought he was an incredible bloke. He was well into middle age and yet a serious thrill seeker. I had thought all his jet skiing etc was just really naff marketing, but the guy was genuinely wacky."

Chris de Vaney (chris@wsel.lu) is another computer professional who responded enthusiastically to the Pick namecheck. "Oh boy, do I remember the Pick system. I evaluated it twice for large UK installations in the early eighties, and I just didn't believe how powerful it was. The natural language query interface still hasn't got anything to match it 13 years later!" Chris's story about an estimated two-year engineering application backlog for a broadcasting organisation being covered in just over eight working days using Pick, is typical of the mail I've been getting. Thanks, everybody. Over the three years I've been doing this, the column has already spun off standalone

columns about OS/2 and Windows NT. Maybe Pick will be next? Or maybe I'll legitimately be able to write more about Pick here (a few readers write in to complain if I wander away from purest Unix for a moment). Because rather like NeXT, the main thrust now for Pick, Mark Chapman tells me, is to host it as an environment on other operating systems. And the entry-level version of Pick is to be hosted on, guess what? Linux.

ISP helpline howler

Here's what happened when I rang the support line of a well-known ISP.

Me: Do you do PAP or require a pre-PPP ASCII dialogue?

Help Desk: What operating system are you using?

Me: Does that matter?

HD: We need to know so we can tell you how to set up your software.

Me: I'm not asking how to set up my software. I'm asking what your software requires so I can supply it. I'm doing it manually to start with. When I understand what's happening, I'll be able to set it up for any operating system and/or application that I want to use.

HD: (After a long pause) Did you say "manually"...?

It seems that any wisdom they have about making the connection seems to be encapsulated into particular applications and operating systems. The help desk staff I've talked to certainly aren't daft, it's just that they seem not to have thought of it in terms of what's going on underneath.

an options file. The modems (or more likely, "virtual modems" like Ascend boxes) that ISPs are using these days are very smart and seem to be used to treating you as very dumb. The simpler you can keep it at your end, the more likely you are to connect. For example, you'll discover that PAP is a two-way street, allowing you to say back to the remote system: "OK, that's who I am. Now let's check who you say you are, and who you really are?" My recommendation is not to bother with any of this, unless you have a lot of time on your hands...

Pick up on Pick

My diversion in the October issue about Dick Pick seems to have triggered off a stream of email from fans of the operating

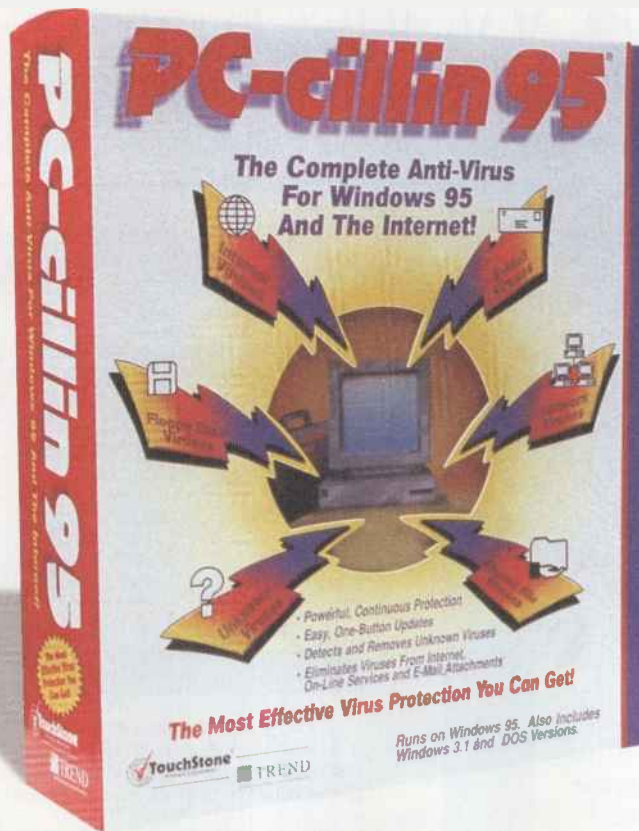
• PCW Contacts

Chris Bidmead is a consultant and commentator on advanced technology. He can be contacted at bidmead@cix.compulink.co.uk

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PC Computing, Sept 1996



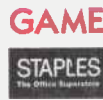
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What a Warper

Terence Green reports on how Warp 4.0 (in beta) has fared on his system. With its new components and three new CDs, he recommends it as a must-have upgrade.

I have been running Warp 4.0, the product formerly known as Merlin, during its beta phase and I have to recommend it as a must-have upgrade for anyone running Warp or OS/2 as their desktop operating system. It's a superb network client and an excellent choice for the connected end user.

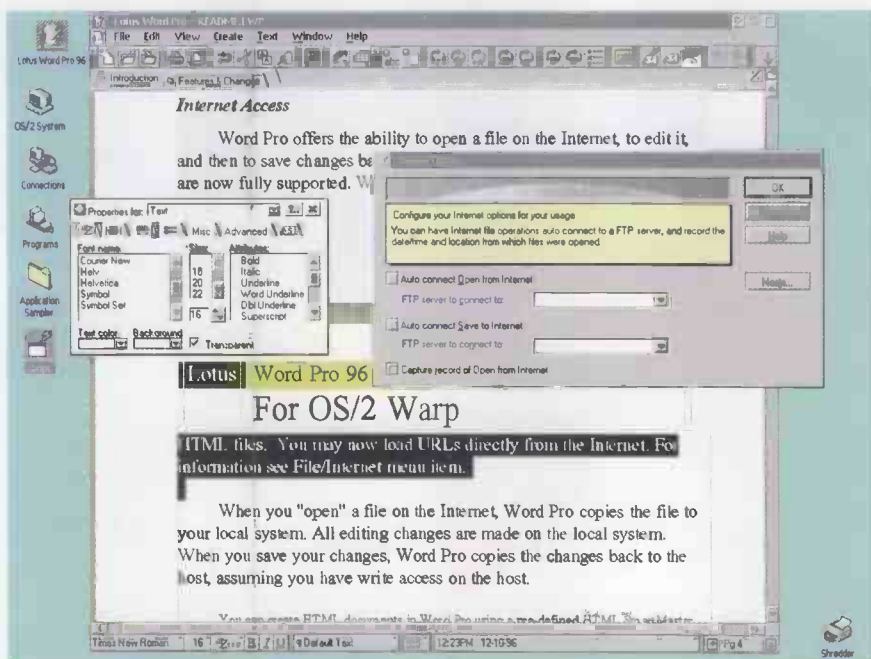
Warp 4.0 includes great internet connectivity with Java support in the operating system. A native OS/2 version of Netscape Navigator didn't make it into the box, but will follow shortly as a free download.

As the US Warp 4.0 code I'm using now has a speech model designed for US accents, I've not yet installed the VoiceType navigation and dictation support. I'll do that when UK Warp 4.0 has become available (due, at the time of writing, by the end of October) and report in my next column if my deadline permits.

What is apparent from the US shrinkwrap is that simply upgrading an existing Warp 3.0 system to Warp 4.0, without adding any of the new bundled components, has very little effect on memory and hard disk space, yet improves both performance and usability. The proviso is that your existing system is a 486 or better with at least 16Mb RAM if you're running a connected desktop, whether you're connected directly to the network or on a dialup connection.

New CDs and BonusPak

In addition to the new components of Warp there are three, new, bundled CDs and an updated BonusPak. The new CDs are NotesMail, the Device Driver CD and the Application Sampler. The Sampler contains around 80 trial versions of OS/2



A word processor for Warp, Lotus WordPro 96 for OS/2, still pre-release, emerges slowly

applications including StarDivision's StarOffice 3.1, an office productivity suite with word processor, spreadsheet, graphics, multimedia and internet capabilities.

The Sampler CD also contains MGI PhotoSuite for OS/2 imaging software. MGI used the Open32 developer extensions to port their application from Windows 95 to OS/2 Warp. Lotus helped develop Open32 which they're using to develop SmartSuite 97 for OS/2. At the beginning of October, Lotus put pre-release versions of WordPro and Freelance Graphics up for free download from www.lotus.com on the SmartSuite product page. So finally, a Lotus OS/2 suite is in prospect, and one based on a quite different approach than the original

idea of a parity release floated by Lotus some years ago. What a long, strange, trip it has been.

The BonusPak CD contains native OS/2 applications (updated from Warp 3.0 versions) including IBM Works, HyperAccess Lite, and FaxWorks. There's also a new Remote Support for the OS/2 Warp package which enables IBM technical support, or company support, teams to offer remote support, maintenance and upgrade for Warp 4.0 users.

WarpCentre

Without doubt, Warp 4.0's user interface is the most user-friendly and functional graphical interface in a desktop operating system today. It precisely reflects desktop

and drive structures, and does so automatically. Thanks to the new Lotus-inspired WarpCentre action bar you can have one-click access to all your programs and files without having to clutter up the desktop with lots of pointers.

As you can see from the screenshot on page 286, the desktop and hierarchical folder structure is presented on the WarpCentre menu exactly as you arranged it. Furthermore, there's no need to worry when you move things around or re-arrange the desktop, because Warp keeps track of this for you.

The user interface is visually pleasing, with new, coloured, tabs in the properties (formerly settings) notebooks, and the new Warp Sans system font. And, of course, all the existing usability features remain. Every folder can be individually configured with details such as its own background image or pattern, which can be a useful way of identifying different projects.

To further speed up access, WarpCentre (actually WarpCenter in the US spelling) also allows you to stack up "trays" of program and folder objects on the taskbar. Using Trays is like having multiple task bars. And, if

On this month's cover-mounted CD

Netscape Navigator 2.021 for OS/2 beta 1

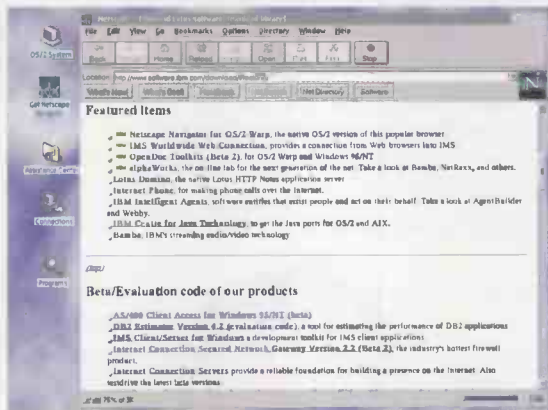
Although it is incomplete and the shipping version should be out by the time you read this, I've nevertheless popped it onto the cover CD as a taster.

Adobe Acrobat beta 3 for OS/2

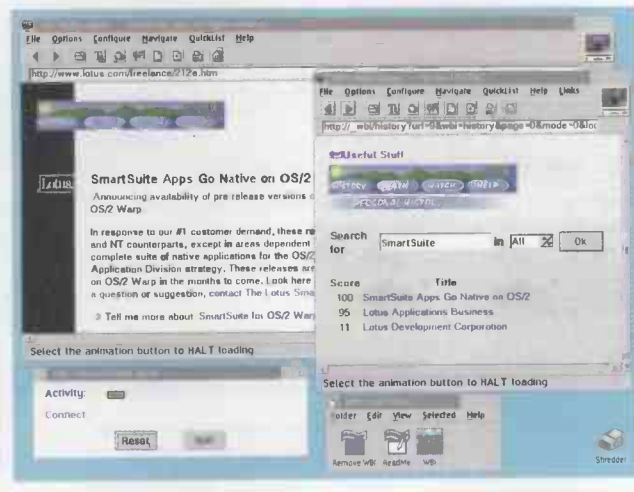
This beta is not time limited, as was the case with the prior version. Adobe's licence permits me to pass it on, but the web site from where I downloaded it does request registration of interest. So if you like the beta and want Adobe to know, do visit www.adobe.com and register your interest.

WBI (Web Browser Intelligence) or "Webby"

Terrible name, but it's one of several really interesting demonstrations of upcoming technology from IBM that can be found at www.alphaworks.ibm.com. Other Alphaworks demos include a Java applet development kit for Windows 3.1 and the NetRexx scripting language for Java.



The fully-functional shipping version of Netscape Navigator 2.021 for OS/2 should be available now from Netscape and IBM's web sites (<http://home.netscape.com>)



This technology demonstration of an intelligent agent from IBM is available for OS/2 and Windows 95. It tracks your Internet usage, and creates a sorted and indexed audit trail (www.alphaworks.ibm.com)

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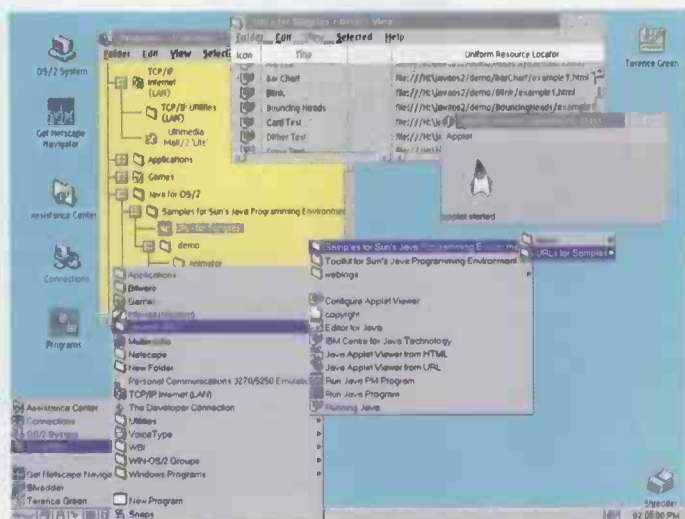
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Of all the graphical user interfaces for PCs, Warp 4.0's truly object-oriented Workplace Shell with WarpCentre is the most user-friendly and functional desktop

you have become used to the LaunchPad, it's still there but now called the Toolbar.

Install

Another aspect of usability is the ease with which Warp 4.0 can be installed and maintained. For large installations there is a remote network install facility which can be

used to automate batch or new user installs and upgrades. Incidentally, Warp 4.0 will install over any previous OS/2 system and it now includes Microsoft Windows applications support as standard. There's no longer a separate Red Box for Windows version.

One of the main problems with Warp 3.0

A brief Warp 4.0 contents list

We're running out of space again and haven't begun to explore Warp 4.0 behind the scenes, so here's a quick rundown of what's in it. (Coverage will continue in next month's column unless the editor requests a full review. His email address is in the front of the magazine if you should feel the urge to let him know how much you appreciate his support for OS/2 coverage.)

- VoiceType for OS/2 and Windows (3.x, 95 and NT)
- Novell NetWare client
- Remote Access Client
- Java (runtime and developer tools)
- Internet connectivity
- Web Explorer browser
- Plug and Play
- Power Management
- Multimedia
- TrueType
- Systems Management (client and agent)

Dear Santa...

Last year, I wanted internet access for schools, a ThinkPad on which to run Warp, and a new home PC. Shortly thereafter, an IBM PC company person wondered why I wanted to run OS/2 when Windows 95 ran so well on the ThinkPad. I used a Toshiba to test Warp mobility instead.

On the home PC front, I eventually built my own thanks to the plummeting price of RAM and Pentiums. I purchased a TMC Pentium/Triton 2 motherboard from Simply Computers for £99 and two 16Mb SIMMs for under £150. The rest of it came from a PC whose disk drive had died in June, and the motivation was the motherboard which died in August. It has worked like a dream, with Warp 3.0, and Warp 4.0 shrinkwrap installed without a hitch, and now runs perfectly.

Three wishes for 1997

The internet story rumbles on, so this year my three wishes are:

1. A return to common sense in internet reportage.
2. Better ISDN support in Warp.
3. Britain to stop frustrating a worldwide ban on landmines. These weapons kill civilians, in the main, and a disproportionate number of kids who think the landmines are toys and pick them up.

The whole idea of the internet as a global information resource is being perverted by trash journalism. For a better perspective on the subject, read *Bandits on the Information Highway* by Daniel J. Barrett, published by O'Reilly & Associates and distributed through International Thompson (www.thomson.com) in the UK. A good point Barrett makes is that it is far easier to spend time with your kids directing them to the good things on the internet, than it is for anyone, governments included, to exert control over computers which may be running in another country with different laws.

The internet is a global forum. It contains nothing that you can't find elsewhere, but it does provide a simple way of discovering information of all types. Parents shouldn't let their kids venture out into the street without offering them guidance on road safety.



and earlier versions was the way the install would bog down and fail on some systems. Usually, these were systems with IDE CD-ROM drives, specific IBM PC models, systems with dodgy memory, or PCs with IRQ clashes which weren't apparent under Windows or DOS.

Support for plug-and-play

Warp 4.0 includes support for plug and play, a graphical Hardware Manager (essentially a graphical version of the RMVIEW command), and a bunch of more device drivers including a separate CD with hundreds of drivers and links to the internet sites of hardware vendors where the latest drivers can be found.

Warp 4.0 plug-and-play support autodetects hardware during the installation process, but this can be turned off if required. If you've ever played with plug and play you might have discovered that it can sometimes go wrong, particularly if there's a mix of plug-and-play and legacy adaptors in the PC. By pressing Alt-F1 and selecting the new F6 option from the ensuing menu, you can disable the auto-detect feature and manually install drivers for problematic hardware.

PCW Contacts

Terence Green can be contacted either by post c/o PCW or by email at tgreen@cix.compulink.co.uk

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Scroll on...

Why is there a lack of live scrolling in Word? Tim Phillips has good and bad news. How to make your signature look good on a fax or email, plus hints and tips and the macro club.

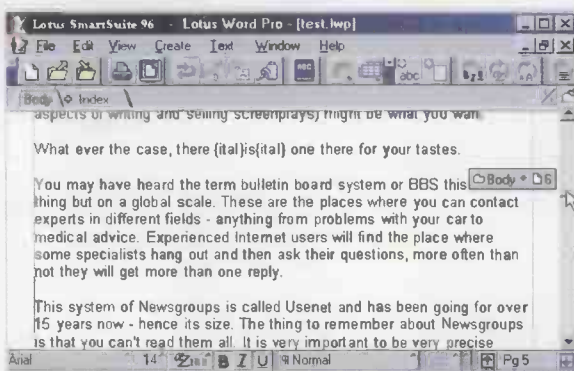
Alexi Cawson mailed me from Brighton to raise an interesting point about how you navigate around documents.

"I have one thing to say about it which continually puzzles and perplexes me — the lack of 'live scrolling' in Word. When you scroll by putting your mouse on the 'button' in the scroll bar and dragging up and down, you can't see the page scrolling up and down with your mouse movement. You get 'Page 1' and 'Page 2' etc, yellow indicators, but this is hardly a compensation."

As Alexi points out, you get live scrolling in Notepad, Netscape and Wordpad. Indeed, it would be hard to imagine a web browser, for instance, that didn't give you a "live" scroll. Well, Alexi, there's bad news and good news.

First, the bad news. Neither WordPerfect nor Word Pro would give you a live scroll in this situation either. To scroll live through any of these packages, you have to use the down arrow at the bottom of the scroll bar. This may be stylistically different to Netscape's scrolling method, but there are worse problems. Don't forget that if you click on the bit of the scroll bar underneath the slider, you descend one screen at a time.

All three packages have different ways of showing where you are in the document when you scroll by grabbing the slider. Word shows which page you are on using a little tag that pops up next to the slider. Word Pro goes one better by showing which section and page you are on in the little tag. Slapped wrists to the development team at WordPerfect — it lets you guess where you are in a document by the position of the slider! This is easy enough on a four-page document, but nigh-on impossible on a 40-pager.



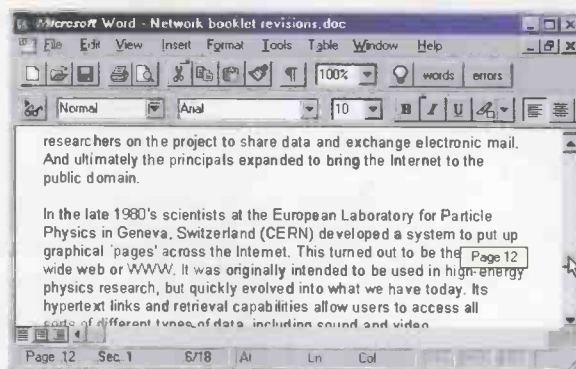
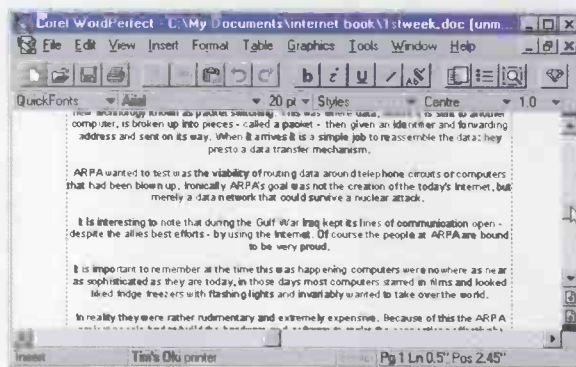
Scrolling in each popular word processor package: Lotus Word Pro (left), Corel WordPerfect (below), and Microsoft Word (bottom)

The good news is that the scrolling is not live for a reason. Try it with a long document and you can jump backwards and forwards very quickly because you are not limited by the time it takes for the PC to scroll. In big documents this is extremely useful: scroll speed is the biggest processor-based limitation on a PC. If you're running Windows 95 on a 486, you'll know what I mean.

If you haven't discovered scrolling by picking up the scroll bar and dragging it, I suggest you give it a try. Look on the bright side.

TrueType signature

At present, if you want to send a signed fax (or email) you can't do it very well. You can scan your signature, yet expanding it immediately makes it look horrendous. There are, however, a few souls who will convert your



signature to a TrueType font — install the font, drop in your signature and it will scale as necessary.

I've received an email from Victory Press,

Tim's macro club

Yes, yes, yes, I know. I had one of my occasional lapses a couple of months ago when printing a macro to cycle documents in WinWord. As about 400 of you were careful to remind me, this is done by Ctrl-F6, and there's an internal command called NextWindow to short-circuit the first macro. Of course, I knew all along and was only testing you. Ahem!...

To make the best of a bad situation, here are a few other points that came out of what they're already calling "The Great Control F6 Disaster of November 1996".

1. Shift-Ctrl-F6 will reverse the direction in which the documents cycle. Thanks to Jean Elliott of Upminster (among others) for that tip.
2. Timothy Morris, of Oxford, has a quickie macro for Word 2: "In Word 2, NextWindow is an internal command. You can simply assign it to CTRL+TAB, although it still requires a macro to assign it, and the syntax needs to be:

```
Sub MAIN
```

```
'set i to scan code for CTRL+TAB
```

```
i = 256 + 9
```

```
ToolsOptionsKeyboard .KeyCode = i, .Show = 0, .Name = "NextWindow", .Add
```

```
End Sub
```

```
"If you add
```

```
i=512+256+9
```

```
ToolsOptionsKeyboard .KeyCode = i, .Show = 0, .Name = "PrevWindow", .Add  
then SHIFT+CTRL+TAB will cycle in reverse too."
```

3. Well, that's the last we'll hear of that, I hope. Meanwhile, a rare bird — a WordStar macro. "I hope there are enough WSWin users out there to make it worth printing," says Nicholas Hill, via AOL. Well, Nicholas, I'm not sure there are. But what the heck, we're a magazine of reference and we must represent the views of a broad church.

This macro is that old chestnut, the transpose letters macro. The reason it's an old chestnut is that everyone makes these mistakes. "Select the first with the mouse, click the button and, hey presto! they swap places, which is why I have named the macro SWAP." Good name.

```
REM Description:
```

```
REM WSWin Macro File: C:\WSWIN\MACROS\SWAP.WMC
```

```
REM C.N. Hill 20 October 1996 [NicholasH1@aol.com]
```

```
EditCut
```

```
CharRight 1, 0,
```

```
EditPaste
```

Errm... that's it. Well, it's the first one I've had in a year, but if anyone has any, um, longer macros for WordStar, we'll print those too.

which will do this for \$28.95 per signature. The company will email you the form to complete. But of course, you can't return the form via email because if you could return the form with your signature on it already, you wouldn't need the service, would you? But enough of this philosophy — see the "PCW Contacts" box (page 290) for how to get in touch with Victory Press.

Big document tip

You thought you'd got away with me lecturing you on long documents, but my alter ego, Storm Dunlop, has some good advice. He's worked with big documents: up to 400,000 words. That's almost a week's work, ho, ho.

"May I sound a note of caution about long documents, such as whole books? Even with a very competent word-processor, such as Word, I would strongly recommend that these should be handled

in sections that do not exceed 20,000-30,000 words," he advises.

According to Storm, there are several reasons for this:

1. Nearly every function, such as loading, scrolling, searching and auto-saving, is much faster with short documents.
2. Even with a large amount of memory, search-and-replace operations throughout an extremely large document are not only slow, but may crash. This is particularly the case if, for some reason, you need to (temporarily) remove the CR/LF characters at the ends of lines or paragraphs, or (even worse) if you have to carry out an operation on all the spaces in a document.
3. Because of the way in which editorial changes are implemented by the word processor, multiple search-and-replace operations may eventually exhaust the memory capacity, again causing a crash.

In short, you are far less likely to get

p290 >

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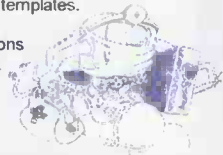
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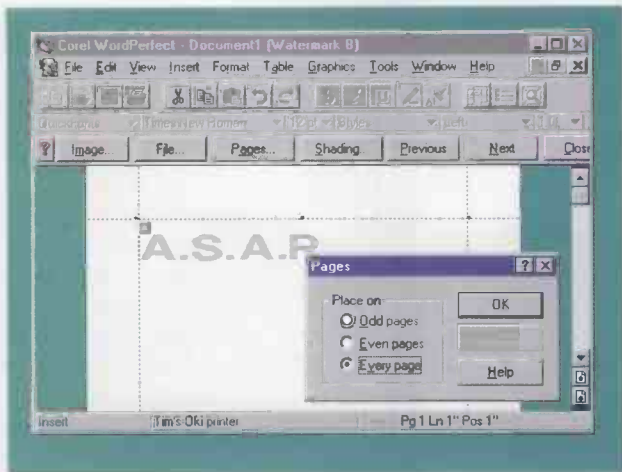
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corruption of a document or lock up the machine if you work with small files. If you need to paginate throughout the book (if you are producing camera-ready copy, for example) it is usually simplest to start the numbering of each section where the previous one left off."

I'd agree, apart from the pagination question, because when you edit any section, you have to manually go through and change the start page of all affected sections. I suppose it's better than a crash.

Watermarker wheezes

Here are two tips for watermarkers. The first is to buy WordPerfect, as Richard Bowden-Dan points out (via AOL).

"The easiest way to put a watermark in WPWin 6.1 is to use the Watermark feature (lurking under the Format menu). Alternatively, there is even one of the dreaded Coaches for the purpose."

It is, he concedes, much trickier in WordPerfect for DOS!

Colin Hensley emails me, from his job with a prominent Japanese car manufacturer, to remind us that all this doesn't have to be done in software — printers can be handy, too.

"Don't forget that many PostScript printers offer watermarking as a feature of the printer. For example, with the HP LaserJet 5PS, the configuration is in the Print Options panel," he adds.

Should Colin be sending such frivolous email on company time? Why not? If his bosses are reading this: give the man a raise. He's the sort of helpful person we should encourage.

Wily ways with Word

Here's corroboration on the file conversion bug issue, from Chris McCarthy in

Watermarking in WordPerfect

Birmingham, following the problems faced by Kim Cullen a couple of months ago.

"It might be worth mentioning that the converter for Word 6 to Word 2 is not perfect.

I regularly receive Word 6 documents at work but actually use Word

2. We have the converter on the network and so can theoretically open Word 6 files without a problem.

"On a number of occasions I have received Word 6 files, opened them, and found the document shorter than I expected. Under some (undefined) circumstances, the converter loses the end of the document; in my case, the last two-and-a-half pages out of a six- or seven-page document."

Chris' support department raised the

Bug board

Has the world gone mad, or is it me? Tor Salomonsen contacts me with a dire warning: *"After a power breakdown, Word 7 will reconstruct the latest autosaved version of your document even if a manually saved version is more current,"* he writes.

Is this true? I haven't been able to replicate it, and there's nothing in Microsoft's knowledge base to confirm the bug. More reports, please.

Word 2 format. The best way to do this is to add a macro to your toolbar, which pulls up the FileSaveAs command and prompts you to save somewhere else as a Word 2 document. You could even replace the save with SaveAs Word 2 format, but this will lose Word 6-specific features. For most of us, it's a small price to pay.

There are a few natty macro writers among us who, I'm certain, will be able to design a nice neat routine with a dialogue box, enabling you to save to a Word2-specific directory.

There are prizes of book or record tokens for clever routines.

Dear Santa...

It's been a hard year to be interested in word processing software, because everyone's doing the same thing: buying Word for Windows.

I really wanted some stiff competition for Word, from the industry, in 1996 and we've sort of got it. WordPerfect's new version matches Word in most respects and betters it in a few, but there's not much point, is there, when Word is being so closely tied to Microsoft's internet effort?

So, what I'd like for Christmas this year is a new type of word processor: one that will help people to write well. Not just in pretty typefaces, but one which will tell you whether what you are writing is any good, whether you should use "yours sincerely" or "yours faithfully", and have an opinion on whether you should have a comma or a semi-colon.

I'd also like something that takes bullet points and makes them into paragraphs, knows the right way to write the punchline to a joke, and suggests interesting and quirky adjectives to brighten up dull documents. I must read millions of words a year, and whether they are letters, white papers, press releases or magazine articles, technology makes sure that most are beautifully presented. They're just badly written.

I'd like a printer that fits the gap between my PC and the monitor, and a PC that scrolls documents to the right a bit, rather than three lines too low, then three lines too high, then three lines too low and so on.

Finally, I'd like a pen computer that can recognise my handwriting, although I think that's probably unrealistic. If you see one, it should be just the right size for my stocking.



issue with Microsoft which admits there's a problem and has made a fix available.

So if you regularly convert important documents from Word 6 to Word 2 (not uncommon), or if they are converted anywhere on your network, check they aren't getting chopped. If they are, get the fix from Microsoft tech support.

The alternative is to save everything in

PCW Contacts

You can contact Tim Phillips by post c/o PCW at the usual address, or email him at his CIS address

CompuServe 104047,2750
or wong@cix.compulink.co.uk

Victory Press, 1119 S. Mission Road,
Fallbrook, CA 92028-3225, USA;
email us043191@interramp.com



Taking the **register**

Stephen Wells dips into the Registry to remove troublesome messages. Plus, adding background graphics to a worksheet, and problems with bins and cases.

These days, many Excel 7 add-ins have their own uninstall program. But when you start Excel after deleting an add-in, you may see a warning notice that such-and-such a file cannot be found.

If you right-click on the Start button and choose Explore, you'll find a program called Regedit.exe in the C:\Windows directory. If you can't find it, click the Name column and it will list the files in alphabetical order. Double-click Regedit to start it. Under the displayed MyComputer root directory you'll see several sub-directories starting with HKEY. You want HKEY_CURRENT_USER. Click on this to expand it, then successively expand Software; Microsoft; Excel; 7.0; Microsoft Excel. You are now six levels down from MyComputer. Go down to the sections with names starting with OPEN. If you double-click the first one it should read:

```
C:\MSOFFICE\EXCEL\LIBRARY\ANALYSIS
\ATPVBAEN.XLA
```

Go down to the last OPEN item. It may be OPEN4 or OPEN5. Click that and you'll probably see an entry like:

```
/F C:\MSOFFICE\EXCEL\
LIBRARY\Program.xla
```

The F switch simply tells Excel to add custom functions among the Insert, Functions menu items. An R switch would open the file as read only. If Program.xla is actually the name of the add-in you're trying to get rid of, just delete OPEN4 or OPEN5 entirely. Close Regedit. You won't have to restart Windows for the change to take effect. Just start Excel and the troublesome message will be removed.

This procedure is much like removing an entry to an .INI (initialisation) file.

Applications, like Excel 7, which only run under Windows 95, don't use .INI files. Everything they need to know is stored in the Registry.

Obviously, Windows 95 can run 16-bit software, like Lotus 1-2-3 Release 5 for Windows. What happens is that when Windows 95 is booted, it examines the WIN.INI, SYSTEM.INI and any additional .INI files, like 123R5.INI, to see if any unique device drivers need to be loaded. Then it moves on and takes its orders from the Registry, which could be defined as a database of everything Windows needs to know.

Look under User and you'll probably see your name. Font sets the default font which might be Times New Roman 10 or Ariel 10. Pos shows the co-ordinates, top, left, width and height of the opening position of the Excel application window. If Basics reads 0, the tutorial runs when Excel is started. If it reads 1, then the tutorial does not run. It's set at 0 when Excel is installed and changes to 1 after the first use.

The Options section offers numbers in hexadecimal and decimal. Choose decimal and it probably reads 87. This is the sum of the following values: 1 to show scroll bars, 2 to show the formula bar, 4 to show the status bar, 16 to use A1-style cell references (rather than Row 1 Column 1), and 64 enables DDE (Dynamic Data Exchange).

But I only pass on these additional details because they're interesting: the average user is well-advised to stay out of the Registry. Generally speaking, it's best to make everyday changes by choosing options in an application, or using Control Panel, as Microsoft recommends.

By design

It's always my little asides which get me into trouble. In a recent column I wrote that you can dress up your displayed worksheets by choosing Format, Sheet Background and selecting a graphic file. I should have left it there, but I slipped in the parenthetical thought that you could print sheets with a background if you have a colour printer. Wrong.

I didn't try it until Peter King emailed that only his worksheet would print. No background. Belatedly, I found Article Q134212 of 28/8/96, entitled "Can't Print Background Graphic Included on Worksheet", in the Microsoft Knowledge Base. It states: "Although you can add a background graphic to a worksheet, this graphic will not be visible when you view your document in print preview or when you print it. The information in this article applies to Excel for Windows 95, version 7.0." And it goes on: "This behaviour is by design of Microsoft Excel, because printing a background is extremely slow on most standard printers."

Time to call on Michael Rickard, an Excel guru at a leading West Coast university who has bailed me out before. He came back with a workaround. His instructions were in shorthand, so I'll spell out the steps I took to make it work.

Let's say you want to print the range A1 to H16 in OLDFILE over Microsoft's familiar Clouds bitmap:

- First make the Camera tool visible. (It's probably on the Utility toolbar.)
- Open OLDFILE.
- Now open a new worksheet. Select the empty range, A1:H16.
- Choose File, Set Print Area.

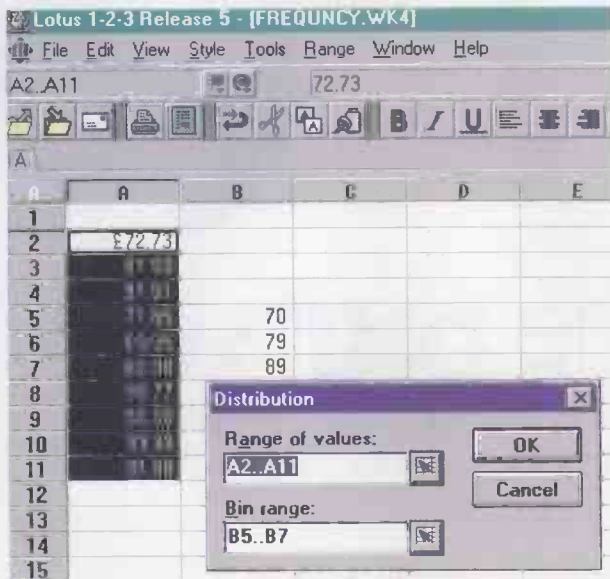


Fig 1 (left) Dividing the distribution of a data array into bins is easy in Lotus 1-2-3, using menu items

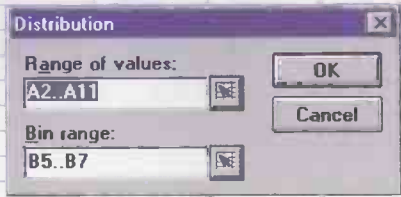


Fig 2 (below) Excel has a FREQUENCY function for arranging distribution, which takes a bit of getting used to

- Now choose Tools, Options, View, No Gridlines. Then cell A1, Insert, Picture, Windows Directory, Clouds.bmp.
- Save this file as NEWFILE. (This is the equivalent of a background picture.)
- Choose Window menu, OLDFILE. Select A1:H16. Click the Camera tool.
- Choose Window, NEWFILE, cell A1. (This pastes a linked picture of your data on top of the clouds image.) Drag this object the last little bit into the top left corner of the sheet.
- Right click and choose Format Object on the shortcut menu, then select No Border, No Fill. Click OK.

That's it. You can now view the combined image under Print Preview and print out a hard copy. I must send Michael a long overdue book token.

Binning it

I've got so used to all this column's enquiries arriving by email that it was almost a shock to receive a nice, old-fashioned, typed letter from Alistair P Campbell of West Sussex: "I think I have found a bug in Excel for Windows 95. When the Frequency function is selected to display the distribution of a data array, the only result is in the first bin. The remaining bins remain blank. I am using a new Dell Dimension XPS P166s and Dell agrees that there appears to be a bug. Your opinion would

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1				
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5	71.85	70		1
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7	88.88	89		3
8	98.77			4
9	88.88			
10	99.99			
11	91.89			

be welcome. I use frequency distributions a lot, and am having to revert to my older Lotus 1-2-3 spreadsheet to provide results for this function."

I've discussed before how some 1-2-3 functions differ from Excel. What we have here is a very easy-to-use menu item in 1-2-3 being replaced by a function in Excel, which takes a bit of getting used to.

Let's say that in the range A2 to A11 you have ten prices. They are in no particular order and there might be duplicates, but they are all below £100. The objective is to see how many prices fall in the ranges £0 to £70, and £70.01 to £79, £79.01 to £89, and £89.01 to £100.

In either 1-2-3 or Excel, you indicate these groups — or bins, as both spreadsheets call them — by simply entering 70, 79, and 89. For this example, we'll enter those numbers in B5 to B7.

In Lotus 1-2-3 Version 5, as shown in Fig 1, you don't have to select any particular cell. You just choose Range, Analyse, Distribution, and a dialogue box invites you

to enter, or select with the mouse, the range of values (here, A2 to A11) and the bin range (here, B5 to B7). Then as soon as you click OK, 1-2-3 automatically puts the answers into the column next to the bin array — easy.

Excel's methodology would confuse anyone until they had become familiar with the full procedure. What you have to do, if you have four bins, is to select any four successive blank cells in any one column. I selected D5 to D8.

Click in the formula bar, then the fx (function) button. Select the Frequency function. This opens a similar dialogue box to the Lotus one.

Again you enter, or select with the mouse, the range of values (A2 to A11 again) and the bin range (B5 to B7). But when you click OK, you find yourself back in the formula bar at the end of the new formula.

Now you have to press Ctrl+Shift+Enter. Only then will you get the right answers, as shown in Fig 2. As this is an array, you don't enter the curly brackets which appear around the formula; you just press, all together, the three keys mentioned.

I sent a demo of this on a disk to Alistair. He graciously replied: "Success! I'm beginning to appreciate Excel more and more. Thank you for your help." Good. Another satisfied reader!

On the case

John Young, of the UAE, asks: "Could you advise if there is an easy way to change the characters in Excel from lower case to upper case on multiple cells, on a spreadsheet? The format menu for fonts does not have the case change as an option. I have found this problem in both Excel 4 and 5, and it can arise when different people have input data to a spreadsheet using a different case (upper or lower). To ensure uniform presentation, I find that it is necessary to adjust each cell and that there is no quick method."

John doesn't specify which version of Excel he is currently using, nor whether he wants to end up with all lower case or all capitals, so I'll discuss a couple of approaches.

One solution for versions 4, 5 or 7 is to use the LOWER, UPPER or PROPER functions. They don't reformat text but will redisplay it in another cell in lower case, capitals, or by capitalising the first letter of

each word respectively. All three functions ignore characters which are not letters. An example is often the best way of clarifying usage:

If cell A5 holds the phrase *There are 2 Brown foxes*. In any cell, =LOWER(A5) would display, *there are 2 brown foxes*; =UPPER(A5) would display, *THERE ARE 2 BROWN FOXES*; and =PROPER(A5) would display, *There Are 2 Brown Foxes*.

The only way I know to change the actual text in place (that is, not repeat it in another cell) is to run a macro. But if you're going to do that, you may as well enter the text, initially in a dialogue box. Then it can be translated before it's used. To broaden the interest for other readers, let's say the text to be entered is a special password.

The regular way of protecting an Excel file with a password is via File, Save As, Options. But suppose you have prepared your own application and want to use a password to protect a part of it. If it's for internal company use, you could make it easier to remember the password by letting the staff member enter it in upper or lower case. You could even give them the first letter as a prompt.

As a gateway, the starting point could be to create a button, which can be done automatically from the Drawing toolbar. You can then assign a macro to it. In other words, the user clicks the button and the macro runs. If the macro is written in VBA, you can use two of its standard functions, Lcase and InputBox. See Fig 3 for the listing.

The password I've used is "mchenry", but because the user-defined GetTheWord function incorporates Lcase, it can be

Dear Santa...

Obviously you read *PCW* or you wouldn't see all these notes in the Hands On section, so look in the Spreadsheets section of our CD-ROM for pressle hints. Click on Excel 97 demo.exe and you'll see how the coming version of Excel can include hyperlinks to Import data from web pages and send mail.

Yes, I'd like a beta copy of Office 97. It will have a new, improved Excel as well as updated versions of Word, Access and PowerPoint. It will also include the web authoring and management application, FrontPage (which I've raved about before), and Publisher, the easy-to-use DTP package. In Excel, the AutoCorrect feature (which irritates me but is beloved by many, I'm sure) will be even more intelligent: popping brackets in formulas if you forget them, for instance.

Microsoft's gone internet bonkers, so the latest Office will be supplemented by a wide range of animations, audio files, clip-art, fonts, help files and templates downloadable free from the MSOffice web site.

After a year, I've still never totally mastered Exchange and Schedule+, so I will welcome the new program, Outlook, which will replace both of them. Maybe the new Office Assistant animated wizards will make things clearer for me, too.

In the same section of our CD, have a look also at the files 123p1.pdf and 123p2.pdf, which run under Acrobat. These will remind you that I'm dying to see the new 32-bit Lotus 1-2-3 97. It, too, will feature shortcuts to the internet, as well as automated demonstrations of common tasks, enhanced printing facilities, new autototaling, and an easier way to create dialogue boxes.

The third present is not for me, but the people who write manufacturers' service contracts: a good pocket dictionary. My current PC came with a one-year free Next Business Day Repair Service Warranty, on-site at their discretion. Or, you could buy two- or three-year warranties. When the year was over, I wanted to pay for an annual renewal, but they've since dropped the one- and two-year options. I was told I could only buy a three-year warranty, which, amazingly, starts from date of purchase. So by purchasing that, I lost my first free year. They also have a Lifetime Return to Factory Warranty; but lifetime isn't defined in the way you or I would. And the right is retained to send parts and tell you, over the phone, how to replace them. They are entitled to offer any services they like, but I wish they wouldn't redefine simple words like "three", "lifetime" and "return".

entered as McHenry, or MCHENRY, or any other case combination. The InputBox function takes a number of arguments, but here I've used the first three and let the defaults be used for the remainder. The prompt in the input box asks "What is your password?", and the title of the box is Password. The third argument here is, M. This means that when the box appears,

the first letter (here, M as a capital) is displayed at the start of the password entry line.

If the user enters Matthew or MacHenry, or makes some other mistake, they receive the message "Sorry. Wrong Password". When the user clicks the OK button in this message box, the workbook is minimised in this macro to symbolise no entry.

If the correct password is entered, the user sees the greeting, "Welcome to this

application", and can continue.

The button and the macro are in the Excel 7 file, Passes.xls, in the Hands On Spreadsheets section of our cover-mounted CD this month.



Fig 3 Assigning a macro

```
Sub Entering()  
    Dim TheWord As String  
    TheWord = GetTheWord  
    If TheWord = "mchenry" Then  
        MsgBox "Welcome to this application."  
    Else MsgBox "Sorry. Wrong password."  
        ActiveWindow.WindowState = xlMinimized  
    End If  
End Sub  
  
Function GetTheWord()  
    GetTheWord = LCase(InputBox("What is your  
        password?", "Password", "M"))  
End Function
```

On the PCW CD-ROM

The *Hands On Spreadsheets* section has a short animated file, Excel 97 demo.exe, which previews the availability of hyperlinks in the forthcoming Excel 97. The files 123p1.pdf and 123p2.pdf are Acrobat files which give some details of the anticipated 32-bit Lotus 1-2-3 97, designed to run under Windows 95 and Windows NT. The Excel 7 file, Passes.xls, has the macro shown on these pages as Fig 3 and a button for running it.

PCW Contacts

Stephen Wells welcomes comments on spreadsheets, and solutions to be shared, via *PCW* at the usual address or at Stephen_Wells@msn.com. Files can be attached with MAPI-compliant software. The UUE program, XferPro, works. It can be downloaded from the CompuServe Internet Resource Forum.

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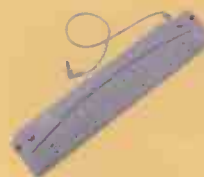
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The video **top ten**, again...

A recent query regarding video rentals has prompted some keen response from readers. Mark Whitehorn presents some of your solutions, plus some general tips and teasers.

In the October issue I published a couple of questions from readers. The first concerned a video rental company which wanted to find out the most popular videos rented out over a specific period, essentially the "Top Ten" videos for that period.

Several people sent in further suggestions, including the following from Roger Moran: "By 'standard' SQL, I assume you are referring to the SQL/92 standard, and explicitly excluding all the various vendor-specific extensions such as the 'TOP' command in Microsoft Access SQL."

No, but the misunderstanding is my fault for not being accurate in my choice of

The screenshot shows the Microsoft Access interface. On the left is a data table with columns 'VideoNumber' and 'Trans_Date'. The table contains 21 records. In the center, there are two SQL query windows. The top window shows a query to select video numbers and counts for a specific date range. The bottom window shows a query to select video numbers and counts from a previous query, ordered by count descending. A small window at the bottom right shows the results of the second query, displaying two records: video number 3 with a count of 8, and video number 4 with a count of 5.

Here is Roger's solution. The only change I have made is to include the dates into the first SQL statement so that the query runs without putting up dialogue boxes

Dear Santa...

Last year, I asked you to make our current crop of RDBMSs a better match to the relational model, and also for more and better database design tools. I don't know about the rest of the kids, but frankly, I was just a little disappointed. None of the RDBMSs has shown a marked improvement, and the tools situation is still dire.

Sigh. Perhaps I'm asking too much. After all, the vendors don't seem to be interested in what I asked for either, so you must face an uphill struggle in trying to persuade them. This year, I'll try for really achievable requests, but first, a bit of background. Many database professionals are having their serious work disrupted by trivial requests from the management about putting data onto this "web" thing. Now, we all know that the web is just a passing fad. Just like CB radio, once the fuss has died down, I'm sure most people will go back to the telephone. But while it is fashionable, we have to look keen. So, what we need are sensible tools for handling data from databases on the web.

Borland has already made a good start with IntraBuilder, and Microsoft is following with the improved web-publishing abilities of the Office products, but there is still a huge way to go. Neither of the products addresses the problems of signalling between the browser and the database to allow proper transaction control. This is not to say that transaction control is impossible, just that it is currently all left to the programmer. There are other problems as well. With present technology, if the browser sends a query which returns, say, 140 records, those are usually buffered at the web server and sent to the browser in chunks of, say, ten. This is crazy! Every time the user wants to see another ten, there is a pause as the server is contacted and the next ten are sent. This problem isn't going to be solved by a single product; it needs to go right to the standards that these technologies use. If you could wangle your way onto the appropriate standards committee to address this one, we would all be eternally grateful.

By the way, I'd still really like a mouse mat with a penguin on it. I mentioned this last year, but it must have got lost in the sleigh. Perhaps you could check under the seats?



words. Eamonn Mulvihill's original request was for a solution which worked with Borland's Local-SQL which he said didn't support nested SELECT statements. I should have said something like "lowest-common denominator SQL" rather than "standard". Roger Moran continues: "Since MS Access seems to be your first choice when describing problems in your column, I will use MS Access SQL syntax in the following, although the SQL is easily ported to any ANSI-compliant SQL/92 dialect.

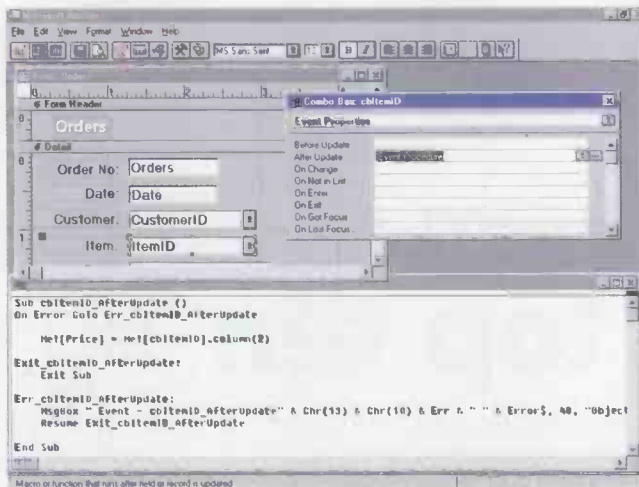
"We start with an aggregate query to provide us with a count of transactions per video within a given date range. This is trivial:

```
SELECT VideoNumber,
       Count(VideoNumber) AS VidCount
FROM Hist
GROUPBY VideoNumber
WHERE Trans_Date BETWEEN
[StartDate] AND [EndDate];"
```

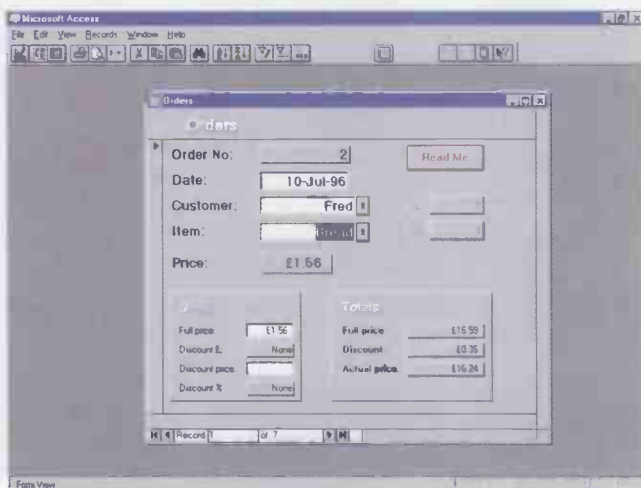
I know it will sound picky, but although the sentiment behind this is quite clear, I think the syntax for Access actually needs

p296 >

(right) Tony Wall's solution, showing the form and the code behind the combo boxes



(below) Geoff's form, which also totals the orders



to read as:

```
SELECT VideoNumber,
       Count(VideoNumber) AS VidCount
FROM Hist
WHERE Trans_Date BETWEEN StartDate
AND EndDate
GROUP BY VideoNumber;
```

"In MS Access, we can use this query directly as the datasource for the second stage. In other products which do not support daisy-chaining queries in this fashion, it is a simple matter to convert the above query into an append query which populates a temporary working table, and then use that as the datasource instead.

"Let's assume we have saved the above query with the name [qryVideoCount]. The 'Top Ten' query will look as follows:

```
SELECT VideoNumber, VidCount
FROM qryVideoCount AS Q1
WHERE (10 > (SELECT COUNT(*) FROM
            qryVideoCount AS Q2 WHERE
            ((Q2.VidCount)>(Q1.VidCount))))
ORDER BY Q1.VidCount DESC;
```

"Here's a basic description of what's going on in the above query. For each record in qryVideoCount (Q1), we find the

number of records in qryVideoCount (Q2) whose VidCount is greater than that of the 'current' record in Q1. If that number is less than ten, we know the 'current' record should be included in our 'Top Ten' list. We apply the test to each record in Q1 and the result will be the 10 desired records.

"The aforementioned query works, and is written in standard SQL, but it cannot be considered very efficient, since for each record in qryVideoCount (between 1 and 12,000 in Eamonn Mulvihill's situation), we must execute the sub-query which determines whether the record is to be included in the 'Top Ten' list. In a real world situation, it would probably be quicker to write some procedural code to pull out the ten records from qryVideoCount.

"Hope this information is useful."

Yes, it certainly is. It won't do as a solution for Eamonn's problem because of the nested SELECT, and I agree that it is likely to have speed problems on a large data set. However, Roger is quite right that his is a solution comfortably within SQL-92 and I have great admiration for its elegance!

You can clearly tweak the second SQL statement very easily to alter the number of records that it returns, simply by changing the numeric value in the line:

```
WHERE (10 > (SELECT COUNT(*) FROM
            qryVideoCount AS Q2 WHERE
```

I have changed it to two in the sample database (ROGER.MDB), because the HIST

table has so little data in it.

Alistair Logie sent in this solution for FoxPro users faced with a similar problem: "I read with interest your PCW Databases column about SQL selections of the top ten rented videos. One solution in FoxPro would be to use two SQL statements and a Cursor:

```
SELECT VideoNumber,
       COUNT(VideoNumber) AS VidCount ;
FROM hist ;
INTO CURSOR mytable ;
GROUP BY VideoNumber ;
ORDER BY VidCount DESC
```

```
SELECT VideoNumber, VidCount ;
FROM mytable ;
WHERE RECNO() < 11
```

"I don't know if this is usable on other databases. It does rely on being able to use the absolute record number, RECNO(), as a selection field. The attraction of using a Cursor as a temporary file is that FoxPro creates and erases it itself."

The second question in the October issue covered a more general problem. Suppose you have a set of Customers and Items for sale. Given that each item has a specific, unique price, it is clear that the price fits into the ITEMS table. If each Customer has a unique price for each item, it is equally clear that the price needs to go into a separate table which lists each customer, item and the unique price for that key value.

What if the situation is somewhere in between, where most prices are standard but there are some exceptions? I produced a solution, but asked for suggestions, improvements or comments. The first comes from Tony Wall, and his database is on the CD as TONYWALL.MDB.

"I have enclosed an alternative solution to the Customer & Prices problem from the October issue. Whether it will work efficiently with the 400 customers and 300+ products is another matter.

"In the first instance I took your Default List and Exception List and used these to create a union query as follows:

```
SELECT *
FROM [PriceList] as PL
WHERE NOT EXISTS
(SELECT *
FROM [ExceptionList] as EL
WHERE PL.[CustomerID] =
EL.[CustomerID] and PL.[ItemID]
=EL.[ItemID]);
UNION SELECT *
FROM [ExceptionList];
```


"This is used as the basis for the combo box data source on the orders form for retrieving the correct price."

Tony then sent another mail message, saying that the performance was terrible with a larger data set. His suggested improvement is well worth looking at, and is in TONY2.MDB. Geoff Wyss sent in another; see GEOFWYSS.MDB.

"In the October 96 issue of PCW, you posed a problem about merging prices from two sources to make up an Order from a default price list and an exceptions list. The attached database file shows two possible solutions which might be of interest, one using a Union query, the other using an IIF statement. Click on form Orders2. There is a ReadMe button on the form which gives an explanation."

For this month's problem, I have held off producing a solution myself. This is mainly due to cowardice, since this problem brings us once again into the holy wars of "strict relational" vs. expediency. I tend towards a purist view, but in this case I can see reasons for a more heretical solution. Before committing myself to be burned at the stake, what do you think? Let's try not to get too wound up about this one. It is Christmas, after all.

"I am a teacher, and recently used Microsoft Access 2.0 to produce a database for recording and reporting on pupils' performance in tests. To keep the database as flexible as possible in use, I store test results in a single table with four fields: each record in the Scores table includes an identifier for the pupil, an identifier for the test, the percentage score achieved by the pupil in the test, and the position of the pupil out of his/her teaching group. Records are added to the table as data are entered by the class teacher. (The pupil and test identifiers together make up the primary key, as each pupil appears in the table many times, as does each test, but each pupil can only take a given test once.)

"It is useful to have the computer calculate the position of the pupil automatically, once the data for a full teaching group has been entered, but I have not found a function in Access to do this easily. The pupils' teaching groups are recorded in a separate table. It is straightforward to produce a query listing for a particular test, the pupils in one teaching group and their percentage scores, and this query can be sorted appropriately. But then to work out the

Teasers

A couple of teasers from Jeff Jenkins:

1. Strange database design

A database I was working on stored amounts as positive numbers and had a separate field to indicate the sign of the number. This field had values of one or two to indicate positive or negative (don't ask why, I didn't design the database). The problem was how to extract the amounts as signed numbers. The solution I came up with was a mathematical one, selecting "amount*(3-(sign*2))". This works as "(3-(sign*2))" evaluates to 1 or -1. A bit of a rigmarole just to get a signed number out.

2. Summing only the positives

I needed to provide a total of all the positive numbers in a particular field in the database (e.g. all the accounts with a credit balance). I couldn't find an sql command to do this, so I resorted to another mathematical solution:

"SUM((amount+ABS(amount))/2)"

Adding the absolute (unsigned) value of a number to itself comes out to zero for negative numbers, and dividing by two negates the effect of adding a number to itself, so the sum works. You can also sum up all the negative numbers with:

"SUM(amount - (ABS(amount))/2)"

Incidentally, the first one also works as

"SUM((ABS(amount)+amount)/2)"

but the negative version

"SUM((ABS(amount)-amount)/2)"

gives a positive total of all the negative numbers.

position of the pupils within the group and store this in the appropriate field, I have resorted to a complex sequence of operations involving creating and deleting temporary tables.

"Using this method to calculate pupils' positions slows down the program significantly and, because of the use of temporary tables, has led to problems when two teachers using the network attempt to enter test scores at the same time. Is there a direct way to fill in the 'position' field in the Scores table? I have tried different techniques, but have not found a wholly satisfactory solution." Andy

Andy's test database (not containing real data about real children) is on the CD as ANDY.MDB.

PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. He's on m.whitehorn@dundee.ac.uk

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want to use recordable CDs (CD-Rs) to distribute large amounts of data, including imaged and OCR documents, to your clients or throughout your organisation or even publish your own multimedia titles. Our CDR Record-26 Pentium processor-based PC comes complete the new Philips CDD2600 2x record and 6x play CD Recorder, with easy to use Windows 95 drag-and-drop CD recording software and powerful multimedia authoring software. The CDR Record-26 is a part of our range of PCs that all do that bit extra

CD Revolution PC Specifications

- Choice of Intel 120/ 133/ 150MHz Pentium® Processor Motherboard with 256KB Cache 64-bit Memory, Pipeline Burst Cache or choice of Intel 200MHz Pentium® Pro Processor with Aurora ATX Motherboard.
- 16MB EDO RAM expandable to 128MB (72-pin)
- 1.6GB fast IDE Hard Drive + 3.5" 1.44MB Floppy Drive
- 2GB fast SCSI Hard Drive + Adaptec 2920 PCI SCSI Card + 3.5" 1.44MB Floppy Drive
- 16-bit Sound Blaster Sound Card + Yamaha YSTM15 Speakers
- G-Force 128-bit video card 2MB RAM
- 15" High Res Colour Monitor (The monitor pictured is an alternative slightly extra cost 17" monitor)
- Professional Keyboard & MS Ergonomic Mouse + Windows 95
- Internal Philips CDD2600 - 2x speed SCSI CD Recorder with 6x playback with 2 blank CDs
- Windows based CD recording software (loaded) + Adaptec SCSI card for CD Recorder

With Intel 120MHz Pentium Processor + Philips CD2600 2x 6x CD Recorder	£1,399	£1,643.83
With Intel 133MHz Pentium Processor + Philips CD2600 2x 6x CD Recorder	£1,449	£1,702.58
With Intel 150MHz Pentium Processor + Philips CD2600 2x 6x CD Recorder	£1,499	£1,761.33
With Intel 166MHz Pentium Processor + Philips CD2600 2x 6x CD Recorder	£1,649	£1,937.58
With Intel 200MHz Pentium Pro Processor + Philips CD2600 2x 6x CD Recorder	£1,999	£2,348.83

The Yamaha CDR100 for a quicker CD recording.

If you are thinking about using a CD recording PC for producing/duplicating CD-Rs, you may like to consider using a PC fitted with a Yamaha CDR100 which records at 4x speed. You should remember when recording a CD-R that a continuous uninterrupted stream of data is required to be fed to the CD recorder and its burning laser. As such

when recording a CD-R all other applications have to be switched off and as such the user loses the use of the PC during recording time. For 650MB this can be a good 36 minutes for a 2-speed record CD recorder and a good 18 minutes for a Yamaha 4-speed record CD recorder. It may not sound a lot when you have got the occasional CD-R to record and the ideal time for a coffee break, but if there is a lot of CD-Rs to be recorded then the faster speed Yamaha CD recorder is perfect in this situation.

With Intel 120MHz Pentium Processor + Yamaha CDR100 4x 4x CD Recorder	£1,549	£1,820.08
With Intel 133MHz Pentium Processor + Yamaha CDR100 4x 4x CD Recorder	£1,599	£1,878.83
With Intel 150MHz Pentium Processor + Yamaha CDR100 4x 4x CD Recorder	£1,699	£1,996.33
With Intel 166MHz Pentium Processor + Yamaha CDR100 4x 4x CD Recorder	£1,799	£2,113.83
With Intel 200MHz Pentium Pro Processor + Yamaha CDR100 4x 4x CD Recorder	£2,149	£2,525.08

CD REVOLUTION ISDN VIDEO CONFERENCING PC



Intel ProShare based PC - It's all about sharing, give & take and seeing eye to eye At last a full-featured desktop conferencing system that lets you simultaneously collaborate with customers, vendors and colleagues in multiple locations.

Without leaving your desk, Intel ProShare V2.0 is a fully-integrated, standards-based system that lets you effectively communicate and exchange information world-wide over an ISDN line or your company's existing Intranet.

Now you can increase productivity and customer service without devoting more resources and instantly reach local and global customers and vendors from your desktop. You'll hear each other, see each other and share documents using Intel's high quality audio, video and data sharing capabilities. Intel ProShare is fully compliant with the H.320 video conferencing standard and is

available stand alone with two silicon packed ISA cards, camera and headset or ready fitted into our CD Revolution Intel Pentium Processor based PC.

CD Revolution PC Specifications

- Choice of Intel 120/ 133/ 150MHz Pentium® Processor on motherboard with 256KB Cache 64-bit Memory, Pipeline Burst Cache or choice of Intel 200MHz Pentium® Pro Processor with Aurora ATX Motherboard.
- 16MB EDO RAM expandable to 128MB (72-pin)
- 1.6GB fast IDE Hard Drive + 3.5" 1.44MB Floppy Drive
- 16-bit Sound Blaster Sound Card + Yamaha YSTM15 Speakers
- G-Force 128-bit video card 2MB RAM
- 15" High Res Colour Monitor (The monitor pictured is an alternative slightly extra cost 17" monitor)
- Professional Keyboard & MS Ergonomic Mouse + Windows 95
- Intel ProShare® V2.0 ISDN Video Conferencing System with Document Sharing and Data Transfer



With Intel 120MHz Pentium Processor	£1,949	£2,290.08
With Intel 133MHz Pentium Processor	£1,999	£2,348.83
With Intel 150MHz Pentium Processor	£2,099	£2,466.33
With Intel 166MHz Pentium Processor	£2,199	£2,583.83
With Intel 200MHz Pentium Pro Processor	£2,549	£2,995.08

CD REVOLUTION DOC' IMAGE PROCESSING PC



Another PC Advert to look at?

This PC will scan the pages for you. Sorry but before you get too excited we don't mean that our Document Image Processing PC System will physically turn the pages and read this magazine for you. But it will if you wanted to take the trouble to cut all the pages out, be able to scan and ocr read all

the pages, although we cannot imagine why you want to do this and whether you would get permission. The point is that our DIP PC System is just as comfortable scanning complicated documents as well as simple ones.

CD Revolution PC Specifications

- Choice of Intel 120/ 133/ 150MHz Pentium Processor with Elite Motherboard, Triton chip-set, 256KB Cache 64-bit Memory, Pipeline Burst Cache or choice of Intel 200MHz Pentium Pro Processor with Aurora ATX Motherboard.
- 16MB EDO RAM expandable to 128MB (72-pin)
- 1.6GB fast IDE Hard Drive + 3.5" 1.44MB Floppy Drive
- G-Force 128-bit video card 2MB RAM + 15" High Res Colour Monitor (The monitor pictured is an alternative slightly extra cost 17" monitor)
- Professional Keyboard & MS Ergonomic Mouse + Windows 95
- Windows based CD recording software (loaded) + Adaptec SCSI card for CD Recorder Internal Philips CDD2600 - 2x speed SCSI CD Recorder with 6x playback with 2 blank CDs
- Fujitsu Scanpartner I0 + ZyLAB Document Image Processing Software + Caere Wordscan OCR Software

With Intel 120MHz Pentium Processor	£2,899	£3,406.33
With Intel 133MHz Pentium Processor	£2,949	£3,465.08
With Intel 150MHz Pentium Processor	£3,049	£3,582.58
With Intel 166MHz Pentium Processor	£3,149	£3,700.08
With Intel 200MHz Pentium Pro Processor	£3,499	£4,111.33

CD REVOLUTION MPEG-1 ENCODING BASED PC



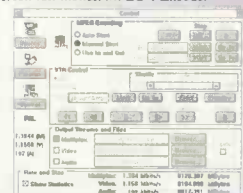
This MPEG real-time encoder PC is only for users with vision

If you're in the business of impressing people by way of multimedia presentations or multimedia titles you need impressive equipment to do the job. When it comes to making an impact there's nothing better than a well thought out interactive, digitally encoded MPEG television program that can be viewed in full-screen full-motion video on a computer monitor or TV set, along with stunning stereo sound.

Our CDR P MPEG-1 PC with CD recorder can directly take sound & vision from quality cameras or playback equipment and in real-time encode directly onto the system hard drive. Playback quality can be equivalent to S-VHS with a stereo sound quality to match. MPEG-1 is now part of the MPC-3 standard and is set to be the digital television de facto standard for PCs. But if you are waiting for MPEG-2 then for a cool £27,000 ex VAT we can even supply you a broadcast quality MPEG-2 encoding PC.

CD Revolution PC Specifications

- Choice of Intel 120/ 133/ 150MHz Pentium Processor with Elite Motherboard, Triton chip-set, 256KB Cache 64-bit Memory, Pipeline Burst Cache or choice of Intel 200MHz Pentium Pro Processor with Aurora ATX Motherboard.
- 16MB EDO RAM expandable to 128MB (72-pin)
- 2GB fast SCSI Hard Drive + Adaptec 2940 PCI SCSI Card + 3.5" 1.44MB Floppy Drive
- 16-bit Sound Blaster Sound Card + Yamaha YSTM15 Speakers
- Jakarta 2MB RAM 24-bit PCI SVGA Graphics Accelerator-on-board hardware MPEG Decoder
- Media Styler (Special Edition) multimedia authoring software (handles both MPEG-1 & MPEG-2 clips)
- 15" High Res Colour Monitor (The monitor pictured is an alternative slightly extra cost 17" monitor)
- Professional Keyboard & MS Ergonomic Mouse + Windows 95
- Windows based CD recording software (loaded) + Adaptec SCSI card for CD Recorder Internal Philips CDD2600 - 2x speed SCSI CD Recorder with 6x playback with 2 blank CDs
- Optimised professional top-of-the-range real-time full-screen full-motion MPEG-1 Encoder



With Intel 120MHz Pentium Processor	£5,999	£7,048.83
With Intel 133MHz Pentium Processor	£6,049	£7,107.58
With Intel 150MHz Pentium Processor	£6,149	£7,225.08
With Intel 166MHz Pentium Processor	£6,249	£7,342.58
With Intel 200MHz Pentium Pro Processor	£6,599	£7,753.83

CD REVOLUTION CUSTOM BUILT PCs & PC SERVERS

Off the peg or Made to Measure

At CD Revolution we've approached the manufacture of our PCs and PC Servers in a different way and we will produce for you a ready-to-go made-to-measure Intel Pentium processor based PC or PC Server to match your exact needs. If required we will even install it for you and provide yourself or your staff with training as required, all at a price you'll be pleased with. For on-going peace of mind we can provide on-site maintenance & even a free help line.

Tailored to your needs

No matter how small or large you want your Intel Pentium processor based CD Revolution PC or PC Server customised, nothing is too much trouble. If you're not quite sure what you need, our sales or technical staff are always pleased to chat with you by telephone or over a coffee and if you're not technical they'll talk in a language you'll understand. What's more you'll be provided with an itemised system quotation, along with relevant product data sheets, so you can make a valued judgment as to your purchasing decision.

Help for the adventurous

Our engineers keep a computerised record of every PC and PC Server built, including all the parts used, configuration files and system jumper settings. So if you decide to add an additional card yourself at a later date, (albeit we are always happy

to do this) and the installation goes wrong, our engineers can advise you what your system settings were originally and they'll be able to offer you suggestions to get you going again.

No Premium - we purchase in bulk. Made-to-measure is usually synonymous with high cost. However, because we purchase in bulk and are official distributors for many of the products we use in manufacture a CD Revolution made-to-measure PC can cost less than an off-the-peg PC, fitted with additional hardware.



CD Revolution Ltd

Specialist PCs
for
Specialist Applications

CDR House, Gogmore Lane, Chertsey, Surrey KT16 9AP
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Back Up Your Hard Disk

from £3.81 (£4.48 inc VAT)

Product Description £ ex VAT £ inc VAT

RICOH BUDGET 2x 4x SCSI CD RECORDERS

Ricoh RS-1420C Internal CD Recorder 2x record 4x play (bare drive)	£259	£304.33
Ricoh RS-1420C External CD Recorder 2x record 4x play (bare drive)	£291	£341.93

PHILIPS 2x 6x SCSI CD RECORDERS



The Philips New CDD2600 (2x 6x) conform to the new CD UDF standard. The Philips CDD2600 is a fourth generation half height 5.25" internal CD Recorder available either in internal or external casings. The brand new CDD2600 is the world's first 6x playback CD recorder and is one of the world's first CD recorders that supports the recently announced new CD UDF (Universal Disc Format) standard which defines a common scheme of

"packet writing" to assure interchange ability of CD-R discs and to greatly increase performance and flexibility when storing large & small files on CD-R. With CD UDF and with yet to be released software, the CD-R will have the capacity to behave much like a floppy disk but with a 680 MB capacity. CD UDF also creates a bridge between the ISO 9660 layout of CD-ROM discs and the UDF file format selected for DVD media.

CDD2600 Features

- Records CD-ROM (XA), CD-Bridge multi-session, CD-I and CD-Audio discs
- Conforms to Write-Once CD format (Orange Book part I)
- Track At Once, Disc At Once and Incremental Packet Writing modes supported
- 2x speed recording and up to 6x speed playback
- Motorised tray loading for easy operation
- SCSI-II interface
- 1MB buffer
- Win 95 and Win NT plug-and-play as a playback CD-ROM drive

Philips CDD2600 Internal CD Recorder 2x record 6x play (bare drive)	£325	£381.88
Philips CDD2605 External CD Recorder 2x record 6x play (bare drive)	£433	£508.78

YAMAHA 4x 4x SCSI CD RECORDERS

YAMAHA CDR100 (pictured below) >> **CDE100II**
The World's First 4x Speed CD Recorders
Thanks to the developed exclusive optical head, spindle motor, high speed signal processing LSI and control unit, Yamaha have engineered a super high precision 4x recordable and 4x readable internal CD drive the CDR100 for the PC. (The external version, the CDE100 II is available for both PC and Mac users).

The selectable speed allows for switching between 4x, 2x and 1x for both recording and playback.

Format Compatibility

This two-in-one unit is a CD drive that boasts highly compatible recordable/readable features in 4-formats CD-ROM (including MPEG and VideoCD), CD-ROM / XA, CD-I and CD-DA. An

analogue audio terminal has been added for convenient CD-DA operations.
Mode Recordability
Since the CDR100/CDE100 II correspond to the Orange Book Part 2 (Incremental writing) recording, the range of applications has been boundlessly expanded. The following three modes are features of the Yamaha, Disc at Once, Track at Once and Multi-session.



Yamaha CDR100 Internal CD Recorder 4x record 4x play (bare drive)	£473	£555.78
Yamaha CDE100II External CD Recorder 4x record 4x play (bare drive)	£584	£686.20

SCSI CD RECORDERS (BARE DRIVES) WITH SOFTWARE

Philips and Ricoh drives in this section come with CeQuadrat WinOnCD ToGo 3.0 for (Windows 3.11/ Win 95). Yamaha drives come complete with a choice of Elektrosen Gear (Windows 3.11/95) or Asiate Toast for Mac.

Ricoh RS-1420C Internal CD Recorder 2x record 4x play with software	£277	£325.48
Philips CDD2600 Internal CD Recorder 2x record 6x play with software	£343	£403.03
Philips CDD2605 External CD Recorder 2x record 6x play with software	£451	£529.93
Yamaha CDR100 Internal CD Recorder 4x record 4x play with software	£493	£579.28
Yamaha CDE100II External CD Recorder 4x record 4x play with software	£604	£709.70

CD RECORDER KITS



CD Revolution All-you-need CD Recorder Kits
Recordable CDs are the most effective, durable, permanent storage medium and can provide decades of safe storage. Any file can be quickly accessed and read directly by using any multisession CD-ROM drive.

To record a recordable CD (CD-R) you need a CD Recorder with software which will allow you to record up to 650MB on a single CD-R. Sourcing all the components needed to upgrade your PC to a CD recording system can sometimes be a bit time consuming. To overcome this we now offer a range of all-you-need CD Recorder upgrade kits.

All-you-need CD Recorder Upgrade Kit

CD Revolution all-you-need CD Recorder Kits come complete with everything needed to work with your appropriately specified PC.

Kit Contents

- Choice of Philips or Ricoh Internal SCSI CD Recorder
- CeQuadrat WinOnCD ToGo Windows 3.11/95 based CD recording software
- Adaptec 1505 ISA SCSI Card, software and cables
- CD-caddy (where applicable)
- 2 blank 74 minute recordable CDs & CD marking pen
- Easy to follow installation and user instructions

The Yamaha CD Recorder Kit - similar to the CD Revolution kit and software is Incat Easy-CD.



CDR packaged - RS-1420C Internal CD Recorder 2x record 4x play with accessories	£327	£384.23
CDR packaged - CDD2600 Internal CD Recorder 2x record 6x play with accessories	£393	£461.78
CDR packaged - CDR100 Internal CD Recorder 4x record 4x play with accessories	£542	£636.85
Yamaha packaged - CDR100 Internal CD Recorder 4x record 4x play with accessories	£587	£689.73
Yamaha packaged - CDE100II External CD Recorder 4x record 4x play with accessories	£660	£775.50

EXTERNAL CD RECORDERS WITH INTEGRAL HDDs

CD Revolution Storage Micro Tower with integral SCSI CD Recorder and SCSI HDD

The Storage Micro Tower is an external mains powered system which includes a choice of CD recorder with either two speed or four speed record and four speed or six speed playback along with a choice of fast SCSI hard drive with a storage capacity of 2, 4 or 9GB.

It connects to a PC or Mac via a single SCSI cable and comes complete with a choice of WinOnCD ToGo CD recording software for PC users or Toast CD recording software for Mac users.

Given its portability the CD Revolution Storage Micro Tower is ideal in any application where budgets on large storage/CD recording are

restricted or in installations where security is an issue and where both hard drive and CD recorder need to be locked away in a security fire safe after use.



CD Revolution/ Philips CDD2600 2x 6x, Microp 4421AV 2.0GB SCSI HDD+software	£929	£1,091.58
CD Revolution/ Philips CDD2600 2x 6x, Microp 3243AV 4.3GB SCSI HDD+software	£1,358	£1,595.65
CD Revolution/ Philips CDD2600 2x 6x, Microp 1991AV 9.0GB SCSI HDD+software	£2,095	£2,461.63
CD Revolution/ Yamaha 4x 4x, Microp 4421AV 2.0GB SCSI HDD+software	£1,089	£1,279.58
CD Revolution/ Yamaha 4x 4x, Microp 3243AV 4.3GB SCSI HDD+software	£1,517	£1,782.48
CD Revolution/ Yamaha 4x 4x, Microp 1991AV 9.0GB SCSI HDD+software	£2,254	£2,648.45

CD RECORDER SOFTWARE

CeQuadrat WinOnCD 3.x - The Amazing all-in-one CD Recording Software

- Native Windows 95 program - Supports the Joliet extension of ISO9660 for long file names of up to 64 characters, International character sets, unlimited directory tree depth, etc. Also works with Windows NT
- CD formatter for all current CD formats, CD-ROM, CD-Digital Audio, CD-ROM XA, PhotoCD (requires PhotoCopy and a Philips/Kodak CD recorder), CD-I, Video CD (requires VideoPack), Bridge Disk, Hybrid Disk, CD Extra and Bootable Disk
- Advanced HFS Support allows True Hybrid Disc with shared data areas
- Improved functionality for CD DA recording
- Track at once or Disc at once CD Recording (if supported by the CD recorder)
- Incremental Packet Writing for economical back up or data exchange

High Speed Formatting The full "on the fly" writing option takes almost no space on the hard disk and makes CD production faster. With WinOnCD files and directories can be placed onto any area of the CD. Furthermore the CeQuadrat Smart File Placement allows the best possible placing for a particular application. Thus CD performance will be perfect.

New CD formats supported by WinOnCD 3.0

- Bootable Disc for direct booting from the CD (if supported by the PC's BIOS)
 - CD-Extra (formerly CD PLUS) defined in the BlueBook as a multisession disc which contains RedBook audio in the first and data such as video, lyrics and background information in the second session. Unlike the regular Mixed Mode CD-ROM which sometimes caused speaker crashes, CD-Extra will not access the data track when playing back on the CD on a CD audio player.
 - Advanced HFS support is a long awaited feature. WinOnCD 3.0 now enables the user to create Shared Hybrid CDs from the PC which up until now was only possible on the Mac.
- Advanced Audio Support**
Recording Audio CDs using the track at once method sometimes caused problems when reading back the CD. With WinOnCD 3.0, Red Book CDs can now be written comfortably in the Disc at once mode (if supported by the CD recorder) which is profitable also for mass replication. P/Q editing is possible for improved audio support and UPC/EAN and ISRC code settings are selectable.
- Incremental Packet Writing**
WinOnCD 3.0 supports incremental packet writing which can be advantageous for economical back up or data exchange. This new feature will definitely avoid any buffer overrun. The user is no longer limited to 99 tracks or approximately 45 sessions when creating a CD.

CeQuadrat WinOnCD 3.x for Windows 95	£299	£351.33
Elektrosen Gear Desktop - Multimedia	£89	£104.58
Elektrosen Gear - Standard - UNIX, HP, Sun	£649	£762.58
Elektrosen Gear - Multimedia - UNIX, HP, Sun	£849	£997.58

RECORDABLE CDs (CD-Rs)



NIPO Hi-SPACE Label Recordable CD, 4x speed, 63 mins 570MB, Orange Book		
10 to 49 - price each	£3.81	£4.48
50 to 99 - price each	£3.70	£4.35
100+ - price each	call	
CIS (no label/blank) Recordable CD, 4x speed, 74 mins 650MB, Orange Book		
10 to 49 - price each	£4.45	£5.23
50 to 99 - price each	£4.32	£5.08
100+ - price each	call	
Philips Label Recordable CD, 4x speed, 74 mins 650MB, Orange Book		
10 to 49 - price each	£5.10	£5.99
50 to 99 - price each	£4.94	£5.80
100+ - price each	call	
Yamaha Label Recordable CD, 4x speed, 74 mins 650MB, Orange Book		
10 to 49 - price each	£5.16	£6.06
50 to 99 - price each	£5.00	£5.88
100+ - price each	call	



CD Revolution Ltd Importers & Distributors of CD Recording and Internet related products Dealer Enquiries Welcome

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 - Range 0-9v or -9-+9v
 - Successive Approximation
 - 60µs/Ch Conversion Time
 - Port Address Selectable
- D/A
 - Dne 12bit Channel
 - Range 0-9v or -9-+9v
 - Unipolar/Bipolar
 - Conversion Time 500ns

from **£131 RRP**
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	Ex. VAT	Inc. VAT
12 BIT AD/DA Card		
DCI-050 12 BIT AD/DA Card	£131	£153.93
DCI-180 12 Bit AD/DA Terminal Board	£109	£128.08
Super 12/14 BIT AD/DA Card		
DCI-060 12 BIT	£134	£157.45
DCI-062 2 D/A	£149	£175.08
DCI-070 14 BIT	£149	£175.08
DCI-072 2 D/A	£164	£192.70
DCI-525 Advance 12 BIT AD/DA Card	£306	£359.55
8 Channel 8/12/14 BIT D/A Card		
DCI-508 8 BIT	£345	£405.38
DCI-512 12 BIT	£414	£486.45
DCI-514 14 BIT	£565	£663.88

Pocket ADDIO Modules



- Connects via Parallel port
- Maximum 16 modules/port
- 11 Input Channels
- Range 0-10v
- 500µs Conversion Time
- Error: 1 LSB
- Power Input DC+9v, 500mA

from **£60 RRP**
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	Ex. VAT	Inc. VAT
Pocket 10/12 BIT AD Converter		
DCP-PAD10 10BIT 0-10v	£60	£70.50
DCP-AD12 12BIT 0-10v	£72	£84.60
Pocket Digital I/O Module		
DCP-DI08	£60	£70.50
Pocket 8 Relay/ 8 OPTO Input		
DCP-RE08	£62	£72.85
Pocket A/D Terminal Board		
DCP-TRM	£32	£37.60
Pocket A/D Prototype Board		
DCP-PAD12	£104	£122.20
Pocket ADDIO Extension Board		
DCP-ADD-E	£35	£41.13

Interface/PC Chassis



- NEMAA/12 Flat Panel Monitor (58mm)
- 10.4" 640 x 480 TFT colour LCD
- Wall or Panelmount
- Touchscreen (optional)

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FPM-30CT Flat Panel Monitor, Colour TFT LCD	£2206	£2592.05
IPC-6520 Rackmount Kit for CRT Monitors	£245	£287.87
PCA-6570 Resistive Touchscreen Kit	£375	£440.62
PNL-6682 10.4" Colour TFT Display with Inverter	£1153	£1354.77
MIPC-5011 Panelmount Keypad (20 keys)	£143	£168.02
MIPC-5021 Panelmount Keypad (56 keys)	£153	£179.77
IPC-6310 Rackmount Keyboard	£398	£467.65
IPC-620 20-slot Multi-system Rackmount IPC Chassis	£637	£748.47
IPC-614 14 slot Dual-system Rackmount IPC Chassis	£264	£310.20
IPC-610A 14 slot IPC Chassis	£330	£387.75
IPC-610MB 14 slot IPC Motherboard	£327	£384.22
IPC-6806 6-slot Wallmount IPC Chassis	£281	£330.17
MBPC-641 4-slot Microbox IPC Chassis	£187	£219.72

Serial Communications Cards



- Standard 422/485 Interface
- Max. 4000ft TX/RX Distance
- I/O Addr Selectable (3 group)
- RS485 Mode Selectable
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	Ex. VAT	Inc. VAT
2 Port RS422/485 Card		
DCI-128w/16450	£68	£79.90
DCI-128F w/16550	£87	£102.22
DCI-128F6 w/16650	£106	£124.55
2 Port RS232 ISA Card		
DCI-080 1 port w/16650	£52	£61.10
DCI-090 w/16550	£75	£88.13
DCI-100 w/16650	£93	£109.28
4 Port RS232/422 Card RS232		
DCI-140 w/16450	£59	£69.33
DCI-140F w/16550	£98	£115.15
DCI-140F6 w/16650	£134	£157.45
4 Port RS232 ISA Card		
DCI-144 w/16450	£119	£139.83
DCI-148 w/16550	£158	£185.65
DCI-148F w/16650	£193	£226.78
8 Port RS232/422 Card RS232		
DCI-150 w/16450 DB25	£173	£203.28
DCI-151 w/16450 RJ11	£161	£189.18
DCI-151F w/16550 RJ11	£238	£279.65
DCI-151FD w/16550	£252	£296.10
DCI-1316F w/16650	£306	£359.55
DCI-1516FD w/16650 RJ11	£320	£376.00
RS422		
DCI-130 w/16450 DB25	£277	£325.48
DCI-130F w/16550	£339	£398.33
DCI-130F6 w/16650	£417	£489.98
8 Port RS232/422 ISA Card RS232		
DCI-152 w/16450 DB25	£197	£231.48
DCI-152E w/ Exp Box	£211	£247.93
DCI-153 w/16550 DB25	£255	£299.63
DCI-153E w/ Exp Box	£283	£332.53
RS422		
DCI-132 w/16450 DB25	£213	£250.28
DCI-132W w/ Exp Box	£244	£286.70
DCI-132FD w/16550 DB25	£277	£325.48
DCI-132FB w/ Exp Box	£283	£332.53
Riscom 8 Port CPU Card RS232		
DCI-755D DB25	£247	£290.23
DCI-755E Exp Box	£270	£317.25
DCI-755J RJ11	£220	£258.50
RS422		
DCI-757D DB25	£270	£317.25
DCI-757E Exp Box	£294	£345.45
Serial Line Converters		
DCI-112 232/422	£45	£52.87
DCI-118 232/485	£36	£42.30

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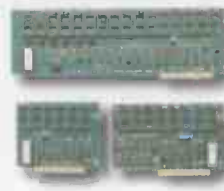
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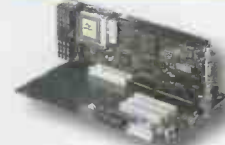


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This month, I have a number of appeals to make:

1. Nigel Backhouse of the Division of Applied Mathematics at the University of Liverpool wonders if any readers would be interested in joining the Great Internet Mersenne Prime Search? He tells me that George Woltman is asking for volunteers with Pentiums and 486s and access to the web, to join a team searching for new, large Mersenne Primes. He provides free software and full instructions on how to use it. This can be downloaded from our [world.compuserve.com/home/pages/just for fun/prime.htm](http://world.compuserve.com/home/pages/just%20for%20fun/prime.htm).

2. Alan Cox has been studying the paper by Artur Ekert and Richard Jozsa in *Reviews of Modern Physics*, July '96, pp1-28, entitled "Quantum Computation and Shor's Factoring Algorithm". In common with your columnist, he finds it difficult to understand but realises the importance of the subject area. Is anyone willing to produce a simple guide to the concepts involved? *PCW* may consider such material for publication, as it would be to the benefit of many readers and relate to the very frontiers of computational theory.

3. Caryl Takvorian is anxious to access a paper on the subject of NP-complete and intractable problems. Is any reader able to supply a suitable reference or offer such a paper to *PCW* and/or Caryl directly?

FRACTRAN: a simple universal programming language for arithmetic
Fractran: Due to JH Conway, Open Problems Commun. Comput, pp4-26, published in 1986.

To play the Fraction Game corresponding to a given list: f_1, f_2, \dots, f_k of fractions and a starting integer N , we repeatedly multiply the integer which is defined at any stage (initially N) by the earliest f_i in the list for which the answer remains an integer. Whenever there is no such f_i the game stops.

Formally: the sequence (N_i) is defined by $N_0 = N$ (given) while $N_{i+1} = f_i N_i$ where i between 1 & k inclusive is the least i for which $f_i N_i$ is integral, providing such an i exists.

Experiment 1 Consider the list of fractions $17/91, 78/85, 19/51, 23/38, 29/33, 77/29, 95/23, 77/19, 1/17, 11/13, 13/11, 15/2, 1/7, 55/1$: these define PRIMEGAME (after Conway). Choosing $N = 2$, the other powers of 2 which are generated are those whose indices are the Prime Numbers in ascending order.

Experiment 2 Consider the list of fractions

$365/46, 29/161, 79/575, 679/451, 3159/413, 83/407, 473/371, 638/355, 434/335, 89/235, 17/209, 79/122, 31/183, 41/115, 517/89, 111/83, 305/79, 23/73, 73/71, 61/67, 37/61, 19/59, 89/57, 41/53, 833/47, 53/43, 86/41, 13/38, 23/37, 67/31, 71/29, 83/19, 475/17, 59/13, 41/291, 1/7, 1/11, 1/1024, 1/97, 89/1$: these define PIGAME (after Conway). Choosing N as 2^n the next power of 2 to appear is $2^{p(n)}$ where $p(n)$ is the n th digit after the point in the decimal expansion of π .

Experiment 3 Consider the list of fractions $583/559, 629/551, 437/527, 82/517, 615/329, 371/129, 1/115, 53/86, 43/53, 23/47, 341/46, 41/43, 47/41, 29/37, 37/31, 299/29, 47/23, 161/15, 527/19, 159/7, 1/17, 1/13, 1/3$: these define POLYGAME (after Conway). Define $f_c(n) = m$ if, when Polygame is started at $c2^{2^n}$, then it stops at 2^m , otherwise leave $f_c(n)$ undefined. Then every computable function appears among f_0, f_1, f_2, \dots . The number c is called the Catalogue Number and is "easily computed for some quite interesting functions". Conway gives f_c for any c whose largest odd divisor is less than 2^{10} .

Problem

Understand and implement FRACTRAN in the form of the first two experiments. Follow this with an initial investigation of Experiment 3... and comment upon this approach to computable functions.

■ Send any implementation of the above algorithms to Mike Mudge, by 1st April, 1997. All material received will be judged using suitable subjective criteria and a prize will be awarded for the best entry (SAE for return of entries, please).

■ Responses to the three appeals should also be sent to Mike Mudge (for forwarding). George Woltman can be contacted directly as indicated above.

Festive fractions

Mike Mudge gets stuck into a feast of fractions for Christmas, and appeals for help on behalf of readers.

Report on Numbers Count May '96

Nigel Hodges examined "Problem MM" and used $x = m/n, y = a/b$ (in their lowest terms) to distinguish two cases p does/does not divide m : obtaining solutions for $p = 5$ involving integers of 15 & 16 digits for m and n and 22, 23, 24 digits for a and b . Note that A. Bremner and J. Cassels, *Mathematics of Computation*, vol. 42, no.165, Jan 1984, pp 257-264, cite "a most startling generator of all solutions for $p = 877$ where 42 & 40 digit integers arise as m & n whilst a & b have 63 & 60 digits respectively". However, the prizewinner this month is Patrick Moss, of 26 Hillside, Grays RM17 5SX. His submission, "Rational Points on a Cubic Curve", includes an arithmetic/algebraic section followed by a section dealing with geometrical arguments, and finally, a set of special cases and generalisations. The computational aspects were programmed in C++ on a Gateway 2000 P5-120, prompting Patrick to ask if any reader has access to some decent code or knows of a not-too-expensive piece of software for handling large integer-length arithmetic? He used Microsoft Excel to draw the graphs but wonders whether other software could have done the job?

Details of this work on request to Patrick. A number of his results were subsequently confirmed in *The Arithmetic of Elliptic Curves* by JH Silvermann.

PCW Contacts

Contributions welcome: Mike Mudge welcomes correspondence from readers on any subject within the areas of number theory and computational mathematics, together with suggested subject areas and/or specific problems for future *Numbers Count* articles. Write to him at 22 Gors Fach, Pwll-Trap, St Clears SA33 4AQ, or phone 01994 231121.



Drive time

Floppy disks have been overtaken and lapped by today's removable storage drives. Roger Gann explains the new technologies and sorts the hatchbacks from the sportsters.

It's all to do with relativity, you know. Ten years ago, when your PC had a 20Mb hard disk, a 1.2Mb floppy was a capacious device capable of backing up the entire drive with a mere 17 disks. Today, the standard hard disk fitted to PCs has become the 1.2Gb drive: a 600-fold increase in capacity. And what of the humble floppy? In the same period, its capacity has increased by less than 20 percent. As a result, it's now at a disadvantage when used in conjunction with any modern large hard disks — for most users, the standard floppy disk just isn't big enough anymore.

In the past, this problem only affected a tiny proportion of users, and for those that did require high-capacity removable disks (typically DTP'ers running Macs), solutions were available: 44Mb 5.25in SyQuest removable hard disks. But these were expensive.

Times have changed, and today, everybody needs high-capacity removable storage. These days, applications don't come on single floppies. They come on CD-ROMs. Thanks to Windows and the impact of multimedia, file sizes have gone through the ceiling. Create a Word document with a few embedded graphics and before you know it, you've got a multi-megabyte data file, quite incapable of being shoehorned into a floppy disk.

Awkward as it is, there's no getting away from the fact that a PC just has to have some sort of removable, writable storage, with a capacity in tune with current storage requirements. We all need removable storage for several reasons: to transport files between PCs, to back up personal data, and to act as an overflow for your hard

disk, to give you (in theory) unlimited storage. It's much easier to swap removable disks than fit another hard disk to obtain extra storage capacity.

In 1981, 5.25in floppies kicked off at 160Kb, quickly went to 180Kb and then to 360Kb with the advent of double-sided drives. In 1984, the 5.25in floppy maxed-out at 1.2Mb. That same year, Apricot and HP launched PCs with the revolutionary Sony 3.5in 720Kb disk drive. Three years down the road, this doubled in size to 1.44Mb and for the past decade or so, that's where it's stayed. Oh sure, there have been attempts to increase the capacity of the humble floppy, but none got very far.

First, there was IBM's bid (in 1991) to foist a 2.88Mb floppy standard on the PC world, using expensive barium-ferrite disks, but it never caught on. And both Iomega and 3M had another go in 1993 with the 21Mb "Floptical" disk. But it never took off: it was just too dear and too small.

For a long time, the range of removable storage options wasn't extensive. You could choose between low-capacity floppies, clumsy tape solutions, expensive optical drives, and removable cartridges. But today, the situation is radically different, and finally there is a real choice in removable storage. There is a wide range of capacities on offer, starting around 100Mb and rising to 1Gb. The new removable drives have never been more affordable, and having been designed with the end-user in mind, are easy to install.

Installation options

Removable drives are available both in external and internal versions. The former will have either a parallel port or SCSI interface, while the latter will have a SCSI or

IDE interface, although IDE is not all that common at the moment.

Unlike fitting a second hard disk, which can be a daunting task, the great news is that most of the new breed of removable storage devices have been designed with ease-of-installation in mind. The easiest to install are the external drives with a parallel port interface. Not only do you not have to take the lid off your PC, but it also lets you share/move the drive between different PCs. You can use it with a notebook, too. And because it uses your printer/parallel port, installation is no more complicated than plugging in a cable.

The only problem with this otherwise perfect arrangement is that the parallel port, which was never designed to handle these devices, isn't very "fast", and older parallel ports can act as a bottleneck, slowing down the drive's data transfer rate. Luckily, however, most recent PCs are equipped with an enhanced parallel port (EPP or ECP) and these are capable of good data transfer rates. I recently used a parallel port tape streamer hooked up to an EPP port and it was capable of backing up at just under 8Mb/min — a pretty respectable rate. In any event, such bottlenecks would only really impinge on fast devices, such as removable hard disks. Slower devices, such as the Zip drive, don't have a stellar data transfer rate to start with and so are unlikely to suffer at the hands of the parallel port interface.

If the ultimate data transfer rate is what you're after, you ought to consider SCSI versions of these devices. Most internal drives (Jaz, SyQuest, MaxIT and Zip) tend to use a SCSI interface, which is fine if you already have a SCSI card fitted as installation is no more complicated than



Left Omega's Jaz drive can take cartridges as big as 1Gb — enough space for you to back up your entire hard disk

Below SyQuest's EZflyer is cheaper but holds a maximum of 230Mb

plugging a spare connector on the SCSI ribbon cable into the back of the drive. The same applies to external SCSI drives, too. Very often they can be "daisy-chained" to other external SCSI devices. If you haven't got a SCSI card, they can be expensive to buy and fiddly to configure, although Omega does a cut-down SCSI host adaptor called the Jet, which sells for around £80. Given the choice, I'd spend another £20 and buy a better host adaptor, from, say, Adaptec, Bus Logic or AvanSys.

Spoil for choice

Although all these devices offer the same basic facilities and differ only in terms of capacity and speed, they do employ different technologies. They can be split into categories based on their respective technologies. At the last count there were three removable storage technologies:

super-floppy, hard disk, and magneto-optical. Even though CD-R discs are dropping in price and the Panasonic innovative PD hybrid drive offers some interesting advantages, neither technology currently has much market presence.

Super-floppies

The current crop of super-floppies may resemble conventional floppy disks in physical size and operation, but they don't use the same magnetic recording technology employed on the standard 1.44Mb floppy. Without doubt, the most popular super-floppy is the Zip drive, of which Omega claims to have sold ten million. The secret of the Zip's good performance (apart from its high 3,000 rpm spin rate) is a technology pioneered by Omega (based on the Bernoulli aerodynamic principle) which actually sucks the flexible disk up towards the read/write head rather than vice-versa. The disks are soft and flexible like floppy disks, which makes them cheap to make and less susceptible to shock. They're fast, and have a capacity of 94Mb — big enough for most users. Sadly, Zip drives are not backward compatible with 3.5in floppies and can't be used as boot devices, although there are BIOSes in the pipeline which will permit that. Imagine, you could install Win95 from a single floppy!

The new kid on the super-floppy block is the rival standard being promoted by 3M and Compaq. An LS-120 disk looks very similar to a common-or-garden 1.44Mb 3.5in disk, but uses a refinement of the old 21Mb floptical technology to deliver much greater capacity and speed. In fact, this technology had originally been developed by Omega, but was abandoned

p304 >

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and sold on to 3M. Named after the "laser servo" technology it employs, an LS-120 disk has optical reference tracks on its surface that are both written and read by a laser system. These "servo" tracks are much narrower and can be laid closer together on the disk: an LS-120 disk has a track density of 2,490tpi (tracks per inch) compared with 135tpi on a standard 1.44Mb floppy. As a result, the LS-120 can hold 120Mb of data.

As well as being a bit bigger, its other advantage over the Zip drive is that it can also read/write ordinary 3.5in floppies and so can be used as a boot device. While its data transfer rate is faster than that of a standard 3.5in floppy drive, it's not as fast as a Zip drive due to its considerably slower spin speed. And at present, the LS-120 isn't available to buy as an add-on — it's currently only available ready-installed on Compaq's new range of Deskpro PCs.

Hard disks

Above about 100Mb, the most commonly used removable drive technology is derived from that found in conventional hard disks, which not only gives you high capacities but also provides fast performance, pretty close to that of conventional fixed hard disks. These drives behave just like small, fast hard disks.

This approach isn't particularly new: SyQuest cartridges have been using the technology for many years. However, SyQuest drives have tended to be small



The PowerMO 230 is one of the latest generation of magneto-optical drives from Olympus

(44Mb and 88Mb). Recently, SyQuest embraced the 3.5in form factor and launched a 135Mb drive (the EZ-135) but this has been rapidly superseded by the 230Mb EZflyer. It's fast, like a hard disk, and reasonably priced (about £200).

Xyratex, the IBM spin-off, has got in on the act with its 540Mb MaxIT drive. This is a little pricier (about £300) but has twice the capacity and can read older SyQuest cartridges. It's nippy, too.

The drive with the largest capacity is Iomega's Jaz which can take cartridges as large as 1Gb. This, too, is affordably priced (about £375) and offers excellent capacity with great performance. Its huge capacity makes it possible to back up your original hard disk in one go, in just a matter of minutes. It's a good choice for audio-visual work, capable of holding an entire MPEG movie in one swallow. You could even make it your primary drive!

Magneto-optical

As you might expect from the name, these drives use a hybrid of magnetic and optical

technologies. The disks have a special alloy layer that can be modified under the influence of a magnetic field. Changes can then be read by reflecting a laser beam off the alloy layer. The magnetic field in the magneto-optical (MO) disk actually twists the laser's beam of light, and this twist can be detected and used to read the data.

However, this is a "two-pass" process, and as a result, MO operations are relatively slow. This drawback is compounded by the fact that MO heads tend to be heavy, which also makes for slow average access times. Nevertheless, MO disks are cheap at around a tenner and they have top archival properties, often being rated with an average life of 30 years — far longer than any magnetic media.

MO came close to being killed off by the Zip, but a new generation of faster, cheaper drives, spearheaded by Fujitsu, have breathed new life into the format. MO disks are much the same size as 3.5in floppies but about twice as thick. Olympus has been the first to market the latest generation of MO kit with the slick-looking PowerMO 230. And Fujitsu has recently announced a 640Mb MO drive, the £299 DynaMO, which is backwards-compatible with older 128Mb and 230Mb MO disks.

PCW Contacts

Roger Gann can be contacted by post c/o PCW at the usual address, or via email at rgann@mcgilivray.win-uk.net

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Direct action

Benjamin Woolley assesses Direct3D, Microsoft's promising API for adding 3D functions to applications. He also finds himself in the thrall of power mania: which hardware is big enough?

The internet is not the only area of the information revolution that Microsoft once neglected and is now determined to dominate. 3D graphics are also now firmly in the company's laser-guided sights. Its strategy has been to buy up existing technologies and Microsoften them up for global exploitation. One of these is Reality Lab, a set of programming tools originally developed by the British company, RenderMorphics, for rendering simple textured shapes in real time. Microsoft has renamed it Direct3D and developed it as the 3D component of its burgeoning multimedia application programming interface, DirectX, version 3 of which had just been launched at the time of writing this. The DirectX "evangelists" (a troop of which are bound for Europe, I am told) are promising that their technology will enable PCs to equal the current performance of consoles and arcades once hardware developments like Intel's MMX and Microsoft's own Talisman (see the November column) are commonly available.

Direct3D is an API, which means it acts as a sort of programming language (used in combination with an existing one, such as C++) for adding 3D functions to applications. Those applications may be games, they may be programs for authoring games and other 3D content, they may be molecular modelling packages, even databases or spreadsheets.

Microsoft has put a lot of work into Direct3D, and the demonstrations I have seen on the developer CD-ROM are promising. A simple textured sphere or teapot (the standard artefact for graphics demos), for example, will render smoothly in real time in a 320x240 window on a standard



An image entitled "Screw the Mold" by Sandford Beml Faisonat, which features in the Apple QuickDraw 3D Gallery (quickdraw3d.apple.com). The image was rendered using QuickDraw 3D, although obviously not in real time

Pentium system. Direct3D (and, indeed, DirectX as a whole) also has the important feature of being able to take advantage of whatever hardware resources are available. If it finds a 3D graphics accelerator, it will be used, so long as there is a driver, which is likely, as most of the major 3D graphics chips are designed to support Direct3D. But equally important, if no acceleration is available, Direct3D objects, and any sounds or 2D images with which they are combined, will still be displayed, generated by a "Hardware Emulation Layer" that reproduces in software any functions that are unavailable in hardware.

Direct3D is not the only 3D API on the market. There is OpenGL too, which is aimed at the higher-end market and is already well-established. More significantly from a PC point of view, there is QuickDraw 3D from Microsoft's old rival, Apple. In at least one head-to-head comparison (published in the American magazine, *Byte*) QuickDraw 3D came out ahead of Direct3D for offering a greater range of object

primitives and for its support of both the Mac and Windows platforms. Some of the Microsoft literature claims that DirectX, too, will be cross-platform. There are some doubts about this. According to at least one source within the company, the main purpose of the technology is to give 32-bit Windows operating environments a competitive edge over rivals, which obviously include Macintosh.

So which API will prevail, and does it matter? It certainly matters, because either Direct3D or QuickDraw 3D are likely to provide the basis for 3D becoming a standard part of the PC environment, as commonplace as sound and 2D graphics are now. You will need to consider this when choosing both software tools and hardware, trying wherever possible to keep your options open by getting support for both (which most third-party developers are, so far, promising to provide).

The question as to which API is likely to prevail is a trickier proposition. We all know who has the marketing muscle. We all know

Infobyte

An Italian company called Infobyte specialises in creating VR tours of historical sites that are truly spectacular. They include the stunning Giotto frescoes in the Basilica of St Francis in Assisi (pictured here), St Peter's Basilica, the Coliseum and, most recently, the restored tomb of the Egyptian queen Nefertari, a VRML version of which can be explored by pointing your browser (running on an extremely powerful



workstation) at the company's excellent web site, www.infobyte.it. Once this sort of thing runs in real time on an ordinary PC over a standard internet link, I think 3D's day will truly have arrived.

who controls the operating system (or at least, the one used by the vast majority). But 3D is a relatively new field in PC terms, QuickDraw is already well supported, and you only have to visit Apple's QuickDraw server (quickdraw3d.apple.com) to see that the company means business.

Power mad

Last month, my Compaq Deskpro's hard disk drive decided to experience a strange, slow-motion crash, deteriorating from full working order to complete cabbage-like coma in the space of an hour. I packed it off to my supplier, where it gathered dust for three weeks awaiting Compaq's delivery of a replacement.

During its absence I had to resort to my backup system, an old 486 Viglen Genie, which, unlike the Compaq, has chuntered away reliably in the background without a squeak of protest since I bought it some time in the last century. Being modestly specified in all departments except RAM (it has 16Mb), the Viglen, I thought, would prove to be unusable. In fact, I found it capable of doing just about the same amount of work. For 3D, I returned to Autodesk's 3D Studio running under DOS; for writing, Microsoft Word running under Windows 3.11; for the internet, good old Pegasus and WinFTP (I decided to forgo the delights of the web for a while). It was not tidy, it was not integrated, but it did work.

Those of us who are working with 3D graphics are currently in the thrall of power mania. We are constantly told that more means more: more processing power, more RAM, and yet more sophisticated software means more creativity, more spectacular effects and yet more moolah.

Dear Santa...



In its opening months, 1996 seemed it might turn out to be the moment when 3D finally fulfilled its promise. Creative Labs was selling the 3DBlaster board, VRML was becoming better known. However, the 3DBlaster did not turn out to be the graphics equivalent of the SoundBlaster because only individual programs (games) could take advantage of it. VRML, too, was a bit of a damp squib; few had the hardware to do anything with it, fewer the desire to spend their online hours wandering terrains that look like they were designed by the Early Learning Centre.

Now, as the New Year arrives, one gets the distinct impression that things are starting to move. With the Millennium board and now the Mystique, Matrox has started to establish 3D acceleration as a standard part of the PC graphics subsystem. With the plummeting price of memory, systems are coming equipped with the 16Mb of RAM that is the absolute minimum for handling textured 3D data. With the emergence of mainstream APIs (see main story), we at last have a mechanism for bringing the benefits of the third dimension not just to games, but to a whole welter of applications.

But I do not expect 1997 to be year zero: we have some way to go yet. Santa keeps forgetting to pack his sleigh with such essentials as modular, easy-to-use 3D authoring tools (the current crop are overweight and monolithic), a standard for plug-ins, and the imagination booster all of us involved in the graphics business need if we are to start to come up with content that is both wonderful and practical.

For me, what 1996 lacked most was a Myst, some game or virtual artefact that aroused one's excitement in the possibilities of 3D. So, Santa, please could you give us another of those in 1997? Not Myst 2, but something that demonstrates what wonderful, colourful, inspirational landscapes that even a humble PC can help create.

So when I sat down in front of what to many must still represent the pinnacle of desktop computing power, a Silicon Graphics workstation, it was in a mood of extreme scepticism. The machine in question was SGI's new "personal" workstation, the O2*. SGI's definition of personal is somewhat different to, say, Viglen's. The cheapest O2 costs just over £5,000, for which you get a 32Mb system armed with a MIPS R5000 RISC processor running at 180MHz. It offers blistering graphics performance through a "unified memory architecture" (i.e. no special-texture RAM) combined with built-in hardware acceleration and a system bus that can shove data around at a rate of 2.1 gigabytes per second.

I spent about an hour on the O2, and found it (temporarily at least) restored my confidence in technology. It was the first time I had used VRML that was both nice to look at and explore, smoother than anything I have so far experienced on an NT box or, for that matter, a Unix one. That, of course, was partly because it used the latest version of SGI's Webspaces VRML 2.0 browser. But it also seemed to indicate that SGI might still retain the edge when it comes to optimising hardware for graphics.

However, do 3D artists have to start contemplating spending more than £5,000 in order to do decent work? Do we really need all that extra power? And if we do, should we pay the premium that is inevitable if you leave the general-purpose PC architecture behind and choose something from SGI? Or should we start thinking about going back to basics: stepping off the technology roller coaster, settling back with the old products that we know and like, and leaving it at that?

For me, for the moment, not even the allure of an O2 can completely discredit the latter strategy. But then, my Deskpro is now back and apparently working well, I have started to use the Workstation edition of Windows NT 4.0, and I have been eyeing a rather nice accelerator board. It can only be a matter of time before power madness once again prevails.

* See *PCW December 96* for a full review of the Silicon Graphics O2.

PCW Contacts

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Yule be lucky...

Last year, Gordon Laing made his Christmas wishes known. Some came true, some didn't. Here, he reviews the year gone by and, ever hopeful, makes up his present list for 1997.

Ho ho ho! It's Christmas time again in the festive land of graphics and DTP. It's funny that the world seems divided into those who love Christmas but hate New Year, or vice-versa. I definitely fall into the former category, lapping up all that is symbolic in the materialistic Western interpretation.

A couple of years ago, when I was editing this Hands On section, I thought it would be a laugh to have a Christmas wish and rant session every year. Fortunately, for me anyway, Hands On's current captain, Eleanor Turton-Hill, has decided to continue with this tradition. So here goes.

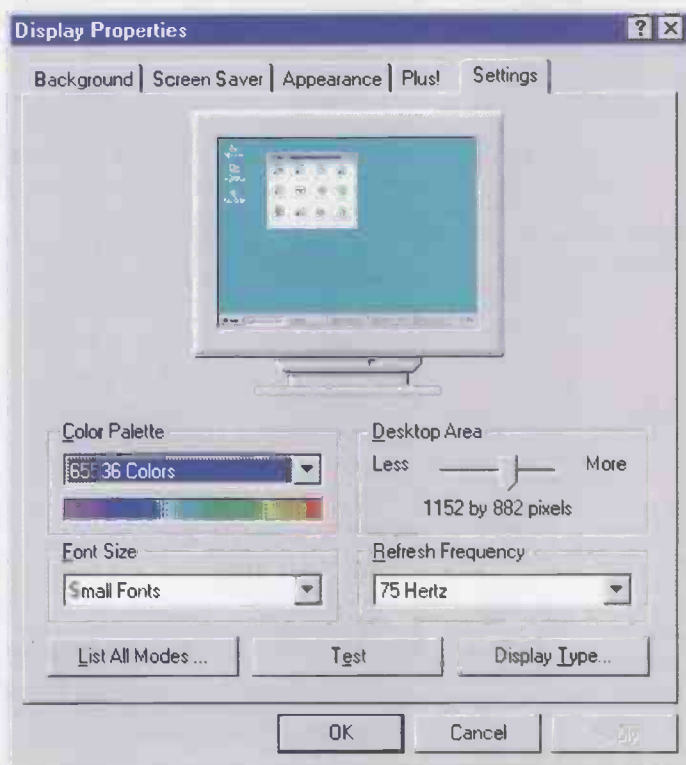
Quark and Adobe

It's been an eventful and quite satisfying year in the world of graphics and desktop publishing. This time last year, Windows 95 was still a fresh and unknown beast, with little native software. Today, we are of course flooded with Windows 95- and NT4-ready products. Sadly, 1996 has not seen an upgrade of two major applications, Quark XPress and Adobe Illustrator, so my joint number-one rant starts here.

XPress 4 is supposedly on its way yet Quark doesn't seem to be in any hurry. After upgrading to Windows 95, I had to

download several updates to get XPress 3.3 working correctly on my system; I'm currently on XPress 3.32 revision 3 but printing is not always 100 percent reliable. Interestingly, Quark dropped development of its fabled image editing package, XPosure, but is poised to release Immedia, its internet and multimedia authoring tool. However, the PC Immedia won't be released until well into 1997.

Quark had better watch out, since Adobe's latest PageMaker 6.5 is beginning to look attractive on both platforms. However, Adobe is the target of what is becoming an annual rant. It's none other



Left Two wishes come true: Windows NT 4's display control panel, complete with a screen refresh rate box for a Matrox Millennium card. Let's hope 95 has this facility soon

Below Preview icons for graphics files created by Photoshop 4 under Windows 95. Great news for native PSD files in the beta



Font of the Month

Pablo Plain

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z B & 1 2 3 4 5 6 7 8 9 0

Monotype has launched a package of three handwriting fonts. Until 31st December 1996, you can buy all three for £45 and even have a cool T-shirt thrown into the bargain. Pablo was created by British designer Trevor Pettit, and is based on the signature of Pablo Picasso.

than Illustrator, which bounds ahead on the Mac but hasn't had a Windows upgrade for years. When I meet Adobe, I comment on how much I admire the company for releasing cross-platform versions of its products almost simultaneously, then gape dumbstruck as Illustrator stumbles uncomfortably into the conversation.

There's still no news to tell, but then, I've always thought FreeHand is a far superior product. Incidentally, FreeHand Graphics Studio 7 is due for release by the end of 1996, along with CorelDraw 7 — a battle of the heavyweight suites we look forward to reviewing soon.

In last January's Graphics & DTP column, I yearned for thumbnail preview icons for graphics files under Windows 95, in the same way that Photoshop generates them on the Macintosh. A few months later my wish was kind of granted by HiJaak 95, which certainly fulfilled the job of creating the icons but, sadly, slowed my PC to a standstill. So I removed it and racked my brains for the answer.

The solution may have arrived in the form of Photoshop 4, which generates thumbnail icons, but only for its native PSD file format on the beta copy — fingers crossed it will work on all file formats when the final is released by the end of 1996.

Photoshop 4 is another winner, despite still not offering some means by which you can quickly work on a low-resolution preview image, record the actions, then have the computer laboriously apply them to the high-resolution original while you're off doing something far more interesting instead.

Particularly welcome, though, is the new Navigation palette, which is great for finding your way around. See last month's review for more details.

Fonts in fashion

Judging by the amount of response I get each time I write about them, fonts are the in thing this year. Regular readers will be pleased to see the return of this column's "Font of the Month", following its two-month absence.

Mid-year I got quite excited about the prospect of OpenType ending the Type-1 versus TrueType font format wars, but sadly, I've heard nothing since.

Web developments have meant more typography on the internet, but this still tends to be displayed as graphics. We'll have to wait and see what happens here.

In the meantime, Adobe released ATM Deluxe which, along with cunning font management, also smooths the outlines of on-screen Type-1 fonts, using similar anti-aliasing techniques to those employed by Microsoft's Plus Pack for TrueType fonts under Windows 95.

Digital doings

1996 has seen a massive commitment by the industry to digital cameras and electronic imaging as a whole. Clearly, someone has come up with enough market research to believe that in 1997, every home computer user will rush out, take digital pictures, scan existing ones, remove unsightly blemishes on friends and relatives, paint moustaches on auntie, and output these masterpieces on colour printers.

The hardware has already started to arrive: everyone and his uncle are releasing digital cameras, while colour inkjet printers are becoming increasingly adept at outputting photographic-quality images. Sony has even announced a mini dye sublimation device for genuinely glossy prints. You want to scan existing pictures? Colour flatbeds are dropping in price, and

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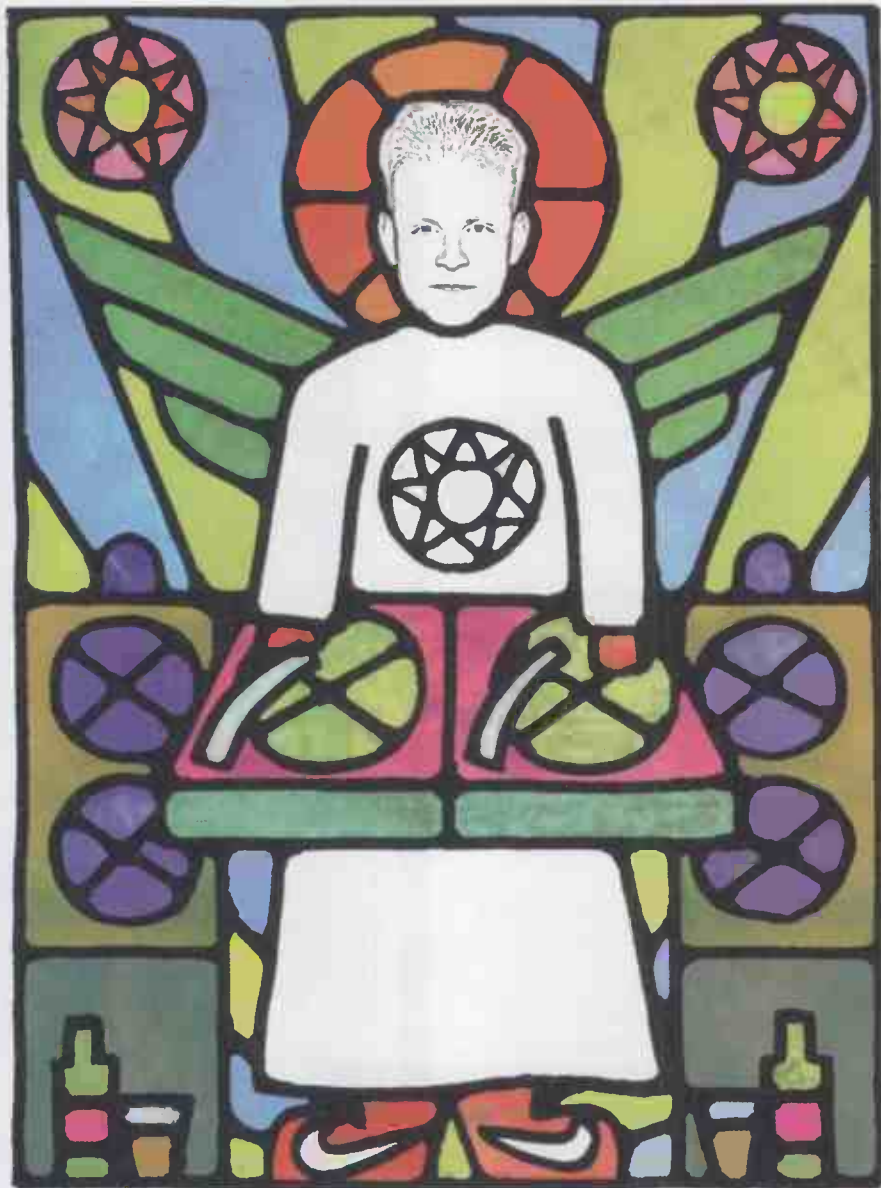
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Is it a heavenly usherette, or is he just doing the washing up? No; it's my Christmas card this year. I'm supposed to be an angelic DJ, spinning the righteous tunes! I've always wanted to do a stained glass window and this year toured the local places of worship for inspiration. In the end I opted not to simulate real lead, but drew heavy black lines on a sheet of paper, then scanned it in line-art mode. The colours are, in fact, real stained glass scans after heavy recolouring and manipulation in Photoshop. I selected the scans in one window, the blank areas in my original, and used Paste Into to fill. I scanned a five-year-old photo (hence the full head of hair!), upped the contrast, then applied the Photocopy filter from Adobe Gallery Effects. A little retouching here and there, and I was finished!

some manufacturers are releasing mini print scanners just for this job (see Kodak's Snapshot Photo Scanner 1, reviewed in this month's First Impressions).

Hardware for graphics users

One of the greatest but most infuriating things about the computer industry is the rate at which hardware drops in price. The good news is that today, you can buy a lot of PC for little cash. But that's bad news for anyone who bought last month, or is too

paranoid to make the commitment. This is an issue for graphics users, who often need some serious equipment to do the job.

Santa delivered the goods last year in terms of hardware: 1996 saw RAM halve in price. So, vulture-like, I swooped down for the kill. I now have 32Mb at work and 48Mb at home which, although it may sound slightly over the top, ended up costing me very little. I've always recommended the upgrade from 8Mb to 16Mb, but now equally strongly endorse moving up to

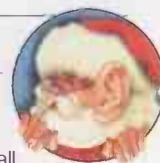
32Mb and beyond. Windows 95 under 32Mb is excellent, particularly if you're using Photoshop and layers. This amount is also the ideal starting point for Windows NT 4 Workstation, about which I'll be writing more in the future.

Big bugbear

Actually, I'm reminded of one enormous bugbear which is the basis of my ultimate wish to Santa: an obvious way of altering the screen refresh rate from Windows 95's display control panel.

This is generally up to the graphics card manufacturer who should write it into the driver, yet there are surprisingly few. Those that do offer the facility also tend to hide it away, which is unforgivable. Interestingly, when installing NT 4, the system recognised a Matrox Millennium card and installed Microsoft's own driver, complete with refresh rate control — the way it should be.

Dear Santa...



My Christmas wishes this year:

1. I'd like to see RAM costs fall again.
2. In an attempt to ban flickering displays, I'd like to see refresh rates easily accessed from the display control panel.
3. Inkjets are improving, but I wish for true photographic quality.
4. Once and for all, I'd like preview thumbnails for graphics file icons in Windows 95 and NT 4.
5. I also wish scanner advertisers would stop confusing buyers with outrageous interpolated resolution claims.
6. Illustrator for Windows, and better use of Windows 95 specifics (recent file lists, right-clicks, etc) for other graphics applications like FreeHand and XPress.
7. How about low-priced, decent digital cameras to really drive the imaging revolution — a great Christmas gadget.
8. And on Christmas morning, every stocking should have an unlocked copy of Adobe's comprehensive Type CD. Now that *would* be a dream come true.

• PCW Contacts

Merry Christmas everyone! If you'd like to send any festive greetings, please email me at gordon@vnu.co.uk

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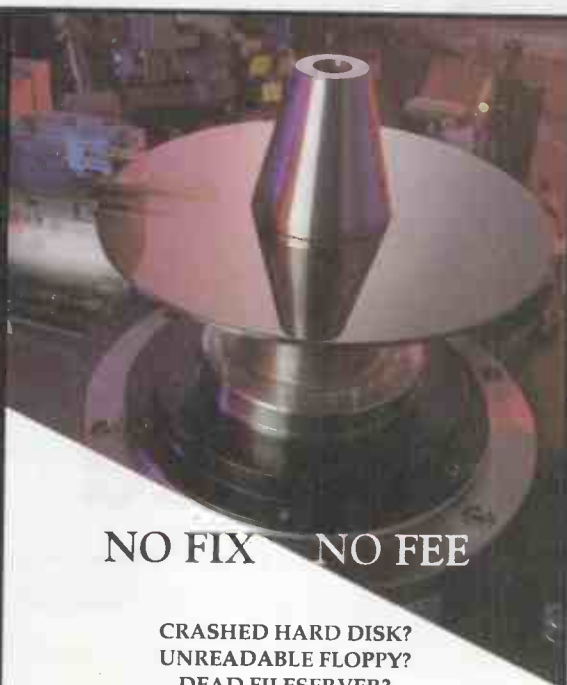
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A **codec** message

In a step-by-step picture guide, Panicos Georghiadis and Gabriel Jacobs show you how to set up audio codecs in Windows 95. Plus, your multimedia queries answered.

We have lots of your queries to catch up with this month, so let's make a start by dealing with a question sent to us by Peter Kenny. He writes: "Your article, in the October issue, referred to a number of compressed sound-file formats. I was interested in the GSM format which is, indeed, listed under Multimedia Properties in my Windows 95 system. However, when I tried to play the GSM sample from the CD-ROM on my system, nothing happened, although all the other samples seemed to work. Do I need to do anything to install the GSM codec in my system?"

"The reason for my interest in GSM is not altogether to do with multimedia, but rather because my data/fax/voice modem (US Robotics Sportster) records all voice messages in files with a .GSM extension. I have been trying to find out about the layout of these files because I want to translate them into .WAV files that I can play through my SoundBlaster-16 card. USR has been very unhelpful. Do you know whether these files are in the GSM format described in your article, or where I can get at any documentation of GSM (preferably on the internet)?"

You can check whether the GSM compressor has been installed on your system by clicking on the multimedia icon in the Control Panel and looking under the list of audio codecs. If it's not there, you can install it from the Win95 CD-ROM. If it is there, you can check its configuration settings by clicking on it. Our file is 44.1kHz, mono. The setting for decompression should be set to All rates.

GSM stands for Global System (for

Mobile (Communications) but the initials are taken from its earlier, French, name: *Groupe Special Mobile*. The Windows 95 bump states that GSM compresses and decompresses audio data conforming to the ETSI-GSM (European Telecommunications Standards Institute — *Groupe Special Mobile*) recommendation 6.10. The GSM 6.10 is a speech encoding system, used in Europe, that compresses 160 13-bit samples into 260 bits (or 33 bytes) — that is, 1,650 bytes/sec (at 8,000 samples/sec). A free implementation can be had on the net using ftp from tub.cs.tu-berlin.de, file `/pub/tubmik/gsm-1.0.tar.Z`.

Additionally, there are two US standards: 1016 (Code Excited Linear Prediction, or CELP, 4,800 bits/sec) and 1015 (LPC-10E, 2,400 bits/sec).

The GSM files created by your modem are probably of genuine GSM format, since GSM compression was made for telephony. But you really need to contact the people who wrote the software that comes with your modem and which creates those files, if you wish to decipher them yourself. We assume that your software doesn't have an option to convert them into WAV files. Some similar software, such as SuperVoice, does this for you.

You'll find many web sites offering GSM-to-WAV conversion programs. Do a Boolean search on GSM and WAV.

A useful reference

"I work for a company that produces electronic books consisting mainly of text and still graphics. We are very keen to offer more video and sound in our products, but are having difficulty in locating anyone who

can provide a digitising service. I would therefore be extremely grateful if you could send me a list of suitable companies."

Paul Cox, Oxford

See the PCW September issue for our review of the *Multimedia and CD-ROM Yearbook*, which contains about 1,400 businesses in the UK providing multimedia products and services. (See the "PCW Contacts" box, page 314, for details.)

Sound-card choice

"I bought your book on MIDI, published by the Sigma Press in 1990, and I've been following the advice given in your column here in PCW, but I really need some help with specific questions. I've recently switched from being mainly a Mac user to owning a plug-and-play Win95 Pentium PC with Adobe Premiere, 3D Studio, and Animator Studio. I also have Roland kit from the cheap end of the range (CM32).

"I want a sound card with good built-in wavetable sounds, versatility, stable performance and a dependable MIDI interface. Sampling is something I'd like to do, but this is only one priority.

"I've read that some cards don't have hardware MIDI interfaces but use a software TSR to emulate it. This can cause MIDI sounds to fail if another TSR overwrites it. I've also read that cards without hardware FM synthesis emulate SoundBlasters in software — that seems like asking for setup headaches and conflicts. Although the option of digital output sounds useful, I don't know how I'd use it.

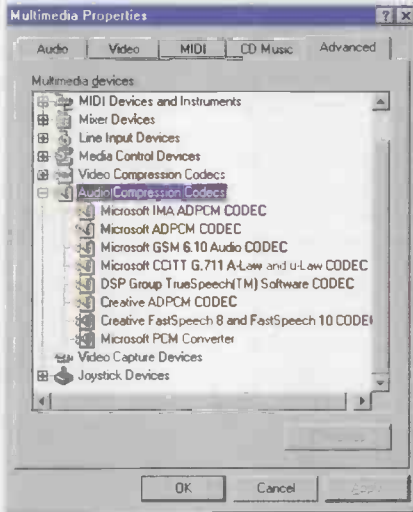
"I'd appreciate your guidance on what to buy, and I should say I've not seen straightforward buying advice in any

Setting up audio codecs in Windows 95 — your step-by-step guide

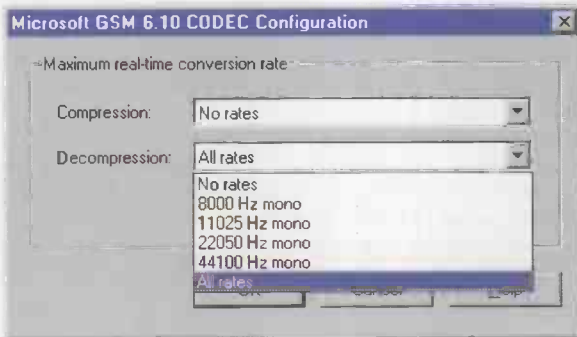


Step 1 (left) Open Multimedia in the Control Panel and select Advanced

Step 2 (below) Select GSM audio compressor from the Audio Compression Codecs



Step 3 (left) Click on Settings



Step 4 (right) Use the Auto-configure button to set the Compression setting for your card and manually set the Decompression setting to All Rates. You can do this for all the other codecs

computer magazine. Nevertheless, I've got a shortlist of five with some 'Fors and Againsts' that I've gleaned from reviews: it is as follows:

1. Turtle Beach TBS2000. Good sounds, good track record, but software MIDI interface. No daughterboard connector. Not easy to get hold of and a bit pricey.
2. SoundBlaster 32. Reasonable price for average sounds, RAM for sampling, good support (I think). Many users, digital output, but software MIDI. No sequencer supplied and no daughterboard connector.
3. SoundBlaster AWE-32. As above, plus reasonable software and daughterboard connector but overpriced (in my opinion).

Perhaps about to be replaced, and due for better synth chip?

4. Orchid NuSound. Good price, average sounds. Good package. Hardware MIDI, daughterboard connector (Orchid's board is only about £20) and NuPanel control panel. But sounds are not the best. No sampling, no digital output and perhaps due for a new card with sampling?
5. Gravis Ultrasound PnP. Good price for good sounds. Sampling, reasonable track record, hardware MIDI but no daughterboard connector. Software perhaps not as good as AWE and not so widely used. SoundBlaster emulation in software.

p314 >



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"And, while I'm asking questions: is an alternative to having a card with sampling, having an expensive sequencer which will mix synth sounds with digital audio sounds? I don't suppose it is because other software (games, Animator Studio) won't be able to play back a mixture of the two as the sequencer can."

Robert Wood
Open University

Lots of questions! We'll try and answer most of them. And thanks for those mini-reviews, although we can't comment on all the details.

Firstly, we should say that some of the views given in the articles in the magazines you've been reading are a bit dated and, frankly, not worth bothering about. Eleanor Turton-Hill's group test of sound cards (PCW April '96) is more up to date.

There's no need to worry about FM emulation and MIDI TSR emulation. These are related to programs running under DOS or strictly using the hardware MPU MIDI interface standard. Most cards come with Windows drivers which override, and/or render useless, any DOS drivers and settings.

The TBS2000 has the same kind of interface as the AWE-32. You can get it from Millenium Music, Tech-mate, Turnkey (see the "PCW Contacts" panel for details) and any of the Byte superstores.

The plain truth is that you won't find a single card that will do everything you want at the best quality. The best overall card which has most of what you want is the AWE-32 (the full version rather than the budget item) at about £170 (plus VAT), which is not expensive for what it offers. It's true that the on-board sounds are a bit thin, but they're no worse than the other cards you mention. A new version (AWE-64) will be out sometime in January with 64-note polyphony. An additional (more expensive) model, the AWE-64 Gold, featuring instrument modelling, will also be available in the New Year.

The best wavetable sounds we've heard on a PC card can be found on the Yamaha DB50 daughterboard (£129) which has an excellent MIDI implementation. You see, it's not just the quality of the samples, but also how much control you have over them during playback — if you want your music to have some expression, that is.

Sequencers need not be expensive

Dear Santa...



Before getting on to our Christmas wish list, let's take a brief look back at 1996. For us, it has been a year when computer companies have actually believed their own hype. Consequently, they have devoted huge efforts and resources to developing products for the internet. For instance, most multimedia authoring programs have had new features added to them, allowing users to create multimedia applications for the net. It has been our job to report on many of these, and in most cases we've been amused rather than impressed. Sorry, but the truth is that if you want multimedia, forget the internet. It's too slow even for still pictures, let alone sound and video. If you want to enjoy multimedia, get it on CD-ROM. Even when everyone has cable lines — with the 17Gb storage of a double-sided DVD (when it's out, if ever) — it will be decades before the internet can deliver comparable performance.

■ We wish the hype over multimedia on the internet would simply stop. Last year, one of our wishes was for full-screen video. So how far have we got? The new version of Adobe Premiere boasts support for 32 x 32 pixel video output for use on the net, and we bet that kids are asking their parents for a magnifying glass for Christmas so they can view it!

■ While on the subject of the net, we wish that web page designers would stop trying to show off and use less video and graphics so that pages would display faster. If you opt not to display graphics, you're left with an awful feeling that you might have missed something. We simply wish they would cut out the gizmos. After all, when you've seen one, you've seen them all.

■ We wish that Windows wouldn't ask us to press OK when there's nothing else to press and things are very far from OK.

■ We wish that when you get the message Abort, Retry, Fail, and you select Retry, something would actually happen other than the same message appearing again and again, until you press Abort or Fail.

■ We wish there was more hardware compatibility. We've spent more days sorting out hardware incompatibility problems with Windows 95 in the last year than we care to contemplate — Plug-it-in 'n Play "solve the problem".

■ We wish there were new typefaces designed specifically for reading text from a computer monitor, and that all programs (especially multimedia authoring tools) would anti-alias fonts on-the-fly.

■ We wish (every year, not just this one) that companies and organisations would stop announcing products before they have dreamed of them. CD-X and DVD were announced ages ago. Where are they? And where are the large flat-screen LCDs which we can hang on our wall — the ones we were promised last decade?

■ We close our eyes and wish hard for no more answerphones on customer support lines, and no more "musak". We want to talk to *real* people at the other end — people who know what they're talking about.

■ We wish for more and cheaper electronic pens to replace mice.

■ And finally, we wish that computer companies would concentrate on delivering what customers want, as they used to in the eighties, as opposed to concentrating on buying each other out, as they have been doing over the last five years. They've been so busy eliminating competition that they've brought stagnation to the computer industry; something which inevitably happens when there aren't enough manufacturers around.

nowadays to incorporate audio as well as MIDI tracks. Only if you want to manipulate your own original sounds as musical instruments (change the pitch and so on) do you need a card that handles sampling. The AWE-32 can use up to 28Mb of RAM, and there are lots of CDs with sounds for it. Steven Helstrip has reviewed some in his Hands On Sound column.

You only need a card with digital In/Out if you want to communicate with digital equipment such as an audio DAT machine. You should note that most digital cards are more expensive and don't have MIDI sounds on them.

To avoid setup headaches, go for a card for which the drivers have been around and well-tested for some time.

■ *Please note: this is the last Multimedia column to be included in the Hands On section of PCW, but you will still be able to read all about the various aspects of multimedia in other parts of the magazine. Panicos Georghides and Gabriel Jacobs will continue to write for us from time to time.*

•PCW Contacts

If you have any queries, or interesting multimedia-related topics to discuss, we'll be pleased to hear from you. You can contact us at g.c.jacobs@swansea.ac.uk or panicos@dial.pipex.com

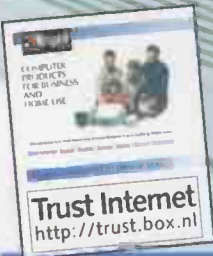
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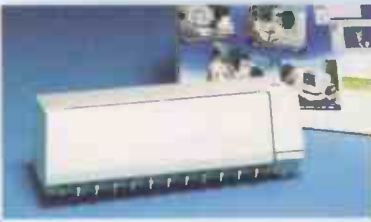
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The key to good **editing**

Editing is *such* a chore. Never mind: Steven Helstrip has some tips to lighten the load. He's also been willing away the hours discovering shortcuts in Cubase — cue Christmas!

E editing MIDI events has never been my favourite hobby, and neither is it ever likely to be. There are, however, a few tricks to make editing easier. The ones I'll describe here are demonstrated using the Key Editor in Cubase, but the same principles can be applied to any piano role-style editor. Also, I'll be counting down the Christmas Tips Chart, looking back at significant software developments in 1996, and writing out my wish-list for someone I stopped believing in when I heard Take That weren't getting back together: Santa Claus.

Easy editing

It's fair to say that piano role editors are mainly used for correcting start points and note lengths. When working with more than one track based on a similar idea, multiple tracks can be viewed simultaneously by highlighting them and opening the editor with Control-E. Clicking

on a note will make the part it belongs to active in the editor. Notes which do not belong to the same part are still visible, but are reduced in size. This method of editing makes it much easier to correct note lengths in relation to other parts, and is ideal for creating perfect velocity crossfades between two tracks.

The Key Editor in Cubase is also ideal for drawing and re-shaping volume and CC

curves. When it is necessary to, say, create a pattern of Continuous Controllers to effect the filter of an instrument, the bottom portion of the screen can be expanded and used to display CCs graphically. To enter CCs with the mouse, simply hold Alt while scribbling in the lower division of the screen.

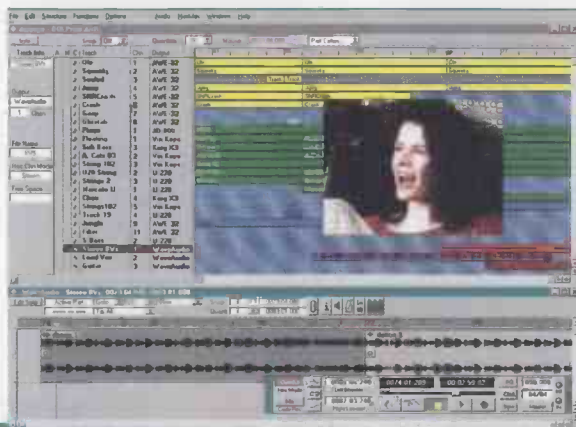
Entering semi-quavers, or other note lengths, on a single note can be achieved quickly using the brush tool. Select this from the toolbox, following a right click of the mouse button — particularly useful when building "cannon-fire" snare fills. The velocities of the part can then be faded using the gradient tool in the lower half of the screen.

Sequencers of note

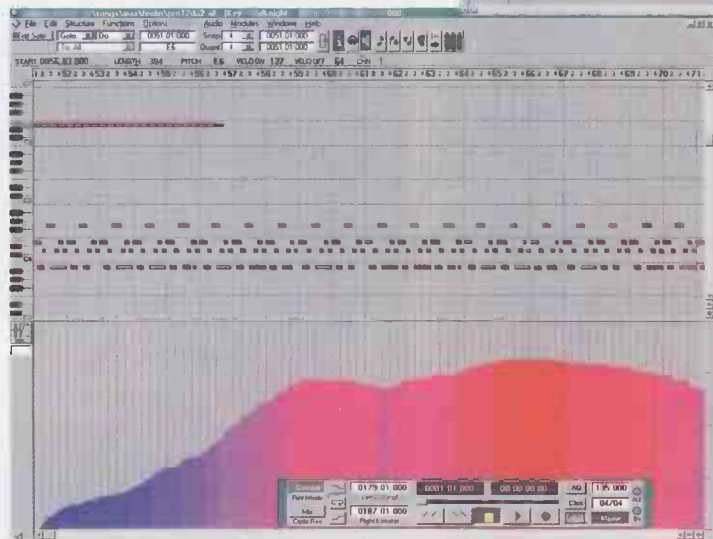
Towards the end of 1995, Steinberg released Cubasis Audio, which created a new breed of application on the PC: the affordable audio

sequencer. Little over £250 bought you a miniature version of the industry standard sequencer, Cubase, and the ability to record up to four stereo tracks of digital audio sampled at CD-quality. What made this even more appealing was that no specialised hardware was required, just a plain and simple sound card. Within six months, practically every known sequencer was updated to support audio tracks.

Before Cubasis Audio arrived, a similar application would have set you back around £800. Of course, this left other sequencer developers no choice but to reduce their prices, which was good news for all of us. Earlier this year, Steinberg surprised us all



Above Version 3 of Cubase came as a pleasant surprise in 1996



Left Drawing and re-shaping volume and CC curves using Cubase's Key Editor

Cubase shortcuts chart

I've been having fun discovering new shortcuts in Cubase. And rather than just keep them to myself, I thought I would compile a Christmas 96 Top Ten Short Cuts Chart. You could have some fun over the festive season just trying to say it.

10. And straight in at ten this month, it's that old favourite, Control-Alt-P. This will swiftly position the left and right locators around a selected part, or parts, in the arrange or edit windows.
9. Climbing seven places, the asterisk key secures number nine. In a moment of inspiration, asterisk will kick Cubase straight into record mode.
8. At eight, it's Shift and PgUp/PgDn for the quickest way to fast forward and rewind through your tunes.
7. Down four places to seven is double click in the arrange window while holding shft. This will select every part on a given track.
6. A non-mover at six is Control-K, to copy parts.
5. At five, Control-Alt-Z will take you to the last part within an arrangement.
4. At four it's another Control-Alt key combination, this time with the letter I. This will hide/display the track info column, which is useful when you need to free up space on your screen.
3. A new entry at three is Alt and the Scissors Tool. When you need to splice a 16-bar part into, say, one-bar sections, hold down Alt while cutting within the first bar of the part. If you need to join the parts together again, this can be done while holding Alt and clicking with the glue tool.
2. Holding at number two this month, it's plain and simple G and H. These two keys enable you to zoom in and out of your arrangement on the horizontal axis. With Shift held down, you can zoom in and out on the vertical axis.
1. And finally, at the top of the Christmas Top Ten Short Cuts Chart, it's shift and function keys 2-12, which allows you to store current left and right locator positions. To recall the locators, simply recall the function key where it was stored.



Logic Audio for Windows 95 is a powerful application on high-end PC hardware

again when it released version 3 of Cubase. Not only was this the first major upgrade in what seemed an age, it came complete with a full-blown audio engine and 32-bit wave editing, all at no extra cost. Consequently, sequencing software fell in price again.

Another major event of the year was the release of Logic Audio for Windows 95. Logic hasn't been too successful on the PC, since it has always been a demanding application that only comes into its own when placed in complex MIDI setups and alongside pro audio hardware. As the Mac seems to have been graced with better audio hardware, it has attracted many Logic users. Now that more high-end hardware has become available, however, PCs that are equipped with Logic are better suited to power users.

Dear Santa...



Firstly, Santa, can you explain why Cubase now requires 12Mb of disc space just to install? Less than three years ago, I ran Cubase from a low-density floppy and still had enough space to save a handful of tunes. What's going on?

One of my least favourite pastimes is spending hours sifting through sampling CDs to find the right sounds or textures for the tracks I produce, so what I'd really like to find beneath the tree this year is the definitive sample collection. It should contain 30 or so snares, kicks and hats to match with warm pads and deep, fat basses that'll make any track rock. How about a belltree sample? They're nice this time of year. The CD should have no vocal hooks — they are *always* dreadful. After all, if somebody comes up with a half decent tune, why would they give it away for somebody else to exploit?

A 21in monitor would be nice, too. And a cordless mouse and keyboard. If the mouse never needed to be cleaned, that would be much appreciated.

And finally, Christmas wouldn't be the same without a Terry's Chocolate Orange. So if you don't mind. Cheers!

PCW Contacts

If you have any hints or tips, MIDI-related items or general comments, send them to the usual PCW address, or to steven_helstrip@pcw.cmail.compuserve.com

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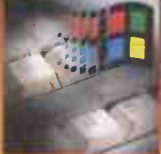
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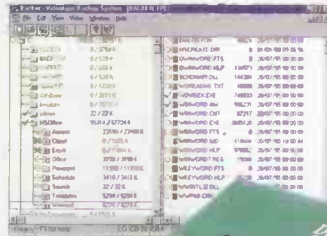
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Spare parts

Tim Anderson compares components for Basic and Delphi. Plus, for those who can't see the wood for the trees there's a guide to choosing a visual programming package.

Visual programming means dropping components into your application and making them go by setting properties and calling methods. That, at least, is the plan and here is an evaluation of some recent components. Your views matter most though, so please let me know which components work well or badly for you.

Crystal Reports 5.0

Crystal Reports is hard to avoid, being widely bundled with products like Visual Basic and Visual dBase. Seagate naturally hopes that users of these bundled versions will want to upgrade. Version 5.0 is the latest release. The Standard version supports most desktop database formats like dBase, Access and Paradox, while the Professional version adds full ODBC and various native SQL formats.

There is a new interface for designing reports, with better drawing features and in-place OLE editing. Of most interest to developers is the new sub-report feature, which enables you to insert a report within a report. Normally, this would be linked to the main report for displaying child records, but it can also display unrelated data. Another new feature enables you to export HTML for adding to web sites.

Crystal is a powerful tool and has components for most development languages including 16- and 32-bit Visual Basic, Delphi and C++. But I do have reservations. One is the sheer size of the product: the main print engine is now over 3Mb; another is that Crystal has its own formula language and although reasonably capable, it is ugly and old-fashioned. Nevertheless, version 5.0 is a significant

upgrade and developers with better things to do than write their own report engine will find it invaluable.

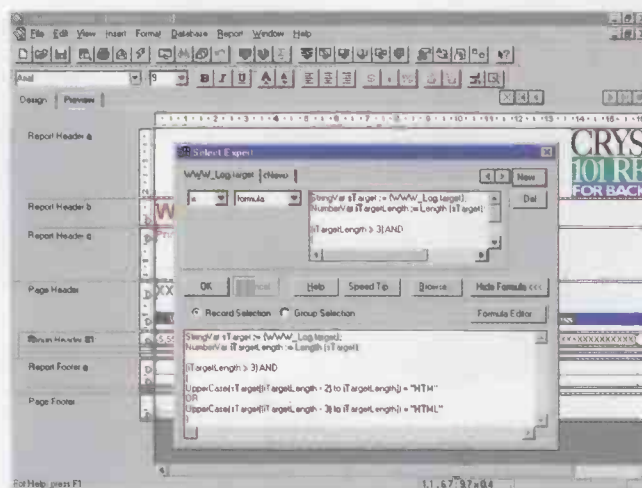
GeoPoint 1.0

Visual Components is responsible for some of the best ActiveX components around, including Formula 1 and Visual Writer. GeoPoint is a more specialist control. It

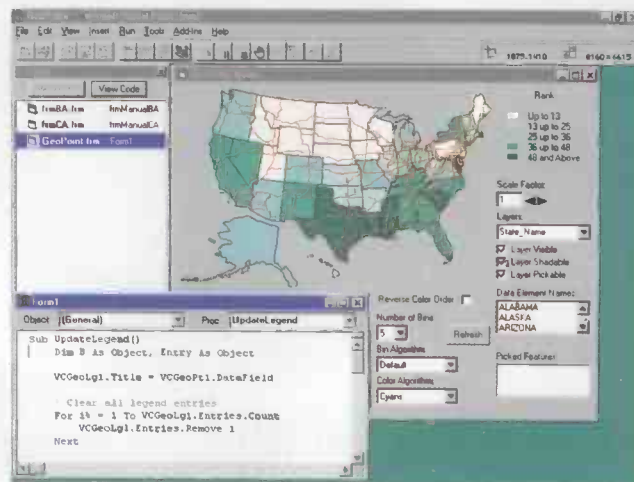
displays maps in MapInfo or Autocad format. By using it alongside the separate Legend control, you can programmatically control the text and shading of each area of the map. A technique called "binning" lets you categorise data into ranges, and then shade the map accordingly: a typical example would be a display of sales performance by region. The user can also

select an area of the map by clicking, so the application can show related data. GeoPoint can be bound to a data control to display your data.

This useful component is spoilt by its presentation. There is no printed manual and the online documentation is poor. The other snag is that the few supplied



Above The Crystal Select Expert lets you create custom fields using the formula editor



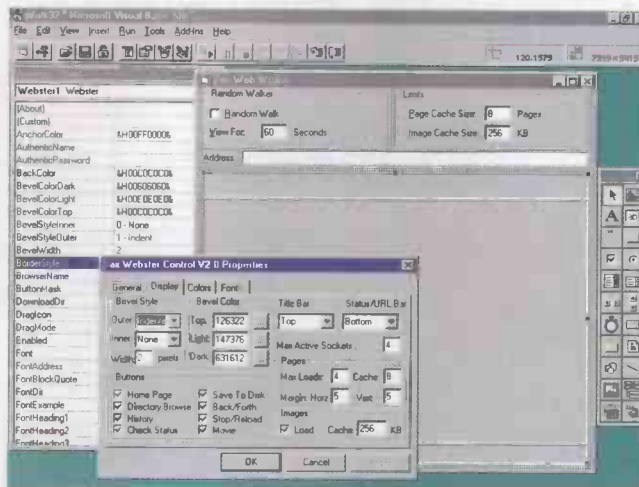
Right GeoPoint is a neat tool with which to analyse geographic data, but its USA map will not be of much use in the UK

maps, heavily biased to the USA, are not likely to be what you want. That means purchasing add-on maps, or buying MapInfo or Autocad to create your own. Making full use of GeoPoint will be expensive.

Sax Webster or Internet Explorer?

The Sax Webster control displays HTML documents. Now at version 2.0, it comes as 16- or 32-bit OCX controls that you can drop into your application.

It is easy to use. You can, for example, display a web page by setting the PageURL property. The main change from the first Webster control is the HTML version supported, now version 3.0 but without frames. It works well and may be useful on 16-bit systems or where a small memory footprint is required. Otherwise, on 32-bit Windows a better option is Microsoft's freely available Internet Explorer 3.0. In Visual Basic 4.0, open the Custom Control dialogue and check Microsoft Internet Controls. This installs the WebBrowser component which is the HTML display part of Internet Explorer. It is just as easy to use as Webster, and far richer in terms of HTML support. You will need to get hold of the Internet Explorer object model, which is part of the ActiveX SDK available on the Microsoft web site.

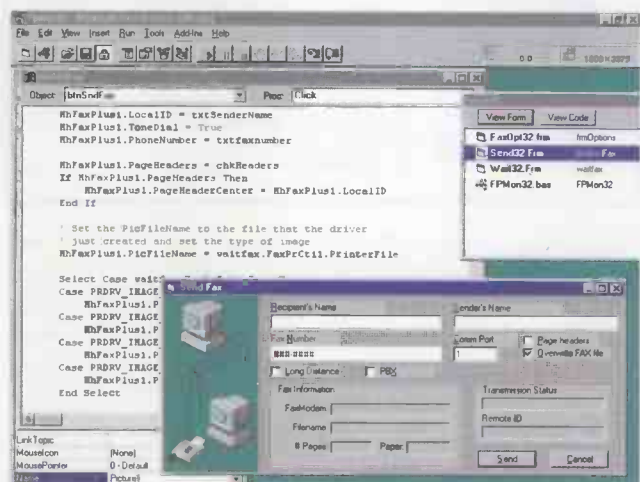


Left Sax Webster: it works, but why not use Internet Explorer instead?

Below FaxPlus: does it have to be so complicated?

Microhelp Fax Plus
Fax software may not be exciting but it is exceptionally useful, at least until the whole world gets webbed.

Fax Plus 2.0 is the new 32-bit version of Microhelp's Fax add-on. It is designed for Windows 3.1 and 95, but not NT. It consists of several controls, including a fax control



How to choose a visual language

Shaun Nicolson writes: "I am considering buying a visual programming package but cannot decide which one. I am considering Microsoft's Visual Basic and Visual C++. The language I choose would have to produce network applications. What are the pro's and con's of these?"

1. Ease of use. This is where Visual Basic scores highly, since you can have a simple utility up and running very fast. That does not mean VB will be the easiest for a large, complex application, since many other factors will then come into play. Delphi also scores well, while Visual C++ is hard to learn with limited visual tools.
2. Performance. This is where languages that compile to native executable code, like C++ or Delphi, generally win over interpreted languages like VB, FoxPro or Java. Database processing speed should be judged separately as all products use fully-compiled database engines. In some applications, performance is not an issue, or is determined more by factors like graphics or hard disk speed rather than the language used.
3. Power. The developer's nightmare is to spend months on a project, only to find that some intractable problem means that it cannot be completed with the current tool. Visual Basic is vulnerable since some features of Windows like callback functions or custom message handling are not available. There is usually a way around it by using a custom control or DLL but these must be written in another language. Version 5.0 should solve some of these problems. If you dread brick walls, C++ is the safest option, with Delphi a close second.
4. Database engine. Most languages have a native database engine, along with the ability to connect to other databases via SQL libraries or ODBC. If you know which database you will be working with, good connectivity is the first thing to check.
5. Availability of add-ons. This is where Visual Basic scores best. Most VBX and ActiveX controls are designed for VB, and may not work well elsewhere. There are also plenty of code libraries for C and C++, but native add-ons for other languages are more limited.
6. Reusable code. To protect your investment, you want to write code that will be reusable in future projects, perhaps even on other computer platforms. This is one of the benefits of object orientation, with Delphi scoring well, C++ fairly well, and Visual Basic less well. Best of all is Java, which forces you to write object-orientated code and runs on multiple platforms.

that handles communications, and a FaxImage control for creating and modifying fax bitmaps. There is a printer driver and control which lets you send faxes by printing from any Windows application. The Fax Plus driver creates a fax image and then fires a StartDoc event in the printer control, so that your code can handle sending the fax.

Unfortunately though, using FaxPlus is not as easy as it should be. In part this is because of fickle telephone lines and diverse hardware that turn faxing into a trouble-prone business. Other problems are down to FaxPlus itself, which is awkward to code and not entirely bug-free. For instance, at the time of writing, the VBX version is unable to correctly convert text files to fax images. Still, it beats trying to write your own fax driver.

Microhelp VB Viewer 2.0

VB Viewer is a product of limited ambitions. Drop it onto a form and you can use it to display files of around 30 different types, including multimedia files. With text documents you can search for text and

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C/C++ Development

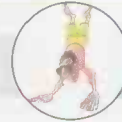
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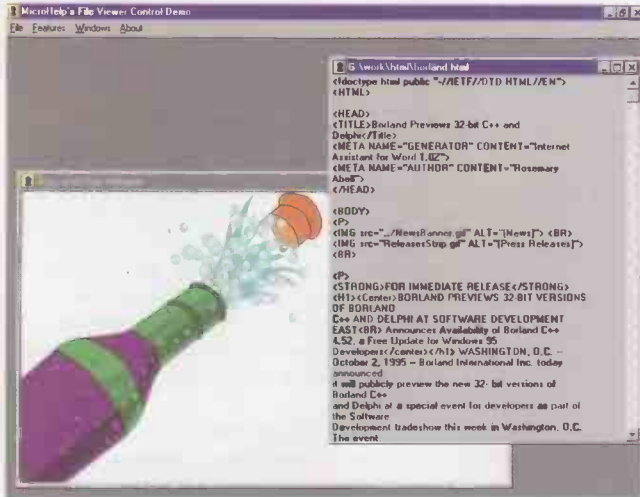
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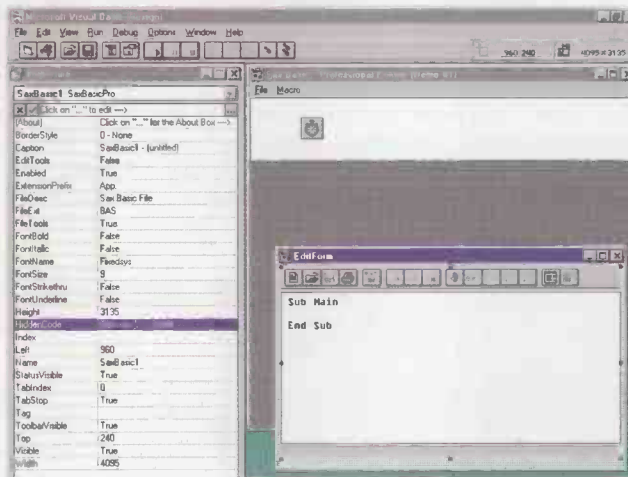
PCW 01



Left VB Viewer can manage a picture, but struggles to display HTML

Below A language within a language, Sax Basic lets you deliver programmable applications

copy to the clipboard. But overall, VB Viewer is a disappointment. One let-down is that formatted documents in word processor formats are displayed as plain text only, unlike the much better QuickView utility that comes free with Windows 95. Some basic formats like HTML and Rich Text Format are not supported at all. You can set VB Viewer to use QuickView viewers, but files then appear in the QuickView window rather than embedded in your form.



has a more elegant solution. You write extensions in a VB class module, and then add them to Sax Basic using the control's AddExtension method. If your application needs a macro language, Sax Basic is ideal and a lot cheaper than licensing the genuine

VBA from Microsoft.

Visual Basic

MT Emms writes: "Using Paint I've created four BMP files. Each is divided into four sectors, the other three being left transparent. I have written a program to merge these bitmaps into one but the last one dominates — in other words, the transparent sectors are not transparent. It was simple on the Mac and Archimedes; surely VB should be able to cope?"

Visual Basic can cope, but it is not as simple as it might be. The secret in this case is to use the PaintPicture method, on either a form or a picture box. The syntax for PaintPicture is:

```
object.PaintPicture picture, x1,
y1, width1, height1, x2, y2,
width2, height2, opcode
```

The final parameter is a long value that defines a bit-wise operation which is performed on the picture as it is drawn. As the VB manual remarks, you can find a list of these operators in the BitBlt topic in the Windows SDK help.

The easy way to use them is to define them as constants in your VB application. For example:

```
Const SRCAND = &H8800C6 ' (DWORD)
dest = source AND dest
Const SRCCOPY = &HCC0020 ' (DWORD)
dest = source
```

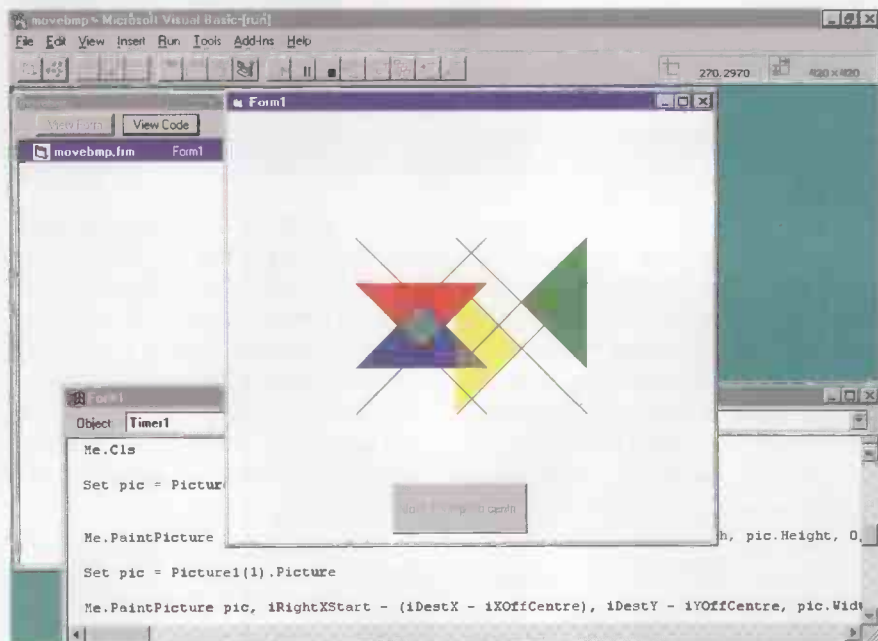
If you then call PaintPicture with the SRCAND constant value, the bitmaps will merge in the way Mr Emms requires. Yes, it is more like programming in C than in Visual Basic, but at least it does the job. An example application is on our cover-

Sax Basic Engine

One way to impress users is to supply an application with its own macro language, like Excel or Word. The Sax Basic Engine lets you do just that. The control has its own IDE, so getting started takes little more than placing it onto a form. The language itself is compatible with Visual Basic for Applications, with excellent support for OLE automation and class modules.

To make Sax Basic useful, you need to extend its language to communicate with your application. The way to do this differs, depending on whether you use the VBX or OCX version. With the VBX, you can add keywords that fire an event called AppExec. You can then write code using Select Case to interpret the command. The OCX version

Merging bitmaps using VB and the SRCAND bitwise operator



mounted CD, which also shows how to move the bitmaps across a form for an animated effect.

Delphi departure

In October, Anders Hejlsberg, the chief architect of Delphi, announced his departure from Borland for the safe pastures of Microsoft. Zack Urlocker, another key member of the Delphi team, has pointed out that "the architectural work that Anders covers is complete for Delphi 97. Anders' departure won't affect the shipping date or features going forward."

Even so, Anders is widely seen as the man without whom Delphi would never have happened, so his move is significant news. If anyone can knock VB into better shape as an OO language, he must be the man. Although Delphi is as good as ever, this weakens the case for migration from Microsoft tools. Personally, I hope that Borland can sustain Delphi's momentum, as it still delivers the best combination of rapid

Dear Santa...

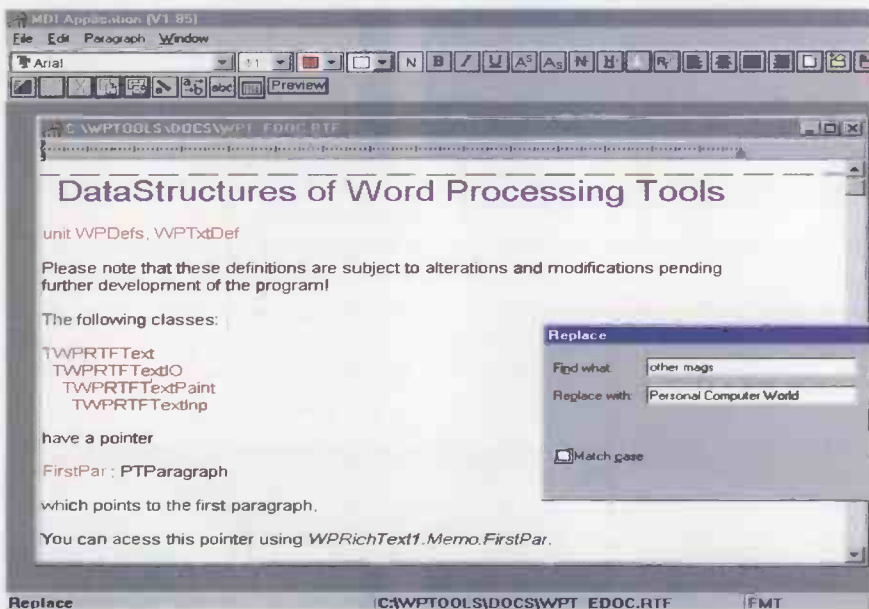
Sensible developers want an easy life. That means fast application building, reusable code, blinding performance and results that run everywhere. Well Santa, it seems you have a habit of giving with one hand and taking back with the other. Last year I asked for an end to the OS wars: a fanciful request, perhaps, but twelve months on and Java may provide an answer. Except that (dear Santa), we need easier, richer interface building, better performance, and decent support for platforms which Java finds difficult, like Windows 3.1 and the Macintosh. In the meantime, even developers who fix upon Windows have three versions with which to contend.

Forget the platform, then, let's look at the tools. First, there's Visual Basic, still the most popular all-round Windows language. Last year's wish-list included a compiler and better OO. The signs are that VB 5.0 delivers some of that, although it will never have the elegance of Delphi's component library. But Office 97 and VBA 5.0 are great news for developers of Office solutions. Thanks, Santa. And thanks for Optima ++, which is real visual development for C++ at last.

While I have your attention, there are a few things I'd like in my stocking for next year. Top of the list has to be a faster, better-organised internet. The web is irresistible for developers, both for technical support and as a platform in itself. But it has to get quicker and more reliable. Please.

Second, an un-present: Windows 3.1, please take it away. It's as bad as DOS, but worse, because people with working Windows 3.1 installations see no reason to change. I understand their point of view, but for developers this is a disaster. Develop two versions, with all the extra costs? Develop 16-bit only and waste all the advantages in 95 and NT? Develop 32-bit only and forget half the market? Hmmm, did I hear someone mention Java?

Third, I'd like better tools for troubleshooting OLE, ActiveX, COM, call it what you will. It's funny how quickly a Visual Basic 4.0 installation produces an "object server not correctly registered" message when you install custom controls. It means a registry problem and there's no easy way to fix it. This highlights a problem that will get worse if ActiveX continues to grow.



development, power and performance.

Word processing tools

Some months ago I mentioned a shareware product called WP Tools, a native Rich Text control for Delphi. On closer inspection, I am impressed. The feature list is good, with support for merge fields, graphics, tables and hyperlinks. The range of controls has a lightweight rich text label and a data-aware text box as well as the usual word processor, toolbar and status bar components. In tests, it has proved fairly reliable, though not entirely bug-free.

The advantage of WP Tools is that as a

native VCL supplied with source, you can track down bugs and amend the code if you can work out what is going wrong. Another benefit is richer functionality. You can access the data structures for both text and formatting, giving a fine degree of control. The Finder class offers sophisticated search and replace, including formatting properties. You can print to a canvas control in order to implement page preview.

Performance is good, on a par with rivals like Visual Writer, AllText and HighEdit. If you are developing for 16-bit Windows, a custom component is all but essential for

WP Tools is a fully-featured, shareware-rich text control for 16- or 32-bit Delphi

working with formatted text, while even in Windows 95 and NT it has advantages over the built-in rich text control.

There are problems. This is shareware, and the documentation is unclear. Advanced users need to be comfortable with such things as streaming and pointers, as WP Tools uses them extensively. To succeed with this product, you must be willing to pore over the source and not be put off by the odd mixture of English and German comments in the code. The extra effort and risk is rewarded by a product that works rather well.

•PCW Contacts

Tim Anderson welcomes your Visual Programming comments and tips. He can be contacted at the usual PCW address or as freer@cix.co.uk

Components listed below are available from:
 Contemporary Software 01344 873343; Grey Matter 01364 654100; and QBS 0181 956 8000.
 Sax Webster £110 for the 16- or 32-bit version (£175 for both), plus VAT.
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 FaxPlus £195 (plus VAT)
 Seagate Crystal Reports 5.0 Standard £199, Professional £299 (both plus VAT)
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GeoPoint 1.0 costs £195 (plus VAT) from Visual Components 01892 834343
 WP Tools is \$119 to register, available via CompuServe, or from the web at members.aol.com/JZIERSCH/wptools

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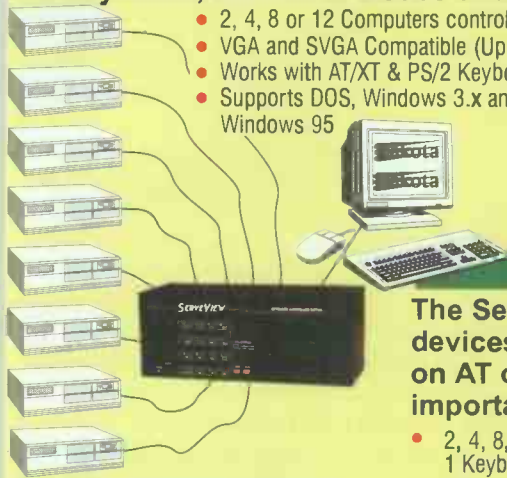
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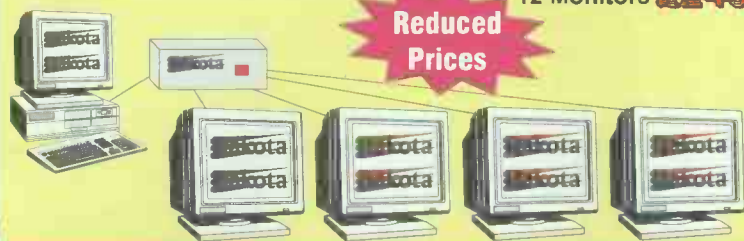
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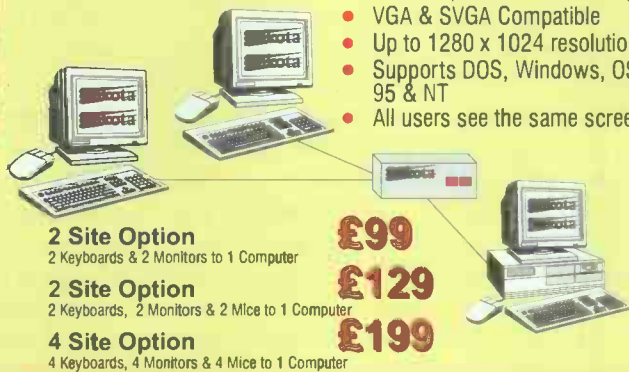
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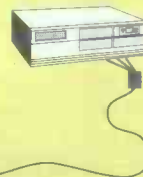
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Stack 'em high

Mark Baynes' new guide to networking terms begins with an explanation of the OSI stack: it puts the 'work' in networks.

Panic over! No sooner had the HP Colorado T4000-S tape drive arrived than I ran down to the shop and bought a TR-4 Travan mini cartridge. I slammed — sorry, I mean carefully installed — the T4000-S into my dodgy server, Palace Pier, and within a few minutes was happily backing up three years' work. Actually, when I say "slam", I mean fiddle around for 20 minutes or so.

The T4000-S comes as a kit with DOS, Windows 3.1 and Win95 software (for more details on the T4000-S see my review panel, page 328) but I wanted to run and install it on Palace Pier under NT Server 3.5. The network card on Palace Pier wasn't working so there was little point in installing the T4000-S on my PC, and even if the network card in Palace Pier was working, the T4000-S is a SCSI-2 device and, firstly, my PC isn't SCSI-enabled, and secondly, I didn't have a SCSI-2 card to make it so.

I first had to go to HP Colorado's web site to download the appropriate NT drivers. Having got these, I realised that I needed to upgrade the server firmware, and having

got the necessary utility from the same site, ran it and then installed the NT driver. Next, I used the standard backup facility, which comes with 3.51, to backup all my data files to the tape. I could then begin to breathe again and set about scrubbing the server hard disk, removing the T4000-S from Palace Pier and installing it into West Pier, then restoring the files from the tape to the server's hard disks so I had two copies.

There was still the problem with the network card on Palace Pier. Because the card had given me no trouble whatsoever for the last 18 months until, that is, I started faffing about with Palace Pier, I should have reasoned that the cause of the problem was Yours Truly. But I didn't. It wasn't until I was on the phone to technical support that I realised the cause of the problem was that I had somehow managed to set the interrupt for the card to 15 — which the on-board Adaptec SCSI rightfully wanted all to itself. Setting the card interrupt to 5 duly solved the problem and I was ready to install NT Server 4.0. At some point, I had managed to set the PCI configuration to its default

setting — pretty stupid really, so please don't tell anyone.

Even though I now have a tape drive in place, I still don't have a proper backup routine. I would prefer to get the tape drive out of any one network node and hang it directly off the wire. I have the same situation with my HP DeskJet 600 which has done sterling service in the last few months, printing off five 20,000-word dissertations without a glitch. At the moment, it is directly attached to my main PC which acts as a print server, but I would prefer to use a separate print server and be able to hang it straight off the network rather than having to attach it via another device. More on this next month.

Danger — philosophers at work

I am a great believer that people who are into the technicalities of computers and networks are rather like philosophers: although they quite often use terms they do not understand, they are still capable of having meaningful conversations; and because everyone thinks that everybody else *does* know what they are talking about, they are afraid to ask the really basic questions. The problem is that some people go on for years using terms which they cannot explain.

Working on this basis, I thought I would devote some time over the next few issues to explaining some of the really basic networking terms. If you are a real expert or just a plain smart-arse, you can devote your attention to other parts of *PCW*; but if there are gaps in your knowledge, read on. I will not attempt to give complete explanations of every networking term and concept, but I will do my best to provide enough information to provide you with a basic understanding which will hopefully improve both your theory and practice of networking.

OSI Seven-Layer Protocol

One of the most common terms that is bandied about, yet poorly misunderstood, is the dreaded OSI (Open System

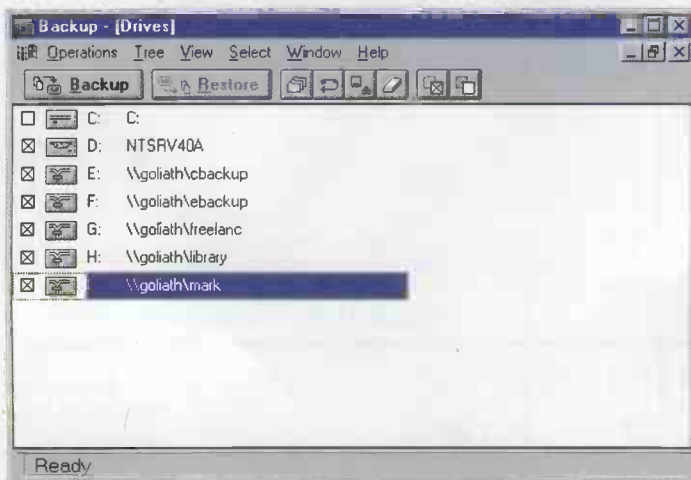


Fig 1
MS Backup is plain and simple but it does the job... just about

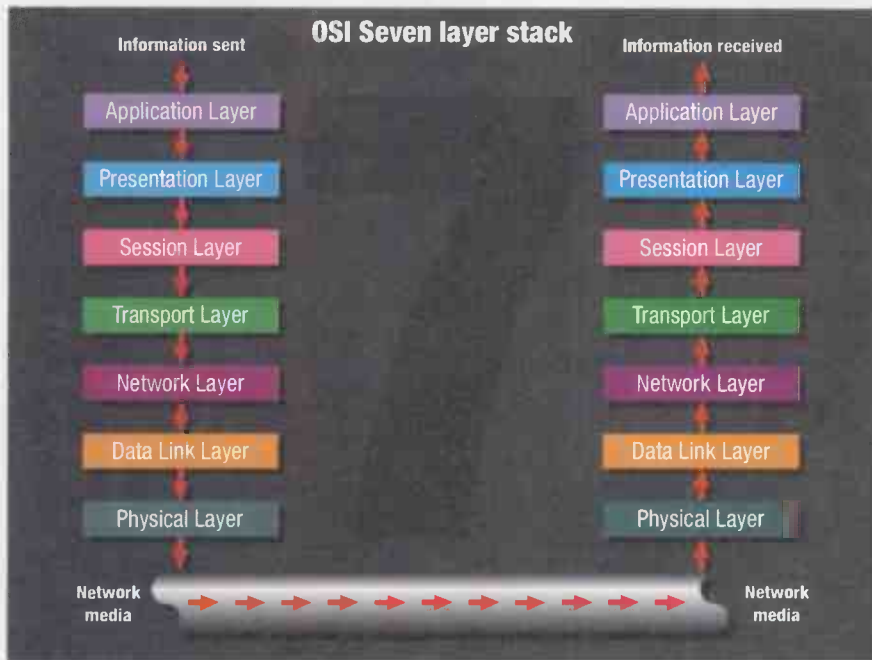


Fig 2 The OSI stack: if it didn't exist, we'd have to invent it

Interconnect) stack a.k.a. the OSI Seven-Layer Protocol defined by the ISO (International Standards Organisation). If you spend your days running and building LANs, you won't need to know a great deal about this. The simple fact is that without it, networks would not network. It is the most basic networking standard that allows one system to talk to another.

A developer, developing the latest and greatest networking widget in the sunshine state of California, knows their widget will work with the next latest and greatest networking device being built by a

developer working underneath a railway arch in Peckham because they will be designing them to work with the OSI stack.

Networking life would be much easier if every network used the same protocol but, in the networking industry, getting everyone to agree to using the same data-communications protocol would be like getting all the hardware manufacturers to agree on the same hardware architecture — impossible. The pragmatic alternative is to have a standard way of translating between different protocols and hence the OSI stack.

Standards Committees

■ American National Standards Institute (ANSI): members of ANSI are manufacturers, users and other organisations with an interest in standards. They devise stuff like ASCII (American Standard Code for Information Exchange). ANSI is a member of the International Standards Organisation (ISO).

■ Comité Consultatif Internationale de Télégraphique et Téléphonique (CCITT): an agency of the ITU whose members include telecommunications agencies, scientific and industrial organisations and the ISO. Some of its most well-known and commonly-used standards are the X series which is concerned with network interfaces and public networks like X.25 and X.400, and the V series which deals with telephone communications like V.21 and V.22 modem standards and such like.

■ Electronic Industries Association (EIA): members manufacture telecommunications and electronic equipment. The EIA is a member of ANSI and sets standards such as the much-loved RS-232.

■ Institute of Electrical and Electronics Engineers (IEEE): usually known as the "I triple E", its members are computing and engineering professionals and it is responsible for setting standards such as the 802 series for local area networking.

■ International Standards Organisation (ISO): international body whose members include other standards organisations and whose most important work in the computing and datacommunications field is on open systems, including the OSI stack.

■ National Institute of Standards and Technology (NIST): a US Government agency which develops a variety of standards, including the data encryption standard (DES).

p328 >

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HP Colorado T4000-S

Colorado Memory Systems is a division of Hewlett-Packard, hence the slightly confusing product name. The T4000-S comes as part of a kit which includes the tape drive itself (standard 5.25in size), four installation screws, and two installation disks with DOS, Windows 3.1

and Win95 software. There is a 66cm long SCSI cable, software and installation guides and, according to the blurb on the box, a free tape (which mine didn't have). The default SCSI ID setting is four but if you need to change this the manual shows you how to reset the jumpers on the drive. If the tape drive needs to be flagged as unterminated, you have to remove three sets of terminating resistors from beneath the rear of the drive, for which you will need a pair of needlenose pliers, then slide it into a spare bay in your PC or server, connect the power and SCSI cables and reboot. I discovered that once I had the correct NT 3.51 drivers installed, using the vanilla NT backup software was quite straightforward. NT 4.0 recognised the drive immediately and I encountered no problems with the T4000-S during the month that I carried out backups at least once a day.

Whether you install this tape drive on a networked PC or a server you will, of course, be able to back up data from right across the network. And, having a capacity of 4Gb uncompressed and 8Gb compressed, it should be able to cope with most small LANs. There are also external, dedicated network and parallel port versions of the T4000 available.

PCW Details

HP Colorado T4000-S

Price £321 (plus VAT)

Contact Hewlett-Packard 0990 474747

A good analogy for a data-communications protocol is a letter. Everyone knows that the agreed format for a letter is the address at the top (43 Acacia Avenue), the salutation (Dear Frank...), the main message (I want to thank you for...) followed by the signature (Yours faithfully...). This is a simple protocol, in the same way that you say "Hello" when you meet someone rather than when you are just about to leave them. Datacommunications protocols are set by standards committees (see the panel, "Standards Committees", on the previous page) who spend many a happy hour doing the boring work so our networks can talk to each other. Essentially, if the OSI stack did not exist, we would have to invent it.

Stack 'em high

Every layer in the OSI stack communicates directly only with those layers directly above and below it (Fig 2): the highest layers

dealing with user services and the lowest layer dealing with the physical nature of the transmission medium itself.

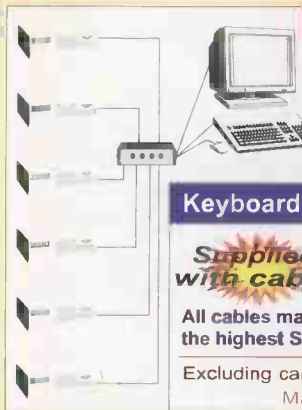
The seven layers of the OSI stack can be sub-divided into two groups, with the transport layer acting as a bridge between them. The application, presentation and session layers deal with end-to-end communications and are not bothered with the minutiae of the details of data transmission. The network, data link and physical layers at the bottom of the stack deal with the nitty-gritty of specific network communications, and the transport layer is the bridge between the two groups.

The OSI stack is a model and as such not all protocols adhere to it precisely, but it does provide a common reference model:

■ 7 Application Layer. This is not a user application (such as Word, Notes, and so on) but it does deal directly with applications in terms of providing services such as email and file transfer.

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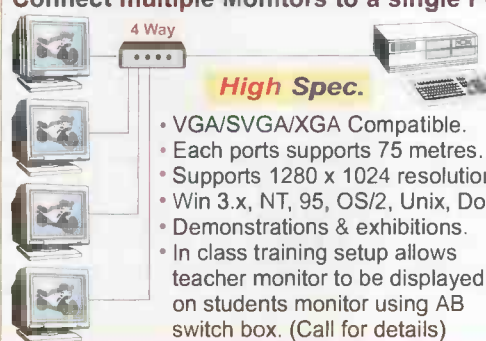
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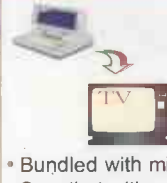
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Dear Santa...

I know you are getting on a bit now and you are very busy at this time of year, but do you remember what I wished for last Christmas? What I wanted was a cut in the cost of Basic Rate ISDN (also known as ISDN-2) installation by BT from a rip-off £400 down to something a bit more realistic so I could actually surf the net instead of doing doggie-paddle. Of course, I didn't want the cut in installation costs just for me and my friend up the road, but for the whole of mankind or anyone with a vested interest in networking in the UK. I reasoned that if the price of ISDN-2 was reasonable, loads of keen individuals and businesses would get it installed and it would really get the UK networking scene moving. Not just the business side of things but also stuff like community networks.

What did you get BT to do, you old duffer? Yeah, so they cut the prices of some ISDN-2 installations from £400 to £199 but then they put the cost of the rental up! What were you thinking of? I know that, at BT, those in charge of ISDN have their Christmas wish lists as well, but as I got mine in early (around February if I remember rightly) I thought I would get priority treatment. I did leave you those really nice sandwiches and that glass of sweet sherry out on Christmas Eve. By the way, sorry about leaving the fire blazing away in the grate.

So this year, I want broadband modems for every house in the land. Yep, more bandwidth than you can shake a stick at, for everyone, right into their home via their cable television set-up. If you can do this, then within a few months most families will be interacting with each other in real time and putting their holiday videos up on the web for everybody else to see. Now wouldn't that be interesting?

At the moment, the craze is for 33.6Kbits/sec modems, the trouble with this being that a 28.8Kbits/sec modem is pushing the capacity of an ordinary telephone line to the limit so buying a 33Kbits/sec version is pretty much a waste of money. However, if you ask BT nicely it will tweak your line for you. Broadband modems, on the other hand, can shove huge amounts of data around: a cable modem can do 30Mbits/sec, while ADSL (Asymmetric Digital Subscriber Line) modems using the telephone lines can do 9Mbits/sec which is still pretty quick. The trouble is, there is no point in you delivering a neat little black box to everybody on Christmas Day if the communications infrastructure isn't there to support it. But when it is, just think — neighbourhood pitted against neighbourhood in the ultimate game of Quake!



■ 6 Presentation Layer. Carries out formatting and security tasks. The presentation layer at one end of a secure file transfer would encrypt data while the presentation layer at the other end would decrypt it with the user being unaware this was happening.

■ 5 Session Layer. Deals with starting, maintaining and stopping sessions between network nodes, especially synchronisation of sessions and error recovery.

■ 4 Transport Layer. Lowest layer that deals with communications — the three layers below deal with the network itself.

Sorts out which particular way to transport data and packet transmission.

■ 3 Network Layer. This sorts out routing strategies. It is fundamental to the efficient working of complex topologies as it works out the best route through the system.

■ 2 Data Link Layer. Uses error detection and correction techniques to ensure that transmissions between network nodes are error-free either by correcting the error or requesting a new transmission.

■ 1 Physical Layer. The lowest layer needs to know the physical nature of the transmission media. For example, is this communication being transmitted over copper or fibre-optic? Sends and receives bits without comprehension of their validity and passes them up to the Data Link Layer.

Bandwidth on demand?

I have finally taken the plunge and allowed BT onto the premises to install my ISDN-2 line. Sod's Law says it looks like I will have to lift up the floorboards in the living room again to run the cable through to my study, but fortunately, the fact that I cannot afford a new carpet yet means that I will just have to shove a couple of rugs out of the way. Will ISDN-2 be worth it? Will my ISP be able to satisfy my insatiable bandwidth demands? Does anyone care apart from me?

PCW Contacts

Mark Baynes is a web developer and IT journalist based in Brighton. He can be contacted as markb@pavilion.co.uk

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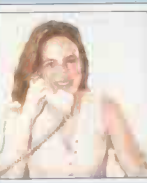
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Lying in **wait**

Howard Oakley remains laserless and disillusioned with Apple shipping delays, so to cheer himself up he considers buying a colour scanner. Plus, top ten SCSI tips.

It is frustrating when a product is available yet for the lack of something simple, it cannot ship. Last month, I was still waiting for my new Apple LaserWriter 12/640PS duplex printer, which was to have been delivered imminently. I am still waiting. The delay seems to be because there is no 500-page sheet feeder — a few bits of plastic which condemn me to plod on with my old and highly simplex LaserWriter II.

Similarly, Apple promised many of us its Apple Internet Connection Kit as recompense for the demise of eWorld last spring. Although I have seen and touched this product in the USA, the closest I've come to it here is a series of apologetic letters promising its eventual arrival and tempting me with web sites which I already know, from my long-standing use of the internet, to be overused and choked. A few copies of version 1.0 of the Kits were distributed to dealers but the production run was quickly terminated. I now await version 1.1.5, which is promised for delivery in a few days' time.

System 7.5.5

Apple has been skipping version numbers a lot recently, a worrying trend. Not only has the near-legendary Internet Connection Kit mysteriously leapt from 1.0 to 1.1.5, but we are now being tempted to upgrade from System 7.5.3r2 to 7.5.5, missing an ill-fated 7.5.4. Needless to say, our friends in the US (we should admire their fortitude as beta-testers for later European versions) have been reporting many bugs and incompatibilities, including an accepted inadequacy in the size of the Finder's heap allocation. Thankfully, John Brisbin has

Software support for the Agfa Arcus II scanner is nicely integrated into Adobe Photoshop, and supports professional-quality colour management



produced a control panel, prosaically called "Finder Heap Fix 1.0.1", which fixes this, so if you are brave enough to make the leap to 7.5.5, only to discover the Finder whingeing about there being insufficient memory, download this from an internet archive or CompuServe and rejoice for John's kindness in the face of Apple's myopia.

Although 7.5.5 does have some incremental improvements, including LaserWriter 8.4 and Apple's first serious attempt at high-performance virtual memory I might, for once, watch the dust settle a bit before upgrading.

System 7.6, and 8.0?

News of Mac OS 8 is more encouraging now. System 7.6, internal codename "Harmony", looks due to ship in January, the next step on the long road to OS 8.

What is certain is that it will not incorporate the new customisable human

interface which has been so widely touted since we first got to learn of "Copland". Apple has justly taken great pride in the Mac's human interface, in spite of gathering criticism that it is now old-fashioned and less rich than other, more recent, pretenders. Rather than betraying its principles, it has now decided to hand over power to the user. Knowing, from meticulous experimental work, that clean and impeccably-designed interfaces are most productive, it is giving us the choice of whatever else we want. This is accomplished by the user setting preferences which then become their personal flavour for the interface.

When we can finally enjoy Mac OS 8 in its fullness, we will be able to make it look and behave more like Windows (of 3.x or 95, if not 97, variety), any of the range of Unix windowing front-ends, or whatever. Controls should extend beyond mere

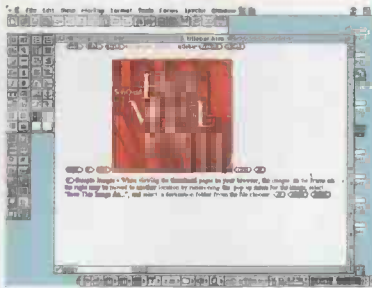
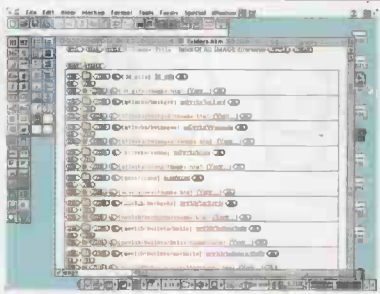
Dear Santa...



Top of this year's Christmas wish-list are those products for which I am still waiting: the Apple LaserWriter 12/640PS duplex printer, Internet Connection Kit and a faster Newton with a larger screen. The last is perhaps the most important as my old MessagePad is rapidly turning into a dead end: given more poke, a screen on which I can write and see more words and do useful sketches, it may be less pocketable, but it will be certainly more useful.

Next (but not first, because of its impossibility) is Mac OS 8. Not for its features but as tangible proof that, in the end, Apple can deliver. To go with it, there should be a sensitive port (to run native on the Power Mac) of Microsoft Word 4 and Excel 4. Both versions had achieved the zenith of their usability, providing good compromises with raw features. But now Word 6 torments me by seemingly being unable to select portions of words, often forcing me to resort to the delete key when the mouse could have done it better. Excel 5 is little better, turning graph production from a couple of mouse motions into an animated display of dialogue drama.

Above all else, I would love to come downstairs on Christmas day to find a really good WYSIWYG web page editor: something technically brilliant like HoTMetaL Pro, with its extensibility and parsing potential, but which provided consistent tools for the direct manipulation of tables, frames and graphics. It is a sad indictment of the software industry that no-one has yet achieved this relatively easy goal despite more than ten years experience developing pre-press applications. Adobe's new version of PageMill promises to be a big step forward, but beta versions have had a rough and inconsistent interface and cannot be extended to cope with future enhancements to HTML. What we have to do now is comparable to having to embed raw PostScript in documents to be printed — quite unconscionable.



SoftQuad's HoTMetaL Pro 3 is a technically excellent web page editor but has not reached full WYSIWYG standard

Ten Top SCSI Tips

1. Put a terminator at the far end of your SCSI chain. If the chain is short, it may work better without an external terminator.
2. Avoid using internally-terminated devices.
3. Check that all devices have IDs set between 1 & 6, and that none are duplicated.
4. Keep all cable lengths as short as possible.
5. Use only the highest-quality SCSI cables.
6. Make sure that all connections are home and secure before starting anything up.
7. Never connect or disconnect SCSI devices when any device is turned on.
8. Turn on all peripheral devices first and let them run up to speed before starting up your Macintosh.
9. Shut down your Mac first, before turning each SCSI device off in turn.
10. Keep a copy of SCSI Probe handy in case of problems.

Cheap programming

Macs have always attracted new and experimental programming languages, including Object Pascal (designed for Apple by Wirth) and the purely visual language Prograph (early 68K versions are now free).

There is no shortage of free or nearly-free development systems to enable enthusiasts to start creating their own programs. Among my current favourites are Concurrent Clean and Python. Concurrent Clean is a functional language with an impressive academic pedigree. It is remarkably efficient as far as functional languages go, and to demonstrate this a full-featured spreadsheet and nifty text editor have been written in Clean.

Python enables fuller access in a more conventional syntax (not unlike C) with objects, modules and more. Being interpreted, it is not quick, particularly when crunching numbers, but for this there are specialist mathematical languages, including MuPAD from the University of Paderborn which I will report on subsequently.

PCW Contacts

Howard Oakley loves to hear from Mac users. He can be contacted via the usual PCW address or on email as howard@quercus.demon.co.uk or hoakley@cix.compulink.co.uk

Apple Computer 0181 569 1199;
web home pages www.apple.com and www.euro.apple.com

System 7.5.5 is available as an update to 7.5.3 from www.support.apple.com.

Agfa Arcus II scanners (around £1,700);
Agfa 0181 231 4200

Concurrent Clean from ftp.cs.kun.nl/pub/clean

Python from ftp.python.org/pub

HoTMetaL Pro 3 from SoftQuad 0181 387 4110

appearance, but include some of the features currently offered in At Ease, for instance. A range of standard flavours, intended to start different types of user on their personal quest for GUI nirvana, should provide ideas.

Scan and SCSI

Having been prevented from enjoying my first duplex printer, I had urgent need of a good colour scanner, and was tempted into buying (a novel concept, perhaps) an Agfa Arcus II flatbed model. Not only is this a capable beast which makes my old greyscale OneScanner look like an ageing toy, but it also reminded me of the vagaries of the SCSI standard and the black art required to successfully install a new device.

At first, I hooked it up to the external SCSI bus of my Power Mac 9500 as the sole device. As Agfa provides only one Centronics-type SCSI connector on the Arcus, I placed a terminator between the cable and the scanner: a standard way of ensuring that the bus was correctly terminated at both ends. The 9500 took grave exception to this. Although it powered

up perfectly, the auto-sensing AppleVision 1710 monitor decided that there was no video signal, and refused to turn on.

Driving a Mac without a mouse can be tricky, but when you cannot see the screen at all it is a true test of ingenuity. I could hear the rattling of drives as various extensions were loaded, including FWB's rumbling hard disk callisthenics. Then all went quiet, as the invisible desktop awaited my command while I wondered what to do next. If I shut the power off, I would risk damaging the contents of my hard disks and would almost certainly have to wait for hidden files to be rebuilt when I restarted. So I pressed the Power key which, in my mind's eye, I saw displaying an (invisible) dialogue, in which the default button produced an orderly shut-down. Pressing Return, it was a relief to hear the disks whine down as the Power Mac powered down, in perfect order.

The answer to getting the scanner to work was to remove the terminator and allow it time to complete its power-on self-test routines before turning the computer on. Well, it's reasonably standard, I suppose.

The initial Welcome screen appears and examines your system for the required amount of hard disk space. If you don't have enough, the installation will let you know early on in the process.

It's a good idea to install Windows 95 directly over your previous Windows installation unless you have vast amounts of spare hard disk space. That way, your existing applications will be set up and ready to use from Windows 95 when you've completed the installation. If you install Windows 95 in a separate directory, you will have to reinstall all of your applications before you can get started.

During the installation you will be asked if you want to save your existing system files. I'd strongly recommend that you answer "yes" to this as it makes the whole installation process reversible. Your old system files will take up about 6Mb of valuable space on your hard disk, which seems extravagant but is well worth doing. If Windows 95 fails to install correctly, you can get your Windows 3.1 system back — if it installs OK, then you can delete the 6Mb of system files.

Interface enhancements

The Windows 95 interface takes some getting used to and feels quite awkward at first. The Program Manager no longer exists and the File Manager has been replaced by the "Windows Explorer". When you Alt+Tab to move between applications, a box appears in the middle of the screen showing icons for all the applications you have open but you can't move back to the Program Manager to start up a new program because it doesn't exist anymore.

In Windows 95, everything hinges on the "Start" button on the Task bar. This gives you access to all the applications and utilities on your system via a series of menus. When you install a new application it is automatically added to the menu list.

The desktop is less cluttered in Windows 95 than in previous versions and the interface design is based on thousands of hours of usability testing and careful analysis of the tasks which all kinds of users perform. When you minimise applications, they sit on the Task Bar at the bottom of the screen so you always know exactly which applications you are running at any one time. The combination of the Start button and the Taskbar gives quick access to most common operations.

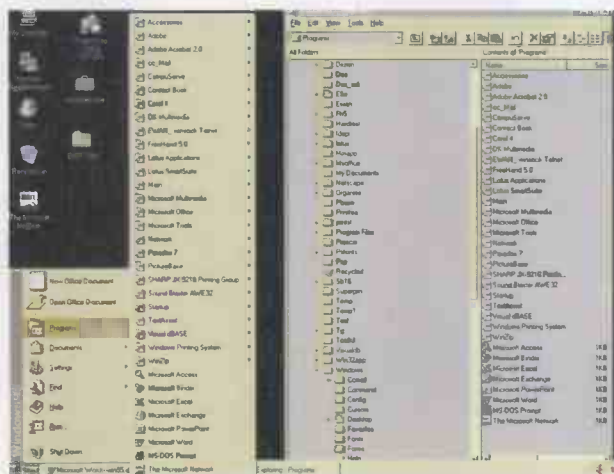
Here are a few tips which will help you to

Is Windows 95 a better operating system?

On the whole, the improvements incorporated into Windows 95 make it a more usable, more stable and more fully-featured OS. Two things you will benefit from straight away 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 and this can cause the entire OS to crash.

Ideally each application should be run in its own independent session, or VM, where it is protected from other applications and does not jeopardise the OS itself. When an application fails, the effect of the failure should be limited to the session in which it is running. Effectively, what VMs do is 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 and this 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.



Here you can see that the files and folders showing in the Start Menu folder in the Windows directory are mirrored in the menu itself. So, you can edit the menu directly from Explorer

Go into the Display option in the Control Panel to control the colours, screensavers and wallpaper.

find your way around:

- Press F1 at any time to go into the Windows 95 Help system. This will display information which is relevant to your location on the desktop. You can also search the help system index for any subject area if you want a comprehensive explanation or a step-by-step list of instructions.
- Right-click on everything. The right mouse button is used extensively all around the desktop of Windows 95. If you're not sure what something does, right-click on it and you should find out by way of a menu or information box. Look out for the Properties option on menus as this allows you to change the appearance of objects on the desktop.
- Experiment with your desktop. The Task Bar can be dragged and dropped to any side of the screen, and you can force it to hide by clicking the Auto-hide check box.

but don't bother with the Taskbar settings dialogue box. Instead, open up Explorer and take a look in the Start Menu folder in the Windows directory. All files and folders listed here are mirrored on the actual Start Menu. You can add new program icons to the menu simply by dragging and dropping.

Make use of shortcuts. Shortcuts provide a way of accessing an application, document or drive from the desktop without having to manually root around for it. All you need to do is drag and drop the executable file onto the desktop or right-click on the desktop and select New, ShortCut, and then Browse to find the file.

PCW Contacts

Eleanor Turton-Hill welcomes feedback and suggestions from readers. She can be contacted at ellie@vnu.co.uk

No-nonsense Buyer's Guide



Buying a **PC**

The one universal rule is that PCs get cheaper, better and faster all the time. The result is that your state-of-the-art PC can become outdated and old-fashioned in a couple of years. It may still work perfectly well, but it probably won't run very fast and won't run the latest software. If you're just planning to do simple word processing, this may not matter. But we're assuming here that you want to buy a general-purpose multimedia PC that can play games, use CD-ROMs and run a range of modern software.

Buying Don'ts

- Don't buy a machine with less than 16Mb of memory if you plan to run Windows 95.
- Avoid cheap 14in monitors.
- Bundled 14.4kb/sec modems are not the bargain they seem. Opt for 28.8kb/sec or one of the new 33.6kb/sec modems when they become available.

Buying Do's

- You can never have too much disk space. Spend extra cash on buying the next largest hard disk size.
- Make sure that Pentium motherboards have an Intel Triton chipset.
- Check the warranty. Is it for on-site or back-to-base repairs? If it's on-site, does the manufacturer offer guaranteed response times?
- Check the technical support. Is it free? Is it

easy to contact?

- For home use, you'll probably want full multimedia capabilities to enable you to use CD-ROM games and edutainment products and play video clips. This should include at least a 16-bit SoundBlaster-compatible sound card and speakers.
- Think about ordering more memory. RAM prices are low at the moment but creeping up — you can pick up 16Mb of EDO RAM for around £100 or less. Upgrading memory to 32Mb is also the quickest way to improve the performance of your machine — often more so than upgrading your processor.
- Look at the software bundle. If you want an office suite, it is far cheaper to buy it as part of the bundle. Larger manufacturers can offer MS Office, for example, at about one third of the RRP. Multimedia CD-ROM bundles will not include the UK version of Encarta '96 — Microsoft only allows the US version to be bundled.

Other things to consider

PCs have become similar in the last few years. The days when smallish computer companies designed their own chipsets (the chips that

assist the computer's main processor) are long gone. Most small box-shifters buy their motherboards from Taiwanese manufacturers. Larger companies either design motherboards themselves (Apricot, Compaq, IBM) or get motherboards built by other companies to their specifications (Gateway).

Most manufacturers now use Intel Triton II chipsets: either 430HX or 430VX. The HX chipset is reckoned to be better for office applications and is optimised to work well with large arrays of EDO RAM. The VX chipset works best with multimedia applications and SDRAM.

Cyrix chips are worth considering. Their 6x86 chips, such as the P133+, are often cheaper and give better performance than their Intel counterparts.

If you are serious about multimedia, it may be worth upgrading your soundcard to a 16-bit wavetable card. A six-speed CD-ROM drive will give you a noticeable performance gain over a quad-speed, but the speed increase of an eight-speed over a six-speed is less tangible. Remember that

For up-to-date PC reviews, see our cover story, this issue.

unlike your hi-fi setup, good speakers are powered from the mains, not from your PC.

•PCW Minimum specification

This is the absolute minimum spec we think you should consider if you're buying a new PC. It's suitable for general business use: word processing, databases and spreadsheets and, with the addition of a modem, for accessing the internet.

- Windows 95
- 100MHz Pentium processor
- 16Mb RAM
- Graphics card with 1Mb of memory
- 810Mb hard disk
- 3.5in floppy disk drive
- Quad-speed CD-ROM drive
- 14in colour monitor
- PCI local bus

•PCW Recommended specification

If you're not completely strapped for cash, this is the PC specification we recommend. No-one who works at PCW would settle for less.

- Windows 95/Windows NT 4.0
- Pentium 133MHz processor (a fast processor will make your computer run quicker and more smoothly)
- 256Kb secondary cache (again, this makes your computer run faster)
- 32Mb EDO RAM. 32Mb of memory speeds your PC up a lot, particularly if you're multitasking (using more than one application simultaneously)
- Graphics card with 2Mb of memory
- 2Gb hard disk — modern computer software takes up a lot of space
- 3.5in floppy disk drive
- Six-speed CD-ROM drive (video clips will play more smoothly; you will be able to access files on CD-ROM disks more quickly)
- 15in colour monitor (significantly easier on the eyes than a 14in version)
- 16-bit SoundBlaster-compatible soundcard
- Speakers
- PCI local bus

•PCW Best specification

Our Best Spec is as good a PC as you are likely to need for most software. For some specialist applications, like professional DTP or CAD, you may need to add even more memory, a bigger hard disk, a more powerful graphics card, or a larger monitor.

- Windows 95 or Windows NT4.0
- Pentium 200MHz
- 512Kb secondary cache
- 32Mb EDO memory
- 4Gb hard disk
- 3.5in floppy disk drive
- Eight-speed CD-ROM drive
- 17in colour monitor
- 4Mb VRAM or WRAM graphics card (this means your graphics card can display more colours and a higher resolution on your monitor: 16 million colours at a resolution of up to 1,280 x 1,024)
- 16-bit wavetable soundcard
- Quality speakers
- PCI local bus

Buying a Notebook



Notebooks are one area in which it's often safer to stick to brand names. Not that some of the Far Eastern kit doesn't work perfectly well, but reliability seems to be a problem and it can be fiendishly difficult to obtain spares. A useful guideline when choosing a notebook is: try before you buy.

Remember that standard notebook specifications are generally a step or two behind the desktop equivalents.

What to look for in a notebook

■ **Pointing device** There's been a wholesale move from trackballs to trackpads. Some notebooks, notably IBM Thinkpads, use stick technology (a device which looks like the rubber on top of a pencil and is controlled using one finger).

■ **CD-ROM drives** are rapidly becoming standard in notebooks. If your notebook is going to be your only machine, it's worth getting one.

■ **Floppy disk drive** Often there's a choice between a CD-ROM drive and a floppy disk drive. Again, if the notebook is to be your only machine, specify both. Otherwise, reinstalling an operating system can mean returning the machine to the manufacturer.

■ **PC Cards** Modern notebooks all have at least one PC Card slot. They take credit-card-sized expansion cards which can add a fax-modem, a network interface card or even an extra hard disk to your computer.

■ **Battery life** Battery life varies from as little as 30 minutes to over six hours. Lithium Ion and Nickel Metal Hydride batteries have now replaced the older NiCad (Nickel Cadmium) batteries.

■ **TFT screens** TFT or active matrix screens are replacing the slower dual-scan or passive matrix screens. It means the screen image is refreshed far quicker.

■ **Warranty** Drop a notebook and it may break, so it is vital to check the terms of your warranty. How long is it? What level of service is provided?

•PCW Minimum specification

Notebooks change rapidly. It's often possible to pick up end-of-line machines with 486 processors from brand-name manufacturers such as Toshiba and Compaq at discounted prices of £1,000 or less. These can be a very good buy. Just make sure they can run the software you need to use.

•PCW Recommended specification

- Windows 95
- Pentium
- Quad-speed CD-ROM drive
- 256Kb secondary cache
- 16Mb RAM
- On-board graphics with 1Mb of memory, PCI local bus
- 850Mb hard disk, 3.5in floppy disk drive and/or dual-speed CD-ROM drive
- TFT 800 x 600 screen

•PCW Best specification

The state-of-the-art notebook: either you're loaded, or your company's picking up the tab.

- Windows 95 or Windows NT
- Pentium
- 256Kb secondary cache
- 32Mb RAM
- On-board graphics with 2Mb of VRAM memory, PCI local bus
- 1.2Gb hard disk
- 3.5in floppy disk drive
- Quad-speed CD-ROM drive
- Active matrix 1,024 x 768 TFT screen
- Long battery life

Glossary of Computing:

Important terms and acronyms

A

Access time

The time it takes for a device to access data. The access time, quoted in milliseconds (ms) for hard disks and nanoseconds (ns) for memory, is usually an average as it can vary greatly. Together with the transfer rate, it is used to gauge the performance of hard disks and other devices. The lower the number, the better the performance.

Applications

An application, or package, is one or more programs used for a particular task. For example: word processing, invoicing or spreadsheeting. Applications are bought shrink-wrapped (wrapped in cellophane for general use) or custom-built for more specific uses.

ASCII (American Standard Code for Information Interchange)

Usually a synonym for plain text without any formatting (for example: italics, bold or hidden text). Since computers naturally use binary rather than Roman characters, text has to be converted into binary in order for the processor to understand it. ASCII assigns binary values to Roman characters. RTF, a Microsoft standard, adds extra formatting features to plain ASCII.

B

Backwards compatible

Compatibility of hardware or software to older versions of the product or standard.

Baud rate

The amount of data that can be sent along a communications channel every second. In common usage, it is often confused with bits per second. These days modem speeds are normally measured in bits per second. (See V* and Bit).

BIOS

Basic Input/Output System. Software routines that let your computer address other devices like the keyboard, monitor and disk drives.

Bit

Binary digit, the basic binary unit for storing data. It can either be 0 or 1. A Kilobit (Kbit) is 210 (1,024 bits); and a Megabit is 220, which is just over a million bits. These units are often used for data transmission. For data storage, Megabytes are more generally used. A Megabyte (Mb) is 1,024 kilobytes (Kb) and a

Kb is 1,024 bytes. A Gigabyte (Gb) is 1,024Mb. A byte (binary digit eight) is composed of eight bits.

Bug (See Crash)

Boot

Short for bootstrap. Refers to the process when a computer loads its operating system into memory. Reboot means to restart your computer after a crash, either with a warm reboot (where you press Ctrl Alt Del) or a cold reboot, where you switch the computer off and back on again.

Bus

A "data highway", which transports data from the processor to whatever component it wants to talk to. There are many different kinds of bus, including ISA, EISA, MCA, and local bus (PCI and VL-bus).

C

Cache (See Memory)

COAST

Cache On A Stick.

CD-ROM

A CD-ROM is the same as a normal audio CD, except it can store data as well as sounds. A CD-ROM player can be attached to your computer to read information from the CD-ROM into the computer's memory in the same way that a domestic CD player reads information from the CD into your hi-fi. The advantage of distributing information on CD-ROM rather than other media is that each one can hold up to 680Mb of data — equivalent to some 485 high-density 3.5in floppy disks. The disadvantage, however, is that you can only write once on CD-ROMs, yet this makes them ideal for archiving.

CISC (See RISC)

CPU

Central processing unit. Normally refers to the main processor or chip inside a PC. (See Processor).

Crash

Common term for when your computer freezes. Can be caused by a power surge, a bug (which is a fault in software), or a GPF.

D

DRAM (See Memory)

DOS (Disk Operating System)

Once the standard operating system for PCs, it is now being replaced by Windows 95 and Windows NT.

DPI (Dots Per Inch)

Common measure of the resolution on a printer, a scanner or a display.

Drive controller card

An expansion card that interprets commands between the processor and the disk drives.

Drivers

Pieces of software that "drive" a peripheral. They interpret between the computer and a device such as a CD-ROM. If you have a SCSI CD-ROM drive connected, you will be able to use it on a PC or a Mac just by loading up the relevant driver on each machine.

E

EIDE (See IDE)

EISA (Extended Industry Standard Architecture)

A bus standard designed to compete with MCA. Now being replaced by PCI.

Electronic mail (E-mail, email)

Still the biggest single use of the internet. When you sign up with an ISP you are given an email address. Usually you can incorporate your name, or part of it, into your email address to make it easy to remember.

Expansion card

Circuit boards that fit inside PCs to provide extra functionality. For example, one might be an internal modem, providing the same functions as an external version (which is more common) but sitting inside the PC. Expansion cards are designed to be fitted and removed by people with little knowledge of PCs.

F

Floppy disk drive

Practically all PCs come with a floppy disk drive. 3.5in HD (high density) 1.44Mb floppy disks are now the standard. They come in hard plastic cases and have replaced the older, literally floppy, 5.25in disks.

Fonts

A font is an alphabet designed in a particular style. Fonts apply to both screen and printed letters. TrueType and Type 1 fonts are stored as shape descriptions, scalable to any size.

Format

To wipe a floppy or hard disk in order to prepare it to accept data.

G

GPF

General protection fault.

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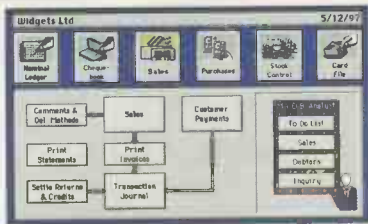
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Changeable Opening Balances	✓	✗	✗	✓	✓	✗	✗
Full Form Customisation	✓	Limited	✗	✓	Limited	Limited	Extra £
Contact Management	✓	✗	✗	✗	✗	✗	✗
No. of Template Files	100	1	3	1	20	0	1
Navigation Flowchart	✓	✗	✗	✗	✗	✗	✗
Different Buy & Sell Measurements	✓	✗	✗	✗	✗	✗	✗
Automatic Backorder Processing	✓	✗	✗	✗	✗	✗	✗
Realtime Postings	✓	✗	✗	✗	✓	✓	✓
Job Costing with Budgets	✓	✗	✗	✗	✓	Limited	✗
Track Reimbursable Expenses	✓	✗	✗	✗	✓	✗	✗
Enter Payments on Invoices	✓	✓	✗	✓	✓	✓	✓
MSRP*	£195.00	£649.00	£550.00**	£349.00	£99.00	£395.00	£395.00†

*Retail price comparison correct as of November 1st 1996 **as at 1/9/96 †Basic package - £100 per extra module

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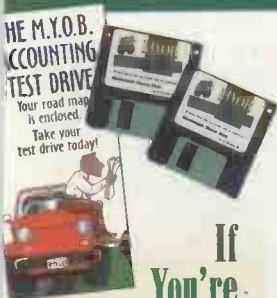
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12PCWB1

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Graphics card

An expansion card that interprets commands from the processor to the monitor. If you want a better, higher-resolution picture or more than your existing setup, you'll need to change your graphics card and/or your monitor.

GUI (Graphical User Interface)

(See Windows)

H**Hard disk**

Sometimes called a fixed disk, hard disks are hermetically-sealed rigid disks able to store data and programs. Disk capacities increase all the time. The standard is now 1Gb but disks of up to 9Gb are available.

Hardware

All electronic components of a computer system, including peripherals, circuit boards and input/output devices.

HTML (Hypertext mark-up language)

The standard language used in the creation of web pages, that can be read by web browsers.

I**IBM-compatible**

Originally meant any PC compatible with DOS. Now tends to mean any PC with an Intel or compatible processor capable of running DOS or Windows.

IDE

Integrated drive electronics. A control system designed to allow computer and device to communicate. Once the standard for PC hard disks, now being replaced by EIDE (enhanced IDE) which offers improved performance and extra features.

INTERNET

Millions of computers interconnected in a global network.

INTERNET SERVICE PROVIDER

ISPs provide access to the internet. You use your modem to dial the ISP's modem. The ISP has a high-bandwidth permanent connection to the internet.

IRDA

Infra-Red Data Association — the standard for exchanging data using infra-red, typically from PDAs or notebooks to a PC or printer.

ISA (Industry Standard Architecture)

This was the original bus architecture on 286 PCs. Also known as the AT bus (the 286 was known as the AT), it is still in use today. Slow by modern standards, but so widely accepted that expansion cards are still made for it. (See EISA, PCI).

ISDN (Integrated Services Digital Network)

A digital voice and data telephone network which looks set to replace the current analogue version. ISDN adaptors are already starting to replace modems as a fast way of accessing the internet and transferring data.

J

JPEG (See MPEG)

K**Kbit (kilobit), Kb (kilobyte)**

(See Bit)

L**LAN (Local Area Network)**

(See Network)

Local Bus

PCI (Peripheral Component Interconnect), developed by Intel, is now the standard for local bus architecture. It is faster than the older VL-Bus (Video Electronic Standards Association local bus) it replaces.

M**Macintosh (Mac)**

A personal computer made by Apple and which is incompatible with PCs. Developed as a rival standard, its operating system looks like Windows, except that it pre-dates it and (in some people's view) looks and works much better.

Maths co-processor

A specialised chip that handles mathematical calculations (floating point operations) for the processor. Modern processors such as the Pentium have a co-processor built into them.

Mbit (megabit) (See Bit)**Mb (megabyte) (See Bit)****MCA**

A type of bus designed by IBM to beat EISA. Although faster, it never became popular because every machine that used it had to pay a royalty to IBM, and because it was not backwards-compatible with ISA.

MPEG (Moving Picture Expert Group)

A standard for compressing video available in several flavours: MPEG 1, MPEG 2, MPEG 4. JPEG (Joint Photographic Expert Group) is a standard for still image compression.

Memory

The term normally refers to RAM (Random Access Memory). This is the kind that disappears when you turn off your computer and is much faster to access than a hard disk. It acts as a staging post between your computer's hard disk and its main processor.

- DRAM (Dynamic Random Access Memory) This requires its contents to be replaced every 1/1000th of a second and is the most common form of memory in PCs.

- SRAM (StaticRAM)

Retains memory until the power is switched off.

- VRAM (VideoRAM)

Faster than DRAM, this is used by graphics cards.

- EDO (Extended Data Out RAM)

The latest type of memory. Offers improved performance.

Cache memory

Temporary memory set aside to store the information that is accessed most frequently. The Pentium processor has 8Kb of inbuilt cache. This can be further speeded up by a secondary cache, typically 256Kb. Part of your DRAM is often used to cache your hard disk.

ROM (Read-Only Memory)

A type of memory which can only be read: you

can't make changes to it as you can to RAM. It is commonly used for things that will never need to be changed, such as the information the computer requires when you start it up.

Modem

The word is a contracted version of "modulator/demodulator", which means that a modem is a box (or, less commonly, an expansion card) that lets your computer talk over phone lines to other computers.

Monitor

Your computer's screen. Signals are sent to it from the video card.

Motherboard

The main printed circuit board which houses processor, memory and other components.

N**Network**

A network is a group of computers linked together with cable. The most common form is a LAN (Local Area Network), where electronic mail and other files can be exchanged between users without swapping floppy disks. Printers and other resources can be shared. All the PCs on a LAN are connected to one server, a powerful PC with a large hard disk that can be shared by everyone.

O**OS (Operating System)**

The operating system communicates with the hardware and provides services and utilities to applications while they run, such as saving and retrieving files.

P

Package (See Application)

PC Card

Formerly PCMCIA. A standard to allow PCs, particularly notebooks, to be expanded using credit-card sized cards.

PDA (Personal Digital Assistant)

Small electronic organisers. The Psion 3a is a typical example.

PCI (See Local bus)

PCMCIA (See PC cards)

Parallel ports

Used by your PC to communicate with the outside world, usually via a printer. Information can travel in parallel along a series of lines, making it faster than serial ports which can only handle one piece of information at a time.

Pixel

Picture element. The smallest possible addressable dot displayed on a monitor.

PowerPC

This family of RISC chips is the result of a collaboration between IBM, Apple and Motorola. It is now used in all Apple Macintosh computers and many IBM workstations.

Processor

The chip that does most of a computer's work.

Programs (See Applications)

Public domain

Software that is absolutely free. The author usually retains copyright but you can make as many copies as you want and pass them to other people. Public domain software often



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consists of small utilities which the author feels might be useful to other people. It is often confused with shareware.

Q

QWERTY

The name of a standard English-language keyboard, derived from the first six letters in the top row. The French equivalent is AZERTY.

R

RAM (Random Access Memory)

(See Memory)

Reboot

(see Boot)

RISC (Reduced Instruction Set Computing)

These are starting to replace CISC (Complex Instruction Set Computing), as they're usually faster. The PowerPC chip is a typical example.

ROM (Read Only Memory) (See Memory)

RTF (Rich Text Format) (See ASCII)

S

SCSI

Small Computer System Interface is a bus that comes as standard in a Macintosh and is starting to rival EIDE on PCs.

Serial port

The serial port, of which there are sometimes two (com1 and com2) is used by your PC to communicate with the outside world. Serial ports are mostly used by modems and similar devices which communicate quite slowly. Some mice use them. Faster communications are achieved via the parallel port.

Shareware

A method of distributing software which is often used by smaller programmers rather than big software houses. It is freely available,

but not free of charge. You are honour-bound to pay a small fee to the software's developer if you continue to use the program after a set period.

SIMM (Single Inline Memory Module)

The standard modules for memory expansion on PCs. Older 30-pin SIMMs have now been replaced by the 72-pin variety available in capacities up to 16Mb.

T

Tape streamer

Magnetic tape recorder designed for backing up data from your hard disk.

U/V

UART (Universal Asynchronous Receiver Transmitter)

Pronounced "you-art". A chip that allows your PC to cope with high-speed communications.

V34 Plus, V34, V32bis

A series of CCITT standards that defines modem operations and error correction. There are more than 20, but the key ones are:

- V32.bis, the standard for 14.4kb/sec modems.
- V34, the standard for 28.8kb/sec modems (see Baud).
- V34 Plus, the new standard for speeds up to 33.6kb/sec.

VESA (See Local Bus)

VGA

Video Graphics Array is the name given to a popular display. VGA graphics have 640 pixels horizontally and 480 vertically, and can display 16 colours. SuperVGA (SVGA) graphics can display 800 x 600 or 1,024 x 768 in as many colours as the memory in your graphics card will allow: up to 16.4 million, or true colour.

VL-Bus (See Local Bus)

VRAM (See Memory)

Windows

A GUI (Graphical User Interface) developed by Microsoft. Windows is supposed to make programs easier to use by giving them a standard, mouse-driven interface.

Windows 3.11 16-bit operating system.

Windows NT Robust, fully 32-bit operating system. Currently has the Windows 3.11 interface, but will soon be available with the Windows 95 interface.

Windows 95 Major improvement to Windows 3.11, with a redesigned interface.

Less prone to crashes and easier to use, but requires more memory.

WINSOCK

Short for "sockets for Windows". The Winsock.dll is an extension for Windows which is necessary for connecting to TCP/IP networks.

WORLD WIDE WEB

A service on the internet which uses special software called Web Browsers (Netscape and Internet Explorer are the two best known ones) to give you access to pages of information with text, pictures and multimedia.

WYSIWYG

An acronym for What You See Is What You Get. What you see on the screen is exactly what you get when you print out your work.

ZIF (Zero Insertion Force)

Sockets used for large CPUs. Lifting a handle enables you to remove the processor.

ZIP

The common standard for compressing files so that they take up less space. Zipped files have the extension .zip and are compressed and decompressed using shareware utilities such as Winzip and PKZIP.

How to choose an ISP

There are now over 100 Internet Service Providers,

which makes selecting the right one a difficult task. Competition between them is now so fierce that many Providers are happy to offer a month's free trial.

All ISPs (Information Service Providers) allow you to send and receive internet email, browse the web and download files from internet servers. But there are differences between the extra services that each provides.

Large, centralised, online services such as AOL and CompuServe offer discussion areas and specialised content like online magazines and easily-searchable file libraries. Some providers allow you one email address per account while others offer you as many as five. Some charge a flat-rate for internet access while others charge extra if you exceed a specified number of hours online.

The quality of the software and technical support provided also varies. In general, the big "consumer" ISPs offer better support and more commercial software. The smaller, more basic, operations often offer cheaper deals.

Some ISPs are more geared up to business users who may need a fast ISDN connection and/or require the service provider to host or even design web pages for them.

Your chosen ISP can have a big effect on the performance of your internet connection, particularly in terms of access speed to US sites. Few ISPs provide local call access to anywhere in the UK. In London you'll have

plenty of choice, but in the west of Scotland, say, the choice will be limited.

•PCW Recommended Products

Big, commercial ISPs. Not cheap, but easy to use, with plenty of extra services thrown in: **CompuServe 0800 289378; AOL 0171 385 9404**

Barebones service that's not for beginners but it does make your PC a full internet node in its own right: **Demon 0181 371 1000**

Another established service provider worth considering: **Easynet 0171 209 0990**

Buying a Printer

There are two main types of printer: laser and inkjet.

Lasers

Most office printers are lasers. They work much like photocopiers, and are cheap to run and print quickly. Their disadvantage is higher initial cost and mono output. Laser printers are available in all sizes and at all prices. Small desktop printers cost as little as £300. You can buy colour laser printers but they are still expensive, typically £5,000 or more.

Types of laser

PCs print by sending a description of the page to be printed down a printer cable. There are three commonly-used page description languages (PDLs):

- **PostScript**

This sends an outline in vector form (see "Drawing Software") to the printer where it is rasterised (converted into dots) and printed to the device's best ability. PostScript is device-independent so that the image looks the same on a monitor (75dpi), a laser printer (300dpi) or a professional image-setter (2,400dpi).

- **PCL**

This stands for Printer Control Language, and it is Hewlett-Packard's alternative to PostScript, licensed to many clone-printer manufacturers. Printers using this tend to be cheaper than PostScript ones but output will vary from one machine to another, making it less suited to professional use.

- **GDI (graphical device interface)**

These printers download the description of your page already used by Windows straight to your printer. They will only work with Windows but are cheap and fast. They are also only suitable for a personal printer and will not work across a network.

•PCW Recommended Products

- **CHEAP LASERS** Epson EPL-5500: **Epson** 0800 220546; street price £300 (see *PCW* February '96)
- **SUB-£750 LASERS** Hewlett-Packard 5P: **Hewlett-Packard** 01344 369222 (see *PCW* November '95)
- **NETWORK LASERS** Hewlett-Packard 5P: **Hewlett-Packard** 01344 369222 (see *PCW* February '96)

Inkjets

Inkjets work by spraying ink onto paper. There are still some mono inkjet printers available, but it is best to stick with a colour inkjet printer as the price difference is negligible. They are cheap to buy but more expensive to run, and slower. Even cheap inkjets can print in good

•PCW Recommended Products

- **H-P Deskjet 870CXi**: **H-P** 0990 474747; street price £311.
- **Lexmark 2070**: **Lexmark** 01628 481500; street price £280. (See *PCW* November 1996).



quality colour, especially on high-resolution paper.

Hybrids

For home use and small offices a hybrid could be the answer. They combine a printer, a fax machine and copying capability in one unit.

•PCW Recommended Products

- Brother HL 730: **Brother** 0161 330 6531. £270.
- Sharp JX 9210: **Sharp** 01753 819819. £209. (see *PCW* January '97)

Buying a Scanner

Scanners are used to import text, graphics or pictures into a PC. They vary from low-cost hand scanners not much bigger than a mouse, to drum scanners costing thousands of pounds. The latter are designed to scan photographic transparencies to professional standards.

Flatbed scanners

The most common type, costing from £300 to over £3,000. They are capable of scanning colour pictures to a high standard. Most have transparency adaptors as optional extras.

Document scanners

A new category which aims to combine the reliability of flatbeds with speed and portability. They're intended for OCR and document management. Most will cope with photographs and some with colour, but it's not their forte.

p344



Buying a Fax Modem

You'll need a modem to connect to the internet or an online service, such as CompuServe or AOL, and also to send and receive email.

Modems are available in three formats: as PC cards to plug into notebooks, as external boxes, and as expansion cards. PC card modems cost the most and external modems cost slightly more than expansion cards.

Apart from the case and the external power supply, there's often little difference between the internal and external versions of a modem. Most modems now have fax capability built in, which means you can receive faxes on your PC to view or print out. If you're strapped for cash, a V32bis 14.4kb/sec modem is just about adequate. Better to buy a



V34 28.8kb/sec modem or one of the new V34 Plus 33.6kb/sec modems.

PCW Recommended Products

Flatbed Scanners

- Professional — Arcus II: Agfa 0181 231 4200; street price £2,600.
- Intermediate — Epson GTX 9000: Epson UK 01442 61144; street price £750.
- Budget — Umax Vista S6E: IMC 01344 872800; street price £299 (PCW, Sept '96).

PCW Recommended Products

Document Scanners

- Visioneer PaperPort VX: Computers Unlimited 0181 200 8282; street price £299.
- Logitech PageScan Colour: Logitech 01344 894300; street price £299.
- Plustek PageReader 800: Scan Direct 01292 671676; street price £149 (PCW, March '96).

PCW Recommended Products

Fax-modems

- External — Hayes Accura 288 Message Modem Hayes 01252 775 577 street price £145. (see PCW November 96, December 96).

Buying a CD-ROM Drive

Just about the only things which differ on today's CD-ROM drives are their speed and means of connection. The most common connection is IDE or Enhanced IDE (EIDE). It is possible to connect an IDE CD-ROM drive to most existing IDE hard disk controllers. Older PCs may need a newer EIDE controller. IDE controllers are also found on many soundcards.



The first CD-ROM drives spun the disc at the same speed as an audio CD and were called single-speed, delivering a sustained data transfer rate of 150Kb/sec. Double-speed drives spun twice as fast, doubling the data transfer to 300Kb/sec, and quad-speeds twice as fast again, raising the transfer rate to 600Kb/sec.

Six-speeds are currently the standard (900Kb/sec), with eight-speeds (1,200Kb/sec) becoming increasingly common. All figures are theoretical

maximums. Buyers should go for quad-speed or higher. There is little to choose between models, but off-the-shelf supplies are frequently short. Internal IDE quads start at

PCW Recommended Products

CD-ROM Drives

- Teac CD56-E six-speed: fitted to many new PCs and costing around £85 (PCW January '96).
- The Goldstar 8X is a good eight-speed choice for around £99 (PCW Aug '96).

Buying a Graphics Card

The graphics card sits inside the PC and controls the features which the software can display on the monitor.

Check the amount of memory on the card. 2Mb is about standard these days, 1Mb is skimpy and 512Kb is barely usable. Better-quality cards are likely to be fitted with VRAM (Video RAM). Also, check out the performance capability of the card. Video cards come as 16-bit, 32-bit, 64-bit and even 128-bit: all you need to know is that a large number of bits means faster performance and more colours.

The most important aspect of your video card, and the most frequently quoted feature, relates to the resolution which the card supports in Windows. This is measured in terms of the number of pixels that the card displays on screen. The absolute minimum these days is 1,024 x 768 with a refresh rate of 70Hz.

A 2Mb card can display 16-bit colour (65,000 colours) at 1,024 x 768 pixels. A 1Mb card can only manage 8-bit colour (256 colours) at 1,024 x 768 pixels. To display 24-bit colour (16 million colours) at 1,024 x 768 you'll need 4Mb of memory.

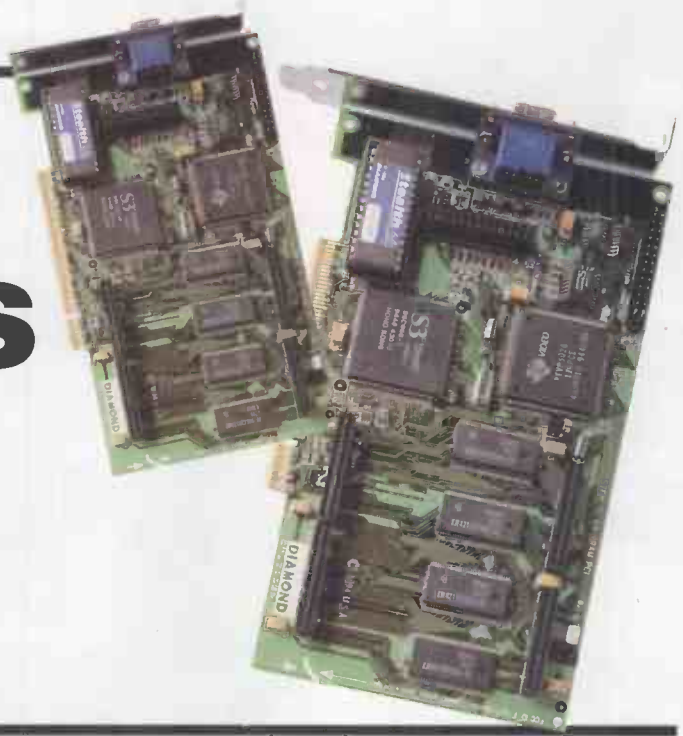
The refresh rate (measured in Hertz) is important, too. It represents the number of frames displayed on-screen, per second. A flickering display is very tiring to use.

Finally, find out whether your video card is "local bus" or not. "Local bus" is a type of interface which connects your video card to the motherboard. It allows the memory in the card to be addressed directly by the CPU which makes it a lot faster than the standard ISA (Industry Standard Architecture) interface.

PCW Recommended Products

Graphics Cards

- ATI Video Xpression: ATI Technologies 01235 833666; around £175 (see Graphics Card group test, PCW June '96)
- Matrox Millennium: Matrox 01793 441144 £150
- VideoLogic GrafixStar 600: VideoLogic 01923 260511 from about £150



Buying a Monitor

Regardless of your computer application, you'll be looking at your monitor all day, so make sure you get a good one.

Some people claim not to see monitor flicker, but your brain will, resulting in fatigue and headaches. A refresh rate of 70Hz or higher will produce a flicker-free image on most monitors.

Interlacing also results in flicker. Always run in non-interlaced modes and ignore interlaced quotes.

The resolution refers to the number of dots (pixels) horizontally and vertically on-screen. Standard VGA mode runs at 640 x 480 pixels, while other typical modes include 800 x 600 and 1,024 x 768. The more pixels, the more you'll be able to fit on screen, but everything will be smaller and may only be suitable on a larger screen. Go for a 15in or 17in monitor capable of running a resolution of 1,024 x 768 non-interlaced at 70Hz or higher. The visible area of most monitors (and TVs for that matter) is smaller than the model implies: a 15in screen may only have a 14.5in visible area, and a 17in may have only 16in visible.



PCW Recommended Products

- For a 15in screen: try the CTX 1569MS (around £300) or the NEC M500 multimedia (around £410 on the street).
- At 17ins there's the Sony 17sfl1 or the Taxan Ergovision 730TCO-S at around £500 (PCW July '96).

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AUGUST 1996 - CARRERA 166+

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APRIL 1996 - CARRERA PANTHER P166

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DECEMBER 1996 - CARRERA P133 EXPLORER NOTEBOOK

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P200	128MB	3.0GB	21" Idek	£3,199	£3,758.83

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P133	16MB	1.6GB	15"	£1,049	£1,232.58
P166	16MB	2.0GB	15"	£1,249	£1,467.58
P200	32MB	3.2GB	17" Idek	£1,799	£2,113.83

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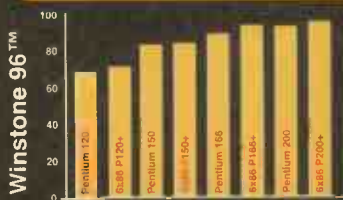


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Buying a **Sound Card**

You need one of these to add sound capability to your PC.

Check compatibility with your CD-ROM drive, and remember that 16-bit cards capable of 44KHz provide higher-quality sound than slower 8-bit cards. Better soundcards now include wavetable synthesis which means they have samples of real instruments held in ROM.

The quality of wavetable synthesis still varies widely. Even cheap cards which have the inferior Frequency Modulation synthesis should have a daughterboard connector allowing them to be upgraded to wavetable.

The newer cards are also plug and play which means, in theory, that you should be able to plug them straight into a PC without any extra configuration. Most cards are bundled with extra software, normally sequencers, wave editors and audio players.

PCW Recommended products

- AWE-32: Creative Labs 01245 265265; £199 (PCW, April '96).
- Aztech SoundGalaxy Waverider Pro: Aztech 01734 814121; £79 (PCW, April '96).

Buying **Software**

Only a few years ago there were dozens of different software applications in each category. During the last two years or so, however, there has been rapid product consolidation. Other magazines list large numbers of packages, most of which are out of date and are not worth considering. We've distilled each category down to just one or two recommended products.

Software A-Z

A
 ■ ACCOUNTS SOFTWARE One of the few categories in which there are still masses of packages on the market at a huge range of different prices. Accounts is also one of the last bastions of DOS.

Recommended products: Lakeview LMS and Exchequer from SBS Systems.

C
 ■ CAD SOFTWARE Computer Aided Design covers everything from architectural drawings through office planning to complex engineering drawings.

Recommended products: AutoCAD, now at release 13, is still the industry standard. However, it's expensive and complex. For the casual user, Drafix QuickCAD is a cheap and accessible way to try your hand at it.

■ CONTACT MANAGERS (see PIMs)

D
 ■ DATABASE At its simplest, an electronic

card index. For just a few hundred names and addresses, an electronic-type Filofax such as Lotus Organizer may be more appropriate.

But for more sophisticated applications like tracking products and customers, the power of a relational database is required. Databases are generally the least user-friendly of the main suite applications. In most office environments you are more likely to use a database application that somebody else has written for you.

Recommended products: Lotus Approach, Microsoft Access.

■ DRAWING SOFTWARE Programs for drawing, that work using vectors. This means each shape drawn is described using mathematical equations.

Recommended products: At the budget end, GSP Designworks 3 stands out. At the professional end of things it's FreeHand 5 which gets our plaudits.

I
 ■ IMAGE EDITING SOFTWARE A program for editing bitmap files (files made up of pixels).

Typically used for converting graphics files, retouching photographs and preparing pictures for printing.

Recommended product: For simple image editing the popular shareware program Paintshop Pro is fine. For professionals, Adobe's Photoshop is the industry standard.

■ INTEGRATED PACKAGES Typically these combine the functionality of a database, word processor and spreadsheet in one application. This makes it easy to move data from one component to another, but integrated packages tend to lack some of the advanced features of individual applications in the Suites.
Recommended product: Microsoft Works.

O
 ■ OCR SOFTWARE Optical Character Recognition software converts printed text into computer text you can edit. You will also need a scanner or fax card to get the printed text onto your PC. OCR saves re-keying documents and can cut down drastically on paper filing systems.

Recommended products: Omnipage is the

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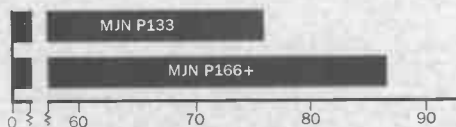
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- Midi tower with 7 drive bays

Software

- Microsoft® Windows 95 with CD & manual
- Lotus SmartSuite 96 for Windows 95 including, WordPro 96, Freelance 96, Approach 96, 1-2-3, Organizer, SmartPics graphics pre-loaded
- IMSI TurboCAD for Windows CAD and design pack
- Fun School educational suite including, Spelling, Maths, Paint and Create
- GSP Pressworks desktop publishing pack
- GSP Designworks art and drawings pack
- GSP Homewise and GSP Money
- Autoworks educational pack
- Computerworks educational pack
- PC Paintbrush professional painting pack
- CV & Job Search Pro employment pack
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- BodyWorks v5 multimedia CD
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P

■ **PERSONAL INFORMATION MANAGERS (PIMs)** PIMs are an electronic way of storing names, addresses, phone numbers and appointments. Contact managers take the idea one step further to include business information about dealings with clients.

Recommended products: Sidekick 95 and Organizer are excellent PIMs. For contact managers we recommend Goldmine for Windows.

■ **PRESENTATION GRAPHICS** Increasingly the trend is towards doing presentations on a PC and the latest packages tackle this by including sound, sophisticated transitions between slides and support for video clips.

Recommended products: Powerpoint and FreeHand are both capable products that are sold with Microsoft Office and SmartSuite respectively.

■ **PROGRAMMING TOOLS** Applications designed for writing software. These range from "low-level" languages which are powerful but difficult to learn and use, to "high-level" languages which, although much easier to use, generally sacrifice performance and flexibility in the process.

Recommended products: Delphi 2.0 is a great example of scalability, catering for beginners and serious developers working on major projects. Visual C++ is the pick of the high-end Windows development tools.

■ **PERSONAL FINANCE PACKAGES** These help you manage home finances. They're also well suited to some small businesses and tend to be easier to use than full-blown accounts packages.

Recommended products: Quicken is the outstanding product in this category and has no serious rivals.

R

■ **REMOTE CONTROL SOFTWARE** Software which lets you access and control a PC remotely, usually by using a modem.

Recommended products: ReachOut, for its simple interface and support for different networks, particularly TCP/IP.

S

■ **SPREADSHEET** An electronic version of an old-fashioned ledger. Ideally suited for balance sheets and sales figures. Excellent graphing and charting facilities are included nowadays.

Recommended products: Lotus 1-2-3, Microsoft Excel.

■ **SUITES** These days, most general business software (word processors, spreadsheets,

presentation graphics packages) is sold in suites. Two suites are widely available: Lotus SmartSuite and Microsoft Office. If you buy them bundled with a new PC, they can cost £100 or less. Bought separately, they cost between £200 and £300. Lotus SmartSuite also contains a database. For Microsoft Office, you pay extra for Office Professional which contains Microsoft's Access database.

Recommended products: Microsoft Office is now close to the industry standard. Its high level of integration gives it the edge over the opposition.

V

VISUAL PROGRAMMING (see Programming Tools).

W

WORD PROCESSOR An application in which you write letters and reports or even produce a simple newsletter. The latest word processors have advanced features such as outliners, table editors and facilities for adding columns of figures.

Recommended products: Microsoft Word is the clear market leader. WordPro (formerly AmiPro) is a capable alternative.

A-Z of Recommended Software Products

Category	Product	Supplier	Contact	Price (Excl. VAT)	Date of PCW review	
A	Accounts	Lakeview LM3	Lakeview Computers	0181 303 3329	£8,750	Jan '96
	Accounts	Exchequer	SBS Financial Systems	01202 298008	£5,980	Jan '96
C	CAD	AutoCad Release 13	Autodesk UK	01483 303 322	£3,150	Oct '95
	CAD	Drafix Quick CAD	Roderick Manhattan	0181 875 4400	£69	Oct '95
D	Database	Approach	Lotus	01784 455445	£99	Nov '96
	Database	Access	Microsoft	01734 270001	£220	Nov '96
	Drawing	Freehand 5	MacroMedia	01344 761111	£450	Apr '96
	Drawing	Designworks 3	GSP	01480 496789	£39.95	Apr '96
I	Image Editing	Photoshop	Adobe	0181 606 4000	£382	Dec '96
	Image Editing	Paintshop Pro	Digital Workshop	01295 258335	£49.95	Jun '95
	Integrated Package	Works	Microsoft	01734 270001	£79.99	Oct '95
O	OCR	Omnipage	Caere	0171 630 5586	£595	Nov '95
	OCR	Textbridge	Xerox Imaging Systems	01734 668421	£349	Nov '95
P	Personal Finance	Quicken	Intuit	0800 585058	£39.95 (incl. VAT)	May '96
	PIM/contact manager	Organizer 2.1	Lotus	01784 455445	£99	Mar '96
	PIM/contact manager	Goldmine for Windows	Elan Software	0171 454 1790	£395	Mar '96
	PIM/contact manager	Sidekick 95	Starfish UK	0181 875 4400	£39	Mar '96
	Presentation graphics	Freelance	Lotus	01784 455445	£415	Nov '96
	Presentation graphics	Powerpoint	Microsoft	01734 270001	£220	Nov '96
	Programming tools	Visual C++	Microsoft	01734 270001	£379	Feb '96
	Programming tools	Delphi 2.0	Borland	01734 320022	249	Feb '96
	R	Remote Control	Reachout	Stac Electronics	01483 740763	£110
S	Spreadsheet	Excel	Microsoft	01734 270001	£220	May '95
	Spreadsheet	1-2-3	Lotus	01784 455445	£365	May '95
	Suite	Office (Standard)	Microsoft	01734 270001	£360	Mar '96/Dec '96
	Suite	Office (Professional)	Microsoft	01734 270001	£460	Mar '96/Dec '96
	W	Word Processing	Word	Microsoft	01734 270001	£220
	Word Processing	WordPro (AmiPro)	Lotus	01784 455445	£99	Oct '96

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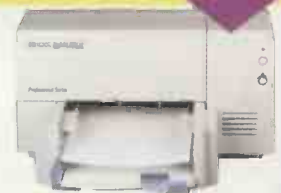
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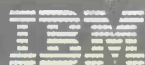
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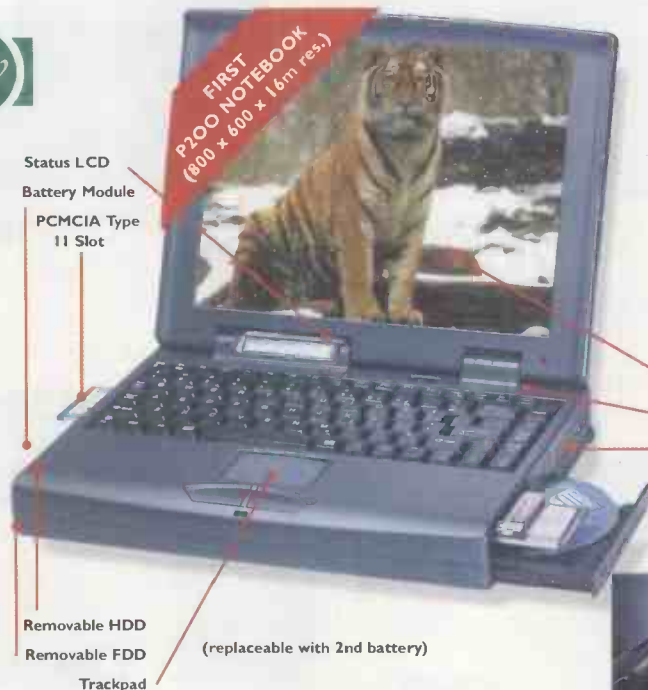
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dan Ultimate/166, PC Magazine, September '96



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The Pentium® PRO is a true 32-bit processor and is particularly suited to operating systems like Windows NT. The growing demand for Windows NT in the business environment means that an ever increasing number of users are requesting the kind of power the dantium PRO can deliver.

The Ultimate PRO PC is a machine for people who want speed and power based on the very latest technology. It boasts a superb specification which already includes many of the most popular upgrade options, and now you can add an Omega Jaz Drive as well. The ideal choice for the high-power user!

The dantium PRO for Business is an entry level system based on the Pentium® PRO processor. As its name suggests, this system has been specifically designed with the business user in mind and comes bundled with the award-winning Lotus SmartSuite 96.

Both the dan Ultimate PRO PC and the dantium PRO/B can be purchased with pre-installed Windows 95 or Windows NT.

Omega Jaz & Zip Drives currently function under Windows NT 3.51, not NT 4. As of November '96 Windows NT4 drivers will become available.

Omega 1GB Jaz Drive

A super-fast removable hard drive that can pack up to 1GB on each cartridge. It's an ideal answer for multimedia - it can record a 2 hour movie, save 8 hours of CD quality sound, save huge graphics files and much more. The Jaz drive's speedy access times and rapid transfer rate mean you can move files around and backup a 1GB hard disk in as little as 5 minutes. There's no limit to the amount of additional cartridges you can use so it's the solution to all your storage needs.



dan Ultimate PRO PC

High-end Pentium® PRO Processor System

- 32MB EDO RAM
- Fast 1.6GB HDD
- Intel Pentium® Pro Processor with 256KB Cache Memory
- Fast Graphics card 2MB SDRAM/64-bit
- 17" Iiyama L/R N/I Monitor (8617E)
- 8xSpeed CD-ROM
- SoundBlaster AWE 32 Value 512K
- Hi-Fi Power dan Speakers (80W PMPO)
- dan 28.8(33.6)KBPS FAX/Modem
- Free Slots: 2 PCi & 1 PCi or ISA
- Fast EIDE PCi HDD Controller
- 1.44MB Floppy Disk Drive
- Midi Tower (ATX) Case w/200W PSU
- Cherry Win 95 UK Keyboard
- Windows 95 or NT (extra cost)
- 1 Parallel & 2 Fast Serial Ports
- Microsoft PS/2 Mouse
- MS Works Suite, Page Plus DTP & MS Encarta '96 US Encyclopedia



180MHz	£ 1998	£ 2348	incl. VAT
200MHz	£ 2087	£ 2453	incl. VAT

PRO Upgrade Options

64MB Memory Upgrade (from 32)	£ 224	264	incl. VAT
Windows NT 4 ws Upgrade	£ 94	111	
TV & Teletext Card	£ 66	78	



dantium PRO/B

Entry Level Pentium® PRO Processor System

- 16MB EDO RAM
- Fast 1.2GB HDD
- Intel Pentium® Pro Processor with 256KB Cache Memory
- Fast Graphics card 1MB/64-bit
- 15" Super VGA L/R N/I Monitor
- 8xSpeed CD-ROM
- Free Slots: 2 PCi, 1 PCi or ISA & 2 ISA
- Fast EIDE PCi HDD Controller
- 1.44MB Floppy Disk Drive
- Midi Tower (ATX) Case w/200W PSU
- Cherry Win 95 UK Keyboard
- Windows 95 (or NT at extra cost)
- 1 Parallel & 2 Fast Serial Ports
- Microsoft PS/2 Mouse
- Lotus Smart Suite 96



180MHz	£ 1366	£ 1606	incl. VAT
200MHz	£ 1455	£ 1710	incl. VAT



PENTIUM® PRO PROCESSOR



dan Midi Tower (ATX) Case

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VAT @ 17.5% E.&O.E.

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Dan presents two different models of dan PCs that have been specially designed for home use by the whole family. The best selling dan Home PC is still available but because of popular demand, we are now introducing

the dan Home Plus. This exciting system is a 'super loaded' version which contains many upgrades. Both systems include multimedia kits, fax modems and collections of software titles. Younger children can enjoy games and educational programs and older ones

can do their homework, listen to music, use an encyclopedia or even watch TV (option at extra cost). Adults can use a word processor, spreadsheet and database, send and receive faxes and e-mail or get connected to the Internet.



- 16GB Hard Disk
- 2MB DRAM Video Card
- 16MB EDO RAM
- 256KB PIPELINE Burst Cache
- Fax Modem
- for INTERNET
- 5X SPEED CD-ROM
- AWE 32 Sound BLASTER

Choose one of the two software packs with the dan Home Plus PC

dan MM Software Pack 1:

Quicken 5, 500 Nations, Dinosaurs 1, Dangerous Creatures 1, Multimedia Golf 2, Musical Instruments 1, Dogs & World of Flight.



OR

dan MM Software Pack 2:

Quicken 5, Cinemania 96, Art Gallery & Golf 2.0



Higher Spec
New LOWER Prices

dan Home Plus PC/SMM

- 16MB RAM - Fast 1.6GB HDD
- Intel Pentium® Processor
- Fast Graphics card 2MB/64-bit
- 15" Super VGA L/R N/I Monitor
- 28.8(33.6)KBPS Fax/MODEM
- Soundblaster AWE Value 512K
- 8x Speed CD-ROM
- 256KB Pipeline Burst Cache Memory
- Fast EIDE PCI Hard Disk Controller
- Free Slots: 2 PCI, 1 PCI or ISA
- 1.44MB Floppy disk Drive
- Midi Tower Case, Win 95 UK Keyboard
- dan Hi-Fi Power Speakers (80WPMP0)
- Windows 95
- 1 Parallel & 2 Fast Serial Ports
- Microsoft Mouse, Microphone, Joystick
- MS Works Suite, Page Plus DTP
- ENCARTA 96 US Encyclopedia, the dan Games Collection (5 Games: Bioforge, Hi Octane, Theme Park, Magic Carpet, Int. FIFA Soccer) plus choose one of the two dan MM Software packages (1 or 2).



EAST BUY
Monthly Payment
APR 19.9%

120MHz	£ 1298	£ 1526 incl. VAT	£ 50.43
133MHz	£ 1353	£ 1590 incl. VAT	£ 52.52
150MHz	£ 1413	£ 1661 incl. VAT	£ 54.84
166MHz	£ 1510	£ 1775 incl. VAT	£ 58.56
200MHz	£ 1596	£ 1876 incl. VAT	£ 61.86

TV TV & Teletext Card £ 80 (€95 inc VAT)

What the experts said



"Dantum Home Plus PC: Nerds have dreams about PCs like this. Performance is spritely, with the help of the EDO RAM and the Intel chipset. Windows 95 positively flies, while Descent is so fast it almost seems like a new game. If you do a lot of graphical work, DTP and photo-editing for example, or disk intensive jobs - programming and the like - then the dan, with its greater performance and the built-in modem, is the better bet. For these reasons and the combination of other hardware, the dan picks up the award for best-value PC here. It is recommended if you want to get your money's worth - and who doesn't?" **PC Format, Best Value Award, (dantum Home Plus), June '96**

NEW

Add-ons

Memory upgrade from 8MB to 16MB	£ 47	incl. VAT 56
16MB to 32MB	£ 94	incl. VAT 111
17" iiyama 8617E		
Monitor Upgrade from 15"	£ 266	incl. VAT 313
15" Monitor Upgrade from 14"	£ 74	incl. VAT 87
2MBSDRAM ATi Video Card		
Upgrade from 2MB DRAM	£ 14	incl. VAT 17
Games Joystick	£ 18	incl. VAT 22

Upgrade the dan Home Plus to a **3D Graphics Card with 3 x 3D Games** add £ 35 (£ 42 inc VAT)

Dan technology cannot guarantee that all other games available on the market will operate correctly with this new 3D Graphics Card.

Save on MS Office 95
MS Office 95 for Students £ 79 (£ 93 inc VAT)

CALL More people qualify for this new Microsoft offer.

UPGRADE TO THE NEW ATI VIDEO XPRESSION (2MB SDRAM)

This is a powerful, extendable 64-bit multimedia accelerator board, designed to bridge the gap between the PC, the TV and the games console. The ATi 264VT graphics processor provides more natural & appealing TV-quality video. It displays 30 frames per second (fps) MPEG encoded video, comes with Direct Draw drivers and will support resolutions up to 1280x1024. The raw processing power of the ATi 264VT graphics processor coupled with the latest technology of SDRAM memory makes it faster than VRAM based cards but at less than half the price. This new high performance synchronous memory technology gives not only refresh rates of up to 120Hz but also produces extremely high data transfer rates of 528 MB/s, making it one of the fastest types of memory available today.



Surf the NET

PIPEX DIAL

A modem is your gateway to the outside world. The dan Home PC is supplied with a standard 14.4KBPS fax modem while the dan Home Plus now includes the faster 28.8(33.6)K BPS model. You can now send and receive faxes from your PC as well as talk to millions of other

computer users through PIPEX DIAL. This trial software is included to give you 28 days (or max 24 hrs) access free of charge with details for a full system upgrade. You can 'surf' the INTERNET, find out information on almost any subject and even do some of your shopping.

dan Home PC/SMM

- 8MB RAM - Fast 850MB HDD
- Intel Pentium® Processor
- Fast Graphics card 1MB/64-bit
- 14" Super VGA L/R N/I Monitor
- ATi ISA TV Tuner Card
- 14.4KBPS Fax/MODEM
- 16-bit Sound Card
- 8x Speed CD-ROM
- 256KB Cache Memory
- Fast EIDE Pci Hard Disk Controller
- Free Slots: 2 Pci
- 1.44MB Floppy Disk Drive
- Desktop Case, Win 95 UK Keyboard
- dan Advanced Speakers (10WPMP0)
- Windows 95
- 1 Parallel & 2 Fast Serial Ports
- dan Serial Mouse, Microphone
- MS Works Suite, Page Plus DTP
- ENCARTA 96 US Encyclopedia & the dan Games Collection (5 Games: Bioforce, Hi Octane, Theme Park, Magic Carpet, FIFA International Soccer)



Now with TV card & Teletext

EASY Buy
Monthly Payment APR 19.9%

120MHz	£ 996	£ 1171	incl. VAT	£ 38.83
133MHz	£ 1051	£ 1235	incl. VAT	£ 40.92
150MHz	£ 1111	£ 1306	incl. VAT	£ 43.24
166MHz	£ 1208	£ 1420	incl. VAT	£ 46.97

Lower Cost Configurations also available.



Desktop System with 15" Monitor Upgrade

"We would be lying if we said that the dan Home Plus/133 was the fastest PC in the world, but it is certainly one of the fastest Pentium 133 machines we have ever tested. This machine speaks volumes about its components and the thought that went into its design. Add to that the fact that it is competitively priced and you end up with a PC that has much to recommend it. Overall, the dan Home Plus/133 is an excellent buy." **WHAT PC, Best Buy (dan Home Plus/133), Aug '96**

SO YOU WANT TO BUY A PC? Christmas 96 RECOMMENDED

dan Home 133 Nov 96

Personal FINANCE EASY Buy

A monthly payment scheme is available to private purchasers, subject to status & proof of identity. A typical example of a payment calculation for a dan computer costing £1228 incl. VAT would be: £1228 + £18 (delivery) = £1246 total cash price, payable by 10% deposit of £124.60 followed by 36 monthly direct debit payments of £40.70 (19.9% APR). Total amount paid over 36 months will be £1589.80. Written quotations are available on request. Dan technology plc is a licensed credit broker.

Watch TV & TELETEXT on your PC

(Requires ATI Video Card with AMC connector) This card combines TV program viewing with video recording on your PC. It enables the PC to receive TV broadcast signals directly from an aerial or cable and display a live TV program on your standard VGA monitor. You can connect it to a VCR, laser disk player or camcorder to capture images or even movie clips. These can then be saved to disk, copied to business presentations, web pages or e-mail messages.



included as standard in dan Home PC

- In addition to the TV capability you can display teletext pages with Fast text. Additional features include:
- Full screen TV, zoom and movie clips capture.
 - Save or print capture images or teletext pages.
 - MPEG-1 Playback (30 fps - supports Video CD 2, Karaoke etc).
 - Save captured still images direct to Windows Wallpaper.
 - Enlarge any area of the TV picture you select.

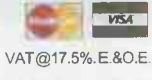
WARRANTY: All dan systems and components come with one year back-to-base parts & labour guarantee and Lifetime Hotline telephone support. Optional 8-working hour response ON-SITE maintenance (£42 for the first year). **14 DAY MONEY BACK GUARANTEE IF NOT SATISFIED** (excludes printers & Software). All software supplied on original media, except for Works & Organizer which are only pre-installed on the hard disk. Dan technology systems prices and specifications are subject to change without notice. All sales are subject to dan technology plc terms and conditions, a copy of which may be obtained on request. All trademarks acknowledged. The Intel Inside logo & Pentium are registered trademarks of Intel Corporation.

Delivery cost to most of UK for one system is £ 15 (£ 18 inc VAT)

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“ One company has become synonymous with servers and that is dan, which has a wide range of options to suit many different network needs. ”

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dantum Server

Award Winning Fileservers

- 32MBRAM
- Choice of Hard Disk Drive from table
- Intel Pentium® Processor
- Intel Chipset
- 512KB Pipeline Burst Cache Memory
- VGA Graphics card 1MB/32-bit
- 14" Monochrome VGA Monitor
- 8x Speed EIDE CD-ROM
- 16-bit Ethernet Network Card*
- Fast EIDE PCI HDD or Adaptec AHA-2940 PCI SCSI Controller
- Free Slots: 2 PCI, 1 PCI or ISA & 1 ISA (SCSI systems have one PCI slot less)
- 1.44MB Floppy Disk Drive
- Full Size Tower Case w/250W PSU
- Cherry Win 95 UK Keyboard
- Windows 95 or Win 3.11
- 1 Parallel & 2 Fast Serial Ports
- dan Serial Mouse

* This Card is Novell NE 2000 compatible.

PCI Network Card available as an upgrade

Pentium PROCESSOR	120	133	166	200
2GB	£1037	£1096	£1262	£1352
2.5GB	£1053	£1112	£1278	£1368
SCSI 2.10GB	£1345	£1404	£1570	£1660
SCSI 4.10GB	£1753	£1812	£1978	£2068

dantum Pro Server

Pentium® Pro Processor System

- 32MBRAM
- Choice of Hard Disk Drive from table
- Intel Pentium® Pro Processor with 256KB Cache Memory
- Fast Graphics card 2MB/64-bit (SDRAM)
- 15" Super VGA LR N/I Monitor
- 8x Speed EIDE CD-ROM
- 32-bit PCI Network Card (3COM900)
- Fast EIDE PCI HDD or Adaptec AHA-2940 PCI SCSI Controller
- Free Slots: 2 PCI, 1 PCI or ISA & 1 ISA (SCSI systems have one PCI slot less)
- 1.44MB Floppy Disk Drive
- ATX Midi Tower Case w/200W PSU
- Cherry Win 95 UK Keyboard
- Windows 95 or Win 3.11 or Windows NT (extra cost)
- 1 Parallel & 2 Fast Serial Ports
- Microsoft Serial Mouse

PENTIUM PRO PROCESSOR	180	200
2GB	£1680	£1773
2.5GB	£1696	£1789
2.10GB SCSI	£1988	£2081
4.10GB SCSI	£2396	£2489

For Novell Netware File Servers you must upgrade the EIDE CD-ROM to an 8x Speed SCSI add £33 (plus £190 for SCSI controller if needed - Adaptec AHA 2940)

Add-ons

Miscellaneous Prices Exclude VAT

16MB Additional Memory Upgrade	£ 94
32MB Additional Memory Upgrade	£ 224
8x Speed SCSI CD-ROM w/o Controller	£ 102
14" Colour Monitor from 14" Mono	£ 101

Network Cards

16-Bit Network Card Ethernet (Novell NE2000 Compatible - Thin Ethernet & Twisted Pair)	£ 22
16-Bit Network Card Ethernet (3COM 509)	£ 61
32-bit PCI Ethernet Card (3COM 900)	£ 82
32-bit PCI 100Mbps base-T Ethernet Card (3COM 905)	£ 84
4 Port 32-bit PCI Cogent Ethernet Card	£437
8 Port 10 base-T Mini Ethernet Hub	£ 38
16 Port 10 base-T Mini Ethernet Hub	£ 88

Uninterruptible Power Supplies - UPS

600VA UPS Line Interactive (Fiskars)	£ 251
800VA UPS ON-Line (Fiskars)	£ 632
1000VA UPS Line Interactive (Fiskars)	£ 415

Tape Streamers

(Controller, Tapes & Backup Software not included)	
2GB DAT Tape Streamer for Server	£ 450
4GB DAT Tape Streamer for Server	£ 524
8GB DAT Tape Streamer for Server	£ 671

Delivery cost to most of UK for one system is £15.

All prices related to Fileservers, Workstations & Network Upgrades exclude VAT @ 17.5%. E.&O.E.

Network Workstations



All dan PCs can be used as workstations by just adding a network card. The most popular card is the 16-bit Ethernet Novell NE2000 compatible. However the 3COM 509 or the PCI card can give higher performance.

Example of Workstations:

Entry level Station
dantum Value/100sWS
dantum Value/120s £ 717
16-bit Ethernet card £ 22
Workstations price £ 739

Best Seller Station
dantum/133sWS
dantum/133s £ 939
3COM509 card £ 61
Workstations price £1000

Power User Station
dantum95/166sWS
dantum95/166s £ 1319
PCI Ethernet card £ 82
Workstations price £ 1401



What the experts said



"This is a big computer. As it is a system that's ready for most eventualities, it has more inside than your average PC. There is nothing to quibble about in terms of presentation, performance, or what you're getting with the system. It's not cheap, but it does represent value for money". *Computer Shopper*, (dan Ultimate120), July '95



"Although other system categories may seem more glamorous, the network fileserver is the most important machine for any company with a LAN, whether it has five or 50 PCs attached to it. While many direct vendors offer suitable systems, one in particular has carved out a niche for itself in the supply of file servers to the extent that it has won this category for the second time running. You voted its entry-level server as runner-up, but it was the dantum PCI Server which really caught your eye in 1994." *PC DIRECT HITS AWARDS, PC Direct June '95*

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Memory



72-pin Modules

4MB Memory Module with Parity	£ 31 (37)
4MB Memory Module EDORAM	£ 19 (23)
8MB Memory Module with Parity	£ 57 (67)
8MB Memory Module EDORAM	£ 37 (44)
16MB Memory Module with Parity	£ 110 (130)
16MB Memory Module EDORAM	£ 73 (86)
32MB Memory Module EDORAM	£ 146 (172)

30-pin Modules

1MB Memory Module with Parity	£ 13 (16)
4MB Memory Module with Parity	£ 35 (42)

RAM Prices are subject to change. Call for latest prices.

Video Cards



PCI 64-bit 1MB EDORAM Video Card	£ 30 (36)
PCI 64-bit 2MB EDORAM Video Card	£ 40 (47)
PCI 64-bit 2MB Xpression SDRAM Video Card	£ 69 (81)
PCI 2MB Mystique SGRAM Video Card	£ 111 (131)
PCI 2MB 3D Rage 2 Video Card (+ 3 games)	£ 85 (100)

Fax/Modems



Internal 14.4KBPS FAX/Modem	£ 44 (52)
Internal 28.8KBPS FAX/Modem	£ 81 (96)
Internal 33.6KBPS FAX/Modem	£ 81 (96)
External 28.8KBPS FAX/Modem	£ 79 (93)
US Robotics Sportster Voice External 28.8(33.6 data)KBPS FAX/Modem	£ 164 (193)

All modems are BABT Approved

CPUs/Motherboards



CPUs

Pentium 120MHz	£ 106 (125)
Pentium 133MHz	£ 162 (191)
Pentium 150MHz	£ 221 (260)
Pentium 166MHz	£ 318 (374)
Pentium 200MHz	£ 403 (474)

Motherboards

PCI Pentium Vx w/256K Pipeline Cache	£ 88 (104)
PCI Pentium HX w/256K Pipeline Cache	£ 96 (113)
PCI Pentium Vx w/512K Pipeline Cache	£ 96 (113)
PCI Pentium HX w/512K Pipeline Cache	£ 105 (124)
PCI Pentium Pro Intel Natoma	£ 200 (235)

Hard Disk Drives



850 MB EIDE	£ 99 (117)
1.2 GB EIDE	£ 128 (151)
1.6 GB EIDE	£ 158 (186)
2.5 GB EIDE	£ 192 (226)
3.0 GB EIDE	£ 258 (304)
2.1 GB SCSI	£ 285 (335)
4.0 GB SCSI	£ 674 (792)
9.0 GB SCSI	£ 1532 (1801)
2.13 GB Wide SCSI	£ 446 (525)
4.0 GB Wide SCSI	£ 800 (940)

Hard disk drives with capacity greater than 525MB require systems with BIOS that support LBA or other translation mechanism or the use of a special controller like the VESA Local BUS Promise 2300Plus.

Adaptec PCI 2940 SCSI controller	£ 190 (224)
Promise VESA 2300plus EIDE controller	£ 43 (51)
Removable Hard Disk Drive Kit	£ 17 (20)

The Company



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Input Devices



Microsoft Serial Mouse	£ 14 (17)
Microsoft Natural Keyboard	£ 39 (46)
Cherry Keyboard for Windows 95	£ 13 (16)
Joystick	£ 18 (22)

The Panasonic PD



A 4x speed CD-ROM & a 650MB read-write optical Disk Drive in one unit with controller and one 650MB cartridge £ 296 (348)
650MB Extra Cartridge £ 26 (31)

Network (Thin Ethernet)



Ethernet Network Card (BNC & 10-base-T)	£ 22 (26)
ISA 3-COM Etherlink III (3C509) Network Card	£ 61 (72)
8-port 10 base-T mini Ethernet Hub	£ 38 (45)
16-port 10 base-T mini Ethernet Hub	£ 86 (102)

Multimedia Devices



8x Speed IDE CD-ROM	£ 74 (87)
8x Speed SCSI CD-ROM	£ 102 (120)
HP SureStore CD Writer 4020i	£ 424 (499)
Sound Blaster AWE (full package)	£ 182 (214)

Prices in brackets include VAT @ 17.5% E.&O.E.

Monitors



17" iiyama 8617E SVGA Colour Monitor FST Tube, .26dot, 86KHz 1600x1200 maximum resolution	£ 487 (573)
17" iiyama 9017E SVGA Colour Monitor The best 17" monitor on the market	£ 551 (648)
21" iiyama 9021E SVGA Colour Monitor Diamond Tron Tube, .30dot, 92KHz 1600x1200 maximum resolution	£ 999 (1174)

14" FST SVGA Colour Monitor
Shadow Mask, .28dot, 72KHz
800x600 maximum resolution
£ 159 (187)



15" FST SVGA Colour Monitor
FST Shadow Mask, .28dot, 72KHz
1024x768 maximum resolution
£ 230 (271)

15" SONY CPD-15SF2 SVGA Colour Monitor
Digital Multiscan technology,
Trinitron Tube, .25dot, 80KHz
1024x768 maximum resolution
£ 350 (412)



20" SONY SVGA Colour Monitor
Trinitron Tube, .31dot, 82KHz
1280x1024 maximum resolution
£ 1210 (1422)

TV & Teletext Card



Watch TV & Teletext on your PC with the NEW ATI Video Xpression 2MB SDRAM and ISA Tuner Card



Perfecting the PC

This card combines TV program viewing with video recording on your PC. It enables the PC to receive TV broadcast signals directly from an aerial or cable and display a live TV program on your standard VGA monitor. You can connect it to a VCR, laser disk player or camcorder to capture and save images or movie clips, for use in other applications. In addition you can also display Teletext pages with Fast text.

Other features include:

- Full screen TV, zoom functions.
- MPEG-1 playback (30fps - for Video CD2, Karaoke, etc.)
- Save or print capture images or teletext images, or even use them as Windows wallpaper.

£ 122 (144)



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3. Keep copies of all correspondence, and if you speak on the phone make a note of who you spoke to.
4. On large orders obtain a written quotation.
5. Wherever possible pay with a personal credit card. All transactions over £100 should be covered by the card company's insurance scheme.
6. Does the price quoted include everything discussed? Is VAT extra?
7. Check how they will deliver and if times are guaranteed.
8. Is telephone support or on-site maintenance included in the price? If a return to base warranty can be extended, how much does it cost?
9. Check that all branded components are genuine.
10. Is the supplier reputable? Do they comply with BS5750 or ISO900? If in doubt, ask to see customer testimonials.

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11.3" Screen

TV out port

ZV port



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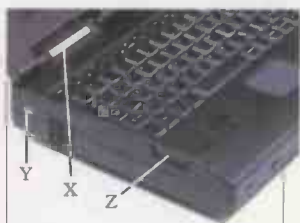
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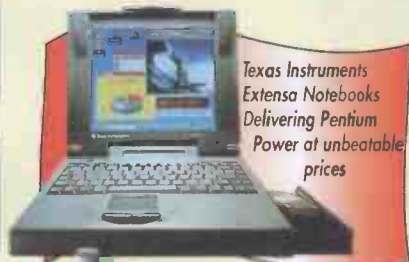


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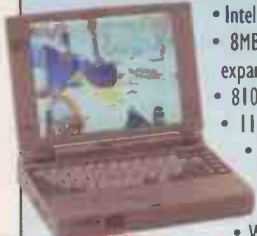
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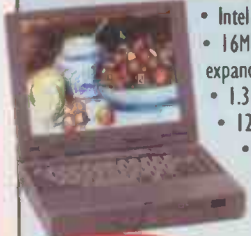
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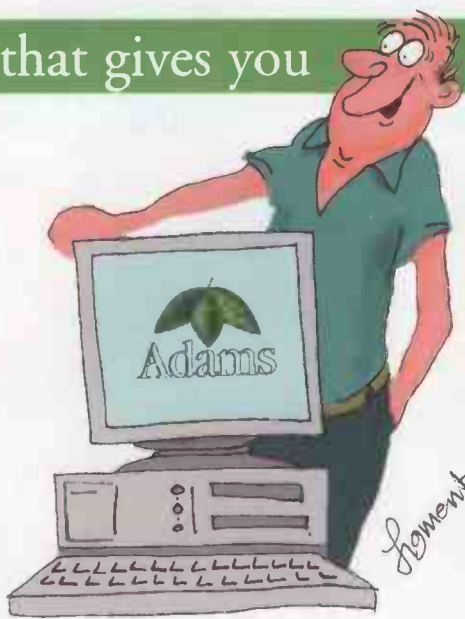
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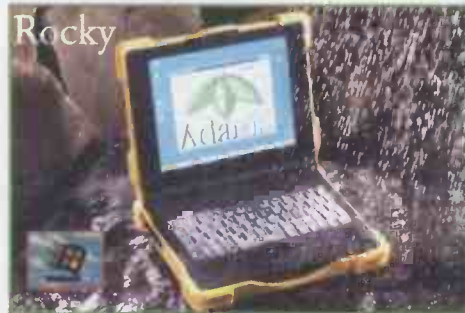
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- Local bus with 64 bit memory addressing
- Ruggedised to American Military standard 810E
- EMI spec: MIL-STD-461C
- 16mb standard memory upgradeable to 32mb
- 810mb 2.5" EIDE local bus shock resistant hard drive upgradeable to 1.2gb
- 9.5" mono trans-reflective (viewable in bright sunlight) VGA LCD (64 grey levels) or 10.4" TFT SVGA LCD's, 65,000 colours, 800 x 600 resolution
- 64 bit local bus graphics accelerator giving notebook resolution of 800 x 600 (TFT) and external monitor display up to 1024 x 768
- External 1.44mb floppy drive connects to parallel port
- 16 bit stereo sound
- Built in stereo speakers
- BIOS controlled power management
- LED status panel
- Intuitive front mounted waterproof pointing device
- Type II PC Card slot (2 x type II)
- High capacity NiMH battery
- Up to 2 hours battery life (with power management)
- TV port (composite video)
- IrDA Infrared Port (HP compatible)
- 2 enhanced serial port, 1 EPP parallel port, external CRT port, audio connectors
- 81 key UK keyboard
- Full security with password protection
- Multi voltage 110-240v charger / power supply
- Weight 2.9kgs with hard drive and battery
- 1 year parts and labour warranty
- MS-DOS 3.11 and Windows FWG 3.11 preloaded
- Tel-Me business information s/ware pre-loaded
- Rocky Toughware case included



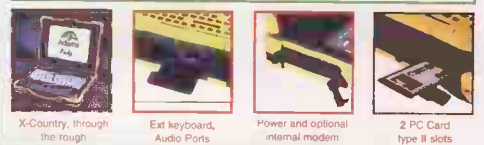
Rough, tough. US military specification. Water resistant, dustproof, salt spray, vibration and shock resistant. "Rocky" the new ruggedised notebook from Adams might be just the machine your looking for. Civil engineers, surveyors, soldiers, sailors, airmen, racing teams, oil explorers, miners or construction engineers, all will benefit from Rocky's tough approach to life. Rocky now comes standard with a Pentium 133mhz CPU, 16mb RAM, a 1gb hard drive and built in sound. Rocky's TFT model now also has a special TFT LCD to allow the SVGA display to be seen in bright sunlight. Rocky is the machine that can take it, and you can take anywhere. Find out more by calling Adams sales on 0161 282 8822 and see how Rocky can tough it with you!



Adams notebooks and PC's help Williams Renault to victory in 1995 and 1996 - We're off to battle again in 1997 when Rocky joins the fray as well!

Rocky Pricing & Options

Rocky Pentium 133, 9.5" mono VGA trans-reflective LCD, 1.0gb HDD, with 16mb RAM	£2399 + VAT
Rocky Pentium 133, 10.4" "sunblind" TFT SVGA LCD, 1.0gb HDD, with 16mb RAM	£2999 + VAT
HDD upgrade from 1.0gb to 1.3gb	£249
Memory upgrade to 24mb	£195
Memory upgrade to 32mb	£395
Internal fax/modem 28800	£239
12v car power adaptor	£59
External Battery	£95
Second 110/240 autoswitching AC PSU	£69
PC Card Fax / Modem 28800	£169
PC Card ethernet adaptor (UTP and Coax)	£99
Quad Speed external CD (via PC Card slot)	£199
MS Office 4.3 Professional with Bookshelf (CD) (must be purchased with notebook)	£199
Yamaha M15 powered speakers	£49



Rocky from £2399

The complete multimedia notebook

Elite Specification

- Intel Pentium® 133 or 150mhz CPU's
- 256k pipeline burst cache
- PCI local bus with 64 bit memory addressing
- 16mb standard memory upgradeable to 40mb
- Quick removable 1gb 2.5" EIDE PCI local bus hard drive upgradeable to 2.0gb
- 11.3" SVGA DSTN LCD 256 colours, and 11.8" or 12.1" TFT SVGA LCD's, 65,000 colours, all LCD's with 800 x 600 resolution
- PCI 64 bit local bus graphics accelerator giving notebook resolution of 800 x 600 and external monitor display up to 1024 x 768
- Software MPEG-1 playback with DCI support
- 1.44mb floppy drive built in
- 16 bit stereo sound card
- Built in stereo speakers and microphone
- Standard eight speed CD-ROM co exists with floppy drive
- BIOS and Microsoft APM compatible power management
- LCD status panel
- Intuitive front mounted trackpad pointing device
- Type III PC Card slot (Takes 1 x type III or 2 x type II)
- Extra high capacity NiMH battery, smart with gas gauge
- Up to 2 - 3 hours battery life (with power management)
- TV port (composite video)
- IrDA Infrared Port (HP compatible)
- 1 enhanced serial port, 1 EPP parallel port, external CRT port, game port, external keyboard port, audio connectors
- Windows 95 UK keyboard
- Full security with password protection and Kensington lock support
- Multi voltage 110-240v charger / power supply
- Weight 3.2kgs with hard drive and battery
- 1 year parts and labour warranty
- Windows 95 preloaded and on CD
- Tel-Me business information s/ware pre-loaded and on CD
- Accura Elite case included



Big quality, full function, small price

The Accura Elite is made by one of the world's largest notebook manufacturers and is available elsewhere in the world as a very famous name. In the UK it's small and famous, it's an Adams. The big advantage of being an Adams, is that you get the big name quality without the price!

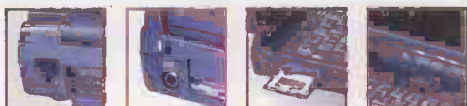
The Elite is one of the most comprehensively equipped notebooks on the market. Available with up to 12.1" SVGA TFT, Intel Pentium from 133 through to 150mhz, 3.3v down to 2.5v as available. Pipeline burst cache, standard eight speed CD-ROM, floppy drive, heat pipe cooling system so no fan noise. Software MPEG with DCI support, 2mb VRAM, TV port, smart battery with gas gauge, 1.0gb hard drive, SIR port, fully Windows 95 APM compliant. Plug 'n Play compatible, Windows 95 keyboard. Kensington lock, removable hard drive, LCD status display. We could go on forever, unfortunately (fortunately?) we don't have space, so call sales on 0161 282 8822 for latest information and prices.

Elite pricing

Model	11.3" DSTN	11.8" TFT	12.1" TFT
Pentium- 133	£1599 (1078.03)	£1899 (2221.33)	£1999 (2348.03)
Pentium- 150	£1669 (1961.00)	£1969 (2213.00)	£2069 (2431.00)

Elite upgrades & options

Memory upgrade to 24mb	£96
Memory upgrade to 40mb	£288
Hard drive upgrade from 1.0gb to 1.3gb	£249
Hard drive upgrade from 1.0gb to 2.0gb	£499
PC Card Fax / Modem 14400	£109
PC Card Fax / Modem 28800	£169
PC Card ethernet adaptor (UTP and Coax)	£99
PC Card SCSI adaptor	£169
Mini Dock	£275
Car power adaptor	£49
Spare Ni Mh battery	£89
Second 110/240 autoswitching AC PSU	£59
3 year parts and labour warranty	£CALL
Vision 3 year parts, labour & accidental damage wty	£CALL
MS Office 95 Professional with Bookshelf (CD) (must be purchased with notebook)	£199
Microsoft Encarta 96 (CD)	£35
Microsoft Works V4.0 (CD)	£35
Yamaha M15 powered speakers	£49



IrDA port, DC In, Composite video, Kensington lock, PC Card type III slot, Keyboard/mouse and audio ports, LCD status panel with battery 'gas gauge'



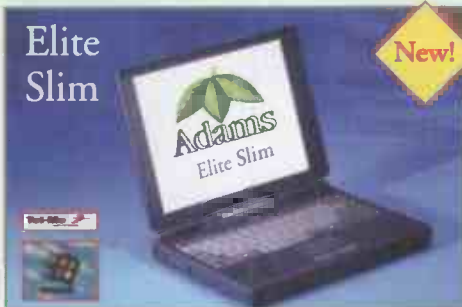
x8 speed CD-ROM, Removable HDD, trackpad and permanent FDD, Parallel, game and CRT port, Removable NiMH battery

Elite from £1599

The slimmest multimedia notebook available

Elite Slim Specification

- Pentium® 133 or 150mhz CPU's
- Intel Triton 440MX chipset with 256k pipeline burst cache
- PCI local bus with 64 bit memory addressing
- 16mb standard EDO memory upgradeable to 40mb
- Integrated, removable 810mb 2.5" EIDE PCI local bus hard drive upgradeable to 1.3gb (12.5mm drive)
- 11.3" SVGA DSTN LCD 256 colours, and 12.1" TFT SVGA LCD's, 65,000 colours, all LCD's with 800 x 600 resolution
- PCI 64 bit local bus graphics accelerator giving notebook resolution of 800 x 600 and external monitor display up to 1024 x 768
- Software MPEG-1 playback with DCI support
- 1.44mb floppy drive built in
- 16 bit stereo waveform sound card
- Built in stereo speakers and microphone
- Standard x8 speed CD-ROM interchanges with FDD
- External FDD kit allows CD and FDD to be used at once
- BIOS and Microsoft APM compatible power management
- LCD status panel
- Intuitive front mounted trackpad pointing device
- Type III PC Card slot (Takes 1 x type III or 2 x type II)
- Zoom video support
- Extra high capacity NiMH battery, smart with gas gauge
- External battery capacity check
- Up to 2 - 3 hours battery life (with power management)
- IrDA Infrared Port (HP compatible)
- 1 enhanced serial port, 1 EPP parallel port, external CRT port, external keyboard/mouse port, audio connectors
- Windows 95 UK keyboard
- Full security with password protection and Kensington lock support
- Multi voltage 110-240v charger / power supply
- Weight 2.7kgs with hard drive and battery
- 1 year parts and labour warranty
- Windows 95 preloaded and (preloaded & on CD)
- Tel-Me business information software (pre-loaded)
- Accura Elite Slim case included



Full function, slim, light weight

The Elite Slim is the latest machine from Adams. Made by the same manufacturer as the Elite, it has the same or better features. A 42mm depth and only 2.7kgs weight allows the Elite Slim to be carried easily in a briefcase, making it ideal for the business man on the move. The 8 speed CD-ROM drive can be easily interchanged with floppy drive. If you want to use both together then a kit is enclosed that allows this. The Elite Slim has full MPEG functionality with DCI support and also features a Zoom Video port. A waveform 16 bit sound card with speakers is installed.

The latest Intel Mobile Triton chipset makes for an efficient low power consuming machine with battery life better than many other notebooks available today. To wrap it up the Elite Slim comes preloaded with Windows 95 and Tel-Me business information. An incredible bundle in an incredibly small package, call sales on 0161 282 8822 and find out why the Elite Slim is going to be the machine for 1997!

Elite Slim pricing

Model	11.3" DSTN	12.1" TFT
Pentium- 133	£1599 (1078.03)	£1999 (2348.03)
Pentium- 150	£1669 (1961.00)	£2069 (2431.00)

Elite Slim upgrades & options

Memory upgrade to 24mb	£96
Memory upgrade to 40mb	£288
Hard drive upgrade from 1.0gb to 1.3gb	£249
Hard drive upgrade from 1.0gb to 2.0gb	£499
PC Card Fax / Modem 14400	£109
PC Card Fax / Modem 28800	£169
PC Card ethernet adaptor (UTP and Coax)	£99
PC Card SCSI adaptor	£169
Mini Dock	£275
Car power adaptor	£49
Spare Ni Mh battery	£89
Second 110/240 autoswitching AC PSU	£59
3 year parts and labour warranty	£CALL
Vision 3 year parts, labour & accidental damage wty	£CALL
MS Office 95 Professional with Bookshelf (CD) (must be purchased with notebook)	£199
Microsoft Encarta 96 (CD)	£35
Microsoft Works V4.0 (CD)	£35
Yamaha M15 powered speakers	£49



Mouse, PC Cards, Audio, Front mounted trackpad, CRT, parallel, FDD and serial port, Docking station port



Elite slim with CD-ROM installed, LCD status panel, main on/off switch, Elite slim with CD and FDD fitted, Only 42mm thick!

Elite Slim from £1599



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Premium PC's for the home or office - knockout warranty

Family Value

Brilliant multimedia machine for the new user

All features as standard Premium system plus

- IBM 6x86 P150+ CPU
- 256 pipeline burst cache
- 16mb EDO RAM
- 1.2gb EIDE hard drive
- 64 bit S3 graphics card with 1mb DRAM
- 14" Accuscan monitor, 1024 x 768, max refresh 72hz
- 16 bit stereo sound card
- Speakers
- MS Works 96

£899 + VAT (1056.33)



Workstation

For the serious home or office user

All features as standard Premium system plus

- Intel Pentium P166 CPU
- 512k pipeline burst cache
- 16mb EDO RAM
- 2.0gb EIDE hard drive
- Soundblaster Pro 16 PNP with quality powered speakers
- Matrox Mystique 3D graphics card, 2mb SGRAM
- 15" Accuscan monitor, 1280 x 1024, max refresh 75hz
- MS Office Professional 95 (CD)
- MS Bookshelf (CD)

£1499 + VAT (1761.33)



Premium

The best business workstation

All features as standard Premium system plus

- Intel Pentium P133 CPU
- 256 pipeline burst cache
- 16mb EDO RAM
- 2.0gb EIDE hard drive
- Matrox Mystique 3D graphics card, 2mb SGRAM
- 15" Accuscan monitor, 1280 x 1024, max refresh 75hz
- MS Office Professional 95 (CD)
- MS Bookshelf (CD)

£1249 + VAT (1467.58)



Knockout machines!

When value for money counts, Adams built home and office PC's are the best around. Their award winning design, proven reliability and ultimate quality and style make them the best value for money available today. Personal Computer World in Nov 96 said in a long term review "... proved a resilient and reliable system." Something worth considering when looking for low cost of ownership.

All Premium systems include:

- Intel 430VX based motherboard
- Ultra fast 64bit EDO RAM
- Eight speed CD-ROM drive
- 64 bit graphics card
- 3 year parts and labour warranty (1st year on site)
- Windows 95 keyboard
- Microsoft Mouse
- Windows 95 (preloaded and on CD)
- Tel-me business information software (preloaded)
- Adams quality injection moulded, stainless steel lined desktop case.

Megastation

Pentium Pro for the home

All features as standard Premium system plus

- Intel Pentium Pro 180 CPU
- 256k on CPU cache
- 16mb EDO RAM
- 3.2gb EIDE hard drive
- Soundblaster Pro 16 PNP with quality powered speakers
- Matrox Mystique 3D graphics card, 2mb SGRAM
- 17" Accuscan monitor, 1280 x 1024, max refresh 75hz
- MS Office Professional 95 (CD)
- MS Bookshelf (CD)

£1999 + VAT (2348.83)



Multimedia

Top spec, top of the range multimedia

All features as standard Premium system plus

- Intel Pentium P200 CPU
- 512k pipeline burst cache
- 32mb EDO RAM
- 3.2gb EIDE hard drive
- Soundblaster 32PNP with Yamaha M15 speakers
- Matrox Mystique 3D graphics card, 2mb SGRAM
- 17" Accuscan monitor, 1280 x 1024, max refresh 75hz
- MS Office Professional 95 (CD)
- MS Bookshelf (CD)

£1999 + VAT (2348.83)



Premium Upgrades & Options

CPU upgrade from IBM 6x86 150+ to 166+	£39
CPU upgrade from IBM 6x86 166+ to 200+	£109
CPU upgrade from Intel Pentium P133 to P166	£179
CPU upgrade from Intel Pentium P166 to P200	£99
CPU upgrade from Intel Pentium Pro 180 to 200	£149
Memory upgrade to 16mb to 32mb	£99
Memory upgrade to 32mb to 64mb	£229
Yamaha M15 powered speakers	£49
Internal 33.6 British made modem	£89
Seagate 3.2gb internal Travan tape streamer	£199



Premium PC's from £899

The best professional workstations anywhere

Pro Workstation

Serious business users only

All features as standard Professional system plus

- IBM 6x86 P200+ CPU
- 512k pipeline burst cache
- 32mb EDO RAM
- 2.0gb EIDE hard drive
- Matrox Mystique 3D graphics card, 2mb SGRAM
- 15" Accuscan, 1600 x 1200, 100hz
- MS Windows 95 (preloaded and on CD)
- MS Office Professional 95 (CD)
- MS Bookshelf (CD)

£1649 + VAT (1937.58)



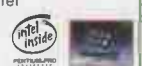
Pro CAD

Autocad Design Station

All features as standard Professional system plus

- Intel Pentium Pro 180 CPU
- 256k on CPU cache
- 32mb EDO RAM
- 3.2gb EIDE hard drive
- Matrox Mystique 3D graphics card, 4mb SGRAM
- 17" Iiyama Vision Master Pro, 1600 x 1200, 100hz
- Calcomp 12" x 12" digitiser
- Seagate 3.2gb travan internal tape streamer
- MS Windows NT 4.0 (preloaded and CD)

£2699 + VAT (3171.33)



Pro Multimedia

For the developer or professional business user

All features as standard Professional system plus

- Intel Pentium 200 CPU
- 512k pipeline burst cache
- 32mb EDO RAM
- 3.2gb EIDE hard drive
- Soundblaster 32PNP with Yamaha M15 speakers
- Matrox Mystique 3D graphics card, 4mb SGRAM
- 17" Iiyama Vision Master Pro, 1600 x 1200, 100hz
- MS Windows 95 (preloaded and on CD)
- MS Office Professional 95 (CD)
- MS Bookshelf (CD)

£2499 + VAT (2936.33)



Professionals - Where performance counts

With every Adams Professional system, we concentrate highly on performance. Every component is carefully selected to be the fastest available, all machines are hand built for every customer. When you're spending a lot of money you want to get something special. That's what the Professionals give you, the fastest of everything available.

Call our sales team on 0161 282 8822 for latest price and spec updates.

Pro DTP

Desktop Publishing Design System

All features as standard Professional system plus

- Intel Pentium Pro 180 CPU
- 256k on CPU cache
- 32mb EDO RAM
- 4.0gb ultra wide SCSI hard drive with 32 bit UW controller
- Matrox Mystique 3D graphics card, 4mb SGRAM
- 17" Iiyama Vision Master Pro, 1600 x 1200, 100hz
- Seagate 3.2gb travan internal tape streamer
- MS Windows 95 (preloaded and on CD)
- MS Office Professional 95 (CD)
- MS Bookshelf (CD)

£3199 + VAT (3758.83)



Pentium Pro

Speed freaks this is it

All features as standard Professional system plus

- Intel Pentium Pro 200 CPU with 256k on CPU cache
- Intel 440FX Natoma chipset dual P-Pro motherboard
- 32mb EDO RAM
- 3.2gb EIDE hard drive
- Soundblaster 32PNP with Yamaha M15 speakers
- Matrox Mystique 3D graphics card, 4mb SGRAM
- 17" Iiyama Vision Master Pro, 1600 x 1200, 100hz
- Seagate 3.2gb Travan Internal tape streamer
- MS Windows NT 4.0 (preloaded and on CD)
- MS Office Professional 95 (CD)
- MS Bookshelf (CD)

£2999 + VAT (3523.83)



All Professional systems include:

- Intel 430HX or 440FX based motherboard
- Ultra fast 64bit EDO RAM
- x12 speed CD-ROM drive
- Top line graphics card
- 3 year parts and labour warranty (1st year on site)
- Accutouch heavy duty keyboard
- Microsoft Mouse
- Tel-me business information software (preloaded)
- Adams quality injection moulded stainless steel lined tower or desktop case.

Professional's from £1649

Professional Upgrades & Options

CPU change from IBM 6x86 200 to Intel P200	£119
CPU upgrade from Intel Pentium Pro 180 to 200	£149
Memory upgrade to 32mb to 64mb	£229
Memory upgrade to 64mb to 96mb	£229
Monitor upgrade from Iiyama 17" to 21" Iiyama VM Pro	£879
Soundblaster 32PNP	£99
Yamaha M15 powered speakers	£49
32 bit PCI ethernet card 10mpbs	£59
Sony SDT 5000 4-16gb DAT (Internal)	£689



Pentium Pro RAID Servers - Constant data on stream



Integrated RAID

- Intel Pentium Pro 180/200mhz CPU (single CPU installed)
- Std dual or CPU card based motherboard
- 256k on CPU cache
- 64mb RAM
- 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.
- 6 speed SCSI CD-ROM with SCSIcont.
- 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 heavy duty keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Windows NT 4 (5 user licence)



Case accommodates 8 removable RAID drives and 8 secondary units



PCI's mounted in alloy glass fibre cabinets, hot spare provision



400w PSUs can be hot swopped, spare unit fitted in lower case

Adams are here to serve you. Our servers are ready and willing to dish out information continuously, as and when you need it, night and day. Our powerful Modu-RAID and Integ-RAID are unique in providing some of the most powerful quality solutions around at a very inexpensive price.



All Adams servers now feature either single or dual Pentium Pro motherboards. These provide maximum performance for minimum cost. On the Integrated RAID we offer the choice of either a standard dual Pentium Pro motherboard or a CPU card based motherboard allowing many more expansion options.

The Modu-RAID offers a "building block" style external disc array, providing the ability to upgrade your server as requirements dictate, from a 3 disc RAID upwards, even peripherals like DAT, can be added to the external block if required.

Accura Integ-RAID gives a traditional server layout, with up to 6 removable drives integrated into the case. Features include a redundant power supply system with "quick change" spare, a high efficiency cooling system and the ability to integrate further peripherals like DAT, CD-ROM and optical drives. The Accura Integ-RAID is one of the most cost effective high performance server systems available.

Our Pro Servers are designed with the small workgroup in mind, with either single or dual Pentium Pro 180's or 200's.

Call technical sales on
0161 282 8822 to find out more.

RAID Servers from £3999



Modular RAID

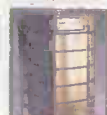
- Intel Pentium Pro 180/200 CPU
- Single or dual CPU motherboard (1 CPU installed)
- Intel Natoma 440FX chipset
- 256k on CPU cache
- 32mb RAM
- Modular expandable RAID enclosure with redundant PSU's
- 4.0gb addressable RAID level 5 array, with 3 x 2gb fast SCSI-II hard drives
- DPT PCI 32-bit bus mastering RAID controller with 4mb cache memory
- 6 speed SCSI CD-ROM drive
- 3.5" 1.44mb floppy drive
- Fast PCI graphics card with 1mb RAM
- 14" Accuscan energy saving, MPR-II monitor, NI, max res 1024 x 768
- 2 serial (16550), 1 parallel port (EPP/ECP)
- 32 bit 100mbps PCI bus mastering ethernet card
- Accura tower case with 200w PSU
- Accutouch heavy duty keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Windows NT 4.0 (5 user licence)



Full redundancy and hot swappability of drive modules and PSU's



Extra mount modules just slip on, no cabling is required



Extra peripherals like DAT can be added to the Modular RAID unit

Integrated RAID pricing (1CPU installed)

Model	Dual P-Pro	CPU Card
Pentium Pro 180	£5999	£6199
Pentium Pro 200	£6148	£6348

Modular RAID pricing (1CPU installed)

Model	P-Pro	Dual P-Pro
Pentium Pro 180	£3999	£4249
Pentium Pro 200	£4148	£4398

Professional Servers - the key to getting connected



Professionals - Where performance counts

- Intel Pentium Pro 180/200 CPU
- Single or dual CPU motherboard (1 CPU fitted)
- 256k on CPU cache
- 32mb RAM
- 4.0gb 8.5ms wide SCSI hard drive with DPT2044 PCI 32-bit bus mastering SCSI controller (caching and RAID upgradeable)
- 6 speed, SCSI CD-ROM drive,
- 3.5" 1.44mb floppy drive
- Fast PCI graphics card with 1mb RAM
- 14" Accuscan energy saving, MPR-II monitor, NI, max res 1024 x 768
- 2 serial (16550), 1 parallel port (EPP/ECP)
- 32 bit PCI 10mbps bus mastering ethernet card
- Tower case with 200w PSU
- Accutouch heavy duty keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Windows NT 4 (5 user licence)

Pro Server pricing (1CPU installed)

Model	P-Pro	Dual P-Pro
Pentium Pro 180	£2899	£3148
Pentium Pro 200	£3048	£3298

Server options & upgrades

180mhz Pentium Pro CPU (inc H/S & fan)	£389
200mhz Pentium Pro CPU (inc H/S & fan)	£525
32mb → 64mb memory	£229
64mb → 96mb memory	£229
Pro Server 2gb → 4gb wide SCSI HDD upgrade	£365
Pro Server 2gb → 9gb wide SCSI HDD upgrade	£720
DPT 2044 → DPT2144 SCSI controller (faster!)	£149
DPT RC4040 cache & RAID module (for above, 0mb)	£349
Modu-RAID upgrade from 2gb → 4gb capacity (2 extra 1gb SCSI-II drives and 2 mount modules)	£879
Modu-RAID 4gb → 8gb upgrade (5 x 2gb SCSI-II)	£1099
Modu-RAID 4gb → 16gb upgrade (5 x 4gb SCSI-II)	£2995
Integ-RAID upgrade to 5 drives (8gb capacity) (2 extra 2gb W-SCSI drives and 2 alloy mounts)	£1249
Integ-RAID 8gb → 16gb upgrade (5 x 4gb W-SCSI)	£1749
RAID cache upgrades (per 1mb)	£10
4-16gb DDS-2 DAT drive mounted mounted in main server	£689
10mbps PCI ethernet card (combo)	£69
10/100mbps PCI ethernet card (UTP only)	£129
Separate external 2gb Modu-RAID box with 2 x PSU's, 3 x m/modules containing 3 x 1gb SCSI-II HDD's	£1149

Pro Servers from £2899

Ordering

We are pleased to accept enquiries between 9am and 6pm Monday to Friday. All Adams PC's, Servers and Notebooks Servers are built specifically to order. We accept cheque with order, Visa, Mastercard or American Express. PO's are welcome from FTSE100 listed companies and government departments. Carriage charges Notebooks £15, PC's £20-25, Servers £20-£35. All prices quoted are subject to VAT, prices indicated in this advertisement in brackets are VAT inclusive

For your peace of mind Adams offer a 3 year parts and labour warranty on your Accura Server or PC. 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.

If you cannot see a specification that suits here, please call sales and we would be grateful to quote for any specification that you may require. Direct Sales telephone 0161 282 8822



Adams' are the official computer supplier to Williams Renault for 1996/1997



Advanced Computer Technology

ADAMS TECHNOLOGY LTD, CITY POINT, CHESTER RD, OLD TRAFFORD, MANCHESTER M32 0RW UK. FAX: 0161 283 1001

*All sales subject to Adams Technology's terms and conditions (available on request) EAOE Jan 97



CLICK

Making Memory Easy... Desktop PC Memory

Find the type of memory for your PC, or call our experts for help - Its FREE !

AMSTRAD

- 7 Series
- 9 Series

APPLE

- Quadra 700,900,950
- Performa 200,410,430
- Quadra 610,650,800,840
- LC475,LC550,LC630
- PowerMac 6100,7100
- Performa 5200,5300
- Performa 6200

AST

- Bravo LC,LRM5,MT
- Premmia 486

COMPAQ

- ProLinea 4/25,
- 4/33,4/33s,
- 4/50,4/66,MT,P75
- Presario all models

COLOSUS

- P75,P90,P100,P120
- P133,P150,P166

DAN

- 95s,Premium,
- Windows,
- Dantum
- Ultimate

DELL

- Performance L,M,T
- ME
- Dimension XPS
- XPS Pentium
- Omniplex
- Optiplex
- Precision 486
- Precision Pentium

ELONEX

- PC433,450,466
- PC500, PC560

ESCOM

- DX2,P60,P75,P100

EVESHAM

- Vale Prima
- Vale Prestige
- Platinum
- Proline

GATEWAY

- PC4sx33,DX33v,
- 66v,P/V,
- P4D
- P575,90,100,120,
- 133 EDO
- 133 Elite
- 166 Sovereign

HIGHMEAD

- DX2/66,DX4/100
- P75,P90,P100

ICL

- Ergo Pro

HEWLETT PACKARD

- Vectra/Netserver
- LF/LM
- N2,M2,XM2,VL2

IBM

- Aptiva 300 Series
- 700 Series
- Valuepoint
- P5/2

MITAC

- DX2/66,DX4/100,
- P60

M/JN

- DX2/66,DX4/
- 100,P75,P100, P120
- P133

OPUS

- DX2/66,DX4/100,
- Prelude
- Premier,Prestige
- Triton

PACKARD BELL

- 386, 486sx
- 486DX

SIMPLY

- DX2,DX4,P60,75,90
- Windows 95
- Office 95

VIGLEN

- Genie 486, Contender
- Pentium EX
- Pentium EDO
- Power 100
- Ultimate 120,133
- Genie PCI

Decide how much more memory you need - Remember if you have a Pentium PC you need to upgrade in pairs (eg. for 16Mb you need 2 x 8Mb modules)

Memory Type / Size	1Mb	4Mb	8Mb	16Mb	32Mb
30 Pin	£8	£19	-	-	-
72 Pin Parity	-	£22	£44	£79	£169
72 Pin Non Parity	-	£15	£27	£65	£137
72 Pin EDO 60ns	-	£15	£27	£65	£137

Prices may be subject to fluctuation. Call to check - it's free.

Prices exclude Carriage + 17.5% VAT Business only prices - consumers please call



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Prices (Ex Vat)

Business user Prices shown - Please add VAT at 17.5%.
(ie £100 item + £10 delivery + £19.25 VAT = £129.25)
Prices may change without notice.

Warranty & Support

All of the memory products we sell are covered by our own 5 year swap out warranty and 14 day Money Back Offer. Should you have a problem our dedicated after sales team will be waiting to help - Call 01705 662299

Delivery

£10 +VAT per order - UK Mainland next working day.* - Fully Insured
*if you pay by credit card before 4.30pm for items in stock we will despatch that day for delivery the next working day, UK Mainland only. Excludes outlying areas, parts of Scotland and all orders placed on Saturday. If you require delivery on Saturday or off the mainland please call for price.

Payment

We make no surcharge for credit card use.
We will not debit your card before the day of despatch.
We despatch same day when you order before 4.30pm.
Please allow 7 working days for cheques to clear before despatch.
Proforma invoices will be supplied on request.
Bank Transfers Welcome - Please ask for details.

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We welcome official orders from all Government bodies.
Our terms for these orders are strictly 30 days from invoice date.

Partners: ORM & J Furby E&OE.

Click is a Specialist Trading Division of Novatech, Blueprint 1400 Dundas Spur Portsmouth PO3 5RW

FREEPHONE 0800 666500

Notebook Memory

Find your Notebook, or call our experts for help if its not listed - Its FREE !

	4Mb	8Mb	16Mb	32Mb		4Mb	8Mb	16Mb	32Mb
AST					IBM				
Ascentia 700, Bravo Notebook	●		●		Thinkpad 701,230C,230CS	●	●	●	
Ascentia 800N 4/33, 4/50	●	●	●		ThinkPad 700, 700C, 720,720C	●	●	●	
Ascentia 900N 4/50, 4/75	●	●	●		ThinkPad 730T,730TE,345C,345CS,355,360	●	●	●	●
Ascentia 950N		●	●	●	ThinkPad 750,755,370C	●	●	●	●
Ascentia J Series		●	●	●	ThinkPad 760C,760CD,760L,760LD	●	●	●	●
Ascentia P Series		●	●	●	ThinkPad 760EX,760ED,760EL,365X,365XD,560,535	●	●	●	●
Power Exec 4/25SL Colour	●				NEC				
COMPAQ					UltraLite Versa, Versa E, M, P, V 4000 P75	●	●	●	●
LTE Lite 4/25C,33C,25E,25SL Mono Notebk	●	●	●		Versa 4050 P90, Versa 4050H, 6000	●	●	●	●
LTE Elite 4/40C, /50E, /40CX, /50CX, /75CX	●	●	●	●	Versa S,2000	●	●	●	●
LTE 5000Series 5000P75,5100P90,5200 P120	●	●	●	●	OLIVETTI				
Concerto 4/25, 4/33	●	●	●		Echos Pentium series				
Contura 4/25, 4/25c, 4/25cx	●	●	●		PANASONIC				
Contura 400C, 400CX, 410, 410C, 410CX	●	●	●		CF21PCF41mkII,mkIII,Pentium	●	●	●	
Contura 420 Dx4/75, 430 Dx4/100	●	●	●		TEXAS-INSTRUMENTS				
Contura Aero 4/25, 4/33C	●	●	●		E xtensa 450,455,455T,550,555CD,560,565	●	●	●	●
Armada 1100 series, 4100 series				●	E xtensa 510		●	●	●
DEC					Travelmate 5000M,5300M,6000		●	●	●
DEC Hi-Note	●	●	●		TOSHIBA				
DEC Hi-Note Ultra	●	●	●		Portege 610CT, Satellite Pro 4000CS, 4000CDT		●	●	●
DEC Hi-Note VP	●	●	●	●	Tecra T500, Portege 650		●	●	●
DELL					Tecra T700CS,T700CT		●	●	●
Latitude 425,433,433c,433cx,450c,450cx	●	●	●		Tecra T710CS, T710CT, T720CS, T720CT, T730		●	●	●
Latitude XP 450c,475c,4100c,4100cx, XPi	●	●	●		T2000, T2000SX, T2000SXe, T2200SX;	●	●	●	●
Latitude MX,MC,LX4100C	●	●	●		T1000LE, T1800, T1850, T1850C Notebook	●	●	●	●
Latitude XPi 100,133	●	●	●	●	T2100/CS/CT, T2105/CS/CT;	●	●	●	●
HEWLETTPACKARD					T2150CDT, T2150CDS, T2155CDT, T2155CDS;	●	●	●	●
Omnibook 600C,600CT	●	●	●		T2110,T2115,T2130,T2135	●	●	●	●
Omnibook 4000,5000,5500	●	●	●		T4400, T6400, T6600 Notebook (All)	●	●	●	●
					T4500, T4600, T4700, T4800, T4850CT;	●	●	●	●
					T1900, T1910, T1950, 1960 (All), T4900CT;	●	●	●	●
					T2400,T2450,T3400,T3600	●	●	●	●

Memory Size	4Mb	8Mb	16Mb	32Mb
Price Band A	£45	£75	£139	£239
Price Band B	£49	£89	£149	£289
Price Band C	£55	£95	£159	£319
Price Band D	£59	£99	£179	£349

Prices exclude Carriage + 17.5% VAT Business only prices - consumers please call

5 Years
We are so confident in the quality and reliability of our memory we will give you a 5 year exchange warranty

3 Money Back
If you are not entirely satisfied with our memory simply return it to us within 14 days for a full refund (less carriage charges)



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Fax 01705 663919 375



Printers

Brother

Lasers

HL730 600dpi	£269
HL760 600dpi Mb	£327
HL1060 600dpi 10ppm	£533
HL1260e 600dpi 12ppm	£843

Canon

Inkjets

BJ30	£104
BJ70 Colour	£142
BJC240 Colour <i>New!</i>	£148
BJ230	£227
BJC4100 Colour	£169
BJC4200 Colour <i>New!</i>	£POA
BJC4550 A3 Portrait Colour	£279
BJC620 Colour <i>New!</i>	£269
BJ300	* £344
BJ330	* £386

Lasers

LBP460 300dpi	* £210
LBP1260+ <i>New!</i>	* £856

Epson

Dot Matrix

LX300	£92
FX870	£234
FX1170	£294
FX2170	£369
LQ300	£112
LQ570+	£206
LQ870	£365
LQ2070	£319
LQ2170	£464

Inkjet

Stylus 200 <i>New!</i>	£99
Stylus Colour 200 <i>New!</i>	£129
Stylus Colour 500	£187
Stylus Colour Pro A4	£295
Stylus Colour Pro XL+ A3	£797
Stylus 1500 A2 Portrait	£502

Lasers

EPL5500W Win 95 Only	£246
EPL5500 1Mb	£327
EPL5500 2Mb	£371
EPL5500 5Mb P/Script	£659

Hewlett Packard

Inkjet

DeskJet 340 CBI <i>Color + Batt + I/Red</i>	£168
DeskJet 400	£109
DeskJet 690C	£185
DeskJet 820Cxi	£251
DeskJet 870Cxi	£296
DeskJet 1600C	£809
DeskJet 1600CM PS	£1214
OfficeJet 350 <i>Scanner Fax & Printer</i>	£459

Lasers

LaserJet 5L	£287
LaserJet 6P <i>New!</i>	£485
LaserJet 6MP <i>New!</i>	£597
LaserJet 5	£859
LaserJet 5N	£1013
LaserJet 5M	£1172
LaserJet 4V A3	£1369
LaserJet 4MV Pscript A3	£1989

Colour Lasers

Colour LaserJet 5C	£4158
Colour LaserJet 5M	£5129

Lexmark Lasers

Optra R+ 4Mb	* £868
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QMS Colour Lasers

MagiColor WX 600dpi 4Mb	£2529
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No of * = No of years On-Site Maint.

Printers

brother® HL-730



- Fast 6 pages per minute
- 600dpi printing in MS Windows
- GDI mode for MS Windows printing
- PCL4 emulation for MS-Dos printing
- 24Bitmap & 35 True Type fonts
- Straight paper path + 200 Sheet tray
- Optional interface for networking

HL-730 £267^{+vat}

HL-760



- Fast 6 pages per minute
- 1200x600dpi printing in MS Windows
- Brother's Printing System for Windows
- PCL4e emulation for MS-Dos printing
- Straight paper path + 200 Sheet tray
- Optional Interface for networking

HL-760 £327^{+vat}

HL-1260



- Fast 12 pages per minute
- 1200x600dpi
- Postscript Level 2 & PCL5e emulation
- 2Mb Ram expandable to 66Mb
- Dual Bin- 150sheet + 500sheet
- Optional 500 bin & duplex unit
- Networking Models available
- 12 months on-site warranty

HL-1260 £839^{+vat}

Printers

Canon BJC-4200



- Superb 720x360 dpi colour output
- Optional BC-22 Photo Cart for Photo realistic images with PhotoRealism™
- Supports wide range of media including High Resolution paper
- Optional BC-20 High speed, High capacity black ink cartridge
- Windows 3.1x & Windows 95 drivers

BJC-4200 £POA

BJC-4550



- A3 colour printing at 720x360dpi
- Optional BC-22 Photo Cart for Photo realistic images with PhotoRealism™
- Supports wide range of A3/A4 media Including High Resolution paper, High Gloss and Back Print Film
- Optional BC-20 High speed, High capacity black ink cartridge
- Windows 3.1x & Windows 95 drivers

BJC-4550 £279^{+vat}

BJC-620



- True 720x720 dpi
- Four separate ink cartridges
- Increased speed in Photo Quality
- New WPS drive with uninstall Option
- Windows 3.1x & Windows 95 drivers for maximum compatibility

BJC-620 £269^{+vat}

Printers

hp HEWLETT PACKARD

The HP DeskJet 690 HP's Versatile Colour Inkjet Printer Brings Images Brilliantly to Life



- 600 x 600 dpi Black 600 x 300 dpi Colour
- Windows 95 Plug n Play compatible
- HP Photo Resolution Enhancement technology using optional HP Photo Cartridge
- 8 built in fonts 30 TrueType Typefaces
- 3 year Return to HP Warranty as standard
- Optional 3 year HP On-site Support for only £40

£185^{+vat}

The HP LaserJet 5L Now everyone can afford the luxury of thier own HP LaserJet.



- 600 x 600 dpi 4 pages per minute laser printing
- HP Ret giving smoother greys and sharper blacks
- 26 Scalable fonts
- HP PrintSmart for full MS Windows compatibility
- 1Mb effectively doubled by HP Met
- 100 Sheet Input Tray taking from A5 to legal paper
- 1 year Return to HP Warranty as standard
- Optional 3 year HP On-site Support for only £99

£287^{+vat}

The HP LaserJet 6P Professional, high-quality printing



- Fast 8 pages per minute 19 second first page out
- 600 dpi further improved by HP Ret + 128 gray
- 45 Scalable fonts + 65 on disk for Windows
- HP PrintSmart for full MS Windows compatibility
- 2Mb expandable to 50Mb
- 100 Sheet Input Tray taking from A5 to legal paper
- 1 year Return to HP Warranty as standard
- Optional 3 year HP On-site Support for only £142

£485^{+vat}



VOTED the Number 1. FOR PRINTERS



£5 for Next Day Delivery* on Software



Plotters

Model	Price
DesignJet 330 A4-A1 *	£1276
DesignJet 330 A4-A0 *	£1776
DesignJet 350C A4-A1 *	£1562
DesignJet 350C A4-A0 *	£2063
330/350 A1 legs, bin & roll feed	£269
330/350 A0 legs, bin & roll feed	£299
DesignJet 700 A4-A1 *	£2469
DesignJet 700 A4-A0 *	£2977
DesignJet 750C+ A4-A1 *	£3269
DesignJet 750C+ A4-A0 *	£3919



Software

Product	Price
Acrobat 3.0	£137
Illustrator v4.1	£240
Photoshop v3.0	£399
PageMaker 6.5	£388

Product	Price
Autodesk AutoCAD LT Win 3.1	£345
AutoCAD LT Win 95	£345

Product	Price
Corel Draw 3 CD	£35
Corel Draw 4 CD	£64
Corel Draw 5 CD	£137
Corel Draw 6 32-bit CD Win95	£264
Corel Draw 3&4 - 6 Upg CD	£224
Corel Draw 5 - 6 Upg CD	£97
Corel WordPerfect 7.0 Win 95 CD	£160
Corel W/P 7.0 comp upg CD	£64
Corel WordPerfect 6.1 CD	£160
Corel W/P 6.1 comp upg CD	£59

Product	Price
Dorling Kindersley P.B Bears Birthday Party	£16
First Incredible Amazing Dictionary	£16
The Way Things Work 2	£21
Ultimate Human Body 2	£21
Cross Section Stowaway	£16
Chronical of the 20th Century	£27
World Reference Atlas	£26
Encyclopaedia of Nature	£21
Encyclopaedia of Science	£21
Encyclopaedia of Space	£21
History of the World	£21
AMA Family Medical Guide	£25

Product	Price
Intuit Quicken for Windows 5 Disk	£26
Quicken for Windows 5 CD	£26
Quicken Deluxe 5 CD	£46
Quick Books v 3.0	£81

Product	Price
Lotus SmartSuite 4 Upg CD Win 3.11	£109
SmartSuite 96 Upg CD Win 95	£109
Lotus Notes 4 - Starter Pack	£564

Product	Price
Novell Netware v3.12 5 User	£475
Netware v3.12 10 User	£1075
IntraNetware 5 User CD	£475
IntraNetware 10 User CD	£1075

Product	Price
Quarterdeck CleanSweep 95	£27
Qemm v8	£47

Product	Price
Quark QuarkXPress	£559



Software

Product	Price
Microsoft Windows 3.1 Applications Upgrade Full Ver	
Office 4.2	£162 £325
Office Professional 4.3	£253 £429

Product	Price
Edutainment AutoExpress UK+Eire Win 3.5"	£29
AutoExpress UK+Eire Win CD	£38
AutoExpress Europe Win CD	£38
Encarta 1997 Encyclopedia	£34
Encarta 1997 World Atlas	£34

Product	Price
Windows 95 Windows 3.x to Windows 95 3.5"	£58
MS Plus! for Windows 95	£27

Product	Price
Windows 95 Apps Update Trade Full	
Access v 7 95	£81 £224
Excel v7 95	£81 £106 £222
Word v7 95	£81 £106 £222
Office 95 standard	£136 £159 £325
Office 95 Pro	£199 £239 £419
Project 95	£81 £281
Frontpage v1.1	£86
Money 97	£22
Publisher 97	£67
Works 4.0 + Bookshelf	£95

Product	Price
Windows 95 Edutainment Bookshelf 97	£45
Cinemanima 1997 CD	£21
Flight Simulator 6 CD	£29
Fury 3 + Sidewinder 3D Pro	£45

Product	Price
Windows 95 Languages Upgrade Full Ver	
Visual Basic 4	£34 £66
Visual Basic Pro 4 CD	£101 £319
Visual Basic Ent 4 CD	£345 £669
Visual C++ 4 CD	£69
Visual C++ 4 Pro+subs CD	£314
Visual J++ CD	£66

Product	Price
Windows NT v 4.0 Upgrade Full Ver	
NT Workstation 4.0	£104 £214
NT Server 4.0 + 5 Clients	£278 £564
NT Server 4.0 + 10 Clients	£376 £777
NT Client 4.0 Licence	£14 £26

Product	Price
Pegasus Capital Lite	£64
Solo Account	£49
Solo Payroll	£37

Product	Price
SoftQuad Hot Metal Pro v 3	£69

Product	Price
Symantec Norton Anti Virus Windows 95	£53
Norton Navigator 95	£39
Norton Utilities Windows 95 Upg	£48
Norton Utilities Windows 95 3.5"	£49
Norton Utilities Windows 95 CD	£89
Norton PC Anywhere v5 dos (HR)	£92
Norton PC Anywhere Windows	£92

Product	Price
S&S International Dr Solomons Anti Virus Windows	£65
Dr Solomons Anti Virus Win 95	£65

Product	Price
Travelling Software Laplink Pro v 5 Dos	£59
Laplink Pro v 5 Windows	£89
Laplink Pro 95 Windows 95	£95



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Business user Prices shown Please add VAT at 17.5%.
(ie £100 item + £10 delivery + £19.25 VAT = £129.25)
Prices may fluctuate - Please call before ordering - Its **FREE!**

Delivery

£5 +VAT per order, for software only orders

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UK Mainland next working day.*

*If you pay by credit card before 4.30pm for items in stock we will despatch that day for delivery the next working day. (UK Mainland only. Excludes outlying areas and orders placed on Saturday. If you require delivery on Saturday or off the mainland please call for price.)

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Please ask for details.

Government & Education

We welcome official orders from all Government bodies. Our terms for these orders are strictly 30 days from invoice date.

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In addition to any manufacturers warranty supplied, all the products we sell are covered by our own 12 month return to base warranty. Should you have a problem our dedicated after sales team will be waiting to help - Call 01705 662299

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Goods are not supplied on a trial basis. You must check specifications and compatibilities with manufacturers before buying. Specifications may change without notice. Goods are offered subject to our standard conditions of sale -



Opening Hours

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Personal collections are welcome. We hold large stocks but unfortunately we do not have any demonstration facilities.

Novatech
Blueprint 1400
Dundas Spur
Portsmouth
PO3 5RW

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Fax 01705 664244
After Sales 01705 662299



novatech



FreePHONE 0800 777500



Modems

US Robotics
The Intelligent Choice in Information Access

Sportster

Free Internet Software



Sportster Voice 33,600 FaxModem

Using the new 33,600 connection speed the U.S. Robotics Sportster Voice 33,600 is able to achieve a transfer rate of 33,600bps. The US Robotics Sportster Voice can also take messages while you are out and, comes with everything needed for the instant connection to the internet.

Sportster Voice 14,400 £75

Sportster Voice 33,600 £129

Sportster X-Jack

Now you can hold V.34 modem in your palm



Designed to support the industry standard PCMCIA 2.0 interface, slotting neatly into a PC or notebook computer, Sportster X-Jack keeps you in touch wherever you are. Drawing power directly from the computer, it delivers the features and performance that previously only a desktop modem could provide. Now with revolutionary X-JACK Connector to reduce the bulk associated with conventional DAA connectors.

Sportster X-Jack 28,800 £129

COURIER I

V.34 Analogue or ISDN

The Courier I-modem is ideal for multiple applications requiring both analogue and ISDN connectivity because it allows access to ISDN services but still maintains compatibility with existing analogue devices.

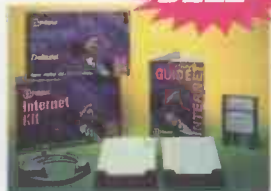


Courier I-modem £269

US Robotics
The Intelligent Choice in Information Access

Modems

Hayes



ACCURA 288 Fax Modem

Get connected to the Internet with the Accura 288 from Hayes
The Inventor of the PC Modem

Hayes

Accura 14.4 + Fax £74
Accura 28.8 + Fax £112
Accura 28.8 Message £134

Motorola

3400 Pro PC £102
3400 Pro Online Internet Pack £109
Premier 33.6 £169
Bit Surfer Pro ISDN £209

novatech 33.6 NetSurfer Data/Fax/Voice Modem



The new Novatech 33.6 NetSurfer is able to connect directly to Pipex at an incredible 33.6 Kbps using the Pipex Trial Dial 30 day free internet connection pack included.

- Fully B.A.B.T. Approved
- Cheyenne Data/Fax/Voice Software
- 14.4 & Group III fax compatible
- Pipex Dial Trial
- MS Windows 95

£84 +vat

Novatech

33.6 Data/Fax Internal £79
33.6 Data/Fax/Voice Ext £84

Psion/Dacom

Surfer 33.6 £119
Surfer Pro 33.6 £121

US Robotics

Sportster Voice 14,400 £75
Sportster Voice 33,600 £129
Sportster Voice 33.6 Internal £129
Sportster 28.8 X-Jack PCMCIA £129
Courier v34 33.6 External £197
Courier v34 33.6 Internal £197
Courier I 33.6/ISDN External £269
Courier I 33.6/ISDN Internal £269

High Speed Serial Card £15

APPROVE connection to telecommunication services specified in the instructions. Subject to the conditions in them.

CD Drives

Goldstar

GCD/R580B Eight Speed EIDE £65

Hitachi

Eight Speed EIDE 125ms acces £64

HP CD Reader/Writer

4020i Quad SCSI Kit £359
6020i 6 x read 2 x write scsi int £405
6020e 6 x read 2 x write scsi ext £489
6020ep 6 x read 2 x write parallel £489

Novatech

Eight Speed IDE £64

Soundcards

Creative Labs

Sound Blaster 16 Value IDE £56
Sound Blaster 32 PnP IDE £76
Sound Blaster AWE32 IDE PnP £114

Zifi Speakers

Zi-Fi Speakers £25
Zi-Fi Pro Speakers £39

Mice

Logitech

Pilot Serial Mouse £15
Mouseman 96 £27
Trackman Marble £45
Trackman Voyager £45

Microsoft

Home Mouse £17
Mouse 2 Serial & PS/2 Intellipoint £35
Mouse 2 Serial & PS/2 Intellimouse £43

Network cards

3COM Etherlink III3C509B

Connection	Bus	1 Pack	5 Pack
BNC	ISA	£66	£293
RJ45	ISA	£65	£276
BNC & RJ45	ISA	£75	£325

Kingston Network Cards

Connection	Bus	1 Pack	6 Pack
BNC & RJ45	ISA	£24	£129
BNC & RJ45 PnP PCI		£45	£259
10/100 Mbps PnP PCI		£65	
BNC & RJ45 PnP PCMCIA		£99	

Network tested and approved complete with drivers for Novell & Microsoft

Kingston Hubs

8 Port Stackable Hub £79
8 Port Workgroup Hub £95
16 Port Workgroup Hub £139
Call for other Kingston Hubs Prices

Network Cables

Length	BNC	RJ45
1 metre	£4	£5
3 metre	£6	£6
5 metre	£9	£10
10 metre	£15	£19

Memory

30 Pin

1Mb 70ns £8
4Mb 70ns £19

72 Pin Non Parity

1x32 4Mb 70ns £15
2x32 8Mb 70ns £27
4x32 16Mb 70ns £65
8x32 32Mb 70ns £137

72 Pin Parity

1x36 4Mb 70ns £22
2x36 8Mb 70ns £44
4x36 16Mb 70ns £79
8x36 32Mb 70ns £169

72 Pin EDO 60ns

1x32 4Mb £15
2x32 8Mb £27
4x32 16Mb £65
8x32 32Mb £137

168 Pin Dimms

1x64 8Mb £35
2x64 16Mb £60
4x64 32Mb £135
8x64 64Mb £275

168 Pin Synchronous DRAM

2x64 16Mb £85
4x64 32Mb £169

Processors

Intel

Pentium 120 £98
Pentium 133 £147
Pentium 150 £206
Pentium 166 £294

OverDrives

DX4 OverDrive

33Mhz to 100Mhz £109
Please state if you have an empty Overdrive socket or require a chip replacement when ordering

Pentium OverDrive

to fit 486 25Mhz £87
to fit 486 33Mhz £119
60/66Mhz to 120/133Mhz £165
75Mhz to 125Mhz £165
90Mhz to 150Mhz £215
100Mhz to 166Mhz £309

Joysticks

Microsoft

Sidewinder 3D Pro £37
Sidewinder 3D Pro + Fury 3 £43
Sidewinder 3D Pro + Earth Seige 2 £45

Keyboards

Microsoft

Natural Keyboard £49

Novatech

105 Key Windows 95 Keyboard £12

Next Day Delivery* if you order before 4.30pm

Hard Drives

Quantum IDE			
1200AT	1.2Gb	11ms	£126
Seagate IDE			
ST31081A	1Gb	14ms	£107
ST31276A	1.2Gb	12.5ms	£117
ST31621A	1.6Gb	14ms	£142
ST32140A	2.1Gb	10ms	£172
Western Digital IDE			
AC-31200	1.2Gb	10ms	£129
AC-31600	1.6Gb	10ms	£144
AC-321000	2.1Gb	10ms	£179
AC-325000	2.5Gb	10ms	£198
AC-331000	3.1Gb	10ms	£259

Tape Streamers

Colorado	
T1000 400/800 Mb Travan Internal	£79
T1000e 400/800 External Parallel	£99
T3000 1.6/32Gb Travan Internal	£119
T4000S 4Gb Travan Internal Scsi	£235
T4000ES 4Gb External Scsi	£299
Iomega	
Ditto 800 Internal	£75
Ditto 800 External Parallel	£94
Ditto 3200 Internal	£179
Ditto 3200 External Parallel	£206
Seagate	
TapeStor 3200 Travan Internal	£149

Other Drives

Iomega	
ZIP Drive 100Mb Ext Parallel	£108
ZIP Drive 100Mb Int SCSI	£108
ZIP Drive 100Mb Ext SCSI	£108
JAZ Drive 1Gb Internal SCSI	£269
JAZ Drive 1Gb External SCSI	£319
SysQuest	
EZ Flyer 230Mb External SCSI	£189
EZ Flyer 230Mb External Parallel	£189
<small>All Sysquest EZ drives supplied with one Cartridge</small>	
Xyratex	
MaxIT SCSI (blue or yellow)	£279
MaxIT Parallel (blue or yellow)	£355

Interface Cards

Controller Cards	
IDE 2Hdd 2Fdd 1Parr 2 Ser 1Game	£14
Adaptec SCSI Controllers	
1542 CP ISA kit	£165
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2920 PCI kit	£95
2940 Ultra PCI kit	£158
2940 Ultra Wide PCI kit	£189
3940 PCI kit	£265
3940 PCI kit Ultra Wide	£312
3985 PCI kit	£465
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Monitors

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44M 14" .28dot 1024x768 NI LR	£177		
GS1505DM 15" 1024x768 NI LR	£209		
56M 15" .28 1024x768 NI FST	£249		
1727DM 17" 1024x768 NI OSD	£409		
Iiyama			
Dot Pitch	Size	Freq. KHz	
MF-8515F 0.28	15"	24-66	£249
MF8617E 0.26	17"	27-86	£489
MF8617ES 0.26	17"	27-86	£499
MF9017E 0.25	17"	27-92	£549
MF8221T 0.27	21"	24.8-94	£959
MF9021T 0.30	21"	24.8-94	£999
Philips			
14" 1024x768 I LR	£155		
15C 15" 1024x768 NI LR	£209		
20C 20" 1280x1024 NI LR	£679		

Sony	
CPD-15SF2 1024x768 NI LR	£297
CPD-17SF2 1024x768 NI LR	£509

Graphics Cards

Hauppauge	
Win TV PCI	£85
Win TV Cinema Pro Windows 95	£205
MATROX Windows 95 Plug n Play	
Millennium PCI Wram 2Mb	£120
Millennium PCI Wram 4Mb	£170
Mystique PCI 2Mb SGRam	£104
Mystique PCI 4Mb SGRam	£135

Diamond Stealth 64 PCI	
64 Video 2121 1Mb DRAM	£44
64 Video 2201 2Mb DRAM	£55
64 Video 3240 2Mb VRAM	£145
Diamond Edge 3D PCI	
2000 2Mb EDO	£75
3240 2Mb VRAM	£146
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Video Logic	
Grafixstar 600 2Mb PCI	£116

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Natural Keyboard	£49
Novatech	
105 Key Windows 95 Keyboard	£12

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SnapScan	£235
StudioScan II SI Adobe PhotoShop LE	£389
StudioScan II SI Full PhotoShop 3	£457
StudioStar Adobe PhotoShop LE	£548
Arcus II Full Adobe PhotoShop	£1289
DuoScan Full Adobe PhotoShop	£3395

Epson Colour Scanners			
	PC Para	PC Scsi	Mac Scsi
GTX5000	£246	£297	£246
GTX8500	£406	£435	£406
GTX9500	£524	£553	£524
GTI8500		£514	£514
GTI9500		£629	£634

Hewlett Packard	
ScanJet 4S Portable Mono	£158
ScanJet 4P Flatbed Colour	£309
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Visioneer	
Paperport VX Windows Mono	£209
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See next page for more details

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Series 3a 2Mb	£284
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Series 3c 2Mb <i>New!</i>	£319
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PSiWin Comms Link	£58

U.S. Robotics	
Pilot 1000	£195
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Software

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720dpi
Colour
on Plain
Paper

Affordable 720x720dpi photo-real colour and black inkjet printer.

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The New Epson Stylus Color 500 incorporates a powerful combination of many advanced Epson printing technologies: These now include software to monitor the status of the printer, including the ink levels and MS Windows 95 ICM and Macintosh ColorSync 2.0 compliant colour matching systems. Together with Epson MicroWeave, Epson MicroFeed, and Epson Error Diffusion, enable vibrant colours subtle graduated tones, and strong contrasting shades, to be rendered with remarkable precision.

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Offering high 720x720 dpi resolution, the versatile Stylus Color 500 delivers photo-real colour output onto a wide variety of materials, including plain, coated, and gloss papers, and OHP transparencies.

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Stylus Color 500 £187^{+VAT}

COVER plus **£65 + VAT**

EPSON

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Epson CoverPlus is a new extended warranty service designed to offer 3 years on-site repair, from the date of purchase, by an Epson trained engineer on Epson printers and scanners.

EPSON Stylus COLOR 200

720 dpi photo-real colour

New
From
EPSON



A stylish and affordable colour printing solution.

The EPSON Stylus 200 is a low cost premium colour inkjet printer, providing the perfect solution for personal and business use. The EPSON Stylus Color 200 provides the flexibility to deliver laser like mono and photo-real colour printing.

The Epson 'Auto-Colour' function analyses the page, selecting the optimum settings for the best results each time you print. In addition the new super penetrating and fast drying Inks, with reduced fading, give vibrant and richer colours.

The Epson Stylus Color 200 is Windows 95 ICM compliant ensuring accurate colour matching between the computer screen and printed output. The new printer driver includes a Video and Digital Camera mode. This ensures that optimum results are achieved when printing video or camera images.

EPSON Stylus COLOR Pro

Professional level colour printing



The Epson Stylus Pro produces photo-real 720 x 720 dpi output using the advanced Epson piezo printhead together with the sophisticated Epson MicroDot ink delivery system. Higher resolution enables smoother tonal gradations and colour blends, and sharper outlines to text and graphics. Epson MicroWeave technology virtually eliminates 'banding'

Perfect results every time for both PC and Mac users. Offering colour quality comparable to printers costing significantly more, the Epson Stylus Pro offers exceptional value for money

- Colour Inkjet Printer with network capability
- Enhanced 720x720 dpi photo-real colour output.
- Prints on full range of media.
- Ideal for photographic images and high quality business graphics.
- Windows and Mac compatible
- Optional PostScript emulation.

Stylus Color 200... £129^{+VAT} Stylus 200 mono £99^{+VAT}

COVER plus **£40 + VAT**

Stylus Pro A4 £295^{+VAT}

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GT-5000 scanner

Epson quality colour scanning.
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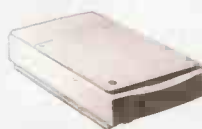
GTX5000 Corel Photopoint + Textbridge OCR ... **£246 £297**

COVER plus **£65 + VAT**

GT-8500 scanner

The easy colour scanning solution
for every office

Available in both parallel, for convenience and SCSI, for speed version, the GT-8500 Scanner is the perfect office scanner. It also comes with useful options including a document feeder and transparency unit



Parallel SCSI

GTX8500 Photoshop LE + Textbridge OCR **£406 £435**

GT 8 5 0 0 Photoshop 3 full version **£514**

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GT-9500 scanner

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Affordable, 36 bit colour scanning for all users

The new Epson GT-9500 can scan at upto 4800dpi and at 36 bits per pixel providing 68 billion colours. Its also has many advanced features such as batch scanning, text enhancement technology and Multiple Page Frame Scanning.



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GTX9500 Photoshop LE + Textbridge OCR **£524 £553**

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Nov '96 Issue.

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Computer Life

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ScanTak-2c

“We can thoroughly recommend the Novatech ScanTak-2c”

PC Magazine Oct '96 Issue.

The ScanTak-2c A4 flatbed is winning awards all over the world. And it's not difficult to see why. Superb value package with Scantastic™ software incorporating sophisticated image manipulation and OmniPage OCR from Caere.

A5 24-Bit Colour Scanner

RESOLUTION	600 x 1200 dpi
MODES	Colour, Greyscale, B/W
24-BIT COLOUR	16.7 Million
8-BIT GREYSCALE	256 Shades
MAX SCAN AREA	178 x 127mm
DIMENSIONS	330 x 188 x 46mm
WEIGHT	1.5 KG
PRICE	£99 ex VAT
TRANSPARENCY UNIT	£50 ex VAT

SCANTASTIC SOFTWARE INCLUDES:

*Nec Web Publisher Metatools - Kai's Power Goo
Micrografx - Greeting Card - Windows Draw
Scan-on-T-Shirt Program Scan to Puzzle Game

SYSTEM REQUIREMENTS:

IBM PC 486 8Mb RAM
MS-DOS 6.0 Windows 3.1x, 95

to scan A5 images”

Rating: Nov '96 ●●●●● Brilliant!

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A4 24-Bit Colour Scanner

RESOLUTION	300 X 600 dpi
INTERPOLATED	2,400 x 2,400
MODES	Colour, Greyscale, B/W
24-BIT COLOUR	16.7 Million
8-BIT GREYSCALE	256 Shades
MAX SCAN AREA	216 x 297mm
DIMENSIONS	488 x 297 x 56mm
WEIGHT	3.5 KG
PRICE	£199 inc VAT

SCANTASTIC SOFTWARE INCLUDES:

Interactive Prescan Window: Colour and B/W
Batch Scan: Scan more than one window
Downloadable Gamma Correction: Gamma value
Shadow / Highlight: B or W point setting
Zoom In / Out Prescan Real Time Flip / Invert
Optical Character Recognition Image Editing
Business Card Reader Colour Matching
Scan to E-mail Colour Copy
Fax Enhancement Slide Show
Digital Copy Photo Album
Auto Image Enhancement Magic Morphing

SYSTEM REQUIREMENTS

IBM PC 486 8Mb RAM
MS-DOS 6.0 Windows 3.1x, 95



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Reliability, performance and service are what you expect from Armari whether you choose an entry level Pentium system or a top of the range Pentium Pro. We aim to give you the best of everything.

We only use the fastest and most reliable components in our systems and we will specify exactly what is in your PC so you know that you are buying a top quality performance PC. Beware of companies who do not specify exactly what is in their systems as you will probably get inferior components and poor performance.

What the magazines say

The Editor's choice goes to Armari both for a very fast machine and for the inclusion of components which go above and beyond the call of duty.

On price, performance and spec the Armari is a clear winner.
Personal Computer World - May 96

Fusion: This is one of the best set-up PCs we've seen this month - if not ever ... the OS and utilities are honed to near-perfection, and the hardware is expertly assembled.
PC PRO - June 96

Arcturus: An exceptionally fast and well specified system with impressive upgrade potential...the Armari puts other P200s in the shade.
PC PRO Recommended - October 96 ... + many more

WARRANTY AND MAINTENANCE

Standard warranty on all systems is one year free on-site maintenance including all parts and labour. To extend this to two years add £79.50 (£93.41 including VAT), or to extend to three years add £145.00 (£170.37 including VAT).



Eclipse

Superb performance using quality components

- Supports Intel P75 to P200 and Cyrix P120+ to P200+
- Supermicro / Boston PCI Motherboard with Intel 430HX chipset, 512KB pipelined burst cache. Socket 7 / VRM / IrDA, six simm sockets (max 512MB RAM)
- On-board 4 drive EIDE interface + full enhanced I/O ports. 4 32-bit PCI + 4 16-bit ISA slots (non shared!)
- 16MB 60ns 72 pin EDORAM memory
- Quantum Fireball 1.2GB E-IDE Hard Disk Drive
- Matrox Mystique 2MB SGRAM (upgradable to 4MB) with 3D hardware acceleration and Direct3D™
- TEAC 58-E 8 Speed 125ms CD-ROM Drive
- Sound Blaster 16 PnP sound card
- Yamaha YST-M15 Active Speakers
- Keytronics Win 95 Keyboard + MS Ergo Mouse II
- 3.5" 1.44MB Sony floppy disk drive
- Elite Series Midi Tower (200W PSU)
- Iiyama Vision Master MF-8515 15" SVGA colour monitor, FST, 1024 x 768@75Hz, on screen display EPA and NUTEK, Digital set up, MPR II, 0.28DP

Arcturus

Dual CPU support and Intel 430HX chipset as standard makes the Arcturus one of the most powerful and expandable desktop solutions available.

- Supports single or dual processor Intel P75 to P200, single processor Cyrix P120+ to P166+
- Tyan TOMCAT III Triton 430HX PCI motherboard
- 512KB 7ns pipelined burst cache. DUAL socket 7.
- On-board 4 drive E-IDE (Mode 4) interface + full enhanced I/O ports. 4 PCI + 5 ISA slots (1 shared)
- 512MB max memory, 8 simm sockets
- EDO, Fast page and ECC memory support
- 16MB 60ns 72 pin EDORAM memory
- Quantum Fireball 2.1GB E-IDE Hard Disk Drive
- Matrox Millennium 2MB WRAM (upgradable to 8MB) with 220MHz RAMDAC
- TEAC 512-E 12 Speed CD-ROM Drive
- Sound Blaster 32 Wavetable Plug and Play
- Yamaha YST-M20DSP surround sound speakers
- Keytronics Win 95 Keyboard + MS Ergo Mouse II
- 3.5" 1.44MB Sony floppy disk drive
- Elite Series Midi Tower case (200W PSU)
- Iiyama Pro MT-9017E 17" 0.25 aperture monitor. 160 Mhz bandwidth, OSD, FST DiamondTron Tube

NPX Pro

Next generation power 32 bit workstation with Intel 440FX chipset to deliver faster PCI, graphics and memory performance. Housed in new ATX case.

- Intel Pentium Pro Processor
- Supermicro P6SNA 440FX chipset PCI motherboard
- ZIF socket 8, USB, IrDA, on-board 4 drive EIDE (Mode 4) interface + full Enhanced I/O ports. 5 x PCI, 3 x ISA (1 shared). Supports EDO, Burst EDO, Fast page and ECC memory upto 512MB.
- 32MB 60ns 72 pin EDORAM memory
- Quantum hard disk *
- Matrox Millennium 2MB WRAM (upgradable to 8MB) with 220MHz RAMDAC
- Pioneer DRA-10X 10 Speed CD-ROM Drive
- Keytronics Win 95 Keyboard + MS Ergo Mouse II
- 3.5" 1.44MB Sony floppy disk drive
- Supermicro ATX Tower case (250W PSU)
- Iiyama Pro MT-9017E 17" 1600 x 1200@72Hz NI, 0.25 aperture, Multi Scan, FST DiamondTron Tube

* Adaptec 2940 Ultra Wide bus master SCSI controller supplied with the 2.1 or 4.3GB SCSI drive options

** Call for details of DUAL PENTIUM PRO systems **

Intel	Excl VAT	Incl VAT	Cyrix	Excl VAT	Incl VAT
P-120	£1206	£1417	P-120+	£1176	£1382
P-133	£1266	£1488	P-150+	£1222	£1436
P-166	£1416	£1664	P-166+	£1286	£1511
P-200	£1516	£1781	P-200+	£1336	£1570

	Excl VAT	Incl VAT		Excl VAT	Incl VAT
P-120	£1653	£1942	P-166	£1863	£2189
P-133	£1713	£2013	P-166+	£1733	£2036
P-150+	£1669	£1961	P-200	£1963	£2307

	Excl VAT	Incl VAT		Excl VAT	Incl VAT
PP-180	£1961	£2304	Quantum Fireball 2.1GB	£2412	£2850
PP-200	£2021	£2375	Quantum Atlas 2.1GB	£2472	£2920

OPTIONS

	Excl VAT	Incl VAT
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Upgrade from 32MB to 64MB EDORAM	£180	£211
Upgrade 1.2GB to Quantum Fireball 2.1GB	£50	£59
Upgrade 2.1GB to Quantum Fireball 3.2GB	£60	£70
Upgrade SCSI HD to Quantum Atlas 4.3GB	£282	£282
Upgrade Millennium to 4MB WRAM	£50	£59
Upgrade Mystique to 4MB SGRAM	£50	£59
Upgrade Millennium to STB Lightspeed 128	£0	£0
Change Millennium to Stealth 3D 2000	-£25	-£29
Upgrade 15" to 17" Iiyama Pro MT-9017E	£291	£342
Upgrade 17" to 21" Iiyama Pro MT-9021T	£449	£528
Upgrade 17" Iiyama Pro to 17" Eizo F-56	£229	£269
Upgrade from Sound Blaster 16 to 32 PnP	£26	£31
Upgrade SB 32 PnP to Full edition	£44	£52
Add Yamaha YST-MSW10 sub-woofer	£80	£94
Upgrade Teac 8X to Pioneer 10X CDROM	£16	£19
Upgrade Pioneer 10X to Teac 12X CDROM	£10	£12
Upgrade Midi to full tower with 300W PSU	£60	£70
Upgrade NPS Pro to Dual Pentium Pro m/b	£CALL	£CALL

Options

	Excl VAT	Incl VAT
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3COM etherlink III 3C905TX PCI 10/100	£115	£135
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HP Colorado T1000 400/800MB Tape drive	£105	£123
Iomega Ditto 2GB internal Tape drive	£115	£135
Conner TST-3200 3.2GB Travan tape drive (includes accelerator card)	£229	£269
HP Colorado T4000s Travan SCSI Tape Drive		
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Windows 95	£65	£76
Windows 95 + Works 95	£99	£116
Windows NT 4 Workstation	£189	£222
Office 95 Pro	£199	£234
Windows for Workgroups 3.11 + DOS 6.22	£59	£69

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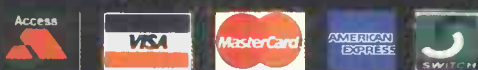
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Kit	1Mb	4Mb	16Mb	32Mb	64Mb
No Parity					
72 Pin	14	25	55	129	
EDO					
72 Pin	15	27	55	129	
Parity					
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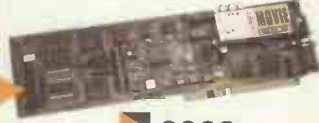
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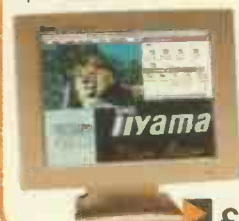
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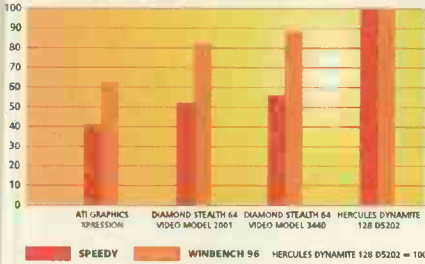
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IDE Hard Drives

	FUJITSU	Ex. VAT	Inc. VAT
1Gb M1614T 10ms E-IDE	£114	£133.95	
1.7Gb Deskstar 12ms E-IDE	£139	£163.33	
MAXTOR			
1.08Gb 71084A 12ms E-IDE	£115	£135.13	
1.6Gb 71626AP 12ms E-IDE	£145	£170.38	
QUANTUM			
850Mb Trailblazer 12ms E-IDE	£95	£111.63	
1.2Gb Bigfoot 5.25" 15ms E-IDE	£135	£158.63	
1.6Gb FB Tempest 12ms E-IDE	£119	£139.83	
2.5Gb Sorocco 11ms E-IDE	£185	£217.38	
SEAGATE			
1.2Gb ST31276A 12.5ms E-IDE mode4	£119	£139.83	
1.7Gb ST31720A 12.5ms E-IDE mode4	£149	£175.08	
2.1Gb ST32132A 12.5ms E-IDE mode4	£Call	£Call	
2.1Gb ST32140A 10.5ms E-IDE mode4	£185	£217.38	
2.5Gb ST52520A 11ms E-IDE mode4	£195	£229.13	
3.4Gb ST33440A 10.5ms E-IDE mode4	£Call	£Call	
4.2Gb ST34250A 10.5ms E-IDE mode4	£Call	£Call	
WESTERN DIGITAL			
850Mb WDAC2850 12ms E-IDE	£109	£128.08	
1.2Gb WDAC21200 10ms E-IDE	£135	£158.63	
1.6Gb WDAC31600 12ms E-IDE	£155	£182.13	
2.1Gb WDAC32100 12ms E-IDE	£189	£222.08	
2.5Gb WDAC32500 12ms E-IDE	£219	£257.33	

MICROSOLUTIONS PARALLEL IDE DRIVES

	Ex. VAT	Inc. VAT
420Mb 12/14ms Backpack 5400	£255	£299.63
850Mb 12/14ms Backpack 5800	£296	£347.80
1.2Gb 12/14ms Backpack 51000	£355	£417.13

SCSI Hard Drives

	FUJITSU	Ex. VAT	Inc. VAT
2Gb M2952S 8ms SCSI-2	£389	£457.08	
4Gb M2954S 8ms SCSI-2	£615	£722.63	
9.1Gb M2949S 8ms SCSI-2	£1,199	£1,408.83	
HEWLETT PACKARD			
2Gb C37258 9ms	£265	£311.38	
MICROPOLIS			
2Gb 4221 Taurus 8.5ms SCSI-2	£349	£410.08	
2Gb 4221AV Taurus 8.5ms SCSI-AV	£399	£468.83	
2Gb 4221W Taurus 8.5ms SCSI-Wide	£415	£487.63	
4.3Gb 3243 Capricorn 8.5ms SCSI-2	£595	£699.13	
4.3Gb 3243AV Capricorn 8.5ms SCSI-AV	£649	£762.58	
4.3Gb 3243W Capricorn 8.5ms SCSI-W	£649	£762.58	
9.1Gb 1991AV Scorpio 12ms SCSI-2	£1,349	£1,585.08	
QUANTUM			
1.4Gb Empire SCSI 2	£195	£229.13	
2.1Gb Atlas 9ms	£425	£499.38	
4.3Gb Atlas 8ms	£585	£687.38	
SEAGATE			
2.1Gb ST32155N Hawk 9ms Ultra-SCSI	£310	£364.25	
2.1Gb ST32151N Hawk 9ms SCSI-2	£325	£381.88	
2.1Gb ST32160N Medalist Pro SCSI-2	£Call	£Call	
4.2Gb ST34371N 8ms Ultra-SCSI	£835	£981.13	
4Gb ST15230N Hawk 9ms SCSI-2	£659	£774.33	
9Gb ST410800N Elite 11ms SCSI-2	£1,450	£1,703.75	

Tape Backup

	Ex. VAT	Inc. VAT
400/800Mb Travan Tapes	£19	£22.33
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1.6/3.2Gb TR3 Travan Int.	£130	£152.75



2.5Gb 11ms E-IDE Hard Drive only **£195** (Ex. VAT) (£229.13 Inc. VAT)

DANMERE
Backer 1.5Gb VHS Backup system £34 £39.95
Scart Lead for Backer 3 metres £4.50 £5.29

MICROSOLUTIONS
800Mb Backpack TR1 Travan Parallel £110 £129.25

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2Gb DAT Surestore External £545 £640.38
4Gb DAT Surestore Internal £555 £652.13
4Gb DAT Surestore External £625 £734.38
8Gb DAT Surestore Internal £689 £809.58
8Gb DAT Surestore External £765 £898.88
4/8Gb T4000P TR4 Parallel Port £389 £457.08
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800Mb T1000 TR1 Travan External £109 £128.08

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800Mb TR1 Travan External (No tape) £95 £111.63
1.6/3.2Gb I03200 TR3 Internal £182 £213.85
1.6/3.2Gb I03200 TR3 Parallel Ext. £192 £225.60
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100Mb ZIP Drive SCSI £110 £129.25
ZIP Drive Media (per disk) £12 £14.10
Jaz Drive Media (per disk) £65 £76.38
1Gb Jaz Drive SCSI Internal £287 £337.23

SEAGATE
1.6/3.2Mb TST3200 TR3 Internal £159 £186.83
2Gb DAT 4320RT SCSI-II Internal £390 £458.25
4Gb DAT 4324RP SCSI-II Internal £449 £527.58
4/8Gb TST-8000 TR4 E-IDE Internal £249 £292.58
4/8Gb TST-8000 TR4 SCSI Internal £249 £292.58
800Mb TST-800 TR1 Travan Internal £85 £99.88

Floppy Drives

	Ex. VAT	Inc. VAT
Panasonic 5.25" 1.2Mb	£33	£38.78
Sony 3.5" 1.4Mb	£15	£17.63

Roldec Technical Tip:

INPUT/OUTPUT

If you are using a true 32Bit operating system such as Windows® NT or UNIX then a SCSI-II hard disk system will give you a huge performance boost. A SCSI hard drive can handle the multiple requests for data supported in these 32Bit environments whereas with an E-IDE drive this facility will be lost.



Function Cards

	Ex. VAT	Inc. VAT
Roldec High Perf I/O, IDE 16550 UART, ISA	£10	£11.75
Roldec Multi I/O 1P/2S/1G IDE ISA	£8	£9.40

ADAPTEC FUNCTION CARDS

1542CF SCSI Controller Card ISA	£129	£151.58
1542CF SCSI Controller Kit ISA	£165	£193.88
2742 SCSI Controller Kit EISA	£249	£292.58
2920 SCSI Controller Kit PCI	£99	£116.33
2940 Ultra SCSI-II Controller Card	£135	£158.63
2940 Ultra SCSI-II Controller Kit PCI	£160	£188.00
2940W SCSI-II Ultra Wide Kit PCI	£195	£229.13
3940U Multi Channel SCSI Kit	£279	£327.83
3940UW Multi Channel SCSI Wide Kit	£315	£370.13
3985 Raid Controller Kit PCI	£485	£569.88
Airport 1000 Infra Red Adaptor	£29	£34.08
Airport 2000 Infra Red Adaptor	£41	£48.18
Airport 2500 Infra Red Adaptor	£61	£71.68

Keyboards & Mice

	Ex. VAT	Inc. VAT
Cherry High Quality	£23	£27.03
Cherry Windows 95 Soft Touch	£19	£22.33
Chicony Standard Key Click	£13	£15.28
Chicony Standard Soft Touch	£10	£11.75
Mitsumi Windows 95 Soft Touch	£11	£12.93
KEYBOARDS		
EC-3N MS Compatible Mouse	£5	£5.88
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MICE		

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Processors

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	CPU Only	Intel™ Marl 256k P/B cache	Intel™ TC430HX 256k P/B cache	PR5 256k P/B cache	PR5R2 256k P/B cache	PN5 256k P/B cache
Bareboard		£105 £123.38	£145 £170.38	£80 £94.00	£75 £88.13	£89 £104.58
Pentium™-133	£144 £169.20	£249 £292.58	£289 £339.58	£224 £263.20	£219 £257.33	£233 £273.78
Pentium™-150	£199 £233.83	£304 £357.20	£344 £404.20	£279 £327.83	£274 £321.95	£288 £338.40
Pentium™-166	£259 £304.33	£364 £427.70	£404 £474.70	£339 £398.33	£334 £392.45	£348 £406.90
Pentium™-200	£379 £445.33	£484 £568.70	£524 £615.70	£459 £539.33	£454 £533.45	£468 £549.90

	Intel Venus Pentium Pro P6	Intel Marl Pentium P5	Intel TC430HX Pentium P5	PR5-256 Pentium P5	PR5-R2 Pentium P5	PN5 Pentium P5
Processor	Pentium Pro P6	Pentium P5	Pentium P5	Pentium P5	Pentium P5	Pentium P5
Memory	EDO/FPM	EDO/FPM	EDO/FPM	EDO/FPM/SDRAM	EDO/FPM	EDO/FPM
No. Slots	4x72	4x72	4x72	4x72 2xDIMM	4x72	4x72
Max Memory	256Mb	128Mb	128Mb	128Mb	128Mb	128Mb
Cache	None	256K Pbc On Board	256K Pbc On Board	256K Pbc On Board	256K Pbc On Board	256K Pbc On Board
Chipset	Intel 440FX	Intel 430FX	Intel 430FX	Intel 430FX	Intel 430FX	Intel 430FX
Bios	Intel 1Mb Flash	Intel 1Mb Flash	Intel 1Mb Flash	Award Flash	Award Flash	Award Flash
Expansion	3PCI 3ISA 1SHR	3PCI 2ISA 1SHR	3PCI 2ISA 1SHR	4PCI 3ISA	4PCI 3ISA	3PCI 4ISA
I/O	Integrated	Integrated	Integrated	Integrated	Integrated	Integrated
PCI IDE	2 Channel 4 device	2 Channel 4 device	2 Channel 4 device	2 Channel 4 device	2 Channel 4 device	2 Channel 4 device
Floppy	2 Drives 2.88Mb	2 Drives 2.88Mb	2 Drives 2.88Mb	2 Drives 2.88Mb	2 Drives 2.88Mb	2 Drives 2.88Mb
Serial	2 16550 High Speed	2 16550 High Speed	2 16550 High Speed	2 16550 High Speed	2 16550 High Speed	2 16550 High Speed
Parallel	ECC/EPP	ECC/EPP	ECC/EPP	ECC/EPP	ECC/EPP	ECC/EPP
Mouse Port	PS/2	PS/2	PS/2	Serial	Serial	Serial
Keyboard Port	PS/2	PS/2	PS/2	AT	AT	AT
Game Port	No	No	No	No	No	No
Integrated Audio	No	No	Crystal P&P	No	No	No
Integrated Video	No	No	Yamaha OPL3 FM	No	No	No
Form Factor	ATX	ATX	ATX	Baby AT	Baby AT	Baby AT

CYRIX

	Ex. VAT	Inc. VAT
686 P133MHz CPU	£79	£92.83
686 P150MHz CPU	£89	£104.58
686 P166MHz CPU	£125	£146.88
686 P200MHz CPU	£265	£311.38

AMD

	Ex. VAT	Inc. VAT
5k86 90MHz	£39	£45.83
5k86 100MHz	£49	£57.58

Call to check compatibility

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25/50MHz 486DX2/SX2 to 63MHz Pent	£89	£104.58
33/66MHz 486SX2 to 486/DX4 100MHz	£115	£135.13
33/66MHz 486DX2 to 83MHz Pentium OD	£122	£143.35
120/133MHz Overdrive for 5v P60/P66	£169	£198.58
125MHz Overdrive for P75	£179	£210.33

Memory

	Ex. VAT	Inc. VAT
1Mb 30 pin	£8	£9.40
4Mb 1x36 72 pin	£13	£15.28
4Mb 1x36 72 pin	£24	£28.20
4Mb 30 pin	£24	£28.20
4Mb EDO 72 pin	£13	£15.28
8Mb 2x36 72 pin	£22	£25.85
8Mb 2x36 72 pin	£45	£52.87
8Mb EDO 72 pin	£22	£25.85
16Mb 4x36 72 pin	£65	£76.38
16Mb 4x36 72 pin	£79	£92.83
16Mb EDO 72 pin	£56	£65.80

SDRAM

	Ex. VAT	Inc. VAT
8Mb 168pin DIMM SDRAM needs 430Vx	£65	£76.38
16Mb 168pin DIMM SDRAM needs 430Vx	£119	£139.83
32Mb 168pin DIMM SDRAM needs 430Vx	£185	£217.38

Pentium™ Pro Motherboards

	CPU Only	Venus Pentium™ Pro P6 ATX
Bareboard	-	£215 £252.63
Pentium™Pro (P6) 180MHz	£349 £410.08	£564 £662.70
Pentium™Pro (P6) 200MHz	£415 £487.63	£630 £740.25
Pentium™Pro (P6) 200MHz 512k Cache	£810 £951.75	£1025 £1204.38

Pentium™ Motherboards 486 Motherboards

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Ex. VAT (£88.13 inc. VAT)

	CPU Only	PCI 486F
Bareboard	-	£68 inc. VAT £79.90
AMD CPU		
486DX4-100	£20 inc. VAT £23.50	£88 inc. VAT £103.04
5x86-P75-133	£24 inc. VAT £28.20	£92 inc. VAT £108.10

Roldec Technical Tip:

Need help with Windows® 95? Check out the help files in the Admin/Reskit/Helpfile directory on the Windows® 95 CD-ROM. They are a very useful source of help and troubleshooting information.



SOFTWARE

Software

	Ex. VAT	Inc. VAT
BORLAND		
SmartSuite v4 Win 3.11 CD	£299	£351.33
SmartSuite v4 Win 3.11 3.5"	£299	£351.33
123 '96 For Windows 95 CD	£229	£269.08
SmartSuite '96 For Windows 95 CD	£290	£340.75
123 v5 For Windows	£219	£257.33
MICROSOFT		
Office v4.2 Standard Win 3.11 CD	£329	£386.58
Office v4.2 Standard Win 3.11 3.5"	£329	£386.58
Office v4.3 Pro For Win 3.11 CD	£439	£515.83
Office v4.3 Pro For Win 3.11 3.5"	£439	£515.83
Office 95 Standard CD	£329	£386.58
Office 95 Standard 3.5"	£329	£386.58
Office 95 Professional CD	£440	£517.00
Excel v5 CD	£229	£269.08
Excel 7 (Win 95) CD	£229	£269.08
Works Version 3 For Win 3.11 CD	£59	£69.33

Works Version 3 For Win 3.11 3.5"	£59	£69.33
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Visual Basic Pro v4 For Win 3.11 CD	£305	£358.38
Visual Basic Pro v4 3.5"	£315	£370.13
PowerPoint v4 3.5"	£255	£299.63
PowerPoint v7 For Windows 95 3.5"	£225	£264.38
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Word v7 For Windows 95 3.5"	£229	£269.08
Access v2 3.5"	£221	£259.68
Access v7 For Windows 95 3.5"	£229	£269.08
Publisher v2 3.5"	£71	£83.43
Publisher v3 For Windows 95 3.5"	£69	£81.08
Publisher v3 For Windows 95 CD	£67	£78.73
Publisher '97 For Windows 95 CD	£72	£84.60
Money v4 For Windows 95 3.5"	£21	£24.68
SYMANTEC		
PC Anywhere 32Bit For Win 95 & NT	£99	£116.33

Operating Software

MICROSOFT

Windows NT V4 SERVER inc. 10 clients	£815	£957.63
Windows NT V4 SERVER inc. 5 clients	£575	£675.63
Windows NT V4 Workstation on CD	£225	£264.38

MS Windows NT V4 Workstation

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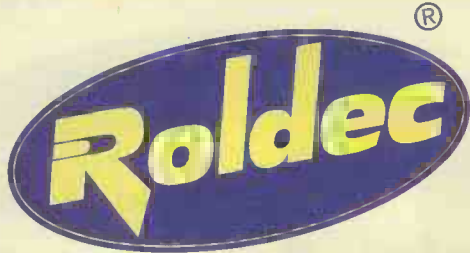
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X-Toi ISDN Adaptor Card ISA	£205	£240.88
DAP 6200 ISDN Adaptor Data Only Ext	£315	£370.13
X-Toi ISDN Adaptor PCMCIA	£365	£428.88
DAP 6300 Lite ISDN Data/Analogue	£389	£457.06
HAYES		
Ultra 64k ISDN System Adapter Ext.	£355	£417.13
TELES		
Plug and play ISDN Adapter ISA	£99	£116.33
Parallel ISDN Adapter + ISDN phone	£299	£351.33
Parallel ISDN Adapter Ext.	£179	£210.33
DECISION COMPUTER		
Single Port 16650 RS-232 Card.	£52	£61.10

Normal 16550 UART serial ports can only transfer data reliably up to 115Kbps. However, most external ISDN devices can transfer data at 128Kbps when the 2 channels are aggregated. Therefore we recommend using a single port 16650 card in these circumstances.

Networking Software

	Ex. VAT	Inc. VAT
Cheyenne FaxServe 10 User	£489	£574.58
NOVELL		
Personal Netware Single User	£44	£51.70
Personal Netware 5 User	£183	£215.03
Netware v3.12 10 User	£979	£1150.33
Netware v3.12 100 User	£3,140	£3689.50
Netware v3.12 25 User	£1,549	£1820.08
Netware v3.12 5 User	£479	£562.83
Netware v3.12 50 User	£1,995	£2344.13
Netware v4.1 10 User	£1,110	£1304.25
Netware v4.1 25 User	£1,589	£1867.08
Netware v4.1 5 User	£479	£562.83
Netware v4.1 50 User	£2,165	£2543.88

Fax Modems

BABT-APPROVED	Ex. VAT	Inc. VAT
Creative Labs Phoneblaster V34 Fax/Data/Voice	£160	£188.00
Motorola 28.8 V34 Internet Solution Ext.	£119	£139.83
Motorola 28.8 V34 Prof. Solution Ext.	£110	£129.25
Multitech 28.8 V34 MT2834ZDX Ext.	£99	£116.33
Multitech 28.8 V34 MT2834ZFX Int.	£99	£116.33
Multitech 14.4 V32 MT1432BLK Ext.	£220	£258.50
Multitech 28.8 V34 MT2834BLK Ext.	£310	£364.25
PACE 28.8 MessageDesk Fax/Data/Voice Ext.	£165	£193.88
PACE 28.8 V34 Linnex Fx34 External	£149	£175.08
PACE 28.8 V34 Linnex NB34 PCMCIA	£159	£186.83
PACE 28.8 V34 Netlink Gold External	£95	£111.63
PACE 28.8 V34 Netlink Gold Internal	£95	£111.63
PACE Europe and USA Adaptor pack	£25	£29.38
PACE GSM Datacard for Panasonic 400	£189	£222.08
Roldec 14.4 V32 Fax/Data/Voice Internal	£39	£45.83
Roldec 14.4 V32 Fax/Modem External	£39	£45.83
Roldec 28.8 V34 Fax/Modem Internal	£65	£76.37
Roldec 28.8 V34 Fax/Modem External	£79	£92.83
Supra 28.8 V34 Voice/Fax/Modem Int.	£75	£88.13
US Robotics 28.8 V34 Courier Internal	£149	£175.08
US Robotics 28.8 V34 Courier External	£195	£229.13
US Robotics 28.8 Sportster X-Jack PCMCIA	£131	£153.93
US Robotics 33.6 V34 Sportster VI Int.	£131	£153.93
US Robotics 33.6 V34 Sportster VI Ext.	£131	£153.93
Xirom PCMCIA Modem/Network Card	£269	£316.08
Hayes 28.8 Accura Internet Kit Deluxe	£129	£151.58
Hayes 28.8 Accura Voice Mail	£149	£175.08
Hayes 28.8 Optima PCMCIA	£159	£186.83

Robotics Sportster 33.6 V34 VI Internal/External

£131 (Ex. VAT)

BEST Roldec BUY

Networking Hardware

3-COM	Ex. VAT	Inc. VAT
3C509 16Bit BNC ISA	£64	£75.20
3C509 16Bit Combo BNC/RJ45 ISA	£69	£81.08
3C509 16Bit RJ45 ISA	£64	£75.20
3C589B PCMCIA Combo BNC/RJ45	£124	£145.70
3C900 32Bit Combo BNC/RJ45/AUI PCI	£99	£116.33
D-LINK		
DE-220 Combo BNC/RJ45 ISA	£29	£34.08
DE-530CT 32Bit Combo BNC/RJ45 PCI	£45	£52.88
DE-650CT PCMCIA Combo BNC/RJ45	£65	£76.38
DE-812TP 12 Port (12xRJ45BNC-AUI)	£159	£186.83
DE-816TP 16 Port (16xRJ45BNC-AUI)	£169	£198.58
DE-805TP 5 Port (5xRJ45BNC) MicroHub	£59	£69.33
DE-950 Network print server External	£179	£210.33
8097C 8 Port Hub with BNC Link	£95	£111.63
8097P 9 Port Hub (9xRJ45) Unmanaged	£95	£111.63
E-LAN		
NE2000-Compatible BNC ISA	£16	£18.80
NE2000-Compatible Combo ISA	£17	£19.98
INTEL		
EtherExpress Pro/10 16Bit BNC/RJ45	£65	£76.38
EtherExpress Pro/100 100Mbps PCI	£89	£104.58

KINGSTON		
Dual Interface Ethernet Adaptor ISA	£23	£27.03
Dual Interface Ethernet Adaptor PCI	£45	£52.88
Dual Interface Ethernet Adaptor x20	£419	£492.33
Dual Interface Ethernet Adaptor x6	£139	£163.33

NOVELL		
NE2000 16Bit BNC ISA	£46	£54.05
NE2000 16Bit Combo BNC/RJ45 ISA	£57	£66.98
NE2000 16Bit RJ45 ISA	£46	£54.05

SMC		
Elite EZ PnP 16Bit Combo ISA	£59	£69.33
Elite Ultra 16Bit BNC ISA	£58	£68.15
Elite Ultra 16Bit RJ45 ISA	£58	£68.15

HEWLETT PACKARD		
Advance Stack 12 Port (12xRJ45BNC)	£349	£410.08
Advance Stack 16 Port (16xRJ45)	£279	£327.83
Advance Stack 8 Port (8xRJ45)	£135	£158.63

ROLDEC		
Roldec 16Bit ISA Combo BNC/RJ45	£15	£17.63
Roldec 32Bit PCI Combo BNC/RJ45	£22	£25.85



Roldec Dual Interface Ethernet Adapters PCI/ISA



BEST Roldec BUY

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APC	Ex. VAT	Inc. VAT
Smart UPS V/S 1000VA inc.Powerchute	£355	£417.13
Smart UPS V/S 1400VA inc.Powerchute	£499	£586.33
Smart UPS V/S 420VA inc.Powerchute	£179	£210.33
Smart UPS V/S 650VA inc.Powerchute	£220	£258.50



Roldec Technical Tip:

Have you got a 33.6Kbps capable modem? If so then you should use a 16650 UART equipped serial port as the 16550 on most motherboards will not be able to take full advantage of this speed increase.

SCANNERS/PRINTERS

Printers

LASER PRINTERS

CANON	Ex. VAT	Inc. VAT
LBP460 Windows Laser	£220	£258.50
LBP1260	£729	£856.58
EPSON		
EPL-5500 1Mb	£339	£396.33
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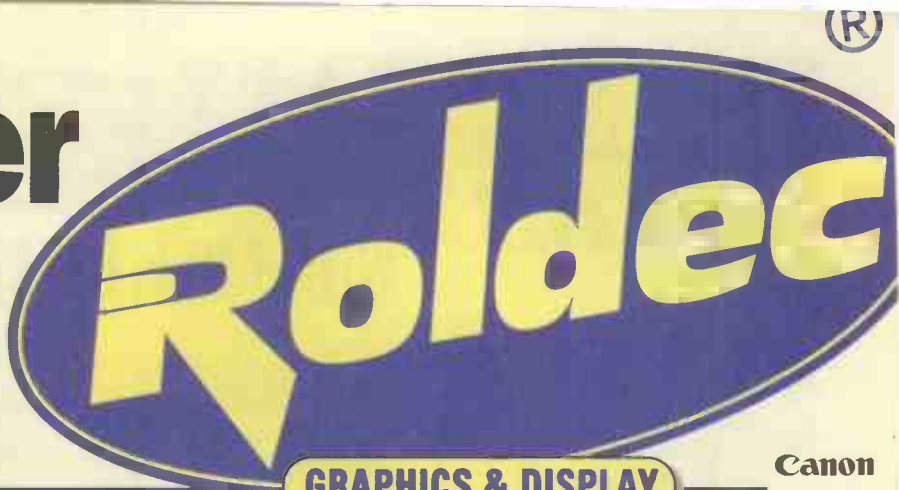
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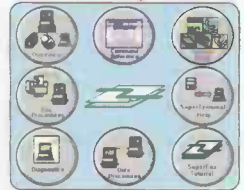
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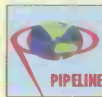
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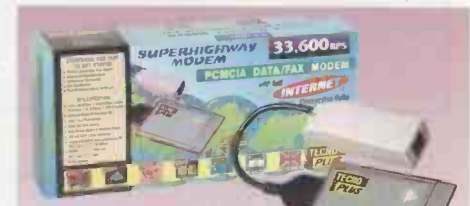
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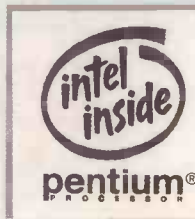
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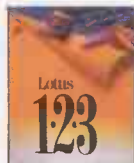
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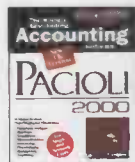
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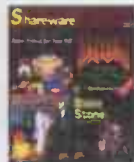
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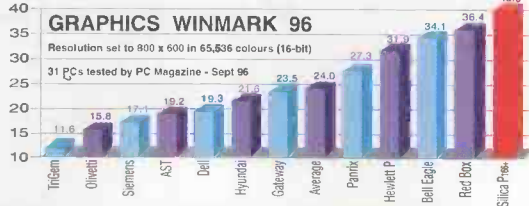
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PC MAGAZINE BENCHMARKS

In the September 96 issue, Ziff Davis UK PC Magazine tested 31 different P166 class PCs. The Graphics WinMark 96 test evaluates a PC's VGA performance. The AVERAGE performance of all 31 PCs was 24.0 - With the lowest at 11.6 - The highest was 36.4. The Hurricane P166+ Graphics WinMark 96 is 40.0 giving it a HIGHER performance than any of 31 tested PCs. The Winstone 32 v1.0 benchmark gives the OVERALL performance for a complete PC system. The Hurricane P166+ Performance of 98.0 is 19% faster than the average of all the 31 PCs which scored Winstone 82.5. The top performer was only 9% faster but at a retail price of £3,049 (inc VAT).



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Tiger Hub 6P (6xRJ45 1xAUI).....	£149
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8 port Smart Hub BNC.....	£89
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6 port BNC/AUI.....	£215

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American Power 1400VA.....	SU £499 BK £339
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American Power 3000VA.....	SU £1199

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FOX Quality Win 95.....	£10
Fujitsu 4870 Membrain (Win 95 optional).....	£17
Fujitsu 4720 Click Action (Win 95 Optional).....	£24
Cherry GB1-6105 Win 95.....	£22
Cherry GB0-3000 Win 95.....	£17
Cherry GB1-3000 Click Action.....	£35
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Windows 95 Click Action.....	£19
Microsoft Natural Win 95.....	£39
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Quality 3 Button Mouse.....	£6
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Logitech Pilot Mouse (DIN or PS2).....	£15
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Genius Mouse 3.....	£11
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Trust Transparency Kit.....	£159
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CoolScan II.....	£875
Super CoolScan.....	£1339
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Vista SE 4800 A4 Flatbed 24bit LE.....	£219
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Vista S12 9600 A4 Flatbed 30bit LE.....	£469
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HP Laserjet 5N.....	£1015
HP Laserjet 5M.....	£1174
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HP Laserjet 5Si MX.....	£2710
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Epson LQ570.....	£209
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Micoconnect 34 office.....	£229
Motorola	
3400 Internet Solution 28.8.....	£118
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PCMCIA 28.8.....	£179
US Robotics	
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CD7930	Hitachi	IDE	EIGHT	1050kbs	£69
R-580B	Goldstar	IDE	EIGHT	1050kbs	£69
CD-868	Aztec	IDE	EIGHT	1050kbs	£65
CR583	Panasonic	IDE	EIGHT	1050kbs	£65
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V15GA	15"	27 1024x768 @76Hz	3Yr *	£319
V17EA	17"	27 1024x768 @76Hz	3Yr *	£449
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CM2111	21"	22 1600x1200 @75Hz	3Yr *	£999
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Generic

Trident 8900D8 1Mb ISA£49

Cirrus Logic 1Mb PCI£29

ET4000 ISA/VL/PCI VESA 16.7 Million Col.£45

Orchid

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Matrox

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Mystique 3D 2Mb£105

Mystique 3D 4Mb£165

Number Nine

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9FX Motion 771 2Mb£195

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GrafixStar

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IntelEndeavor 430FX 256 3 4 200 A/S

IntelTucson 430FX 128 3 4 166 A/P

Supermica Tri II 430HX 256 4 4 200 A/P/U

Ausetek Dual 430FX 256 4 4 200 A

A = Built in 2xS 16550 UART, 1xP + E-IDEx4, 2xPdd

P = 256kb Pipe Line Cache ** 512Kb

U = Universal Serial Bus

S = Built In sound blaster 16

Intel 430FX G586£65

Intel 430FX PT5£79

Intel 430HX G586-IPC 512K PLC...£89

Intel 430VX G586-IPV£79

Intel Endeavor£205

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SuperMicro 430HX 512K PLC.....£159

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Pentium® Pro M/B's

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P6DNF 440FX 1Gb 4 4 AMI Y A/B

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Pentium 100Mhz AMD£59

Pentium 120Mhz.....£99

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Pentium 200Mhz.....£359

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AMD/SGS

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5X86 133Mhz£29

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Stealth 64 1Mb Dram Video 2121 ..£48

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Edge 3D 2120XL 1Mb Dram£69

Edge 3D 3240XL 2Mb Vram.....£129

Stealth 3D 2000 2Mb EDO£72

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Free Installation guide with every hard drive

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1.2Gb	Fujitsu	M1636T	64K	11ms	£125
1.2Gb	Seagate	ST31276A	64K	12ms	£129
1.2Gb	Quantum	BF1280AT	64K	15ms	£119
1.2Gb	Quantum	FBL1280AT	128K	11ms	£135
1.2Gb	Western Dig	AC21200A	128K	10ms	£135
1.7Gb	IBM	29H7188	128K	12ms	£159
1.6Gb	Connor	CF61221	128K	12ms	£155
1.6Gb	Western Dig	AC31600A	128K	12ms	£155
1.7Gb	Quantum	SR1700AT	128K	11ms	£177
2.0Gb	Seagate	ST32140A	128K	10ms	£179
2.1Gb	Western Dig	AC32100A	128K	12ms	£199
2.1Gb	Quantum	TBL10280A	128K	10ms	£178
2.5Gb	Quantum	BF2550AT	128K	15ms	£175
2.5Gb	Quantum	SR2550AT	128K	11ms	£219
2.5Gb	Western Dig	AC32500A	128K	12ms	£219
3.1Gb	Western Dig	AC33100A	128K	12ms	£269
3.1Gb	Quantum	TM3200AT	128K	10ms	£239

SCSI HARD DRIVES

1.0Gb	Seagate	ST51080N	128K	10ms	£159
1.2Gb	Quantum	FBL1280S	128K	10ms	£185
2.0Gb	Micropolis	MIC4221AV	512K	9ms	£379
2.1Gb	Connor	CFP2107S	512K	9ms	£369
2.1Gb	HP	C3725S	256K	9ms	£375
2.1Gb	IBM	85G3683	512K	9ms	£285
2.1Gb	Quantum	XP2150S	1Mb	8ms	£425
2.1Gb	Fujitsu	M2952S	512K	8ms	£399
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2.1Gb	Seagate	ST32550N	1Mb	8ms	£479
4.0Gb	Seagate	ST15230N	512K	10ms	£639
4.0Gb	Seagate	ST15150N	1Mb	8ms	£679
4.2Gb	Connor	CF04207S	512K	9ms	£598
4.3Gb	IBM	74G704S	512K	8ms	£599
4.3Gb	Quantum	XP34300S	1Mb	8ms	£575
9.0Gb	Seagate	ST1410800	1Mb	11ms	£1199
9.0Gb	Fujitsu	M2949S	512K	8ms	£1189

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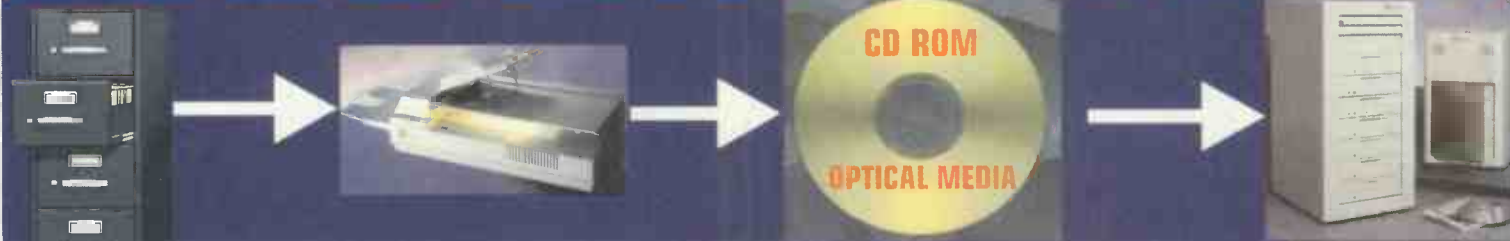
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P C1533A	4GB	16GB	30MB	45MB	£625
P C1553A	24GB	96GB	30MB	45MB	£1450
KABYTE 8505XL	7GB	14GB	30MB	45MB	£1350
KABYTE 8700XL	7GB	14GB	30MB	45MB	£1350
MAMMOTH	20GB	40GB	180MB	360MB	£4250
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8.5GB

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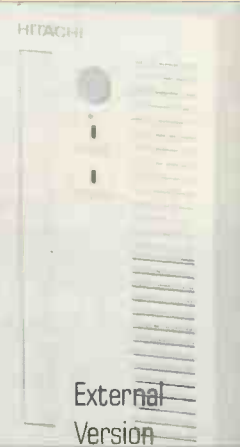
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- Built-in 'joy stick'
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- Changeable and rechargeable internal NiMH battery pack
- PCMCIA Type III or 2 x Type II slots
- Built-in floppy disk drive (can be exchanged for optional MPEG-1 + video module with TV tuner connector)
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- User upgradeable CPU to 150MHZ
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- Win '95 or Windows 3.11 pre-loaded
- PCMCIA 28.8 Fax/Data Modem pre-loaded
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Any notebook computer can be configured to your exact specification before despatch



MP100 (133 Pentium 133MHZ)	PRICE (EX. VAT)	PRICE (INC. VAT)
SCREEN.....		
DSTN 11.4"	£1759	£2066
TFT 10.4"	£1899	£2231
TFT 12.1"	£2229	£2619

MP120 (150 Pentium 150MHZ)	PRICE (EX. VAT)	PRICE (INC. VAT)
SCREEN.....		
DSTN 11.4"	£1859	£2184
TFT 10.4"	£1999	£2348
TFT 12.1"	£2329	£2736

MP150 (166 Pentium 166MHZ)	PRICE (EX. VAT)	PRICE (INC. VAT)
SCREEN.....		
DSTN 11.4"	£1959	£2301
TFT 10.4"	£2099	£2466
TFT 12.1"	£2429	£2854

Accessories

	PRICE (EX. VAT)	PRICE (INC. VAT)
RAM upgrade per MB	£10	£11.75
Docking Station	£194	£227.95
NiMH Battery (internal)	£75	£88.12
NiMH Heavy Duty Battery (external)	£125	£146.87
Additional external AC adaptor	£55	£64.62
Car Adaptor	£45	£52.87
MPEG Module	£195	£229.12
HDD Housing Kit	£39	£45.82
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HP Omnibook 5500

Desktop power on the move. Weighs 6.8lbs. Optional CD-ROM replaces floppy drive.



MODEL	PROCESSOR	HARD DISK	RAM	SCREEN	PRICE
5500CT	Pentium 133	2GB	16MB	12.1" TFT	£3229
5500CT	Pentium 133	1.35GB	16MB	12.1" TFT	£2949
5500CT	Pentium 120	1.35GB	16MB	10.4" TFT	£2399
5500C	Pentium 100	1.35GB	16MB	11.3" DSTN	£1799
5500GS	Pentium 100	810MB	16MB	11.3" DSTN	£1549

ACCESSORIES	PRICE
Docking Station	£399
Car Adaptor	£69

HP Omnibook 800

Heavyweight performance in a lightweight package of 1.7kg. Product comes complete with external floppy disk drive, battery pack, AC adaptor and 3 year worldwide warranty. Pre-loaded with Windows 95 and Windows 3.11 plus HP's PIM software. The 800 offers instant-on, full sized keyboard, a built-in pop-up mouse, quick launch software keys and a long life lithium-ion battery.



MODEL	PROCESSOR	HARD DISK	RAM	SCREEN	PRICE
800CT	Pentium 133	1.44GB	16MB	10.4" TFT	£2979
800CT	Pentium 100	1.44GB	16MB	10.4" TFT	£2549
800CT	Pentium 100	810MB	16MB	10.4" TFT	£2259
800CS	Pentium 100	1.44GB	16MB	10" DSTN	£2329
800CS	Pentium 100	810MB	16MB	10" DSTN	£2039

ACCESSORIES	PRICE
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Car Adaptor	£69

PC Card Modems

Apex Data V34 28.8 Fax/Data Modem

Internal line interface. No lumps, no bumps. No expensive replacement cable.

- Worldwide approval
- Easy 5 step Installation
- Come complete with enablers, socket services and client drivers.

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Pision V.34 Dacom 28.8 Data/Fax Modem

- Free Delrina fax and communications software
- Internet starter kit
- UK market leader
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Only £159.vat



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IBM 14.4/14.4 Fax/Data Modem

Only £99.vat

PC Card GSM Cellular Data

Nokia Cellular Data Card

Link your notebook to your Nokia digital handportable phone, enabling you to send and receive faxes and to check your e-mail as easily from across the continent as from across the street

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Nokia Cellular Data Card with FREE SMS software **£299.vat**



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 OR **£899.VAT**
 When including Connection to Vodafone or Cellnet

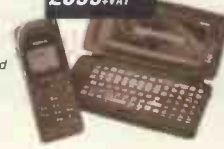
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HP OmniGo 700 Personal Communicator

An integrated productivity tool for mobile business professionals that delivers communications, business and time management functions, anytime, anywhere.

HP OmniGo 700
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- 2 MB RAM
- RS-232 port and IrDA-compatible Infra-red port
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- Terminal emulation, file transfer & scripting

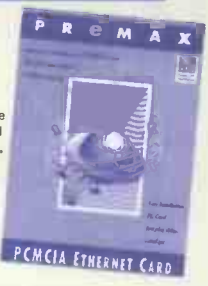
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 Remote Connections – Transfer files, Go on-line Easy e-mailing – "Hot Button" connect to your home cc: Mail network to send and receive e-mail messages



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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.



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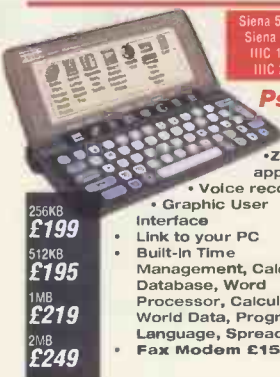
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- Link to your PC
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- Omega desktop with 7 drive bays.
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- Microsoft Windows 95 with manual and CD
- Lotus pre-loaded suite including Word Pro 96, Lotus 1-2-3, Approach 96, Organizer, SmartPics (limited offer)
- GSP pre-loaded suite including Pressworks DTP, Designworks, Money and Homewise (limited offer)

Options

PowerStation Models

As above but also includes PC joystick and five CD multimedia titles shown below

- BodyWorks v5 CD
- Shareware CD
- Infopedia Encyclopaedia 96 CD,
- WinTutor 95 CD
- Semerc Educational CD

£30 plus VAT Extra = £35.25 inc. VAT Extra

Printer Options

Epson Stylus Color 200 colour printer

£179 +VAT = £210.33 inc. VAT

Facit mono laser printer - £Call for Special Price



FREE
First 2000 customers only
Free 14.4 Modem on P120 model or 28.8 Modem on P150+ model

P120 Model (P120 Multimedia Special)

Intel P120 Pentium processor
14.4 BAPT approved Modem
14" Screen

£1021^{.08} inc. VAT

£869 +VAT

P150+ Model (P150+ Multimedia Special)

IBM/Cyrix/ST 6x86 P150+ processor
28.8 BAPT approved Modem
15" Screen

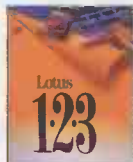
£1098^{.63} inc. VAT

£935 +VAT

Eight speed CD model - £1138.58 (£969 +VAT)



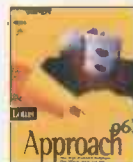
Microsoft Windows 95
The best operating system for the PC. To get the most out of your PC you need to buy a system that comes optimised for Windows 95



Lotus 1-2-3 Spreadsheet
Lotus 1-2-3 is the best multi-dimensional spreadsheet available and will let you do virtually anything with numerical information



Lotus Word Pro 96
The latest version of Lotus's award winning full-feature wordprocessing package.



Lotus Approach 96
Powerful 32-bit relational database and information management package



Lotus Organizer
Full-feature personal information manager and scheduler that allows you to manage your time and work.



Lotus SmartPics
The finest clipart images that cover a wide range of topics and which can be easily incorporated into your documents for added impact.



GSP DesignWorks
Full-feature drawing package like CorelDraw that allows you to create logo, business graphics etc for use in other applications



GSP PressWorks
Advanced easy to use Desktop Publishing suite that allows you to create reports, memos, adverts, brochures, newsletters etc.



TIME

01282 777 111

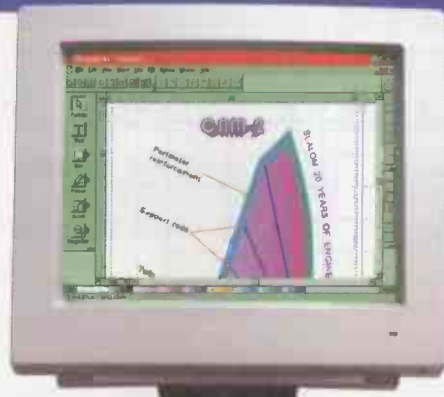
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Sales Lines Open: Mon - Fri 8.30am - 7pm, Sat 9am - 5pm

Fax 01282 77 01. All prices exclude VAT at 17.5% and delivery at £25 +VAT (E29.38 Inc. VAT) for UK mainland. Prices including VAT are now also shown. *Finance prices include UK mainland delivery & VAT. ** Depending on the package, software will be either pre-loaded or provided on CD. Pack shots shown for illustration purposes only. Crossed out price based on total selling price of individual items. 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. Goods are normally despatched within 10 to 14 days. All goods will be fulfilled within 28 days unless otherwise specified. Screen sizes shown for CRT tube size as per industry practice. E & OE.



All Offers End
31st December



Omega P150+



December 1996

**P120
and
P150+
Systems**

**Free
Modem
Offer**



Key Features

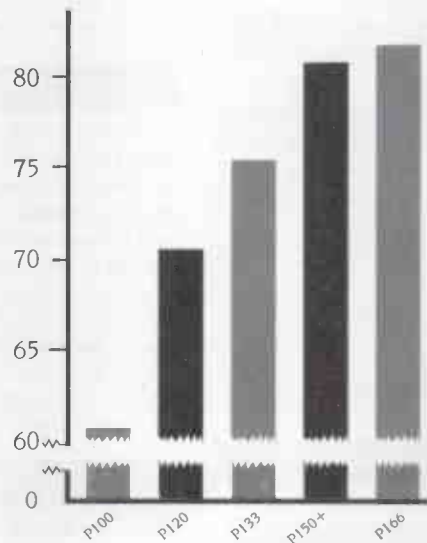
- ✓ **16Mb RAM**
You need 16Mb RAM for best performance with Windows 95. 16Mb also allows you to multi-task (use several applications at the same time). A 16Mb P120 system will yield better productivity than an 8Mb P200 system!
- ✓ **P120 or P150+ Processor**
The Intel Pentium P120 is over 60% faster than the P75 and is quickly becoming the most popular high performance processor. We also include 256k Pipeline burst mode cache to enhance the performance. The IBM/Cyrix/ST P150+ is faster still, providing performance almost on a par with the Pentium P166 processor. (See chart.)
- ✓ **1000Mb Hard Disk**
Massive 1Gb fast enhanced IDE hard disk to give you plenty of storage potential.
- ✓ **Fast Multimedia**
Fast quad speed CD-ROM drive with 16-bit stereo sound, twin stereo speakers - all are included.

- ✓ **Fast 64-bit Graphics**
High resolution colourful images with fast displays and ability to display smooth video clips. Advanced design allows switching to 2Mb to yield higher resolution/more colours at no extra cost!
- ✓ **Fax/data/Internet Modem**
We include a 14.4 BABT fax and data modem as standard which can also be used for the Internet. A modem is now an essential part of a multimedia PC. Do not buy a PC without one (limited offer). The P150+ model includes a faster free 28.8 modem for a limited period only.
- ✓ **Massive Software Bundle**
Microsoft Windows 95 together with the latest Windows 95 software suite from Lotus and much more! everything you are ever likely to need! (Limited offer). Software is pre-loaded with on-line documentation

APPROVED for use with telecommunication systems specified in the instructions for use subject to the conditions listed on them

Relative Performance

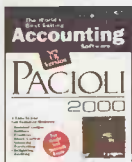
Relative processor performance based on Ziff Davis Winstone 96™ as certified by MDR labs.



GSP Money
The fast and easy way to organise your home finances. It can manage your bank and credit card accounts and much more.



GSP HomeWise
The ultimate home and family organizer including message centre, household contents, party planner, chores list, holiday planner etc.



Paciolli 2000 Accounts
Full-feature accounting suite including 8 integrated modules including nominal ledgers, stock control, invoicing and budgeting!



BodyWorks v5 CD
Explore the system, structures and functions of the body in fascinating detail including 3-D views and video clips.



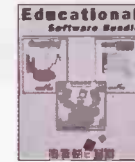
Shareware CD
Packed with almost 100 of the best shareware programs and games including DOOM, Raptor, Pinball and BlakeStone.



Infopedia Encyclopaedia 96 CD
The most comprehensive multimedia encyclopaedia available allowing you to search and browse with ease.



WinTutor 95
Windows 95 training package with four professional training programs on one CD.



Semerc Educational CD
The leading school software for the National Curriculum from SEMERC. Includes Graphplot, Treasure chest, Sheetwise and more.

Joystick and CD Titles with PowerStation models only £35.25 inc. VAT extra

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Fax 01282 77 07 01. All prices exclude VAT at 17.5% and delivery at £25 +VAT (£29.38 inc. VAT) for UK mainland. Prices including VAT are now also shown. *Finance prices include UK mainland delivery & VAT. **Depending on the package, software will be either pre-loaded or provided on CD. Pack shots shown for illustration purposes only. Crossed out price based on total selling price of individual items. 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. Goods are normally despatched within 10 to 14 days. All goods will be fulfilled within 28 days unless otherwise specified. Screen sizes shown for CRT tube size as per industry practice. E & OE.



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COMMUNICATIONS INTERFACES



4-Port Multi-User Serial Card

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

£149

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

£89

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	£950

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

ADAM 8ch Analog Input Module	£169
ADAM 8ch Thermocouple Module	£180
ADAM Analog Output Module	£135
ADAM Digital I/O Module	£99
ADAM Relay Output Module	£99
ADAM Counter/Frequency Module	£169
ADAM IP66 Industrial Enclosure	£85
ADAM Power Supply Unit 24V	£149

IEEE-488 Interface Card

Provides complete IEEE-488 functionality on a half size card.

- ▼ Powerful, easy to use software command set
- ▼ DMA & Interrupt
- ▼ On-board firmware driver
- ▼ 16 digital outputs
- ▼ Basic, Pascal & C drivers
- ▼ IEEE-488 cable 2m

£175

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

144 bit Digital I/O Card

High Density mixed digital I/O Card for industrial monitoring & control.

- ▼ 144 Digital I/O lines
- ▼ Buffered circuits for higher driving capacity than the 8255
- ▼ Interrupt handling
- ▼ Output status readback

£155

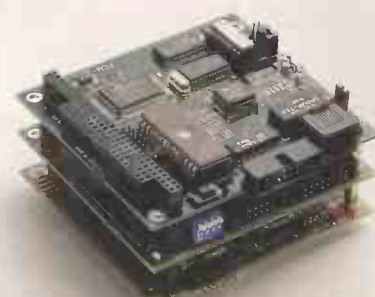
Wiring Kit & Relay Boards

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

PC-104 MODULES

PC-104 Modules (shown below) simply stack together to form a compact modular PC-based system which has very low power consumption.

PC-104 386SX/33 CPU Module 1Mb	£299
PC-104 SVGA Display Module	£169
PC-104 Ethernet Module	£109
PC-104 Super I/O Module	£99
PC-104 RAM/ROM Disk Module	£89
PC-104 PCMCIA Memory Module	£250
PC-104 RS422/RS485 Module	£199
PC-104 Digital I/O Module	£129
PC-104 Global Positioning (GPS)	£450



Analog & Digital I/O Card

Versatile fully integrated multifunction A/D, D/A and Digital I/O card.

- ▼ 12 bit 40KHz
- ▼ 16 single-ended or 8 differential A/D inputs
- ▼ 1 D/A output
- ▼ 16 digital inputs
- ▼ 16 digital outputs
- ▼ Pacer Clock
- ▼ Timer/Counter
- ▼ DMA and Interrupt
- ▼ Wiring Terminal Board

£199

High Performance A/D Card

The complete and cost-effective solution for your PC based automation needs.

- ▼ 12 bit 100KHz
- ▼ 16 single-ended or 8 differential A/D inputs
- ▼ Built in 1K word FIFO
- ▼ Amplifier x0.5 to x1000
- ▼ 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

£2000

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

£2200

Flash ROM Disk Card

Half-size disk card which can use up to 3Mb of SRAM, EPROM or Flash memory chips to replace a floppy disk drive. It offers faster access times and better protection from vibration, vapors and contaminants than physical drives.

- ▼ Emulates drive A,B,C or D
- ▼ Boots when emulating drive A
- ▼ Accepts 128Kx8 or 512Kx8 EPROMs,Flash Memory or SRAM.
- ▼ On-board Lithium Battery
- ▼ Simple installation
- ▼ No software required

£89

Passive Backplanes

Passive Backplane 3 slot	£30
Passive Backplane 6 slot	£45
Passive Backplane 8 slot	£50
Passive Backplane 12 slot	£60
Passive Backplane 14 slot	£70
Passive Backplane Dual 8+4 slot	£60
Passive Backplane Dual 8+6 slot	£70

Disk Drives & Controllers

Only supplied as part of a system.	
Floppy Drive 1.44Mb	£40
Floppy Drive 1.2Mb	£40
IDE Hard Drive 630Mb	£135
IDE Hard Drive 1Gb	£155
IDE Hard Drive 1.6Gb	£220
IDE Hard Drive 2Gb	£330

Industrial 19" Chassis

The rugged all steel chassis conforms to the 19" rack mounting standard. The unit includes a 14 slot passive backplane and a high efficiency power supply (250W) in a dual-fan cooled chassis.

- ▼ Supports 386 and 486 CPU Cards
- ▼ 10 long/4 short slots (ISA bus)
- ▼ Mounting for up to 4 drives
- ▼ Hold down clamp to protect plug in cards from vibration
- ▼ Positive air pressure inside generated by dual (push-pull) cooling fans
- ▼ Removable air filters

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Industrial 19" Chassis ISA/PCI backplane

The same robust 19" Industrial Chassis as described left but fitted with a special backplane offering 3 PCI slots and 9 ISA slots for use with our Pentium range of CPU Cards.

- ▼ High Quality and Reliability
- ▼ Heavy-duty steel construction
- ▼ Supports Pentium CPU Cards
- ▼ 3 PCI long slots
- ▼ 4 ISA long slots
- ▼ 5 ISA short slots
- ▼ 1 CPU Card slot

£500



Industrial CPU Cards 386/486 ISA

Industrial Grade CPU Cards designed to be highly reliable in harsh industrial environments. Built to ensure high end stability under extremes of temperature, shock and vibration. Special features include watchdog timers, RAM/ROM disk, PC-104 Interface, floppy/IDE interface, parallel and RS232/RS485 serial ports.

Half-size Cards	
CPU Card 386SX/40	£240
CPU Card 486DX2/66	£295
CPU Card 486DX4/100	£325
Full-size Cards	
CPU Card 486DX2/66 256K cache	£320
CPU Card 486DX4/100 256K cache	£350

Industrial CPU Cards Pentium ISA/PCI

Additional features to those above include 2 Enhanced IDE controllers, SCSI controller and PS/2 Mouse Port.

Full-size Cards	
CPU Card Pentium/100 256K cache	POA
CPU Card Pentium/120 256K cache	£560
CPU Card Pentium/133 256K cache	£640
CPU Card Pentium/150 256K cache	£750
CPU Card Pentium/166 256K cache	£850

Display and Keyboards

14" SVGA Colour Monitor	£225
Rack Mount Kit for 14" Monitor	£250
SVGA Display Card 1Mb ISA bus	£99
SVGA Display Card 1Mb PCI bus	£99
Rack Mounted Compact Keyboard	£199
Compact keyboard	£60
Standard Keyboard	£40

Memory Components

Only supplied as part of a system	
SIMM 1Mb 72pin parity	POA
SIMM 4Mb 72pin parity	£40
SIMM 8Mb 72pin parity	£75
SIMM 16Mb 72pin parity	£145
SIMM 4Mb 72pin EDO	£40
SIMM 8Mb 72pin EDO	£75
SIMM 16Mb 72pin EDO	£145



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= 1MB X 32 BIT EDO	£19			
= 1MB X 36 BIT		£29	£25	
= 2MB X 32 BIT		£30	£29	
8MB = 2MB X 32 BIT EDO	£29			
= 2MB X 36 BIT		£47	£47	
= 4MB X 32 BIT		£65	£65	
= 4MB X 32 BIT EDO	£65			
= 4MB X 36 BIT		£88	£88	
32M = 8MB X 32 BIT		£149		
= 8MB X 32 BIT EDO	£159			
= 8MB X 36 BIT		£169		
64M = 16MB X 32 BIT		£340		
= 16MB X 36 BIT		£369		
72 PIN SO DIMM				
4MB = 3.3V & 5V		£39		
8MB = 3.3V & 5V		£69		
16MB = 3.3V & 5V		£129		

168 PIN DIMM (APPLE)				
8MB = 1MB X 64 BIT - 60NS		£49		
16MB = 2MB X 64 BIT - 60NS		£85		
32MB = 4MB X 64 BIT - 60NS		£174		
64MB = 8MB X 64 BIT - 60NS		£269		
168 PIN Synchronous DIMM (SDRAM)				
8MB = 1MB X 64 BIT - 60NS		£79		
16MB = 2MB X 64 BIT - 60NS		£129		
32MB = 4MB X 64 BIT - 60NS		£239		
64MB = 8MB X 64 BIT - 60NS		CALL		



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LEVEL 2 256K MODULE		£12		
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DRAM CHIPS				
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64K X 4 BIT 80 / 100 NS DIP		£0.50		
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256K X 4 BIT 60 / 70 NS DIP		£5		
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256K X 16 BIT 70NS ZIP		£17		



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EVOLUTION IV/ie, FLYER 32LCT, SD32, PRO VEISA LT, VL EXPRESS 486,		GP 17		
EVOLUTION V, 6, DUAL 6, REVOLUTION MP,		GP 5		
EVOLUTION V DT, ST, V ST/ie, X, OPTIMA/DT, /MT, /SL, SEQUEL 586 /DT, /MT,		GP 6		
EVOLUTION VQ SERVER, REVOLUTION Q, SMP, QUAD 6,		GP 16		
EXPRESS XP2,		GP 15		
FLEXCACHE 33/386DT, 33/386 TOWER, FLYER SD 4/25s,	GP 3			

Amstrad

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PC1512 128K KIT,	18 CHIP £10	6 CHIP £5		
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PERFORMA 6000, 6110CD, 6112CD, 6115CD, 6117CD, 6118CD, POWER MAC 6100, 7100, 8100 SERIES, QUADRA 800, 840AV, WORKGROUP SERVER 80, GP 8				
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LASERWRITER PRO 810,	4MB £59	8MB £84
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ADVANTAGE 486/xx, BRAVO 4/33, 486/25, PREMIUM 386/33TE, 486s, PREMIUM II 386/xx, 486s, POWER PREMIUM, PREMIUM SERVER SE 4/33,		8MB £84		
ADVANTAGE 6xx, 8xx, 6000p, ADVENTURE, PRO 486s, BRAVO 4/ SERIES, LC, II, III, LP, MS, MS-L, MS-T, MT SERIES,		GP 4		
ADVANTAGE PLUS 486 DX/33, 486DX2/50, DX2/66,		CALL		
BRAVO MS-T 6150, MANHATTAN G, V, PREMIIA 4/xx, GX P/SERIES, SE 4/xx, P/XX, MTE 4/xx, P/XX,		GP 5		
MANHATTAN SMP, 16MB £134	32MB £249	64MB £484		
PREMIUM 386/ 25, 33, T, SX16, PREMIUM II 386SX/ 20, 25,		GP 6		
PREMIUM SERVER SE4/50, 4/66, CUPID BOARD,		4MB £44		
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PREMIUM EXECUTIVE 286, 386SX,		£44			

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MODEL 3333,		CALL		
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GLOBALYST 200, SAFARI 3151,	£54	£169			
GLOBALYST 250, P & SAFARI 3181,					
MODEL 3120,	£49	£74	£134	£249	
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SAFARI 3330,	£39				
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DESKTOP MEMORY				
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EVOLUTION IV/ie, FLYER 32LCT, SD32, PRO VEISA LT, VL EXPRESS 486,		GP 17		
EVOLUTION V, 6, DUAL 6, REVOLUTION MP,		GP 5		
EVOLUTION V DT, ST, V ST/ie, X, OPTIMA/DT, /MT, /SL, SEQUEL 586 /DT, /MT,		GP 6		
EVOLUTION VQ SERVER, REVOLUTION Q, SMP, QUAD 6,		GP 16		
EXPRESS XP2,		GP 15		
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DESKPRO 386N, 386xxx,		GP 12		
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DESKPRO 4xxx, 5xxx, 5xx/MX SERIES, PRESARIO 5500 SERIES,		GP 6		
PROLINEA 5xxx, 5xxx/MX, /xxxox,		GP 6		
DESKPRO 5xxxM, XE 5/60, PROLIANT 1000 5/60, 2000R, 4000R, 4500R/SERIES, PROSIGNA PC SERVER 5xxx, SYSTEMPRO /XL G P 16				
DESKPRO XE 4/SERIES,		GP 13		
DESKPRO XL SERIES, PROLIANT 1500R, PROSIGNA 300, 500,		GP 10		
ENHANCED/PROLINEA 4/SERIES, NET 1/xx, MT 4/SERIES, & VS SERIES,		GP 15		
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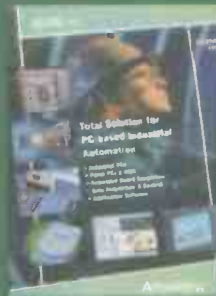
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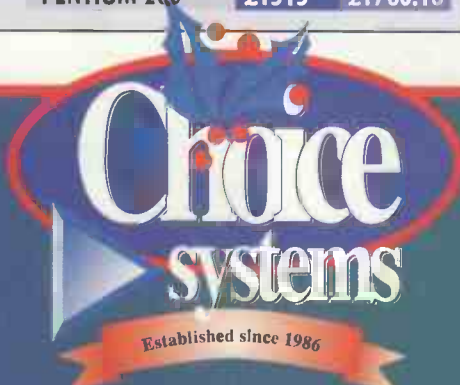


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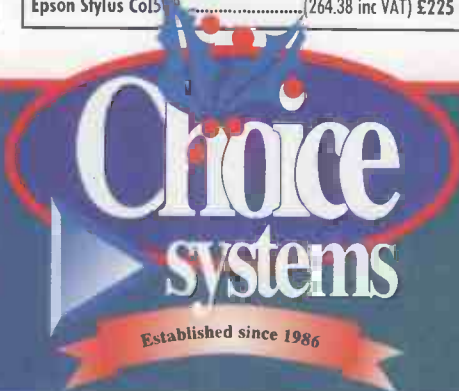
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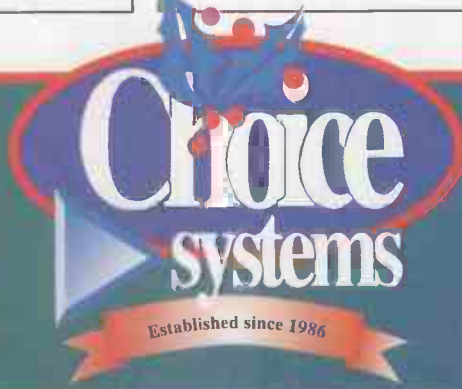
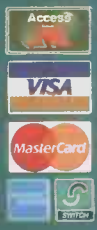


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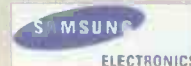
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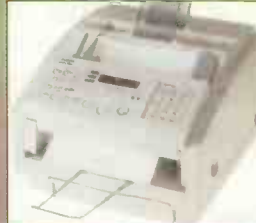


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HP EPL5600	(S051016) £109	Kyocera FS1550 / 1600	(TK12) £49	Texas Instruments MicroLaser	(2559879/8) £38 £105
HP EPL7100/7500/8000/8100	(S051009) £149	Mannesmann Tally MT904/908	(Pack of 2) £18 £75	Texas Instruments MicroLaser XL	(2569502/03) £49 £129
HP EPL9000 / 9100	(S051022) £159	Mannesmann Tally MT905 or MT906	(Pack of 2) £18 £85	Texas Ins. MicroLaser Power-Pro/E	(2633476) £135** £129
HP JetStream 8800 Process Cartridge	£129** £215	Mannesmann Tally MT9005	£16** £169	Xerox 4030	£79 £199

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Photo Paper (Deskjet 690) (20) (C1847A)	8.50
Premium Gloss Paper (50) (C3837A)	34.95
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anion Glossy Paper (50) (G101A4)	22.50
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M Films HP Deskjet/PaintJet (50) (CG3460)	21.95
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anion Stylus Transparency (30) (S041063)	34.95
HP Premium Transparency (50) (C3835A)	34.95

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Brand/Model	Black	Colour
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Canon BN22/32	(BJ101) 4.25	
Canon BN22/32 PRINthead		£25
Canon BJ10/20	(BC01) 13.95	
Canon BJ200	(BC02) 15.95	
Canon BJC210	(BC02/05) 15.95	22.50
Canon BJ130	(BJ1481) 10.95	
Canon BJC300/330	(BJ642) 10.95	
Canon BJC300	(BC10) 25.95	
Canon BJC70	(BC11) 29.95	
Canon BJC70	TANKS 3s(BC111) 8.95	13.95

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Epson Stylus Pro XL+	(S020034/66) 10.95	22.95
Epson Stylus 500/200	(S020093/97) 14.50	19.95
Epson Stylus 1500	(S020062/49) 32.95	20.95

INKJET CARTRIDGES & REFILLS

Brand/Model	Black	Colour
Kodak Diconix 150/180/330C	9.95	14.95
IBM Execjet II/IC/110/150C	20.95	27.95
IBM 4079 Plus (CYMK) (6's)	14.95	19.95
Mannesmann T7070 PRINthead	25.95	37.95
Mannesmann T7070	TANKS 4.95	12.95
Olivetti JP150 Mono Block	18.95	
Olivetti JP350/450	18.95	27.50
Olivetti Printhead +4 Ink	38.95	
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Xerox 4020 Maintenance Fluid		13.95

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M DC 2120Xi (QIC-80 Formatted)	6.95	£33

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M MC 3000XLPIMAT (700Mb)	16.95	£83
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3M TR3 Travan 1600Mb	24.95	£120
3M TR4 Travan 4000Mb	26.95	£130

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SONY QW3000XL 1.0Gb	14.95	£73
SONY QW3010XLF 850Mb	15.95	£78
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3M DDS D4/60M 4mm	5.95	£28
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Maxell 4mm/8mm Cleaning Tape		£10.95

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3M 3.5" 230Mb	12.95	£69
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The PC system is a high performance system that includes a fast 120MHz Intel® Pentium processor, 16Mb RAM, large 1000Mb hard disk, superb 14" SVGA colour screen and full-feature quad speed multimedia. Alternatively go for our high performance P150+ model which includes an eight speed CD-ROM drive and 15" screen.

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The Epson Stylus colour printer is one of the UK's best selling colour inkjet printers and produces superb 720dpi resolution. It includes autosheet feed and produces excellent results.

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Epson Stylus Printer

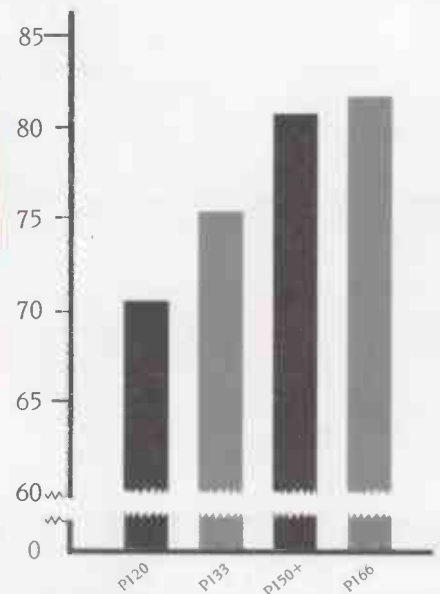


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Relative processor performance based on Ziff Davis Winstone 96™ as certified by MDR labs.



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All Offers End
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P150+
Printer
Bundles**



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- Lotus Organizer
- Lotus SmartPics graphics
- GSP Pressworks desktop publisher
- GSP Designworks art and drawing pack
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3

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4

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Key Features

P120 or P150+ Processor based Multimedia Systems

Lotus Business Software
Epson Stylus Colour Printer (Limited Offer)

14.4 Fax / Data / Internet Modem (Limited Offer)

Superb Leisure / Educational Software

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5



Modem included

(Limited Period Offer)

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AMD, Cyrix or Intel processors can be used. For US Robotics new 33600 Modem - add £131

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- 8 speed CD-Rom
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- MS compatible mouse
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1.3GB IDE	£122	£143.35
1.6GB IDE	£139	£163.32
2.0GB IDE	£169	£198.58
2.5GB IDE	£199	£233.83
3.2GB IDE	£229	£269.08
SCSI Drives 1-8GB	£POA	

SPECIAL OFFER
Mini or Desktop Tower (200 watts) Sony 1.44MB Floppy Disk Drive Computech 105 Key Board Computech 3 button mouse & Mouse Mat
£49.00

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Zip Drives		
Zip Drive 100MB Parallel	£109	£128.08
Zip Drive 100MB SCSI	£109	£128.08
Zip Disk Single	£12	£14.10
Zip Disk Six Pack	£65	£76.38
Ditto Easy Drives		
Ditto Easy 800MB Parallel Port	£85	£99.88
Ditto 2GB Internal	£109	£128.08
Ditto 2GB External	£149	£175.08
Ditto 3.2GB External	£219	£257.33
Jaz Drives		
Jaz 1GB SCSI Internal	£299	£351.33
Jaz 1GB SCSI External	£329	£386.58
Jaz Disk (Single)	£79	£92.83
Jaz Disk (5 pack)	£359	£421.83

FLOPPY DRIVES

3.5" 1.44MB Sony	£16	£18.80
5 1/4" mounting bracket for above	£5	£5.88
Floppy Disk Drive IDE Cable	£4.50	£5.29

CD DRIVES/RECORDERS

Aztech 8 speed	£62	£72.85
Aztech 10 speed	£95	£111.62
Yamaha CDR100	£479	£562.83
Yamaha CDR102	£329	£386.58

SOUND CARDS

SoundBlaster 16 PnP	£52	£61.10
SoundBlaster 32 PnP IDE	£89	£104.58
SoundBlaster AWE32 PnP IDE	£125	£146.88
WaveBlaster II	£75	£85.78
Creative BlasterKeys	£102	£119.85
Creative BlasterKeys Kit	£272	£319.60
Aztech 16-bit sound card	£39	£45.83
Orchid NuSound PnP32	£101	£118.68

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Super values with high performance J-S speakers

120 watts (J-530v)	£25	£29.38
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Yamaha Multimedia speakers YST-M5	£33	£38.78
Yamaha Multimedia speakers YST-M10	£37	£43.48
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POINTER DEVICES

3 button mouse, MS compatible	£8	£9.40
Genius Easy mouse	£8	£9.40
Genius mouse 3	£12	£14.10

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COMPUTECH KEYBOARDS

Computech 105 key Win 95 keyboard	£11	£12.92
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Computech 586 Pentium - Triton II 82430HX Chipset, 256k pipeline burst, P75-P200, enhanced IDE on board		
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Computech Pentium Pro Intel 82440FX chipset 6 x 72 pin, 4PCI & 4ISA, P150-P200 Pro, Super I/O		
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Asus 586 Pentium - Triton II HX Chipset, 512k pipeline burst, P75-P200	£139	£163.33
Asus Pentium PCI MB, P75-P200,		
Intel 430HX, Adaptec 7880, Raid port on board, 512k pipeline burst	£249	£292.58
Gigabyte 586 Pentium Intel 82430HX PCI Chipset, 512k pipeline burst, 4 PCI & 4 ISA, P75-P200 Super I/O	£119	£139.83
DUAL Gigabyte ATX Form Factor Dual P75-P200 processors, Intel 82430HX PCI Chipset, 512k pipeline burst, super I/O + Adaptec 7880 ultra SCSI on board	£225 exc	£264.38
ATX Tower Case for above	£79	£92.83

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8MB 72 Pin 70 N/S	£39	£45.83
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16MB 72 Pin 70 N/S EDO	£89	£104.58
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32MB EDO	£169	£198.58
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16MB 168 Pin Dimm	£85	£99.88
32MB 168 Pin Dimm	£195	£229.13
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CPU

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AMD K5 P75	£55	£64.63
AMD K5 P100	£69	£81.08
Cyrix 686 P120 + 100 Mhz	£79	£92.83
Cyrix 686 P150 + 120 Mhz	£99	£116.33
Cyrix 686 P166 + 133 Mhz	£149	£175.08
Intel P75	£75	£88.13
Intel P100	£255	£299.63
Intel P120	£109	£128.08
Intel P133	£149	£175.08
Intel P150	£199	£233.83
Intel P166	£285	£334.88
Intel P200	£399	£468.83
Intel Pro 150	£329	£386.58
Intel Pro 180	£369	£428.83
Intel Pro 200	£399	£468.83
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486 Cooling Fan	£3.50 exc	£4.11
586 Pentium Cooling Fan	£4.50 exc	£5.29

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Adaptec ISA 1542 CF/Kit	£164	£192.70
Adaptec PCI 2940 Kit	£169	£198.58
2825 kit VLB EIDE + SCSI	£102	£119.85

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COMPUTECH GRAPHICS CARDS

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2MB EDO Graphics + MPEG	£69 exc	£81.07 inc
4MB Vram MPEG XING S3 986	£239 exc	£280.83 inc

Diamond 3D

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2MB Diamond Stealth 64 Dram PCI	£63	£74.03
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Please ring for prices on 3D Edge Cards 2MB EDO Diamond Stealth 3D 2000	£89	£104.58
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Mystique 2MB	£109	£128.08
Mystique 4MB	£165	£193.88
Millenium 2MB WRAM	£119	£139.83
Millenium 4MB WRAM	£189	£222.08
Millenium 2MB WRAM upgrade	£65	£76.38
Millenium 4MB WRAM upgrade	£129	£151.58
Millenium 6MB WRAM upgrade	£175	£205.63

Hauptpage

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Win TV Celebrity TV/Teletext AVI capture	£237	£278.48
M-JPEG Capture Card Video	£224	£263.20
Win Motion / 60 M-JPEG	£314	£368.95

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APC BK 250EC	£76	£89.30
BK 600EC	£149	£175.07
BackUPS Pro 280	£106	£124.55
BackUPS Pro 420	£169	£198.58
BackUPS Pro 650	£186	£218.55
BackUPS Pro 1000	£310	£364.25
SmartUPS 450i	£219	£257.33
SmartUPS 700i	£245	£287.88
BTS BS-600	£140	£164.50
BTS BS-900	£240	£282.00
BTS ELAN 600	£434	£509.95
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3C-590 Combo PCI	£80	£94
3C-589 Combo PCMCIA	£125	£146.88

Dlink

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650CT Combo PCMCIA	£89	£104.58

SMC

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Xircom

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BNC Parallel	£199	£233.83
BNC PCMCIA2	£125	£146.88
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All cards are ISA unless otherwise specified

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Computech YD 15" .28 MPRII 65 KHz 1280 x 1024	£199	£233.83

Daewoo

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17" Taxan Ergovision EV730LR	£427	£3554.60
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Iiyama		
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HP Scanjet 4S Greyscale	£189	£222.08
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Bubblejet		
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BJ230 Mono	£228	£267.90
BJ300 80 Column	£344	£404.20
BJ330 136 Column	£386	£453.55
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EPSON		
Dot Matrix		
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FX1170 9 Pin	£298	£344.28
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LQ300 24 Pin	£118	£138.65
LQ570 + 24 Pin	£206	£242.05
LQ870 24 Pin	£365	£428.88
LQ1070+ 24 Pin	£289	£339.58
LQ2170 24 Pin	£465	£546.38
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Stylus 200 Colour	£130	£152.75
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	Exc. VAT	Inc. VAT
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Stylus Colour Pro A4	£299	£351.33
Stylus Colour Pro XL+(A3)	£794	£932.95
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Inkjet		
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HP DJ 820cxi	£252	£296.10
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Laser		
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- Microfine Toner for Sharper Text & Crisper Graphics
- Straight Paper Path Technology
- Optimised Windows '95 / 3.1 / 3.11 Printer Driver
- High Speed Bi-Directional Parallel Port
- True Type Compatible Scalable Fonts on Disk
- 200 Sheet Multi-Purpose Feeder

BROTHER HL-730
Razor Features & Benefits

- Enhanced Performance, Professional-Loading Output
- 6 ppm Engine Speed
- 1200 x 600 DPI Resolution (Windows)
- 600 x 600 (Non-Windows) for Sharp, Crisp Professional Output
- Microfine Toner for Sharper Text & Crisper Graphics
- Straight Paper Path Technology
- Optimised Windows '95 / 3.1 / 3.11 Printer Driver
- High Speed Bi-Directional Parallel Port
- True Type Compatible Scalable Fonts on Disk
- 200 Sheet Multi-Purpose Feeder

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MS Excel 95	£195	£229.13
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Antivirus Toolkit Win 95	£59	£69.33
Antivirus Toolkit Dos	£51	£59.93
Antivirus Toolkit Win NT	£59	£69.33
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MS Publisher for Win 95	£63	£74.03
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Page Plus for 95	£28	£32.90
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Corel Draw Ver 5 CD	£168	£197.40
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Corel Flow	£45	£52.88
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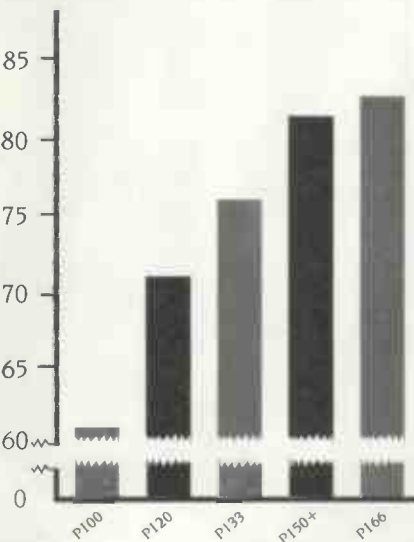
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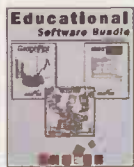
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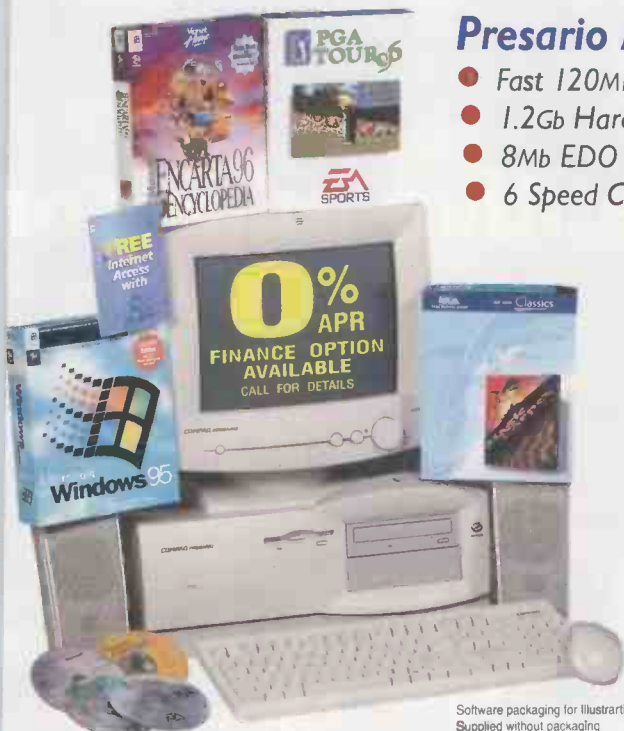
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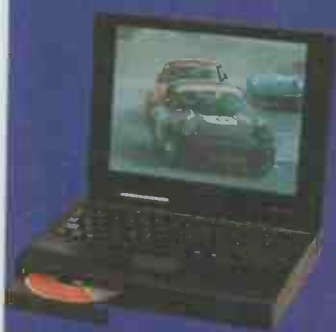
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- On Board 2 Fast serial & ECP Parallel
- Desktop or Mini Tower Case
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- Microsoft Windows 95
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1.7 Gb EIDE	£1140	£1190	£1290	£1390
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1.7 Gb EIDE	£1500	£1560	£1650	£1750
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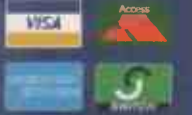
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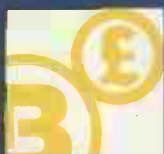
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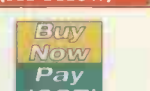


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EPSON Stylus Color 200

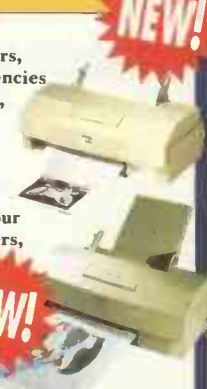
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- 8X Speed IDE CD-ROM, MPEG playback
- 14" monitor (SVGA, MPRII, DPMS compliant)

ADVANTAGE! 7302 DESKTOP £1275

- 16Mb RAM, 1.2Gb Hard Drive, 120 MHz Intel Pentium Processor
- 8X Speed IDE CD-ROM, MPEG playback
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- 28.8 Kbps data/fax modem with full duplex voice support & DSVD

ADVANTAGE! 7303 DESKTOP £1529

- 16Mb RAM, 1.6Gb Hard Drive, 133 MHz Intel Pentium Processor
- 8X Speed 3 disk changer IDE CD-ROM, MPEG playback
- 15" monitor (SVGA, MPRII, DPMS compliant)
- 28.8 Kbps data/fax modem with full duplex voice support & DSVD

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- 16Mb RAM, 2.5Gb Hard Drive, 166 MHz Intel Pentium Processor
- 8X Speed IDE CD-ROM, MPEG playback
- 14" monitor (SVGA, MPRII, DPMS compliant)
- 28.8 Kbps data/fax modem with full duplex voice support & DSVD

ADVANTAGE! 9306 MINI TOWER £2382

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J40 P120 DSTN 16/1000	£1485	J50 P133 TFT 8/00	£1878
A41 P120 DSTN 16/800CD	£1612	A42 P120 TFT 8/800	1878
P41 P120 TFT 16/1000CD	£2206	P41 P120 TFT 16/2000CD	£2376
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4122 16/2500CD & 15" Monitor	1676
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8714 16/2500CD & 17" Monitor	2439
DeskPro 2000	
5120 16/1080	666 5133 16/1080 741
5133 16/1620	825 5166 16/1080 955
5166 16/1620	1041 5200 32/1620 1320
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AGFA

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QuickTake 150	399
PowerShot 600	665

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QV-10A Digital Camera £299

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QV-100A Digital Camera £435

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KODAK

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- JPEG Compression File Storage
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PSION			
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Series 3a 512k	197	Series 3a 1Mb	219
Series 3c 1Mb	259	Series 3c 2Mb	305
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Toolkit 1	39	Games Pack Deluxe	31
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1120 T 8/810	1419	4100 8/630	1415
4110 8/810	1950	412016/1080	2204
4120 T 16/1080	2417	4130 T 16/1080	2839

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800CT P133 16/1350	2973		

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TravelMate 6030 P133 16/1350	2812
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72pin Parity	-	22	42	77	172	-
72pin EDO	-	16	27	66	139	-
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x86 - P150	88 6x86 - P166	129
x86 - P200	359	

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PentiumPro 180	334 PentiumPro 200	415

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Pentium 63	89 486→ Pentium 83	125
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Pent 100 - Pent 166	389	

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T4000es 8Gb Ext. SCSI	289		

CONNER			
Tapestor 800Mb Int	79	Tapestor 800Mb Par	119
Tapestor 3200Mb Int	134	Tapestor 8000Mb IDE	235
Tapestor 8000Mb SCSI	235		

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SureStore 6000 4-16Gb	649	713	1739

IOMEGA			
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Ditto 2000 Internal	89	Ditto 2000 Parallel	124
Ditto 3200 Internal	149	Ditto 3200 Parallel	173

SONY			
SDT-5200 2/4Gb Int	479		
SDT-5000 4/16Gb Int	514	SDT-5000 4/16Gb Ext	594
SDT-7000 4/16Gb Int	579	SDT-7000 4/16Gb Ext	664

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5200 2.5Gb Int SCSI		335
5525ES 525Mb Int SCSI		369
5150ES 150Mb Ext SCSI		369
5200 2.5Gb Ext SCSI		425
5525ES 525Mb Ext SCSI		450

WANGDAT			
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3200 2/4Gb Int SCSI	455	3200 2/4Gb Ext SCSI	545
3400 4/16Gb Int SCSI	535	3400 4/16Gb Ext SCSI	625

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 - 256k Pipeline burst cache (upgradeable)
 - Supports SDRAM, EDO & Fast Page Mode memory
 - Onboard EIDE, 2 serial & parallel ports
 - Includes concurrent PCI & USB support
- £79**

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Ultrapad A4 & xRes	439	Ultrapad A3	545
U/pad A3 electrostatic	618	Ultrapad A2	1339

Accessories			
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Clarix Works 4, FileMaker Pro (for Windows 95 users)	249		
Clarix Works 3, FileMaker Pro, Impact (for Win 3.11)	249		
MS Works 3	74	MS Works 4.01	73
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MS Office Pro 7 Win95	5425	Novel PerfectWorks	10



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Java Cafe	84	Spider Win95	38
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Web Buddy	42	Web Gallery	43
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TextBridge Pro	229	TextBridge Pro 96	225
Wordscan Plus 4	285		

OPERATING SYSTEMS

OS/2 Warp	49	OS/2 Warp & Win	85
NT 4.0 Workstation	225	NT 4.0 Server & 5 Clients	589
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Windows 95 Full	111	Plus Pack Win95	26

PROGRAMMING

Borland C++ 5.0	199	Delphi Desktop Win95	202
Delphi Developer Win95	322	Turbo C++ 3.0 DOS	54
Turbo C++ 4.5 Win	54	Turbo Pascal 1.5	78
Visual Basic DDS	79	Visual Basic Pro DOS	189
Visual Basic 3.0 Win	70	Visual Basic 4 Win 95	65
Visual Basic Pro 4	319	Vis Basic Enterprise 4	665
Visual C++ 4.0	67	Visual C++ Pro 4.0	335
Visual C++ Enterprise	679	Visual J++	62

PROJECT MANAGEMENT

Project 4 DOS	205	Superproject	460
Project 4 Win	279	Project 4.1 Win95	289

ROUTING

AutoRoute Express UK+Irl FD	34
AutoRoute Express UK+Irl CD	45
AutoRoute Express Europe FD	34
AutoRoute Express Europe CD	45
AutoRoute UK+Irl DDS	225
AutoRoute UK+Irl Windows	239
AutoRoute Express 5 GB Win95	42
AutoRoute Express 5 Europe Win95	42
Route 66	34
Route 66 Ultimate Traveller	79

SPREADSHEETS

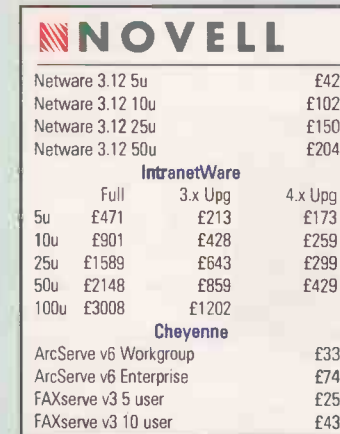
1-2-3 5.0 Win	209	1-2-3 6.0 Win95	229
Excel 5	218	Excel 7 Win95	225
Supercalc	58		

UTILITIES

AfterDark 95	27	ACT! 2 Win	13
ArcSolo Win	69	ArcSolo Win95	81
cc-mail 6	93	Checkit Diagnostics	2
Checkit Pro	58	Cleansweep 95	2
Corel SCSI 2.5	56	Dashboard 95	21
Dr Sol AntiVirus DOS	58	Dr Sol AntiVirus Win	71
Dr Sol AntiVirus Win95	72	Fast Move	31
FirstAid 95	22	FirstAid 95 Deluxe	34
Fix It	29	HiJack Win95	38
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Norton Anti-Virus	45	Norton Backup	81
Norton Utils Win95	54	Norton Navigator Win95	51
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PC Tools 9 OOS	73	PC Tools 2 Win	61
Power Desk	22	PowerTranslator Win95	75
QEMM 8	46	QuickView Plus	25
RAM Doubler 2	39	Sidekick 95	21
Sidekick 95 Deluxe	33	Stacker 4.1 Win95	36
Uninstaller	31	VirusScan 3in1	23
Wincheckit	29	WinProbe 95	31
XTree Gold DOS	82	XTree Gold Win	65
Zip It	21		

WORD PROCESSING

WordPro 96	69	Word 6 Win	219
Word 7 Win95	225		



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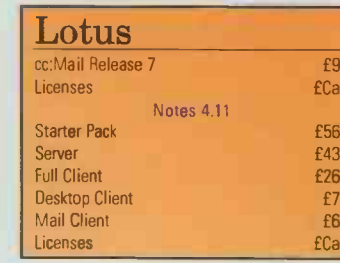
Netware 3.12 5u	£425
Netware 3.12 10u	£1020
Netware 3.12 25u	£1500
Netware 3.12 50u	£2041

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Licenses	£69
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PageMaker 6.5 VU	Adobe	Photoshop 4 VU	139
Photoshop LE-Full	166		
AutoCAD LT 2 VU	Autodesk	AutoCAD LT Win95 VU	175
Delphi Desktop VU	Borland	Delphi Developer VU	145
	Caere		
Omnipage Pro 6 VU	95	Omnipage Pro 5-6	58
Omnipage Pro 7 VU	95	Omnipage Pro 6-7	70
	Clarix		
Works 4 VU/CU	49	FileMaker Pro 3 VU	80
	Corel		
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Draw 3-5 CD	75	Draw 4-5 CD	72
Draw 7	146		
WordPerfect Suite 6 CD	65	W/P Suite 6 FDCD	93
Office Pro 3 CD	119	Office Pro 7 CD	119
WordPerfect 7 CD	65	WordPerfect 7 FDCD	90
	Microsoft		
Word/Excel/Access/PowerPoint VU	89		
Word/Excel/Access/PowerPoint CU	110		
Office 7 VU	139	Office 7 CU	162
Office Pro 7 VU	204	Office 7 Pro CU	245
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Windows 3.x to Win 95 Upgrade 1u MLP	57
MS-DOS to Win 95 Upgrade 3.5"	111
MS-DOS to Win 95 Upgrade 1u MLP	96
Plus! Pack add-on 3.5"	26
Plus! Pack add-on CD	26
Plus! Pack add-on 1u MLP	23



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Project v4.1	£289	-	-	£85	£110
PowerPoint v7	£225	£125	£199	£89	£110
Word/Excel/Access v7	£232	£125	£199	£89	£110
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Visual Basic v4	£65	-	-	£35	-
Visual Basic Pro v4	£319	-	-	£105	-
Visual Basic Ent v4	£665	-	-	£345	-
Visual C++ v4	£67	-	-	-	-
Visual C++ Pro v4	£335	185	-	£172	-
Visual J++	£62	-	-	-	-



Windows NT 4		Cheyenne	
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Bracketed figure is nominal capacity

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ST31720A (1.7Gb)	146	ST52520A (2.5Gb)	198

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Bracketed figure is nominal capacity

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4345 (4.3Gb)	689	3391 (9Gb)	1219
Fireball (1.2Gb)	164	Fireball (2.1Gb)	232
Fireball (3.2Gb)	294	Atlas (2.1Gb)	314
Atlas (4.3Gb)	559	Atlas II	Call
Viking	Call		
ST51080N (1Gb)	163	ST31051N (1Gb)	224
ST31055N (1Gb)	219	ST32155N (2.1Gb)	289
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RCD 5040 Internal	527	RCD 5040 External	603
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CDR4400i Int	559	CDR4400e Ext	619
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YAMAHA Quad Speed Writers	569		
CDR100 Internal	519	CDE100 External	569

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SB AWE 32 PnP	89	W/blaster II games Pak	65
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8x Speed IDE	67		
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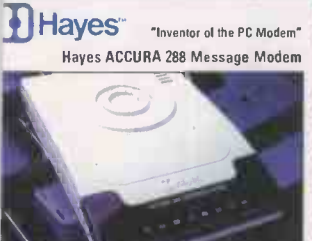
MODEMS

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Microlin 33k6 PCMCIA	136		

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Surfer Pro 33k6	125

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Sportster Voice 33k6 Internal	129
Sportster 33k6 Mac	132
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Courier I Internal/External	267
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- V.42/V.42bis MNP 2-5 Error Correction/Data Compression
- Fax Speeds: 300bps - 14,400bps, Group 3 fax, Class 1 and 2.0
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Hayes Ultra 24 Modem	40	Dlink DFE500TX 100MHz	44
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Arcada Backup Exec v6 Server WinNT	267	Star LC24-200 ASF	40
Viewsonic V15ES 15	260	Brother HL-6 Paper Cassette	40
Microtek Scanmaker IIIHR	258	Creative Soundblaster Dev Kit Win	37
Borland C++ v4.5 DOS/Win Version Upg	60	Oki ML-280 Serial Interface	37
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Syquest 88Mb Internal	125	Star LC-10 ASF	36
IMSI TurboCAD v3.2 DOS	40	Nextbase AR Express UK Win	18
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Lotus 1-2-3 v2.4 DOS Version Upg	180	Microsoft Sound System Software	32
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Primax Compact 4800 Flatbed	180	Star LC24-15 Tractor Feed	31
Storage Options 4xSpeed Parallel CDROM	120	Epson EPL-7500 Face Up Tray	30
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Diamond Stealth 64 Video 1Mb	55	Generic Disc Box 10cap 5.25	2
Canon BJ30/BJC70 Battery Pack	31	Generic Disc Box 10cap 5.25	5
Lotus cc:mail Platform v4 DOS	115	Borland Prologon DOS	10
Rocetec 1.2Mb Ext Floppy Drive	20	Dataseq DS-Fax	10
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BJI-643C/M/Y	BJC-800 Colour	18
BJI-201BK	BJC-600/610/620 Black	8
BJI-201C/M/Y	BJC-600/610/620 Colour	7
BC-10	BJ-30/70 Black	22
BCI-10BK	BJ-30/70 Black Tank 3pk	10
BC-11	BJC-70 Colour	25
BCI-11BK	BJC-70 Black Tank 3pk	12
BCI-11C	BJC-70 Colour Tank 3pk	15
BC-20	BJC-4000/4100 Black	20
BC-21	BJC-4000/4100 Colour	31
BCI-21BK	BJC-4000/4100 Black Tank	6
BCI-21C	BJC-4000/4100 Colour Tank	13

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S020062	Stylus 1500 Black	32
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S020049	Stylus II/11s/200 Colour	18
S020093	Stylus 500 Black	14
S020097	Stylus 200/500 Colour	18
S020034	Stylus Colour/Pro Black	10
S020036	Stylus Colour/Pro Colour	22
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51641A	Deskjet 820/850/870 Colour	18
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51645A	Deskjet 1600 Black	16
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C3900A	LaserJet 4V	91
C3903A	LaserJet 5P	49
C3906A	LaserJet 5L	39
C3909A	LaserJet 5Si	119

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TK-12	FS-1550/1600/3400/3600	44
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69G8256	Optra E	38
1382100	Optra 7k Diamond Fine	109

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10117923	SuperScript EP	69
50015043	SuperScript 860	89
OKI		
4452	OL400/800	17
4851	OL400e/400w/600/610/810	15
5075	OL1200ex/Okipage 16n	35
5096	Okipage 4w	18

PANASONIC		
KX-P453	KX-P4410/4430/4400	28
KX-P455	KX-P4400/4401/5400	10
KX-P457	KX-P6100/6150	12
KX-P459	KX-P6300/6500	12

SHARP		
JX92TC	JX-9200/9210	37
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T-9104W	T-Win	8
044726	T-9108/9208	80

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BF-102 A4	A4 Black Print Film 20sht	25
HG-101 A4	A4 Glossy Film 20sht	15
HR-101 A4	A4 HiRes Coated 200sht	16
FS-101 A4	A4 Fabric 10sht	23

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S041061	A4 Coated 720dpi 100sht	11
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S041063	A4 Transparencies 30sht	32
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S041079	A2 720dpi 30sht	23
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S041069	A4 Premium Glossy 50sht	27
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Travan TR-1 400/800Mb	19	Travan TR-3 1.6/3.2Gb	22
Travan TR-4 4/8Gb	25	Ditto 2000 1/2Gb	14

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1.3Gb 5.25"	59	Panasonic PD disk	33
2.6Gb 5.25"	115		

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CANON		
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3Tx-8500	407	430
3Ti-8500		510
3Tx-9500	520	549
3Ti-9500		630
3T-8500 Par & SCSI 327	GT-9500 Par & SCSI 446	
3T Transparency unit 365	GT Auto Doc Feeder 310	

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Scanjet 4C 545	ScanJet 4SI Ethernet 1495	
4C Office Pro 645	4C Graphics Pro 645	
4C Document feeder 310	4C Transparency unit 445	

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SuperVista S12	399	429	499	829
Powerlook II	1499			1599
Powerlook 2000				2995
Mirage D-16L				5495

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LE = Photoshop LE, Plus = Full Photoshop
Pro = Full Photoshop & Transparency Adaptor

UMAX SCANNERS
TECHNOLOGICAL ADVANTAGE & SECURITY
FLUOR AVAILABLE FOR ALL SCANNERS

Vista-S6E
• 24bit/16.7m colour scanning
• 300x600dpi optical resolution
• 4800x4800 max res. thru Ultra View technology
• VistaScan & PageManager Software
Photoshop LE available at £20 **£239**



SuperVista-S12
• 600x1200dpi optical resolution
• Max. resolution: 9600x9600 dpi
• Analog Gamma Design for better image quality
• Fast scan speed
• Bundled with Photoshop LE **FROM £429**

VISIONEER			
PaperPort Vx Win 229	PaperPort Vx Mac 239		
PaperPort ix 249			

VISIONEER PAPERPORT ix
• Integrated with high quality Windows 95 Keyboard with 3 Windows short-cut keys
• Ideal for those who need to save desk space
• 256 grayscale imaging
• FREE software worth £250:
Xerox TextBridge OCR
Visioneer FormTyper
Netscape Navigator
Corex CardScan SE
PictureWorks Copier **SALES FLASH!**



Award winner! £249

LASER PRINTERS

BROTHER		
HL-730 263	HL-760 315	
HL-1060 529	HL-1260e 825	
HL-1650 975		

CANON		
LBP-460w 210	LBP-1260+ 825	

EPSON		
EPL-5500W 245	EPL-5500 1Mb 325	
EPL-9000 1082	EPL-5500 2Mb 369	
EPL-9000PS 1349	EPL-5500 PS 655	
EPLN-1200 Call	EPLN-1200 PS Call	

MINOLTA	
PagePro 6 339	

GCC Elite XL 616
• A3 Edge to Edge Printing, 600dpi, 16ppm
• 8Mb Memory upgradable to 64Mb (Standard SIMMS)
• AccuGray GrayScale Enhancement
• 10Base-T / 10Base-2 Multi-Platform performance
• Energy Star / Mono Consumable / Ozone friendly **£2499**



GCC Elite XL 808
• A3 Edge to Edge Printing, 800dpi, 8ppm
• 12Mb Memory upgradable to 64Mb (Standard SIMMS)
• AccuGray GrayScale Enhancement
• 10Base-T / 10Base-2 Multi-Platform performance
• Energy Star / Mono Consumable / Ozone friendly **£2799**



GCC Elite XL 1208
• A3 Edge to Edge Printing, 1200dpi, 8ppm
• 24Mb Memory upgradable to 64Mb (Standard SIMMS)
• AccuGray GrayScale Enhancement
• 10Base-T / 10Base-2 Multi-Platform performance
• Energy Star / Mono Consumable / Ozone friendly **£3895**

GCC THE LEADING NAME IN ELECTRONIC PRE-PRESS PROOFING TECHNOLOGIES

HEWLETT PACKARD		
Laserjet 5L 287	Laserjet 6P 485	
Laserjet 6MP 597	Laserjet 5 859	
Laserjet 5N 1013	Laserjet 5M 1172	
Laserjet 4V 1369	Laserjet 4MV 1980	
Laserjet 5Si 1959	Laserjet 5SiMX 2649	
Laserjet 5 Colour 4159	Laserjet 5M Colour 5119	

KYOCERA		
FS400 304	FS1550+ 787	
FS1600+ 935	FS3400+ 1153	
FS3600+ 1385		

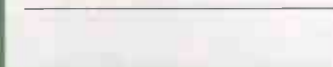
LEXMARK		
Optra E 329	Optra R+ 869	
Optra RN+ 1043	Optra RT+ 1025	
Optra LX+ 1319	Optra LXN+ 1625	
Optra N 2055	Optra N Pro 2510	
Optra C 4755	Optra C Pro 5960	

FS-400

- 4ppm print speed
- Low cost of ownership (1p/page)
- 300x300 dpi & 300x1200 dpi
- Parallel & High Speed I/O ports
- 1Mb RAM (5Mb max)
- Optional internal network card (Ethernet or Tokenring)
- Optional 250 sheet second paper feeder
- Optional PostScript (requires 2Mb memory)
- Optional face-up tray
- 3 year warranty on drum

£304

Also available:
FS-1550 and FS-3400, 10 + 18ppm models, 300dpi.
plus:
FS-1600+ and FS-3600+ 10 + 18ppm models, 600dpi.
All feature ultra low running cost and extensive paper handling and connectivity options.
Prices on request.



KYOCERA

Tally



T 9108 Laser Printer

- Low cost of ownership
- 8 pages per minute
- Small and compact
- 300 dpi/600 dpi
- Silent operation
- Microsoft Windows printing system, smart easy and fast Windows operation
- PCL4.5*
- 1 year on site warranty

£305

T9208 £399

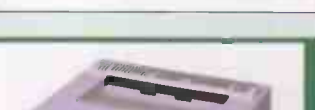
T9012 £669

TOTALLY COMMITTED TO PRINTERS

NEC

SuperScript 860 GDI Pro Laser Printer

- 8 page per minute printing
- 600 dpi quality with SET for 1,200 x 600 resolution
- Host based and peer to peer networking capability
- Compatible with Microsoft® Windows™, DOS and other operating systems
- 200 sheet cut paper feeder and 5,000 page toner cassette
- 1 year warranty



£309

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£49
only while stocks last

ScanMan EasyTouch

The personal scanner with 256 gray scale, portability, and easy installation

- ScanMan EasyTouch boardless scanner with pass-through parallel port connector
- Includes OmniPage Direct Anyfont OCR software and FotoTouch Color image editing software
- Software automatically merges multiple scans into full pages
- 100 - 400 dpi scanning resolution
- TWAIN-compliant
- User Guides
- Full product support
- 2-year guarantee

MICROTEK		
ScanMaker E3 215	ScanMaker E6 318	
ScanMaker III 1095	Trany Adaptor 269	
OEM Photoshop LE 30	OEM Photoshop Full 130	

ScanMaker E6

- FEATURES**
- Fast single-pass speed
 - 4800 dpi maximum resolution
 - 216mm x 330mm scanning area
- INCLUDES**
- ScanWizard™ scanning software
 - OCR software for scanning text
 - Image-editing software



£340

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LASER PRINTERS



OL600ex LED Page Printer
6 Pages Per Minute
600 x 600 dpi **£253**



OL610ex LED Page Printer
6 Pages Per Minute
600 x 600 dpi **£315**

OKI

People to People Technology



OKIPAGE 4w
LASER QUALITY WINDOWS PRINTER
600 dpi class LED technology
Four-pages-per-minute **£195**

OL810ex **£489**

OL16n **£769**

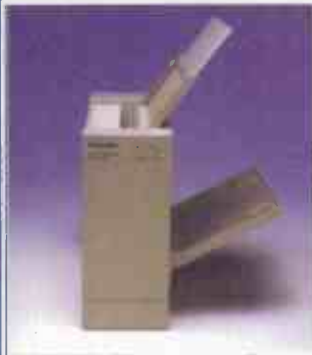
KX-P6150



- 6 ppm Print Speed
- 300x300 dpi Resolution
- SatinPrint-Optimum Resolution Technology
- Ultra-compact Design
- Bi-directional Parallel Interface
- Power Save Mode and Waste Toner Recycle
- Windows 3.1 Driver Included
- HP LaserJet™ IIP Emulation

£279

KX-P6300 GDI



- 6 ppm Print Speed
- True 600 dpi Resolution
- Supports Windows 95 & 3.11

£221

- KX-P4440 **£665**
- KX-P6300 **£221**
- KX-P6500 **£299**

Panasonic

SHARP

Up to 2½ times faster than GDI & PCL printers



JX-9200 **£195**

- 4 pages per minute
- 300 x 300 dpi resolution
- Printer Memory never needs to be upgraded
- Fast 1st print, less than 30 seconds
- Graphical and audio user interface
- No ozone emission
- Silent in standby mode
- Smaller than A4 footprint - 299mm(W) x 291mm(D) x 185mm(H)
- 12 months on-site warranty included
- Ultra low copy costs, 2000 copies from Toner, 20000 copies from Drum (at 4% coverage)

JX-9210 **£269**

- All above, plus 600 x 600 dpi

JX-9460 **£589**

- 6 pages per minute
- 300 x 300 dpi resolution
- Up to 600 dpi quality with Sharp High Resolution Technology
- True 600 dpi PostScript option
- Emulations include PCL5
- 1 Mb RAM upgradeable to 9 Mb
- 250 sheet cassette

JX-9660 **£645**

- 8 pages per minute
- Dual 250 sheet cassettes
- 300 x 300 dpi resolution
- Up to 600 dpi quality with Sharp High Resolution Technology
- True 600 dpi PostScript option
- Emulations include PCL5
- 1 Mb RAM upgradeable to 9 Mb

JX-9680 **£699**

- 12 pages per minute
- 600 x 600 dpi resolution
- Emulations include PCL5e
- PostScript Level 2 upgradeable
- Network flexibility options
- Dual 250 sheet cassettes
- 2 Mb RAM upgradeable to 50 Mb

ALL ABOVE LASER PRINTERS HAVE A RISC PROCESSOR. INTERFACE SWITCHING BETWEEN ALL PORTS INSTALLED AND 12 MONTHS ON-SITE WARRANTY



Colour Printing 720 dpi on plain paper

COVER plus
Epson CoverPlus three year extended warranty service available - **£65.00**

Stylus Color 500
Colour Inkjet Printer

- 720x720 dpi photo-real output
- Includes software to monitor and advise on the status of the printer, including ink levels
- Windows 95 ICM & Macintosh ColorSync 2.0 compliant
- Includes PrintArtist (PC) software
- 1 year RTB warranty

£187

WHAT PC?

COVER plus
Epson CoverPlus three year extended warranty service available - **£99.00**

EPL-5500
Compact 600 dpi laser Printer

- World's most compact laser
- True 600x600 dpi
- Print speed: 6 ppm
- High speed 22.5MHz SparcLite RISC CPU
- HP PCL5e, GL2
- Optional Postscript

FROM £325

COVER plus
Epson CoverPlus three year extended warranty service available - **£40.00**

Stylus Colour 200
720 dpi Colour Inkjet Printer

- 720 dpi photo-real colour
- Prints on plain, coated papers, envelopes and OHP transparencies
- Permanent Piezo print-head
- Windows 95 ICM compliant
- Video and camera mode
- 1 year RTB warranty

£129

COVER plus
Epson CoverPlus three year extended warranty service available - **£95**

GTx-5000
Colour Flatbed Scanner

- 2400 dpi Output Resolution
- 300 dpi Optical Resolution
- 3 pass colour scanning, 1 pass mono scanning
- Scans documents upto 216mm x 297mm
- 1 year RTB warranty

£520

COVER plus
Epson CoverPlus three year extended warranty service available - **£149**

GTx-9500
Colour Flatbed Scanner

- 4800 dpi and 36 bits per pixel in colour
- Bi-directional parallel interface
- Advanced scanning options - TET, batch, page frame and negative film scanning
- Optional transparency unit and document feeder
- 1 year RTB warranty

£520

EPSON

HL-730 **£263**

The new HL-730 from Brother is the low cost solution for your printing needs - flexible, high print quality at an affordable price. The new HL-730 from Brother offers compatibility within various computing environments.

- 6ppm engine speed
- 600 dpi resolution
- Straight Paper Path Technology
- Easy to set up and use
- 200 sheet adjustable paper tray



HL-1060 **£529**

Brother's new mid range laser printer offers 10 pages per minute print speed with the added benefit of fast 600 dpi output. The HL-1060 gives superb print quality and versatile paper handling, with dual bin as standard.

- 10ppm engine speed
- True 1200 x 600 dpi output
- 400 sheet capacity
- 2Mb memory as standard



brother



HL-760 **£315**

The solution to your demanding print needs - flexible, high print quality at an affordable price. The HL-760 offers high performance print speed of 6 pages per minute, with the added benefit of fast 600 dpi output.

- True 1200 x 600 dpi resolution
- Enhanced memory management technology
- Network connectivity
- Sleep mode



HL-1260e **£825**

Incorporating Brother's own high speed 12 ppm engine and 1200dpi, the Brother HL-1260e delivers superb quality output with stunning graphic and text reproduction, for professional documentation.

- PCL5e/BR-Script 2
- True 1200 x 600 dpi
- 650 sheet paper input
- 2Mb memory upgradeable to 66Mb

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CANON

30	104	BJC-70	141
240	149	BJC-4100	189
230	227	BJC-4550	275
300	343	BJ-330	386
-620	266	BJC-800	878

Canon

BJ-30 BUBBLE JET PRINTER

£106

For mobile printing or light usage
Ultra Compact. Weighs only 1.4kg
Printing at 720 x 360 dpi in B&W with smoothing
Built-in 30 page sheet feeder
Optional portable kit and universal power adaptor
Microsoft® Windows® 3.1 and 95 compatible

BJC-4100 COLOUR BUBBLE JET PRINTER

£176

The ideal colour printer for home and business
Quality colour printing and crisp-jet black
True 720 x 360 dpi colour for near photographic results
Prints at 4.5ppm using optional black only cartridge
Windows® 3.1 and 95 compatible
3 year return to base Canon warranty
Winner of "Best buy" award - PC Direct
Winner of "Platinum" award - PC Answers

CITIZEN

Printiva 600c	257
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EPSON

Stylus 200 Mono	99	Stylus 200 Color	129
Stylus 500 Color	187	Stylus 1000	319
Stylus 1500	499	Stylus Pro	295
Stylus ProXL A3+	785	Postscript RIP	160

HEWLETT PACKARD

eskJet 340C	139	D'Jet 340 + Mac kit	172
eskJet 400 Mono	109	DeskJet 400 Colour	117
eskJet 690C	186	DeskJet 820Cxi	249
eskJet 870Cxi	294	DeskJet 1600C	809
eskJet 1600CN	1029	DeskJet 1600CM	1208
eskJet Colour Upg Kit	28		

LEXMARK

Vinwriter 150c	189	ColourJet 1020	134
ColourJet 2050	210	ColourJet 2070	214

OKI

kiJet 2010	235
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DOT MATRIX PRINTERS

EPSON

LX-300	91	LX-1050	178
FX-870	234	FX-2170	369
LQ-100+	82	LQ-300	112
LQ-570+	206	LQ-870	364
LQ-2070	325	LQ-2170	464
DLQ-3000	774	DFX-50001	169

OKI

ML280	190	ML380	215
ML320	299	ML385	310
ML3320	315	ML3390	315
ML520	329	ML321	359
ML521	389	ML590	435
ML591	499	ML395 Mono	635
ML395 Colour	715	ML3410	799

PANASONIC

KX-P1150	87	KX-P2023	108
KX-P2124	191	KX-P2135 Colour	123
KX-P3626	265	KX-P3696	262

STAR

LC90	59	LC240C	53
LC4511	245	LC-7211	248
LC-1521	295	XB24/250C	399

TALLY

MT83	175	MT135	195
MT84	205	MT136	275
MT150/9	285	MT150/24	399
MT151/9	339	MT151/24	445
T2045	845	T2045C	929

PLOTTERS

HEWLETT PACKARD

DesignJet 330 A1	1275	DesignJet 330 A0	1774
DesignJet 350C A1	1560	DesignJet 350C A0	2061
DesignJet 700 A1	2429	DesignJet 700 A0	2917
DesignJet 750C Plus	Call	DesignJet 750C A0	4315

COPIERS

HEWLETT PACKARD

CopyJet Colour	1079	CopyJet M Colour	1439
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HP DeskJet 400 printer



- Up to 3 pages per minute (Black)
- Approximately 4-7mpp
- 600 x 300 dpi (Black), 300 x 300 dpi (Colour)
- Enhanced 256 Levels of Grayscale
- Up to 16.7 Million Brilliant Colours
- Resolution Enhancement technology for Crisp, Clear Printing
- Windows 95 Plug and Play compatible
- Automatic 50 Page Sheet Feeder
- Small Footprint

£109

HP DeskJet 690 printer

- 600 x 600 dpi (Black), 600 x 300 dpi (Colour)
- Windows 95 Plug and Play compatible
- HP Photo Resolution Enhancement technology using optional HP Photo Cartridge
- 8 built in fonts, 30 TrueType Typefaces

£185

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
H5462A	HP DeskJet 820/820Cxi	1 Year Return	3 Year on-site - next day/exchange	£47
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/4P	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-900, HP Fax-950	1 Year Unit Exchange	3 Year on-site - next day/exchange	£75
H5470A	HP OfficeJet	1 Year Unit Exchange	3 Year on-site - next day	£102
H5471A	HP SureStore/DAT	1 Year Unit Exchange	3 Year on-site - next day	£118
H5473A	HP DeskJet 1600C/CM	1 Year Unit Exchange or 1 Year Return	3 Year on-site - next day	£105
H5475A	HP ScanJets (Colour)/4Si	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 5N/5M	1 Year Return	3 Year on-site - next day	£160
H5480A	HP Vectra PC	1 Year on-site, 2 Year Return	3 Year on-site - next day	£125
H5482A	HP LaserJet 4V, 4MV	1 Year Return	3 Year on-site - next day	£235
H5485A	HP CopyJet	1 Year Return	3 Year on-site - next day - 4 hour response	£299
H5489A	HP DesignJet 300/350	3 Year on-site - next day	3 Year on-site - 4 hour response	£300
H5492A	HP LaserJet 530/530MX	1 Year on-site - next day	3 Year on-site	£112
H5500A	HP LaserJet 5L	1 Year Return	3 Year on-site - next day	£420
H5501A	HP Colour LaserJet 5M	1 Year on-site - next day	3 Year on-site - next day	£946
H5729A	HP DesignJet 750, 755	1 Year on-site - next day	3 Year on-site - next day	£771

HP OfficeJet Model 350



- 600 x 300 dpi with REt ensures crisp reproduction
- Plain-paper Fax Output • PC Fax Capability
- 300 dpi scanner • Includes OmniPage LE (OCR software)
- One product to setup! One print cartridge to change.
- As easy to use and install as standalone devices.
- Space Saving. The HP OfficeJet LX can do it all.

£296

HP DeskJet 870Cxi Printer



- High quality 600x600 dpi black with new pigment ink
- New colour inks for more brilliant colours
- HP's Resolution Enhancement technology
- Scalable TrueType Fonts for Microsoft Windows
- Single, manual and automatic sheet feed
- Multiple paper types and sizes, envelopes, labels
- Dual I/O (PC or Macintosh)
- 1 year warranty

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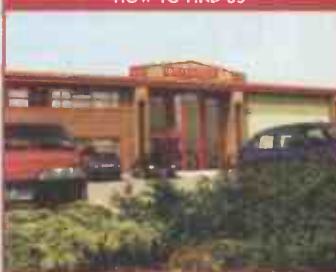
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The P133 and P166+ multimedia PowerStation systems are the best multimedia deals you will find anywhere.

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and we feature a comprehensive multimedia kit as standard with fast eight speed CD-ROM drive, stereo speakers, PC joystick and five CD multimedia titles.

Each system is designed to be future-proof with chip upgradeability to Intel P200, RAM up to 128Mb, and plenty of drive bays for extra storage. Included in the price is Microsoft Windows 95 with a massive software bundle of the best business, educational and leisure programs. All this with the complete peace of mind you get by buying direct from Time - the UK's leading direct PC supplier for almost a decade. Buy with confidence from the UK's leading PC specialists.

Multimedia PowerStation Specification

- 133MHz Intel Pentium processor (P133 model) or IBM/Cyrix/ST 6x86 P166+ processor (P166+ model)
- Both systems upgradeable to Intel 200MHz Pentium processor
- 256k Pipeline burst mode cache
- Plug and play motherboard with Intel socket 7
- Massive 32Mb EDO RAM (Max 128Mb)
- 2000Mb (2Gb) enhanced IDE hard disk
- Eight speed IDE CD-ROM drive
- 33.6 v34 BAPT approved fax/data/Internet modem (Limited offer with P166+ model only)
- Integrated 16-bit stereo sound
- Twin stereo speaker system and PC joystick
- 3.5" 1.44Mb floppy disk
- Enhanced parallel, PS/2 mouse and two high speed serial ports
- 64-bit Integrated graphics (uses 1Mb RAM; switchable to 2Mb for increased resolution /colours)
- Graphics video acceleration with software MPEG facility
- 14" (on P133 model) or 15" (on P166+ model) crisp sharp .28dp NI SVGA screen
- 105 Windows 95 keyboard
- Microsoft® compatible mouse
- Colossus desktop (P133 model) or Omega desktop case (P166+ model)
- One year warranty extendable to three or five years
- Microsoft Windows 95 with manual and CD
- Lotus pre-loaded suite including Word Pro 96, Lotus 1-2-3, Approach 96, Organizer and SmartPics (limited offer)
- GSP pre-loaded suite including Pressworks DTP, Designworks, Money and Homewise (limited offer)
- 5 CD multimedia titles including BodyWorks v5, Infopedia 96 encyclopaedia, WinTutor 95 tutorial and more.



P133 Model (Colossus PowerStation D)
32Mb EDO RAM 2Gb hard disk 14" screen No modem
£ 1291 ^{.33} inc. VAT
£ 1099 +VAT

P166+ Model (Omega PowerStation E)
32Mb EDO RAM 2Gb hard disk 15" screen 33.6 BAPT approved modem
£ 1397 ^{.08} inc. VAT
£ 1189 +VAT

Microsoft Windows 95 The best operating system for the PC. To get the most out of your PC you need to buy a system that comes optimised for Windows 95	Lotus 1-2-3 Spreadsheet Lotus 1-2-3 is the best multi-dimensional spreadsheet available and will let you do virtually anything with numerical information	Lotus Word Pro 96 The latest version of Lotus's award winning full-feature word processing package.	Lotus Approach 96 Powerful 32-bit relational database and information management package	Lotus Organizer Full-feature personal information manager and scheduler that allows you to manage your time and work.	Lotus SmartPics The finest clipart images that cover a wide range of topics and which can be easily incorporated into your documents for added impact.	GSP DesignWorks Full-feature drawing package like CorelDraw that allows you to create logo, business graphics etc for use in other applications	GSP PressWorks Advanced easy to use Desktop Publishing suite that allows you to create reports, memos, adverts, brochures, newsletters etc.

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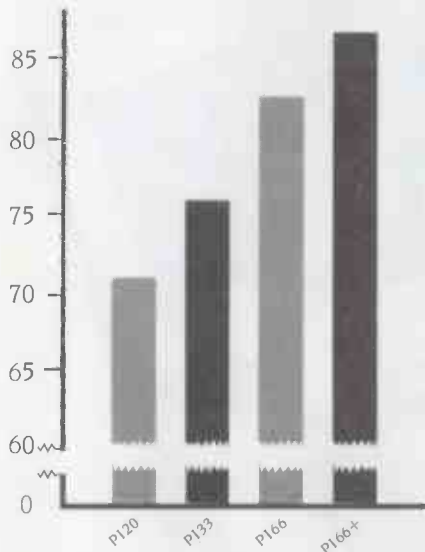
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Fax 01282 77 07 01. All prices exclude VAT at 17.5% and delivery at £25 +VAT (£29.38 inc. VAT) for UK mainland. Prices including VAT are now also shown. *Finance prices include UK mainland delivery & VAT. **Depending on the package, software will be either pre-loaded or provided on CD. Pack shots shown for illustration purposes only. Crossed out price based on total selling price of individual items. 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. Goods are normally despatched within 10 to 14 days. All goods will be fulfilled within 28 days unless otherwise specified. Screen sizes shown for CRT tube size as per industry practice. E & OE

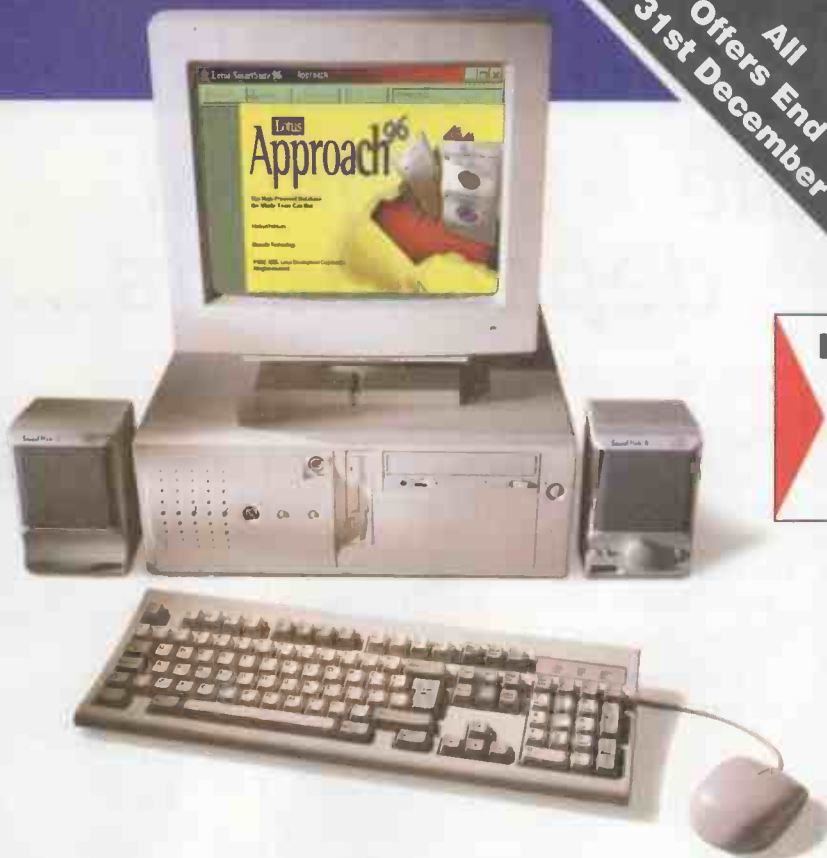
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31st December

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Relative processor performance based on Ziff Davis Winstone 96™ as certified by MDR labs.



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P133 and P166+ Power Station

“P166+ muscle matches P200 power”

Key Features

- ✓ **P133 or P166+ Processors**
These are high performance processors running at fast bus speeds and providing incredible performance. Each system comes complete with 256k burst cache to further enhance performance. The P166+ processor is almost as powerful as the Pentium 200MHz processor.
- ✓ **32Mb EDO RAM**
32Mb EDO RAM allows you to multitask smoothly (use several applications at the same time) and enhance productivity.
- ✓ **2000Mb Hard Disk**
Massive 2Gb fast enhanced IDE hard disk to give you plenty of storage potential.
- ✓ **Eight Speed Multimedia**
Eight speed CD-ROM drive with 16-bit stereo sound card, twin stereo speakers, joystick and five full-feature CD multimedia titles - all are included.
- ✓ **Fast 64-bit Graphics and Superb Screens**
High resolution colourful images with fast displays and software MPEG ability to display smooth video clips. Advanced design allows switching to 2Mb to yield higher resolution / more colours at no extra cost! Superb 14" (on P133 model) or larger 15" (P166+ model) are included.
- ✓ **Massive Software Bundle**
Microsoft Windows 95 together with the latest pre-loaded Windows 95 software suite from Lotus and much more! Everything you are ever likely to need!
- ✓ **33.6 BABT Approved Modem**
A fast 33.6 modem is included with the P166+ model for a limited period (first 1000 customers). This modem can also work at slower speeds eg 28.8.

"...in fact the average (Winstone) score of the (fourteen 6x86 P166+) Cyrix based systems matches the average score of twelve 200MHz Pentium based systems reviewed."

Computer Shopper - Worldwide Edition, October 1996

FREE
33.6 Modem with P166+ Model

(Limited Offer)



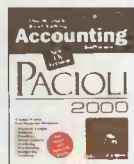
GSP Money

The fast and easy way to organise your home finances. It can manage your bank and credit card accounts and much more.



GSP HomeWise

The ultimate home and family organizer including message centre, household contents, party planner, chores list, holiday planner etc.



Paciolli 2000 Accounts

Full-feature accounting suite including 8 integrated modules including nominal ledgers, stock control, invoicing and budgeting!



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Explore the system, structures and functions of the body in fascinating detail including 3-D views and video clips.



Shareware CD

Packed with almost 100 of the best shareware programs and games including Doom, Raptor, Pinball and BlakeStone.



Infopedia 96 Encyclopaedia CD

The most comprehensive multimedia encyclopaedia available allowing you to search and browse with ease.



WinTutor 95 CD

Windows 95 training package with four professional training programs on one CD.



SEMERC Educational CD

The leading school software for the National Curriculum from SEMERC. Includes Graphplot, Treasure chest, Sheetwise and more.

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TIME

Sales Lines Open: Mon - Fri 8.30am - 7pm, Sat 9am - 5pm

Granville House, Blackburn Rd, Simonstone, Burnley, BB12 7GT

Fax 01282 77 07 01. All prices exclude VAT at 17.5% and delivery at £25 +VAT (£29.38 Inc. VAT) for UK mainland. Prices including VAT are now also shown. *Finance prices include UK mainland delivery & VAT. **Depending on the package, software will be either pre-loaded or provided on CD. Pack shots shown for illustration purposes only. Crossed out price based on total selling price of individual items. 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. Goods are normally despatched within 10 to 14 days. All goods will be fulfilled within 28 days unless otherwise specified. Screen sizes shown for CRT tube size as per industry practice. E & OE.



TSBO3A

Evesham Micros

the **best** in all departments...

the Company...

- Established 13 years with secure financial status.
- Founder member of the Personal Computer Association and member of its payment protection plan.
- Lifetime technical support by friendly, knowledgeable and award winning team.
- Optional installation/training service.
- 10 year labour warranty – a "decade of service".

the deal...

- Reasonable delivery charges.
- Business Lease Rental options.
- Cost effective upgrades.
- No deposit personal finance options.
- 1 year On-site maintenance on base unit and monitor (except notebook models).
- Credit cards charged only AFTER shipment.
- Popular configurations in stock and ready to ship.
- 14 day money back guarantee.*

*Please note that we are unable to offer a 14 day moneyback guarantee for any software products.

the basics...

- Intel PCIset motherboards for top performance.
- Top quality name-brand components.
- Choice of Windows 95 or DOS/Windows 3.11 operating system.
- Upgrade to Windows NT 4 available.
- 24 hour dynamic burn-in procedure.

'95 AWARDS

WHAT PC?

1995 PC Awards
"Best Mainstream Business PC"
Vale Prestige

Best SYSTEMS

PC Direct December 1995
Vale Platinum

PC PRO SPEED

November 1995
Vale Platinum

PC MAGAZINE UK EDITORS CHOICE

May 1995
Vale Platinum

Computer BUYER RECOMMENDED

March 1995
Vale Premier

WIN PERSONAL COMPUTER BEST BUY

February 1995
Vale Platinum

WHAT PC? BEST BUY

February 1995
Vale Prestige

PC today

January 1995
Vale Voyager

PC PRO SPEED

January 1995
Vale Platinum

PC MAGAZINE UK EDITORS CHOICE

January 1995
Vale Platinum

PCPro

January 1995
Vale Premier



SERVICE AWARDS

Please note that actual products (including screen displays) may not exactly match the photographic representations. Industry standard practice is to quote a monitor's CRT size – the actual viewing area is approximately 1" less. Speakers are only included with multimedia versions of Vale PCs (Microsoft Media 96 and Lotus Multimedia Office 96). The Intel Inside Logo, Pentium and OverDrive are registered trademarks and the Pentium Processor Logo and the Pentium Pro Processor Logo are trademarks of Intel Corporation. All other trademarks acknowledged.

the product...

Rather than sing our own praises we thought we would let the reviewers, from the computer magazines, offer their impartial opinions on our latest models...

'96 AWARDS



Editor's Choice

November 1996

Vale Platinum HXse Pro 200MHz

"...very good performance and features at a great price."

"...a workhorse with credible performance and a lot of capacity. An excellent system

if you want a well-balanced PC with high-speed peripherals."

"The Evesham Vale Platinum HXse Pro was consistently among the best performers in PC Labs' tests, with notably good graphics and disk Winmark results."

"Up there with the leading pack on performance and build quality, but outstripping the others on price and features, was our Editor's Choice, the Evesham Vale Platinum HXse Pro."



November 1996

Vale Platinum HX 166MHz

"The display on the 15in Goldstar Studioworks 56m monitor is crisp and clear and holds its own adequately among the battery of iiyamas. The 56m also sports reasonable built-in speakers..."

"Evesham has yet again produced a high quality and well specified machine. ...the build quality is good and the components are impressive."

FEATURES ★★★★★
 VALUE FOR MONEY ★★★★★
 OVERALL ★★★★★

...just some of our

PRIME CUTTINGS



November 1996

Vale Platinum HX 200MHz Media 96

"It's speed and attention to detail make it well worth the price."

"The Evesham is consistently the best performer in this set. It has the most up-to-the-minute technology..."

"Overall, the Evesham is probably the finest machine in this set."

Personal Computer World

October 1996

Vale Platinum HXse 166

"Like a crack regiment, this PC is neat, efficient and performs with panache."

"Call me sad, but as far as PCs go, the thing which gets me excited is a machine with most of the usual trusted bits, yet fitted out in a neat and efficient manner and at a decent price, of course. Evesham Micros' Platinum HX 166 is just such a machine."

"Perhaps I've been in this business too long, but the insides of this machine really got me going."

"...totally uninterrupted space for full length cards in every slot, without obstruction from heatsinks."

Even with every drive bay and slot occupied, the processor and SIMM slots remain visible, allowing for easy identification and expansion."

"In our tests the Evesham performed superbly thanks to a decent configuration and the large 32Mb memory. Build quality is exceptional."

"Aspiring PC builders should get hold of one of Evesham's machines to see how it's done."

"Good Points: Superb design and performance."



9/10

November 1996

Vale Prestige 166MHz

"Evesham Micros has long established itself as supplying value for money with good specifications and leading name components."

"If you're working to a tight budget this machine must be top of your list."

"...Evesham's new range of Pentium systems put good components to work in well-designed systems."

"Cables are all neatly tied out of the way, including the CD audio cable, making access to the inside of the Prestige particularly easy."



ON TEST:
Brief Encounters

November 1996

9/10

Vale Platinum HXse 200MHz

"Evesham has balanced the various components of its Platinum machine well, giving good results when we put it under test. Although we've seen faster...machines there haven't been many of them and most have cost much more."

"...a good competitor and you'd be well advised to add it to your short, short list."

We couldn't have said it **better!**



November 1996
Vale Platinum HX P200



November 1996
Vale Prestige



November 1996
Vale Platinum HXse Pro



August 1996
Vale Platinum HX



August 1996
Vale Prima



August 1996
Vale Prestige



June 1996
"Business NT servers"
Vale Fileserver



June 1996
Vale Prima



May 1996
Vale Voyager II



May 1996
Vale Platinum



April 1996
Vale Voyager II



April 1996
Vale Platinum SE



March 1996
Vale Platinum SE

YOUR CHOICE OF MULTIMEDIA BUNDLES:

Microsoft

- ◆ Works 3 (for Windows 3.1) OR Works 4 (for Windows 95)
- ◆ Money
- ◆ Fine Artist
- ◆ Explorapedia
- ◆ Encarta 96 (International Edition)
- ◆ Dinosaurs
- ◆ Golf
- ◆ Scenes
- ◆ Windows Entertainment Pack
- ◆ Fury 3 (trial version)
- ◆ SideWinder Joystick



Lotus Office 96

- ◆ Lotus SmartSuite 4 (for Windows 3.1) or SmartSuite 96 (for Windows95): 1-2-3, WordPro, Approach, Freelance Graphics, Organiser.
- ◆ Quicken 4
- ◆ Core!DRAW! 4
- ◆ Software Toolworks Grolier Encyclopaedia for 1996
- ◆ ITN European Video Atlas
- ◆ Superb games: Screamer, Command & Conquer, Simon the Sorcerer II



Like the Vale PCs they are fitted to, our multimedia kits are quality conscious!! We offer high quality sound cards, CD-ROM drives and speakers, and two of the best software suites available.

- ◆ High performance eight speed CD-ROM drives
- ◆ Creative Labs SoundBlaster 16 card (Prima & Prestige models), Yamaha on-board 16 bit sound (Platinum HX models), Creative Labs Vibra 16 sound (Platinum HX Pro models), Creative Labs 32 voice Wavetable sound (Platinum HXs models)
- ◆ Zy-Fi² amplified stereo speaker system for crystal clear audio
- ◆ Choice of Microsoft Media 96 bundle or Lotus Multimedia Office 96

Some items are already included as standard in some Vale models, and the price of the multimedia upgrades reflects this.



We offer a full range of multimedia packs and products, any of which can be specified with your Vale PC, see the later pages of our advert for full details. Please note that bundled versions of software and sound cards are not full retail packs, and the software features on-line documentation. Occasionally we may supply vouchers for software titles which need to be redeemed with manufacturers.

Vale Prima ^{Triton 2}

COMPUTER SHOPPER

"Good specification, good performance and a good price."
Vale Prima P133 December 1996

Computer BUYER RECOMMENDED

June 1996

"Its quality and breadth make the Evesham well worth its asking price."
Vale Prima P100

Vale Prima - Computer Shopper's "Best Buy"

Our Vale Prima PC is now established as a standard setting entry level PC, confirmed by winning Computer Shopper's "Best Buy" award when pitted against computers from 13 leading suppliers. We set out to build a quality PC and sell it at a keen 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 latest Intel 430 PCiset and features 256k of pipeline burst cache (almost unheard of at this price). The beauty of this PC is that it is capable of expanding with your needs - who knows in a years time your P100 might have grown into a P200 with a mountain of EDO RAM.

- ◆ Integrated motherboard with Intel 430 PCiset
- ◆ Choice of Intel Pentium processor or Cyrix 686 processor
- ◆ Intel socket 7 for processor upgrades
- ◆ 4xPCI & 3x16-bit expansion slots
- ◆ 1Gb Seagate mode 4 IDE hard disk drive with PCI controller
- ◆ 8Mb EDO RAM (expandable to 128Mb)
- ◆ 256kb Pipeline-Burst cache
- ◆ 1 EPP parallel port and 2 serial ports with 16550 UART
- ◆ 1Mb PCI video card
- ◆ 14" non-interlaced monitor (0.28mm dot pitch)
- ◆ Multimedia models include an eight speed CD-ROM drive
- ◆ 3.5" 1.44Mb floppy disk drive
- ◆ Midi-tower style case
- ◆ TÜV approved power supply with low noise fan
- ◆ Mitsumi mouse and 'Windows95' keyboard
- ◆ Includes 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
- ◆ 14 day moneyback guarantee
- ◆ 1 year On-Site Maintenance for parts and labour
- ◆ Lifetime technical support hotline
- ◆ 10 year labour warranty

Each system includes your choice of Windows 3.11 or Windows 95 at no extra cost. Or you can upgrade to Windows NT 4 instead for £75^{net}



With latest Intel **430** PCiset

NO DEPOSIT PERSONAL FINANCE

Prima P100/1Gb Microsoft Media 96 PC **£37.75** per month inc VAT
No deposit. 36 monthly payments. APR 18.5%. Total payable £1339.00 inc VAT. Cash price £1056.33 inc VAT.



A Vale Prima PC with optional CD-ROM drive

PRIMA PENTIUM MODELS

Please see above for full details of multimedia packs.

pentium	Standard	EDIA 96	Lotus Office 96
P100	£719 ⁺ VAT (£844.83)	£899 ⁺ VAT (£1056.33)	£919 ⁺ VAT (£1079.83)
P133	£799 ⁺ VAT (£938.83)	£979 ⁺ VAT (£1150.33)	£999 ⁺ VAT (£1173.83)
P166	£949 ⁺ VAT (£1115.08)	£1129 ⁺ VAT (£1326.58)	£1149 ⁺ VAT (£1350.08)

Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Multimedia models feature an eight speed CD-ROM drive.

PRIMA 686 MODELS

Please see above for full details of multimedia packs.

686 PROCESSOR	Standard	EDIA 96	Lotus Office 96
P120+	£699 ⁺ VAT (£821.33)	£879 ⁺ VAT (£1032.83)	£899 ⁺ VAT (£1056.33)
P166+	£779 ⁺ VAT (£915.33)	£959 ⁺ VAT (£1126.83)	£979 ⁺ VAT (£1150.33)

Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Multimedia models feature an eight speed CD-ROM drive.

Vale

Prestige

Triton 2

16Mb RAM Standard



DIAMOND MULTIMEDIA Stealth 3D 2000

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. By fitting the 2Mb version of the latest Diamond Stealth 3D Video card and coupling it with the superb 15" Eco15 monitor, the specification and performance truly earn the title "Prestige".

- ◆ Choice of Intel Pentium[®], Pentium[®] Pro or Cyrix 686 processor
- ◆ Intel 430 PCiset (Prestige Pentium & 686) or Intel 440 PCiset (Prestige Pro)
- ◆ Intel socket 7 (Prestige Pentium & 686) or socket 8 (Prestige Pro) for processor upgrades
- ◆ 1.2Gb Seagate Medalist mode 4 IDE hard disk drive with PCI controller
- ◆ 16Mb EDO RAM, expandable to 128Mb
- ◆ 256kb Pipeline-Burst cache
- ◆ Seagate Medalist fast PCI mode 4 IDE hard disk
- ◆ 4xPCI & 3x16-bit expansion slots
- ◆ 1 EPP parallel port and 2 serial ports with 16550 UART
- ◆ Diamond Stealth 3D 2000 PCI video card (2Mb EDO RAM)
- ◆ 15" Vale Eco15 fully non-interlaced monitor (0.28mm dot pitch)
- ◆ 3.5" 1.44Mb Floppy Disk Drive
- ◆ TÜV approved Power Supply with low noise fan
- ◆ Choice of desktop or midi-tower case
- ◆ Full-tower case available at extra cost
- ◆ Includes 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
- ◆ Keytronic "Phoenix" Windows 95 keyboard
- ◆ Mitsumi mouse
- ◆ 14 day moneyback guarantee
- ◆ 1 year On-Site Maintenance for parts and labour
- ◆ Lifetime technical support hotline
- ◆ 10 year labour warranty

NO DEPOSIT PERSONAL FINANCE

Prestige P166+11.2Gb Lotus Multimedia Office 96 PC **£49.51** per month inc VAT
 No deposit, 36 monthly payments, APR 18.5%, Total payable £2782.36 inc VAT. (Cash price £1385.33 inc VAT).

To get these...



WHAT PC? 1995 PC Awards: "Best Mainstream business PC"



"Evesham's machine comes jam-packed with quality peripherals."

Prestige Media 96 PC with Creative Labs SoundBlaster 32 sound card upgrade and Zy-Fi[®] 2 Pro speaker upgrade

"Superb value in a machine which doesn't compromise on speed either."

"With the excellent sound card and graphics adaptor, there's nothing in the box that you'll really need to upgrade."

"With its powerful 32Watt speakers, the Evesham is a corking machine for multimedia."

"...comes with such a good selection of peripherals and software that it scoops our Value award."

We fit these...

Pipeline-Burst cache

With latest intel 430 PCiset

With latest intel 440 PCiset

Each system includes your choice of Windows 3.11 or Windows 95 at no extra cost. Or you can upgrade to Windows NT 4 instead for £75^{***}



DIAMOND MULTIMEDIA Stealth 3D 2000 video card (2Mb EDO RAM)



ELITEGROUP Motherboard

KEY TRONIC[®] Keyboard



Panasonic Floppy drive

Mitsumi Mouse

PRESTIGE PENTIUM MODELS

Please see page 3 for full details of multimedia packs.

pentium	Standard	Office 96	Lotus Office 96
P100	£919 ⁺ VAT (£1079.83)	£1099 ⁺ VAT (£1291.33)	£1119 ⁺ VAT (£1314.83)
P133	£999 ⁺ VAT (£1173.83)	£1179 ⁺ VAT (£1385.33)	£1199 ⁺ VAT (£1408.83)
P166	£1149 ⁺ VAT (£1350.08)	£1329 ⁺ VAT (£1561.58)	£1349 ⁺ VAT (£1585.08)

2.1Gb Medalist Add £50⁺VAT (£58.75) to the price of 1.2Gb models
 2.5Gb Medalist Pro Add £100⁺VAT (£117.50) to the price of 1.2Gb models
 Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Multimedia models feature an eight speed CD-ROM drive.

PRESTIGE 686 MODELS

Please see page 3 for full details of multimedia packs.

Standard	Office 96	Lotus Office 96	
P120+	£899 ⁺ VAT (£1056.33)	£1079 ⁺ VAT (£1267.83)	£1099 ⁺ VAT (£1291.33)
P166+	£979 ⁺ VAT (£1150.33)	£1159 ⁺ VAT (£1361.83)	£1179 ⁺ VAT (£1385.33)

2.1Gb Medalist Add £50⁺VAT (£58.75) to the price of 1.2Gb models
 2.5Gb Medalist Pro Add £100⁺VAT (£117.50) to the price of 1.2Gb models
 Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Multimedia models feature an eight speed CD-ROM drive.

PRESTIGE PRO MODELS

with Pentium[®] PRO processor and 16Mb EDO RAM

Please see page 3 for full details of Microsoft Media 96 and Lotus Multimedia Office 96 packs.

180MHz	Standard	Office 96	Lotus Office 96
1.2Gb	£1269 ⁺ VAT (£1491.08)	£1449 ⁺ VAT (£1702.58)	£1469 ⁺ VAT (£1726.08)

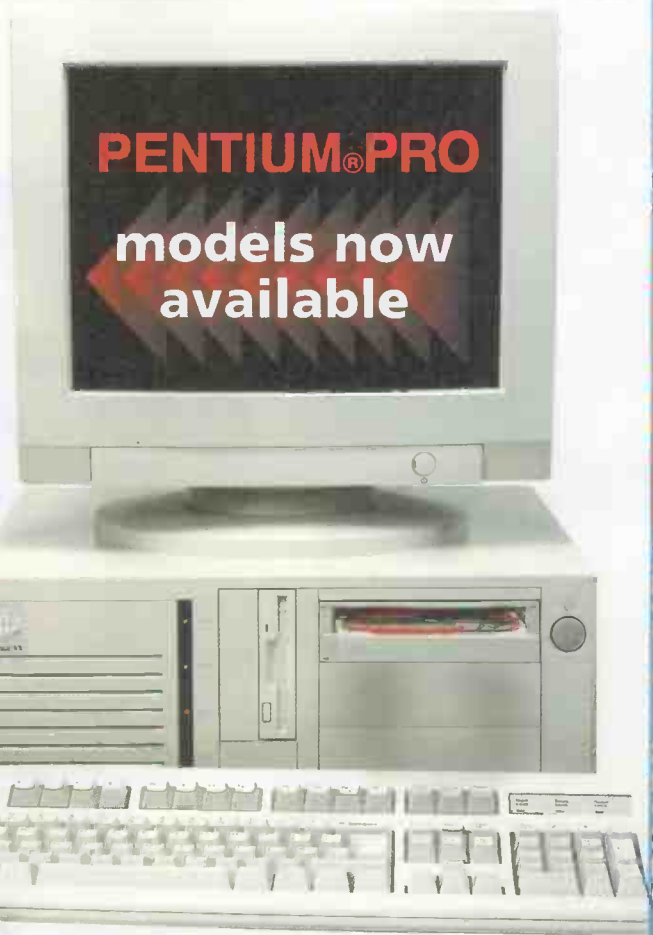
2.1Gb Medalist Add £50⁺VAT (£58.75) to the price of 1.2Gb models
 2.5Gb Medalist Pro Add £100⁺VAT (£117.50) to the price of 1.2Gb models
 Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Multimedia models feature an eight speed CD-ROM drive.

PRESTIGE OPTIONS

- Windows NT 4 instead of DOS & Windows 3.11/95 (supplied on CD-ROM)£75+VAT (£88.13)
 - 32Mb RAM instead of standard 16Mb£100+VAT (£117.50)
 - 15" Viewsonic 15GS monitor (69kHz scan)£50+VAT (£58.75)
 - 15" Vale Studioworks 15 monitor (as Vale Platinum HX)£50+VAT (£58.75)
 - 17" Vale Studioworks 17 monitor (as Vale Platinum HXse)£280+VAT (£329.00)
 - Matrox Millennium 2Mb video card£60+VAT (£70.50)
 - Matrox Millennium upgrade to 4Mb£75+VAT (£88.13)
 - Eight speed CD-ROM drive£65+VAT (£76.38)
 - "Internet ready" pack (see page 7)£189+VAT (£222.08)
 - Full-tower case£30+VAT (£35.25)
 - Basic installation/training service£50+VAT (£58.75)
 - Extended on-site maintenance See page 7
- PLEASE SEE PAGE 7 FOR VALE ACCESSORIES



See page 7 for details



A Vale Prestige PC with optional CD-ROM drive

Evesham Videos Visit your nearest Showroom at EVESHAM • CAMBRIDGE • BIRMINGHAM • MILTON KEYNES

Vale Platinum *Triton 2*



PLATINUM MODELS

See page 3 for full details of multimedia packs. Please note that the multimedia packs do not include speakers as these are built into the monitor.

Model	Standard	MEDIA 96	Lotus Office 96
P133	21Gb £1179+VAT (€1385.33)	£1249+VAT (€1467.58)	£1269+VAT (€1491.08)
	25Gb £1229+VAT (€1444.08)	£1299+VAT (€1526.33)	£1319+VAT (€1549.83)
P166	21Gb £1329+VAT (€1561.58)	£1399+VAT (€1643.83)	£1419+VAT (€1667.33)
	25Gb £1379+VAT (€1620.33)	£1449+VAT (€1702.58)	£1469+VAT (€1726.08)
P200	21Gb £1429+VAT (€1679.08)	£1499+VAT (€1761.33)	£1519+VAT (€1784.83)
	25Gb £1479+VAT (€1737.83)	£1549+VAT (€1820.08)	£1569+VAT (€1843.58)

PLATINUM 686 MODELS

See page 3 for full details of multimedia packs. Please note that the multimedia packs do not include speakers as these are built into the monitor.

Model	Standard	MEDIA 96	Lotus Office 96
P166+	21Gb £1159+VAT (€1361.83)	£1229+VAT (€1444.08)	£1249+VAT (€1467.58)
	25Gb £1209+VAT (€1420.58)	£1279+VAT (€1502.83)	£1299+VAT (€1526.33)

PLATINUM PRO MODELS

See page 3 for full details of multimedia packs. Please note that the multimedia packs do not include speakers as these are built into the monitor.

Model	Standard	MEDIA 96	Lotus Office 96
P180	21Gb £1449+VAT (€1702.58)	£1519+VAT (€1784.83)	£1539+VAT (€1808.33)
	25Gb £1499+VAT (€1761.33)	£1569+VAT (€1843.58)	£1589+VAT (€1867.08)
P200	21Gb £1559+VAT (€1851.83)	£1629+VAT (€1914.08)	£1649+VAT (€1937.58)
	25Gb £1609+VAT (€1890.58)	£1679+VAT (€1972.83)	£1699+VAT (€1996.33)

Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Please note that all models feature an eight speed CD-ROM drive.

- ◆ Latest ATX style motherboard and case for easy expansion and upgrades
- ◆ Latest Intel 430HX PCIset – improves upon the 430FX PCIset by supporting all the features essential to power users, such as large EDO memory arrays and PCI bus mastering IDE
- ◆ New Matrox Mystique 3D multimedia video accelerator (2Mb)
- ◆ Panasonic CR-583 eight speed CD-ROM drive

WHY SETTLE FOR LESS?

Motherboard

- ◆ Intel Tucson ATX motherboard with Intel 430HX PCIset (Platinum/686 models)
- ◆ Intel Venus ATX motherboard with Intel 440FX PCIset (Pro models)
- ◆ Support for Windows95 'plug and play' environment
- ◆ Supports P55C processor (MMX) (Platinum/686 models)
- ◆ Support for native signal processing
- ◆ Flash BIOS
- ◆ 3x PCI, 1xPCI/16-bit & 2x16-bit expansion slots

Processor

- ◆ Intel Pentium® processor up to 200MHz with Intel socket 7 for processor upgrades (Platinum models)
- ◆ Cyrix 686 processor with Intel socket 7 for processor upgrades (686 models)
- ◆ Intel Pentium® PRO processor with Intel socket 8 for processor upgrades (Pro models)

Cache & RAM

- ◆ 256kb Pipeline-Burst cache
- ◆ 16Mb EDO RAM, expandable to 128Mb (Platinum/686 models)
- ◆ 16Mb EDO RAM, expandable to 256Mb (Pro models)
- ◆ 32Mb EDO RAM, expandable to 128Mb (SE/SE 686 models)
- ◆ 32Mb EDO RAM, expandable to 256Mb (SE Pro models)

Ports

- ◆ EPP and ECP capable printer port
- ◆ 2x16550 compatible UART driven high speed serial ports

Hard Disk

- ◆ Seagate Medalist (2.1Gb) enhanced IDE hard disk
- ◆ Seagate Medalist Pro (2.5Gb and 5Gb) – the fastest IDE drive we have yet seen
- ◆ On-board PCI hard disk controller

Video

- ◆ Matrox Mystique 3D multimedia accelerator with 2Mb synchronous graphics RAM (Platinum/686/Pro)
- ◆ Matrox Millennium professional graphics accelerator with 2Mb WRAM (all SE models)
- ◆ Vale Studioworks 15 monitor (Platinum/686/Pro)
- ◆ Vale Studioworks 17 monitor (all SE models)

Sound

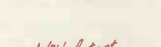
- ◆ Yamaha on-board 16 bit sound chip (Platinum/686 models)
- ◆ Creative Labs Vibra 16 sound card (Pro models)
- ◆ Creative Labs 32 voice WaveTable upgrade (all SE models)

CD-ROM & Floppy drive

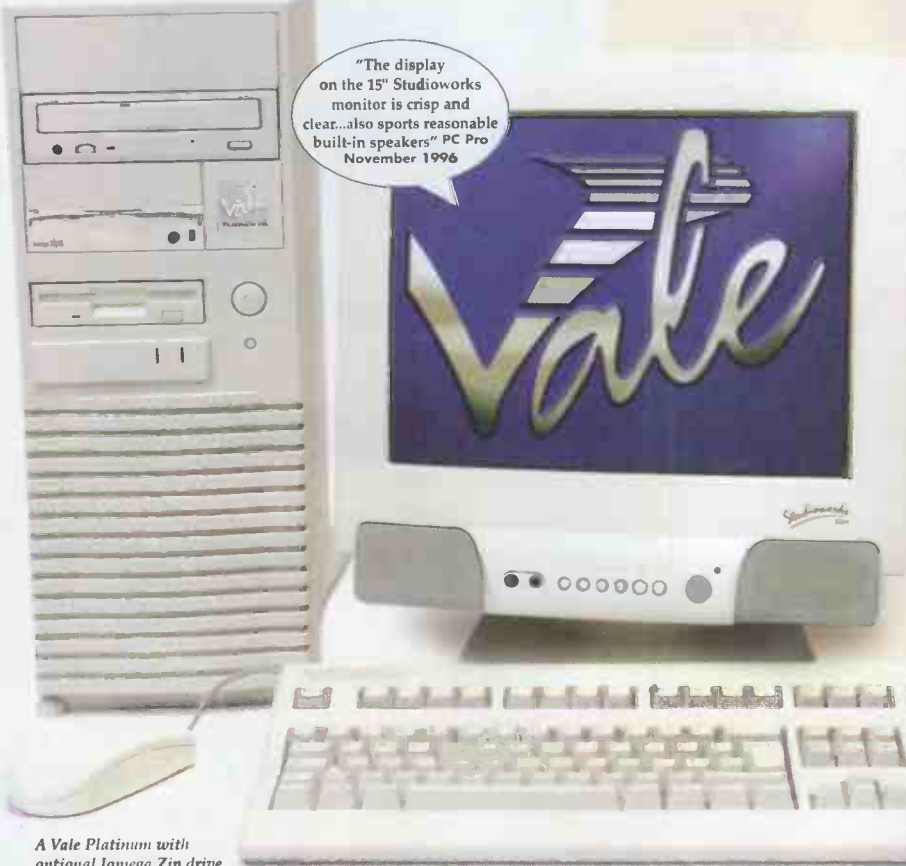
- ◆ Panasonic CR-583 eight speed CD-ROM drive
- ◆ Panasonic 3.5" 1.44Mb floppy disk drive



"Best Graphics Card" Matrox Millennium



"The display on the 15" Studioworks monitor is crisp and clear...also sports reasonable built-in speakers" PC Pro November 1996



A Vale Platinum with optional Iomega Zip drive

Vale Studioworks Monitors

Superb quality 15" micro-processor controlled monitor (Platinum/686/Pro models)

- ◆ Dark non-glare invar mask FST screen with 'Edge-to-Edge' display, giving as much as 30% greater useable picture area than most 14" models
- ◆ Ingeniously simple digital push button system allows complete control over all display adjustments, including pin-cushion, trapezoid and rotation, with on-screen representation of the settings
- ◆ 1024x768 at a flicker-free 75Hz refresh rate
- ◆ 1280x1024 maximum resolution @ 60Hz refresh rate
- ◆ Built-in amplified speakers leaving you with an un-cluttered desk
- ◆ DDC-2 plug and play compatible

Platinum SE models use the Studioworks 17, which has the following enhancements to the Studioworks 15:

- ◆ 17" display with 0.26mm dot pitch
- ◆ 1280x1024 non-interlaced at a flicker-free 75Hz refresh rate
- ◆ 1600x1280 maximum non-interlaced resolution @ 60Hz refresh rate
- ◆ Built-in detachable side panel mounted speakers with 4W rms stereo power amplifier



"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





Platinum SE

Triton 2

Vale Platinum SE: the power user's dream.

By enhancing the already highly specified Vale Platinum, we have created the computer that answers the dreams of the most demanding users.

Personal Computer World
HIGHLY COMMENDED
The Vale Platinum is a beautiful PC. The whole design, from case to motherboard, plus the 2Gb Seagate hard drive, impressed us. Evesham's build quality, plus the use of the Triton II chipset, shows up in performance."
August 1996 Vale Platinum 133

PC MAGAZINE UK EDITORS' CHOICE
Platinum SE Pro 200

"consistently among the best performers in PC Labs' tests, with notably good graphics and disk WinMark results...outstripping the others on price and features, was our Editors' Choice, the Evesham Vale Platinum HXSE Pro." November 1996 Vale Platinum SE Pro 200

Computer BUYER RECOMMENDED
November 1996 Vale Platinum 200

"The Evesham is consistently the best performer in this set. It has the most up-to-the-minute technology. Its speed and great attention to detail make it well worth the price."



Motherboard



EDO RAM



PROCESSOR



pentium[®] PROCESSOR PENTIUM-PRO PROCESSOR

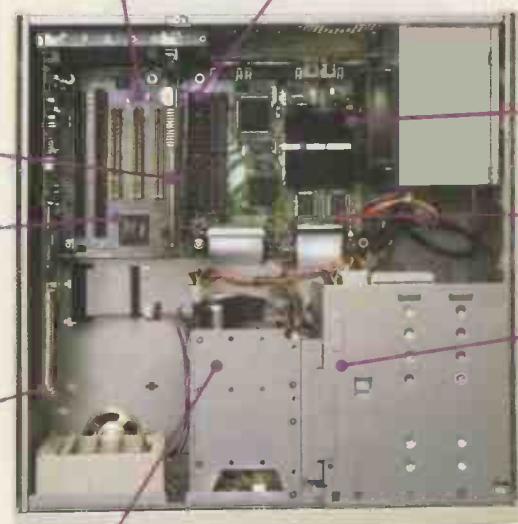
Cyrix 686, Intel Pentium[®] or Pentium[®] Pro processor



Panasonic Floppy & CD-ROM drive



High quality ATX style case



Anatomy of a winner



Hard disk

- ♦ Seagate Medalist hard disk (2.1Gb)
- ♦ Seagate Medalist Pro hard disk (2.5Gb and 5Gb). Medalist Pro is the fastest IDE hard disk we have yet seen - Internal Data Transfer Rate: 116Mb/sec Average access time: 12 msec



August 1996 Seagate 2.1Gb hard disk



Case

- ♦ High quality ATX style case with good access for upgrades and expansion (no tools required)
- ♦ Choice of desktop or midi-tower case
- ♦ 1x5.25" and 2x3.5" external drive bays free (midi-tower) or 2x5.25" external drive bays free (desktop) in standard configuration
- ♦ TÜV approved power supply with low noise fan

Warranty

- ♦ 14 day moneyback guarantee
- ♦ 1 year On-Site Maintenance for parts and labour
- ♦ Lifetime technical support
- ♦ 10 year labour warranty

Operating System

- ♦ Includes your choice of either Windows 95, 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
- ♦ Or upgrade to Windows NT 4 instead at a cost of £75+VAT (=£88.13)

Keyboard & Mouse

- ♦ Keytronic 'Windows 95' PS/2 keyboard
- ♦ Microsoft mouse 2.0 (PS/2)



SPECIAL OFFER!!!

Platinum SE 166MHz/2.5Gb with...
Iomega 100Mb internal zip drive
Vale 33600bps internal modem
17" Iiyama Vision Master monitor
Multimedia Labs TC 1500 speaker system

Ready to ship **£1949+VAT** (£2290.08)

NO DEPOSIT PERSONAL FINANCE

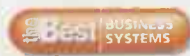
£61.69 per month inc VAT
No deposit. 36 monthly payments. APR 18.3%.
Total payable £220.84 inc VAT. (Cash price £1726.06 inc VAT).



May 1995 Vale Platinum



November 1995 Vale Platinum



PC Direct December 1995 Vale Platinum



March 1996 Vale Platinum SE



April 1996 Vale Platinum SE



May 1996 Vale Platinum

The Platinum SE has the following enhancements to the standard Platinum:

- ♦ 32Mb EDO RAM
- ♦ Matrox Millennium professional graphics accelerator (2Mb WRAM)
- ♦ Vale Studioworks 17 monitor (85kHz scan) - see below left
- ♦ Creative Labs 32 voice Wavetable sound upgrade

PLATINUM SE MODELS

See page 3 for full details of multimedia packs. Please note that the multimedia packs do not include speakers as these are built into the monitor.

Model	Standard	EDO 196	Lotus Office 96
P133	2.5Gb £1689+VAT (£1902.33)	£1889+VAT (£2199.58)	£1709+VAT (£2008.08)
	5.0Gb £1819+VAT (£2137.33)	£1989+VAT (£2306.63)	£1909+VAT (£2243.06)
P166	2.5Gb £1769+VAT (£2078.58)	£1839+VAT (£2160.83)	£1859+VAT (£2184.33)
	5.0Gb £1969+VAT (£2313.58)	£2039+VAT (£2395.83)	£2059+VAT (£2419.33)
P200	2.5Gb £1869+VAT (£2196.08)	£1939+VAT (£2278.33)	£1959+VAT (£2301.83)
	5.0Gb £2069+VAT (£2431.08)	£2139+VAT (£2513.33)	£2159+VAT (£2536.83)

PLATINUM SE 686 MODELS

See page 3 for full details of multimedia packs. Please note that the multimedia packs do not include speakers as these are built into the monitor.

Model	Standard	EDO 196	Lotus Office 96
P200+	2.5Gb £1749+VAT (£2055.08)	£1819+VAT (£2137.33)	£1839+VAT (£2160.83)
	5.0Gb £1949+VAT (£2290.08)	£2019+VAT (£2372.33)	£2039+VAT (£2395.83)

PLATINUM SE PRO MODELS

See page 3 for full details of multimedia packs. Please note that the multimedia packs do not include speakers as these are built into the monitor.

Model	Standard	EDO 196	Lotus Office 96
P200	2.5Gb £1999+VAT (£2348.83)	£2069+VAT (£2431.08)	£2089+VAT (£2454.58)
	5.0Gb £2199+VAT (£2583.83)	£2269+VAT (£2666.08)	£2289+VAT (£2689.58)

Prices highlighted in yellow indicate "Ready to Ship" models which we try to keep in stock for immediate despatch. Please note that all models feature an eight speed CD-ROM drive.

PLATINUM OPTIONS

No CD-ROM drive	deduct £65+VAT (£74.38)
Windows NT 4 instead of DOS & Windows 3.11/95	£75+VAT (£88.13)
Upgrade from 256kb to 512kb cache (Pro models)	£475+VAT (£558.13)
Upgrade from 16Mb to 32Mb EDO RAM (Platinum/686/Pro)	£100+VAT (£117.50)
Upgrade from 16Mb to 64Mb EDO RAM (Platinum/686/Pro)	£300+VAT (£352.50)
Upgrade from 32Mb to 64Mb EDO RAM (SE models)	£200+VAT (£235.00)
2Gb SCSI hard disk instead of 2.5Gb IDE	£339+VAT (£396.33)
Matrox Mystique upgrade to 4Mb graphics RAM	£69+VAT (£81.08)
Matrox Millennium 2Mb video card (Platinum/686/Pro)	£40+VAT (£47.00)
Matrox Millennium upgrade to 4Mb	£75+VAT (£88.13)
Upgrade to Multimedia Labs TC1500 & SP7001 speaker system (see page 12)	£99+VAT (£116.33)
"Internet ready" pack (see page 7)	£189+VAT (£222.08)
Basic installation/training service	£50+VAT (£58.78)
Extended on-site maintenance	See page 7

PLEASE SEE PAGE 7 FOR VALE ACCESSORIES

MONITOR UPGRADES PLATINUM SE

15" Viewsonic 15GS (69kHz)	£20+VAT (£23.00)	N/A
17" Vale Studioworks 17	£230+VAT (£276.25)	N/A
17" Iiyama Vision Master PC Magazine "Editors Choice" April '95	£250+VAT (£293.75)	£20+VAT (£23.50)
17" Iiyama Vision Master ES (built-in speakers and Spatializer 3D sound processor)	£280+VAT (£329.00)	£50+VAT (£58.75)
17" Iiyama Vision Master PRO (0.25mm dot pitch DiamondTron tube)	£350+VAT (£411.25)	£120+VAT (£141.00)
21" Iiyama Vision Master	£1000+VAT (£1175.00)	£770+VAT (£904.75)

All monitor upgrades (except the Iiyama Vision Master 17ES) include a pair of Zy-Fi 2 amplified speakers

CALL: 01386 765500 Mail order Fax: 01386 765554 Email: sales@evesham.co.uk

Vale Warranty

NOVA SURE

- ◆ Extend your on-site maintenance cover to 2 or 3 years for complete peace of mind
- ◆ Scheme operated through Novasure – a division of Hitachi Credit (UK) PLC – and underwritten by Cornhill Insurance PLC
- ◆ Applicable to any Vale PC except notebook models



Rates:

FOR PCs UP TO £1700 ^{+VAT}	SECOND YEAR.....£69
	SECOND AND THIRD YEAR.....£99

These rates are exempt from VAT. Please note that these rates are applicable only at the time of purchase of the PC.

PCs FROM £1700 ^{+VAT} TO £2500 ^{+VAT}	SECOND YEAR.....£89
	SECOND AND THIRD YEAR.....£129

Vale Finance

FLEXIBLE PERSONAL FINANCE PACKAGES

- ◆ No deposit required
- ◆ Repay over 12, 24, or 36 months
- ◆ APR 18.5%
- ◆ Available for any purchase over £500 (12 month term), £750 (24 month term) or £1000 (36 month term)

NO DEPOSIT PERSONAL FINANCE

Example: Prima P100/1Gb All-in-one Media % PC

£37.75 per month inc VAT

No deposit, 36 monthly payments, APR 18.5%. Total payable £1339.00 inc VAT. (Cash price £1056.33 inc VAT).

◆ See the previous pages for further example rates, or call for a quote
Finance available subject to status. Written details available upon request.

BUSINESS RENTAL SCHEME

- ◆ Flexible lease agreement available to qualified commercial customers
- ◆ Please call for full details

BUSINESS RENTAL SCHEME

Example: Prima P100/2.5Gb Lotus Multimedia Office % PC

£78.52 per month +VAT

3 year term. Includes 3 years on-site maintenance. Other terms are available – please call for details.

ACCOUNT FACILITIES

- ◆ Available to qualified commercial customers – please call for details

Vale Software

OFFICE 95 Bundles

- ◆ Word ◆ Excel ◆ Powerpoint
- ◆ Schedule+ ◆ Access (Office professional only)

OFFICE 95 STANDARD.....	£179 ^{+VAT} (£210.33)
OFFICE 95 PROFESSIONAL.....	£249 ^{+VAT} (£292.58)

Product supplied is Office95 Upgrade Pack, plus a suitable product to upgrade from.

Microsoft



Now all your programs work together like one!



From 1st December Office 95 includes a voucher to upgrade to Office 97 (when available) for a nominal Postage & Packing fee.



Microsoft Office 95

For £85^{+VAT} (£99.88)

- ◆ Microsoft Office Professional for Windows 95
- Are you or any of your family over the age of 5 in full or part time education? If so you can qualify for this offer.
- Product is supplied on CD-ROM only, with on-line documentation, via voucher redemption.

Vale Internet Solution

Many packages offer 30 day trial access often with limited access times and leading to high monthly charges. At Evesham Micros we believe in providing a product which is ready to use minutes after you open the box. Join the internet revolution safe in the knowledge that you will have nothing to pay (apart from local rate telephone calls) for 12 months.

£189^{+VAT}
(£222.08)



At last a complete Internet Solution!

- Vale 33600bps external voice/fax/modem
- 'Supervoice' voice/fax software
- 12 Months **UNLIMITED** Internet Access via Premier Internet – one of the UK's largest providers
- Full e-mail account
- Full technical support
- 100% UK local rate telephone access

Vale Storage & Backup



zip drive

Affordable personal storage solution to organise, move and backup your data. It works just like a hard drive, but the 100Mb cartridges give it unlimited expansion potential. Available as either an internal or a stand alone unit – the stand alone unit simply plugs into your parallel port in an instant, with a through port for printer operation.

- ◆ Includes one 100Mb cartridge, and Zip tools software to help you organise your data
 - ◆ Highly portable external unit: (180mm x 137mm x 38mm and only 450g)
- ZIP DRIVE** internal *.....£99^{+VAT} (£116.33)
- ZIP DRIVE** external.....£129^{+VAT} (£151.58)
- Zip cartridge.....£14^{+VAT} (£16.45)
- Zip cartridge.....6 pack £69^{+VAT} (£81.08)
- *Only available fitted to a Vale PC

ditto tape drives

Crash insurance for your PC **ditto** 2GB

- ◆ Internal unit fitted to your Vale PC for easy one-step backup
 - ◆ 2Gb unit uses new low cost cartridges
- 2Gb DITTO DRIVE**.....£115^{+VAT} (£135.13)
- Tapes.....3 pack £59^{+VAT} (£69.33)
- Ditto Travan drives:**
- 800Mb DITTO DRIVE**.....£80^{+VAT} (£94.00)
- Tape for ditto 800Mb.....£25^{+VAT} (£29.38)
- 3.2Gb DITTO DRIVE**.....£180^{+VAT} (£211.50)
- Tape for ditto 3.2Gb.....£29^{+VAT} (£34.08)
- Quoted capacities are with compression software supplied

jaz drive

At last – a 1Gb portable solution.



The ultimate solution for storing, transporting and playing multimedia applications. Or backup your entire hard disk. Or create your own digital photo album. Or transport huge graphics files to printers and service bureaus. Just use as many cartridges as you need.

- ◆ Light weight (approx 900g)
 - ◆ Very compact (203 x 137 x 38mm)
 - ◆ Includes one 1Gb cartridge, and Jaz tools software to help you organise your data
 - ◆ Requires SCSI interface card
- JAZ DRIVE**.....£349^{+VAT} (£410.08)
- 1Gb Jaz cartridge.....£89^{+VAT} (£104.58)
- PCI SCSI interface card.....£75^{+VAT} (£88.13)



Vale Corporate & Network Services

These are just a few of the hundreds of companies who have benefited from dealing with Evesham Micros



- Competitive pricing for everything from a single PC to a large network installation
- A single point of contact for all requirements from Evesham Micros
- A range of business finance options including leasing
- Account facilities available to qualified commercial customers

- Volume pricing available
- Unrivalled after sales service
- Detailed product knowledge and market-place awareness
- Personal, efficient and friendly service at the end of the telephone
- Fully trained sales staff conversant with Microsoft MOLP & Select programmes



Call us for volume pricing.

Call us for network installation and support.

Corporate Sales Centres
EVESHAM 01386 769404
CAMBRIDGE 01223 323898
BIRMINGHAM 0121 446 5050
MILTON KEYNES 01908 230898

Vale Samurai RAID server



A Vale Samurai RAID server

The new Vale Samurai RAID Server provides the ultimate solution to your mission critical system requirements. The standard DPT RAID controller and EDO RAM combine with the power of an Intel Pentium® Pro processor for high performance under both Windows NT and Netware. By utilising this industry proven technology you can be assured that your data integrity will be maintained. The following is a sample specification - please call us to discuss your requirements.

Samurai case:

- ◆ Twin redundant PSU system
- ◆ 12 external drive bays with caddy system
- ◆ Lockable front doors and access covers



Closed view

- ◆ ATX motherboard with Intel 440FX PCIset
- ◆ 200MHz Pentium® PRO processor
- ◆ 256kb integrated processor cache
- ◆ 64Mb EDO RAM
- ◆ DPT PCI RAID controller with 4Mb cache
- ◆ 10Gb RAID array giving 8Gb useable space
- ◆ Six speed SCSI CD-ROM drive
- ◆ 4Gb HP Surestore DAT drive
- ◆ 3COM 10/100Mbps PCI ethernet card
- ◆ 1Mb PCI video
- ◆ 14" SVGA monitor
- ◆ Choice of operating system available at extra cost
- ◆ 1 year on-site maintenance



100Mbps ready



£6999+VAT
(£8223.83)

RENTAL SCHEME
£250.06+VAT per month

BUSINESS RENTAL SCHEME

All figures quoted on this page are for a 3 year term and include on-site maintenance for the duration of the term. Other terms are available - please call for details.

SAMURAI OPTIONS

MS DOS 6.22 / Windows 3.11	£69+VAT (£81.08)
MS Windows NT server software	£650+VAT (£763.75)
MS Windows NT client software	£ CALL
Novell Netware client/server software	£ CALL
Network Support Helpdesk	£ CALL

Vale Fileservers

Vale Fileservers offer a cost effective solution with the flexibility to meet your requirements

Pentium® processor models:

- ◆ ATX style motherboard with Intel 430 PCIset and 256kb Pipeline-Burst cache
- ◆ Midi tower style case (illustrated)
- ◆ Dedicated server case available at extra cost (see options)

Pentium® PRO processor models:

- ◆ ATX style motherboard with Intel 440FX PCIset and 256kb integrated processor cache
- ◆ Midi tower style case (illustrated)

All models:

- ◆ 16Mb EDO RAM
- ◆ Adaptec 2940 PCI SCSI controller and SCSI hard disk
- ◆ Six speed SCSI CD-ROM drive
- ◆ TÜV approved power supply with low noise fan
- ◆ Choice of operating system available at extra cost (see options)
- ◆ 3COM 10/100Mbps PCI ethernet card
- ◆ 1Mb PCI video
- ◆ 14" SVGA monitor
- ◆ 1 year on-site maintenance



June 1996
"Business NT servers"
Vale Fileserver



Example: P133/2Gb fileserver

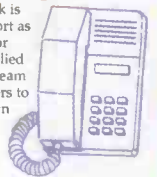
BUSINESS RENTAL SCHEME
£68.25+VAT per month



A Vale Fileserver (Pentium PRO)

Network Support Helpdesk

The Network Support Helpdesk is designed to offer telephone support as front or second line support for Network operating systems supplied by Evesham Micros, backed by a team of professionally qualified engineers to help you keep your network down time to a minimum and budget your support cost.



FILESERVER MODELS

Pentium processor	2Gb HDD	4Gb HDD
100MHz	£1699+VAT (£1996.33)	£1939+VAT (£2278.33)
133MHz	£1779+VAT (£2090.33)	£2019+VAT (£2372.33)
166MHz	£1949+VAT (£2290.08)	£2189+VAT (£2572.08)
Pentium PRO processor	2Gb HDD	4Gb HDD
200MHz	£2399+VAT (£2818.83)	£2639+VAT (£3100.83)

FILESERVER OPTIONS

Upgrade to 32Mb EDO RAM	£100+VAT (£117.50)
Upgrade to 64Mb EDO RAM	£300+VAT (£352.50)
4Gb HP Surestore DAT drive	£650+VAT (£763.75)
Dedicated server case (Pentium models only)	£300+VAT (£352.50)
MS DOS 6.22 / Windows 3.11	£69+VAT (£81.08)
MS Windows NT server software	£650+VAT (£763.75)
MS Windows NT client software	£ CALL
Novell Netware client/server software	£ CALL
Network Support Helpdesk	£ CALL

Dedicated server case:

- ◆ Twin redundant PSU system
- ◆ 12 drive bays
- ◆ Lockable access cover



The optional dedicated server case (Pentium models only)

Evesham Micros Visit your nearest Showroom at EVESHAM • CAMBRIDGE • BIRMINGHAM • MILTON KEYNES

Evesham Micros
 Mail order Fax: 01386 765500
 Email: sales@evesham.co.uk
 01386 765354

Vale 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 it's stride.



...commendably robust...Evesham Micros' excellent Seagate hard disk leaves others standing...It has better power management, it's better built and has a clearer screen...the Evesham's superior motherboard ties it all together for a faster system...a multimedia monster...
Vale Voyager II P90 Dual Scan Colour

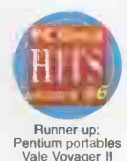


"A bit hefty, but solid. It also boasts several desirable features, such as the good quality, high-resolution screen, the mouse pad, and the option of either a CD-ROM or two memory-effect-free Lithium Ion batteries for longer operating times."
Vale Voyager II P90 Dual Scan Colour

Designed for
 Each system includes your choice of Windows 95 or Windows 3.11 at no extra cost.

QUALITY & STYLE

The Voyager II measures 295 x 225 x 49mm and weighs 3.3kg. The quality of fit and finish is amongst the best we have ever seen.



PC Direct May 1996
 "performance and power-saving options are extremely good...the fastest 90MHz Pentium notebook we have seen to date."
Vale Voyager II P90 TFT Colour

EXPANSION PORTS

The Voyager II has PCMCIA ports for use with two type II cards or one type III card. Rear panel connectors include serial port (16550 compatible); EPP parallel port; SVGA monitor, PS/2 mouse or keyboard, MIDI/game port, TV set, and infra red data link. A further port enables fast connection to a port replicator/docking station.

SECURITY

Anchor for Kensington security cable.

KEYBOARD

The Voyager II uses a full function 86-key keyboard. Unlike many notebooks, it has a good solid feel.

BUILT-IN AUDIO

The Voyager II really is multimedia ready. It has 16 bit stereo sound built in, together with stereo speakers and microphone. There are jacks for an external microphones, and stereo line in/line out. Audio utility software provided.

REMOVABLE HARD DISK

The enhanced IDE hard disk is removable for data security and upgradeability.

TOUCHPAD

The built in touchpad, with palm rest, controls the cursor effortlessly and accurately.

CD-ROM DRIVE

The optional six speed CD-ROM drive replaces the floppy drive to make the Voyager II a self contained multimedia workstation.

3.5" FLOPPY DRIVE

The built in floppy drive slides out to allow fitment of either the optional CD-ROM drive or auxiliary battery. The floppy drive can then be used via a cable (supplied with the CD-ROM drive).

BATTERY

The Voyager II uses the very latest Lithium Ion technology for long life and no 'memory effect'. The batteries 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.

DISPLAY

The Voyager II has a high quality 10.4" LCD display, with a choice of Dual Scan colour or TFT colour. It can display up to 800x600 SVGA with 64k colours (TFT models) or 256 colours (Dual Scan models). The display driver is a 32 bit PCI bus Windows accelerator with 1Mb video RAM. A port is provided for connection to an external monitor (up to 1024 x 768 resolution) and there is a composite video output for connection to a suitable TV set (NTSC and PAL compatible).

WARRANTY

The Voyager II has 12 months 'return to base' warranty covering parts, with a 10 year warranty on labour.



Dual Scan Colour

1GB	1.8GB
P100 £1399 ^{+VAT} (€1643.83)	£1549 ^{+VAT} (€1820.05)
P120 £1479 ^{+VAT} (€1737.83)	£1629 ^{+VAT} (€1914.09)
P133 £1559 ^{+VAT} (€1831.83)	£1709 ^{+VAT} (€2008.08)

TFT Colour

1GB	1.8GB
P100 £1649 ^{+VAT} (€1937.83)	£1799 ^{+VAT} (€2113.83)

11.3" TFT Colour

1GB	1.8GB
P120 £1929 ^{+VAT} (€2266.58)	£2079 ^{+VAT} (€2442.83)
P133 £2009 ^{+VAT} (€2360.58)	£2159 ^{+VAT} (€2536.83)

11.3" 16Mb

Economy models

1GB	1.8GB
P100 £1299 ^{+VAT} (€1526.33)	£1449 ^{+VAT} (€1702.58)

These models have a Dual Scan colour display, no cache, and use a Nickel Metal Hydride battery.

VOYAGER II OPTIONS

Internal six speed CD-ROM drive	£199 ^{+VAT} (€233.83)
Additional primary battery	£195 ^{+VAT} (€229.33)
Auxiliary battery	£199 ^{+VAT} (€233.83)
Upgrade from 8Mb to 16Mb RAM	£75 ^{+VAT} (€98.13)
Upgrade from 8Mb to 24Mb RAM	£150 ^{+VAT} (€176.25)
Upgrade from 8Mb to 40Mb RAM	£295 ^{+VAT} (€346.63)
Port replicator	£149 ^{+VAT} (€175.08)
Docking station & port replicator	£399 ^{+VAT} (€468.83)
Cigar lighter adaptor	£49 ^{+VAT} (€57.58)
Additional PSU	£59 ^{+VAT} (€69.33)
External keyboard	£29 ^{+VAT} (€34.08)
Zy-Fi® 2 amplified speakers	£29 ^{+VAT} (€34.08)

NOTEBOOK ACCESSORIES

VOYAGER II PORT REPLICATOR & DOCKING STATION

The Port Replicator has ports for; monitor, keyboard, mouse, 2x serial, 1x parallel, DC power in, MIDI/game, audio output, and a compact SCSI connector - use it to connect your Voyager II quickly to the peripherals on your desk. The full Docking Station adds a 200W power supply, with two drive bays (1x 3.5" & 1x 5.25"), three 16-bit ISA expansion slots (2x full length & 1x half length), and two PCMCIA slots (1x type II & 1x type III).

TOTAL CARE WARRANTY

Our optional "Total Care" package replaces the existing warranty with 2 year care. If your Voyager II or Quest 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, £174.88+VAT (€205.48) for the Voyager II P100/1Gb dual scan colour model.

Vale Quest



Quest is a 2-in-1 design which really does combine the best of both worlds. The Notebook is light weight, sleek and sophisticated with good battery life. Adding the Base Station gives you all the features of a desktop PC at your fingertips.

LARGE SVGA DISPLAY

Large and clear 11.3" LCD display with 800x600 resolution and up to 256 colours (Dual Scan models) or near photographic 64,000 colours (TFT models).

This is a real screen shot, not simulated.

PCI VIDEO

High performance PCI bus video controller with 1Mb EDO RAM.

BUILT-IN AUDIO

On-board 16-bit stereo sound (SoundBlater Pro compatible) with built-in speakers and microphone.

MINIATURE POWER SUPPLY

A big, heavy power supply is a real millstone to a light weight notebook, but the Quest has a matchbox sized unit weighing just 200g. It's even auto sensing for supply voltage (90-260V).

MAXIMUM BATTERY LIFE

High performance Duracell battery and low voltage Pentium processor.

STANDARD FEATURES

- ◆ 8Mb high performance EDO RAM, expandable to 40Mb.
- ◆ Enhanced IDE hard disk.
- ◆ 1.44Mb floppy drive
- ◆ Solid comfortable keyboard with Windows95 keys.
- ◆ Superbly responsive touchpad.
- ◆ Extensive power management features including "suspend to RAM" and "suspend to disk".
- ◆ IrDA compliant infrared port, with TranXit utility software for simple wireless communications.
- ◆ PCMCIA expansion ports for two type II cards or one type III card.
- ◆ Serial port (16550A compatible), parallel port (EPP and ECP compatible), PS/2 port for external mouse or keyboard, and port for external SVGA monitor (1024 x 768 resolution).
- ◆ Audio expansion jacks for stereo line in & line out, and an external microphone.
- ◆ Dual function, auto configuring joystick/MIDI port caters for a wide range of peripherals.
- ◆ Anchor for Kensington security cable.



SUPER-LIGHT SLIM DESIGN

The Quest measures just 297mm x 236mm x 35mm and weighs only 2.5kg, making it one of the most portable notebooks around.

Designed for



Each system includes your choice of Windows 95 or Windows 3.11 at no extra cost.



BASE STATION

SLIM AND LIGHT

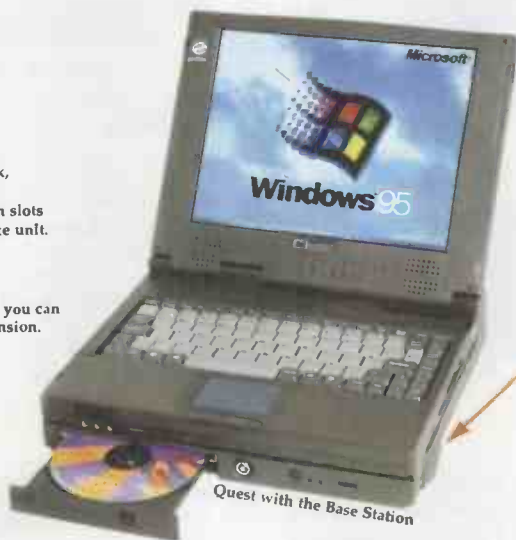
The Base Station adds only 1.2kg to the weight of the notebook, making the combination no bigger and heavier than many conventional notebooks. The Quest's mains power supply even slots inside the Base Station so you don't have to carry it as a separate unit.

FAST DOCKING

Under Windows95 the Base Station is a Plug and Play device - you can 'hot dock' without switching off the notebook for instant expansion.

6X CD-ROM DRIVE

You can't afford to be without a CD-ROM drive these days, and with 6x speed technology the Quest lacks nothing in multimedia performance.



STANDARD FEATURES

- ◆ Full length PCI expansion slot.
- ◆ Two PS/2 ports for connection to an external keyboard and mouse.

AMPLIFIED SPEAKERS

Amplified stereo speakers with front volume control provide adequate sound for small audiences. Audio output ports are provided for further expansion.

NOTEBOOK ACCESSORIES

NOTEBOOK CARRYING CASES

VALE Carry Case £30.VAT (£35.25)
A neat, compact padded case with carrying handle and detachable shoulder strap. Ideal for protection "out in the field".



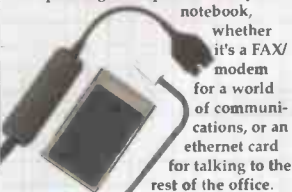
Vale SystemTraveller £49.VAT (£57.58)
The complete luggage carrier for the modern business traveller. Thickly padded to protect your equipment

- Exterior dimensions 330x280x115mm
- Computer compartment
- Accessory/printer pocket
- Document pocket
- Cellular phone pocket
- Holders for diskettes, pens, business cards
- Adjustable padded divider
- Detachable shoulder strap



PCMCIA

33600bps Modem.....£139+VAT (£163.33)
Ethernet card.....£69+VAT (£81.08)
PCMCIA is the industry standard for expanding the capabilities of your notebook,



Dual Scan Colour

1GB 1.8GB

P120 £1399.VAT (£1643.83) £1549.VAT (£1820.08)

P133 £1449.VAT (£1702.58) £1599.VAT (£1878.83)

Dual Scan Colour

1GB 1.8GB

P120 £1799.VAT (£2113.83) £1949.VAT (£2290.08)

P133 £1849.VAT (£2172.58) £1999.VAT (£2348.83)

QUEST OPTIONS

Base Station.....£399+VAT (£468.83)
Additional primary battery.....£195+VAT (£229.13)
Upgrade from 8Mb to 16Mb RAM£89+VAT (£104.58)
Upgrade from 8Mb to 24Mb RAM£149+VAT (£175.08)
Upgrade from 8Mb to 40Mb RAM£249+VAT (£292.58)
Cigar lighter adaptor£49+VAT (£57.58)
External keyboard£29+VAT (£34.08)
Zy-Fi® 2 Pro amplified speakers.....£49+VAT (£57.58)

Evesham Micros Visit your nearest Showroom at EVESHAM • CAMBRIDGE • BIRMINGHAM • MILTON KEYNES

Vale Communications



Vale Plug-N-Play ethernet adaptor

The easiest and fastest installation with top-rated performance.

- NE2000 compatible ISA bus Plug-N-Play card
- RJ45 and BNC ports
- Full duplex operation to out-perform other NE2000 compatible cards by up to 30%



£29^{+VAT}
(£34.08)

Over the years the Vale range of Personal Computers has built a reputation for performance products at competitive prices. Building on this success we have introduced a range of products designed to enhance your PC.

Whether you require an NE2000 compatible network card, a v34 28,000bps fax/modem or an FM radio, you can be sure that the quality and technical support will be second to none.

Vale PCI ethernet adaptor

This high performance 32-bit PCI Ethernet adaptor is suitable for a wide range of the network operating systems.

Vale's SP2080 32-bit PCI bus Ethernet adaptor provides the performance you need to keep up with today's fastest servers and workstations. It will cope with sensitive bandwidth applications while using less of your CPU resources, ideal for solving I/O bottlenecks.

- 32-bit PCI bus card
- Extensive driver support for all popular network operating systems
- RJ45 and BNC ports
- Full duplex operation for maximum performance



£39^{+VAT}
(£45.83)

Vale 33600bps voice/fax/modems

Whether you want to access the Internet or simply fax the office, a modem is an essential addition to any PC system. Our external unit means you just plug-in and go, and with the free software supplied you can be using the Internet within minutes of installation.

- 33600bps Voice/fax/modem
- CompuServe internet starter pack: includes full Internet and World Wide Web access software, with first month membership free and 10 hours free on-line time
- Fax software
- Internal and external voice/fax/modems available
- PCMCIA fax/modem (not voice) now available



£89^{+VAT}
External version
(£104.58)

£79^{+VAT}
Internal version
(£92.83)

£139^{+VAT}
PCMCIA version
(£222.08)

Vale PCI etherspeed adaptor

The high performance 10/100 Mbps dual speed PCI Ethernet adaptor.

Vale's SP2500A EtherSpeed Ethernet adaptor provides the easiest way to adapt from 10 Mbps ethernet to 100 Mbps Fast Ethernet – just change the hub connection and the card will automatically run at the new speed.

- 32-bit PCI bus card
- 10Mbps and 100Mbps performance via RJ45 auto speed sensing port
- Extensive driver support for all popular network operating systems



£89^{+VAT}
(£104.58)

Vale Internet solution

At last a complete Internet Solution!

Many packages offer 30 day trial access often with limited access times and leading to high monthly charges. At Evesham Micros we believe in providing a product which is ready to use minutes after you open the box. Join the internet revolution safe in the knowledge that you will have nothing to pay (apart from local rate telephone calls) for 12 months.

- Vale 33600bps external voice/fax/modem
- 'Supervoice' voice/fax software
- 12 Months **UNLIMITED** Internet Access via Premier Internet – one of the UK's largest providers
- Full e-mail account
- 100% UK local rate telephone access
- Full technical support



£189^{+VAT}
(£222.08)

Vale PCMCIA ethernet adaptor

Hassle free ethernet for your portable.

- RJ45 and BNC ports



£69^{+VAT}
(£81.08)

Vale Mini-Hub

The perfect answer for users who require a flexible, mobile networking product, this pocket-sized, 5 port hub is simple to install and easily expandable.

- 10BASE-T standard with 5 RJ45 ports
- Simple expansion by cascading up to 4 hubs
- Ideal for small workgroups
- No AC power adapter required – takes power from keyboard port via supplied cable



Rear view with 5 ports and DC input.

£59^{+VAT}
(£69.33)

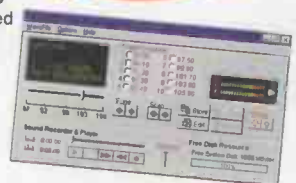
Vale FM Radio receiver

Within minutes of connecting the NEW Vale FM Radio to your multimedia PC, you can tune to your favorite station via a user-friendly interface.

- High quality FM stereo radio with noise shielding technology for the multimedia PC
- Simple Plug-N-Play installation: connects to 25-pin serial port, no external power required
- Ultra sensitive shielded antenna
- User friendly Windows 3.1 and Windows 95 compatible software to control all radio functions



£29^{+VAT}
(£34.08)



System requirements: 16-bit Sound Card, Windows 3.1/95 operating system, Speakers or Headphones.

Vale Cabling & Terminators

- | | |
|---|---|
| Ethernet Cable, per meter.....£0.75 ^{+VAT} (£0.90) | BNC T Connector.....£3.20 ^{+VAT} (£3.76) |
| Cable with BNC plugs at each end: | Through Connector...£1.80 ^{+VAT} (£2.16) |
| 5m length.....£8.50 ^{+VAT} (£10.20) | Cable plug.....£1.75 ^{+VAT} (£2.10) |
| 10m length.....£14.00 ^{+VAT} (£16.80) | Terminator.....£2.00 ^{+VAT} (£2.40) |
| 20m length.....£20.00 ^{+VAT} (£24.00) | |

Please note that all products have 12 months warranty (not on-site maintenance) and that product packaging is shown for illustration purposes only.

TWO GREAT MULTIMEDIA BUNDLES

OFFERED WITH A VARIETY OF PACKS

Microsoft



- ◆ Works 3 (for Windows 3.1) or Works 4 (for Windows95) - Your choice, please specify which
- ◆ Encarta 96 (International Edition)
- ◆ Money
- ◆ Fine Artist
- ◆ Explorapedia
- ◆ Dinosaurs
- ◆ Golf
- ◆ Scenes
- ◆ Fury 3 (trial version)
- ◆ Windows Entertainment Pack



Lotus SmartSuite:
1-2-3, Word Pro, Approach
Freelance Graphics, Organizer
Productivity Software:
Quicken 4, CorelDRAW! 4
Edutainment Software:
Software Toolworks Grolier
Encyclopaedia for 1996,
ITN European Video Atlas
Top Games Titles:
Command & Conquer, Simon
the Sorcerer II, Screamer

Lotus Office 96



SPEAKER UPGRADES

Upgrade the ZyFi2 speakers in any of the following packs for a modest surcharge.
ZyFi2 PROs£20+VAT (£23.50)
Multimedia Labs TC1500£50+VAT (£58.75)

See the CD-ROM drives (below) for details of the complete packs. When ordering please quote pack number. We recommend a minimum 486sx33 system with MS DOS 6.x or Windows95 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. Lotus provide 30 days telephone support for their own software. Occasionally we may supply vouchers for software titles which need to be redeemed with manufactures.

PANASONIC CR-583 8 SPEED CD-ROM DRIVE & PACKS

Drive only **£65+VAT (£76.25)**

Includes cables and driver software

- Enhanced IDE ATAPI interface
- Eight speed 1200kb/sec sustained DTR
- Super fast 150ms access
- Plug and Play compliant
- MPC and White Book (CDI) compatible
- Output from audio CDs via headphone socket
- Multi-session drive - compatible with Kodak Photo CD



Drive and card only:

£110+VAT (£129.25) (pack 8a)
with Soundblaster 16 card

£160+VAT (£188.00) (pack 8c)
with Soundblaster 32 card

With Zy-Fi² speakers and
Microsoft

£175+VAT (£205.63) (pack 11a)
with Soundblaster 16 card

£225+VAT (£264.38) (pack 11b)
with Soundblaster 32 card

With Zy-Fi² speakers and
Lotus

£205+VAT (£240.88) (pack 10a)
with Soundblaster 16 card

£255+VAT (£299.63) (pack 10b)
with Soundblaster 32 card

NB - bare drives require sound card or motherboard with secondary IDE connector NOT - proprietary Panasonic interface

PANASONIC CR-584 12 SPEED CD-ROM DRIVE & PACKS

Drive only **£99+VAT (£116.25)**

Includes cables and driver software

- Enhanced IDE ATAPI interface
- Twelve speed 1800kb/sec average DTR
- Ultra fast 110ms access
- Plug and Play compliant
- MPC and White Book (CDI) compatible
- Output from audio CDs via headphone socket
- Multi-session drive - compatible with Kodak Photo CD



Drive and card only:

£144+VAT (£169.20) (pack 12a)
with Soundblaster 16 card

£194+VAT (£227.95) (pack 12b)
with Soundblaster 32 card

With Zy-Fi² speakers and
Microsoft

£209+VAT (£245.58) (pack 13a)
with Soundblaster 16 card

£259+VAT (£304.33) (pack 13b)
with Soundblaster 32 card

With Zy-Fi² speakers and
Lotus

£239+VAT (£280.83) (pack 14a)
with Soundblaster 16 card

£289+VAT (£339.58) (pack 14b)
with Soundblaster 32 card

NB - bare drives require sound card or motherboard with secondary IDE connector NOT - proprietary Panasonic interface

SOUND CARDS

CREATIVE
CREATIVE LABS

SoundBlaster 32 card
(IDE CD-ROM interface)**£99+VAT (£116.33)**

Multimedia Labs ▶ **TC 1500**
Wireless Remote Control

Compact Hi-Fi Multimedia Stereo
75 Watt Amplifier System

THE BEST SOUND PER POUND

This amazing new product brings a new dimension to multimedia. Hearing is believing!

- Micro size amplifier 11/2"W x 7"H x 6"D giving 12 Watts RMS per channel.
- Unique palm size remote IR control.
- Side firing 4" woofers and front firing high frequency piezo tweeters.
- Separate bass & treble controls, variable mic. gain control, and stereo-mono switch.



only **£85+VAT (£99.88)**

UPGRADE your existing speaker system with the
Killer Sub ▶ **SP7001**

50 Watt Amplified Bass Reflex Subwoofer Speaker

- 25 Watts RMS mono power with built in electronic crossover.
- Free standing, speaker cabinet made of natural wood material for perfection in bass response. Cabinet is 61/4"W x 12"H x 10"D. May be mounted vertically or horizontally on the floor.



only **£68+VAT (£79.90)**

ZY-FI SPEAKERS

ZY-FI COMPACT

£12+VAT (£14.10)

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 (active use requires batteries or optional mains adaptor)
- 3" Full Range Cone
- Magnetically shielded
- Volume Control
- Bass Booster
- Treble Booster



ZY-FI 2

£29+VAT (£34.08)

"Zy-Fi2s are definitely a sound investment." PC Answers "Recommended" March 1995

- Built-in Stereo Power Amp
- 64 Watts PMPO (12 Watts RMS)
- Magnetically shielded
- Volume Control
- Tone control



ZY-FI 2 PRO

£49+VAT (£57.58)

"These are the boys to add a bit of oomph to your PC." PC Answers "Recommended" March 1995

Rating 9/10. "Excellent value for money." PC Zone April 1995

Rating 9/10. "a lot of sound for the money" PC Plus April 1996

Rating 6/6. "sound quality on a different level from the other speakers" PC Guide "Best Buy" September 1996

- Built-in Stereo Power Amplifier
- 120 Watts PMPO (36 Watts RMS)
- Magnetically Shielded
- Size 14x23x15cm
- Volume Control
- Bass control
- Treble control



ZY-FI BASS £75+VAT (£88.13)

Subwoofer system with satellite speakers. Experience thumping bass and chirpy treble from your PC sound card with Zy-Fi² Bass.

- Built-in Power Amplifier
- Subwoofer unit 80 Watts PMPO (20 Watts RMS). Dimensions 273 x 165 x 275mm
- Satellite speakers 24 Watts PMPO (2x3 Watts RMS). Dimensions 120 x 96 x 98mm
- 5.25" subwoofer drive unit
- 3" satellite units
- Magnetically shielded
- Individual volume and bass controls
- External mains PSU



PCI MOTHERBOARDS



PENTIUM MOTHERBOARD FOR ONLY £80+VAT

TYPE 6 FOR PENTIUM UP TO P120.....£80+VAT (£94.00)
 ● 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 P100 processor.....£165+VAT (£193.88)
Type 6 board with P120 processor.....£195+VAT (£229.13)
NB - all board + CPU offers include heatsink and fan.

486

TYPE 7 FOR '486 PROCESSORS.....£80+VAT (£94.00)
 ● 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 486x2+66 processor.....£105+VAT (£123.38)
Type 7 board with 486x4+100 processor...£129+VAT (£151.58)
CLEARANCE OFFER: Type 7 board with 486x2+66 processor (not upgradeable).....£89+VAT (£104.58)
NB - all board + CPU offers include heatsink and fan.

Triton with 256kb Pipeline-Burst cache

TYPE 9 FOR PENTIUM UP TO P166.....£99+VAT (£116.33)
 ● ECS Triton board with Intel 430VX PCIset ● 4xPCI local bus slots ● 3xISA slots ● ZIF socket ● 256kb Pipeline-Burst 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 ● Accepts 72-pin SIMMs.
Type 9 board with P120+ 686 processor.....£164+VAT (£192.70)
Type 9 board with P166+ 686 processor.....£244+VAT (£286.70)
Type 9 board with P120 Pentium processor...£209+VAT (£243.54)
Type 9 board with P133 Pentium processor...£264+VAT (£310.20)
Type 9 board with P166 Pentium processor...£434+VAT (£509.95)
NB - all board + CPU offers include heatsink and fan.

Upgrade your PC

UPGRADE YOUR 386/486

Full-tower case fitted with:

- ◆ Type 6 motherboard (see above)
- ◆ Pentium P120 processor & fan
- ◆ Power supply
- ◆ 8Mb RAM
- ◆ 1Mb video card

£299+VAT (£351.33)



PROCESSORS



Intel Pentium processors
 P100.....£85+VAT (£99.88)
 P120.....£110+VAT (£129.25)
 P133.....£165+VAT (£193.88)
 P150.....£225+VAT (£264.38)
 P166.....£335+VAT (£399.63)
 P200.....£435+VAT (£511.13)

Please note: Pentium 133 and above require socket 7

486x2-66.....£25+VAT (£29.38)
 486x4-100.....£49+VAT (£57.58)
 Motherboard support for 3.3V required.
 Intel 486x2-66
 Overdrive.....£99+VAT (£116.33)
 Suits Vale PCs bought before October '94.

Heatsink and fan recommended for all processors.
 CPU Heatsink.....£3+VAT (£3.53)
 Fan & heat sink for 486.....£10+VAT (£11.75)
 Pentium.....£9+VAT (£10.58)

468. Personal Computer World January 1997

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.



Runner up: Vale monitors



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
- EcoScan17 is DDC-2 plug and play compatible

15".....£249+VAT (£292.58)

17".....£449+VAT (£527.58)

iiyama Vision

Master 17£495+VAT (£581.63)



0.26mm dot pitch • 1600x1200 max • Up to 86kHz horiz. scan • 1280x1024 @ 80Hz refresh • MPRII and EPA compliant - PC Magazine "Editor's Choice" April 1995

iiyama Vision Master 17ES£525+VAT (£616.88)

As above with built-in stereo speakers and Spatializer 3D sound processor

iiyama Vision Master PRO 17£595+VAT (£699.13)

0.25mm dot pitch DiamondTron tube • Up to 92kHz horz. scan • 1600x1200 max resolution @ 72Hz flicker-free refresh • MPRII and EPA compliant

iiyama Vision Master 21£1238+VAT (£1454.65)

0.27mm dot pitch • Up to 94kHz horz. scan • 1600x1200 max resolution @ 75Hz refresh • MPRII and EPA compliant

Viewsonic 14ES 14".....£180+VAT (£211.50)
 0.28mm dot pitch • 1024x768 max non-interlaced • 800x600 @ 72Hz refresh • EPA Energy Star compliant

Viewsonic 15GS 15".....£299+VAT (£351.33)
 0.27mm dot pitch • 1280x1024 max non-interlaced • Up to 69kHz scan • 1024x768 @ 85Hz refresh • EPA Energy Star compliant

Please note that industry standard practice is to quote a monitor's CRT size - the actual viewing area is approximately 1" less.

Memory: SIMMs

- 1Mb 30-pin£15+VAT (£17.63)
- 4Mb 30-pin£25+VAT (£29.38)
- 4Mb 72-pin£19+VAT (£22.33)
- 8Mb 72-pin£35+VAT (£41.13)
- 16Mb 72-pin£70+VAT (£82.25)
- EDO RAM:
4Mb EDO£25+VAT (£29.38)
- 8Mb EDO£50+VAT (£58.75)
- 16Mb EDO£100+VAT (£117.50)
- Level 2 Pipeline-Burst cache:
256kb module£30+VAT (£35.25)
- 512kb module (suits Intel Endeavour and Atlantis boards only).....£50+VAT (£58.75)

Seagate HARD DISKS



Runner up: Seagate hard disks



Optional installation kit (5.25" mounting bracket kit plus cables)£10+VAT (£11.75)

- Seagate 214Mb IDE£89+VAT (£104.58)
- Seagate ST3630A (IDE) 630Mb.....£112+VAT (£131.60)
- Seagate ST31276A (IDE) 1.2Gb.....£125+VAT (£146.88)
- Seagate ST32132A (IDE) 2.1Gb.....£185+VAT (£217.38)
- Seagate ST32430N (SCSI) 2Gb£499+VAT (£586.33)
- IBM 100Mb (SCSI).....£49+VAT (£57.58)

matrox VIDEO CARDS



"Best Graphics Card"
 Matrox Millennium



- Matrox Mystique 2Mb synchronous graphics RAM (PCI Bus).....£89+VAT (£104.58)
- Upgrade to 4Mb (Mystique).....£69+VAT (£81.08)
- Matrox Millennium 2Mb WRAM (PCI Bus)£129+VAT (£151.58)
- Upgrade to 4Mb (Millennium).....£75+VAT (£88.13)

Storage & Backup Solutions

ditto tape drives

Crash insurance for your PC

- ◆ New format using 2Gb low cost cartridges
- ◆ Easy one-step backup
- ◆ Simple plug & go setup



2Gb Internal unit.....£115+VAT (£135.13)
 2Gb Parallel port unit.....£165+VAT (£193.88)
 Tapes for ditto 2Gb.....3 pack £59+VAT (£69.33)

Ditto Travan drives:

- ◆ Available as either Internal or stand alone unit
- ◆ Stand alone version simply connects to the PC's parallel port, with a through port for printer operation

800Mb Internal unit.....£80+VAT (£94.00)
 800Mb Parallel port unit.....£100+VAT (£117.50)
 Tape for ditto 800Mb.....£25+VAT (£29.38)

3.2Gb Internal unit.....£180+VAT (£211.50)
 3.2Gb Parallel port unit.....£235+VAT (£276.13)
 Tape for ditto 3.2Gb.....£29+VAT (£34.08)

Quoted capacities are with compression software supplied

jaz drive

At last - a 1 Gb portable solution.

The ultimate solution for storing, transporting and playing multimedia applications. Or backup your entire hard disk. Or create your own digital photo album. Or transport huge graphics files to printers and service bureaus. Just use as many cartridges as you need.



zip drive

Affordable personal storage solution to organise, move and backup your data. 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
- Backup your hard drive Quickly and easily
- Take it with you Zip drive and cartridges are portable
- ◆ 29ms seek time
- ◆ Up to 1Mb/sec data transfer
- ◆ Very compact (180mm x 137mm x 38mm)
- ◆ Light weight (approx 450g)
- ◆ Includes one 100Mb cartridge, and Zip tools software to help you organise your data
- ◆ Limited lifetime warranty on Zip cartridges

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. Whatever.

ZIP DISK DRIVE.....ONLY £129+VAT (£151.58)
 100Mb Zip cartridge.....£14+VAT (£16.45)
 100Mb Zip cartridge.....6 pack £69+VAT (£81.08)

- The space you need, the speed you need and the portability you need, at a price you can afford
- 1Gb of space on each cartridge
- Faster than most hard disks
- ◆ 12ms seek time
- ◆ 5.5Mb/sec average sustained data transfer
- ◆ 256kb read/write cache
- ◆ Very compact (203mm x 137mm x 38mm)
- Fully compatible with Windows 95, DOS/Windows and Macintosh
- Requires SCSI interface card
- ◆ Light weight (approx 900g)
- ◆ Includes one 1Gb cartridge, and Jaz tools software to help you organise your data

JAZ DISK DRIVE.....ONLY £349+VAT (£410.08)
 1Gb Jaz cartridge.....£89+VAT (£104.58)
 PCI SCSI interface card.....£75+VAT (£88.13)

Video Cards

DIAMOND

MULTIMEDIA



Why Diamond Video Cards?

The highly acclaimed Stealth range has won many press accolades including the coveted PC Magazine "Editors Choice", and all have a 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.



Please note that Diamond products are not supplied in retail packaging



May 1995 and June 1996 (Stealth 64VideoVRAM)



September 1996 (Stealth 3D 2000)



27 June 1995 - US Edition (Stealth 64VideoVRAM)



September 1996 (Stealth 3D 2000)
"A decent graphics card and 3D for this price is a real bargain. Diamond have a real winner on their hands."

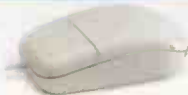
The new Stealth 3D 2000 brings outrageously fast graphics acceleration with realistic 3D rendering. It also comes with MPEG video acceleration so you can enjoy full-screen video.

- Diamond Stealth 64DRAM 1Mb (PCI Bus)£50+VAT (€58.75)
- Diamond Stealth 64DRAM 2Mb (PCI Bus)£70+VAT (€82.25)
- Diamond Stealth 3D 2000 2Mb (PCI Bus)£79+VAT (€92.83)
- Diamond Stealth 64VideoVRAM 2Mb (PCI Bus)£170+VAT (€199.75)
- Upgrade to 4Mb for Stealth 64VideoVRAM£120+VAT (€141.00)

Mice & Keyboards

MITSUMI

Mitsumi Mouse as used in Vale Prima and Prestige PCs£10+VAT (€11.75)



KEY TRONIC



Keytronic 'Windows 95' Keyboard as used in Vale Platinum PCs£29+VAT (€34.08)
"...pleasantly curved and delightful to type on..." PC Pro, November 1995

Microsoft

- Microsoft Home Mouse with the Home Edition of Intellipoint software£25+VAT (€29.38)
- Microsoft Mouse 2.0 Intellipoint version as used in Vale Platinum PCs£38+VAT (€44.65)

STEERING WHEELS & YOKES

MSC Multi-System - combined steering wheel, handlebars, yoke£69+VAT (€81.05)



It's a bike!

It's a plane!

It's a car!

- CH Flightstick£27+VAT (€31.73)
- CH Flightstick Pro£55+VAT (€64.63)
- CH Virtual Pilot£62+VAT (€72.85)
- CH Virtual Pilot Pro£72+VAT (€84.60)
- PRODUCTS CH Pro Pedals£75+VAT (€88.13)

FAX/MODEMS

Internet ready

AT LAST A COMPLETE INTERNET SOLUTION!

- Vale 33600bps external voice/fax/modem
- 'Supervoice' voice/fax software
- 12 Months UNLIMITED Internet Access via Premier Internet - one of the UK's largest providers
- Full e-mail account
- 100% UK local rate telephone access
- Full technical support

Many packages offer 30 day trial access often with limited access times and leading to high monthly charges. At Evesham Micros we believe in providing a product which is ready to use minutes after you open the box. Join the internet revolution safe in the knowledge that you will have nothing to pay (apart from local rate telephone calls) for 12 months.



The complete solution ..£189+VAT (€222.08)

VALE FAX/MODEMS

- 33600bps voice/fax/modem as above
- Supervoice voice/fax software
- Vale 33.6 internal£79+VAT (€92.83)
- Vale 33.6 external£89+VAT (€104.58)
- Vale 33.6 PCMCIA fax/modem (not voice)£139+VAT (€163.33)

Tel-Me

Tel-Me is an on-line Information system, giving you direct access to key Information sources.

SPECIAL OFFER with any modem £15+VAT (€17.63)
We supply the full version of Tel-Me with one month free subscription and usage credit of £30+VAT.



pace FAX/MODEMS

- Microlin 28.8 internal£99+VAT (€118.33)
- PCMCIA 28.8 internal£189+VAT (€222.08)
- Microlin 33.6 internal£139+VAT (€163.33)
- Microlin 33.6 external£140+VAT (€164.50)



Message Desk 33.6 internal£159+VAT (€188.83)
Message Desk 33.6 external£160+VAT (€189.00)
Voice, Data and Fax Modem. Integrates your PC and your telephone to provide complete communications facilities.

International Travel Pack£39+VAT (€45.83)
Allows use of modem in the USA and most of Europe.

SPECIAL OFFER
All modems include internet connection software with free trial connection period.



US Robotics FAX/MODEMS

- USR 33.6 internal£154+VAT (€180.85)
- USR 33.6 external£155+VAT (€182.13)

UPSs, UPSs, UPSs



Protect your installation from mains power faults with an uninterruptible power supply.

- Station 40 (400VA)£129+VAT (€151.58)
- Station 140 (1400VA)£415+VAT (€487.63)
- Station 60 (600VA)£155+VAT (€182.13)
- Station 200 (2000VA)£649+VAT (€762.58)

SYSTEM SERIES ON-LINE UPSs

- True on-line protection
- True Sine wave output
- Fully automatic operation with LED status indicators
- Communications interface for use with automatic shutdown software
- System 300 has comprehensive LCD display of operating, monitoring and diagnostic information

- System 60 (600VA)£440+VAT (€517.00)
- System 300 (3000VA)£1399+VAT (€1643.83)

NETWORK PRODUCTS

Kingston TECHNOLOGY CORPORATION

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



£39+VAT (€45.83)

Network hubs.

- 9 port stackable hub£129+VAT (€151.58)
- 16 port hub£219+VAT (€257.33)

DIGITAL EDGE

Hands on experience:

PCGAMER April 1996
"This is undoubtedly the most advanced, well built and realistic steering wheel money can buy."
Rating: 90%

Dedicated PC racers know that the latest software titles offer incredibly realistic racing simulation. However, these software advances have not been matched by developments in control technology - until now...

The Digital Edge F1 SIM offers the serious game-racer the equipment necessary to take on and beat the best in the world.

No expense has been spared to provide a perfect copy of an F1 car. Built without compromise from heavy duty steel construction and using the highest quality components, F1 SIM provides a 10" leather bound F1 steering wheel, "paddle" gear changes mounted behind the wheel, and steel brake and accelerator pedals. The system is secured to a wooden base by quick release bolts to provide both stability, and optimum viewing performance.

F1 SIM is also extremely easy to connect, requiring no cards to be fitted into the PC - the unit merely connects via one cable to the joystick port.

In use, the Digital Edge F1 SIM is as close as most of us will get to driving a Formula 1 car, yet enables the user to develop their racing skills much further than they would have thought possible.

The Digital Edge F1 SIM: designed to make you the best you can be.

£199+VAT (€233.83)

From the Internet Players Review, July 1996:
"Response is good, and the gear paddles become second nature to use in a very short time. Lovely! I'll never use keyboard or joystick control in a racing game again. Verdict: Well built, solid, and compatible with all the software I could throw at it... If you're serious about your racing (and you can afford it) then the [F1 SIM] is worthy of serious consideration. I'm glad I bought mine. My rating: 96%"
Dave Weaver



F1 SIM RACING SIMULATOR

SCAN THESE PRICES

Scanners from Mustek

FLATBED A4 COLOUR SCANNERS

- All use *single-pass* scanning – much faster than models which scan each colour separately
- Colour, 8-bit grey and line art modes
- 12 built-in halftoning patterns
- Paragon 600/2 SP is a new 'small footprint' design with compact exterior dimensions and 216mm x 296mm scan area
- Other models have 216mm x 356mm scan area
- Image scanning and photograph re-touching software, and powerful OCR software

single pass scanning for less than £900

ALL SCANNERS NOW HAVE TWAIN DRIVERS FOR WINDOWS95

Please note: remember that large scans at high resolution require a lot of RAM (or a lot of hard disk space and patience). For example, an A4 document scanned in 24 bit colour at 300dpi is 24Mb. At 600dpi it is 96Mb!

	Paragon 600/2 SP	Paragon 800 SP	Paragon 1200 SP
OPTICAL RESOLUTION:	300x600dpi	400x800dpi	600x1200dpi
INTERPOLATED RESOLUTION:	4800dpi	6400dpi	9600dpi
COLOUR DEPTH:	24-bit	30-bit	30-bit
FREE SOFTWARE:	ImagePals GO! TextBridge OCR	ImagePals GO! TextBridge OCR	ImagePals GO! TextBridge OCR
	£199+VAT (£233.83)	£249+VAT (£292.58)	£329+VAT (£386.58)
<small>Transparency adaptor for 600/2.....£135+VAT (£158.63) Automatic sheet feeder for 600/2....£169+VAT (£198.58)</small>		<small>Transparency adaptor for 800 & 1200.....£139+VAT (£163.33) Automatic sheet feeder for 800 & 1200...£199+VAT (£233.83)</small>	



"the scanner produced some of the best scans we've seen from a budget flatbed. Offering great value for money, a goodly range of software and easy set-up, the Mustek 600 II SP is a winner."

"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."

Requirements: *486x25 or higher, Windows 3.1x, Mouse, CD-ROM drive, and SVGA graphics or higher. 600 & 800 models require at least 8Mb RAM, and Hard disk with at least 50Mb free. 1200 model requires at least 16Mb RAM, and Hard disk with at least 80Mb free.

SCAN SERVICE

TRY BEFORE YOU BUY

Sample disk pack for either the flatbed or colour hand scanners (please state which) containing several images scanned in various modes to provide an exact representation of each scanner's capabilities. A fact sheet is also included containing loading instructions, scanning info., and printed originals. Cost Per Pack **£5+VAT** (£5.88) incl delivery. Refundable on purchase of a scanner.

SOFTWARE OFFERS

Photo Impact 3.0 SE & Wordlinx for Windows95 – allows text import directly into MS Word **£30+VAT** (=**£35.25**)

Photoshop 3.0 LE Premier image manipulation for Windows 3.1x/95 **£40+VAT** (=**£47.00**)

Software supplied on CD. Includes tutorials and on-line documentation. Requires minimum 486x4-100 and 16Mb RAM.

COLOUR HAND SCANNER

Colour 800



£69+VAT (£81.08)

or with 'parallel port' interface **£119+VAT** (£139.83). Connects directly to parallel port, with through port for printer (not suitable for bi-directional printers).

True 24-bit colour, 800dpi

COLOUR SCANNER FEATURES:

- Colour mode gives genuine 16 million colour, 400dpi optical scanning (and up to 800dpi via software interpolation)
- Greyscale mode with true 256 greyscales at up to genuine 800dpi
- Halftone and Line-art modes at up to genuine 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

Requirements: *486x25 or higher, at least 8Mb RAM, Windows 3.1x, Mouse, Hard disk with at least 35Mb free, and SVGA graphics or higher.

PICTURE THIS! - DIGITAL CAMERA

SANYO image PC

Introducing Image PC – the digital camera from Sanyo that opens up a colourful new world of possibilities for PC users at work and home.

£399+VAT (£468.83)



- Capture vibrant colour images any time, any place for instant use with your PC or laptop
- No fuss, no film or developing, no scanner required
- Simple point and shoot operation – fixed focus lens and automatic flash (the flash can be overridden)
- Store for up to 32 images in memory, then download to your PC with the serial cable supplied
- Windows® compatible software supplied to view, resize, crop, rotate and adjust colour balance of your images on your PC
- Use it to build-up your family album, or create flyers, adverts, newsletters, reports, or for property guides or insurance claims
- 640x480 resolution with 24 bit colour depth

System requirements: 486 or higher processor, Windows 3.1 or higher, 3.5" floppy disk drive, hard disk drive with at least 15Mb available, 8Mb RAM or higher, 256 colour VGA display or higher, RS232 serial port



June 1996
"Picture quality is excellent. Despite its fixed focus lens, the shots are sharp and certainly up to VGA resolution. The flash is fine up to 20ft. This is, in our view, a brilliant product and an undoubted Best Buy. It's not exactly cheap, but it does its job brilliantly."

Rating: ●●●●●●●●
This review was written assuming a price of £699inc VAT
470 • Personal Computer World • January 1997



November 1996
"The Sanyo strikes a good compromise between picture quality, image storage and price. It's simple to use, takes pretty good pictures."

Rating: 8/10
This review was written assuming a price of £580inc VAT

256 GREYSCALE SCANNER

- Genuine 256 greyscale performance – not interpolated from 32 greyscales
- Photo-realistic quality monochrome scans, with actual shades and shadows, at up to genuine 400dpi resolution (and up to 800dpi via software interpolation)
- Halftone and Line-art scanning at genuine 800dpi resolution
- Includes "iPhoto Plus" top professional Windows based image scanning and photograph re-touching software, and "Perceive OCR" software

with internal interface card **£29+VAT** (£34.08) or with 'parallel port interface' **£79+VAT** (£92.83)

Requirements: *486x25 or higher, at least 8Mb RAM, Windows 3.1x, Mouse, Hard disk with at least 35Mb free.



A4 COLOUR SHEETFED SCANNER

The simple, effective colour 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 24-bit (16.7 million colour) scanning
- Also 256 greyscale, Halftone and Line-art modes
- Genuine 300dpi resolution, interpolated to 1200dpi
- Document size: 216x356mm max, 51x89mm min
- 10 sheet automatic document feeder
- Very compact "small footprint" design
- Includes "iPhoto Plus" top professional Windows based image scanning and photograph re-touching software, and "Wordlinx" OCR software

with internal interface card **£119+VAT** (£139.83)

Requirements: *486x or higher, at least 8Mb RAM, Windows 3.1x, Mouse, Hard disk with at least 50Mb free, and SVGA graphics or higher.



PRINTERS

HP DeskJet – Laser-sharp type & brilliant colour, at an amazing price...

HP DeskJet 400C

NEW Inkjet Printer **£149+VAT** (£175.08)

- Compact design with fold away paper tray
- Simple 3 button front panel
- Intuitive on-line help with graphical user interface
- 600 x 300dpi for precise black
- Up to 300 x 300dpi colour with snap-in colour cartridge
- Prints up to 16.7 million colours
- HP's Resolution Enhancement and ColorSmart technology
- Up to 3ppm fast black printing
- Prints on plain, glossy or recycled paper, transparencies, envelopes and labels

HP DeskJet 690C

NEW Inkjet Printer **£209+VAT** (£245.58)

- Up to 600 x 600dpi for precise black
- 600 x 300dpi for superb colour
- Simultaneous use of black and colour cartridges
- HP's RealLife Imaging System: Photo ReT and ColorSmart technology
- Up to 5ppm black, up to 1.7ppm colour (Econofast mode)
- Versatile media handling – prints on plain, glossy or recycled paper, transparencies, envelopes, labels and continuous banners up to 5.5m long
- Wide selection of Scalable fonts

HP DeskJet 870C

NEW Inkjet Printer **£335+VAT** (£393.63)

New professional series printer with premium performance to increase office productivity

- 600dpi high resolution black printing
- Up to 600 x 300dpi colour printing
- HP's Colour Resolution Enhancement technology for superior quality colour
- Up to 8ppm black, up to 4ppm colour
- Print on plain, glossy or recycled paper, transparencies, envelopes and labels
- Comprehensive support for many operating systems including DOS, Windows 3.1/95 and Macintosh
- 26 scalable fonts plus 125 TrueType fonts for Windows
- 1000 page per month duty cycle (black)



LaserJet 5L

Simply the best low cost laser printer

£329+VAT (£386.58)

- Crisp, clear, permanent HP LaserJet printing
- Impressive 600dpi documents
- 1Mb standard, expandable to 9Mb
- 26 True Type scalable fonts built-in; additional 70 scalable fonts on disk
- Fast return to application gets you back to work while your document prints
- Simplified control panel with 1 operator button and 3 status LEDs
- HP PrintSmart technologies provide simple, complete printing for Windows and/or DOS
- Set up and use in as little as 15 minutes

HP DeskJet 340	£159 ^{***} (£186.83)	HP OfficeJet LK printer/canner/fax	£499 ^{***} (£586.33)
Colour Ink for 310/320/340/540	£30 ^{***} (£35.25)	HP LaserJet 6 P	£549 ^{***} (£645.08)
HP DeskJet 680C	£229 ^{***} (£268.08)	HP LaserJet 6 MP	£679 ^{***} (£797.83)
NEW HP DeskJet 820 requires Windows 3.x/95	£279 ^{***} (£327.83)	HP LaserJet 5	£369 ^{***} (£4126.83)
HP DeskJet long life black ink cartridge	£25 ^{***} (£29.38)	HP LaserJet 5 N	£1129 ^{***} (£1326.58)
HP DeskJet colour ink cartridge	£25 ^{***} (£29.38)	HP Support pack 3 year On-Site warranty agreement for DeskJet (mono models)	£55 ^{***} (£64.63) (colour) £65 ^{***} (£76.38)

HEWLETT PACKARD

Authorised Reseller Personal Computer Products

Canon

BJ-30 portable Bubble Jet

- For mobile printing or light desktop use
- High quality 360 x 360dpi output at up to 2.2 pages/minute
- Added "smoothing function" gives effective 720 x 360dpi resolution
- Prints onto plain paper, envelopes and OHP film
- LCD control panel for ease of use
- 30 sheet built-in feeder
- Windows 3.1 and Windows 95 compatible
- Optional portable kit and worldwide power adaptor

£119+VAT (£139.83)

BJC-4100 personal colour Bubble Jet

- 720 x 360dpi colour resolution for near photographic results
- 720 x 360dpi mono printing plus "smoothing" function for crisp text and graphics
- Up to 4.5ppm mono with optional BC-20 high capacity black cartridge
- Wide range of media available from plain paper to high gloss film
- Simple setup and use, with advanced Windows and MS-DOS drivers
- Automatic sheet feeder for up to 100 sheets of paper or 10 envelopes
- Free "Pressworks 2" page layout software, including 20 extra True Type fonts and 100 clip art images
- Includes BC-21 cartridge with black and colour ink tanks
- 3 year manufacturer's warranty

£189+VAT (£222.08)

BJC-4550 A3 colour Bubble Jet

- A3 colour and mono output at 720 x 360dpi resolution for stunning presentations
- Up to 4.8ppm mono with optional BC-20 high capacity black cartridge
- Optional BC-22 Photo Cartridge gives unparalleled PhotoRealism™
- Wide range of media available from plain paper to envelopes to high gloss film
- PC and Mac™ compatible
- Automatic sheet feeder for up to 100 sheets of A4 paper or 50 sheets of A3 paper
- Includes BC-21 cartridge with black and colour ink tanks
- 3 year manufacturer's warranty

£305+VAT (£358.38)

LBP-460 Windows® laser

- Incorporates Microsoft® Windows® Printing System for simple setup and use, high print speed and fast return to application
- 600dpi engine with Canon's 'Automatic Image Refinement' technology for sharp print quality
- Re-cyclable toner cartridge
- 100 sheet automatic feeder
- Prints onto plain paper, envelopes, labels and OHP film
- Windows 3.1 and Windows 95 compatible
- 1 year on-site warranty

£239+VAT (£280.83)

Canon BJC-210	£129 ^{***} (£152.88)	Canon BJ-230	£259 ^{***} (£306.88)
Canon BJC-620	£295 ^{***} (£348.88)		

CLEARANCE BARGAINS

- Categories: 1. As new, complete
2. Slightly soiled, complete
3. Soiled, incomplete

MUSTEK SCANNERS

600dpi A4 colour scanner NEW	£169 ^{***} (£198.58)
600dpi A4 single pass colour Cat 2	£169 ^{***} (£198.58)
A4 sheetfed scanner (mono) Cat 2	£75 ^{***} (£88.13)

CD-ROM DRIVES

Psonic/Sony 2x speed Cat 2	from £75 ^{***} (£88.13)
TEAC CD55A 4x speed Cat 2	£20 ^{***} (£23.5)

FAX/MODEMS

SPECIAL OFFER – ALL FAX/MODEMS INCLUDE INTERNET ACCESS SOFTWARE WITH FREE TRIAL CONNECTION PERIOD

Pace V22 (internal) Category 2	£25 ^{***} (£29.38)
Pace V32 (internal) Category 2	£39 ^{***} (£45.83)
Pace V22 PCMCIA Category 2	£25 ^{***} (£29.38)
Pace V32 PCMCIA Category 2	£49 ^{***} (£57.58)
US Robotics V34 PCMCIA cellular modem NEW	£129 ^{***} (£151.58)
Pace V32 Message desk (int.) Cat 1	£79 ^{***} (£92.83)
Pace V34 Message desk (ext.) Cat 2	£109 ^{***} (£128.08)

IOMEGA BACKUP

3.2Gb tape drives (external) Cat 2	£149 ^{***} (£175.08)
Zip 100Mb drive Category 2	£99 ^{***} (£116.33)

PRINTERS

Canon BJ-30 Category 2	£129 ^{***} (£151.58)
Canon BJC-70 Category 2	£175 ^{***} (£205.63)
Canon BJC-210 Category 2	£149 ^{***} (£175.08)
Canon BJC-610 Category 2	£179 ^{***} (£210.33)
Canon Stylus Colour 2S Cat 2	£109 ^{***} (£128.08)
HP DeskJet 340 Category 2	£139 ^{***} (£163.33)
HP DeskJet 660 Category 2	£179 ^{***} (£210.33)
HP DeskJet 820 Category 2	£199 ^{***} (£233.83)
HP DeskJet 850 Category 2	£199 ^{***} (£233.83)
HP DeskJet 870 Category 2	£249 ^{***} (£292.58)
HP LaserJet 5L Category 2	£249 ^{***} (£292.58)

LASER

Vale Voyager docking station Cat 2	£199 ^{***} (£233.83)
Voyager cigar lighter adaptor NEW	£49 ^{***} (£57.58)

NOTEBOOKS

MONITORS

20" Tatung MKR monitor Cat 2	£450 ^{***} (£528.75)
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OTHERS

Software – many recent titles.....Please call

Intel 486px4-75 processor Category 2	£25 ^{***} (£29.38)
IBM 100Mb SCSI hard disk Cat 2	£49 ^{***} (£57.58)
Seagate 528Mb IDE hard disk Cat 1	£89 ^{***} (£104.58)
Joystick card NEW	£5 ^{***} (£5.88)
Various keyboards Category 2	£10 ^{***} (£11.75)
Motherboard with 486px2-66 Cat 3	£59 ^{***} (£69.33)
SoundBlaster Pro 16ASP NEW	£49 ^{***} (£57.58)
Zy-Fi amplified speakers Cat 2	from £5 ^{***} (£5.88)
MM Labs TC1500 speakers Cat 2	£65 ^{***} (£76.38)
MM Labs SP7001 subwoofer Cat 2	£55 ^{***} (£64.83)
Gresham GPR 1200VA UPS Cat 2	£199 ^{***} (£233.83)
Creative VideoBlaster NEW	£119 ^{***} (£139.83)

Please contact our Evesham branch for these products. All are clearance lines, shop soiled or second hand stock and all carry 12 months warranty. This stock changes quickly – please call to check availability before ordering. More clearance bargains are held at our other branches – please call them if you do not see what you require.

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Same day despatch whenever possible. Delivery on orders up to £150.00 ex VAT value is charged at £4.50+VAT (£5.29). All orders above this value are shipped by Insured Express Courier service at a charge of £8.00+VAT (£9.40) – normally next working day after despatch (UK mainland only, others please call). Please note that 5 banking days must be allowed for cheque clearance. Immediate clearance on Bank Drafts and Building Society cheques. Account facilities available to qualified commercial customers.

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TECHNICAL SUPPORT **01386-769403** Monday to Friday 10.00 - 5.00
Vale customers please refer to your "Passport to Service"

1 YEAR WARRANTY ON ALL GOODS

All goods subject to availability. Please note that On-site Maintenance applies to UK mainland only. Details correct at time of going to press. Prices and specifications subject to change without notice. E & O E.
THIS ADVERT IS EFFECTIVE FROM 1/12/96
SOME PRICES AND SPECIFICATIONS MAY CHANGE AFTER 31/12/96

Visit your nearest Showroom at **EVESHAM • CAMBRIDGE • BIRMINGHAM • MILTON KEYNES** Media Code: PECW

Multimedia Time Machines 97

The new Multimedia Time Machines 97 are powerful, high specification systems that feature a minimum of 16Mb or 32Mb RAM and have been optimised for Microsoft® Windows® 95. Excellent business software from Lotus and other leading manufacturers is included together with a range of educational and leisure software. All are fully multimedia ready with fitted eight speed CD-ROM drive, top quality sound cards and a superb range of CD multimedia titles. All systems include a 28.8 fax and Internet pack allowing these systems to function as a powerful fax machine and allowing you to get on-line to services such as CompuServe and the Internet. At these amazing prices with interest free credit available for a limited period, these top brand systems are without doubt the best computer

solutions for the serious home, professional and small business user. Add a quality printer pack (available on interest free credit) for a complete solution.

Time Machines 97 Key Features

- 16Mb or 32Mb RAM minimum
- 256k or 512k Burst mode cache
- P120 to P200 processors
- 28.8 Fax / data / Internet modems
- Superb graphics with software MPEG
- Large 15" or 17" (optional extra) screens
- Eight speed CD-ROM multimedia with premium speakers and microphone
- The best software bundle in the UK

Time Machines 97 Specification

- Intel Pentium P120, IBM/Cyrix/ST 6x86 P150+, P166+ or Intel Pentium P200 processors
- 16Mb or 32Mb RAM expandable to 128Mb
- 256k or 512k Burst mode cache
- 1Gb or 2Gb fast enhanced IDE hard disks
- 1.44Mb floppy drive
- Enhanced parallel, PS/2 mouse and two high speed serial ports
- Cases: Model 97-1 Colossus midi tower case with 7 drive bays, Models 97-2 and 97-4 Omega desktop case with 7 drive bays, Model 97-6 Colossus full tower case with 9 drive bays
- Graphics: 64-bit integrated graphics with video acceleration (Integrated graphics uses 1Mb of system RAM; switchable to 2Mb to give more colours and higher resolutions). 4Mb 'SGRAM' graphics card supplied on model 97-6.
- Software MPEG capability allowing playback of MPEG-1 videos
- 105 Windows 95 keyboard and Microsoft compatible mouse
- 15" SVGA low radiation colour screen (17" optional extra)
- Microsoft Windows 95 with manuals and CD
- Twelve month warranty extendable to five years

Multimedia Hardware

- Eight speed IDE CD-ROM drive
- 16-bit High quality integrated sound 3D wavetable sound card on model 97-6.
- Twin premium stereo speaker (15 watt) system with separate A/C adapter
- PC joystick and PC microphone

Fax / Data / Internet Modem

- Included with all models 28.8 or 33.6 BABT approved fax / data / Internet modem
- 3.2Gb Tape back-up supplied with model 97-6.

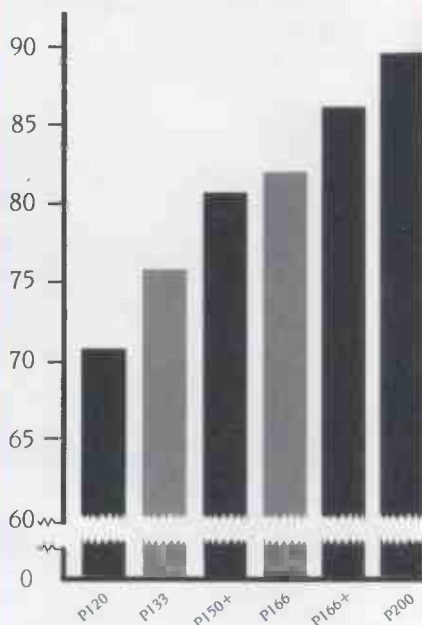
APR*

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.

Relative Performance

Relative processor performance based on Ziff Davis Winstone 96™ as certified by MDR labs.



Multimedia Time Machine 97-1 P120

Intel P120 processor, Colossus midi tower with 16Mb RAM, 256k burst mode cache, 1Gb hard disk, eight speed CD-ROM drive, integrated 64-bit PCI graphics, 28.8 internal modem, and large 15" .28dp screen

£39 Per Month

£142.70 deposit and 24 monthly payments of £53 OR £478.70 deposit and 24 monthly payments of £39. APR 0% Total price £1179 + VAT = £1414.70 inc. delivery and VAT.



Multimedia Time Machine 97-2 P150+

IBM/Cyrix/ST 6x86 P150+ processor, Omega desktop with 16Mb RAM, 256k burst mode cache, 1Gb hard disk, eight speed CD-ROM drive, integrated 64-bit PCI graphics, 28.8 internal modem, and large 15" .28dp screen

£49 Per Month

£166.20 deposit and 24 monthly payments of £53 OR £262.20 deposit and 24 monthly payments of £49. APR 0% Total price £1199 + VAT = £1438.20 inc. delivery and VAT.

TIME

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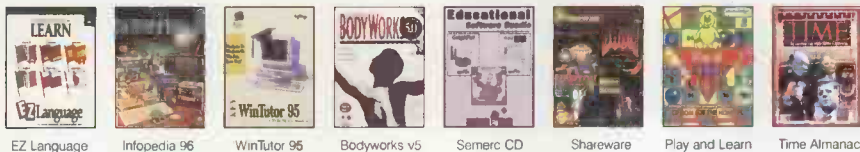
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31st December**

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Software Bundle**

Pack shots shown for illustration only. Software is pre-loaded or supplied on CDs

Lotus Business Software:

- Lotus Windows 95 Software Suite -
- Lotus Word Pro 96 for Windows 95 word processing package
- Lotus Approach 96 for Windows 95 database system
- Lotus 1-2-3 v5 spreadsheet
- Lotus Organizer v2
- Lotus SmartPics graphics

General Business / Home Office Software

- GSP Pressworks desktop publishing pack
- GSP Designworks art and graphics pack
- Pacioli 2000 Business Accounts
- GSP Money personal finance package
- TurboCAD for Windows
- Organize Your Way
- Picture This! graphics pack
- Masterclips SE clipart
- GSP Homewise home and personal utilities

Educational Software

- Fun School 4, Fun School Maths, Fun School Spelling, Fun School Paint and Create
- Flying Fingers typing tutor
- EZ Language French, German and Spanish

Multimedia CD Software

- EZ Language multimedia CD
- Infopedia UK 1996 encyclopaedias and reference books
- WinTutor Windows 95 multimedia tutorial
- BodyWorks v5 educational / medical multimedia CD
- Semerc educational national curriculum school suite CD including GraphPlot graphics pack, Sheetwise spreadsheet, Treasure Chest clipart
- Shareware CD pack including Doom and many other games
- Play and Learn educational CD
- Time Almanac CD



Multimedia Time Machine 97-4
P166+

IBM/Cyrix/ST 6x86 P166+ processor, Omega desktop with 32Mb EDO RAM, 256k burst mode cache, 2Gb hard disk, eight speed CD-ROM drive, integrated 64-bit PCI graphics, 33.6 Internal modem, and large 15" .28dp screen



Multimedia Time Machine 97-6
P200

Intel P200 processor, Colossus full tower with 32Mb EDO RAM, 512k burst mode cache, 2Gb hard disk, eight speed CD-ROM drive, graphics card with 4Mb 'SGRAM' video, wavetable 3D sound card, 28.8 external modem, 3.2Gb tape back-up system and large 15" .28dp screen

£59 Per Month

£204.20 deposit and 24 monthly payments of £71 OR £492.20 deposit and 24 monthly payments of £59. APR 0% Total price £1599 +VAT = £1908.20 inc. delivery and VAT. 15" to 17" Upgrade £199 +VAT = £233.83 inc. VAT

£79 Per Month

£282.70 deposit and 24 monthly payments of £102 OR £834.70 deposit and 24 monthly payments of £79. APR 0% Total price £2299 +VAT = £2730.70 inc. delivery and VAT. 15" to 17" Upgrade £199 +VAT = £233.83 inc. VAT

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TM972A

Multimedia PowerStations

The new Multimedia PowerStation models from Time come with high specifications which have been optimised for Windows® 95 and include fast processors, a minimum of 16Mb RAM, large hard disks up to 2.0Gb, fast controllers and plenty of expansion potential.

All are fully multimedia ready with fitted quad speed or eight speed CD-ROM drives, 16-bit sound, an excellent range of educational CD titles including BodyWorks v5, Infopedia Encyclopaedia with reference books, and

WinTutor 95 Windows tutorial. All systems also include powerful fax/data/Internet modems which are essential for todays business and home needs.

Also included is the best business software from Lotus, GSP and Pacioli which will handle all your requirements for word processing, filing, number crunching, organizing, graphics, accounts and desktop publishing. At these special introductory prices, with the finance option from under £55 per month these systems are simply unbeatable.

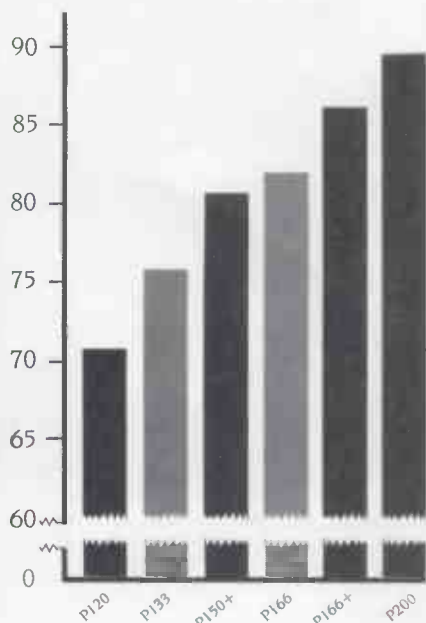
16Mb RAM On All Systems

32Mb on models
E and G

APPROVED for comparison with other computer systems specified in the advertisement for use subject to the conditions set out in them.

Relative Performance

Relative processor performance based on Ziff Davis Winstone 96™ as certified by MDR labs.



Specification

- Intel Pentium P120, IBM/Cyrix/ST 6x86 P150+, P166+ or Intel P200 processor
- 16Mb or 32Mb RAM expandable to 128Mb
- 1Gb or 2.0Gb Fast enhanced IDE hard disks
- 1.44Mb floppy drive
- Enhanced parallel, PS/2 mouse and two high speed serial ports
- Cases: Model A, C and E - Omega desktop case with 7 bays; Model B - Colossus midi tower case with 7 drive bays, Model G - Colossus full tower case with 9 drive bays
- 64-bit Graphics (Integrated graphics use 1Mb of system RAM; switchable to use 2Mb RAM on 16Mb systems to give more colours and higher resolutions). 4Mb 'SGRAM' on model G
- 14", 15" or 17" SVGA low radiation colour screen
- PC keyboard and Microsoft® compatible mouse
- Microsoft Windows 95 with manuals and CD
- 12 Month warranty extendable to five years
- 14.4 BABT fax / data / Internet modem on model A. 28.8 or 33.6 modem on all other models (limited offer)

Multimedia Hardware

- Quad or eight speed IDE CD-ROM drive
- Integrated 16-bit high quality sound. 3D wavetable sound card on model G
- Twin stereo speaker system (4w) and PC joystick

Software Bundle**

Included with all systems. Software is pre-loaded with on-line documentation. (Limited offer).

Lotus Windows 95 Software Suite

- Lotus Word Pro 96 for Windows 95 word processing package
- Lotus Approach 96 for Windows 95 database system
- Lotus 1-2-3 v5 spread sheet
- Lotus Organizer v2
- Lotus SmartPics graphics
- GSP Pressworks desktop publishing pack
- GSP Designworks art and graphics pack
- Pacioli 2000 Business Accounts
- GSP Homewise home and personal utilities
- GSP Money personal finance package

Multimedia CD Software

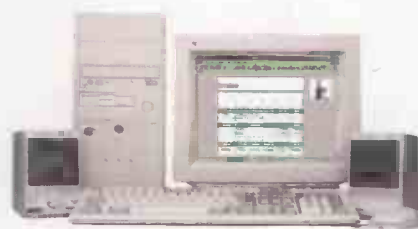
- Infopedia encyclopaedias and reference books
- WinTutor Windows 95 multimedia tutorial
- BodyWorks v5 educational/medical multimedia CD
- Semerc educational national curriculum school suite CD including Graphplot graphics pack, Sheetwise spread sheet, Treasure Chest clipart
- Shareware CD pack including Doom and many other games



Multimedia PowerStation A
P120

Omega desktop with Intel Pentium P120 processor, 16Mb RAM, 256k burst mode cache, 1Gb hard disk, quad speed CD-ROM drive, integrated 64-bit graphics, 14.4 BABT fax/data/Internet modem and 14" .28dp screen

£1056^{.33} inc. VAT
£899 +VAT



Multimedia PowerStation B
P120

Colossus midi tower with Intel Pentium P120 processor, 16Mb RAM, 256k burst mode cache, 1Gb hard disk, eight speed CD-ROM drive, internal 28.8 fax/data/Internet modem, integrated 64-bit PCI graphics and 14" .28dp screen

£1115^{.08} inc. VAT
£949 +VAT

TIME

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All Offers End
31st December

Time
Power-
Station
Offers



Infopedia 96



WinTutor 95



Bodyworks v5



Semerc CD



Shareware

Finance from under £54.¹⁵ per month

*Finance Example Cash Purchase: £999 +VAT = £1203.20 inc. delivery & VAT. Credit Purchase: 10% (£120.32) deposit and 24 equal monthly payments of 54.15. Total Price 1419.92 inc. delivery & VAT. 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.

***APR
19.8%**



**Multimedia PowerStation C1
P150+**

Omega desktop with IBM/Cyrix/ST 6x86 P150+ processor, 16Mb RAM, 256k burst mode cache, 1Gb hard disk, quad speed CD-ROM drive, integrated 64-bit PCI graphics, 28.8 internal fax / data / Internet modem and 15" .28dp screen

£1133.⁸⁸ inc. VAT
£965 +VAT

Model C with eight speed CD £1 173.83 (£999 +VAT)



**Multimedia PowerStation E
P166+**

Omega desktop with IBM/Cyrix/ST 6x86 P166+ processor, 32Mb EDO RAM, 256k burst mode cache, 2Gb hard disk, eight speed CD-ROM drive, integrated 64-bit PCI graphics, 33.6 internal fax / data / Internet modem and 15" .28dp screen

£1397.⁰⁸ inc. VAT
£1189 +VAT



**Multimedia PowerStation G
P200**

Colossus full tower with Intel Pentium P200 processor 32Mb EDO RAM, Intel Triton 2 chipset, 512k burst mode cache, 2Gb hard disk, eight speed CD-ROM drive, 4Mb 'SGRAM' graphics, 28.8 external modem, 3.2Gb tape back-up system and 15" .28dp screen

£2113.⁸³ inc. VAT
£1799 +VAT

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- 32-bit PCI Video Card with 2Mb Video RAM
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- Universal AC Charger & Auto-Sensing Mains Adapter
- Carry Case
- Advanced Power Management
- 12 Months Return To Base Warranty

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and Vat is £1661.45

£1399

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and Vat is £1778.95

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ACTIVE TFT 12.1"

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and Vat is £2131.45

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this notebook uses
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pentium**
PROCESSOR



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- PCI Bus system with 256k level-2 cache
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- 3.5" 1.44Mb floppy drive swappable with 6 speed CDROM
- Built-in Touchpad with 2 buttons
- Rechargeable internal NiMH battery with in-built battery gauge
- PCMCIA Slot: 1 x Type III or 2 x Type II
- 16-bit stereo soundblaster compatible soundcard with built in speakers, microphone and sound software
- LCD Display showing machine status
- Universal AC Charger & Auto-Sensing Mains Adapter
- Advanced Power Management
- 12 Months Return To Base Warranty

DESIGNote 3500 Series

£1499

Total price inc. delivery and Vat is £1778.95

this notebook uses
**INTEL
pentium**
PROCESSOR



Mitac 5024
FROM ONLY
£34.53
PER MONTH
APR 19.9%

This picture shows
the optional
8 speed CDROM

- Intel Pentium P90 processor
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- 1Mb Video RAM
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- 540Mb hard disk
- 3.5" 1.44Mb floppy drive which can be exchanged for CDROM
- Built-in Touchpad with 2 buttons
- Rechargeable internal NiMH battery
- PCMCIA Slot: 1 x Type III or 2 x Type II
- 16-bit stereo soundblaster compatible soundcard with built in speakers, microphone and sound software
- Universal AC Charger & Auto-Sensing Mains Adapter
- Advanced Power Management
- 12 Months Return To Base Warranty
- 8 Speed CD-ROM option odd £195 + vat

Mitac 5024 Series

£899

Total price inc. delivery and Vat is £1073.95



9600 D/SCAN
FROM ONLY
£28.77
PER MONTH
APR 19.9%

this notebook
uses
**intel
inside**
DX4-100

- Intel 486dx4-100 processor
- Large 11.3" Dual Scan Colour Screen
- 1Mb Video RAM
- 4Mb Ram upgradable to 20Mb
- 540Mb hard disk and built-in 3.5" 1.44Mb floppy drive
- Lexmark Trackpoint
- Rechargeable internal removable NiMH battery
- PCMCIA Slot: 1 x Type III or 2 x Type II
- 16-bit stereo soundblaster compatible soundcard with built in speakers, microphone and sound software
- Universal AC Charger & Auto-Sensing Mains Adapter
- Carry Case
- Advanced Power Management
- 12 Months Return To Base Warranty
- 8Mb RAM version £849, 12Mb RAM version £925, 20Mb RAM version only £999

Microsave 9600 Series

£749

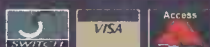
Total price inc. delivery and Vat is £897.70

Finance Example: 9600 is £2749 + vat = £880.08 total cash price (collected). Deposit is 10% followed by 36 equal monthly payments of £28.77 (APR 19.9% - Variable). Written quotation available on request.

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- Fast 64 bit PCI 2Mb Windows Accelerator Graphics Card with MPEG software

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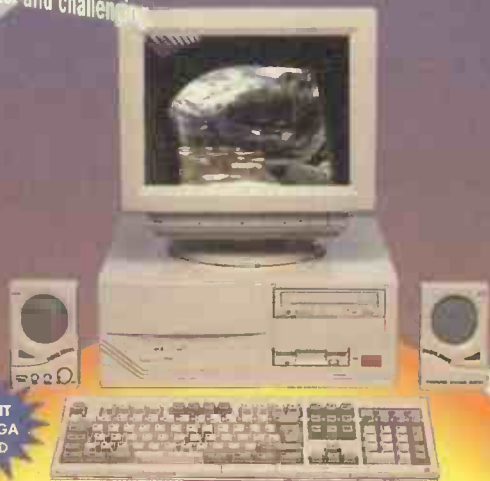


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- 2MB SDRAM 64bit 3D Graphics Card with MPEG software
- Mechwarrior 2 and Wipeout Software ● Joystick
- 1.3GB Fast IDE HDD
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- PCI Enhanced IDE Controller
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- 2MB SDRAM 64bit 3D Graphics Card with MPEG software
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- Windows 95
- PCI Enhanced IDE Controller
- 3.5" 1.44MB FDD
- 5 Spare PCI/ISA slots
- Plug 'n' Play
- Windows 95 Keyboard
- 2 x Fast Serial Ports (16550 UART)
- 6 Storage Device Bays
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- 15" Pin Cushion Control 1024x768 NI Power Management Colour Monitor
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- Fast 2MB EDO RAM 64 bit PCI SVGA Windows Accelerator Card

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|-----------------|---------------|----------------|
| | Ex VAT | Inc VAT |
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 - 256K Pipe Line Burst Cache
 - 1.7GB Fast IDE HDD
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 - 256K Pipe Line Burst Cache
 - 1.7GB Fast IDE HDD
 - Fast 1MB EDO RAM 64bit PCI SVGA Windows Accelerator card with MPEG software
 - 14" SVGA Colour Monitor LR, NI
- | | | |
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| | Ex VAT | Inc VAT |
| P166 16MB | £889 | £1044.57 |
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TINY P200 System

- Intel 200MHz Pentium® Processor
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 - 256K Pipe Line Burst Cache
 - 1.7GB Fast IDE HDD
 - Fast 1MB EDO RAM 64bit PCI SVGA Windows Accelerator card with 1MPEG software
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- 1.7GB Fast HDD
- 14" SVGA MPR 11 Colour Monitor .28 LR, NI & Energy Star Compliant
- Fast 1MB EDO RAM 64 bit PCI SVGA Windows Accelerator Card with MPEG software
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- Windows 95 on CD
- PCI Enhanced IDE Controller
- 3.5" 1.44MB FDD
- 5 Spare PCI/ISA slots

- Multimedia Kit with Eight Speed Multisession CD ROM Drive & 16 bit Stereo Soundcard with Speakers

- Plug'n'Play
- Windows 95 Keyboard
- 2 x Fast Serial Ports
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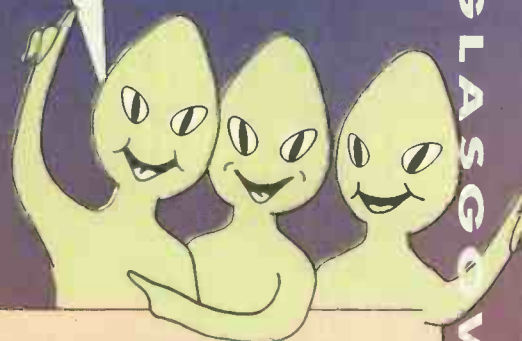
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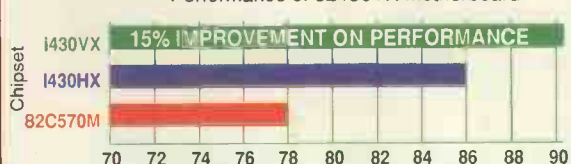
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pages 14 - 19

New Brother & Hewlett Packard Printers

pages 34 - 35

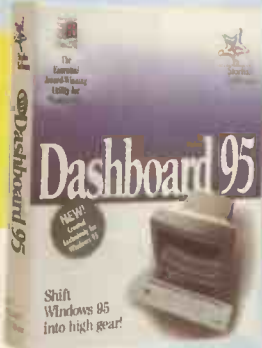
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Cards are not debited until despatch

MEMORY

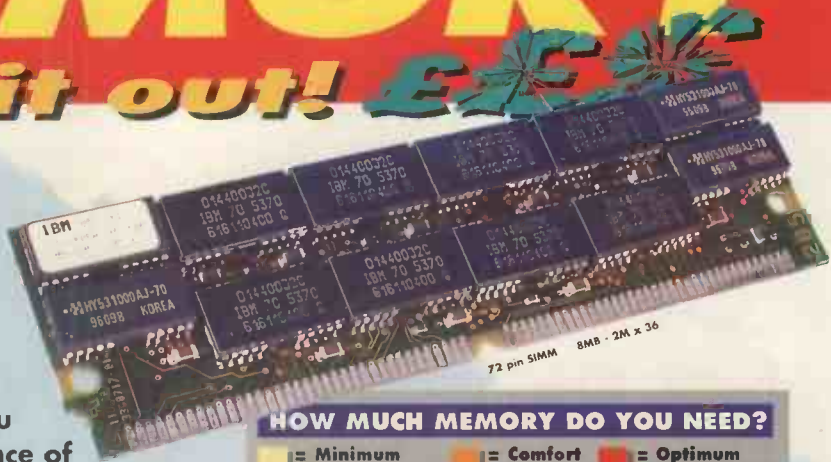
Check it out! **EASY**

Why upgrade?

As operating systems and applications become more complex, there are higher demands on hardware. You can improve the performance of your system simply by adding more memory.

Adding more memory will result in:

- Major improvements in speed
- Less drain on resources
- Applications opening faster
- Ability to open more applications within Windows
- Less disk caching in Windows - this really slows your system down



HOW MUCH MEMORY DO YOU NEED?

	Minimum Requirement	Comfort Level	Optimum Performance
Windows 3.1	4	8	16
Windows 95	8	16	32
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

As Windows 95 uses both multi-threading and multi-tasking even the applications themselves will run much faster. Under Windows 95 memory management has been vastly improved and this utilises all of the installed memory to provide a more efficient system.

"Adding memory to your computer is undoubtedly the easiest, most cost effective way of increasing the performance of your system"

DON'T JUST TAKE OUR WORD FOR IT...

"...Pentium 75MHz with 16MB of RAM outperforms a P166 with 8MB of RAM"
Personal Computer World, July 1996

"...it can be concluded that the best price/performance ratio in PCs today is obtained by optimising the memory..."
Personal Computer World, July 1996

"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

... and here's what some of our customers have said ...

I want to express my appreciation of the efficiency and helpfulness of your technical and customer sales staff - they are a model for other companies to emulate and I will ensure that all my friends and colleagues turn to your company first for their requirements.

H Harris
Cardiff

I write to congratulate your technical support and sales staff in resolving the problem with a laptop CD Ö.. Your prompt response and helpful attitude is a credit to your organisation and a refreshing change when trading mail order.

I look forward to doing business with you again.

R E Standish
Merseyside



OKI NEC



HITACHI GoldStar



BEWARE!

Beware of cheap, low grade, non-factory original modules. These can have two layer boards with long tracks resulting in aerial effects, causing high soft error rates, data corruption and memory protection faults.

Memory Bank only supply grade one, factory original memory as specified and used by major PC manufacturers.

BEWARE!

Beware of economy ASIC parity modules. These inferior modules let systems think they are using parity modules but do not trap and flag soft errors.

Memory Bank only supply modules with genuine parity DRAMs

BEWARE!

Beware of second-hand, pulled memory. Memory Bank supply new, branded and fully certified modules.

BEWARE!

Beware of low voltage, sub standard memory that does not meet the 4.5 to 5.5 volt industry standard. Sub-spec memory runs too slow and can give timing errors that can corrupt data and CMOS configuration information.

BEWARE!

Beware of companies selling modules with 3 and 12 month warranties. Memory Bank provide 10 year guarantees on regular SIMMs and full lifetime guarantees on all Matched Memory Kits.

DELIVERY CHARGES
See page 40



Everyone at Memory Bank passes through the Powermark Academy

The Stationery Office

Public Sector customers can purchase through The Stationery Office by calling 01603 694153.

Non-defective returned goods subject to a restocking fee. Goods are not supplied on a trial basis

BANK

Check it out!

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, data output, refresh, parity and physical characteristics are all matched to give optimum performance for 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
- guaranteed compatibility
- 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 six years.

UPGRADING IS EASY

With most memory upgrades it's just a case of:

- 1 switching off PC
- 2 removing lid
- 3 locating SIMM sockets
- 4 installing SIMMs
- 5 closing lid
- 6 switching back on



Every month Memory Bank supplies 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
0181-956 7000
(100 lines)

Memory

RAM Doublers Pondered With Professor Paul



Dear Professor Paul, There are many adverts for software RAM doublers suggesting a vast increase in speed and performance. These seem a good option and are reasonably priced. Can you help me? Are they really that good? I would appreciate your comments...

Yours, Raymond Ram

Dear Mr Ram, I have researched RAM doublers at length in my laboratory over many months and there is no substitute for the real thing. RAM is the only true upgrade that does not affect system performance in any way. Don't forget that the RAM doubler is a programme itself and requires system resources. This will reduce speed and performance, but a true RAM upgrade will let your computer work with great efficiency. As a recent article in PCW said 'there is no substitute for real RAM'. Professor Paul

Send your thoughts and queries to Professor Paul, c/o Memory Bank, The Powermark Centre, The Waterfront, Elstree Road, Elstree, Hertfordshire 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

GRADE ONE REGULAR SIMMS & DIMMS

30 PIN SIMMS

These are mainly used in 386 and 486 systems over 2 years old. They are 3.5" long and have a notch cut out next to pin one. The notch will allow the SIMM to be inserted only one way into the socket. They come in capacities of 256Kb, 1MB, 4MB and 16MB. They have usually 3 or 9 DRAM chips on the circuit boards and are always single sided. These are available in non-parity and parity form.

Processor	Number of 30 pin SIMMS per bank	Type	Capacity	Speed	ex. VAT	inc. VAT
286	Pairs (2)	1M x 32	4MB	70ns	£19	£22.33
386SX	Pairs (2)	1M x 32	4MB	60ns	£20	£23.50
386DX	Quads (4)	1M x 36	4MB	70ns	£31	£36.43
486SX	Quads (4)	1M x 36	4MB	60ns	£32	£37.60
486DX	Quads (4)	2M x 32	8MB	70ns	£38	£44.65
		2M x 32	8MB	60ns	£39	£45.83
		2M x 36	8MB	70ns	£58	£68.15
		2M x 36	8MB	60ns	£59	£69.33
		4M x 32	16MB	70ns	£89	£104.58
		4M x 32	16MB	60ns	£91	£106.93
		4M x 36	16MB	70ns	£95	£111.63
		4M x 36	16MB	60ns	£96	£112.80
		8M x 32	32MB	70ns	£190	£223.25
		8M x 32	32MB	60ns	£181	£212.68
		8M x 36	32MB	70ns	£229	£269.08
		8M x 36	32MB	60ns	£191	£224.43
		16M x 32	64MB	60ns	£860	£1010.50

GOLD EDGED SIMMS

*Specified by many PC manufacturers - longer

Processor	Number of 30 pin SIMMS per bank	Type	Capacity	Speed	ex. VAT	inc. VAT
MTBF						
1M x 9	1MB	70ns	£31	£36.43		
1M x 9	1MB	60ns	£25	£29.38		

DIMMS

72 PIN DIMMS

1M x 32	5V	4MB	70ns	£69	£81.08
2M x 32	5V	8MB	70ns	£99	£116.33
4M x 32	5V	16MB	70ns	£399	£468.83

168 PIN DIMMS

1M x 64	8MB	60/70ns	£79	£92.83
2M x 64	16MB	60/70ns	£129	£151.58
4M x 64	32MB	60/70ns	£198	£232.63
8M x 64	64MB	60/70ns	£385	£452.38
1M x 64SDRAM	8MB	66MHz	£89	£104.58
2M x 64SDRAM	16MB	66MHz	£135	£158.63
4M x 64SDRAM	32MB	66MHz	£215	£252.63

72 PIN SIMMS

These are used in newer 486 and most Pentium systems. These are longer than 30 pin SIMMs (4.25") and also have a notch next to pin one, together with another cut-out in the centre of the pins.

Processor	Number of 72 pin SIMMS per bank	Type	Capacity	Speed	ex. VAT	inc. VAT
486SX	Single (1)	1M x 32	4MB	70ns	£19	£22.33
486DX	Single (1)	1M x 32	4MB	60ns	£20	£23.50
Pentium	Pairs (2)	1M x 36	4MB	70ns	£31	£36.43
		1M x 36	4MB	60ns	£32	£37.60
		2M x 32	8MB	70ns	£38	£44.65
		2M x 32	8MB	60ns	£39	£45.83
		2M x 36	8MB	70ns	£58	£68.15
		2M x 36	8MB	60ns	£59	£69.33
		4M x 32	16MB	70ns	£89	£104.58
		4M x 32	16MB	60ns	£91	£106.93
		4M x 36	16MB	70ns	£95	£111.63
		4M x 36	16MB	60ns	£96	£112.80
		8M x 32	32MB	70ns	£190	£223.25
		8M x 32	32MB	60ns	£181	£212.68
		8M x 36	32MB	70ns	£229	£269.08
		8M x 36	32MB	60ns	£191	£224.43
		16M x 32	64MB	60ns	£860	£1010.50

72 PIN EDO SIMMS

1M x 32 EDO	4MB	60ns	£21	£24.68
2M x 32 EDO	8MB	60ns	£39	£45.83
4M x 32 EDO	16MB	60ns	£91	£106.93
8M x 32 EDO	32MB	60ns	£185	£217.38

Synchronous (SD) RAM - Call for details

PRICE INSTABILITY!

Call for latest offers on memory before ordering

COMPONENT MEMORY

PIPELINE BURST CACHE

This is the next generation of cache memory, and only works with a Pentium processor and a Triton or compatible chipset together with EDO main memory. It transfers data to and from the cache synchronously in 16Kb blocks without any processor intervention. It is the fastest cache currently available.

Benefits:

- Installs in seconds
- Performance increase of 15% or more

L2 256K Pipeline Burst Cache Module **£32** £37.60 inc. VAT

512K Pipeline Burst Cache Module **£60** £70.50 inc. VAT

DRAM

Dynamic Random Access Memory, Dual In line Pin DRAM DIPs were usually seen as main memory. They are used to populate certain laser printer boards and to upgrade certain graphics and sound cards. They have typical speeds of 60ns, 70ns, 80ns.

Benefits:

- Laser printers can upload fonts
- Print complex graphics and decrease printing time
- Sound cards can upload samples using wavetable synthesis
- Improve resolution & colours on graphics cards

256K x 1 DIP 70/80ns **£2.10** £2.43 inc. VAT

256K x 16 SOJ 60/70ns **£15** £17.63 inc. VAT

1M x 1 DIP 80ns **£3.90** £4.58 inc. VAT

1M x 1 DIP 70ns **£4.50** £5.29 inc. VAT

SRAM

Static Random Access Memory

Faster than DRAM - typical speeds are 15ns, and 20ns, they are used to upgrade motherboard cache. Motherboards will typically have 9 sockets, 1 of which is for tag - this holds the position of the data. Adding 256Kb to the motherboard is the most common upgrade requiring nine 32Kb x 8 chips.

Benefits:

- Speed up processing and improve efficiency
- Improves caching to hard disk in Windows

32K x 8 15ns SRAM **£4.95** £5.82 inc. VAT

32K x 8 20ns SRAM **£6.79** £7.98 inc. VAT

128K x 8 20ns SRAM **£28** £32.90 inc. VAT

8K x 8 15ns SRAM **£7** £8.23 inc. VAT

VRAM

Video Random Access Memory

VRAM is generally more expensive than Dynamic RAM and typically used on video boards. This can be read from and to simultaneously and hence is faster than DRAM.

Benefits:

- More colours in Windows
- Higher resolution

256K x 8 70ns SOJ **£22** £25.85 inc. VAT

Educational Sales 0181-956 7890
Fax 0181-956 7744

Technical Sales 0181-956 7000
Fax 0181-956 7100

Customer Service
Telephone 0181-956 7700 Fax 0181-956 7477

After Sales Technical Support
Telephone 0181-956 7711 Fax 0181-956 7478

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956 7890



MEMORY

Check it out! **EXTRA**

MATCHED MEMORY UPGRADES

Matched memory upgrades for ACER

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
ACERNOTE 750, 750C	£88	£103.40			£219	£257.33		
ACERNOTE 730, 760, 780CXX	£60	£70.50	£115	£135.13				
ACERNOTE 760i, 760i, 763, 782, 784	£60	£70.50	£115	£135.13	£225	£264.38		
ACERNOTE PRO 950, 954			£120	£141.00	£230	£270.25	£449	£527.58
ACERNOTE LIGHT 356, 358, 359, 361			£88	£103.40	£165	£193.88	£323	£379.53
ACERMATE 486 SERIES	£39	£45.83	£72	£84.60	£131	£153.93		
ACERPOWER	£39	£45.83	£72	£84.60	£131	£153.93		
ACERPOWER PENTIUM PC			£72	£84.60	£131	£153.93	£241	£283.18
ALTOS PENTIUM			£72	£84.60	£131	£153.93	£241	£283.18
ACROS +4790, 9130, 9133, 9135, 9137	£39	£45.83	£72	£84.60	£131	£153.93	£241	£283.18
ASPIRE DESKTOP & MINTOWER	£39	£45.83	£72	£84.60	£131	£153.93	£241	£283.18
ENTRA : 3094, 3692, 3894, 3126, 3714	£39	£45.83	£72	£84.60	£131	£153.93	£241	£283.18

MAJOR PRICE INSTABILITY!
Call for latest offers on memory
before ordering

Matched memory upgrades for APPLE

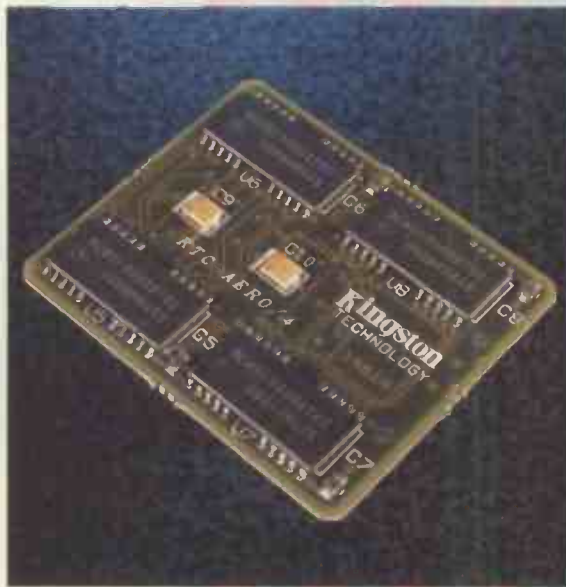
Complete range stocked - call for details

Matched memory upgrades for APRICOT

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
XEN 486SX-25, 486DX2-50,	£39	£45.83	£72	£84.60	£131	£153.93		
LS550E, LS550 200MHz			£99	£116.33	£189	£222.08	£375	£440.63
V5550, V5660			£58	£68.15	£113	£132.78	£240	£282.00
M5530 MULTIMEDIA			£58	£68.15	£113	£132.78	£240	£282.00
FT EXX 1500					£156	£183.30	£288	£338.40
SHOGUN SERVER					£156	£183.30	£288	£338.40

Matched memory upgrades for AST

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
ADVANTAGE 486SX/20 486/25 486/33	£60	£70.50	£120	£141.00				
ADVANTAGE PRO 486 SERIES	£49	£57.58	£79	£92.83	£115	£135.13	£240	£282.00
ADVANTAGE 614P, 812P, 814P 816P	£49	£57.58	£79	£92.83	£115	£135.13	£240	£282.00
ADVANTAGE 6000 & 8000 SERIES	£49	£57.58	£79	£92.83	£115	£135.13	£240	£282.00
ADVANTAGE EXPLORER	£60	£70.50			£229	£269.08		
BRAVO LC 486 SERIES	£49	£57.58	£79	£92.83	£115	£135.13	£240	£282.00
BRAVO MS, MT PENTIUM SERIES			£79	£92.83	£115	£135.13	£240	£282.00
BRAVO MS-L, MS-T 4/66d			£79	£92.83	£115	£135.13	£240	£282.00
BRAVO MT 4/33, 4/66	£49	£57.58	£79	£92.83	£115	£135.13	£240	£282.00
BRAVO NOTEBOOK	£60	£70.50			£229	£269.08		
PREMMIA 4/33 4/50d 4/66d			£85	£99.88	£169	£198.58	£325	£381.88
PREMMIA GX / P90/P100			£85	£99.88	£169	£198.58	£325	£381.88
PREMMIA SE: 4/33 4/66d P/60			£85	£99.88	£169	£198.58	£325	£381.88
MANHATTEN SMP					£169	£198.58	£325	£381.88
POWEREXEC 3/25 SL, SLC, EL, 4/33SL	£72	£84.60	£120	£141.00	£230	£270.25		
POWEREXEC 4/25SL COLOUR	£99	£116.33			£258	£303.15		
ASCENTIA 900N, 910N	£93	£109.28	£138	£162.15	£256	£303.15		
ASCENTIA 950N SERIES			£142	£166.85	£263	£309.03		
ASCENTIA J SERIES			£126	£148.05	£236	£277.30	£455	£534.63
ASCENTIA P50 P50			£138	£162.15	£203	£238.58		



Matched memory upgrades for ALR

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
PROVEISA MULTUS SMP 4/66d	£57	£66.98			£176	£206.80		
PROVEISA VM: 4/33, 4/66d	£57	£66.98			£176	£206.80		
BUSINESS VEISA 386/33 BOARD	£99	£116.33	£136	£159.80	£203	£238.53	£357	£419.48
BUSINESS VEISA ARRAY 486/50 BOARD	£99	£116.33	£175	£205.63	£245	£287.88	£357	£419.48
REVOLUTION MP: 4/100, P/66, P/100	£39	£45.83	£72	£84.60	£131	£153.93		
EVOLUTION IV ST 4/66d			£72	£84.60	£131	£153.93	£241	£283.18
EVOLUTION SDT: 100, 133, 150, 166			£72	£84.60	£131	£153.93	£241	£283.18

Matched memory upgrades for AMSTRAD

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
PC6486	£56	£65.80			£174	£204.45		
PC7386, MEGA PC	£56	£65.80			£174	£204.45		
PC 7486C	£56	£65.80			£174	£204.45		
PC9486 30 PIN VERSION	£56	£65.80			£174	£204.45		
PC9486 72 PIN VERSION	£39	£45.83			£131	£153.93		
PC9555i			£58	£68.15	£113	£132.78		
MULTIMEDIA SERIES	£39	£45.83			£131	£153.93		

Call if your PC is not listed here

Matched memory upgrades for AT&T / NCR

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
SAFARI 3180 3181, GLOBALYST 250 250P	£77	£90.48	£138	£162.15	£258	£303.15	£502	£589.85
3120 NOTEBOOK	£59	£69.33						
GLOBALYST 580, 590, 600			£85	£99.88	£169	£198.58	£325	£381.88

continued...

THE LARGEST DIRECT MEMORY SUPPLIER!

Every month Memory Bank supplies thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the United Kingdom.

14 day money-back guarantee and limited lifetime warranty on all matched memory

Just call us with the make and model of your system and our experts will do the rest!

VISA

MasterCard

SWITCH

Cards are not debited until despatch

DELIVERY CHARGES
See page 40

POWERMARK ACADEMY

Everyone at Memory Bank passes through the Powermark Academy

The Stationery Office

Public Sector customers can purchase through The Stationery Office by calling 01603 694153.

Non-defective returned goods subject to a restocking fee. Goods are not supplied on a trial basis

BANK

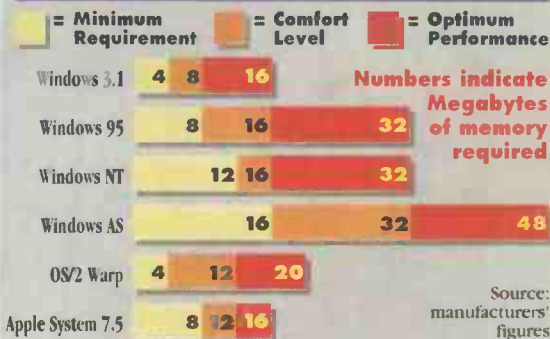
Check it out! *£££*

Technical Sales Order Lines
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MATCHED MEMORY UPGRADES

HOW MUCH MEMORY DO YOU NEED?



Matched memory upgrades for AT&T/NCR continued

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
GLOBALYST 720 730 620 PENTIUMS			£85	£99.88	£169	£198.58	£338	£381.88
GLOBALYST 360 363 TPC, 510 520 530 630	£49	£57.58	£79	£92.83	£115	£135.13	£214	£282.00
MOD 3333, GLOBALYST 550 575: 486s	£49	£57.58	£79	£92.83	£115	£135.13		

Matched memory upgrades for CANON

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
NOTEJET 486 (BM22)	£65	£76.38	£120	£141.00				
NOTEJET 486: 8M100 8M120	£55	£64.63	£115	£135.13				
NOTEJET III, INNOVA BOOK IB1100	£66	£77.55	£126	£148.05	£252	£296.10		
NOTEJET 486 SERIES	£60	£70.50	£115	£135.13	£225	£264.38		
INNOVA IB150C 175C	£55	£64.63		£213	£250.28			
INNOVA BOOK 200LS, 1846, 18100	£66	£77.55	£190	£223.25	£230	£270.25		
INNOVA BOOK: 350CD			£120	£141.00	£225	£264.38		
INNOVA BOOK: 360CD, 475CD/CDT			£120	£141.00	£225	£264.38		

QUALITY!

Being the largest direct supplier means we buy memory direct from world class manufacturers. Memory Bank only supplies factory original memory.

Matched memory upgrades for COMPAQ

	1MB		2MB		4MB		8MB			
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT		
DESKPRO 286e, 386/2020e, 386/25/25e	£30	£35.25			£82	£96.35				
DESKPRO 386S	£19	£22.33			£82	£96.35				
PROLINEA 4/25s, 4/33, 4/50, 4/66			£48	£56.40			£88	£103.40		
DESKPRO 286N 386N 386s/20N					£93	£109.28				
SLT 286S LAPTOP					£99	£116.33				
SLT 386S/20 LAPTOP					£130	£152.75				
LTE 286 LAPTOP					£119	£139.83				
LTE 386S/20 LAPTOP	£30	£35.25								
			4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
ARMADA 1100			£89	£104.58	£165	£193.88				
ARMADA 4100			£93	£109.28	£169	£198.58	£312	£366.60		

continued...

Matched memory upgrades for COMPAQ continued

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
DESKPRO 486/33, 50, 66 RANGE			£150	£176.25			£515	£605.13
SYSTEMPRO XL 486/50, PENTIUM					£156	£183.30	£288	£338.40
DESKPRO 386/33L 486/33L BOARD			£230	£270.25	£350	£411.25	£650	£763.75
DESKPRO 486/25M, 486S/33M BOARD	£159	£186.83	£219	£257.33	£299	£351.33	£599	£703.83
DESKPRO XL: 450, 560, 5100, 5133			£109	£128.08	£175	£205.63	£262	£307.85
DESKPRO XL: 6150 1050/CD5, 6200 2100/PD					£219	£257.33	£405	£475.88
DESKPRO 5/90			£89	£104.58	£155	£182.13	£210	£246.75
DESKPRO MDL: 1200, 2000	£119	£139.83	£179	£210.33	£262	£307.85		
DESKPRO: 2000, 4000, 6000	£119	£139.83	£179	£210.33	£262	£307.85		
PROLIANT 1500: 5/75 5 /100 5/120	£109	£128.08	£175	£205.63	£262	£307.85		
PROLIANT 1500R: 5/75 5 /100 5/120	£109	£128.08	£175	£205.63	£262	£307.85		
PROLINEA 575, 590, 5100	£109	£128.08	£175	£205.63	£239	£280.83		
PROLINEA MX: 575, 590, 5100, 5120	£109	£128.08	£175	£205.63	£239	£280.83		
PROLINEA 4/25S, 4/33, 4/50, 4/66	£39	£45.83	£72	£84.60	£131	£153.93		
PROLINEA 5/75/90MX	£109	£128.08	£175	£205.63	£262	£307.85		
PROLINEA 1500: 5/133 5/166	£109	£128.08	£175	£205.63	£262	£307.85		
PROLINEA MDL: 1200, 2000	£119	£139.83	£179	£210.33	£249	£292.58		
PROSIGNIA 500 SERIES	£109	£128.08	£175	£205.63	£262	£307.85		
PROSIGNIA PC SERVERS 486	£39	£45.83	£72	£84.60	£131	£153.93	£245	£287.88
PROSIGNIA VS: 486DR2/66 486/33	£39	£45.83	£72	£84.60	£131	£153.93	£245	£287.88
LITE LITE 20/25/25C/25E	£110	£129.25	£219	£257.33	£315	£370.13		
LITE ELITE SERIES	£99	£116.33	£143	£168.03	£311	£365.43		
LITE 5000, 5100, 5200, 5280, 5300			£122	£143.35	£195	£229.13	£385	£452.38
CONTURA 3/20, 3/25, 3/25C	£70	£82.25	£225	£264.38				
CONTURA 400 C/CX, 4100, 410CX	£78	£91.65	£138	£162.15	£258	£303.15		
CONTURA 425 C/CX	£55	£64.63	£107	£125.73	£199	£233.83		
CONTURA AERO 4/33C, 4/25	£75	£88.13	£109	£128.08	£199	£233.83		
CONCERTO 4/25, 4/33	£75	£88.13	£115	£135.13	£175	£205.63		
PRESARIO CDS 510, 720, 972, 982, 990, 992	£49	£57.58	£109	£128.08	£175	£205.63	£239	£280.83
PRESARIO 425 433 633 650 660	£39	£45.83	£72	£84.60				
PRESARIO 800 SERIES	£39	£45.83	£72	£84.60				
PRESARIO 7212, 7222, 7232, 7234			£119	£139.83	£179	£210.33	£249	£292.58
PRESARIO 9232, 9234, 9240, 9642			£119	£139.83	£179	£210.33	£249	£292.58

Lifetime warranty on all matched memory

Matched memory upgrades for DEC

	8MB		16MB		32MB		64MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
2000 ALPHA AXP 300			£156	£183.30			£524	£615.70
3000 ALPHA AXP 600, 700, 800, 900					£421	£494.60	£776	£911.80
3000 ALPHA AXP 300: L, LX, X			£125	£146.88			£469	£551.08
MICROVAX 3100 MODEL 30 & 40	£230	£270.25			£372	£437.10		
DEC-SYSTEM 5000, 5900	£174	£204.45	£225	£264.38	£499	£586.33		
DEC-SYSTEM 5100	£230	£270.25			£372	£437.10		
ALPHASTATION 200/400 SERIES	£79	£92.83	£144	£169.20	£262	£307.85	£469	£551.08
ALPHASTATION 250: 4/266; 255, 300			£139	£163.33	£249	£292.58	£479	£562.83
ALPHASERVER 400: 4/166	£79	£92.83	£144	£169.20	£262	£307.85	£469	£551.08
ALPHASERVER 1000: 4/200, 4/233			£257	£301.98	£497	£583.98	£755	£887.13
CELEBRIS 4100, 466, 560, XL590	£79	£92.83	£144	£169.20	£262	£307.85	£467	£548.73

continued...

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MEMORY

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MATCHED MEMORY UPGRADES

Matched memory upgrades for DEC continued

	8MB		16MB		32MB		64MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
CELEBRIS ALPHA XL: 233, 266	£79	£92.83	£144	£169.20	£262	£307.85	£467	£548.73
CELEBRIS GL: 5100, 5120, 5133, 5166			£135	£158.63	£249	£292.58	£477	£560.48
PRIORIS MX, LX	£79	£92.83	£144	£169.20	£262	£307.85	£467	£548.73
PRIORIS ZX SERVER S133AMP			£156	£183.30	£288	£338.40	£524	£615.20
560ST, 566	£79	£92.83	£144	£169.20	£262	£307.85	£467	£548.73
VENTURUS SERIES	£64	£75.20	£129	£151.58	£234	£274.95	£462	£542.85
HI NOTE	£115	£135.13	£225	£264.38				
HI NOTE ULTRA SERIES	£135	£158.63	£252	£296.10				
HI NOTE VP	£126	£148.05	£240	£282.00				
PC325SL	£120	£141.00	£230	£270.25				
PC425 (PREMIUM): SL/e, SL/c/o	£93	£109.28	£258	£303.15				
PC NOTE: 433DX, 466D2, 4100			£130	£152.75	£244	£286.70		
STARION PC SERIES	£64	£75.20	£129	£151.58	£234	£274.95	£462	£542.85

Matched memory upgrades for DELL

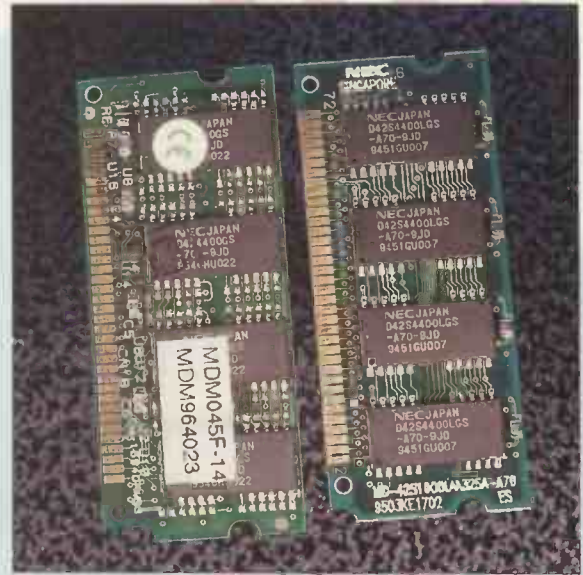
	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
POWERLINE WORKSTATION DE, SE			£95	£111.63	£169	£198.58	£329	£386.58
POWEREDGE XE: 433, 450, 466	£31	£36.43	£65	£76.38	£155	£182.13	£265	£311.38
POWEREDGE EL, SP, XE PENTIUM			£95	£111.63	£169	£198.58	£329	£386.58
LATITUDE NB 433, 433C, 433CX	£65	£76.38			£230	£270.25		
DIMENSION XPS: P90, P100, 113C			£90	£105.75	£159	£186.83	£309	£363.08
DIMENSION XPS 'S' SERIES	£120	£141.00	£199	£233.83	£345	£405.38		
DIMENSION 'V' SERIES	£120	£141.00	£199	£233.83	£345	£405.38		
OMNIPLEX ME 4100, 433, 450, 466,			£90	£105.75	£159	£186.83	£309	£363.08
OMNIPLEX PENTIUM RANGE			£95	£111.63	£169	£198.58	£329	£386.58
OPTIPLEX: 425, 433, 450, 466	£31	£36.43			£155	£182.13		
OPTIPLEX XL/XM/XMT S/75, 90 RANGE			£95	£111.63	£169	£198.58	£329	£386.58
OPTIPLEX GL/GM/GMT/GXL/GXM			£90	£105.75	£159	£186.83	£309	£363.08
OPTIPLEX DXG: 590, 5100, 5120, 5133			£95	£111.63	£169	£198.58	£329	£386.58
LATITUDE LM: P100SD, P1335T			£109	£128.08	£175	£205.63	£349	£410.08
LATITUDE M SERIES	£79	£92.83	£159	£186.83	£279	£327.83		
LATITUDE XP SERIES	£79	£92.83	£159	£186.83	£279	£327.83		
NETPLEX SERIES	£31	£36.43	£65	£76.38	£155	£182.13		
PERFORMANCE L/M/T: 4/33/50/66	£31	£36.43			£155	£182.13		
PERFORMANCE ME: 433, 450, 466			£95	£111.63	£169	£198.58	£329	£386.58
4000X: 486/33, 486/50, 486/66			£95	£111.63	£169	£198.58	£329	£386.58

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PC386 SXM	£56	£65.80	£109	£128.08				
VIS RANGE	£39	£45.83	£72	£84.60	£131	£153.93		
PC433M, 450M, 466M	£56	£65.80			£176	£206.80		
486 V/E SERIES			£78	£91.65	£144	£169.20	£262	£307.85
PC-400 SERIES	£39	£45.83	£72	£84.60	£131	£153.93	£231	£271.43
PC-400E, 433E, 450E SERIES					£136	£159.80	£288	£338.40
PC-500 SERIES	£39	£45.83	£72	£84.60	£131	£153.93	£231	£271.43
ELONEX 560F EISA	£39	£45.83	£72	£84.60	£131	£153.93		
PC 575M/L, PCS120M/L, PCS133M/L			£52	£61.10	£108	£126.90	£240	£282.00



Matched memory upgrades for ESCOM

	8MB		16MB		32MB		64MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
486 DESKTOP RANGE	£54	£63.45	£119	£139.83	£209	£245.58		
486 DX4/100 PCI	£54	£63.45	£119	£139.83	£209	£245.58		
P75/90 PCI MULTIMEDIA	£52	£61.10	£108	£126.90	£240	£282.00	£399	£468.83
P75/90 PCI DESKTOP	£52	£61.10	£108	£126.90	£240	£282.00	£399	£468.83
P100/120/133 PCI TOWER	£52	£61.10	£108	£126.90	£240	£282.00	£399	£468.83
P200 PCI TOWER	£52	£61.10	£108	£126.90	£240	£282.00	£399	£468.83

Lifetime warranty on all matched memory

Matched memory upgrades for GATEWAY

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
PC 45X-33	£26	£30.55			£120	£141.00		
PC4: DX-33V, DX-66V	£26	£30.55			£120	£141.00		
PC4: DX2-66P/V	£26	£30.55	£55	£64.63	£120	£141.00	£199	£233.83
PC4: DX2-66P, D-66, D-100	£26	£30.55	£55	£64.63	£120	£141.00		
PS-120/133 ELITE			£62	£72.85	£114	£133.95	£262	£307.85
PC-PS XL: 75, 90, 120, 133			£62	£72.85	£114	£133.95	£262	£307.85
PC-PS: 60, 66, 100, 120, 166			£62	£72.85	£114	£133.95	£262	£307.85
PC-PS: 90, 100 & EXECUTIVE			£62	£72.85	£114	£133.95	£262	£307.85
PC-PS: 100, 130, 133 MULTIMEDIA			£62	£72.85	£114	£133.95	£262	£307.85
PC-PS: 120, 133, 166, 200 MULTIMEDIA			£120	£141.00	£199	£233.83	£345	£405.38
PC-64: 180, 180XL, 200XL			£62	£72.85	£114	£133.95	£262	£307.85

Matched memory upgrades for HEWLETT PACKARD

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
ENTRIA: 14M, 19M, 14C, 15C, 17C	£21	£24.68	£42	£49.35	£98	£115.15	£196	£230.30
ENVIZEX SERIES	£21	£24.68	£42	£49.35	£98	£115.15	£196	£230.30
MULTIMEDIA PC SERIES	£21	£24.68	£42	£49.35	£98	£115.15	£196	£230.30
PAVILIO SERIES	£21	£24.68	£42	£49.35	£98	£115.15	£196	£230.30
VECTRA 386/25 PC, 486 PC, 486S/20	£35	£41.13	£61	£71.68				

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Matched memory upgrades for HEWLETT PACKARD

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	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
VECTRA VL3 5/75/90/100			£42	£49.35	£82	£96.35	£194	£227.95
VECTRA VE2-5/75 5/100 5/133			£42	£49.35	£82	£96.35	£194	£227.95
VECTRA VL 4 RANGE			£42	£49.35	£82	£96.35	£194	£227.95
VECTRA XM4 5/: 75, 100, 120, 133, 150			£42	£49.35	£82	£96.35	£194	£227.95
VECTRA XU 5/75/90/100VE			£42	£49.35	£98	£115.15	£196	£230.30
VECTRA XU 6/150/180/200					£230	£270.25	£399	£468.83
VECTRA VT 6/150/200					£145	£170.38	£269	£316.08
VECTRA 500 RANGE			£42	£49.35	£82	£96.35	£194	£227.95
NETSERVER SERIES					£131	£153.93	£239	£280.83
OMNI BOOK 530	£72	£84.60	£132	£155.10				
OMNI BOOK 600CT			£132	£155.10	£252	£296.10		
OMNIBOOK 4000 SERIES			£126	£148.05	£225	£264.38		
OMNIBOOK 5000, 5500 SERIES			£138	£162.15	£258	£303.15	£497	£583.98

Call if your PC is not listed here

Matched memory upgrades for HEWLETT PACKARD WORKSTATIONS

	16MB		32MB		64MB		128MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
APOLLO 9000-747i, 745i	£205	£240.88	£329	£386.58			£1250	£1468.75
APOLLO 9000 712: 60, 80i, 100	£205	£240.88	£329	£386.58	£645	£757.88		
9000 SERIE 800 BUSINESS SERVER			£380	£446.50			£1200	£1410.00
9000 SERIES-750, 755, 755/125	£229	£269.08	£329	£386.58	£789	£927.08	£1399	£1643.83
9000 D-CLASS WEB SERVER			£380	£446.50			£1250	£1468.75
3000 SERIES-LX/RX	£205	£240.88			£645	£757.88	£1815	£2132.63

Matched memory upgrades for IBM

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
PS/2 70, Portable 70/75	£38	£44.65	£72	£84.60				
PS/2 90, 95, 95A	£38	£44.65	£72	£84.60	£131	£153.93		
PS/2 95 ARRAY PENTIUM (ECC)			£120	£141.00	£265	£311.38		
VALUEPOINT 6381, 6382	£38	£44.65	£72	£84.60	£131	£153.93	£240	£282.00
VALUEPOINT 6384 RANGE	£38	£44.65	£72	£84.60	£131	£153.93		
PENTIUM VALUEPOINT PERFORMANCE SERIES	£38	£44.65	£72	£84.60	£131	£153.93	£240	£282.00
THINKPAD 710	£66	£77.55	£126	£148.05				
THINKPAD 760-C, CD, L, LD			£190	£223.25	£470	£552.25	£799	£938.83
THINKPAD 350, 350C	£66	£77.55			£246	£289.05		
THINKPAD 355C, 355CS	£76	£89.30	£129	£151.58	£239	£280.83		
THINKPAD 360, 360C, 360CS, 730T	£76	£89.30	£129	£151.58	£239	£280.83		
THINKPAD 500, 510			£105	£123.38	£186	£218.55		
THINKPAD 700, 720			£105	£123.38	£186	£218.55		
THINKPAD 750, 750C, 755C, CDV			£105	£123.38	£186	£218.55	£273	£320.78
PC466DX2, 100DX4					£72	£84.60		
PS/1 - PRO 486	£38	£44.65	£72	£84.60				
PS/1 CONSULTANT, ESSENTIAL, WILLOW	£38	£44.65	£72	£84.60				
PS/2 SERVER 95: 9595 INT/ING/OPT	£69	£81.08	£120	£141.00				
PENTIUM APTIVA			£52	£61.10	£108	£126.90	£240	£282.00
PC 300, 500			£42	£49.35	£84	£98.70	£195	£229.13

continued...

Matched memory upgrades for IBM continued

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PENTIUM 300 SERIES			£52	£61.10	£108	£126.90	£240	£282.00
PC 700 SERIES MDL 730-KAA, MDL 750			£62	£72.85	£114	£133.95	£195	£229.13
PC 700 SERIES MDL 730-KAC, MDL 750			£52	£61.10	£108	£126.90	£240	£282.00
AMBRA ENTERPRISE 486 SERIES	£56	£65.80			£176	£206.80		
RISC SYSTEM 6000: 40P			£119	£139.83			£399	£468.83
XSTATION 160			£119	£139.83			£399	£468.83
PC SERVER 310			£78	£91.65	£144	£169.20	£262	£307.85

Matched memory upgrades for IBM WORKSTATIONS

	16MB		32MB		64MB		128MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
RS/6000 POWER-STATION/SERVER	£678	£796.65	£722	£848.35	£1450	£1703.75	£3050	£3583.75
RISC 6000 HD2 32MB MEMORY BOARD					£1999	£2348.83		
RISC SYSTEM 6000: 39H	£678	£796.65	£722	£848.35	£1450	£1703.75	£3050	£3583.75
RS/6000 POWER-STATION/SERVER					£759	£891.83	£2580	£3031.50

Matched memory upgrades for ICL

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
WIN STATION P75i					£148	£173.90	£229	£269.08
WIN STATION P100, P133, P166, WIN STATION, MULTIMEDIA PENTIUMS					£148	£173.90	£229	£269.08
DRS M75			£150	£176.25	£233	£273.78	£415	£487.63
DRS M95			£150	£176.25	£233	£273.78	£415	£487.63
VALUEPLUS SD RANGE	£90	£105.75	£150	£176.25	£252	£296.10		
VALUEPLUS DL RANGE	£90	£105.75			£252	£296.10		
ZENO AND ERGO PRO 486			£150	£176.25	£252	£296.10	£415	£487.63
ERGO PRO 586			£148	£173.90	£229	£269.08	£400	£470.00

Matched memory upgrades for OLIVETTI

	4MB		8MB		16MB		32MB	
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PCS11, 33			£53	£62.28	£106	£124.55	£156	£183.30
PCS40, 44			£45	£52.88	£89	£104.58		
M300-28			£45	£52.88	£89	£104.58		
MODULO RANGE			£45	£52.88	£89	£104.58	£145	£170.38
SUPREMA M6-600, 700			£89	£104.58	£145	£170.38		
PCI/ISA PENTIUMS			£85	£99.88	£139	£163.33		
ECHOS PENTIUM NOTEBOOK			£89	£104.58	£165	£193.88	£355	£417.13

Matched memory upgrades for OPUS

	4MB		8MB		16MB		32MB	
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PRELUDE VLB 1486: SX/33 DX2/66	£39	£45.83	£72	£84.60	£131	£153.93		
PREMIER RANGE VLB: 1486DX2/66	£39	£45.83	£72	£84.60	£131	£153.93		
PROFESSIONAL PCI 1486DX2	£39	£45.83	£72	£84.60	£131	£153.93	£249	£292.58
PROFESSIONAL PCS-90			£59	£69.33	£115	£135.13	£240	£282.00
PROFESSIONAL POWER WINDOWS			£59	£69.33	£115	£135.13	£240	£282.00

Memory

Aaron Answers EDO



Extended Data Out (EDO) SIMMS are the new generation of 72 pin modules. They are non-parity, fast SIMMS that improve the systems performance. They are enhanced further when working with Pipeline Burst cache. EDO modules work by holding the data active on the output of the chip allowing the next read cycle to begin instead of waiting for the old data to clear.

Burst Extended Data Out SIMMS are split into two parts. One part collects the data and the other submits the data to the bus. By splitting the process into two separate parts increases the efficiency of the BEDO SIMM and so makes the entire process faster.

Send your questions to Aaron's Answers, c/o Memory Bank, The Watermark Centre, The Waterfront, Elstree Road, Elstree, Hertfordshire 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.

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MATCHED MEMORY UPGRADES

Matched memory upgrades for **PACKARD BELL**

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
XL410 SERIES	£57	£66.90	£109	£128.08	£176	£206.80		
LEGEND 435	£39	£45.83	£72	£84.60	£131	£153.93		
LEGEND 605, 900	£39	£45.83	£72	£84.60	£131	£153.93		
486 VLB, EXECUTIVE, ELITE RANGE	£39	£45.83	£72	£84.60	£131	£153.93	£240	£282.00
FORCE RANGE	£57	£66.90			£176	£206.80		
MULTIMEDIA 486/586 RANGE		£52	£61.10	£108	£126.90	£235	£276.13	

Matched memory upgrades for **PANASONIC**

	2MB		4MB		8MB		16MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
CF-380 NOTEBOOK	£45	£52.88	£75	£88.13				
CF-580 & CF-V21P 486SX25 (5 VOLTS)			£85	£99.88			£220	£258.50
CF-V21P 486: SX-50, DX2-40 (3 VOLTS)			£95	£111.63	£179	£210.33	£339	£398.33
CF-V41 RANGE			£85	£99.88	£155	£182.13	£259	£304.33
CF-370 NOTEBOOK	£86	£101.05						

Matched memory upgrades for **SILICON GRAPHICS WORKSTATIONS**

	32MB		64MB		128MB		256MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
PERSONAL IRIS: 4D/30, 4D/35	£480	£564.00						
IRIS INDIGO2	£350	£411.25	£590	£693.25	£1150	£1351.25	£2569	£3018.58
CHALLENGE M/S	£350	£411.25	£590	£693.25	£1150	£1351.25		
CHALLENGE L/XL			£890	£1045.25			£590	£702.25
POWER CHALLENGE L/XL/DM			£890	£1045.25			£3590	£4218.25
IRIS CRIMSON			£1299	£1526.33				

Lifetime warranty on all matched memory

Matched memory upgrades for **SUN WORKSTATIONS**

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
MOD: 3/60, 3/80, 4/110	£59	£69.33			£199	£233.83		
SPARC 1 4/60, 4/65, 4/75	£59	£69.33			£199	£233.83		
SPARC ELC			£99	£116.33			£279	£327.83
SPARC STATION LX	£49	£57.58			£189	£222.08		
SPARC SERVER: 4/330, 4/370, 4/390			£115	£135.13			£395	£464.13
SPARC SERVER: 4, 5			£129	£151.58			£410	£481.25
	32MB		64MB		128MB		256MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
SPARC SERVER 20	£859	£539.33	£849	£997.58				
SPARC SERVER STATION ENGINE 10			£839	£985.83				
SPARC CENTER 2000	£479	£562.83	£959	£1126.83	£1669	£1961.08	£3340	£3924.50
SPARC CENTER 1000	£479	£562.83	£959	£1126.83	£1669	£1961.08	£3340	£3924.50
ULTRA 1	£445	£522.88	£869	£1021.08	£1610	£1891.75		
ULTRASPARC 2 MDL 2200	£445	£522.88	£869	£1021.08	£1610	£1891.75		



Matched memory upgrades for **TEXAS INSTRUMENTS**

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
TRAVELMATE 4000/4000E	£185	£217.38			£770	£904.75		
TRAVELMATE 4000M	£179	£210.33			£686	£806.05		
TRAVELMATE 5000, 5010, 5020, 5100			£135	£158.63	£255	£299.43		
TRAVELMATE 5300			£145	£170.38	£268	£314.90		
EXTENSA 450, 455	£60	£70.50	£115	£135.13	£225	£264.38		
EXTENSA 510, 515			£115	£135.13	£213	£250.28	£325	£381.88
EXTENSA 550, 560, 570			£119	£139.83	£245	£287.88	£442	£519.35

Matched memory upgrades for **TOSHIBA**

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
T1000/E/XE/LE, T1800, T1850C, T2000SX, T2200SX	£77	£90.48	£126	£148.05				
T2100, T2100CS	£65	£76.38	£119	£139.83	£226	£265.55		
T2100CS, T2130CS, CT	£65	£76.38	£119	£139.83	£226	£265.55		
T2400CS, T2450, T2400CT, T2150 CDT, T3600	£75	£88.13	£159	£186.83	£250	£293.75		
T3200SX/C	£70	£82.25						
T3400, T3400CT	£65	£76.38	£129	£151.58	£249	£292.58		
T4400, T6400 SX/C, DX/C	£95	£111.63	£170	£199.75	£240	£282.00	£442	£519.35
T1900, T1910, T1950CT, T1960, T3400CT	£80	£94.00	£140	£164.50	£258	£303.15		
T4500, T4600, T4700CT, T4800CT	£80	£94.00	£140	£164.50	£258	£303.15		
T4850CT, T4900CT	£80	£94.00	£140	£164.50	£258	£303.15	£509	£598.08
PROTEGE 610CT, T2130CS	£146	£171.55	£269	£316.08	£509	£598.08		
PROTEGE 620, 650	£145	£170.38	£271	£318.43				
DYNAPAD T200, T200CS	£80	£94.00	£140	£164.50	£258	£303.15		
SATELLITE PRO 400 SERIES	£173	£203.28	£325	£381.88	£506	£594.55		
SATELLITE 100CS, 105CS	£173	£203.28	£325	£381.88	£506	£594.55		
TECRA 500: CDT, CS	£145	£170.38	£271	£318.43	£525	£616.88		
TECRA 700: CS, CT	£150	£176.25	£269	£316.08	£510	£599.25		
TECRA: 710 CDT, T200CT	£146	£171.55	£269	£316.08	£509	£598.08		

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See page 40



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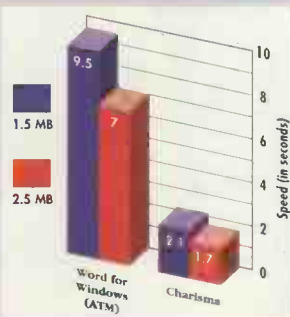


MATCHED MEMORY UPGRADES

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	4MB
Soft fonts	1MB	8 - 10 PostScript fonts	4MB
PostScript cartridge	1.5MB	Network printer sharing	4MB

Matched memory upgrades for LASER PRINTERS

	1MB		2MB		4MB		8MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
APPLE LASERWRITER SELECT 300/310					£60	£70.50		
APPLE LASERWRITER PRO 810					£99	£116.33	£155	£182.13
APPLE LASERWRITER PRO 600/630					£60	£70.50		
BROTHER HL-660, 1260	£57	£66.98						
BROTHER HL8/E/V HL10			£65	£76.38	£135	£158.63		
CANON NOTEJET 486, BN22/BJC-880					£65	£76.38	£120	£141.00
CANON LBP4, 4+, LITE, SX	£75	£88.13	£107	£125.73				
CANON LBP8II			£85	£99.88	£150	£176.25		
CANON LBP8IV			£63	£74.03	£65	£76.38		
CANON LBP 860, 1260					£60	£70.50		
COMPAQ PAGERMARK 15/20					£90	£105.75	£160	£188.00
EPSON EPL4000/4100/4300/8100	£63	£74.03	£95	£111.63				
EPSON EPL7000	£73	£85.78	£108	£126.90				
EPSON ACTION LASER 1600/1100					£60	£70.50	£115	£135.13
FUJITSU VM4, VM8	£60	£70.50			£120	£141.00		
IBM 4029	£50	£58.75	£70	£82.25	£100	£117.50		
IBM 4039 & 4079					£65	£76.38	£120	£141.00
LEXMARK OPTRA LX/L/R/RX	£50	£58.75	£70	£82.25	£100	£117.50		
LEXMARK WIIWRITER 200/400/600	£50	£58.75	£70	£82.25	£100	£117.50		
KYOCERA F800	£76	£89.30	£110	£129.25	£175	£205.63		
KYOCERA F5400, 410, 1500, 1550	£75	£88.13	£150	£176.25	£268	£314.90		
NEC SILENT WRITER 2					£120	£141.00		
OKI LASER 400	£59	£69.33	£97	£113.98				
OKI 800/820					£120	£141.00		
OKI LASER 830/840/850					£76	£89.30		
PANASONIC 4420, 4450i	£67	£78.73	£100	£117.50	£167	£196.23		
PANASONIC 5410, 4440	£50	£58.75	£70	£82.25	£100	£117.50		
TEXAS MICROLASER POWER					£120	£141.00		

MAJOR PRICE INSTABILITY!
 Call for latest offers on memory before ordering

Matched memory upgrades for VIGLEN

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
VIGLEN III 33	£57	£66.98	£112	£131.60	£176	£206.80		
VIG 45X25, 40X33/50, 40X2-50/66	£39	£45.83	£78	£91.65	£131	£153.93		
CONTENDER RANGE	£39	£45.83	£72	£84.60	£131	£153.93		
GENIE 286/386SX	£37	£66.98	£112	£131.60	£176	£206.80		
GENIE 486VIB RANGE			£78	£91.65	£131	£153.93	£245	£287.88
HOME 75, 100 Series			£62	£72.85	£114	£133.95	£262	£307.85
PERFORMANCE 120i			£62	£72.85	£114	£133.95	£262	£307.85
POWER 133			£62	£72.85	£114	£133.95	£262	£307.85
ULTIMATE, AWESOME Series			£62	£72.85	£114	£133.95	£262	£307.85
PENTIUM 75/90/100/133MHz			£62	£72.85	£114	£133.95	£262	£307.85

Matched memory upgrades for ZENITH

	4MB		8MB		16MB		32MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
Z-300/400 SERIES: Z420/425/433/450	£49	£57.58			£149	£175.08		
Z-SERVER EX: 433DE, 450DE, P66E			£79	£92.83	£149	£175.08	£285	£334.88
Z-SERVER IE: 433DE, 466E, P40E			£75	£88.13	£145	£170.38	£285	£334.88
Z-SPORT 420/425	£45	£52.88						
Z-STATION 510/33/50/66/100 100 SERIES			£75	£88.13	£145	£170.38	£285	£334.88
Z-NOTEFILEX 486DX 33/50/66/100	£87	£102.23	£132	£155.10	£252	£296.10		
Z-NOTE MX: 75 & 100 MHz	£85	£99.88	£155	£182.13	£270	£317.25		
Z-NOTE GT			£130	£152.75	£265	£311.30	£489	£574.58
Z-STATION 500			£99	£116.33	£210	£246.75	£410	£481.75
Z-SERVER WG SERIES			£140	£164.50	£250	£293.75	£445	£522.68

QUALITY!

Being the largest direct supplier means we buy memory direct from world class manufacturers. Memory Bank only supplies factory original memory.

Call if your PC is not listed here

Matched memory upgrades for HP PRINTERS

	1MB		2MB		4MB		8MB	
	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT	£ EX VAT	£ INC VAT
LASERJET II, IID	£60	£70.50	£125	£146.88	£175	£205.63		
LASERJET IIP, III, IID, IIIP			£99	£116.33	£175	£205.63		
LASERJET SP, SIMP, 6P, 6MP					£65	£76.38	£117	£137.48
LASERJET 5M, 5M					£65	£76.38	£117	£137.48
LASERJET 5Si, 5Siim					£65	£76.38	£117	£137.48
HP 5 COLOUR					£65	£76.38	£117	£137.48
HP COPYJET					£65	£76.38	£117	£137.48
LASERJET IIIi, 4, 4M					£65	£76.38		
LASERJET 4i, 4MV, 4MP, 4P, 4V					£65	£76.38		
LASERJET 4MP, 4P			£110	£129.25	£65	£76.38	£117	£137.48
DESIGNJET 1200 C/PS/1200, 1600C					£67	£78.73	£119	£139.83
DESIGNJET 600/650					£67	£78.73	£119	£139.83
PAINTJET XL300					£65	£76.38	£117	£137.48
HP COLOUR LASERJET					£65	£76.38	£117	£137.48

Memory

Dr Jane Preaches Parity



Parity SIMMs have memory checking capabilities - this double checks and verifies the data in the RAM. Older machines usually demand parity modules but most Pentium systems accept non-parity modules. 30 pin parity modules are known as 'by 9', for example 1M x 9. These are 8 bit modules with an extra bit for parity. Non-parity modules are known as 'by 8', for example 1M x 8.

72 pin parity modules are known as 'by 36', for example 2M x 36 (8MB). These are 32 bit modules with 4 bits for parity. Non-parity modules are known as 'by 32', for example 2M x 32 (8MB).

Your system manual will state whether or not your motherboard takes parity modules. To be sure it is always best to call the Memory Bank technical specialists (0181 956 7100) and they will provide the correct upgrade path for your system.

Send your thoughts and queries to Dr Jane, c/o Memory Bank, The Powermark Centre, The Waterfront, Elstree Road, Elstree, Hertfordshire 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!

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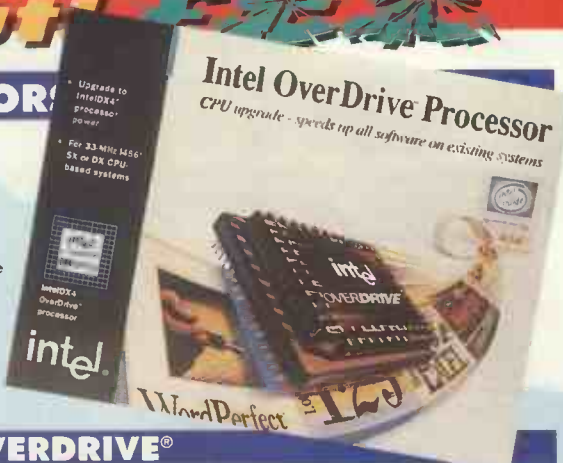
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WordPerfect	48	47	37



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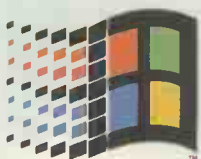
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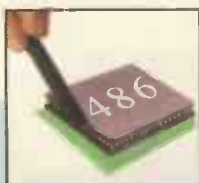
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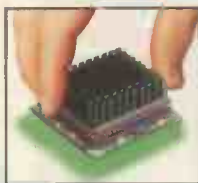
A simple 10 minute installation of an Evergreen 586 enables you to migrate from a 486SX, 486DX or 486DX2 up to a 133MHz 586 system



MICROSOFT
WINDOWS
COMPATIBLE



Locate 486 CPU or OverDrive socket and carefully remove the 486 processor if necessary.



Align pin 1 on the upgrade module with the CPU or OverDrive socket and place the upgrade into the socket.



Firmly press the upgrade (with fingers on heatsink) down into the socket, and you're finished.

PC WEEK Labs, Feb. 12, '96

"Installing the Evergreen upgrade was a simple task taking less than ten minutes to complete."



Winstone 96 Test Results: Windows 95

HP Vectra 486DX/33 MHz	18.7
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- High capacity 3.2GB (compressed) to insure total data protection for most of today's PCs
- Industry leading reliability and support for complete confidence - Window 95 compatible
- Easy to use, full featured software for powerful and convenient operation - simple connection
- Compatible with Travan™ TR-3, QIC3020 and QIC-WIDE formats
- 2 year, 24 hour express exchange warranty

Cartridge
DC30200 **£29** (£34.08)



HP Colorado T4i
£289

HPS14000 £339.58 inc. VAT

HP Colorado T4i

NEW NETWORK READY!
Affordable data protection for your PC or Server

- 4GB native capacity
- Network ready backup
- Includes Novell NetWare and Windows NT drivers
- 2 year, 24 hour express exchange warranty

HP Colorado T1000e

- Travan technology
- 800MB capacity with compression
- Up to 9.5MB/min back up speed

T1000e Internal
CMST1000 **£85** (£99.88)

T1000e External
CMST100E **£109** (£128.08)

Cartridge
DC600T **£19** (£22.33)

HP Surestore CD Writer 6020 range

The simplest way to make CDs
The ideal solution for
multimedia communications
The most cost effective choice
for archiving

- Dual speed write, 6 speed read
- Readable by any CD ROM drive with Windows and Windows 95
- Easy CD Pra and Alchemy software
- 1 year, 24 hour express exchange warranty
- 1 blank CD ROM disk

HP SureStore 6020i- internal
£489 (£574.57)

HP SureStore 6020es - external SCSI
£589 (£692.07)

HP SureStore 6020ep - external parallel port
£589 (£692.07)

Blank CD ROM
CDPHB **£10** (£11.75)

EXABYTE STORAGE

Store up to **14GB** quickly and cost effectively



Full
kit
solution!

EXABYTE®

Exabyte-8700 8mm
Tape Drive System
Everything you need for
economical and effective
data management

£949

EXB8700-£ £1115.08 inc. VAT

Now PC LANs and Macintosh workstations can attain levels of reliability, performance and compatibility never before available - on your office desk!

- **14GB (compressed)**
- 60MB transfer rate per minute
- Small footprint size
- SCSI interface and cabling included
- Exabyte 2 year warranty and world wide support
- Intelligent hardware and data compression

With every Exabyte solution the user can choose from any one of four professional backup packages giving the user a truly flexible solution. Choose:

Arcada Backup Execc for NetWare or NT (single server)

Dantz Retrospect for Macintosh (workstation)

Cheyenne ARCserve for NetWare or NT (single server)

Palindrome Backup Director for NetWare or NT (single server)

Bare drive
£699 £821.33 inc. VAT

Tape
EXB54M **£15** £17.63 inc. VAT

Cleaning cartridge
EXBRMM/C **£20** £23.50 inc. VAT

14



DELIVERY
CHARGES
See
page 40



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XYRATEX STORAGE

x y r a t e x

Xyratex MaxIT

MaxIT is unlike any other drive. It is a portable storage unit that can easily deal with endless amounts of data with all the speed and flexibility you need. MaxIT reads and writes to removable 540MB cartridges and also supports Syquest 270MB.

Work the way you want to! MaxIT offers you many opportunities for improved performance

Xyratex MaxIT
External SCSI (DOS & OS2)

£295

XYRA/MAXIT/SCSI £346.63 inc. VAT

SPEED

- Run applications straight from disk
- Instantly access large data files
- Streamline operations and speed up the way you work
- Fast back up - 6.45MB/sec

CAPACITY

- Frees your hard drive from having to store large files
- Handle large multimedia presentations
- Work with digital images
- Store multiple hard drives on one disk



Double the capacity of Xyratex Maxit products with Novatech software
£59 £69.33 inc. VAT
Call for details

- Simplify data management: one disk per client, subject or file
- Ideal for backing up important hard disk data

LOW COST

- Cost of around 10 pence per MB

PORTABILITY

- Exchange files with clients and colleagues
- Small footprint - ideal for those with limited space on their desktops - yet portable
- Safe portable data storage

COMPATIBILITY

- Compatible with 270MB media
- 540MB MCD media
- SCSI or parallel port interface
- Connection to PC or Mac

MaxIT Parallel Port

XYRA/MAXIT-P **£345** £405.38

MaxIT Mac Version

XYRA/MAXIT-MAC **£299** £351.33

MaxIT Internal (DOS & Windows)

XYRA/MAXIT/SCSI/I **£245** £287.88

MaxIT Cartridge

Single XYRA/C **£45** £52.88

3 Pack XYRA/C/6 **£119** £139.83

Every MaxIT includes

- Interface and power cables
- Removable stand
- Software drivers
- Power supply
- Cartridge

Storage & Backup



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Powermark Plug n Play PCI Fast SCSI II Card

- Designed for Windows 95
- High speed 32-bit PCI bus master DMA transfers up to 133MB/sec in burst mode
- Co-exists with SCSI, IDE or EIDE adapters
- User friendly utility for quick and easy adapter installation and system configuration
- AMD Chipset
- Multitasking & Multi-threaded support
- Disconnect/reconnect tech-nique prevents performance being downgraded during multitasking operations
- Drivers for all major platforms

£99

MBSCSI £116.33

Wide, Ultra and Ultra-Wide versions also available

IOMEGA STORAGE

iomega®



IOMEGA DITTO 800

Easy, dependable, full featured backup for you data

Iomega Ditto 800 Internal

IODITTO/I **£75** £88.13

Iomega Ditto 800 External

IODITTOE-800/E **£94** £110.45

Iomega Ditto 3.2GB Internal

IOTRAY3/I **£175** £205.63

Iomega Ditto 3.2 GB Parallel

IOTRAY3/E **£215** £252.63

3.2GB cartridge

DC3020 **£25** £29.38



- New, advanced Travan technology
- 800Mb capacity (with compression)
- Direct drive - no belt

IOMEGA JAZ DRIVE

Easy to use mass storage solution

- Provides 1GB of disk space on each compact cartridge
- Store 8 hours of CD-quality sound
- Store 150 colour photographs
- Portable - goes where you go

Iomega Jaz Drive
1GB External SCSI

IOJAZ/SCSI **£329** £386.58

1GB cartridge

IOJAZ/C **£69** £81.08

Iomega Zip Drive

£109*

£128.08 inc. VAT

Parallel - IOZIP/PT SCSI - IOZIP/SCSI Internal - IOZIP/SCSI-I

IOMEGA ZIP DRIVE

Affordable personal storage solution to organise, move and backup your data... anywhere

- Increase your storage capacity inexpensively with 100MB removable disks
- High capacity mobile storage - use it at the office, at home, on the road, anywhere
- Excellent and easy for transferring information between two computers

6 pack of cartridges

IOZIP/C/6 **£55** £64.63

Carry case

IOZIP/CASE **£24** £28.20

Universal power adapter

IOZ/POWER **£29** £34.08

* Price for Credit Card, Switch and cash purchases. Call for credit price.



Iomega Jaz Drive
1GB Internal SCSI

£275

IOJAZ/SCSI-I £323.13 inc. VAT

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UPS APC22	£981.13 inc. VAT

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420VA	£149
UPS APC84/PRO	£175.08 inc. VAT
1400VA	£374
UPS APC14/PRO	£439.45 inc. VAT



**BACK UP PRO
WITH PLUG & PLAY
POWERCHUTE**

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UPS APC82/PRO+	£123.38 inc. VAT
420VA	£159
UPS APC84/PRO+	£180.63 inc. VAT
650VA	£189
UPS APC86/PRO+	£222.08 inc. VAT

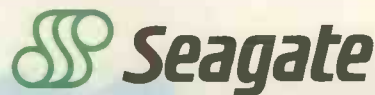
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SOFTWARE**

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UPS-PCHUTE-UNIX	£81.08 inc. VAT
for Windows NT	£49
UPS-PCHUTE-WT	£57.58 inc. VAT
for OS/2	£59
UPS-PCHUTE-OS	£69.33 inc. VAT

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SEAGATE STORAGE



**Seagate TapeStor
3200 - IDE Internal**
£149
SEATRA/3200 £175.08 inc. VAT

Higher capacity
Up to 3.2GB of storage capacity with software compression (1.6GB os standard)

Higher performance
UP to 19MB per minute and capable of supporting 2MB/sec data transfer rate floppy controllers
Transfer rates optimised with unique FastSense™ feature

Higher level of support
SoftSelect enables the minicartridge drive to be used in single or multiple floppy disc drives systems without requiring any additional components. All Seagate data storage products come with a 2 year warranty

Higher level of flexibility
Choose from internal/external options with IDE or SCSI interfaces

Seagate External DAT Drive
2GB - 4GB **£549**
4GB - 8GB **£669**
SEADAT24 £645.05 inc. VAT
SEADAT4-8 £786.08 inc. VAT
2GB Tape £8 (£9.40) 4GB Tape £19 (£22.33)

Higher performance
Up to 400Kb per second native transfer rate combined with a 1MB buffer means that this is one of the highest performance DAT drives available.

Higher level of reliability
Read after write, four head design for ultimate reliability. Seagate stands behind the quality and reliability of its products with a two year warranty.

**Seagate TapeStor 8000
Internal £255** (£299.63)
SCSI IDE SEATRAY8000/15
SEATRAY8000/1

3200 Cartridge
DC3020Q **£29** £34.08 Inc. VAT



Seagate TapeStor 800 (TRAVAN)
Internal **£85** External **£125**
SEATR800/X £99.88 inc. VAT SEATR800E £146.88 inc. VAT
Cartridge - £19 (£22.33) DC800T

- Ideal for inexpensive daily or weekly backups or long term storage
- Transfer rates optimised with unique FastSense™ feature
- Store from 420MB to 3.2GB with software compression
- Simple, easy installation and operation
- Two year limited warranty

The ideal backup solution for desktop and workstation PCs running DOS, Windows 3x or Windows 95.

Higher capacity
The new tape drive supports Travan TR2, QIC media and QIC-Wide media and main industry standard storage media
Easy Connection
Simply connect the internal floppy drive controller of parallel port depending on whether you want the internal or external model.

IBM STORAGE

The IBM range of SCSI hard disks offers the user a multitude of benefits that either other drives don't or, if they do, the user pays a premium price for them. IBM SCSI hard disk drives are all Audio Visual (AV) ready and essential for any multimedia PC user.



**IBM Ultrastar ES -
2GB (3.5")**
£245
HD182.05 £287.88 inc. VAT

SCAM plug and play compliant
Ultrastar ES supports the implementation of SCAM-2. This simplifies and improves the installation and configuration of SCSI disk drives.

Enhanced performance and capacity to meet the demands of your storage requirements for the home or office.

Quick access time
8.5ms access time and a 512Kb buffer enables the Ultrastar ES to outperform other drives in its class.

Enhanced SCSI performance
The Ultrastar ES is one of the first drives designed with Ultra SCSI as the primary interface. It delivers enhanced SCSI performance required by entry many PCs, workstations and servers.

S.M.A.R.T capability
The Ultrastar ES supports the industry standard Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) protocol which can help alert a system of impending drive failure.

All Audio Visual Ready

IBM Ultrastar XP - 4.5GB
£635
HD184.15 £746.13 inc. VAT

Performance optimised, high capacity storage for data critical applications

Fast seek time
The 7200RPM spin rate combined with leading 9.59 - 12.58MB/sec - among the fastest available.

S.M.A.R.T technology
IBM's long term experience in developing and implementing drive failure protection through Predictive Failure Analysis™ helps ensure the highest level of data availability on Ultrastar XP drives.

Embedded sector servo technology
Ultrastar XP drives use an embedded sector servo eliminating the need for dedicated tasks that can dramatically impact on the performance of the drive.

IBM Ultrastar 2XP 4.5GB (Superslim - 1" height)
£749 £880.08 Inc. VAT
HD184.05

IBM Ultrastar 2XP 9.1GB
£1399 £1643.83 Inc. VAT
HD189.1XP



DELIVERY CHARGES
See page 40



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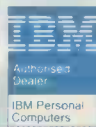
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HARD DISK DRIVES



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Seagate

Quantum

WESTERN DIGITAL



Maxtor

FUJITSU

MICROPOLIS

TOSHIBA PARTNERS

IDE HARD DISK DRIVES

Seagate	CFS850A	850MB	14ms	£99	£116.33
Western Digital	AC2850	853MB	10ms	£105	£123.38
Quantum	HDQ1.2I	1.2GB	12ms	£129	£151.58
Western Digital	AC21200	1.28GB	10ms	£129	£181.58
Western Digital	AC31600	1.62GB	10ms	£134	£157.45
Quantum Sirocco	QM31700SR	1.7GB	12ms	£145	£170.38
Seagate	ST31720A	1.7GB	12ms	£150	£176.25
Seagate	ST32140A	2.1GB	10ms	£185	£217.38

Western Digital	AC32100A	2.1GB	12ms	£189	£222.08
Quantum	Tempest	2.1GB	12ms	£189	£222.08
Seagate	ST52520A	2.5GB	12ms	£205	£240.88
Quantum Sirocco	QM32160TM	2.5GB	12ms	£164	£192.70
Western Digital	AC32500A	2.5GB	12ms	£189	£222.08
Western Digital	AC33100A	3.1GB	12ms	£242	£284.35
Quantum Fireball	QM33200TM-A	3.1GB	12ms	£242	£284.35
Quantum Fireball	QM33840TM-A	3.8GB	12ms	£269	£316.08

Hard disk drives, backup & controller cards

SCSI HARD DISK DRIVES

Micropolis	4221	2.05GB	8.5ms	£399	£468.83
Quantum	XP32105S	2.1GB	10ms	£229	£269.08
Seagate	ST32550N Barracuda	2.1GB	11ms	£485	£569.88
Seagate	ST3217N Barracuda	2.1GB	12ms	£485	£569.88
IBM (AV)	Ultrastar ES	2.1GB	8.5ms	£245	£287.88
Seagate	ST32151N Hawk-2	2.1GB	9ms	£315	£370.13
IBM (AV)	Ultrastar XP	4.55GB	8ms	£635	£746.13
Fujitsu	M2934S	4.3GB	10ms	£615	£722.63
Micropolis	3243	4.3GB	8.5ms	£609	£715.58
Micropolis	3243FW Fast-Wide	4.3GB	9ms	£659	£774.33
Seagate	ST15230N Hawk-4	4.3GB	9ms	£669	£786.08

Seagate	ST15150N Barracuda	4.3GB	8ms	£795	£934.13
	Fast SCSI 2				
IBM	Ultrastar 2XP	4.55GB	7.5ms	£749	£880.08
Seagate	ST410800N Elite	9.09GB	8ms	£1345	£1580.38
IBM (AV)	Ultrastar 2XP	9.1GB	10ms	£1399	£1643.83
Micropolis	1991	9.1GB	12ms	£1295	£1521.63
Fujitsu	M295495Y	9.1GB	10ms	£1299	£1526.33

Audio Visual SCSI

Micropolis	4221AV	2.05GB	8.5ms	£455	£534.63
Micropolis	3243AV	4.3GB	12ms	£695	£816.63
Micropolis	1991AV	9.1GB	8.5ms	£1445	£1697.88

All IBM SCSI hard disk drives listed are AV compatible

PCMCIA HARD DISK DRIVES (Type III)

Calluna	Calluna260	260MB	16ms	£329	£386.58
Ministar	PCM/260	130MB		£229	£269.08

2.5" HARD DISK DRIVES

2.5" IDE

Hitachi	DK212A/81	810MB	12ms	£235	£276.13
Hitachi	DK212A/10	1.0GB	12ms	£195	£229.13
Toshiba	HDT1.0G	1.0GB	12ms	£299	£351.33
Olivetti	ECHOS	1.3GB	12ms	£499	£586.33
Toshiba	MK1301AV	1.35GB	12ms	£509	£598.08
Toshiba	MK1702MAN	1.7GB	12ms	£445	£522.88

HARD DISK DRIVE ACCESSORIES

EXTERNAL CASES

SDCASE1/3	Single external device case (Half/Full height)	£85	£99.88
SDCASE1/3-FW	Single external fast and wide device case	£129	£151.58
SDCASE2/3	Dual external device case (Half/Full height)	£112	£131.60
SDCASE4/3	Quad external device case (Half/Full height)	£205	£240.88
SDCASE4/S-10	Quad external hot plugable device case	£1099	£1291.33
SDCASE1/S-H	Single external device case for CD ROMs	£74	£86.95

CABLES CONNECTORS AND CONVERTERS

SCSIQ/2	Dual device internal SCSI cable	£8	£9.40
SCSIQ/3	3 way internal SCSI cable	£14	£16.45
SCSI/CBLFW	Fast and Wide internal SCSI cable	£99	£116.33
SCSITERM/A	SCSI active terminator	£27	£31.73
SCSITERM/P	SCSI passive terminator	£12	£14.10
IDE/CBL	Dual device internal IDE cable	£7	£8.23
CONK/PAR	Parallel to SCSI converter (Centronics)	£109	£128.08
CONK/PAR-MD	Parallel to SCSI converter (Micro D)	£119	£139.83
SIM/SCSI/PCMC	PCMCIA SCSI converter/controller (Centronics)	£109	£128.08

EIDE CONTROLLER CARDS

ADAPTEC EIDE CONTROLLERS

EIDE-AT32 Kit	ISA	Dual channel	£35	£41.13
EIDE-AT42 Kit	ISA	Dual channel + floppy support	£39	£45.83
EIDE-VLVP52 Kit	VLB	Dual channel, floppy, 2 x 16550 & EPP	£46	£54.05
NEW EIDE S2 VP	ISA	Dual channel, floppy, 2 x 16550 & EPP	£65	£76.38

SCSI CONTROLLER CARDS

DPT

DPT 2022	32-bit SCSI II	E-ISA	Bare	£259	£304.33
DPT 2124	32-bit SCSI II	PCI	Bare	£359	£421.83

See Adaptec feature on page 19 for more controllers



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Western Digital 1.6GB

£134

IDE HDWD1600 £157.45 inc. VAT

Quantum 2.5GB

£164

IDE HD0251 £192.70 inc. VAT

Western Digital 3.1GB

£242

IDE HDWD3100 £284.35 inc. VAT

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DC6000 format

	INTERNAL SCSI (Bare)	EXTERNAL SCSI KITS	INTERNAL SCSI (Bare)	EXTERNAL SCSI KITS	
Model 3660 250MB QIC Streamer	TAND/250 £261 (£306.68)	£384 (£451.20)	Model 4120 1.2GB QIC Streamer	TAND/1.2 £412 (£484.10)	£545 (£640.38)
Model 3820 525MB QIC Streamer	TAND/525 £320 (£376.00)	£449 (£527.50)	Model 4220 2.5GB QIC Streamer	TAND/2.5 £457 (£536.98)	£595 (£699.13)
			Model 4222 5.0GB QIC Streamer	TAND/5.0 £485 (£569.88)	£620 (£728.50)

AMACOM MASS STORAGE

AMACOM PCMCIA EZCD CARD

EIGHT SPEED CD ROM

- PCMCIA Type II & III
- MPC II and Photo CD
- 1.2MB/s transfer rate
- 150 access time

NEW!

CDAMA/EZCARD8 **£239** £280.83

SIX SPEED CD ROM

CDAMA/EZCARD6 **£205** £240.88

QUAD SPEED CD ROM

CDAMA/EZCARD4 **£171** £200.93

AMACOM PARALLEL EZCD

PARALLEL PORT CD ROM

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EZCD SIX SPEED

CDAMA/EZCD6 **£175** £205.63

EZCD QUAD SPEED

CDAMA/EZCD4 **£135** £158.63



Amacom Parallel EZCD Sound

- Portable parallel port CD ROM drive
- Built-in 16-Bit sound card for multimedia capability
- Pass through printer port for concurrent printing
- Built in power supply and cooling fan
- DOS, Windows, Windows 95 and OS/2 compatible

EIGHT SPEED £275
CDAMA/EZCD58 £323.13 inc. VAT

SIX SPEED £239
CDAMA/EZCD56 £280.83 inc. VAT

QUAD SPEED £205
CDAMA/EZCD54 £240.88 inc. VAT

Amacom PCMCIA EZCD 8 Speed

£239

CDAMA/EZCARD8 £280.83 inc. VAT

AMACOM EZCD PLUS PCMCIA

- Portable PCMCIA based CD ROM & mobile audio CD Player
- 600Kb/sec sustained data transfer
- Operable with 6 AA batteries (supplied with a mains adapter)

AMACOM EZCD PLUS 4
CDAMA/EZCDPLUS4 **£239** £280.83

AMACOM EZCD PLUS 6
CD/EZCDPLUS6 **£251** £294.93

AMACOM EZ DISK

EXTERNAL 3.5" PARALLEL PORT HARD DRIVE

- Easy connection to parallel port

EZ DISK 850MB
HDAMA/EZ850 **£251** £294.93

EZ DISK 540MB
HDAMA/EZ540 **£224** £263.20

EZ DISK 1.2GB
HDAMA/EZ1.2 **£281** £330.18

EZ DISK 1.6GB
HDAMA/EZ1.6 **£330** £387.75

EZ DISK 2GB
HDAMA/EZ2000 **£375** £440.63

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
AMA/EZPARA **£99** £116.33



AMACOM PSDAT

- Portable parallel and SCSI based external DAT drive
- Incorporates Hewlett Packard 4mm DAT drives
- Data transfer rates of up to 90MB per minute via SCSI
- Data transfer rates of up to 30 MB per minute via parallel port
- Pass through printer port for concurrent printing
- DOS, Windows, Windows 95, NT, OS/2, UNIX and Mac compatible

HUGE STORAGE CAPACITY



AMACOM PSDAT 4GB
AMAPSDAT/4 **£799** £938.83

AMACOM PSDAT 8GB
AMAPSDAT/8 **£999** £1173.83

AMACOM DISKLITE

EXTERNAL 2.5" PARALLEL PORT HARD DRIVE

- Data transfer up to 900Kb/sec
- Printer port for concurrent printing
- Carry case included for mobility



DISKLITE 540MB
HDAMA/DLS40 **£275** £323.13

DISKLITE 810MB
HDAMA/DL810 **£345** £405.38

DISKLITE 1.2GB
HDAMA/DL1.2 **£599** £703.83

Cards are not debited until despatch

... and here's what some of our customers have said ...

I have been attempting to upgrade and generally improve the performance of my computers...

...understanding the correct solution was attained and implemented with a first time success rate on each occasion. In all, the service she provided has been first class and I will be happily recommending you to other colleagues in the industry.

P Vincent
London

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ARCSERVE 6

ENHANCED RELIABILITY

- RAID 5 fault tolerance - prevents incomplete critical backup
- Real time tape mirroring - duplicate media can be stored remotely
- Full disaster recovery protection
- Intelligent Loader - improved diagnosis of installation errors

ARCserve 6 for Netware
£335

ARC6/NW £393.63 inc. VAT



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ARCserve 6 for Workgroups (25 User)

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- 32-bit multi-threaded architecture
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 ARCSUITE2 **£661** £776.68

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- Includes a host of features distinct to Inoculan

Innoculan V4 for NT
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Cheyenne Infinite Disk for Windows 95
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SCSI Master 1542CP kit

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AHA1542C/K £193.88 inc. VAT



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- Now Plug & Play

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The pocket size organiser that's always in touch with your PC

1000 model
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5000 model
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DELIVERY CHARGES
See page 40

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Reliability, compatibility and ease of use



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LOW COST DIAL-UP COMMS ACCURA Message/Business Modem
• New internal ISA version
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ADVANCED BUSINESS COMMS OPTIMA Business Modem
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HAYES MODEMS
The industry standard

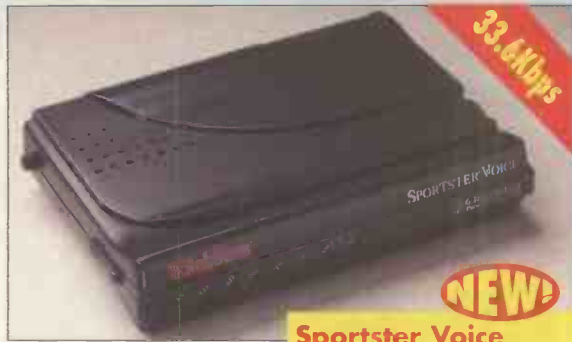
Model	V34	V32bis	GSM V32	V42bis	8:1 V42bis	Fax	Fax on demand	Voice	Security	33,600	ex. VAT	inc. VAT
HAAC14	•	•	•	•	•	•	•	•	•	•	£79	£92.83
HAAC28	•	•	•	•	•	•	•	•	•	•	£119	£139.83
HAAC28/V	•	•	•	•	•	•	•	•	•	•	£119	£139.83
HAAC28/V	•	•	•	•	•	•	•	•	•	•	£142	£166.85
HAAC28/V	•	•	•	•	•	•	•	•	•	•	£142	£166.85
HAOP28/V	•	•	•	•	•	•	•	•	•	•	£215	£252.63
HAOP28/P	•	•	•	•	•	•	•	•	•	•	£163	£191.53
HA GSM/P	•	•	•	•	•	•	•	•	•	•	£105	£123.38
HA GSM/AL	•	•	•	•	•	•	•	•	•	•	£105	£123.38
HAUL14	•	•	•	•	•	•	•	•	•	•	£299	£351.33
HAOPES/P	•	•	•	•	•	•	•	•	•	•	£55 (£64.63), 2 port	£89 (£104.58)

PORTABLE COMMS OPTIMA 288 Fax PC Card
• PCMCIA 2.0/2.1 Type II
• New optional GSM kits available
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• Flash ROM
£163 £191.53

ISDN COMMS ULTRA ISDN
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All modems supplied by Memory Bank are BABT APPROVED

U.S. ROBOTICS MODEMS



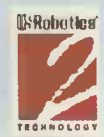
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USRP/VF-ES £153.93 inc. VAT

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• Fax On Demand facilities
• Remote voice & fax retrieval
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• 10 mailbox voice mail
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• Unique XJACK connector
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X2 shatters the 28.8/33.6 speed barrier. Connect at speeds up to 56Kbps.
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U.S. ROBOTICS MODEMS

Model	V32bis	V32terbo	V.34	MINI2-4	V42	V42bis	MINI5	HST Cellular	Fax	33,600	Internal	inc. VAT	External	inc. VAT
USRSPI4	•	•	•	•	•	•	•	•	•	•	£76	£89.30		
USRSPI4/ME	•	•	•	•	•	•	•	•	•	•			£76	£89.30
USRSP28/S	•	•	•	•	•	•	•	•	•	•	£131	£153.93		
USRSP28/ES	•	•	•	•	•	•	•	•	•	•			£131	£153.93
USRSP28/MAC	•	•	•	•	•	•	•	•	•	•			£145	£170.38
USRCDF/1	•	•	•	•	•	•	•	•	•	•	£219	£257.33		
USRCDF/1	•	•	•	•	•	•	•	•	•	•			£219	£257.33
USRXJACK/P	•	•	•	•	•	•	•	•	•	•			£131	£153.93
USRSERIAL/2	•	•	•	•	•	•	•	•	•	•			£49	£57.58

Courier I

• V34/33.6Kbps
• ISDN 2 - 64Kbps
• Asynchronous/Synchronous PPP
• Free lifetime technical support
• 5 year warranty
£285 £334.88 inc. VAT
External USRC/ISDN
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28,800 Voice Modem
£109
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External version illustrated

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28.8 & 33.6

Every Powermark Voice modem is supplied with:

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- Local/remote fax retrieval
- Unlimited number of messages stored
- Synchronous and asynchronous operation
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POWERMARK MODEMS

Model	V32bis	V34	MNP2-5	V42	V42bis	Fax	Voice	33,600	Internal	External
									inc. VAT	inc. VAT
MBMOD288	●	●	●	●	●	●	●		£89	£89
MBMOD288V/E	●	●	●	●	●	●	●		£105	£109
MBMOD336V	●	●	●	●	●	●	●		£115	£119

MBSERIAL 2/A - 2 Port High Speed Serial Card £17 £19.98

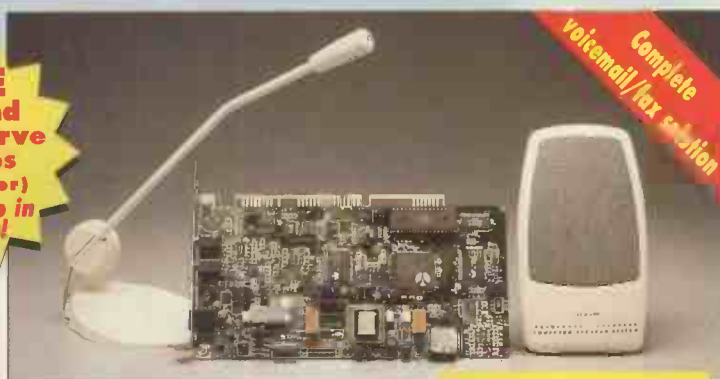
- Dual 16550 UART serial connection
- Enables shorter communication times and therefore reduces costs
- **Save £3 when purchased with any modem**

Top quality, fully featured, Internet ready, BAPT approved modems brought to you at unbeatable prices from Memory Bank. All modems feature Auto-Dial and Auto-Answer to ensure ease of use. Error correction and data compression provide enhanced reliability and improved throughput of data giving you complete piece of mind whilst saving you money.

ZOOM MODEMS

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FREE AOL and Compuserve services
(Trial offer)
Get on line in minutes!



Zoom's new ComStar™ is a complete communications centre for PC compatible computers.

ComStar combines a full featured V34/28.8 bps data and 14.4 bps fax

- V34 fax
- Answer phone
- Sound card
- Conference quality full duplex speakerphone
- Digital answering machine
- Voice mail
- Speed dialer
- Easy installation with 'Plug & Play'

Zoom ComStar™
V34 Internal/Voice
£139

ZOOM288I £163.33 inc. VAT

ComStar provides a complete set of communication features at a price you can afford.

Zoom ComStar™ V34 Internal

ZOOM288I/COMS **£139** £163.33

ComStar comes complete with a high quality external microphone, external speaker and software.

ZOOM MODEMS

Model	V32	V32bis	V34	MNP2-5	V42	V42bis	Fax	Voice	Internal	External
									inc. VAT	inc. VAT
ZOOM144X	●	●	●	●	●	●	●	●	-	£76
ZOOM144I	●	●	●	●	●	●	●	●	£67	-
ZOOM144X/MAC	●	●	●	●	●	●	●	●	-	£105
ZOOM288X	●	●	●	●	●	●	●	●	-	£99
ZOOM288I	●	●	●	●	●	●	●	●	£115	-
ZOOM288X/MAC	●	●	●	●	●	●	●	●	-	£129
ZOOM288I/COMS	●	●	●	●	●	●	●	●	-	£139

Modems



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LOWER PRICE

Motorola ISDN Office Solution
£299
 MOTO/ISDN OFF £351.33 inc. VAT

A totally integrated solution at a price unmatched by any other ISDN terminal adapter.

The BitSURFR Pro is a feature rich, 128Kbps ISDN terminal adapter that enables home and remote office professionals to increase productivity and cut costs by reducing the time required to transfer files. It also eliminates the need for multiple phone lines.

- "Bonding" gives ultra fast transfer rates of up to 128Kbps. Simply connect to the serial port of your PC or Macintosh.
- Multi-link PPP technology, provides high speed connection to the Internet over ISDN

The Motorola ISDN Office Solution includes:

- Motorola BitSURFR Pro 128Kbps terminal adapter
- Communications and Internet software
- Interactive instruction disk
- PC based Configuration Manager utility with on-screen instructions
- Help Guide to help you through set up procedures
- Cables and connectors

Ideal for: • Internet 'surfing' • Telecommuting • Desktop Videoconferencing • Remote LAN access

VISA

MasterCard

SWITCH

Cards are not debited until despatch

... and here's what some of our customers have said ...

I would be grateful if you would pass my thanks to Andrew in Technical Support for his help in resolving my difficulties in installing the hardware I had purchased. I'm happy to say that my system is now up and running.

G Strigley
London

MOTOROLA MODEMS



33.6Kbps

FREE £100 ABTA holiday vouchers

When you buy any 3400 Motorola modem (while stocks last)



Motorola Premier 33.6

£195
 MOTO/PREMIER £229.13 inc. VAT

- Remote access and setting via telephone
 - Automatic Rate Adaption allows the Premier to dynamically adjust its data rate backward and forward
 - Multiple phone number and password protection
 - T.30 error correction ensures your fax will arrive at its destination without errors
- Other features include auto answer, auto dial, call progress indication and software volume control

MOTOROLA PREMIER 33.6Kbps

- The Motorola Premier 33.6 is a high performance V34/V42 bis data and fax modem that allows users to transmit data at 33.6Kbps
- Incorporates advanced technology that enhances operation with features including echo cancelling, automatic adaptive line equalising
- Flash controller and Flash DSP RAM for future enhancements and upgrades
- Fully compatible with any Group III fax device



Motorola 3400 Online

£119
 MOTO34/ON £139.83 inc. VAT

Get fast access to the Internet with the Motorola 3400 online modem - a complete Internet solution package, ideal for the home and office user.

- Type II PCMCIA data/fax modem card
- Free CompuServe Trial software
- Data and fax communications software
- UK phone adapter plug
- "Read Me First" Guide in eight languages
- Interactive manual in eight languages



Motorola PCMCIA 28.8 PRO

£165
 MOTO/PCMCIA £193.88 inc. VAT

MOTOROLA PCMCIA 28.8 PRO

Fast, easy communication for portable computers using advanced, international technology. It makes communications across Europe easier than ever before.

- V34 technology to send and receive data at super fast rates of up to 115,200 bps
- Auto synchronous - adjusts to line conditions resulting in economical and error free connection
- Group III compatible

- Windows based software enables the user to configure their modem automatically to the local phone system and PTT specifications
- Internal DAA Internal interface makes the Motorola PCMCIA Pro extremely compact
- Help screen facility which enables users to "self diagnose" any problems by simply clicking on the "Analysis" button

• 5 year warranty

MOTOROLA MODEMS

Model	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	Fax	Voice	External	inc. VAT
MOTO/PREMIER Premier 33.6	●	●	●	●	●	●	●	●	●	£195	£229.13
MOTO/PCMCIA V34 PCMCIA	●	●	●	●	●	●	●	●	●	£165	£193.88
MOTO34/ON 3400 Online	●	●	●	●	●	●	●	●	●	£121	£142.18
MOTO34* 3400 Pro PC	●	●	●	●	●	●	●	●	●	£109	£128.08
MOTO34/MAC 3400 Pro Mac	●	●	●	●	●	●	●	●	●	£129	£151.58

DELIVERY CHARGES
See page 40



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V34 modem only £89



Multimodem II MT2834 ZDX
£89
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- 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)
- Supports 33.6K (only MT2834BLK)



Multimodem II MT2834 BLK
£315
 MULT128 £370.13 inc. VAT



Multimodem II MT2834LTI
£139
 MULTI/PCMV34 £163.33 inc. VAT

NEW!
MTZDX12 Rack Solution
£539
 £633.33 inc. VAT

MULTITECH MODEMS

Model	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	Fax	33.6	Internal	inc. VAT	External	inc. VAT
MULT1	●	●	●	●	●	●	●	●	●			£135	£158.63
MULT128Z	●	●	●	●	●	●	●	●	●			£89	£104.58
MULT128Z/1	●	●	●	●	●	●	●	●	●	£89	£104.58		
MULT1/PCMV34	●	●	●	●	●	●	●	●	●			£139	£163.33
MULT128	●	●	●	●	●	●	●	●	●			£315	£370.13
MULT114	●	●	●	●	●	●	●	●	●			£221	£259.67
MULT128PES1	●	●	●	●	●	●	●	●	●			£399	£468.83

MULTIMODEM LTI SERIES

- PCMCIA card
- V17 & Group 3 fax
- V42 Lap-M error correction
- V42bis data compression
- MNP level 5
- Asynchronous operation
- Free Multiexpress fax & comms software
- 5 year warranty
- Available in 28.8bps (V34) and 14.4bps (V32bis)

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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!

Our easily installed High Speed Serial Card gives you maximum performance.
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Save £3
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Adapt your phone to international sockets - works in over 200 countries



The essential modem connection for the travelling computer user wherever that may be. Whether on business or just travelling you need the Laptop Lifeline.

- TeleDaptors(tm) for 220+ destinations
- Suitable for all current UK/USA modems
- Lifetime warranty and 24 hour global support

LAPTOP LIFELINE
TELEADAPT LIFE **£99** £116.33

MEMORY

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TDK MODEMS



The DF2814 Global class PC card is a full featured, ultra high speed, International PCMCIA data fax modem with internal DAA phone line interface.

It's the only fax/modem approved for certified and legal use in 22 different countries. The pull down 'country selector' is easy to use and defaults to the country of origin at power up. The country selector can be upgraded from TDK's bulletin board system as new versions become available.

- V34/28.8 bps data, 14.4 bps fax
- Compact size - internal DAA
- Approved in 22 countries
- TDK Global support
- 5 year warranty

One card - Worldwide use

TDK DF2814 Global Fax/Modem

£149

TDK/PCM28 £175.08 inc. VAT

Every TDK DF2814 includes:

- WinFax Lite and Pro
- Protective carry case
- RJ11 and country specific adapter plugs
- Instruction book
- Installation software

TDK introduces the world's fastest Fax PC card and Ethernet card combined at only £239 -

The Global Networker



TDK Global Networker

- 33,600bps
- 10MB Combo Card

£239

TDK/GLOBAL £280.83 inc. VAT



PSION DACOM MODEMS



A desk top modem to take your breath away!

- Surfer 33.6Kbps data/fax/voice modem
- Data/fax/voice/communications software
- Your first Surfsuit
- 30 day Internet trial, including World Web browser
- Getting started guide
- All cables included

£136

PSIONSURF £159.80 inc. VAT
Colours may vary

The range of Gold Card PC Cards from Psion Dacom give you the latest technology and can provide you with the ultimate package for mobile comms.

Gold Card V34 GSM **£239**

PSIONDPC34-GSM £280.83 inc. VAT



PSION DACOM MODEMS

Model	V34	V32bis	MNP2-4	MNP10	V42	V42bis	MNP5	Fax	GSM	33.6K	PC Card	inc. VAT
PSIONDPC33.6 V.34 Gold Card	●	●	●	●	●	●	●	●	●	●	£155	£192.13
PSIONDPC32-GSM V.32 GSM	●	●	●	●	●	●	●	●	●	●	£179	£210.33
PSIONDPC34-GSM V.34 GSM	●	●	●	●	●	●	●	●	●	●	£239	£280.33
PSIONDPC7UG Upgrade for Gold Cards	●	●	●	●	●	●	●	●	●	●	£105	£123.38
PSIONDPCGSM GSM + Fax for your mobile phone	●	●	●	●	●	●	●	●	●	●	£159	£196.83

PSION DACOM ETHERNET MODEMS

PSIONDPC34/E V.34 - Fax + Ethernet	£269	£316.08
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Lower ISDN prices!

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X.TOLL ISA Internal Guide

- Windows 95, NT, Windows For Workgroups 3.11 (TA only)
- 128Kbps data throughput
- Plug and Play
- No memory Space
- Half size card for ISA and EISA
- Synchronous and Asynchronous PPP
- Routing capabilities

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DAP 6300 LITE
 External ISDN Adapter

from **£399**
 from £468.83 inc. VAT

RACDAP6300/L



MDF 34 MODEM

• 28.8 Kbps/V34
£165 £193.88

RACMDF34

X.TOLL PCMCIA ISDN

- PCMCIA type II
- Plug and Play
- 128Kbps data throughput
- Windows 95, NT, 3x(TA only)

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FREE Internet software!

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Internet access - only **£7.50** per month for unlimited usage

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MBNET PCMCIA

- Credit card sized PCMCIA Ethernet card
- Conforms to IEEE 802.3 and fits into Type I, II and III PCMCIA slots
- Windows 95 compatible

SINGLE **£69** £81.08

5 PACK **£339** £398.33



2000C/P Plug & Play

£19
 MBNET2000C/P £22.33 inc. VAT

- Improved performance by full-duplex capability (20Mbps) with full downward compatibility
- Full duplex design doubles performance
- Plug and Play, auto-setup
- Jumper or software configuration
- Auto-detection for ISA bus
- Supports 8 IRQs and 8 I/Os
- Smart remote boot ROM
- Uses NE2000 drivers - needs no additional drivers

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10/100 Mbit PCI Card
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9 PORT HUB

- 9 port auto partitioning
- Hub status LEDs

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- Personal Netware (2 user)
- 2 x 2000C/P
- 2 x terminator, 2 x T-piece
- 5m cable

MBNETKIT/2 **£79** £92.83

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- Personal Netware
- 1 x 2000C/P
- 5m cable

MBNETKIT/1 **£47** £55.23

MBNET32PCI PLUG & PLAY

- Ideal for high-performance system applications
- BNC and RJ45
- Plug & Play
- High performance Bus Master architecture/ DMA Buffer

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MBNET32PCI

MBNET32/P/5

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THE 3400 SERIES

Fax - Modem - Ethernet Adapter

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- V34 modem (V34bis upgradable)
- Simultaneous functionality without loss of speed
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- International modem approval

3410 - 10 BaseT Ethernet / V34 modem
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3420 - Combo Ethernet / V34 modem (BABT and internationally approved)
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Grey Cell Systems



thinking ahead



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2200 LAN/Ethernet range

- Fully NE2000 network driver compatible
- Direct connection to 10 Base-T twisted pair Ethernet and/or Thin Ethernet
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ALL Greycell cards supported with

- Automatic installation program
- Lifetime warranty
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- CE approved

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Pro/100 (PCI) adapter

£87
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ETHEREXPRESS PRO/100 (PCI) ADAPTER - 5 pack
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EP10-TP INETP/TP •

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XIRCOM NETWORKING

ISDN connectivity for under £300

Xircom
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CREDIT CARD 10/100 ADAPTER

Connect portable PCs to 100Base-TX Ethernet networks with this high performance PC card adapter

- 100Mbps connectivity allows portable PCs to connect to 100Base-TX Ethernet networks and take advantage of higher network bandwidth
- Auto negotiation of 100 or 100Mbps connection rate
- Window 3x installation program automatically configures both PC and NOS (SNMP agent included)
- Multi-lingual documentation
- Full driver support, including Novell, Windows 95, and Windows NT

Credit Card Ethernet adapter 10/100 - Upgradable

- Supports 10Base-T or a combination of 10Base-T and 10Base-2

(to upgrade to full 10/100 all you need is a Xircom cable upgrade kit)

Single card RJ45

XIR10U/RJ45 **£95** (£111.63)

6 pack RJ45

XIR10U/RJ45-6 **£539** (£633.33)

Single card Combo

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6 pack Combo

XIR10U/C-6 **£649** (£762.58)

Upgrade kit

XIR10/100-KIT **£119** (£139.83)



NEW!

Credit
Card ISDN Adapter

£299

XIR/ISDN £351.33 inc. VAT



V34 (TP) - 33.6Kbps
Credit Card Ethernet+ Modem V34

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XIRPCM/T-FM/V34 £374.83 inc. VAT

**CREDIT CARD
33,600
MODEM**

- Type II PC Card
- V34, 33,600

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- Country select function
- Includes Delrina WinFax Lite and WinComm Lite



- Flash ROM upgradable
- Plug & Play
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Everything you need to connect your modem to phone systems worldwide

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- High-performance, memory-saving SmartRing software
- 16 or 4 Mbps software selectable ring speed

PS-CT2-16CTP (TP)

Credit Card Token Ring adapter II_{ps}

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Intelligent serial I/O with four V.34 modems integrated on a single ISA card

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- Four times more reliable than external modems and serial board combinations
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- Supports XMAP1 block mode interface for faster data throughput with less server processor load

MPM41 Multiport Modem Card

XIR/PORT **£1179** £1385.33 inc. VAT

**MPM41 multiport
modem card**

£1179

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NEW!

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The 17" multimedia monitor option

Taxan 730 TCO-S
(Windows 95 Plug & Play)

£485

TAXAN730TCOS £569.88 inc. VAT

TAXAN

The market leading monitor brand in the UK offering a comprehensive range of high performance and quality display solutions. Taxan monitors are the preferred choice for graphics professionals and home users.

	Size	Dot pitch	Resolution at up to:	Frequency	Tube	exc. VAT	inc. VAT
TX410LR	14"	0.28mm	1024 x 768	60Hz	Conventional	£177	£207.98
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TX540 TCO-S	15"	0.28mm	1280 x 1024	60Hz	FST	£459	£539.33
							• Built-in audio
TX730TCO	17"	0.28mm	1280 x 1024	60Hz	FST	£459	£539.33
TX730 TCO-S Multimedia Monitor	17"	0.28mm	1280 x 1024	60Hz	FST	£485	£569.88
							• Built-in speakers • Microphone and headphone sockets • Volume/mute control
TX740LR	17"	0.26mm	1280 x 1024	79Hz	FST	£559	£658.83
TX740 TCO-S Multimedia Monitor	17"	0.26mm	1280 x 1024	79Hz	FST	£579	£680.33
							• Built-in speakers • Microphone and headphone sockets • Volume/mute control
TX1080LR	20"	0.28mm	1600 x 1200	65Hz	Conventional	£830	£975.25
TX2150TCO	21"	0.28mm	1600 x 1200	75Hz	Diamondtron	£1095	£1286.63

DIGITAL DISPLAY PANELS

	Size	Resolution	Frequency	Panel Type	exc. VAT	inc. VAT
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TXCRY500	11.3" colour	640 x 480	72Hz	STN LCD	£1149	£1350.08
TXCRY600	10.4" colour	640 x 480	72Hz	TFT LCD	£1199	£1408.83
TXCRY620	12.1" colour	800 x 600	72Hz	TFT LCD SVGA	£1699	£1996.33



Taxan 410LR
£177

TAXAN410LR (£207.98)

The ideal budget high quality 14" monitor



NEW!
Taxan 530TCO
£279

TAXAN530LR (£327.83)

The 15" professional solution



NEW!
Taxan 2150-TCO
The Diamondtron 21" professional option

- 0.28mm dot pitch
- New compact size
- TCO 95 compatible

£1095

TAX2100 TCO (£1286.63)

The 17" FST 'Full Scan' monitor



Taxan 740TCO
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TAXAN740LR (£645.08)

The 17" FST 'Full Scan' ultra high resolution monitor



Taxan 1080LR
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TAX1080LR (£975.25)

The 20" high performance solution



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(Windows 95 Plug & Play)
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TAXAN730LR (£539.33)

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PWR5837 **£19** £22.13

QuickShot Soundmate

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Yamaha YST-M15

• 10 watts
• Built-in amplifier
PWR59K/YAMAHA **£49** £57.58



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128-bit!
 Includes £200 of Free software

- AVI Acceleration
- 1600 x 1200 resolution
- Software MPEG playback
- SmartTools software
- 2MB - 4MB memory

£135
 VID65/600 £158.63 inc. VAT

NEW!

GrafixStar 450 64-bit
3D Graphics!



Low cost Windows, multimedia and 3D acceleration

2MB EDO
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HITACHI

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£419
 HITMON17MVX/PRO2 £492.33 inc. VAT



17" Super Fine Dot Pitch



Amazing Performance!

Hitachi is one of the world's largest manufacturer of computer monitor tubes. With a \$5.5 billion spend on R&D last year, Hitachi is strategically placed to bring to the market the very latest in computer screen technology. The current product range offers users a choice of technologically advanced, high performance and attractively priced computer monitors.



1st year on-site

Exc. VAT Inc. VAT

	Code	Size	Dot pitch	Resolution	Refresh	Tube		
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17MVXPro2	HITMON17MVX/PRO2	17"	0.21mm	1280 x 1024	77Hz	FST, TCO92, Nutek	£419	£492.33
CM2096	HITMONCM2096	20"	0.27mm	1280 x 1024	75Hz	Standard, Energy Star	£785	£922.38
CM2011	HITMONCM2011	20"	0.24mm	1280 x 1024	75Hz	Standard, Energy Star	£869	£1021.08
CM2111	HITMONCM2111	21"	0.21mm	1600 x 1200	75Hz	FST, Nutek	£975	£1145.63
CM2112	HITMONCM2112	21"	0.21mm	1600 x 1280	80Hz	FST, Nutek, TCO92	£1399	£1643.83

All models are PC, Macintosh and Workstation compatible (when supplied with the appropriate adapter)

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3D Xpression

£189
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NEW!

Awesome 3D acceleration with TV quality video and full motion MPEG playback - All at an affordable price
 Ideal for those demanding great graphics with clear crisp video

- 2MB EDO RAM
- 16.7 million colours at 800 x 600
- Resolution up to 1280 x 1024
- Up to 120Hz refresh rate
- Expansion via ATI Multimedia Channel connector

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£129

£151.58 inc. VAT
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FTV quality MPEG video with blazing 64-bit performance... crisp photo realistic images

Ideal for multimedia users at home or at work

- 2MB ED DRAM
- 16.7 million colours at 800 x 600
- Resolution up to 1280 x 1024
- Up to 120Hz refresh rate
- Expansion via ATI Multimedia Channel connector



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INTELLIGENT TV FOR YOUR PC
 TV Tuner and video accessory for AMC enabled graphics accelerators

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Graphic Xpression

A fast value packed 64-bit graphics accelerator



For the all round user of Microsoft Windows applications to give that extra spice to graphics

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- Resolution up to 1280 x 1024
- Up to 75Hz refresh rate

ATI-6X/ISA **1MB version £83** £97.53



Graphic Pro Turbo
A high value/performance graphics solution

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- 16.7 million colours at 800 x 600 with 2MB version
- Resolution up to 1280 x 1024
- Up to 100Hz refresh rate

ATI-GPT/PCI **2MB £194** £227.95

ATI-GPT/PCI/4 **4MB £308** £361.90



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 Stereo speakers & Microphone
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 • 8 speed CD ROM drive
 • 16-bit 3D sound card
 • Stereo speakers and microphone

MSMLK17/8 **£119** £139.83

VALUE AUDIO KIT
POWERMARK 8 SPEED VALUE AUDIO KIT

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16-BIT SOUND CARD

- 3D SOUND
- SoundBlaster compatible
- IDE interface
- Integrated MIDI interface
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- Windows 95 compatible
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 185ms access time
 Quick audio CD play button on panel
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Multimedia & Graphics Cards



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SB32AWE/IDEV **£95** £111.63

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• No ASP chip
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VBLSTR300 **£203** £238.53

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VBLSTMP400 **£114** £133.95

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GAMEBLASTER/V **£149** £175.08

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Aztech 3D Galaxy
£139
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- Supports SEGA™ PC games
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- Enhanced digital joystick post
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The ideal present



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12 Speed CD ROM drive

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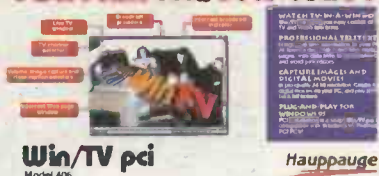
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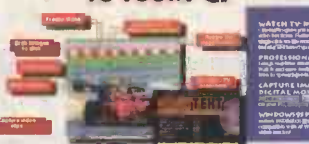


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Model 300

Hauppauge!

Video Magic
THE TOTAL SOLUTION FOR EDITING VIDEO ON YOUR PC!
CAPTURE - capture high quality frames from your TV.
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The true 3 in 1 multimedia card

Graphics card

Video playback card - full motion

Wave table sound card

all on a 1/2 size PCI card!



- 1MB or 2MB VRAM versions
- 1280x1024 with 256 colours
- 30 frames per second
- Full duplex playback and record
- Fast full stereo audio capability

RASTERMEDIA 1MB
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RASTERMEDIA 2MB
RMEDIA/2 **£349** £410.08

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enhancements
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Ultra-compact utilising line-averaging technology

Make your system TV ready!

PC Micro Presenter
The ultimate presentation and training tool

£119

FOCUS/MICRO/PRES

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Ideal for:

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Big on features - small in size and price

- Works with any size television
- Flicker free
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- S-video and RCA video connection
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Why spend 20 times as much for a conventional bulky display/projection device?

Includes:

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- Cables

PC Micro Presenter Plus
with hand-held infrared remote control unit

£169 **NEW!**

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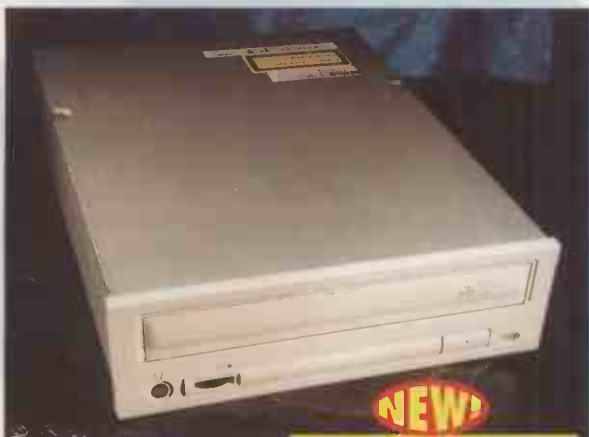
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TEAC 12 SPEED IDE CD ROM DRIVE

1.8MB/sec transfer rate
EIDE/ATAPI
Seek time 80ms
Access time 160ms
Tray loading
CD ROM XA, Photo CD and CD-I compatible
256 Kb buffer
Supports DMA data transfer

TEAC 12 Speed CD ROM Drive

£119
COTEAC/S12E/1 £139.83 inc. VAT

Can be mounted vertically or horizontally
Windows 95 compliant

INTERNAL BARE DRIVE
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TEAC

CD-R50-S Quad read/ Quad write CD Recordable Internal Drive

£599 £703.83 inc. VAT
Includes cable set, software drivers and media



Bare drive
£549
COTEAC/R £645.08 inc. VAT

TEAC JUKEBOX IDE CD ROM

• 8 speed
• 6 disk
• Internal
£149
COTEAC/JUKER £175.08

CD ROM DRIVES

IDE	Product Code	Type	Speed	Transfer rate	Access	Loading	Cache	Interface	Int	inc. VAT	Ext	inc. VAT
Powermark 8 speed	MBCDROM/8	IDE	8	1200Kb/sec	185ms	Tray	256Kb	ATAPI	£66	£77.55	-	-
Powermark 10 speed	MBCDROM/10	IDE	10	1500Kb/sec	90ms	Tray	256Kb	ATAPI	£81	£95.18	-	-
Pinnacle X-treme 10 speed	CDPINN/X-TREME	IDE	10	1500Kb/sec	89ms	Tray	256Kb	ATAPI	£199	£233.83	-	-
Toshiba XM5522	CDT5522/1	IDE	6	900Kb/sec	150ms	Tray	128Kb	ATAPI	£79	£92.83	-	-
Creative 8 speed	BLASTERCD/8X	IDE	8	900Kb/sec	150ms	Tray	256Kb	ATAPI	£89	£104.58	-	-
TEAC CD512E 12 speed - BARE DRIVE	COTEAC/S12E	IDE	12	1800Kb/sec	90ms	Tray	250Kb	ATAPI	£119	£139.83	-	-
Toshiba XM5602B 8 speed	CDT5602B/1	IDE	8	1200Kb/sec	120ms	Tray	128Kb	ATAPI	£69	£81.08	-	-
Pioneer Super 10 speed	CDPISUPER10X	IDE	10	1500Kb/sec	90ms	Tray	128Kb	ATAPI	£119	£139.83	-	-
Aztech 10 speed	AZTCD/10	IDE	10	1500Kb/sec	90ms	Tray	128Kb	ATAPI	£89	£104.58	-	-
Aztech 12 speed	AZTCD/12	IDE	12	1800Kb/sec	80ms	Tray	128Kb	ATAPI	£99	£116.33	-	-
SCSI												
NEC 8Xi/e	CDN8X	SCSI	8	1200Kb/sec	99ms	Caddy	512Kb	SCSI	£145	£170.38	£209	£245.58
Panasonic 506 8 Speed	CDPA506/1	SCSI	8	1200Kb/sec	135ms	Tray	128Kb	SCSI	£105	£123.38	-	-
Pioneer DRU124X	CDPDRU124	SCSI	Q	660Kb/sec	150ms	Tray	256Kb	SCSI	£149	£175.08	£185	£217.38
Plextor 6x	CDPLEX/6	SCSI	6	900Kb/sec	115ms	Caddy	512Kb	SCSI	£165	£193.88	£229	£269.08
Plextor 8x	CDPLEX/8	SCSI	8	1200Kb/sec	99ms	Caddy	512Kb	SCSI	£239	£280.83	£345	£405.38
Toshiba XM-3701B	CDT3701B	SCSI-II	6	1000Kb/sec	135ms	Tray	256Kb	SCSI	£145	£170.38	£239	£280.83
CD ROM JUKE BOXES												
Pioneer DRM624X Quad disk	CDPDRM624X	SCSI-II	Q	670Kb/sec	150ms	Caddy	256Kb	SCSI	£394	£462.95	£469	£551.08
NEC 4x4 C Quad disk	CDN4K/1	SCSI-II	Q	600Kb/sec	150ms	Tray	256Kb	SCSI	£85	£99.88	-	-
Toshiba 3701 7 disk stack	CDT3701B/7	SCSI-II	6	1000Kb/sec	135ms	Caddy	256Kb	SCSI	£1299	£1526.33	-	-
TEAC 6 disk internal	COTEAC/JUKER	SCSI-II	8	1200Kb/sec	120ms	Tray	256Kb	ATAPI	£149	£175.08	-	-
RECORDABLE CD ROM DRIVES												
TEAC 4x4 CD-R50-S Kit	COTEAC/R-R			Quad read, dual write with Easy CD software					£599	£703.83		
TEAC 4x4 CD-R50-S Bare	COTEAC/R			Quad read, dual write					£549	£645.08		
Plasmon 4240 Recorder	CDPLAS/4240E			Quad read, dual write with Incat software					£439	£515.83	£479	£562.83
Plasmon 4400 Recorder	CDPLAS/4400			Quad read, quad write with Incat software					£559	£656.83	£629	£739.08
HP 4020i SureStore	HPS4020I/CD								£431	£506.43		

Key to drive speeds: D=Double, Q=Quad, T=Triple, 6=Six speed, 8=Eight speed

Multimedia & Digital Cameras



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RASTERMEDIA TV
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MEMORY

Check it out! **£££**

SANYO DIGITAL CAMERA



**TRUE
640 x 480
VGA
resolution**

SANYO

Introducing Image PC - the digital camera from Sanyo that opens up a colourful new world of possibilities for PC users at work and home

image
PC

Sanyo Image PC
Digital Camera

£319

SANYO/IMAGE £374.83 inc. VAT

**It's Simple
and fun**

POINT AND SHOOT - Now you can capture vibrant colour images at any time, any place. All you have to do is point and shoot.

CONNECT TO YOUR PC - Ideal for home and business use, your Sanyo Image PC gives you the ability to add stored images to newsletters, reports or even personalised birthday cards.

PREVIEW, RETRIEVE AND ENHANCE - With your Sanyo Image PC, you can preview

your pictures in full screen or thumbnail size, allowing you to decide what images to keep before downloading data. Once on your PC you can use the photo enhancement software that is supplied to edit the picture.

DRAG AND DROP, CUT AND PASTE - Get all the functionality with Chelsea image editing software.

PRINT OR E-MAIL - Produce fun mail shots, clever presentation or e-mail captured images.

- 24-bit full colour
- 1MB flash memory
- Progressive scan CCD
- Stores 16 high resolution or 32 standard resolution image files
- Chelsea photo enhancement software supplied
- Optional 2MB or 4MB memory expansion
- True 640 x 480 VGA resolution

CASIO DIGITAL CAMERA

CASIO

**Quick View.
Instant Images.
Infinite Potential.**

The Casio QV-10 Digital Camera.



NEW! Casio QV-100
Digital Camera

£4.69

CASIO/QV100A1 £551.08 inc. VAT

QV-10 Digital Camera (PC)

£329

CASIO/QV10A1 £386.58 inc. VAT

QV-10 DIGITAL CAMERA (Mac)

CASIO/QV10A1/M **£329** £386.58

QV-10A MAINS ADAPTER

CASIO/QV10/ADK6SEL **£12** £14.10

PC CONNECTION KIT

Includes software & cables

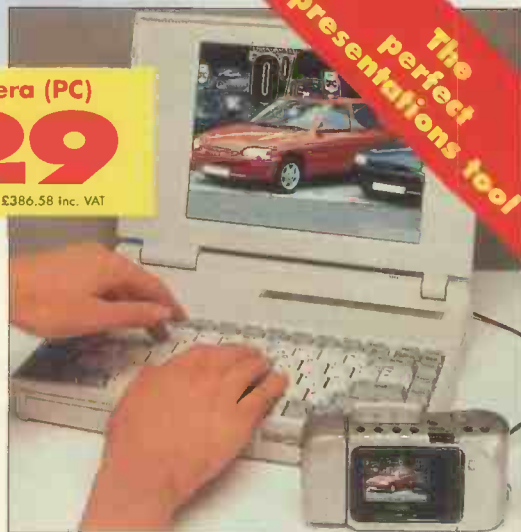
CASIO/QV10/PCKIT **£49** £57.58

MAC CONNECTION KIT

Includes software & cables

CASIO/QV10/MACKIT **£49** £57.58

- Built-in high resolution colour 1.8" TFT LCD screen
- 96 image memory
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- Any image delete function
- Self timer
- Multi image display
- Close-up macro lens
- 16.7 million colours (24 bit)
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- Compact lightweight design (less than 200gms)



The perfect presentations tool

Images can be downloaded to PC/Mac, laptop or TV/video

NEW!

QG-100 MINI COLOUR PRINTER

Print out passport size photographs

£189

£222.08

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Easily View & Organise Digital Camera Images

The easy way to store and organise all your digital images, the PhotoWallet™ will connect directly to the most popular digital cameras currently on the market.

Share the pictures easily with another user via the Inter-Comm™ utility included in the pack (two copies of PhotoWallet™ and Inter-Comm™ required)

- The essential software for all digital camera and scanner users
- Transfer images to other Windows applications
- Zoom, rotate and print any image
- Accepts input from twin devices (e.g. scanners)
- PhotoWallet™ Pro - is network enabled and has multiple image send

PHOTOWALLET™ COMPACT 50

£68 £79.90 inc. VAT (2 user pack £99.00)

PHOTOWALLET™ PRO

£199 £233.83 inc. VAT (PhotoWallet™ Compact 50 is limited to 50 wallets of 200 images each)



DELIVERY CHARGES

See page 40

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KODAK DIGITAL CAMERAS

What can a Kodak Digital Science camera do for you?

Plenty! You can take a picture. Then, almost instantly, the same image can appear on your computer screen, ready for your communication needs. Use a Kodak Digital Science camera...

- in the home. These cameras can be significant learning tools for children and teenagers and a useful extension to your multimedia PC

- as a business tool. Ideal for anyone who relies on quality images to sell a product or service. Bring alive a presentation or report with real life images imported from your camera.

Kodak ds
 digital science™

Kodak DC20
£245

KODAKDC20 £287.88 inc. VAT

Kodak DC40 **£455** **Kodak DC50** **£695**

KODAKDC40 £534.63 inc. VAT KODAKDC50 £816.63 inc. VAT



Kodak DC25
 • 2MB internal storage
 • Use optional 2MB Kodak picture card compact FLASH memory cards to store even more pictures
 • 24-bit
 • Resolution up to 493 x 373

£399

KODAKDC25 £468.83 inc. VAT



Kodak Digital Science DC20 Camera

- The DC20 point and shoot camera is very simple to use thanks to a focus free lens and automatic exposure facility and it stores up to 16 images (1MB memory) at any one time
- Turn your images into digital photographs and print or E-mail them - resolution 493 x 373 (in high mode)
- Kodak's POWER GOO - Professional image editing software allows you to create special images and experiment with the image

- Create custom slide shows
 - The mobile image solution - extremely compact (31mm x 102mm x 61mm)
- Includes:
 Macintosh and PC cable
 3V lithium battery
 User guide
 PHOTO-ENHANCER software for photo enhancement

Kodak Digital Science DC40 Camera

- The cost effective, versatile ready to use digital camera for the professional and business user.
- 756 x 504 resolution
 - 4MB internal memory

- Focus free
- Stores up to 99 images in compressed mode (44 in standard mode)

Kodak Digital Science DC50 Camera with zoom

- Offers greater flexibility with image types and resolutions
- Store 7 'best' quality images, 11 'better' quality images or 22 'good' quality images per 1MB
 - 1MB standard memory - unlimited memory storage with PCMCIA memory cards
 - 756 x 504 resolution
 - 3x outofocus zoom lens with close-up mode

GRADE ONE REGULAR SIMMS & DIMMS

30 PIN SIMMS

These are mainly used in 386 and 486 systems over 2 years old. They are 3.5" long and have a notch cut out next to pin one. The notch will allow the SIMM to be inserted only one way into the socket. They come in capacities of 256Kb, 1MB, 4MB and 16MB. They have usually 3 or 9 DRAM chips on the circuit boards and are always single sided. These are available in non-parity and parity form.

Processor	Number of 30 pin SIMMS per bank	Type	Capacity	Speed	ex. VAT	inc. VAT
286	Pairs (2)	1M x 32	4MB	70ns	£19	£22.33
386SX	Pairs (2)	1M x 32	4MB	60ns	£20	£23.50
386DX	Quads (4)	1M x 36	4MB	70ns	£31	£36.43
486SX	Quads (4)	1M x 36	4MB	60ns	£32	£37.60
486DX	Quads (4)	2M x 32	8MB	70ns	£38	£44.65
		2M x 32	8MB	60ns	£39	£45.83
		2M x 36	8MB	70ns	£58	£68.15
		2M x 36	8MB	60ns	£59	£69.33
		4M x 32	16MB	70ns	£89	£104.58
		4M x 32	16MB	60ns	£91	£106.93
		4M x 36	16MB	70ns	£95	£111.63
		4M x 36	16MB	60ns	£96	£112.80
		8M x 32	32MB	70ns	£190	£223.25
		8M x 32	32MB	60ns	£181	£212.68
		8M x 36	32MB	70ns	£229	£269.08
		8M x 36	32MB	60ns	£191	£224.43
		16M x 32	64MB	60ns	£860	£1010.50

GOLD EDGED SIMMS

*Specified by many PC manufacturers - longer MTBF

1M x 9	1MB	70ns	£31	£36.43
1M x 9	1MB	60ns	£25	£29.38

72 PIN SIMMS

These are used in newer 486 and most Pentium systems. These are longer than 30 pin SIMMS (4.25") and also have a notch next to pin one, together with another cut-out in the centre of the pins.

Processor	Number of 72 pin SIMMS per bank	Type	Capacity	Speed	ex. VAT	inc. VAT
486SX	Single (1)	1M x 32	4MB	70ns	£19	£22.33
486DX	Single (1)	1M x 32	4MB	60ns	£20	£23.50
Pentium	Pairs (2)	1M x 36	4MB	70ns	£31	£36.43
		1M x 36	4MB	60ns	£32	£37.60
		2M x 32	8MB	70ns	£38	£44.65
		2M x 32	8MB	60ns	£39	£45.83
		2M x 36	8MB	70ns	£58	£68.15
		2M x 36	8MB	60ns	£59	£69.33
		4M x 32	16MB	70ns	£89	£104.58
		4M x 32	16MB	60ns	£91	£106.93
		4M x 36	16MB	70ns	£95	£111.63
		4M x 36	16MB	60ns	£96	£112.80
		8M x 32	32MB	70ns	£190	£223.25
		8M x 32	32MB	60ns	£181	£212.68
		8M x 36	32MB	70ns	£229	£269.08
		8M x 36	32MB	60ns	£191	£224.43
		16M x 32	64MB	60ns	£860	£1010.50

72 PIN EDO SIMMS

1M x 32 EDO	4MB	60ns	£21	£24.68
2M x 32 EDO	8MB	60ns	£39	£45.83
4M x 32 EDO	16MB	60ns	£91	£106.93
8M x 32 EDO	32MB	60ns	£185	£217.38

Synchronous (SD) RAM - Call for details

DIMMS

72 PIN DIMMS

1M x 32 5V	4MB	70ns	£69	£81.08
2M x 32 5V	8MB	70ns	£99	£116.33
4M x 32 5V	16MB	70ns	£399	£468.83

168 PIN DIMMS

1M x 64	8MB	60/70ns	£79	£92.83
2M x 64	16MB	60/70ns	£129	£151.58
4M x 64	32MB	60/70ns	£198	£232.63
8M x 64	64MB	60/70ns	£385	£452.38
1M x 64SDRAM	8MB	66MHz	£89	£104.58
2M x 64SDRAM	16MB	66MHz	£135	£158.63
4M x 64SDRAM	32MB	66MHz	£215	£252.63

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The easy way to store and organise all your digital images, the PhotoWallet™ will connect directly to the most popular digital cameras currently on the market.

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- The essential software for all digital camera and scanner users
- Transfer images to other Windows applications
- Zoom, rotate and print any image
- Accepts input from twin devices (e.g. scanners)
- PhotoWallet™ Pro - is network enabled and has multiple image send

PHOTOWALLET™ COMPACT 50

£68 £79.99 inc. VAT
 (2 user pack £99.00)

PHOTOWALLET™ PRO

£199

PHOTOWALLET™ £233.83 inc. VAT

(PhotoWallet™ Compact 50 is limited to 50

wallet of 700

images each)

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- 2ppm in colour
- 600 x 600 dpi in black
- 600 x 300 dpi in colour with PhotoRet
- 512KB memory
- 30 TrueType fonts



£189
HPDJ690 £222.08 inc. VAT

**HP
SupportPack**

- On-site warranty by HP engineers
- Recommended for all HP Laserjets, Deskjets & Copyjets



**DELIVERY
CHARGES**
See page 40



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HP DeskJet 870Cxi

*Premium personal inkjet
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- Lotus Wordpro, 1 month
Compuserve FREE trial
included

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- 600 x 360 dpi in black
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- 59 page sheet feeder
- Windows 95 compatible

HP DESKJET 400
HPDJ400 **£119** £139.83 inc. VAT

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HPDJ400C **£139** £163.33 inc. VAT

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1600C**

- 600 x 600 dpi in black
- HP DESKJET 1600C**
HPDJ1600C **£819** £962.33 inc. VAT

**HP DESKJET
340 COLOUR**

- 600 x 600 dpi in black
- 13 scalable Windows fonts

**HP DESKJET 340 NOW
WITH CUT SHEET FEEDER**
HPDJ340 **£155** £182.13 inc. VAT

**HP DESKJET 340 without
colour kit**
HPDJ340 **£142** £166.85 inc. VAT

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colour kit and IR adapter
for cable-free printing**
HPDJ340K **£179** £210.33 inc. VAT

HP LASERJET 6P

HP Laserjet 6P

£499
HPJ6P £586.33 inc. VAT

- 600 x 600 dpi
- 8 pages per minute
- RET technology incorporated to enhance resolution
- 2MB RAM
- PCL6 compatible

HP LASERJET 6MP - POSTSCRIPT

HPJ6MP **£609** £715.58 inc. VAT



HP DeskJet 820Cxi

*High performance
personal inkjet printer*

- Only Windows compatible
- 6.5 ppm in black
- 4ppm colour
- 600 x 600 dpi black
- 600 x 300 dpi colour
- 50 TrueType fonts

£249
HPDJ820CXI £292.58 inc. VAT

**HP LASERJET
5Si**

- 24 pages per minute
- 600 dpi
- 4MB RAM
- 1 year on site warranty

HP LASERJET 5Si
HPLJ5 **£1985** £2332.38 inc. VAT

HP LASERJET 5SiM
• 12MB RAM
HPLJ5SIMX **£2834** £3329.95 inc. VAT

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NEW!

*The complete
office solution*

- 600 x 300 dpi
- High quality printer
- Integrated fax
- Photocopier
- Scanner

HP OFFICEJET 350

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**HP LASERJET
5**

HP LASERJET 5
HPLJ5 **£868** £1019.90 inc. VAT

HP LASERJET 5P
HPLJ5P **£575** £675.63 inc. VAT

HP LASERJET 5N
HPLJ5N **£1015** £1192.63 inc. VAT

**HP LASERJET 5M
POSTSCRIPT**
HPLJ5MP **£1199** £1408.83 inc. VAT

**HP LASERJET
5L**

- 4 pages per minute
 - 600 x 600 dpi in black
 - 1MB RAM
 - New innovative style case
- HP LASERJET 5L**
HPLJ5L **£289** £339.58 inc. VAT

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COLOUR**

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HPJ5COLUS £4933.83 inc. VAT

**HP5M COLOUR
(POSTSCRIPT)**
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HPJ5MUSM £6108.83 inc. VAT

**Matched
Memory Kits for
HP Printers on
page 11**

BANK

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BROTHER PRINTERS



brother®

HL - 730 laser printer
The solution to your demanding print needs - the Brother HL730 printer offers flexible, high print quality and at a truly affordable price.

NEW LOW PRICE!

£289

BROHL730

£339.58 inc. VAT

The Brother name is synonymous with quality, reliability and cost effective price

- **Looks professional**
Crystal clear printing with true 600 x 600 dpi in Windows
Brother micro-fine toner provides superb quality print
- **Prints quickly**
6ppm printing
Utilises unique straight line printing technology which means faster printing

- **Printing flexibility**
Supports Windows and DOS as standard, Macintosh optional
Enhanced memory management system
512Kb memory as standard
- **Runs economically**
Built-in toner save mode
Automatic power save mode
Easy replaceable cartridge



Brother 760 Printer

- 6ppm printing
- 1MB memory
- 1200 x 600 (WIN)
- 600 x 600 (DOS)
- 12 month return-to-base warranty

£349

BROHL760 £410.08

Brother HL660 Printer

- Fast true 600 dpi at an affordable price
- 6 pages per minute printing
- True 600 dpi
- PCL5e
- Network connectivity
- Straight paper path

£385

BROHL660 £452.38

Brother HL1660 Printer

- 16ppm printing
- Up to 1200 dpi printing
- 12,000 page high-capacity printing cartridge

£1099

BROHL1660 £1291.33

MFC 9000 multifunction printer

Fax • Scanner • Copier

- 6ppm - 600 dpi

£729

BROMFC9000 £856.58 inc. VAT

NEW!



Brother 1060e Laser Printer

£599

BROHL1060 £703.83



Brother HL1260

High volume and capacity printing

- 12 page per minute printing
- True 600 dpi
- High volume paper input - 650 sheets as standard
- Duplex option
- Full network connectivity

HL - 1260 laser printer
£825

BROHL1260 £969.38 inc. VAT

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EPSON®



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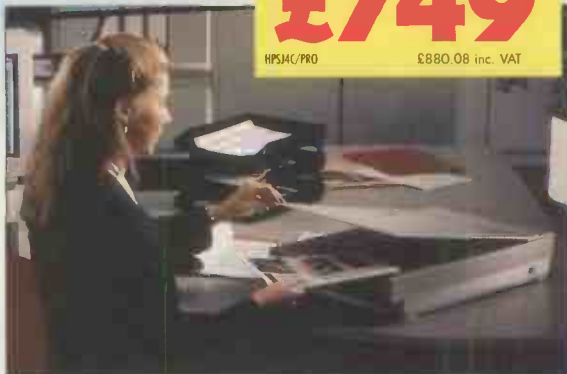
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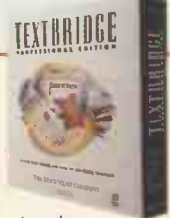
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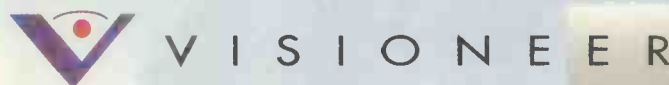
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See page 40



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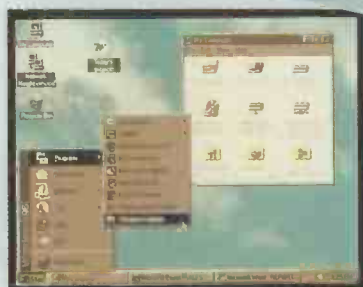
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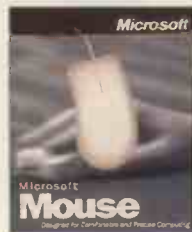
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**DELIVERY
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DBASES/WCUP	Dbase V WIN CUP	£140	£164.50
MSACC/DBKIT	MS Access V2.2 Developers Kit WIN	£229	£269.08
MSFOX/PROW	MS Foxpro V3.0 WIN 3.5	£139	£163.33
BOR/PARASW/UG	Paradox V5 WIN UP	£71	£83.43
SUPERBASE/W95	Superbase 95 WIN	£165	£193.88

UTILITIES

Norton Software			
NORU	Norton Utilities V8	£83	£97.53
NORUBUP	Norton Utilities V8 UP	£47	£55.23
NORUTILS	Norton Utilities For Win 95	£83	£97.53
NORAV95	Norton Antivirus For Win 95	£59	£69.33
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QEMM95	Qemm for Windows 95	£44	£51.70
STACKV4UP	Stacker V4 UP	£36	£42.30
SYTOS+SOS2	Systos Plus for OS/2	£129	£151.58
XTREE64W	Xtree Gold V4 WIN	£69	£81.08
PCILLIN	PC-illin 95	£34	£39.95

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16Mb 4x32.....	£49	£57 ⁵⁸	16Mb EDO	£56	£65 ⁸⁰
32Mb 8x32.....	£119	£139 ⁸³	32Mb EDO.....	£139	£163 ³³

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ME03	256k	256 x 9	70ns	£5	£5.88
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ME10	4MB	4 x 9	70ns	£25	£29.38

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Model	Capacity	Configuration	Speed	EX. VAT	INC. VAT
ME15	4MB	1 x 32	70ns	£12	£14.10
ME20	8MB	2 x 32	70ns	£24	£28.20
ME25	16MB	4 x 32	70ns	£49	£57.58
ME30	32MB	8 x 32	70ns	£119	£139.83

72-PIN WITH-PARITY MEMORY

Model	Capacity	Configuration	Speed	EX. VAT	INC. VAT
ME17	4MB	1 x 36	70ns	£25	£29.38
ME22	8MB	2 x 36	70ns	£49	£58.83
ME27	16MB	4 x 36	70ns	£97	£116.95
ME35	32MB	8 x 36	70ns	£194	£231.33

72-PIN EDO MEMORY

Model	Capacity	Configuration	Speed	EX. VAT	INC. VAT
ME18	4MB	1 x 32	60ns	£14	£16.45
ME24	8MB	2 x 32	60ns	£26	£30.55
ME29	16MB	4 x 32	60ns	£56	£65.80
ME34	32MB	8 x 32	60ns	£139	£163.33

168 PIN DIMM MEMORY

Model	Capacity	Configuration	Speed	EX. VAT	INC. VAT
ME50	8MB	64Bit	70ns	£59	£69.32
ME55	16MB	64Bit	70ns	£99	£116.33
ME60	32MB	64Bit	70ns	£169	£198.58
ME65	64MB	64Bit	70ns	£329	£386.58

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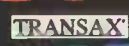
MATCHED MEMORY

Model	Capacity	Configuration	Speed	EX. VAT	INC. VAT
Deskpro XL 450, 466, 560, 566, 590, 5100, 5120, 5133.	4Mb	148187-001	MM5	£69	£81.08
	8Mb	148188-001	MM10	£55	£64.63
	16Mb	148189-001	MM15	£129	£151.58
Prosignia 300, Prosignia 500, 5/905/120, 5/150	32Mb	148190-001	MM20	£189	£222.08
	633, 650, 660	4Mb	141684-001	MM25	£27
PORTABLE 486/66, 486C/66	8Mb	141685-001	MM30	£50	£58.75
	16Mb	141686-001	MM35	£95	£111.63
	2Mb	118689-001	MM40	£49	£57.58
LTE 5000, 5100, 5200, 5300	4Mb	118690-001	MM45	£36	£42.30
	8Mb	118677-001	MM50	£56	£65.80
	8Mb	213515-001	MM55	£75	£88.13
LTE Elite 4/40/C, 4/40CX, 4/50CX, 4/50E, 4/75CX	16Mb	213515-002	MM60	£139	£163.33
	32Mb	213515-003	MM65	£259	£304.33
	64Mb	213515-004	MM70	£499	£586.33
Presario 510, 520, 524, 526, CDS 720, 724, 860, CDS 920, 924, CDTV 520, 920.	4Mb	147522-001	MM90	£20	£23.50
	8Mb	147523-001	MM95	£32	£37.60
	16Mb	147524-001	MM100	£75	£88.13
ProLinea / Deskpro EDO	32Mb	147525-001	MM105	£155	£182.13
	8Mb	243011-001	MM110	£45	£52.88
	16Mb	243012-001	MM115	£69	£81.08
Deskpro XE 4100, 433s, 450, 466, 4Mb	32Mb	243013-001	MM120	£149	£175.08
	16Mb	243014-001	MM125	£299	£351.33
	4Mb	141684-001	MM130	£29	£34.08
Prolinea 4/25S, 4/33, 4/50, 466, 8Mb	16Mb	141685-001	MM135	£51	£59.93
	16Mb	149320-001	MM140	£95	£111.63
	4Mb	141684-001	MM130	£29	£34.08

Model	Capacity	Configuration	Speed	EX. VAT	INC. VAT
Advantage! Pro 486, Bravo LC, LP	4Mb	500987-002	MM185	£29	£34.08
	8Mb	500987-003	MM190	£39	£45.83
	16Mb	500987-004	MM195	£75	£88.13
Manhattan G	32Mb	500987-005	MM200	£149	£175.08
	4Mb	501159-001	MM205	£39	£45.83
	8Mb	501159-002	MM210	£59	£69.33
PowerExec 3 & 4/33 SL 4/25SL	16Mb	501159-003	MM215	£99	£116.33
	32Mb	501159-004	MM220	£169	£198.58
	4Mb	500984-001	MM225	£59	£69.33
Ascenia 800, 810	8Mb	500984-002	MM230	£85	£99.88
	16Mb	500984-003	MM235	£169	£198.58
	4Mb	501488-001	MM240	£55	£64.63
Low Profile Power Desktop, Power Desktop 486P series, 486D series.	8Mb	501488-002	MM245	£85	£99.88
	16Mb	501488-003	MM250	£149	£175.08
	4Mb	310-2507	MM145	£31	£36.43
Dimension XPS midsize 4100 & 456. Performance range. OptiPlex range. PowerEdge XE 466, 433 & 433s	16Mb	310-2625	MM150	£89	£104.58
	4Mb	310-2507	MM155	£20	£23.50
	8Mb		MM160	£42	£49.35
Vectra 486 Range	16Mb	310-3327	MM165	£79	£92.83
	32Mb		MM170	£149	£175.08
	4Mb	D2156A	MM175	£29	£34.08
Aptiva	8Mb	D2152A	MM180	£55	£64.63
	4Mb	92G7539	MM255	£20	£23.50
	8Mb	92G7541	MM260	£39	£45.83
T2100, T2105, T2110, T2135, T2150	16Mb	92G7543	MM265	£95	£111.63
	32Mb	92G7545	MM270	£189	£222.08
	4Mb	NW2026U	MM275	£55	£64.63
Portege 610C, Satellite Pro 400CDT	8Mb	NW2027U	MM280	£75	£88.13
	16Mb	NW2028U	MM285	£130	£152.75
	24Mb	NW2029U	MM290	£189	£222.08
	8Mb	NW2031U	MM295	£75	£88.13
	16Mb	NW2032U	MM300	£149	£175.08
	32Mb	NW2034U	MM305	£299	£351.33

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MOODELS	SIZE	MANUF'S PART N°	CODE	KINGSTON PART N°	EX. VAT	INC. VAT		
AST	Advantage Pro 486,	4Mb 500987-002,5008	MEK5	KST-0987/4	£29	£34.08		
	Bravo LC, LP	8Mb 500987-003,5013	MEK10	KST-0987/8	£57	£66.98		
		16Mb 500987-004,	MEK15	KST-0987/16	£104	£122.20		
		32Mb 500987-005,	MEK20	KST-0987/32	£207	£243.23		
	Manhattan G	4Mb	501159-001	MEK25	KST-486P/4	£170	£199.75	
		8Mb	501159-002	MEK30	KST-486P/8	£79	£92.83	
		16Mb	501159-003	MEK35	KST-486P/16	£150	£176.25	
		32Mb	501159-004	MEK40	KST-486P/32	£235	£276.13	
	PowerExec 3	4Mb	500984-001,5013	MEK45	KST-0984/4	£53	£62.28	
		8Mb	500984-002,	MEK50	KST-0984/8	£85	£99.88	
		16Mb	500984-003,5013	MEK55	KST-0984/16	£150	£176.25	
	Ascentia 800, 810	4Mb	501488-001	MEK60	KST-800N/4	£48	£56.40	
8Mb		501488-002	MEK65	KST-800N/8	£76	£89.30		
16Mb		501488-003	MEK70	KST-800N/16	£147	£172.73		
Deskpro XL, ProLiant 1500 series, ProSignia 300, 500	8Mb	148188-001	MEK100	KTC-1481/8	£76	£89.30		
	16Mb	148189-001	MEK105	KTC-1481/16	£150	£176.25		
	32Mb	148190-001	MEK110	KTC-1481/32	£235	£276.13		
	64Mb	148191-001	MEK115	KTC-1481/64	£468	£549.99		
LTE 500, 5100, 5200	8Mb	213515-001	MEK120	KTC-E5000/8	£85	£99.88		
	16Mb	213515-002	MEK125	KTC-E5000/16	£150	£176.25		
	32Mb	213515-003	MEK130	KTC-E5000/32	£292	£343.10		
	64Mb	213515-004	MEK135	KTC-E5000/64	£558	£655.65		
COMPAQ	Deskpro 2000, 4000 & 6000	8Mb	243011-002	MEK150	KTC-2430/8	£57	£66.98	
		16Mb	243012-002	MEK155	KTC-2430/16	£113	£132.78	
		32Mb	243013-002	MEK160	KTC-2430/32	£207	£243.23	
		64Mb	243014-002	MEK165	KTC-2430/64	£412	£484.10	
Armada	8Mb	217914-001	MEK180	KTC-A4100/8	£81	£95.18		
	16Mb	217915-001	MEK185	KTC-A4100/16	£142	£166.85		
	32Mb	217916-001	MEK190	KTC-A4100/32	£267	£313.73		
IBM	Aptiva	4Mb	9267539,070N04	MEK200	KTM-APTIV/4	£29	£34.08	
		8Mb	9267541,070N08	MEK205	KTM-APTIV/8	£57	£66.98	
		16Mb	9267543,070N01	MEK210	KTM-APTIV/16	£104	£122.20	
		32Mb	9267545,070N32	MEK215	KTM-APTIV/32	£207	£243.23	
		64Mb	76H0274	MEK220	KTM-0274/16	£155	£182.13	
IBM	PC365 S180, 6589-10U & 18U 6589-17U, S200 6589-12U	32Mb	76H0275	MEK225	KTM-0274/32	£301	£353.68	
		32Mb	76H0275	MEK225	KTM-0274/32	£301	£353.68	
DELL	PowerEdge XE, Optip, Omniplex 4100, Dimension XPS P60 Optiplex GXPRO	4Mb	310-3325	MEK300	KTD-LMT/4	£29	£34.08	
		8Mb	310-6083	MEK305	KTD-LMT/8	£57	£66.98	
		16Mb	310-3327	MEK310	KTD-LMT/16	£104	£122.20	
		32Mb	N/A	MEK315	KTD-LMT/32	£207	£243.23	
		64Mb	N/A	MEK320	KTD-GXPRO32	£296	£347.80	
DELL	Optiplex GXPRO	64Mb	N/A	MEK325	KTD-GXPRO64	£641	£753.18	
		T2100, T2105, T2111, T2135, T2150	4Mb	NW2026U	MEK400	KTT-2100/4	£48	£56.40
			8Mb	PA2027U	MEK405	KTT-2100/8	£81	£95.18
			16Mb	NW2028U	MEK410	KTT-2100/16	£150	£176.25
24Mb	NW2029U		MEK415	KTT-2100/24	£216	£253.80		
TOSHIBA	Portege 610C, Satellite Pro 400CDT	8Mb	NW2031U	MEK420	KTT-610/8	£85	£99.88	
		16Mb	NW2032U	MEK425	KTT-610/16	£156	£183.30	
		32Mb	NW2034U	MEK430	KTT-610/32	£320	£376.00	
DIGITAL	HINOTE VP 520, 525 & 535	8Mb	FR-PCP9M-BA	MEK500	KTV-VP500/8	£84	£98.70	
		16Mb	FR-PCP9M-BB	MEK505	KTV-VP500/16	£158	£185.65	
		32Mb	FR-PCP9M-BC	MEK510	KTV-VP500/32	£296	£347.80	

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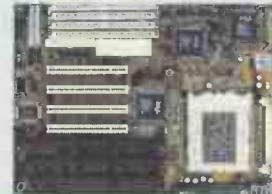
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C150	INTEL	PENTIUM	150MHZ	16K	3.3V	£205	£240.88
C166	INTEL	PENTIUM	166MHZ	16K	3.3V	£279	£327.83
C201	INTEL	PENTIUM	200MHZ	16K	3.3V	£369	£433.57



CODE	MAKE	TYPE/MODEL	CACHE	EX VAT	INC VAT
C205	INTEL	PENTIUM PRO 166	512K	£469	£551.00
C210	INTEL	PENTIUM PRO 180	256K	£350	£421.83
C201	INTEL	PENTIUM PRO 200	256K	£399	£468.83
C215	INTEL	PENTIUM PRO 200	512K	£749	£880.08

486 CPUs	CODE	MAKE	TYPE/MODEL	SPEED	CACHE	VOLTAGE	EX VAT	INC VAT
	C10	INTEL	SX	25MHZ	8K	5V	£6.99	£8.21



CODE	MAKE	TYPE/MODEL	SPEED	CACHE	VOLTAGE	EX VAT	INC VAT
C145	CYRIX	6X86-P133+	120MHZ	16K	3.3V	£99	£116.33
C160	CYRIX	6X86-P150+	133MHZ	16K	3.3V	£95	£111.63
C165	CYRIX	6X86-P166+	133MHZ	16K	3.3V	£139	£163.33
C170	CYRIX	6X86-P200				£349	£410.08

486 CPUs	CODE	MAKE	TYPE/MODEL	SPEED	CACHE	VOLTAGE	EX VAT	INC VAT
	C47	CYRIX	DX4	100MHZ	8K	5V	£19	£22.33
	C111	CYRIX	5X86	100MHZ	16K	3.3V	£39	£45.82
	C30	CYRIX	DX/2	66MHZ	8K	5V	£15	£17.63
	C42	CYRIX	DX/2	80MHZ	8K	3.3V	£16	£18.80
	C7	UMC	SX	20MHZ	8K	5V	£5	£5.87
	C5	UMC	SX	40MHZ	8K	5V	£6.50	£7.64



Throughout the history of producing Am386 and Am486 processors' AMD has maintained a solid working relationship with Microsoft Corporation. Building on this relationship, they worked closely with Microsoft to ensure the AMD-K586 processors Windows compatibility. As a result, the AMD-K586 processor is licensed by the Microsoft Windows Hardware Quality labs to carry the Windows logo, a viable, compatible fifth-generation processor to the PC Industry.

CODE	MAKE	TYPE/MODEL	SPEED	CACHE	VOLTAGE	EX VAT	INC VAT
C55	AMD	K5 5X86-75	75MHZ	16K	3.3V	£39	£45.83
C56	AMD	K5 5X86-90	90MHZ	16K	3.3V	£48	£56.40
C57	AMD	K5 5X86-100	100MHZ	16K	3.3V	£59	£69.33

486 CPUs	CODE	MAKE	TYPE/MODEL	SPEED	CACHE	VOLTAGE	EX VAT	INC VAT
	C44	AMD	DX/4	100MHZ	8K	3.3V	£23	£27.03
	C51	AMD	5X86	133MHZ	16K	3.3V	£32	£37.60
	C50	AMD	DX/4	120MHZ	8K	3.3V	£32	£37.60

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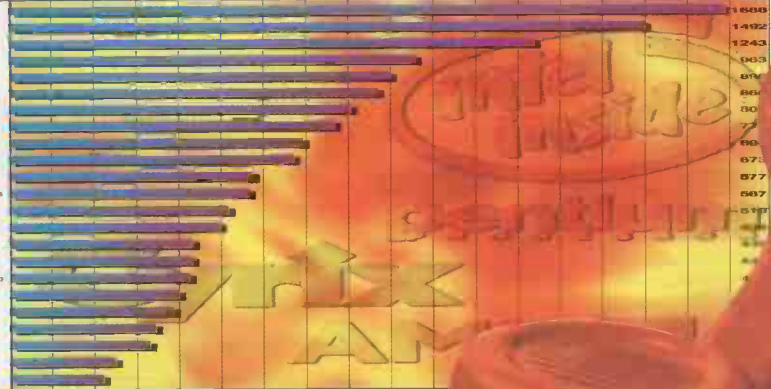
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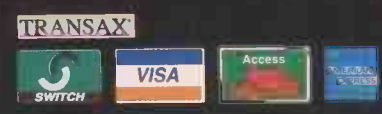
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HEAT SINKS & FANS			
HS10	486 HEAT SINK & FAN	£3.40	£4.00
HS20	PENTIUM HEAT SINK & FAN	£4.26	£5.00
HS25	PENTIUM PRO HEAT SINK & FAN	£9.00	£10.58
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2Mb PCI 64Bit Video Card	£35 + VAT
Heatsink & Fan	£4.26 + VAT
Total individual cost	£282.26 + VAT
Total bundle cost	£253.00 + VAT

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Heatsink & Fan	£9 + VAT
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4

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3. Firmly press the Powerleap module into the socket. The upgrade is now complete and you can now turn on your PC and enjoy the massive increase in computing power!



Upgrade your 486 SX/DX system to a 586/133Mhz
POWERLEAP 586/133

- Increases existing CPU performance by up to 350%
- 16K internal cache
- Gives systems ultra high maths performance
- Plug and Play – no software needed
- 5yr warranty

00100 PowerLeap 586/133

EX. VAT **£79** INC. VAT **£92.83**

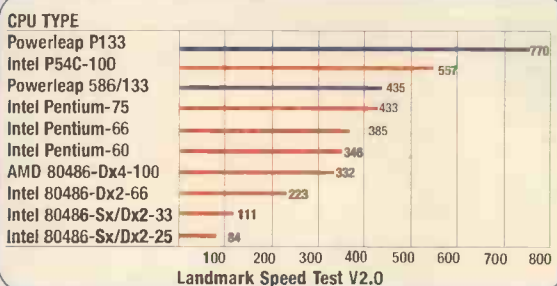


Upgrade your Pentium 60/66 system to a Pentium 133Mhz
POWERLEAP P133

- Maximises investment in existing Pentium hardware
- Higher reliability due to lower operating voltage
- Plug and Play – no software needed
- 5 year warranty

00105 PowerLeap P133

EX. VAT **£145** INC. VAT **£170.38**



The Pentium™ OverDrive processor is available in four versions, based on your system's bus speed

CODE	SPEED	WITH O/D SOCKET	WITHOUT O/D SOCKET
INTEL OVERDRIVE CPUs			
0020/21	DX/4 100MHZ	£109	£128.08
0025/30	Pentium 63/83MHZ	£89	£104.58
INTEL PENTIUM OVERDRIVE CPUs			
0035	INTEL Pentium Overdrive	P60 to P120	£165 £193.88
0040	INTEL Pentium Overdrive	P66 to P133	£165 £193.88
0045	INTEL Pentium Overdrive	P75 to P125	£165 £193.88
0050	INTEL Pentium Overdrive	P90 to P150	£215 £252.63
0055	INTEL Pentium Overdrive	P100 to P166	£309 £363.08

Same-day despatch on all stock

PLEASE NOTE! Although all prices & specifications are correct at time of going to press, the company reserve the right to alter both without prior notification. All prices exclude delivery & are valid from 1/12/96 to 31/12/96. E&OE. 6PM* see page 8.

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MOTHERBOARDS

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Pentium Pro Motherboard



CPU Supports Pentium Pro 150/166/180/200, Zif socket 8 VRM included.

Architecture 4 PCI slots & 3/4 ISA slots

Cache Supports either 256k or 512k Internal CPU Cache

System Memory Uses 72-pin SIMM modules x 4 auto banking in multiple configuration up to 256MB. Supports both Fast page Mode & EDO DRAM.

I/O SPEC. Supports 4 IDE devices, 2x floppy disk drives, 2x 16550 UART fast serial port EPP/ECP high performance parallel port. Supports USB.

System BIOS

Supports Flash ROM, Plug & Play, Green Feature, NCR 810 SCSI BIOS. Award version 4.51PG PNP V1.0A

PCB Size

22cm x 28cm



Opti Viper Pentium Motherboard

The Opti Viper Mainboard is a high performance mainboard offering similar features and performance to it's Intel rivals but at a lower cost. It is based on the advanced Pentium microprocessor, the PCI Bus and the Opti Viper Chipset. The mainboard offers a high degree of flexibility in configuration and is fully IBM PC/AT compatible.

CPU

Support either 75-200 Mhz Pentium. CPUs with 321 Zif socket & regulator Module (VRM). Support Pentium P55C. Support Cyrix/IBM 6x86, AMD K5 CPUs

Architecture

3 PCI Local Bus slots & 4 x 16 bits ISA Bus slots. All 3 PCI slots support Master mode

Cache Memory Slot

Cache module options 256KB or 512KB pipeline burst SRAM module.

System Memory

Uses 72-pin SIMM modules x 4 auto banking in multiple configuration up to 256KB. Support both Fast page Mode & EDO DRAM module

I/O SPEC.

2 PCI IDE interface on board support ATA spec. up to mode 4 IDE interface. Support two 16550 compatible enhanced serial port, Floppy disk interface & EPP/ECP high performance parallel port function.

System BIOS

Supports Flash ROM, Plug & Play, Green Feature, NCR 810 SCSI BIOS

PCB Size

22cm x 26cm

SECURE ON-LINE ORDERING

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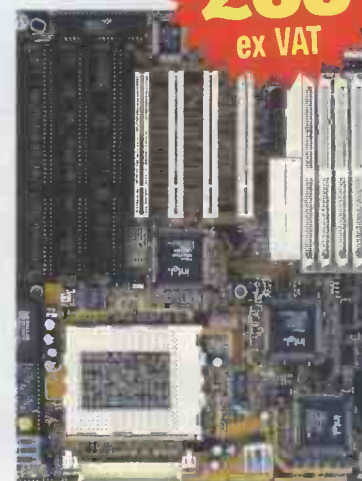
Triton VX Pentium Motherboard

The 1430VX mainboard is a high-performance mainboard based on the advanced Pentium™ microprocessor, the PCI Local Bus & the Intel 1430VX chipset. The mainboard offers a high degree of flexibility in configuration & is fully IBM PC/AT compatible.

- Intel 1430VX PCiset™ chipset
- Support either 75/90/100/120/133/166/180/200 Mhz PENTIUM™ CPUs with 321pin ZIF socket and Voltage Regulator Module (VRM)
- Support Pentium P55C
- Support Cyrix 6x86, AMD K5 CPUs
- Uses 72-pin SIMM modules x 4 auto banking in multiple configuration up to 128Mb
- Supports both Fast Page Mode and Extended DATA Output (EDO) DRAM module
- Support SDRAM/EDO DRAM Page Mode DRAM use 168-pin DIMMx1
- Supports cache module socket, cache module options 256kb or 512kb pipeline burst SRAM module
- 3 PCI Local Bus slots, and 4 x 16 bits ISA Bus slots
- All 3 PCI slots support Master mode
- System BIOS support 4 IDE hard disk drivers that don't need device driver for s/w application, the capacity each hard disk can large than 528Mb up to 8.4Gb

- PCI Bus master IDE interface on board with two connectors support 4 IDE devices in 2 channel, the PCI IDE Controller supports PIO Mode 0 to Mode 4 at maximum transfer rate of 16.67Mbps and Bus master IDE DMA Mode 2
- On board super Multi-I/O chip that support 2 serial port with 16550 Fast UART compatible, 1 parallel port with EPP and ECP capabilities, and a floppy disk drive interface
- Support PS2™ connector
- Support the Universal Serial Bus (USB) (option)
- System BIOS supports NCR810 SCSI BIOS firmware and Green feature function, Plug and Play Flash ROM (option)

media
FORCE



		EX. VAT	INC. VAT
M47-E	486 PCI M/B 256k cache, I/O onboard with Cyrix 586-100 MHz	£75	£88.13
M96	Elite P75-200 Motherboard 256k PLB IDE I/O Triton 2HX Chip Set	£109	£128.07
M96V	Elite P75-200 Motherboard 256k PLB IDE I/O Triton 2VX Chip Set	£109	£128.07

CM2	256k Pipeline Burst Cache Module	£10	£11.75
CM3	512k Pipeline Burst Cache Module	£25	£29.38
M92-HX5	Gigabyte High Quality P75-200 512k PLB IDE I/O onboard Triton 2HX Chipset	£119	£139.83



CODE	DESCRIPTION	EX. VAT	INC. VAT
M98-V	ChainTech 5IGM Supports Intel Pentium 200MHz 4 Chip VX PCI set	£89	£104.58
M98-H	ChainTech 5IFM Supports Intel Pentium 200MHz 2 Chip HX PCI set	£99	£116.32

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FACTORY

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CONTROLLERS

CODE	DESCRIPTION	EX. VAT	INC. VAT
BUSLOGIC CONTROLLER CARDS			
IC5-BL	KT445C VLB 32BIT SCSI ADAPTOR	£95	£111.62
IC15-BL	KT545C ISA 16BIT SCSI ADAPTOR	£139	£163.33
IC20-BL	KT946C PCI SCSI ADAPTOR	£149	£175.10
IC25-BL	KTC930C PCI ULTRA SCSI ADAPTOR KIT	£125	£146.88
IC30-BL	BTC930C PCI ULTRA SCSI CARD	£99	£116.33
IC35-BL	KTC950C PCI ULTRA SCSI WIDE ADAPTER KIT	£179	£210.33

ISA & VLB I/O CARDS			
IC90	ISA SUPER I/O CARD 2FDD/2HDD/2S/1P/1G	£7	£8.23
IC60	Vesa Super I/O (M3) 4HDD/2FDD/2S/1P/1G E-IDE	£11	£12.93



ADAPTEC CONTROLLER CARDS			
IC18	1515	£56	£65.80
IC19	1522	£95	£111.63
IC25	1542 CP ISA SCSI Controller Card	£119	£139.83
IC30	1542 CP ISA SCSI Controller Kit	£159	£186.83
IC35	2842 Vesa Local SCSI Controller Kit	£149	£175.08
IC40	2742T EISA SCSI Controller Kit	£229	£269.08
IC41	2920 Controller Kit	£96	£112.80
IC45	2940 PCI SCSI Controller Kit	£149	£175.08
IC46	2940 Ultra Wide SCSI Controller Kit	£195	£229.13
IC42	Slim SCSI PCMCIA Controller	£115	£135.13
IC48	348 Parallel SCSI	£74	£86.95
IC49	358 Mini SCSI Plus	£99	£116.32
IC51	3940U	£265	£311.38
IC52	3940UW	£319	£374.83
IC100	Airport 1000	£29	£34.08
IC105	Airport 2000	£42	£49.35
IC110	Airport 2500	£65	£76.38
S350	EZ-SCSI Software V4.0	£43	£50.53

VIDEO CARDS

CODE	DESCRIPTION	EX. VAT	INC. VAT
Diamond			
V82	DIAMOND STEALTH 64 VRAM VIDEO 2MB	£139	£163.33
V83	DIAMOND STEALTH 64 VRAM VIDEO 4MB	£245	£287.88
V-05	DIAMOND STEALTH 1MB DRAM 2000 PCI	£46	£54.05
V-010	DIAMOND STEALTH 2MB DRAM 2000 PCI	£59	£69.32
V-015	DIAMOND STEALTH 1MB EDO 2001 PCI	£48	£57.58
V-020	DIAMOND STEALTH 2MB EDO 2001 PCI	£59	£69.33
V-025	DIAMOND STEALTH 3D 2000 2MB EDO	£75	£88.13
V-026	DIAMOND STEALTH 3D 3000 2MB VRAM	£149	£175.08
V-027	DIAMOND STEALTH 3D 3000 4MB VRAM	£309	£363.08
V100	DIAMOND EDGE 3D 1MB DRAM	£135	£158.63
V105	DIAMOND EDGE 3D 2MB DRAM	£149	£175.08
V110	DIAMOND EDGE 3D 2MB VRAM	£245	£287.88
V115	DIAMOND EDGE 3D 4MB VRAM	£315	£370.13
Hercules			
V200	HERCULES STINGRAY 64/VIDEO PCI 1MB	£49	£57.58
V201	HERCULES STINGRAY 64/VIDEO PCI 2MB	£59	£69.33
V202	HERCULES TERMINATOR 3D 40ns EDO 2MB	£111	£130.43
V203	HERCULES TERMINATOR 3D 40ns EDO 2MB With MPEG Hardware 2MB	£142	£166.85
V204	HERCULES TERMINATOR 3D 40ns EDO 4MB	£184	£216.20
V205	HERCULES 128 Video PCI 2MB	£118	£139.33
V206	HERCULES 128 Video PCI 4MB	£162	£190.35
BTC			
V44	BTC 32BIT 1MB PCI	£21	£24.68
V51	BTC 64BIT 1MB 2MB PCI	£30	£35.25
V51-M	BTC 64BIT MPEG Card 1MB 2MB PCI	£35	£41.12
S3			
V52	PCI Vision S3 64Bit Card 1MB 2MB PCI	£27	£31.72
V54	PCI Vision S3 64Bit Card 2MB PCI	£34	£39.95
Trident			
V45	TRIDENT 9440 32BIT 1MB 2MB PCI	£32	£37.60
Cirrus Logic			
V46C	Cirrus Logic 5434 64 1MB 2MB PCI	£21	£24.67
V49-C	Cirrus Logic 5446 1Mb 2Mb PCI MPEG	£36	£41.13
V49-M	Cirrus Logic 5440 1MB 2MB PCI 64 MPEG	£25	£29.38
Video Logic			
V65	1MB DRAM Upgrade Chips	£9	£10.57
V71	2MB Video VRAM Upgrade module	£99	£116.32
V87	Video Logic GrafixStar 300 VLB	£35	£41.12
Number Nine Visual Technology			
V15-9	9FX Motion 331 1Mb PCI	£115	£135.13
V28-9	9FX Motion 331 2Mb PCI	£148	£173.90
V30-9	9FX Motion 531 1Mb PCI	£115	£135.13
V36-9	9FX Motion 531 1Mb PCI	£145	£170.38
V40-9	9FX Motion 771 1Mb PCI	£195	£229.13
V45-9	9FX Motion 771 4Mb PCI	£295	£346.63
V50-9	Imagine 128 1280 4Mb PCI	£459	£539.33
V55-9	Imagine 128 1600 4Mb PCI	£569	£668.58
V60-9	Imagine 128 8Mb PCI	£949	£1115.08

6 ACCESSORIES

FLOPPY DISKS

CODE	DESCRIPTION	EX. VAT	INC. VAT
DRIVES			
F05	MITSUMI 1.44MB 3.5"	£16	£18.80
F05-S	SONY 1.44MB 3.5"	£19	£22.33
F05-P	PANASONIC 1.44MB 3.5"		
	DIE CAST METAL CHASSIS	£21	£22.33
F010	MITSUMI 1.2MB 5.25"	£31	£36.43
ACCESSORIES			
U111	3.5" TO 5.25" M/KIT	£2	£2.35
AC40	LONG 5 HEAD FLOPPY CABLE	£2.50	£2.94
D10	Disk Storage Box	£3	£3.53

KEYBOARDS

Microsoft Natural Keyboard

- Unique contoured design encourages a balanced more natural hand & wrist position
- IntelliType software
- 104 key design - extra function keys



CODE	DESCRIPTION	EX. VAT	INC. VAT
AC45	PS/2 K/b Adaptor	£3	£3.53
K32	Win 95 Ergo Kbd & Built in Trakker	£35	£41.12
K5	BTC 102 Key UK K/b	£9	£10.58
K33	BTC 104 Key Win 95 UK K/b	£10	£11.75
K35	BTC 102 Key H/Quality K/b	£12	£14.10
K36	BTC 7931 Win 95 - H/Quality	£12	£14.10
K37	BTC 2-Part W95 Ergo K/b	£27	£31.73
K20	Fujitsu 4870 Click K/b	£18	£21.15
K25	Fujitsu 4700 Click K/b	£25	£29.38
K15	Cherry Windows 95 K/b	£17	£19.98
K30	Microsoft Natural K/b	£49	£57.58
K38	BTC Wireless K/board	£35	£41.13

CABLES & ACCESSORIES

CODE	DESCRIPTION	EX. VAT	INC. VAT
AC5	1.5m Parallel Printer Cable	£3	£3.53
AC5-E	Enhance Bi-Tronics Printer Cable	£7	£8.23
AC11	3m Parallel Printer Cable	£4	£4.70
AC10	5m Parallel Printer Cable	£5	£5.88
AC15	2-1 Printer Switch Box	£9	£10.58
AC20	4-1 Auto Printer Switch Box	£16	£18.80
AC25	25 Pin Male to 25 Pin Male Cable (suit. for above printer switch box)	£2	£2.35
AC30	Internal SCSI Cable	£3.50	£4.11
AC41	Serial Cable (Male to Female 28-Pin)	£2.99	£3.51
AC35	IDE Cable	£1.50	£1.76
AC36-7	0.7M IDE Cable (3 Heads)	£5.00	£5.88
AC40	Floppy Drive Cable (5 Head)	£2.50	£2.94
AC50	PC to Monitor Power Cable	£1.99	£2.34
AC56	Brit. Mains 3 Pin Fused Power Cable	£2.50	£2.94
AC80	Keyboard Extension Cable	£2.90	£3.41
AC65	VGA/SVGA Monitor Extension Cable	£3	£3.53
AC45	PS/2 Keyboard Adaptor (Std. keyboard to PS/2)	£3	£3.53
AC80	Box of 10 x 1.44Mb Formatted Disks	£1.99	£2.33
AC81	10 x Fuji 1.44Mb Formatted Disks	£4.99	£5.86
AC70	High Quality Mouse Mat	£1	£1.18
IDE Cables/FDD/SCSI Cables and Heads			
AC30-3	Int. SCSI Cable 3 Heads	£5	£5.88
AC30-4	Int. SCSI Cable 4 Heads	£12	£14.10
AC30-5	Int. SCSI Cable 5 Heads	£15	£17.63
AC30-6	Int. SCSI Cable 6 Heads	£19	£22.33
AC30-8	Int. SCSI Cable 8 Heads	£23	£27.08
AC30-E1	Ext. SCSI Cable HPS500M-50 Cent	£19	£22.33
AC30-E2	Ext. SCSI Cable HPS500M-HPS500M	£23	£27.03
TOM & JERRY MOUSE MATS			
AC71	"Real Mouse" Mat	£3.99	£4.69
AC72	"President" Mat	£3.99	£4.69
AC73	"Chase" Mat	£3.99	£4.69

JOYSTICKS

CODE	DESCRIPTION	EX. VAT	INC. VAT
J10	Rockfire Fire Dragon	£25	£29.38
J15	Rockfire H/Performance Joypad	£6	£7.05
J16	Rockfire Maya Fighter	£29	£34.08
J17	Rockfire Avant Garde	£19	£22.33
J20	Rockfire Reversible Joypad	£6	£7.05
J25	Rockfire U/F Shuttle Joypad	£13	£15.28
J30	Rockfire K/B Emulator C/pad	£19	£22.33
J35	Rockfire Glide Zipper 1	£15	£17.63
J40	Rockfire Glide Zipper 2	£27	£31.73
J50	Rockfire 4 Button Joystick	£8.50	£9.99
J55	Rockfire As above with throttle	£10	£11.75
J45	Trust Extreme Joystick keyboard emulator and hat	£49	£57.57
J41	Trust Predator Joystick	£18	£21.15
J60	Microsoft Sidewinder Pro 3	£34	£39.95
J61	Microsoft Sidewinder	£19	£22.13
J56	Flight Simulator 10" Genuine Race Wheel & Pedals	£220	£258.5

Silver Shuttle Keyboard Emulator Control Pad Glide Zipper I Infrared Remote Controllers UF Shuttle JoyPad - for the professional

SILVER SHUTTLE £13 EX. VAT **GLIDE ZIPPER £15 EX. VAT** **UF SHUTTLE £13 EX. VAT**

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THE GrafixStar 600
Lightning Fast 128 bit Windows Acceleration

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CODE: V96
EX. VAT



- Lightning Fast Windows performance from Tseng Labs ET6000 - 128bit graphics accelerator • Free MPEG Playback Software
- 2.25MB D-RAM (upgradable to 4.25) • 32-bit PCI local bus. Plug-n-Play compliant
- 5 Years Manufacturers' Warranty
- Drivers supplied include: Microsoft Windows 95, Windows 3.1 and Workgroups 3.1
- Accelerated Video Drivers: Windows 95 Direct Draw for accelerated playback of software MPEG, Indeo, Cinepack and other AVI clips.

THIS MONTH'S SPECIALS

V-D15	DIAMOND STEALTH 1MB EDO 2001 PCI	£49	£57.58
V-D25	DIAMOND STEALTH 3D 2000 2MB EDO	£75	£88.13
V-4C	CIRRUS LOGIC 5434 64 1MB 2MB PCI	£21	£24.67
V-5	1MB DRAM Upgrade Chips	£9	£10.57

V46-C MediaFORCE Video Excel 64Bit Accelerator

- Compatibility**
- 486SX/DX and Pentium PCI systems
 - Register compatible with EGA and VGA
 - Non-interlaced or interlaced monitor support
 - Compatible with Multi-scanning and PS/2 monitors
 - 1024x768 75Hz refresh
- Resolution & Colour Selection**
- Supports 640x480 in 16, 256, 32K, 64K and 16M colours
 - Supports 800x600 in 16, 256, 32k and 64K colours
 - Supports 1024x768 in 16 and 256 colours (I and NI)
 - Supports 1280x1024 in 16 and 256 colours interlaced
 - Supports 1600x1200 in 16 colours Interlaced
- Extended Text Display**
- 80 column text modes in 30, 43, and 60 rows
 - 132 column text modes in 25, 30, 43, and 60 rows
- Software Drivers Supported**
- CLMODE • TSRFONT • Windows NT 3.1 • Windows NT 3.5 • MS Windows 3.x



£21
CODE: V46-C
EX. VAT

CODE	DESCRIPTION	EX.VAT	INC. VAT
V86	GrafixStar 400 1MB	£39	£45.82
V86/1	GrafixStar 400 2MB	£48	£56.40
V96	GrafixStar 600 2.25MB	£122	£143.35
V95	GrafixStar 700 2MB	£169	£199.58
V95/1	GrafixStar 700 4MB	£305	£358.38

V52 MediaFORCE Video Excel PCI Vision S3 64Bit Card

- Compatibility**
- 486SX/DX and Pentium PCI systems
 - Register compatible with EGA and VGA
 - Non-interlaced or interlaced monitor support
 - Compatible with Multi-scanning and PS/2 monitors
 - 1024x768 75Hz refresh
 - High performance DRAM based 64Bit graphics engine
 - Support for India. Cinepack & software accelerated MPEG-1 video playback
- Resolution & Colour Selection**
- Supports 640x480 in 16, 256, 32K, 64K and 16M colours
 - Supports 800x600 in 16, 256, 32k and 64K colours
 - Supports 1024x768 in 16 and 256 colours (I and NI)
 - Supports 1280x1024 in 16 and 256 colours interlaced
 - Supports 1600x1200 in 16 colours interlaced
- Extended Text Display**
- 80 column text modes in 30, 43, and 60 rows
 - 132 column text modes in 25, 30, 43, and 60 rows
- Software Drivers Supported**
- S/MODE • S3 REFRESH • Win 3.1 • Win 95
 - AutoCAD • 3D Studio

£27
CODE: V52
EX. VAT

GrafixStar™	400 V86	600 V96	700 V95
Graphics Controller	S3 TRIO64V+	TSENG-T6000	VISION968
Performance	95+ MILLION Wm	110+ MILLION Wm	
Memory	DRAM 1MB	2.25MDRAM	VRAM 2-4MB
Maximum Resolution	1600x1200	1600x1200	1600x1200
AVI Acceleration	Standard	Standard	Standard
Software MPEG Playback	Yes	Yes	Yes
Bus Type	PCI	PCI	PCI

V51-M BTC 64-Bit MPEG Card 1Mb 2Mb PCI



- ARK2000MT VGA Graphic Chipset • ICS 5342 Gendec
- 1MB standard VGA memory on-board, easily upgradable to 2MB
- Video Acceleration, Support 30 fps video playback Colour space conversion, Continuous interpolation with Pixel Scaling 800x600 24-bit, 1024x768 16-bit colour video windows

£35 EX.VAT **£41.13** INC. VAT

V44 BTC 1618 32-Bit PCI VGA

- Entry level card with Advance ALG2302 graphic chipset
- 32-Bit PCI interface (PCI 2.0)
- 32-bit graphics engine • 32-bit memory data path
- 1MB standard VGA memory on-board
- Driver support includes: Windows 95 & 3.1X, Windows NT 3.5, OS/2 Warp, AutoCAD, 3D Studio
- Up to 1024 x 768 (256 colours)



£21 EX.VAT **£24.68** INC. VAT

V51 BTC 1628 64-Bit PCI VGA



- ARK2000PV VGA graphic chipset • 64-bit engine
- 32-Bit PCI interface (PCI 2.0 fully compatible)
- 64-bit memory data path • Up to 1600 x 1200 in 256 colours
- GUI accelerator for Windows 95, 3.1X, NT and OS/2 2.X, Warp
- 1MB standard VGA memory on-board (upgrade to 2MB)
- Driver support includes: Windows 95 & 3.1X, PC CAD 6.0, Versa CAD/386 2.1, Windows NT 3.1 & 3.5, OS/2 2.X & Warp

£30 EX.VAT **£35.25** INC. VAT

THE COMPLETE 3D ENTERTAINMENT & MULTIMEDIA ACCELERATOR

- 64-bit PCI graphics accelerator for the home
- Lightening fast 3D texture mapped games
- Fast and stable Windows
- High quality video playback
- Blazing DOS performance
- Includes 3D games
- 2 or 4 Mb base boards
- 2Mb board upgradeable to 4Mb



FROM: £99
CODE: V127
EX. VAT

Matrox (Win 95 Compatible Plug and Play)

V125	Millenium WRAM 2Mb PCI with games	£125	£146.88
V126	Millenium WRAM (UPGRADE) 2Mb PCI	£65	£76.38
V130	Millenium WRAM 4Mb PCI with games	£170	£199.75
V127	Matrox Mystique 2Mb SGRAM	£99	£116.33
V128	Matrox Mystique 2Mb SGRAM with 2 3D Games	£139	£163.33
V129	Matrox Mystique 4Mb SGRAM with 2 3D Games	£175	£205.63
V131	Matrox Mystique 2Mb Upgrade	£59	£69.33

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next day to all addresses
in the mainland UK.

Seagate

TAPESTOR 800MB TRAVAN

- Available as internal or standalone units
- Backup Exec software (DOS & Win)
- 800Mb Travan cartridge • Interface cable
- 9.5Mb/minute backup rate
- Backward compatible with QIC80 & AccuTrak compatibility



CODE	DESCRIPTION	TAPE	EX. VAT	INC. VAT
T53	Seagate 2GB DAT		£479	£562.83
T54	Seagate 8GB DAT		£619	£727.33
T55	Exabyte 4200 4GB		£529	£621.58
T56	SCSI Tape Drive 500MB		£249	£292.57
T57	SCSI Tape Drive 1GB		£349	£410.07

CODE	DESCRIPTION	TAPE	EX. VAT	INC. VAT
T60	TAPESTORE 800 (INT)		£85	£99.87
T90	TAPESTORE 3200 (INT)		£139	£163.33
T62-B	FALCON 8000 SCSI (INT)		£253	£297.28
T63-E	FALCON 8000 SCSI (EXT)		£319	£374.83
T64-E	FALCON 8000 EIDE (INT)		£253	£297.28

IOMEGA DITTO EASY DRIVE

- Utilises the latest Travan technology
- Available as internal or stand alone
- 2 year manufacturer's warranty

EASY DRIVE
£75
EX. VAT



PC MAGAZINE EDITORS' CHOICE

SECURE ON-LINE ORDERING

CODE	DESCRIPTION	TAPE	EX. VAT	INC. VAT
T80	DITTO 800MB (INT)		£75	£88.12
T85	DITTO 800MB (EXT)		£93	£109.28
T78-E	EXABYTE 3.2GB (INT)			
	TAPE STREAMER KIT		£115	£135.13
T200-I	IOMEGA 2000 (INT)		£104	£128.08
T200-E	IOMEGA 2000 (EXT)		£144	£169.20

COLORADO MEMORY SYSTEMS INC.

COLORADO TRAVAN T1000 TAPE DRIVE

- 800Mb capacity (with compression)
- Fits into 3.5" or 5.25" drive bay
- Up to 9.5Mb/min backup speed
- Backward compatible with QIC-80 & QIC-40
- TRAVAN technology
- Includes FREE Tape



CODE	DESCRIPTION	TAPE	EX. VAT	INC. VAT
T65	Travan T1000 (INT)		£85	£99.88
T66	Trakker T1000e (EXT.)		£107	£125.73
T67	Jumbo DJ50 (inc. controller & W3.11 backup software)		£139	£163.32

CODE	DESCRIPTION	EX. VAT	INC. VAT
T60-S	HP SureStore 2000i	£463	£544.03
T61-S	HP SureStore 2000E	£577	£677.98
T62-S	HP SureStore 5000i	£587	£689.74
T63-S	HP SureStore 5000E	£875	£793.13
T64-S	HP SureStore 6000i	£705	£828.38
T65-S	HP SureStore 6000E	£815	£957.63
T66-S	HP SureStore 12000E	£2050	£2408.75
T43	Tapes for T60S to T66S	£7	£8.23

T46	TAPE FOR T60/80/85/65/66	£20	£23.50
T48	TAPE FOR T90/78-E	£24	£28.20
T48/4	TAPE FOR T62-8/63-E/64-E	£27	£31.72
T205	TAPE FOR T200-I/200-E	£17	£19.97

TAPES

REMOVABLES / OPTICAL DRIVES

Panasonic

THE NEW PD SYSTEM 2-IN-1 CD-ROM AND OPTICAL DRIVE FROM PANASONIC

The PD System is a combined Quad Speed CD-ROM Drive & 650Mb rewritable Optical Disk Drive.

It features:

- Removable 650Mb optical media for fast archiving or distribution.
- SCSI-2 Interface for Mac and PC
- Corel SCSI™ supports majority of host adaptors
- CD-ROM supports Video CD and CD-I movie
- All accessory parts are included for quick and easy installation



CODE	DESCRIPTION	INTERFACE	EX. VAT	INC. VAT
CD200	Internal PD Drive Kit	SCSI	£320	£398.32
CD210	Internal PD Drive Kit with SCSI adaptor	SCSI	£359	£421.83
CD215	External PD Drive Kit	SCSI	£369	£433.58
CD205	650MB PD Optical Disks	N/A	£32	£37.60

100Mb ZIP Drive

A cost-effective medium, ideal for storage, backup and data transport. It works like a hard drive, but with the flexibility of a cartridge drive.

- Expand your hard drive without limits
- Parallel or SCSI
- Size 180 x 136 x 37mm
- 29ms seek time
- Interchangeable 100Mb Disks (200Mb with compression)

CODE	DESCRIPTION	EX. VAT	INC. VAT
T70	ZIP Drive 100MB Para.	£108	£126.90
T71	ZIP Drive 100MB SCSI	£111	£130.43
T72	100MB ZIP Disk	£10	£11.75
T72-6	ZIP Disk 6 Pack	£55	£64.63

JAZ Drive

Ideal for storing, playing & transporting multimedia applications. Backup a one gigabyte hard disk in as little as 5 minutes. Simply plug the Jaz drive into a SCSI port for an instant second hard drive: one that works faster than most and has a full gigabyte of capacity. Saves up to 8 hours of CD-quality sound and 150 colour photographs, a JAZ Insider drive fits into any available 3.5" drive bay.

CODE	DESCRIPTION	EX. VAT	INC. VAT
OP26	JAZ Internal Drive 1GB SCSI	£275	£323.13
OP30	JAZ External Drive 1GB SCSI	£325	£381.27
OP35	JAZ Disk (Single)	£69	£81.07
OP40	JAZ Disk (5 Pack)	£329	£386.57
OP50	JAZ Jet Interface	£69	£81.07
OP15	Fujitsu 230MB Opt. On. EXT	£399	£468.82
OP15	Fuji Optical Disk (230MB)	£15	£17.62

GENERAL TAPES AND MEDIA

CODE	DESCRIPTION	TYPE	EX. VAT	INC. VAT
T40	Form.ted DC2120	A	£7	£8.23
T41	DC2120XL-350MB	B	£12	£14.10
T42	QIC-WIDE-420MB	C	£12	£14.10
T45	MC3000XL-700MB	D	£15	£17.63

CODE	DESCRIPTION	TYPE	EX. VAT	INC. VAT
T46	TL1	E	£20	£23.50
T44	8mm DAT 112m	H	£6	£7.05
T49	QW3080 4Gb	J	£19	£22.33
T47	Tape for IOMEGA 1700	J	£17	£19.97

Same-day despatch on all stock

PLEASE NOTE! Although all prices & specifications are correct at time of going to press, the company reserve the right to alter both without prior notification. All prices exclude delivery & are valid from 1/12/96 to 31/12/96. E&OE. 6PM* see page 8.

Choice Peripherals: Units 1&2, Highgrounds Way, Rhodesia, Worksop, Notts, S80 3AF.

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3.5" EXT PARALLEL PORT HDD

AMACOM	CAPACITY	EX VAT	INC VAT
ED38-A EZ DISK	850MB	£247	£290.23
ED40-A EZ DISK	1.2GB	£279	£327.83
ED43-A EZ DISK	1.6GB	£329	£386.58
ED44-A EZ DISK	2GB	£369	£433.58

2.5" EXT PARALLEL PORT HDD

AMACOM	CAPACITY	EX VAT	INC VAT
ED30-AD DISKLITE	540MB	£275	£323.13
ED38-AD DISKLITE	810MB	£335	£393.63
ED40-AD DISKLITE	1.2GB	£585	£687.38

2.5" HARD DISK DRIVES

N040-T TOSHIBA	540MB	£179	£210.33
N044-T TOSHIBA	810MB	£199	£223.83
N046-T TOSHIBA	1.3GB	£349	£410.08
N047-T TOSHIBA	1.7GB	£429	£504.08
N048-T TOSHIBA	2.1GB	£599	£703.83
N040-I IBM	540MB	£149	£175.08
N044-I IBM	810MB	£189	£222.08
N046-I IBM	1.2GB	£335	£393.63

3.5" EIDE HD DRIVES

QUANTUM	CAPACITY	CACHE	A/TIME	WARRANTY	EX VAT	INC VAT
HD38-Q TRAILBLAZER	850MB	128k	14ms	2 YRS	£105	£123.38
HD39-Q FIREBALL	1GB	128k	14ms	2 YRS	£119	£139.83
HD44-Q FIREBALL	2.1GB	128k	11ms	2 YRS	£179	£210.33
HD48-Q FIREBALL	3.2GB	128k	11ms	2 YRS	£225	£264.38
HD56-Q SCIRROCCO	2.5GB	128k	11ms	3 YRS	£199	£233.83

SEAGATE	CAPACITY	CACHE	A/TIME	WARRANTY	EX VAT	INC VAT
HD38-S ST3850A	850MB	128k	12ms	3 YRS	£95	£111.63
HD39-S ST31081A	1GB	64k	14ms	3 YRS	£119	£139.83
HD40-S ST51270A	1.2GB	256k	12ms	3 YRS	£129	£151.58
HD43-S ST31621A	1.6GB	64k	14ms	3 YRS	£145	£170.37
HD44-S ST32140A	2GB	128k	10ms	3 YRS	£179	£210.33
HD56-SI ST52520A	2.5GB	256k	11ms	3 YRS	£215	£252.63

5.25" IDE HD DRIVES

QUANTUM BIGFOOT	CAPACITY	EX VAT	INC VAT
HD40-QF QUANTUM BIGFOOT	1.2GB	£109	£128.08
HD44-QF Q/BIGFOOT	2.1GB	£149	£178.08
HD56-QF QUANTUM BIGFOOT	2.5GB	£169	£198.58

SCSI HARD DISK DRIVES

QUANTUM	CAPACITY	CACHE	A/TIME	WARRANTY	EX VAT	INC VAT
HD55-Q FIREBALL	2.1GB	128k	12ms	3 YRS	£269	£316.08
HD55-QA ATLAS	2.1GB	1MB	8ms	5 YRS	£399	£468.83
HD55-QS SATURN	2.1GB	1MB	8.5ms	5 YRS	£349	£410.07
HD60-QA ATLAS	4GB	1MB	7.9ms	5 YRS	£549	£645.08

SEAGATE	CAPACITY	CACHE	A/TIME	WARRANTY	EX VAT	INC VAT
HD45-S ST51080N	1GB	128k	12ms	5 YRS	£179	£210.33
HD55-S ST325155N Hawk	2GB	512k	9ms	5 YRS	£349	£410.07
HD56-S ST32550N Barra.	2.1GB	512k	8ms	5 YRS	£499	£586.33
HD60-S ST15150N Barra.	4GB	1MB	8.5ms	5 YRS	£649	£762.57
HD65-S ST410800N Elite	9GB	1MB	7.2ms	5 YRS	£1499	£1761.32

FUJITSU	CAPACITY	CACHE	A/TIME	WARRANTY	EX VAT	INC VAT
HD60-F M2934SAV	4GB	512k	10ms	5 YRS	£579	£680.33

MICROPOLIS	CAPACITY	CACHE	A/TIME	WARRANTY	EX VAT	INC VAT	
HD55-MS 4421	2.1GB	512k	8.5ms	5 YRS	£275	£323.13	
HD55-MS AVW	4221AVW	2GB	512k	8.5ms	5 YRS	£459	£539.33
HD60-MS 3243	4.3GB	512k	8.5ms	5 YRS	£595	£699.13	
HD60-MS AVW	3243AVW	4.3GB	512k	8.5ms	5 YRS	£689	£809.58
HD61-MS 4345NS	4.55GB	512k	7.9ms	5 YRS	£729	£856.58	
HD66-MS 1991	9.1GB	512k	12ms	5 YRS	£1145	£1345.38	
HD65-MS AV	1991AV	9.1GB	512k	12ms	5 YRS	£1275	£1498.13
HD66-MS 3391NS	9.1GB	512k	7.9ms	5 YRS	£1399	£1643.83	

3.5" EIDE HARD DISK DRIVES

MAXTOR ENHANCED EIDE HARD DISK DRIVES



Maxtor

- Fast, reliable storage
- Up to 512k cache
- 3 Years manufacturer's warranty
- Ideally suited for upgrading to Windows 95 or Windows NT
- Access times as low as 10ms
- Available in 1, 1.3, 1.6 and 2Gb

2GB HARD DRIVE KIT £199 EX. VAT

Bare Drives

	EX.VAT	INC. VAT
HD39-M Maxtor EIDE Hard Drive 1Gb	£115	£135.12
HD41-M Maxtor EIDE Hard Drive 1.3Gb	£129	£151.57
HD43-M Maxtor EIDE Hard Drive 1.6Gb	£148	£173.90
HD44-M Maxtor EIDE Hard Drive 2Gb	£178	£209.15
HD56-M Maxtor EIDE Hard Drive 2.7Gb	£229	£269.08

Retail Kits

	EX.VAT	INC. VAT
HD39-RM Maxtor EIDE Hard Drive 1Gb Kit	£129	£151.57
HD41-RM Maxtor EIDE Hard Drive 1.3Gb Kit	£145	£170.80
HD43-RM Maxtor EIDE Hard Drive 1.6Gb Kit	£157	£184.48
HD44-RM Maxtor EIDE Hard Drive 2Gb Kit	£199	£233.82
HD56-RM Maxtor EIDE Hard Drive 2.7Gb Kit	£259	£304.33

NEXT-DAY DELIVERY!

Subject to Conditions.

HARD DISK DRIVES

9

WESTERN DIGITAL HARD DRIVES



Offering the highest levels of quality, the Western Digital range of Hard Drive Kits are backed by a full 3 year warranty and contain everything you will need to easily extend the storage capabilities of your PC.

Bare Drives

	EX.VAT	INC.VAT
HD38-W Western Digital EIDE Hard Drive 850Mb	£103	£121.03
HD40-W Western Digital EIDE Hard Drive 1.2Gb	£135	£158.63
HD43-W Western Digital EIDE Hard Drive 1.6Gb	£147	£172.73
HD44-W Western Digital EIDE Hard Drive 2.1Gb	£199	£233.82
HD56-W Western Digital EIDE Hard Drive 2.5Gb	£225	£264.38

Retail Kits

	EX.VAT	INC.VAT
HD40-RW Western Digital EIDE 1.2Gb Kit	£155	£182.12
HD43-RW Western Digital EIDE 1.6Gb Kit	£179	£210.33
HD44-RW Western Digital EIDE 2.1Gb Kit	£179	£210.33

NB. Please ensure that you have the necessary cables and fixings when purchasing bare drives as they do not come with individual drives.

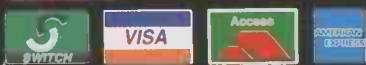
- Fast, reliable storage
- Up to 512k cache
- 3 Years manufacturer's warranty
- Ideally suited for upgrading to Windows 95 or Windows NT
- Access times as low as 10ms

WARNING
failure to read these pages may result in you being seriously overcharged by other suppliers



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SMILE MONITORS

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DELIVERED NEXT DAY

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GUARANTEE

As part of our continuing customer care policy all sales order lines will be staffed from 7am to 11pm, seven days a week. With Tech Support available 9am to 9pm.

10 MONITORS

Smile CD642VL 14" FST Monitor

- 14" Non-Glare Etched
- 1280 x 768 (Non-Interlaced) Resolution
- 0.28mm Dot Pitch
- 250 x 185mm Display Size
- Scan Freq.: Horiz. 30KHz - 65KHz Vert. 50Hz - 90Hz
- Video Bandwidth: 45MHz
- VR Control
- 15 pin D-sub Connector Macintosh Quadra/PowerPC Adaptor (optional)
- MPR-II Compliant
- Analog RGB (0.7Vp.p, 75ohm) Separate Sync, TTL Positive or Negative
- 2 Year warranty, 1st Year on site on ALL Smile monitors



SMILE
A SMILE WITH VALUE

M025 Smile 14" VGA Monitor **£169** EX.VAT **£198.58** INC. VAT

Smile CA1516SL 15" FST Monitor

- 15" Non-Glare, Flat Square Tube
- 1280 x 1024 (Non-Interlaced) Resolution
- 0.28mm Dot Pitch
- 260 x 195mm Display Size
- Scan Freq.: Horiz. 30KHz - 65KHz Vert. 50Hz - 100Hz
- Video Bandwidth: 80MHz
- Microprocessor-based control with LCD Display
- 15 pin D-sub Connector Macintosh Quadra/PowerPC Adaptor (optional)
- MPR-II Compliant • 2 Year warranty, 1st Year on site on ALL Smile monitors



SMILE
A SMILE WITH VALUE

M032 Smile 15" Colour Monitor **£239** EX.VAT **£280.83** INC. VAT

Smile CA1516CL 15" FST Monitor

- 15" Non-Glare, Flat Square Tube
- 1280 x 1024 (Non-Interlaced) Resolution
- 0.28mm Dot Pitch
- 260x 195mm Display Size
- Scan Freq.: Horiz. 30KHz - 65KHz Vert. 50Hz - 100Hz
- Video Bandwidth: 80MHz
- Microprocessor-based control with LCD Display
- Analog RGB (0.7Vp.p, 75ohm) Separate Sync, TTL Positive or Negative
- MPR-II Compliant
- 2 Year warranty, 1st Year on site on ALL Smile monitors



SMILE
A SMILE WITH VALUE

M041 Smile 15" VGA Monitor **£249** EX.VAT **£292.58** INC. VAT

Smile CA1716SL 17" FST Monitor

- 17" Non-Glare, Flat Square Tube
- 1280 x 1024 (Non-Interlaced) Resolution
- 0.28mm Dot Pitch
- 310 x 230mm Display Size
- Scan Freq.: Horiz. 30KHz - 65KHz Vert. 50Hz - 100Hz
- Video Bandwidth: 100MHz
- Analog RGB (0.7Vp.p, 75ohm) Separate Sync, TTL Positive or Negative
- Microprocessor-based control with LCD Display • MPR-II Compliant
- 2 Year warranty, 1st Year on site on ALL Smile monitors



SMILE
A SMILE WITH VALUE

M045 Smile 17" VGA Monitor **£389** EX.VAT **£457.08** INC. VAT

MEDIA FORCE

MediaForce 14" VFM Monitor

- 14" Tint Glare or Non-Glare
- 1024 x 768 N/A Resolution
- 252 x 180mm Display Size
- Scan Freq.: Horiz. 31.5KHz - 35.5KHz Vert. 50Hz - 90Hz
- Analog RGB (0.7 Vp.p, 75 ohm)
- 15 Pin D-sub Connector (Macintosh PowerPC Adaptor (optional))
- Power On/Off, Brightness, Contrast, H Phase, Vertical Size
- 12 Month Guarantee



MediaForce 14" **£139** EX. VAT

M0914 MediaForce 14" Monitor **£139** EX.VAT **£163.33** INC. VAT

MediaForce 15" VFM Monitor

- 15" Flat Square Tube
- 1024 x 768 (Flicker Free) N/A Resolution
- 260 x 195mm Display Size
- Scan Freq.: Horiz. 30KHz - 64KHz Vert. 50Hz - 100Hz
- Video Bandwidth: 75MHz
- Microprocessor-based control with 10 user programmable modes
- Analog RGB (0.7Vp.p, 75ohm) Separate or composite Sync, TTL: Positive or Negative
- MPR II function optional
- 15 Pin D-sub Connector • 1 Year Guarantee

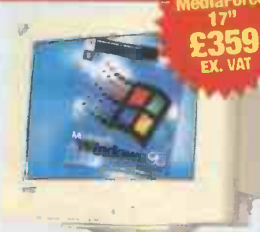


MediaForce 15" **£199** EX. VAT

M0915 MediaForce 15" Monitor **£199** EX. VAT **£233.83** INC. VAT

MediaForce 17" VFM Monitor

- 17" Flat Square Tube
- 786 x 1024 N/A Resolution
- 0.26 to 0.28mm Dot Pitch
- 360 x 270mm
- Scan Freq.: Horiz. 30KHz - 70KHz Vert. 30Hz - 66Hz
- Video Bandwidth: 30KHz to 50KHz
- 15 Pin D-sub Connector
- Analog RGB (0.7/1.0 Vp.p) HV Separate
- Microprocessor-based control with VESA/EPA Compliance LCD Display
- Power Save Facility (with indicator)
- MPR-II Compliancy optional
- 12 Month Guarantee



MediaForce 17" **£359** EX. VAT

M0917 MediaForce 17" Monitor **£359** EX. VAT **£421.83** INC. VAT

MediaForce 20" VFM Monitor

- 20" Deflection Dark Tint, Flat Square Tube
- 1280 x 1024 N/A Resolution
- 0.26mm Dot Pitch
- 260x 195mm Display Size
- Scan Freq.: Horiz. 30KHz - 65KHz Vert. 50Hz - 100Hz
- Video Bandwidth: 80MHz
- Microprocessor-based control with LCD Display
- Analog RGB (0.7Vp.p, 75ohm) Separate Sync, TTL: Positive or Negative • MPR-II Compliant
- 15 Pin D-sub Connector
- 12 Month Guarantee



MediaForce 20" **£729** EX. VAT

M0920 MediaForce 20" Monitor **£729** EX. VAT **£856.58** INC. VAT

CODE MODEL SIZE EX VAT INC VAT

SMILE				
M060	CA-2011	20"	£899	£1056.33
M062	CA-2111-FST	21"	£1099	£1291.33

VIEWSONIC Economy Series				
M027	14ES	14"	£174	£204.45
M031	15ES	15"	£242	£284.35

VIEWSONIC Graphic Series				
M039	15G	15"	£285	£334.88
M033	15GS	15"	£290	£340.75
M047	17GS	17"	£495	£581.63
M065	20G	20"	£890	£1045.75

VIEWSONIC Multimedia with Built-in Speakers				
M036	15GA	15"	£345	£405.38
M048	17EA	17"	£460	£540.50
M049	17GA	17"	£520	£611.00

VIEWSONIC Professional Series				
M044	17PS	17"	£599	£703.83
M070	21PS	21"	£1180	£1386.50

TRUST MONITORS				
M017	CM2528D	14"	£159	£186.83
M017P	Digital	14"	£169	£198.58
M018P	Digital	15"	£239	£280.83
M048P	Precision	17"	£389	£457.08
M048T	Visual Sound	17"	£329	£386.57
M061	CM5031	20"	£649	£762.57

IYAMA MONITORS				
M0101	MF8617E	17"	£489	£574.58
M0102	MT9017E	17"	£549	£645.08
M0103	MF8221E	21"	ECALL	
M0104	MT9021E	21"	ECALL	
M0100	MF8515	15"	£249	£292.58

SONY MONITORS				
M077	SF2	15"	£298	£350.15
M081	GDM17SFT	17"	£505	£593.38

Same-day despatch on all stock

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ADI MONITORS - ALL COME WITH 2 YEARS ON-SITE SWAP-OUT WARRANTY

M024 ADI ProVista 14" Colour Monitor

- 800x600 at flicker free 72Hz
- 0.28 dot pitch
- Easy to use analogue intake controls
- Low radiation and power saving



ProVista 14"
£160
EX. VAT



£160 EX.VAT **£188** INC. VAT



M034 MicroScan 4V 15" Colour Monitor

- Maximum resolution 1280x1024
- 0.28 dot pitch
- Microprocessor intelligence
- Brilliant FST tube



4V 15"
£225
EX. VAT



£225 EX.VAT **£264.38** INC. VAT



M042 ADI MicroScan 5V 17" Col. Monitor

- Massive 16" FST viewable area
- 0.28 dot pitch
- Maximum resolution 1280x1024
- Microprocessor Intelligence



ADI 5V 17"
£399
EX. VAT



£399 EX.VAT **£468.83** INC. VAT



M0522 MicroScan 17 (TCO) 17" Col. Monitor

- Maximum resolution 1600x1200
- 0.26 dot pitch for sharp focus
- On-screen display and colour adjustment
- TCO emissions and power saving approval



TCO 17"
£465
EX. VAT



£465 EX.VAT **£546.38** INC. VAT



M0521 ADI MicroScan 17X+ Portrait Monitor

- Maximum resolution 1280x1024
- Displays a full A4 page on the screen
- Virtually half the cost of a 21" monitor
- 0.26 dot pitch for sharp focus



17X+ 17"
£569
EX. VAT



£569 EX.VAT **£668.58** INC. VAT



M0523 DUO Multimedia 17" Col. Monitor

- Built in stereo speakers and microphone
- Matching ADI Keyboard & mouse
- Maximum resolution 1280x1024
- 0.28 dot pitch



DUO 17"
£445
EX. VAT



£445 EX.VAT **£522.88** INC. VAT



SCANNERS

MONITORS & SCANNERS

11

CODE DESCRIPTION SCANNER TYPE MAX RES EX VAT INC VAT

TRUST SCANNERS

CODE	DESCRIPTION	SCANNER TYPE	MAX RES	EX VAT	INC VAT
SC10	Ami-Colour	Hand-held		£75	£88.12
SC20	2400SP	Flatbed	2400dpi	£209	£245.58
SC50	9600SP	Flatbed	9600dpi	£399	£468.82
SC51	4800 Compact	Flatbed	4800dpi	£239	£280.83
SC70	Page Scanner	Flatbed		£199	£233.83
SC25	Transparency Kit for 2400/9600			£169	£198.57

EPSON SCANNERS

CODE	DESCRIPTION	SCANNER TYPE	MAX RES	EX VAT	INC VAT
SC100	Epson GTX8500 Parallel			£470	£552.25
SC106	Epson GTX8500 SCSI			£545	£640.38
SC110	Epson GTX9000 Parallel			£570	£669.75
SC115	Epson GTX9000 SCSI			£652	£766.10
SC120	Epson GT18500 SCSI			£720	£846.00
SC105	Epson GT19000 SCSI			£818	£961.15

HEWLETT PACKARD SCANNERS

CODE	DESCRIPTION	SCANNER TYPE	MAX RES	EX VAT	INC VAT
SC150	4S Grey Scale Document Scanner			£158	£185.56
SC106	Scanjet 4P			£312	£366.60
SC100	Scanjet 4C Colour Scanner			£592	£695.60
SC165	Support Pack for Scanjet 4C/4S			£140	£164.50
SC170	Support Pack for Scanjet 4S/4P			£66	£77.55

SC65 Scanera Hand-Held Scanner

- 16.7 Million Colours
- 400dpi Resolution, up to 800dpi
- Auto-installation on both hardware and driver setting
- Full TWAIN Scan (4.3" width 105mm)
- Scan Mode: 24-bit dither colour 256 Greyscale Black & White



SCANERA 800dpi SCANNER
£65
EX. VAT



UMAX



Umax Vista S6E

- Optical Resolution 300x600dpi
- Maximum Resolution 4800x4800dpi
- 24-bit colour, single pass colour CCD
- Includes VistaScan, the user-friendly scanner interface
- Includes MagicMatch profiles and Kodak CMS
- Bundled with Presto!, the document handling software that integrates fax, print, e-mail, OCR and filing functions
- Optional Transparency Adaptor Sheet feeder
- Network capability within PC and MAC environment
- All Umax Scanners are supplied with 16-bit ISA SCSI card, Presto Office Suite which includes Image editing, OCR, Archiving, e-mail and Fax & Copy Software.



UMAX VISTA S6E
£209
EX. VAT

Umax Vista S12

- Optical Resolution 600x1200dpi
- Maximum Resolution 9600x9600dpi
- Analog Gamma Design for capturing more details producing output quality superior than 30-bit scanners
- Parallel Image Processing Design for fast scanning speed
- Bundled with VistaScan, the user-friendly scanner software
- Includes MagicMatch Colour Calibration Profiles and Kodak CMS for accurate Colour from scan, display to print
- Optional Transparency Adaptor and Optional Automatic Document Feeder
- Includes Presto!, an integrated software for scan, copy, fax, e-mail, Image editing and filing



UMAX VISTA S12LE
£429
EX. VAT

UMAX SCANNERS

CODE	DESCRIPTION	EX. VAT	INC. VAT
SC5-U	Vista S6E	£209	£245.58
SC10-U	Vista S6E LE	£235	£276.13
SC15-U	Vista S6E Pro	£649	£762.58
SC20-U	Vista S12LE	£429	£504.08
SC25-U	Vista S12 Plus	£499	£586.33
SC30-U	Vista S12 Pro	£829	£974.08
SC35-U	Power Look II Pro	£1499	£1761.33
SC40-U	Power Look II Pro LE	£1599	£1878.83
SC45-U	Power Look II ColourPro	£1995	£2344.13
SC50-U	Power Look 2000	£3295	£3871.63
SC60-U	Power Look Pro	£2099	£2466.32
SC55-U	Sheet feeder for S6 & S12	£349	£410.08

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Bare-Bones System

Simply take 1 stylish case (supplied) and add a lightning fast Opti Viper Pentium Motherboard (fitted). Make sure the case has a fitted floppy drive and hard disk tray (sorted). For individual flavouring choose your memory, CPU, hard disk drive and video card and you're ready to go!



Total individual component price would cost £130.00 Plus VAT

£109 EX VAT £128.08 INC VAT

- Stylish case
- Opti Viper Pentium Motherboard
- Removable hard disk tray
- Fitted floppy disk

**SAVE
£24.67
£109 + VAT**

GENERAL PRINTERS

FULL RANGE OF PRINTER CARTRIDGES AVAILABLE!

12 PRINTERS

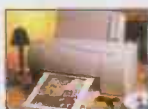
CODE	MODEL	EX VAT	INC VAT
BROTHER			
PR250	HL-630 Windows printer	£163	£191.53
PR255	HL-631 (1MB) Windows printer	£219	£257.33
PR260	HL-660 6PPM laser	£365	£428.88
PR265	WL-660 6PPM Win laser 600dpi	£199	£233.83
PR270	HL-1260 12PPM LASER	£825	£969.37
PR271	HL-730 6PPM	£269	£316.08
PR272	HL-760 1200 x 600 dpi	£339	£398.33
HEWLETT PACKARD			
PR36	HP LaserJet 5L	£289	£339.58
PR31	HP LaserJet 5P	£575	£675.63
PR33	HP LaserJet 5MP	£723	£849.53
PR34	HP LaserJet 5	£869	£1021.08
PR38	HP LaserJet 5N	£1015	£1192.63
PR39	HP LaserJet 5M	£1174	£1379.45
PR40	HP LaserJet 5Si	£1905	£2332.38
PR41	HP LaserJet 5Si MX	£2834	£3329.95
PR42	HP Colour LaserJet 5P	£4184	£4892.70
PR43	HP Colour LaserJet 5M	£5132	£6030.10
PR44	HP OfficeJet LX	£459	£539.33
PR46	HP DeskJet 1600C	£815	£957.63
PR46-M	HP DeskJet 1600CM	£1214	£1426.25
PR45	HP DeskJet 600	£141	£165.68
PR22	HP DeskJet 690C	£184	£216.20
PR47	HP DeskJet 820	£249	£292.58
PR49	HP DeskJet 870CXi	£298	£350.15
OKI			
PR110	OKI OL4 Windows Laser	£212	£249.10
PR205	OKI OL600ex	£285	£334.88
PR210	OKI OL610ex	£350	£411.25
PR110	OKI Colour Inkjet	£209	£245.58
PR216	OKI OL810 Laser	£645	£757.88

CODE	MODEL	EX VAT	INC VAT
CANON			
PR50	BJ30 Mono Portable	£105	£123.38
PR56	BJC210 BubbleJet	£119	£139.83
PR60	BJC70 Colour Portable	£142	£166.85
PR65	BJ230 BubbleJet	£239	£273.78
	BJC30	£105	£123.38
	BJC70	£142	£166.85
PR70	BJC4100 BubbleJet	£169	£198.58
PR75	BJC610 BubbleJet	£267	£313.73
	BJC330	£346	£406.55
PR80	LBP 460 Laser	£211	£247.93
PR90	BJC800	£866	£1051.63
PR91	BJ300	£346	£406.55
PR92	BJ230	£229	£269.08
PR93	BJ330	£366	£453.55
PR94	LBP1260 Laser	£719	£844.83
MINOLTA			
PR19	PagePro 6 laser	£357	£419.48

Lexmark Colour Jetprinter 1020



£149 EX VAT £175.08 INC VAT



Lexmark Colour Jetprinter 2050

£229 EX VAT £269.08 INC VAT

Lexmark Colour Jetprinter 2070



£285 EX VAT £334.88 INC VAT

PRINTERS

Brother HL-660 Laser Printer

- Fast 600 DPI output • 6 pages per minute
- GDI mode for windows • PCL level 5c with Epson and IBM emulations for DOS, UNIX and OS/2 operating systems • Straight paper path • Enhanced memory management • Network connectivity option • Environmentally friendly
- Separate toner and drum consumables • Economy print mode
- Low cost per copy • 2Mb memory as standard
- High speed bi-directional interface • Auto emulation switching



PR260 HL-660 - 6PPM **£365** £428.88
PR250 HL-630 Windows **£163** £191.53

EPSON PRINTERS

EPSON COLOR 500

- Up to 720x720 dpi photo real colour
- Includes software to monitor and advise on the status of the printer, including ink levels
- Windows 3.1x, 95 & Mac compatible
- EPSON "Auto-Colour" function, Windows 95 ICM & Macintosh Colour Sync 2.0 Compliant
- Free PrintArtist (PC) software included
- 1 year RTB warranty with optional 3 year on-site warranty
- EPSON CoverPlus 3 year extended warranty service available - \$65



£209 EX VAT £245.58 INC VAT

EPSON STYLUS 200

- Laser like 720 dpi printing
- Prints on plain, coated paper, envelopes & OHP transparencies
- Permanent Piezo print-head
- EPSON "Auto-Grey" function
- Status monitor inc. ink levels
- Optional 720 dpi colour upgrade
- Video & camera mode
- Windows 95 ICM compliant (When colour upgrade installed)
- 1 year RTB warranty with optional 3 year on-site warranty
- EPSON CoverPlus 3 year extended warranty service available - \$40



£105 EX VAT £123.38 INC VAT

EPSON STYLUS COLOR 200

- 720 dpi photo-real colour
- Prints on plain, coated paper, envelopes & OHP transparencies • Permanent Piezo print-head • EPSON "Auto-Colour" function
- Status monitor inc. ink levels
- Video & camera mode • NEW! inks
- Windows 95 ICM compliant
- 1 year RTB warranty with optional 3 year on-site warranty
- EPSON CoverPlus 3 year extended warranty service available - \$40



£130 EX VAT £152.75 INC VAT

CODE	MODEL	EX VAT	INC VAT
PR107	Epson Stylus 200	£105	£123.38
PR108	Epson Stylus Color 200	£130	£152.75
PR106	Epson Stylus Color 500	£209	£245.58
PR18	Epson LX300 9Pin Dot Matrix	£92	£108.10
PR12	Epson Stylus 820 Color Kit	£29	£34.08
PR13	Epson Stylus Pro A4	£293	£344.28
PR14	Epson Stylus Pro XL A3 Color	£785	£922.38
PR15	EPL-5500W 6ppm Laser	£245	£287.88
PR16	EPL-9000 8ppm A3 Laser	£1195	£1404.13
PR17	EPL-9000PS 8ppm A3 Postscript	£1475	£1733.13

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MODEMS / INTERNET

CODE	DESCRIPTION	INT/EXT	EX VAT	INC VAT
MEDIA FORCE FAX/MODEMS (NON-BABT)				
F150	14,400 Voice	INT	£39	£45.82
F195	14,400 Voice	EXT	£49	£57.57
F155	28,800	INT	£59	£69.33
F163	28,800	INT/EXT	£89	£104.58
F170	28,800 Voice	EXT	£79	£92.83
F190	14,400	EXT	£39	£45.82
F175	28,800	EXT	£75	£88.12
F185	PCMCIA 28,800	INT/EXT	£129	£151.58
F250-V	33.6 Voice BABT approved	INT	£75	£88.13
F250-P	28.8 PCMCIA BABT approved		£109	£128.08
F255	28.8 BABT approved	EXT	£79	£92.83
TRUST FAX/MODEMS				
F25	14,400	INT	£39	£45.83
F66	14,400	EXT	£55	£64.33
F66-3	33.6 BABT approved	INT	£75	£88.13
F87	28,800	EXT	£109	£128.08
MOTOROLA DATA/FAX MODEM				
F200	34,000 28.8 Ext Pro	EXT	£113	£132.78
F205	3400 Online 28.8	EXT	£119	£139.83
F206	PCMCIA		£179	£210.32
F207	ISDN		£325	£381.87
F208	PREMIER		£219	£257.32
PACE FAX/MODEMS				
F125	Pace V.34 Internet Kit	INT	£125	£146.88
MIRQ FAX/MODEMS				
F210	28.8 Office Connect 34	INT	£210	£246.75
LASAT FAX/MODEMS				
FL300	Safire 288	EXT	£139	£163.32
FL305	Safire 144	EXT	£85	£99.87
FL310	Credit 288 PCMCIA	EXT	£149	£175.07
FL315	Flex Card combo PCMCIA	EXT	£299	£351.32
FL320	288 Internal	INT	£119	£139.82
FL325	640i External ISDN	EXT	£279	£327.82



HAYES ACCURA 28.8 INTERNET KIT

- Auto Voice / Data / Fax discrimination.
- Voice answer phone.
- Remote voice & Fax message retrieval.
- All software cables & Internet.
- Fax on demand.



HAYES MESSAGE MODEM

- Complete Kit for the PC containing everything you'll need to send & receive e-mail & start surfing the net straight away.
- UK - wide local call access.
- 30 days FREE Internet access with CompuServe, AOL & Premier Internet.
- Only £30 pounds per quarter for unlimited Internet access.

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CODE	DESCRIPTION	EX VAT	INC VAT
F1100	Internet Kit 28.8	£109	£128.08
F1100	Message Modem 28.8	£139	£163.32
F1100	Optima 28.8 Business Modem	£215	£252.62
F1100	Optima 28.8 V34 PCMCIA Fax/Data	£165	£193.87

CHASSIS



NEW RANGE! D60 SERIES CASES	EX.VAT	INC. VAT
CS100 D603 Mini Tower with PSU	£49	£57.58
CS105 D607 Desktop with PSU	£49	£57.58
CS110 D602 Medium Tower with PSU	£65	£57.58



NEW RANGE! D80 SERIES CASES	EX.VAT	INC. VAT
CS500 D803 Mini Tower with PSU	£55	£64.62
CS501 D807 Desktop with PSU	£56	£65.80



SPORTSTER Vi 33.6 Modem

- Personal Voice mail, 10 mailbox voice mail
- Fax on demand - up to 100 faxes stored for distribution
- Call discrimination fax/data fax/voice
- Remote voice message retrieval
- Remote fax retrieval
- Mailbox Security
- Internal speaker
- Touch Sensitive volume control
- Internet ready and compatible at 33,600 bps
- Vertical or horizontal standing
- Voice/fax/data software
- Five year warranty
- Free Internet Software
- Full Duplex Speaker Phone (requires soundcard or external speaker)

SPORTSTER 28.8 XJACK®

- BABT approved Sportster modem
- Group III Fax
- Unique XJACK® connector
- Error correction & data compression
- Telephone cord
- User's manual
- Quick reference card
- Free Internet software
- Data/Fax Software
- PCMCIA card & socket service drivers
- Five year warranty

COURIER DUAL STANDARD V.34 FAX (V.32bis)

- Security Dial-Back with password protection
- Flash Memory (upgradable)
- Universal connect (exclusive to U.S.Robotics)
- ASL (exclusive to U.S.Robotics)
- Auto Data/Fax Selection
- QuickConnect (exclusive to U.S.Robotics)
- DOS/Windows software inc.
- Synchronous Dialling
- Data/Voice Switch (front mounted selector)
- Free Internet software
- BABT approved
- External & PC Internal versions
- Five year warranty

CODE	DESCRIPTION	EX VAT	INC VAT
F90-3	Sportster 33.6 Modem Int/Ext	£131	£153.93
F97	Courier Dual Speed V.34 Fax with V.32bls	£197	£231.48
F96	Sportster 28.8 PCMCIA	£131	£153.93

BABT APPROVED MODEMS

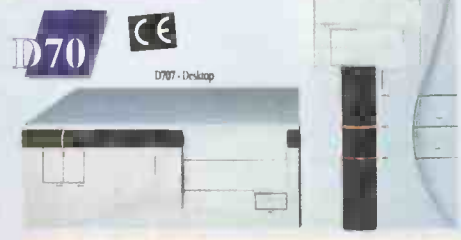
CODE	DESCRIPTION	EX. VAT	INC VAT
F250-P	28.8 PCMCIA BABT approved	£109	£128.08
F255	28.8 BABT approved	EXT £79	£92.83



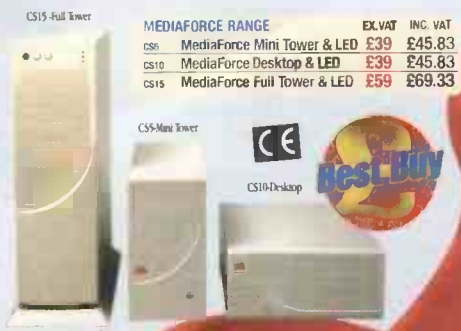
SPECIAL OFFER!
F250-V 33.6 Voice INT EX. VAT INC VAT
BABT-approved modem £75 £88.13

CHASSIS/ MODEMS

13



NEW RANGE! D70 SERIES CASES	EX.VAT	INC. VAT
CS600 D707 Desktop with PSU	£59	£69.32
CS601 D702 Midi Tower with PSU	£79	£92.82



MEDIAFORCE RANGE	EX.VAT	INC. VAT
CS5 MediaForce Mini Tower & LED	£39	£45.83
CS10 MediaForce Desktop & LED	£39	£45.83
CS15 MediaForce Full Tower & LED	£59	£69.33

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LOTUS POWER MultiMedia Kits

Entry level Kits

A Multimedia Kit for the High-level user.



Lotus

Kit Includes:

- Lotus SmartSuite 4 or SmartSuite 96
- WaveTable PnP Sound Card
- 50w Power Speakers
- Plus your choice of IDE CD-ROM Drive

8x **EX. VAT £130** **INC. VAT £152.75**
10x **EX. VAT £145** **INC. VAT £170.38**

MediaFORCE MultiMedia Kits

Entry level Kits

A Basic Multimedia Kit with everything you need to get you started in Multimedia.

Kit Includes:

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- Power Speakers
- Plus your choice of IDE CD-ROM Drive

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Casio QV-10

- Digital field recording
- Built-in 2Mb flash memory
- Number of images: 96
- Fixed focus with macro position
- Connection kit for PC or Macintosh

CASIO QV10
£299
EX. VAT

DESCRIPTION	EX VAT	INC VAT
DC1 Casio QV-10A1	£299	£351.33
DC1-A Casio QV-10A1 Power Adaptor	£12	£14.10
DC2 Kodak DC20	£240	£282
DC3 Kodak DC40	£430	£505.25
DC4 Kodak DC50	£670	£787.25
DC5 Kodak Camera Power Adaptor	£55	£64.63

SOUND CARDS

MediaFORCE Audio Excel PnP 16

- ISA bus Plug and Play device support: SB16, WSS, MPU401, GAME PORT, MIXER
- Auto hardware switching mode between WSS and SB without program setting
- Support Microsoft Windows 95 and OS/2 Warp 3

Compatibility

- Windows Sound System • Sound Blaster 16/PRO/2.0
- WSS mixer and SB mixer • MPU401 MIDI
- Wave Table Synthesis • AdLib • Windows 3.1
- Meets and exceeds Multimedia PC Level 2 Specs
- Digitized Audio • Up to 16Bit stereo 44KHz

Stereo Mixer

- Mixing from CD audio, Line-in, Voice FM WaveTable

- Mono mixing from MIC • Adjustable volume FM Music Synthesizer
 - OPL 3 FM (4 operators) and up to 15 melody sounds and 5 rhythm (20 voices)
- MIDI Interface**
- Fully compatible with MPU401 MIDI UART mode & Sound Blaster MIDI mode
 - Game Port • Standard IBM PC joystick/game & ext MIDI port
 - CD-ROM Interface • SECONDARY IDE Interface
 - Wave Table Synthesis • MPU401 (optional)
 - 3D Sound • Supports 3D sound upgrade board (optional)
 - Software • Configurable I/O address, IRQ, DMA channel for all interface (jumperless)



PNP 16 SOUND CARD
£19
EX. VAT

14 MULTIMEDIA

BTC 1833 16-Bit Sound System



- Adlib, Sound Blaster, Sound Blaster Pro, Microsoft Windows Sound Systems
- Microsoft Windows 95
- Microsoft Windows NT • IBM OS/2

Superior Sound

- Real 16-bit stereo sampling
- Programmable sample rate from 4KHz to 44.1KHz for both record and playback
- Record, compress, and playback voice, sound, and music

Advanced Synthesiser

- High quality 20-voice stereo ESFM™ Enhanced FM music synthesiser (OPL3 compatible)
- MPU 401 (UART mode), Sound Blaster MIDI Interface for MIDI devices
- WaveTable module upgradeable
- Game Port
- Supports 2 joysticks

Ease Of Use

- I/O address, IRQ and DMA channel can be set via software • Plug and play compatible

Bundle Software:

- Audio Recorder, Audio Reminder, Audio Clip Library, Timer, Stopwatch, Volume Control, Mixer, Recording Control, Talking Clock, Talking Calculator, Chime

SUPPORTS WINDOWS 95 & OS/2 WARP 3.0

BTC 1833
£22
EX. VAT



BTC 1857 16-Bit 3D Soundcard

- Adlib, Sound Blaster, Sound Blaster Pro, Microsoft Windows Sound Systems • Microsoft Windows 95
- Microsoft Windows NT • IBM OS/2

Superior Sound

- Real 16-bit stereo sampling
- Programmable sample rate from 4KHz to 44.1KHz for both record and playback • Record, compress, and playback voice, sound, and music

Advanced Synthesiser

- High quality 20-voice stereo ESFM™ Enhanced FM music synthesiser • MPU 401 (UART mode), Sound Blaster MIDI interface for MIDI devices
- Game Port • Supports 2 joysticks

Bundle Software as BTC1833

BTC 1857
£30
EX. VAT



SOUNDBLASTER COMPATIBLE

	EX. VAT	INC. VAT
S020 Audio Excel DSP 16 Sound Card	£19	£22.33
S021 Audio Excel DSP 16 + Wave Table	£33	£38.78
S027 Trust Sound Wave 16 Plus 3D	£35	£41.13
S028 BTC 16-Bit Sound Card	£22	£25.85
S030 Trust KORG Wave Table Upgrade	£85	£99.88
S031 Orchid "Nu-Sound" Wave 32	£95	£111.63
S032 BTC 16-Bit Sound Card + Wave Table	£35	£41.13
S0280 BTC 1857 16-Bit 3D Sound	£30	£35.25
S036 Trust Sound Wave 32 3D Wave Table	£59	£69.33

CREATIVE LABS SOUND BLASTER

	EX. VAT	INC. VAT
S052 Sound Blaster 16 PNP	£63	£74.03
S067 AWE 32 Full Edition	£125	£146.88
S068 AWE 32 PnP	£79	£92.83

CREATIVE LABS MULTIMEDIA

	EX. VAT	INC. VAT
S097 3DO Blaster Game Player	£255	£299.63
TRUST MULTIMEDIA		
S090 Video Master Game Player VGA to TV	£69	£81.08
S095 Video Master MPEG Player	£105	£123.38
S0100 PCTV Video Master + Cinema & Teletext Module	£129	£151.58
S0101 Teletext Module for PCTV Card	£22	£25.85
S0103 Cinema Module for PCTV Card	£99	£116.33
M515 Microphone	£4	£4.70
AC90 Game Headphones	£5	£5.88
AC91 Midi Headset	£5	£5.88
MEDIAFORCE		
S037 16-Bit Soundcard	£21	£24.68
S038 3D Spailizer 16-Bit Soundcard	£29	£34.08

MICE

DESCRIPTION	EX VAT	INC VAT
M151 Primax Venus 3 Button	£19	£22.33
M152 Primax Rainbow 3 Button	£9	£10.58
M153 Beetle Mouse - Walnut Burl	£8	£9.40
M154 Beetle Mouse - US Flag	£8	£9.40
M155 Beetle Mouse - Ladybird	£8	£9.40
M156 Whale Mouse - Walnut Burl	£9	£10.58
M157 Whale Mouse - Grey	£9	£10.58
M158 MediaFORCE Ergo Mouse	£10	£11.75
M10 MediaFORCE 2 Button Serial Mouse with driver software	£4	£4.70
M12 Mitsumi High Quality Serial Mouse	£7	£8.23



BEETLE - US FLAG
£8
EX. VAT



BEETLE - LADYBIRD
£8
EX. VAT



WALNUT BURL
£9
EX. VAT

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CD810	Panasonic Eight Speed	IDE	8	1200Kbs	Tray	£64	£75.20
CD810-S	Panasonic Eight Speed	SCSI	8	1200Kbs	Tray	£119	£139.83
CD90	Pioneer DR-U124X	SCSI	4.4	675Kbs	Tray	£139	£163.32
CD47	Pioneer DRM-62X Jukebox	SCSI	4.4	675Kbs	Caddy	£299	£351.32
CD103-2	BTC Eight Speed	IDE	8	1200Kbs	Tray	£65	£76.37
CD95	Microsolutions Ext	Parallel	4	600Kbs	Tray	£229	£269.08
CD900	MediaFORCE	IDE	10			£72	£84.60
CD166	Pioneer CD Media					£6.50	£7.64
CD165	Kodak CD Media					£6.50	£7.64
CD80	CD Storage Tower					£15	£17.62
CD05	3 to 1 CD ROM Interface Card					£5	£5.87
CD811	Goldstar Eight Speed					£75	£88.13
CD0901	Aztech Ten Speed					£95	£111.83
CD902	Pioneer Ten Speed					£139	£163.33
CD802	Teac Eight Speed					£75	£88.13
CD803	NEC Eight Speed					£79	£92.83
CD804	Hitachi Eight Speed					£65	£76.38
CD805	Sony Eight Speed					£75	£88.13

CD-ROM PCMCIA - AMACOM		EX VAT	INC VAT
CD400	EZCD Card Quad Speed CD-ROM	£195	£229.13
CD401	EZCD Card Six Speed CD-ROM	£250	£293.75
CD402	EZCD Card Eight Speed CD-ROM	£285	£334.88
CD403	EZCD Plus Dual Speed CD-ROM/Audio Player	£190	£223.25
CD404	EZCD Plus Quad Speed CD-ROM/Audio Player	£239	£280.83
CD405	EZCD Plus Six Speed CD-ROM/Audio Player	£255	£299.63

CD-ROM PARALLEL PORT - AMACOM		EX VAT	INC VAT
CD300	EZCD Quad Speed	£135	£158.63
CD301	EZCD Six Speed	£189	£222.08
CD302	EZCD Eight Speed	£225	£264.38
CD303	EZCD Quad Speed with 16Bit Soundcard	£205	£240.88
CD304	EZCD Six Speed with 16Bit Soundcard	£265	£311.38
CD305	EZCD Eight Speed with 16Bit Soundcard	£299	£358.38

SPEAKERS



Trust 3D Sound Dimension Speakers

- 300Watt powered speakers
- Ideal for multimedia



SP45 Trust 3D Sound £49 £57.58

CODE	MODEL	OUTPUT	EX VAT	INC VAT
MEDIAFORCE				
SP50	Blaster 50	50W	£15	£17.62
SP55	Blaster 120	120W	£25	£29.37
SP60	Blaster 160	160W	£29	£34.07
TRUST				
SP5	Soundwave 40	15W	£14	£16.45
SP10	Soundwave 30	25W	£19	£22.33
SP15	Soundwave 20 (+ stands)	25W	£22	£25.85
SP22	Soundwave 240	240W	£41	£48.18
SP45	3D Sound Dimension	300W	£49	£57.58
SP120	Bass Boost Box	120W	£65	£76.37
YAMAHA				
SP24	M5 High Quality Speakers	6W	£35	£41.12
SP27	M15 High Quality Speakers	10W	£45	£52.87
SP28	Yamaha M20DSP 10 Watt Speakers		£x	£x
SP30	MSW10 Sub Woofer System	25W	£73	£85.78
ACTIVE				
SP23	Active	20W	£14	£16.45
SP40	Active	80W	£25	£29.38
SP42	Active	120W	£35	£41.13
LABTECH SPEAKERS				
SP80	LCS-1012 1.3Watts RMS Speakers		£Call	
SP81	LCS-1014 4Watts RMS Speakers		£Call	
SP82	LCS-1020 9Watts RMS Speakers		£39	£45.83
SP83	LCS-1022 10Watts RMS Speakers		£49	£57.58
SP84	LCS-1022 10Watts RMS Speakers & 3D Spatializer Sound		£59	£69.33
SP85	LCS-2412 20Watts RMS Subwoofer & Speakers		£79	£92.83
SP86	LCS-2412 20Watts RMS Subwoofer & Speakers & 3D Spatializer Sound		£95	£111.63
SP87	LCS-3010 20Watts RMS Speakers		£69	£81.08
SP88	LCS-3210 20Watts RMS 3D Spatializer Sound Speakers		£85	£99.88

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CD-ROMs 15

PLASMON CDR4240
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- Quad Speed
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- 1 Year Warranty

CD-ROM WRITERS

	EX VAT	INC VAT
CD168 Plasmon CDR4240 2 x 4 Internal	£455	£534.63
CD169 Plasmon CDR4240 2 x 4 External	£490	£575.75
CD170 Plasmon CDR4400 4 x 4 Internal	£690	£810.75
CD171 Plasmon CDR4400 4 x 4 External	£720	£846.00
CD172 Plasmon CDR4240 2 x 4 Internal Full Kit	£490	£575.75
CD173 Plasmon CDR4240 2 x 4 External Full Kit	£520	£611.00
CD174 Plasmon CDR4400 4 x 4 Internal Full Kit	£720	£846.00
CD175 Plasmon CDR4400 4 x 4 External Full Kit	£760	£893.00
CD161 Yamaha CDR100 4 x 4 Internal with software	£549	£645.08
CD162 Yamaha CDE100 4 x 4 External with software	£579	£680.33
CD163 Sony CDU924-S 2 x 4 Internal	£668	

CD161-L	Neato CD Labeller Kit	£55	£64.63
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CD164 Richo 2 x 4 Internal Full Kit	£390	£458.25
CD167 Richo 2 x 4 Internal	£330	£387.75
CD 107 Low Cost SCSI Card For External Drive	£45	£52.88
AC 30 Ricoh DB 25 Centronics 50 Pin External SCSI Cable	£7	£8.23
CD167 Richo 2 x 4 External Bare Drive	£419	£492.33

SPEAKERS

CODE	MODEL	EX VAT	INC VAT
AIWA SPEAKERS			
SP70	TS-CD20 10Watt RMS Subwoofer & 2 x 5 Watt Speakers	£79	£92.83
SP71	SC-C77 20Watt RMS Speakers	£49	£57.58
SP72	SC-C55 10Watt RMS Speakers	£35	£41.13
SP73	SC-C47 6Watt RMS Speakers	£25	£29.38



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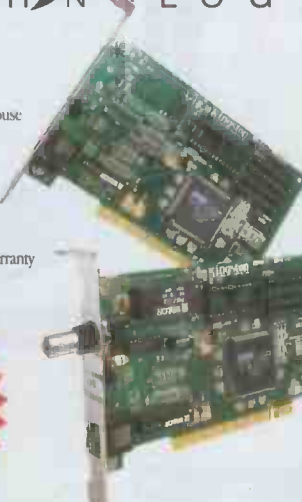
NETWORKING

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- Individually tested with Lifetime Warranty
- NE2000 Compatible - guaranteed

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COMBI
£25
EX VAT**



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N200	ISA Combi Card	£25	£29.38
N205	PCI Combi Card	£55	£64.63
N210	8 Port Hub	£89	£104.58
N215	8 Port Stackable Hub	£105	£123.38
N220	16 Port Hub	£165	£193.88
N202	ISA Combi Card PnP	£27	£31.73
N205-100	PCI 10/100 fast Ethernet Combo adaptor	£79	£92.82



CODE		EX VAT	INC VAT
HUBS & REPEATERS			
N30	Trust 8 Port Smart Hub	£92	£108.10
N35	Trust 16 Port Smart Hub	£169	£198.58
N80	Trust 2 Port Ethernet Repeater	£104	£122.20
N81	Trust 3 Port Smart Repeater	£129	£151.57
N85	Trust 6 Port Ethernet Repeater	£219	£257.33
N105	Mini size Ethernet Hub 8Port	£79	£92.83

CODE		EX VAT	INC VAT
NETWORKING			
N103	3COM 3C509 Combo	£65	£76.37
N154	3COM 3C509 Combo 5 Pack	£310	£364.25
N20	Pocket LAN adaptor	£49	£57.58

CODE		EX VAT	INC VAT
CABLES & TOOLS, ETC			
N55	100M RG58 Coax Cable	£21	£24.68
N55-1	1M RG58 BNC Fly Lead	£4	£4.70
N55-2	2M RG58 BNC Fly Lead	£5	£5.88
N55-5	5M RG58 BNC Fly Lead	£7	£8.23
N55-10	10M RG58 BNC Fly Lead	£10	£11.75
N55-5	5M RG58 BNC Fly Lead	£7	£8.23

CODE		EX VAT	INC VAT
3COM NETWORKING PRODUCTS			
N53	3COM ETHERLINK 111 ISA 3C509B BNC	£60	£70.50
N53-5	3COM ETHERLINK 111 ISA 3C509B BNC 5 PACK	£269	£316.08
N152	3COM ETHERLINK 111 ISA 3C509B RJ45	£60	£70.50
N153	3COM ETHERLINK 111 ISA 3C509B RJ45 5 PACK	£269	£316.08
N103	3COM ETHERLINK 111 ISA 3C509B COMBO	£65	£76.38
N154	3COM ETHERLINK 111 ISA 3C509B COMBO 5 PACK	£309	£363.08
N104	3COM ETHERLINK 111 ISA 3C900 PCI COMBO CARD	£95	£111.63
N157	3COM ETHERLINK 111 PCMCIA 3C589 COMBO CARD	£109	£128.08
N158	3COM FAST ETHERLINK 10/100 PCI 3C905 COMBO	£95	£111.63
N400	3COM OFFICE CONNECT 8 PORT HUB/BTPC+1BNC	£134	£157.45
N410	3COM OFFICE CONNECT 8 PORT HUB/BTPM+1BNC+SNMP	£349	£410.08
N420	CASTELLE OFFICE CONNECT PRINT SERVER	£319	£374.83
N430	3COM S/STACK II 12 PORT HUB TP	£349	£410.08
N440	3COM S/STACK II 24 PORT HUB TP	£609	£715.58
N450	3COM S/STACK II 12 PORT HUB 100 TX	£1499	£1761.33
N460	3COM S/STACK II SWITCH 1000 12 PORT	£1849	£2172.58
N470	3COM S/STACK II SWITCH 1000 24 PORT	£2279	£2677.83

CODE		EX VAT	INC VAT
INTEL NETWORKING PRODUCTS. ALL INTEL CARDS ARE PNP/FULL DUPLEX			
N500	INTEL ETHEREXPRESS PRO 10+ ISA COMBO	£63.75	£74.91
N500-5	INTEL ETHEREXPRESS PRO 10+ ISA COMBO 5 PACK	£289	£339.58
N510	INTEL ETHEREXPRESS PRO 10+ ISA FLASH COMBO	£77	£90.48
N510-5	INTEL ETHEREXPRESS PRO 10+ ISA FLASH COMBO 5PK	£359	£421.83
N520	INTEL ETHEREXPRESS PRO 10+ ISA RJ45	£63	£74.03
N520-5	INTEL ETHEREXPRESS PRO 10+ ISA RJ45 5 PACK	£268	£314.90
N530	INTEL ETHEREXPRESS PRO 10+ ISA RJ45 FLASH	£70	£82.25
N540	INTEL ETHEREXPRESS PRO 10+ PCI COMBO	£89	£104.58
N300	INTEL ETHEREXPRESS PRO 10/100 PCI	£92	£108.10
N310	INTEL ETHEREXPRESS PRO 10/100 SMART PCI ADAPTOR	£509	£598.08
N600	INTEL NETPORT EXPRESS EL PRINT SERVER	£225	£264.38
N610	INTEL STACKABLE HUB 100 BASE TX 12 PORT	£1249	£1467.58
N615	INTEL EXPRESS 10/100 DOWNLINK	£599	£703.83
N620	INTEL EXPRESS SWITCHING HUB 5 PORTS/2 UPLINK SLOTS	£2499	£2936

CODE		EX VAT	INC VAT
BTS UPS LINE INTERACTIVE			
N8600	BTS LS600 LINE INTERACTIVE 600VA	£137	£160.98
N8900	BTS LS900 LINE INTERACTIVE 900VA	£235	£276.13
N81000	BTS LS1000 LINE INTERACTIVE 1KVA	£279	£327.83
N81200	BTS LS1200 LINE INTERACTIVE 1.2KVA	£329	£386.58

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BTS UPS TRUE ON-LINE SYSTEMS (ALLOW 14 DAYS FOR DELIVERY)			
NE600	BTS ELAN 600 TRUE ON LINE 600VA	£439	£515.83
NE1000	BTS ELAN 1000 TRUE ON LINE 1KVA	£589	£692.08
NE1500	BTS ELAN 1500 TRUE ON LINE 1.5KVA	£785	£922.38
NE2000	BTS ELAN 2000 TRUE ON LINE 2KVA	£965	£1133.88
NE3000	BTS ELAN 3000 TRUE ON LINE 3KVA	£1695	£1991.63

CODE		EX VAT	INC VAT
CABLES & TOOLS, ETC			
N55	100M RG58 COAX CABLE	£21	£24.68
N90	UTP 1000R CABLE-EASY PULL BOX CAT 5	£60	£70.50
N95	RJ45 Crimp Plug	£7	£8.23
N70	BNC Crimp Plug	£1	£1.18
N71	BNC T-Piece	£1	£1.18
N72	BNC In-Line Coupler	£1	£1.18
N73	BNC Terminator-50 Ohm	£1	£1.18
N90-1	UTP 1MTR Drop Connector Cable - Cat 5	£2	£2.35
N90-2	UTP 2MTR Drop Connector Cable - Cat 5	£2.50	£2.94
N91	UTP 3MTR Drop Connector Cable - Cat 5	£3	£3.53
N92	UTP 5MTR Drop Connector Cable - Cat 5	£4	£4.70
N93	UTP 7MTR Drop Connector Cable - Cat 5	£5	£5.88
N94	UTP/RJ45 Crimp Plug	£0.25	£0.29

CODE		EX VAT	INC VAT
TRUST ENERGY PROTECTOR SERIES OF SMART UPS			
N89	Energy Protector 400VA UPS	£104	£122.20
N96	Energy Protector 650VA UPS	£139	£163.33
N97	Energy Protector 1200VA UPS	£242	£284.35
N98	Energy Protector Monitor Card & Shutdown Software	£15	£17.63

16 NETWORKING

Kingston EtherX 100Base-TX 8-port Fast Ethernet Hub & 2 10/100 PCI Cards



The EtherX 100Base-TX Eight Port Fast Ethernet Hub is an unmanaged, Class II rack-mountable multi-port repeater device designed for Fast Ethernet networks or Fast Ethernet segments on an existing network. Because the hub is Class II compliant it features dual connectors on the eighth port to support either a traditional connection or an alternative crossover connection which allows the device to be cascaded to another hub for network expansion beyond eight nodes. The hub is a single height device which fits into networking racks accepting standard 19 inch devices. Alternatively, the compact design allows for placement in most workgroup environments. Status LEDs on the front of the unit provide Line, Activity and Partition status for easy troubleshooting. Like all Kingston networking products, the EtherX 100Base-TX hub is covered by a limited lifetime warranty and is backed by free technical support.

- 19" Rack-mountable design for easy installation and convenient storage
- 8 UTP ports for 100Base-TX connection
- Conforms to IEEE 802.3u 100Mbit/sec Class II • Repeater specifications
- 8 Link, Activity and Partition Status LEDs for easy troubleshooting
- Power LED and Collision LED for collision detection and condition
- Dual connectors on last UTP port for crossover or straight-through cable wiring for easy scalability
- Full preamble, amplitude, and timing regeneration with automatic partition and reconnection
- Limited Lifetime Warranty
- Toll free technical support

**8 PORT
HUB
£579
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10/100 PCI CARDS**

N212 100Base-TX 8-Port Hub & 2 10/100 PCI Cards £579 EX.VAT £680.33 INC.VAT



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NETWORKING

MediaFORCE - PCI Combi Card

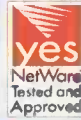
- Complies with PCI Bus 2.0 & later.
- Supports Full-Duplex (20MHz) Ethernet Function.
- Auto Adaptor Setup using Bios setup program.
- 2 LED Indicators for monitoring.
- Auto Detect for UTP or BNC.
- Supports 10Base-T.



N40 PCI Combi Card **£29** EX.VAT **£34.08** INC.VAT

MediaFORCE - BNC Network Card

- 16/8 bit data transfer via ISA bus.
- Quick diagnostic LED(ACTIVITY, LINK) to indicate network status.
- 16k memory buffer.
- Optional 8/16/32KB Boot ROM socket.
- UMC chip.



N5 BNC Network Card **£14** EX.VAT **£16.45** INC.VAT



NETWORKING 17

MediaFORCE - PCMCIA Ethernet Adaptor

- Fits into Type II PCMCIA slot.
- 16 KB data buffer.
- Media Coupler comes with 10Base-2 & 10Base-T.
- Low power consumption.
- Extensive driver support.
- LED's for monitoring link & traffic conditions.



N25 PCMCIA Ethernet Adaptor **£65** EX.VAT **£76.37** INC.VAT

MediaFORCE - UTP Network Card

- 16/8 bit data transfer via ISA bus.
- Quick diagnostic LED(ACTIVITY, LINK) to indicate network status.
- 16k memory buffer.
- Optional 8/16/32KB Boot ROM socket.
- UMC chip.



N09 UTP Network Card **£14** EX.VAT **£16.45** INC.VAT

MediaFORCE - Combi Network Card

- 16/8 bit data transfer via ISA bus.
- Quick diagnostic LED(ACTIVITY, LINK) to indicate network status.
- 16k memory buffer.
- Optional 8/16/32KB Boot ROM socket.
- UMC chip.



N10 Combi Network Card **£16** EX.VAT **£18.80** INC.VAT

MediaFORCE - PNP Combi Card

- Complies with IEEE 802.3 10Base-2 & 10Base-T.
- Provides an RJ-45 for twisted pair wiring & a BNC for RG-58 A/U cabling.
- Selectable Interrupts, I/O & boot ROM address.
- Supports full Duplex.



N08 PNP Combi Card **£19** EX.VAT **£22.33** INC.VAT

MediaFORCE - 4 Port Hub

- Allows inter-connection of thin coaxial & UTP segments within a single device.
- 5 UTP ports for twisted pair wiring.
- LED indicators & auto port to port.
- Complies with IEEE 820.3 10Base-T & 10Base2 standards.



N100 4 Port Hub **£49** EX.VAT **£57.58** INC.VAT

MediaFORCE - 8 Port Hub

- Allows inter-connection of thin coaxial & UTP segments within a single device.
- 8 UTP ports for twisted pair wiring & 1 BNC port for thin coaxial cable.
- LED indicators & auto port to port.
- Complies with IEEE 820.3 10Base-T & 10Base2 standards.



N105 8 Port Hub **£59** EX.VAT **£69.32** INC.VAT

MediaFORCE - 16 Port Hub

- Allows inter-connection of thin coaxial & UTP segments within a single device.
- 16 UTP ports for twisted pair wiring & 1 BNC port for thin coaxial cable.
- LED indicators & auto port to port.
- Complies with IEEE 820.3 10Base-T & 10Base2 standards.



N110 16 Port Hub **£109** EX.VAT **£128.08** INC.VAT

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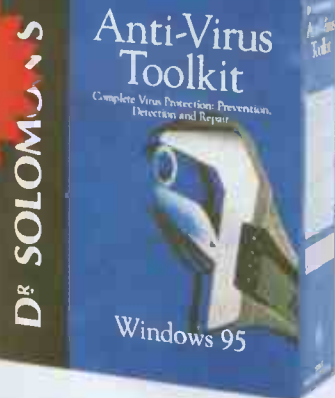
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- Free technical support - 7 days a week, 24 hours a day.
- Monthly or quarterly updates via post, CompuServe, CD, Internet or BBS.

CODE	DESCRIPTION	EX VAT	INC VAT
S-05	Audit	£265	£311.38
S-010	Anti-Virus Tool Kit City Upgrade Win	£59	£69.33
S-015	Anti-Virus Tool Kit Mnth Upgrade Win	£114	£133.95
S-020	Anti-Virus Tool Kit City Upgrade Win '95	£65	£76.38
S-025	Anti-Virus Tool Kit Mnth Upgrade Win '95	£121	£142.18
S-030	Anti-Virus Tool Kit 10 User License	£249	£292.58
S-035	Anti-Virus Tool Kit 20 User License	£399	£468.83
S-040	Anti-Virus Tool Kit 50 User License	£799	£938.83
S-050	Anti-Virus Tool Kit Windows NT	£72	£84.60
S-060	VirusGuard 10 User	£273	£320.78
S-065	VirusGuard 20 User	£459	£539.33
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18 SOFTWARE

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S-510	Sage Instant Payroll 11 for Windows	£39	£116.33
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S-0K10	Quicken V3 on CD	£28	£32.90
S-0K5	Pegasus Solo Accounts	£64	£75.20
S-P10	Pegasus Solo Payroll	£43	£50.53
S-T5	TaxCalc	£20	£23.50

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S-R65	Drafts Quick CAD v2.1 for Win 3.x	£42	£49.35
S-070	Drafts Quick CAD 95 for Win 95	£42	£49.35
S-075	Drafts CAD Professional	£119	£233.83
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S-R85	Planix Home Designer 3D	£25	£29.38
S-R90	Planix Exterior Designer 3D	£25	£29.38
S-R120	Planix Photolandscape	£21	£24.68
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S-1215	Lotus Notes V4.1 Desktop Client	£74	£86.95
S-1220	Lotus Notes V4.1 Dtp Client License	£69	£79.90
S-1225	Lotus Notes V4.1 Dtp Client 10 User	£824	£733.20
S-1230	Lotus CC Mail R6 Software Pack	£105	£123.38
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S-MS95	Ultimate Climb for Windows 95	£23	£27.03
S-MS100	Nickelodeon 3D Movie Maker	£25	£29.38
S-MS105	Robbit Ears Bundle 1.0 for Win 95	£23	£27.03
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S-830	V7 CPU Upgrade Windows 95	£64	£75.20
S-835	Visual dBase for Windows v5.5	£195	£229.13
S-840	Visual dBase pro Comp Upg.	£149	£175.08
S-845	Visual dBase Upgrade for Win 95	£55	£64.63
S-125	Lotus Approach for 3.x	£76	£89.30
S-140	Lotus Approach for '95	£96	£112.80
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S-135	Microsoft Access for Win 95 CCG U/G	£89	£112.80

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S-0K40	Multi Dictionary	£19	£22.33
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SOFTWARE 19



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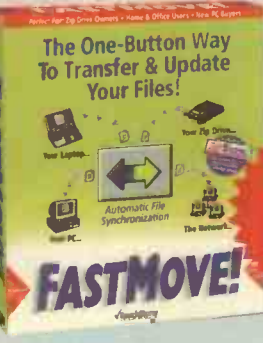
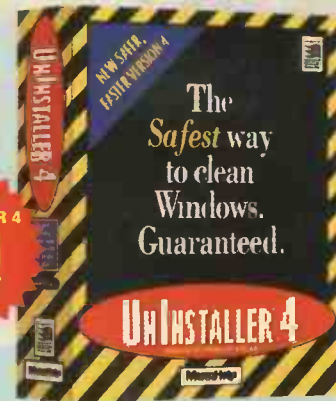
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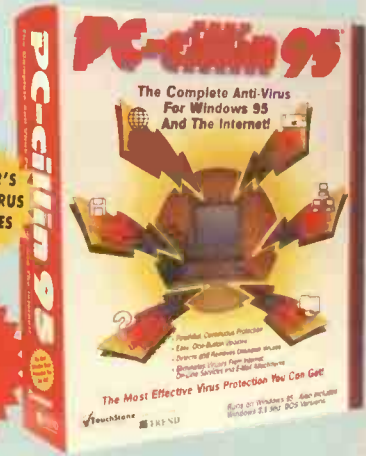
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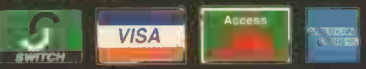
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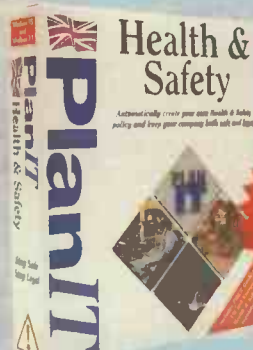
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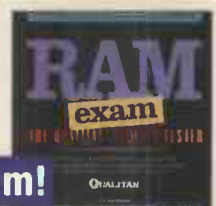
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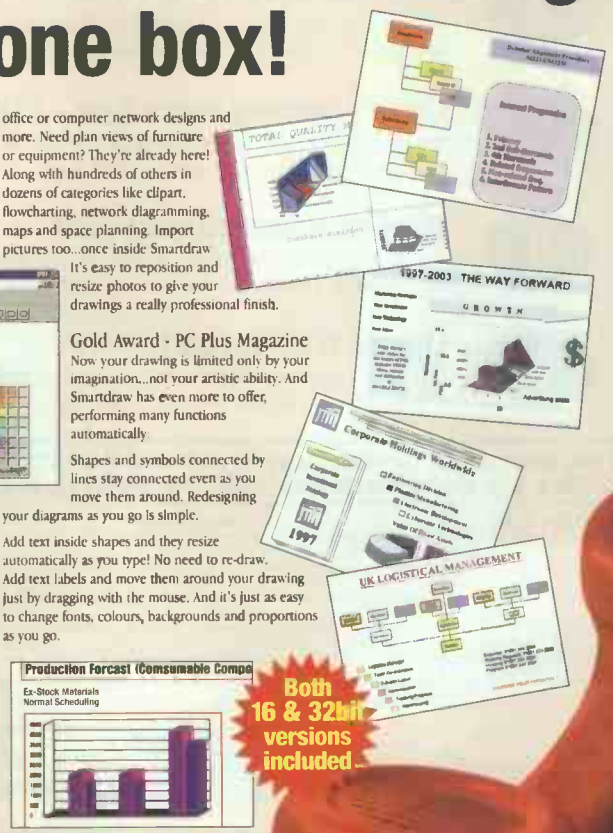
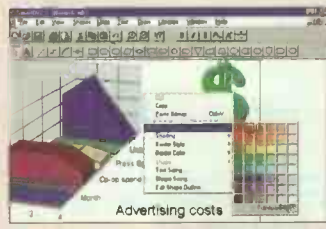
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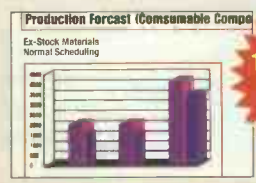


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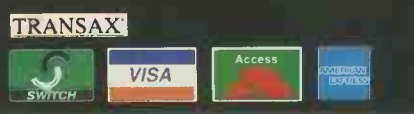
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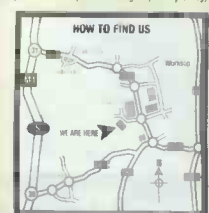
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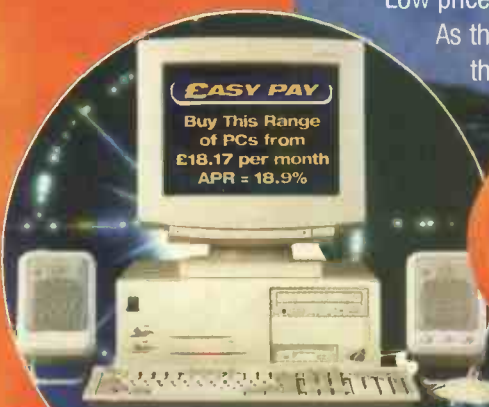
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ELS K5-100	£19.31	£4.09	£509	£598⁰⁸	
ELS P133	£22.72	£4.81	£599	£703⁸³	
ELS P150	£25.00	£5.29	£659	£774³³	
ELS P166	£28.41	£6.02	£749	£880⁰⁸	
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CD-ROM UPGRADES	Ex. Vat	Inc. Vat
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P133	£36.39	£9.05	£9.59	£1126 ^{2,3}	
P150	£38.29	£9.53	£10.09	£1185 ^{2,3}	
P166	£42.08	£10.47	£11.09	£1303 ^{2,3}	
P200	£45.50	£11.32	£11.99	£1408 ^{2,3}	

	EASY PAY APR 18.9%	EASY PAY† Monthly (3 YRS)	EASY LEASE†† Weekly (3 YRS)	Ex. Vat PRICE	inc. Vat PRICE
P133	£55.74	£13.86	£14.69	£1726 ^{2,3}	
P150	£58.02	£14.43	£15.29	£1796 ^{2,3}	
P166	£61.82	£15.37	£16.29	£1914 ^{2,3}	
P200	£64.85	£16.13	£17.09	£2008 ^{2,3}	

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32Mb EDO RAM to 64Mb EDO RAM	£199	£233 ^{2,3}

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17" NI (1280 x 1024) MPR2 0.28dpi	£269	£316 ^{2,3}
2Mb VRAM Video Upgrade	£199	£233 ^{2,3}
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2Mb Video Upgrade for Matrox Mystique	£99	£116 ^{2,3}

All monitors come with 2 years warranty. The 1st year is advance replacement followed by one year RTB.

SOFTWARE

MS Office 95 Upgrade	£189	£222 ^{2,3}
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INPUT DEVICES

Fujitsu Full Size Tactile Keyboard	£25	£29 ^{2,3}
Ergonomic Keyboard	£32	£37 ^{2,3}
Ergonomic Microsoft Mouse	£13	£15 ^{2,3}

WARRANTY OPTIONS

12 Months Return to Base	FREE	
12 Months On-Site Warranty (96 only)	£39	£45 ^{2,3}
24 Months On-Site Warranty	£99	£116 ^{2,3}
36 Months On-Site Warranty	£199	£233 ^{2,3}

CD-ROM UPGRADES

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10 Speed CD-ROM	£29	£34 ^{2,3}

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Rapier Family Computers

PLEASE NOTE: Interest free credit is subject to status. Make sure that you will be able to afford the monthly finance payments before entering into a finance agreement. Written details are available upon request. Interest free credit is only available on these systems. We reserve the right to change bundled CD titles without prior notice. Subject to availability.

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- Mini Tower Case • CE Approved Power Supply • 8 Speed CD-ROM Drive
- Fast EIDE PCI HD Controller • 1 ECP/EPP Parallel Port & 2 Fast Serial Ports (16.550)
- 102 Key UK Keyboard • 256K Pipeline Burst Cache
- Serial Mouse • 16Bit Sound Card & Stereo Speakers
- 33.6Kbps Voice Fax / Modem with 1 month FREE Internet access with FORCE9
- 12 Months On-Site Warranty • Windows 95 & Lotus SmartSuite 96
- 23 Different CD-ROM Titles

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- Intel 133MHz Pentium™ Processor
- 256K Pipeline Burst Cache RAM • 16Mb EDO RAM
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- 16bit Sound Card and Twin Stereo Speakers • 15" Digital SVGA Colour Monitor
- 33.6 Voice BAPT Fax Modem with 3 Months FREE Internet access through FORCE9
- Windows 95 and Mouse • Windows 95 Keyboard
- Multi-directional Joystick • OKI Jet 2010 Colour InkJet Printer and Cable
- Lotus SmartSuite 96 including: Lotus WordPro 96, Lotus 123 96, Lotus Approach 96, Lotus Organizer 96 & Lotus Freelance 96 • PLUS 23 Different CD-ROMs
- 12 Months On-Site Warranty

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£1799
£1531.06
EXC. VAT

Rapier Family Computers - Option Three

- Intel 200MHz Pentium™ Processor
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- 3.2GB EIDE Hard Disk Drive • 2Mb 64Bit PCI Graphics • 10 Speed CD-ROM
- 16bit Sound Card and Twin Stereo Speakers • 17" Digital SVGA Colour Monitor
- 33.6 Voice BAPT Fax Modem with 3 Months FREE Internet access through FORCE9
- Windows 95 and Mouse • Windows 95 Keyboard
- Multi-directional Joystick • OKI Jet 2010 Colour InkJet Printer and Cable
- Lotus SmartSuite 96 including: Lotus WordPro 96, Lotus 123 96, Lotus Approach 96, Lotus Organizer 96 & Lotus Freelance 96 • PLUS 23 Different CD-ROMs
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12 months	£10 per month

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Pick up the phone to

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and in

20 minutes

you'll have

33.6Kbps access

to the

premier Internet service

in the UK from

just £10 per month

plus Vat

Call now on 01909 531 923

OR why not switch to Force9 on-line at www.force9.net



Force9 Internet Holdings Ltd. The Old Brewery Yard, Kilton Road, Worksop.
Fax: 01909 477 199 E-mail: sales@force9.net Web: www.force9.net



Local 0345 number access

Regardless of where you are in the UK, you pay only local call charges. And because there's just one number, you can travel anywhere in the UK and access Force9 without having to reconfigure - great for portable users!



Satisfaction guaranteed

We're sure Force9 is the fastest, most reliable Internet access in the UK. If for any reason you are dissatisfied we will immediately refund the remaining duration of your subscription. Guaranteed.



Starter Pack only £19.99

Our Starter Pack includes the Microsoft Internet Suite and over 500Mb of great Net software.



Watford Electronics Ltd **Aries**



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See Page 2 for details

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JANUARY 97
ISSUE

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Choose one of these CDs FREE with every order.

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SOCD 2

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SOCD 3

- MasterClips 6000 - Collection of 6000 Professional Cliparts.

SOCD 4

- Space Mission - All you ever wanted to know about space exploration.

SOCD 5

- World War II - Learn history first hand!

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2	Ordering information

OFFER 1 Aries V32bis 14,400 baud Fax/Modem

Aries V32bis 14,400 baud Fax/Modem

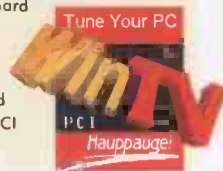
- Internal **£24.95**
- External **£29.95**



FREE: 30 days Internet Access

OFFER 2 Hardware Offers

1. Fujitsu 1.7Gb M1623T 3.5" E-IDE 10ms Hard Disk Drive **£139.95**
2. TMC Pentium A15TV Motherboard **£78.95**
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 - Intel VX chipset Motherboard
 - 256K Pipeline Burst Cache
 - Upgradable to 128Mb RAM On-Board
 - Windows 95 PnP Flash BIOS
3. Bring TV and Hi-Res Fast Graphics to your Screen with:
 - Hauppauge WIN/TV PCI Card and
 - Videologic 2Mb GrafixStar 400 PCI Graphics Card **£129.95**



OFFER 3 Aries EnergyPro 17" Flat Screen Colour Monitor

- 0.28mm dot pitch
- AntiStatic/Anti-Glare/Invar Shadow Mask Tube
- Resolution:
 - 1280 x 1024 Non-Interlace - 60Hz
 - 1024 x 768 Non-Interlace - 82Hz
- Digital Controls
- MS Windows PnP compatible
- 12 Months On-Site Maintenance Warranty



£299

All Prices exclude VAT

OFFER 4 TrafficMaster Freeway

As seen on TV

- Live traffic information 24hrs a day
- Advance warning of delays
- Automatic audio message
- Covers all of Britain's motorways
- Requires no fittings or wiring
- Free 12 month's information (worth £24)

£69



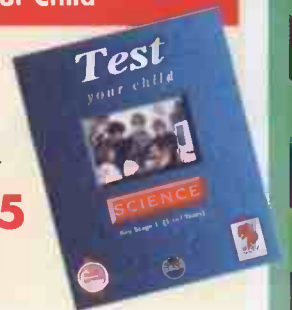
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Ten out of Ten 'Test your Child'

- Test Your Child MATHS
 - Test Your Child ENGLISH
 - Test Your Child SCIENCE
- All of the above Three Packs for

Only: **£29.95**

Please specify if you require 'Stage 1' - 5 to 7 years or 'Stage 2' - 7 to 11 years



OFFER 6 Software Offers:

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- Symantec Norton Navigator 95 **£25.95**
- IMSI MasterClips 35,000 (ClipArts/Sounds/Fonts) **£29.95**
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By fax: Any time on **01582 488588** Payment can be made using Visa, MasterCard, Switch or Delta cards - please ensure that you give the name on the card, the card number, the expiry date together with the billing address and delivery address (if this is different).

By post: Send us your order and cheque with full payment including delivery and VAT @ 17.5%. Please allow 5 working days from receipt for cheque clearance.

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Carriage Charges (inc. Insurance & packaging)

Minimum standard delivery from **£6.95**

Express next day delivery from **£8.00**

Note: higher charges may be made depending on the weight and value of your order and the delivery address.

Warranty

All goods, except software and clearance offer items, supplied carry a minimum of 12 months return to base warranty, (unless stated otherwise). For certain products a warranty may entail dealing direct with the manufacturer. Watford Electronics reserves the right to repair or replace an item which becomes faulty after 14 days of the purchase date. If within 14 days of the date of purchase, but before using the product, or opening the software package, you realise that the product is unsuitable, please call our Customer Services Dept on **01582 745545** for a Returns Authorisation Number and we will be happy to refund the cost of the item. Please note that in these circumstances there will be a handling fee of £10 or 15% of the cost (whichever is the higher).

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All items, offers, specifications and prices are correct and believed, in good faith, to be available at the time of going to press, but this may change without notice due to circumstances beyond our control. Goods are not sold on a trial basis. Please check the suitability of the products with your system and/or the manufacturers before ordering. Goods are sold subject to our full terms and conditions of sale which are available on request. All trademarks are acknowledged. E&OE.

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Aries THE SIGN OF QUALITY



Xmas Multimedia PC '97 System

- Intel advance Triton 2 VX chipset Motherboard
- AMD K5-PR120 Processor*
- 8Mb EDO RAM expandable to 128Mb
- 256K Pipeline Cache
- 3.5" 1.44Mb Floppy Drive
- 1Gb Fast Hard Disk Drive
- 4X CD ROM Drive
- 16 bit Sound Blaster Compatible Sound Card
- Stereo Speakers
- 1Mb PCI Graphics Card - 64bit
- On-board fast PCI enhanced IDE hard disk controller
- Dual 16550 UART Serial ports and an Enhanced EPP parallel port
- 4 x PCI & 3 x ISA 16bit expansion ports (One shared)
- 105 key Enhanced Windows 95 Keyboard
- MS compatible Mouse
- Desktop PC Case
- 14" Super VGA 0.28mm Colour Monitor
- MS Windows 95
- 12 months On-Site† Maintenance



Model	Price	Finance
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PR120*	£699 (£821.33 inc VAT)	per month from £37
---------------	-------------------------------	---------------------------

Optional Upgrades - see below



* New processor - equal to / better performance than an Intel Pentium P120 Processor

† Mainland UK only

Design of the PC and Monitor case may vary from that shown

Aries Universa PC^{plus} Systems

- Intel advance Triton 2 VX chipset Motherboard with an Intel Pentium® Processor
- 16Mb RAM expandable to 128Mb
- 256K Pipeline Burst Cache RAM
- 850Mb Fast Hard Disk Drive
- Plug & Play support for Windows 95
- Processor upgradable to Pentium 200MHz using Type 7 ZIF Socket
- 64 bit 1Mb PCI Graphics Controller Card
- 3.5" 1.44Mb Floppy Drive
- On-board fast PCI enhanced IDE hard disk controller
- Dual 16550 UART Serial ports and an Enhanced EPP parallel port
- 4 x PCI & 3 x ISA 16bit expansion ports (One shared)
- 105 key Enhanced Windows 95 Keyboard
- MS compatible Mouse
- Desktop PC Case
- 14" EnergyStar MPRII Low Radiation, Non-Interlaced Colour Monitor (0.28mm dp)
- MS Windows 95
- SIX Year Warranty consisting of: 12 months On-Site* Parts & Labour Warranty & Five years (return to base) Labour Only Warranty after 12 months



Shown with optional multimedia kit

Optional Upgrades

US-03	16Mb to 32Mb EDO RAM Upgrade	£89
US-20	Upgrade to Aries EnergyPro 15" Micro.Controller 1280x1024 NI Monitor	£49
US-21	Upgrade to Aries EnergyPro 17" Micro.Controller 1280x1024 NI Monitor	£199
US-30	Upgrade 1 year to 3 years On-Site Maintenance	£119



LOW COST FINANCE 17.9%

Available on all Aries PCs - See example below



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* UK Mainland only

Model	Price	Finance
P5-P120	£699 (£821.33 inc VAT)	per month from £37
P5-P133	£749 (£880.08 inc VAT)	per month from £40
P5-P150	£799 (£938.83 inc VAT)	per month from £42
P5-P166	£889 (£1044.58 inc VAT)	per month from £47
P5-P200	£979 (£1150.33 inc VAT)	per month from £52

APR 17.9% Finance calculation example: Cash Price: £699 + VAT = £821.33 Deposit: 10% £82.13 and 24 equal payments of £36.43 Total Price: £956.33 Finance is available subject to status. Be sure you can afford the payments prior to entering into an agreement. price excludes carriage.

For ordering information, please see page 2

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Aries THE SIGN OF QUALITY

Aries Business Media ^{plus} Series

- Intel advanced Triton 2 VX chipset Motherboard with an Intel Pentium® Processor
- 16Mb Fast EDO RAM expandable to 128Mb
- 256K Pipeline Burst Cache RAM
- 1Gb (1000Mb) Fast Hard Disk Drive
- 8X Speed CD ROM Drive
- 16 bit Sound Blaster Compatible Sound Card
- Aries 25W Hi Fi Stereo Speakers
- CD Bundle Pack (see following page)
- Plug & Play support for Windows 95
- Processor upgradable to Pentium 200MHz using Type 7 ZIF Socket
- VideoLogic GrafixStar 400 64 bit PCI Graphics Card with 1Mb DRAM
- 3.5" 1.44Mb Floppy Drive
- On-board fast PCI Enhanced IDE HD controller
- Dual 16550 UART Serial ports and an Enhanced EPP parallel port
- 4 x PCI & 3 x ISA 16bit expansion ports (One shared)
- 105 key enhanced Windows 95 Keyboard
- MS compatible Mouse
- Desktop PC Case
- 14" EnergyStar MPRII Low Radiation, Non Interlaced Colour Monitor (0.28mm dp)
- MS Windows 95
- SIX Year Warranty consisting of: 12 months On-Site* Parts & Labour Warranty Five years (return to base) Labour Only Warranty after 12 months.

Aries Business Media ^{plus} systems make no compromise on quality or performance while continuing Aries reputation for superb value. With Pentium processors up to 200MHz ensuring stunning speeds, an EIGHT speed multimedia kit and Videologic 64-bit graphics you really can't buy better.

Optional Upgrades

BM-03	16Mb to 32Mb EDO RAM Upgrade	£89
BM-20	Upgrade to Aries EnergyPro 15" Micro.Controller 1280x1024 NI Monitor	£49
BM-21	Upgrade to Aries EnergyPro 17" Micro.Controller 1280x1024 NI Monitor	£199
BM-30	Upgrade 1 year to 3 years On-Site Maintenance	£119



Model	Price	Finance
P5-P120	£849 (£997.58 inc VAT)	per month from £43
P5-P133	£899 (£1056.33 inc VAT)	per month from £47
P5-P150	£949 (£1115.08 inc VAT)	per month from £50
P5-P166	£1039 (£1226.83 inc VAT)	per month from £55
P5-P200	£1129 (£1326.58 inc VAT)	per month from £59



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Microsoft

OFFICE 95 UPGRADES

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- Word
- Excel
- Powerpoint
- Schedule+



* Special price only available when purchasing an Aries PC. Software packshots for illustration purposes only.

OFFICE 95 PROFESSIONAL SPECIAL OFFER

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OFFICE PROFESSIONAL 95

- Word
- Excel
- Powerpoint
- Access
- Schedule+

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£88.13 inc. VAT

Product is supplied on CD ROM only, with on-line documentation, via voucher redemption

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- RAC Rally
- Funschool Maths
- Easy Tutor 95
- Webster's Dictionary
- Webster's English Usage Dictionary
- Webster's Dictionary of Quotations
- Webster's Biographical Dictionary
- Roget's 21st Century Thesaurus

Alternative Bundle £39*

- MS Encarta 97 UK EDITION
- Serif PagePlus HomeOffice '95
- 3D Garden Designer
- RAC Rally
- Funschool Maths
- Easy Tutor 95

* Only when purchased with an Aries Media PC system. Supplied instead of the Standard CD Bundle.



All prices exclude Carriage & VAT @ 17.5% except where shown. All prices, specifications and offers subject to change without notice. See page 2 for ordering details

Aries



Turn your PC into a 24 hour information centre with a Hauppauge WIN/TV PCI Card



£79.95

£93.94 inc VAT
with any Aries PC see page 17 for details

Aries Professional Media Series ^{plus}



THE ULTIMATE PERFORMERS

Looking for the fastest PCs around? The search is over. The Aries Professional Media systems 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. Professional Media systems feature the latest Intel Triton chipset designed to get the ultimate performance from the Pentium processor. Combine this with 32Mb of high speed EDO-RAM and Pipeline Burst Cache and you have a system that is probably the finest example of Power Computing available anywhere.

Model	Price	Finance
P5-P133	£1249 (£1467.58 inc VAT)	per month from £66
P5-P150	£1299 (£1526.33 inc VAT)	per month from £68
P5-P166	£1389 (£1632.08 inc VAT)	per month from £73
P5-P200	£1479 (£1737.83 inc VAT)	per month from £78

- Intel advanced Triton 2 VX chipset Motherboard with an Intel Pentium® Processor
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- 256K Pipeline Burst Cache RAM
- 1.6Gb (1,600Mb) Fast Hard Disk Drive
- Aries V34 33,600 baud external Internet Voice Fax/Modem Solution
- TEN Speed CD ROM Drive
- Aries 3D 16 bit Sound Card
- Aries 80W Digital Plus Stereo Speakers*
- CD Bundle Pack (see below)
- Plug & Play support for Windows 95
- Processor upgradable to Pentium 200MHz using Type 7 ZIF Socket
- Videologic GrafixStar 600 128 bit PCI Graphics Card with 2Mb MDRAM
- 3.5" 1.44Mb Floppy Drive
- On-board fast PCI Enhanced IDE hard disk controller
- Dual 16550 UART Serial ports and an Enhanced EPP parallel port
- 4 x PCI & 3 x ISA 16bit expansion ports (One shared)
- 105 key enhanced Windows 95 Keyboard
- MS compatible Mouse
- Midi Tower PC Case
- 15" EnergyStar MPRII Low Radiation, Non-Interlaced Colour Monitor (0.28mm dp)
- MS Windows 95
- SIX Year Warranty consisting of: 12 months On-Site** Parts & Labour Warranty Five years (return to base) Labour Only Warranty after 12 months.

Optional Upgrades

PM-03	32Mb to 64Mb EDO RAM Upgrade	£149
PM-06	Upgrade to 2Gb IDE HDD	£49
PM-30	Upgrade 1 year to 3 years On-Site Maintenance	£135

If you require any other upgrade not shown here, please ask



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*Speaker casing may differ from that shown

**UK Mainland only

Monitor Options* - upgrade now and save £££'s

	Aries 15" EnergyPro Digital	Aries 17" EnergyPro Digital	Aries 8000S 17" EnergyPro+	Panasonic PanaSync 5G 1734U	Panasonic PanaSync 17MM 1734FU
Screen Size	15"	17"	17"	17"	17" Multimedia
Dot-Pitch	0.28mm	0.28mm	0.26mm	0.27mm	0.27mm
Resolution Non-Interlace	1024 x 768 92Hz 1280 x 1024 60Hz	1024 x 768 82Hz 1280 x 1024 60Hz	1024 x 768 105Hz 1280 x 1024 82Hz 1600 x 1200 70Hz	1024 x 768 79Hz 1280 x 1024 84Hz	1024 x 768 79Hz 1280 x 1024 84Hz
Frequencies Horz. Vert.	30 to 65KHz 50 to 120Hz	30 to 65KHz 50 to 120Hz	30 to 85KHz 50 to 120Hz		
Other Features	Digital Controls Low Radiation MPRII/CE	Digital Controls Low Radiation MPRII/CE	Digital Controls Low Radiation MPRII/CE/EPA	Digital Controls Low Radiation MPRII/CE/TCO	Digital Controls Low Radiation MPRII/CE/TCO
Upgrade from 14" Aries Monitor	£49 £57.58 inc. VAT	£199 £233.83 inc. VAT	£269 £316.08 inc. VAT	£279 £327.83 inc. VAT	£348 £408.90 inc. VAT
Upgrade from 15" Aries Monitor	-	£149 £175.08 inc. VAT	£219 £257.33 inc. VAT	£229 £269.08 inc. VAT	£229 £269.08 inc. VAT

*Upgrade prices only available at time of Aries PC purchase

APR **17.9%** Finance calculation example: Cash Price: £1249 + VAT = £1467.58 Deposit: 10% £146.76 and 24 equal payments of £65.09 Total Price: £1708.82 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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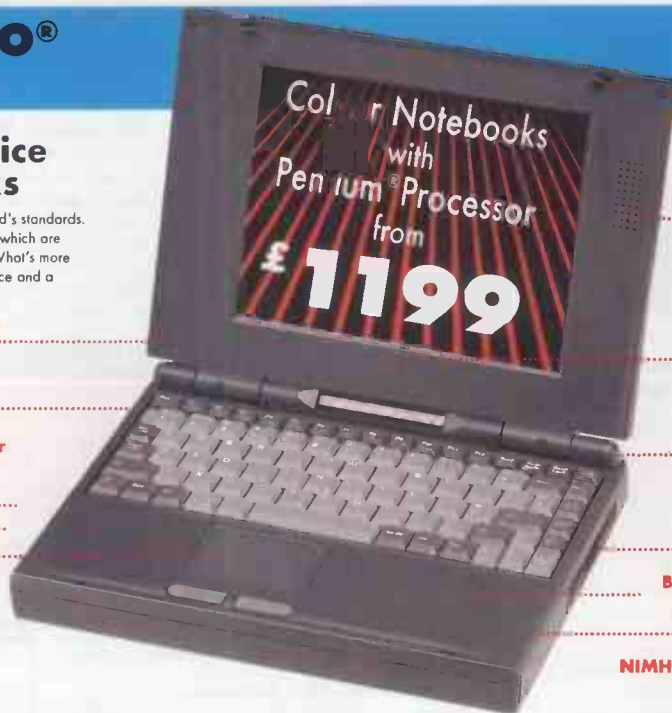
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Aries THE SIGN OF QUALITY

WORKBOOK PRO[®] COLOUR NOTEBOOK

The Professional's Choice for Colour Notebooks

The Aries WorkBook Pro offers outstanding value even by Watford's standards. Both the DualScan and TFT displays deliver crisp, vibrant images which are combined with the superb performance of a Pentium processor. What's more they come equipped with PCMCIA slots, touch pad pointing device and a 16bit stereo sound system.



- Infrared Communication Port - IrDA standard
- PCMCIA Slot - 2 x Type II OR 1 x Type III
- Removable Hard Disk Drive
- Built-in TouchPad Pointing Device
- Line in/Speaker Out/Mic in
- Built-in Microphone
- LCD Status Display
- 16-bit Stereo Sound System
- 3.5" Floppy Disk Drive
- Built-in Stereo Speakers
- NIMH Battery

ARIES WORKBOOK[®] PRO SPECIFICATION

- Intel 100MHz or 120MHz Pentium processor
- 8Mb RAM expandable to 24Mb
- 256Kb onboard cache
- 540Mb removable hard drive
- 1.44Mb 3.5" floppy drive
- 10.4" colour Dual Scan or TFT LCD screen
- 32 bit Video Accelerator with 1Mb Video RAM
- 16 bit SoundBlaster compatible stereo sound system
- Built-in stereo speakers and microphone
- Built-in TouchPad pointing device
- Enhanced 16550 UART serial port
- EPP/ECP hi-speed parallel port
- PCMCIA slots - 2 x Type II or 1 x Type III
- Serial Infrared communication port - IrDA
- Jacks for Stereo Line In/Speaker Out/Mic in
- External Super VGA monitor port
- External PS/2 keyboard connector
- Docking station connector
- Advanced Power Management
- LCD Status Indicator
- Fully modularised design
- Simultaneous display capabilities
- Rechargeable NiMH battery pack
- MS Windows 95 (with manuals)
- MS DOS v6.22 & MS Windows v3.11 optional (free)
- Weight approx. 2.8kg
- One year warranty - return to base (parts & labour)



ARIES WORKBOOK[®] PRO Intel Pentium[®] Processor with 8Mb RAM & 540Mb HD

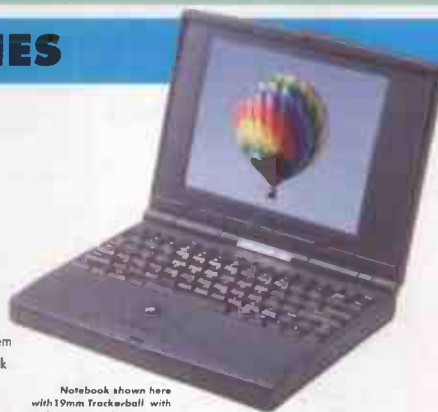
WorkBook[®] Pro P120 10.4" DUAL SCAN COLOUR	WorkBook[®] Pro P120 10.4" TFT COLOUR
£1199 £1408.83 inc. VAT	£1399 £1643.83 inc. VAT
Finance per month from £45	Finance per month from £53

WORKBOOK PRO UPGRADES

8 to 16Mb RAM Upgrade	£198
8 to 24Mb RAM Upgrade	£289
Upgrade to 810Mb HD	£79
Aries V34 33,600 baud PCMCIA Fax/Modem	£99
Upgrade to 1Gb HD	£125
Upgrade to 1.35Gb HD	£179
Spare Battery Pack	£89

7000 NOTEBOOK SERIES

- 4Mb RAM expandable to 32Mb
- 540Mb 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
- Audio (In/Out) with volume control
- Built-in Speaker/Microphone (requires sound system)
- 1.44Mb 3.5" Floppy Drive
- 83 key QWERTY Keyboard
- PCMCIA slots (2 x Type II/1 x Type III)
- 19mm Trackerball (Optional Track-point device)
- 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
- Weight: 3Kg ● Carrying Case



Notebook shown here with 19mm Trackerball with 2 buttons supplied as standard. Optional TrackPoint Control Stick available.

Limited Availability
Only while stocks last

- ADVANCED POWER MANAGEMENT
- FLEXIBLE PCMCIA
- LOW POWER 3.3V
- BUILT-IN-SOUND
- SUPERB PERFORMANCE
- EXTERNAL STATUS INDICATOR
- INTERNAL STATUS INDICATOR PANEL
- REMOVABLE HARD DISK DRIVE

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
Intel SL 486SX - 33	£799 (£938.83 inc. VAT)	30	£899 (£1056.33 inc. VAT)	34	£999 (£1173.83 inc. VAT)	38

Upgrade to 8Mb RAM & MS Office v4.2 **£199**
(£233.83 inc. VAT)

MICROSOFT OFFICE

Communications Upgrade
£125 (£146.83 inc. VAT)

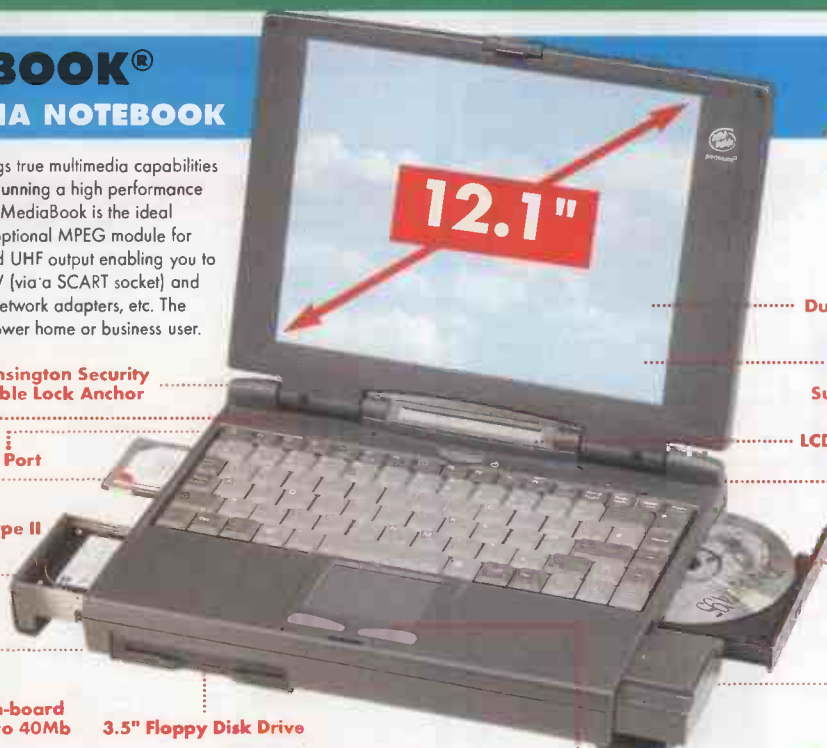
Includes: V32bis (14,400 baud) voice/fax modem, plus software which supports voice mail, multiple mail boxes, fax on demand and remote access.

APR **17.9%** Finance calculation example: Cash Price: £1199 + VAT = £1408.83 Deposit: 10% £140.88 and 36 equal payments of £44.99 Total Price: £1760.49 Finance is available subject to status. Be sure you can afford the payments prior to entering into an agreement. Price excludes carriage.

Aries MULTIMEDIA NOTEBOOK

MEDIABOOK® MULTIMEDIA NOTEBOOK

The Aries MediaBook brings true multimedia capabilities to the notebook platform. Running a high performance Intel Pentium® processor, a 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 (via a SCART socket) and PCMCIA slots for adding network adapters, etc. The ultimate portable for the power home or business user.



LOW COST
finance only
17.9% APR

Built-in Stereo Speakers

Kensington Security Cable Lock Anchor

TV Port

PCMCIA Slot - 2 x Type II OR 1 x Type II and 1 x Type III

810Mb Removable Hard Disk Drive

8Mb RAM on-board expandable to 40Mb

3.5" Floppy Disk Drive

Dual Scan or Active Matrix TFT LCD Screen

800 x 600

Super VGA 256 Colour Display with 2Mb of Video RAM

LCD Status Display

Infra Red Communication Port - IrDA standard

6X

Six Speed CD ROM

NIMH Removable Battery

Latest technology TouchPad with ALPS drivers



Processor

- Intel Low Powered Pentium Processor
- Intel Pentium Processors upgradable to 150MHz using ZIF socket

Memory

- 8Mb RAM on-board expandable to 40Mb
- 256K Level 2 Write-Back Cache, Pipeline Burst SRAM

Storage

- 810Mb Removable Hard Disk Drive
- 1.44Mb 3.5" Floppy Drive

Multimedia - CD ROM Drive/Sound System

- 6X Speed CD ROM Drive
- 16 bit Stereo Sound System
- Sound Blaster, Sound Blaster Pro and MS Sound System for Windows compatible
- Built-in Microphone
- Built-in Stereo Speakers

Display/Video System

- 11.3" Super VGA 800 x 600 - 256 Colours Dual Scan DSTN or Active Matrix TFT LCD Screen
- Supports up to 1024 x 768 - 256 Colours mode on external monitor
- Simultaneous display of both screen & external video
- Windows GUI accelerator
- Full power management
- PCI Bus Colour Graphics Interface with 2Mb Video RAM
- Optional Software MPEG drivers

Pointing Device/Keyboard

- Latest technology TouchPad with ALPS drivers
- Both external PS/2 mouse (optional) and integral TouchPad can work concurrently
- Windows 95 86 Key Keyboard

Warranty

- THREE Year Warranty consisting of: 12 months* Parts & Labour Return to Base & 2 years Return to Base Labour only Warranty *Mainland UK only

I/O Ports

- Infra Red Communication Port - IrDA standard
- Built-in TV Part
- MIDI/Game Port
- PCMCIA Slot - 2 x Type II OR 1 x Type II and 1 x Type III
- 16550 UART Hi-Speed Serial Port
- EPP/ECP Hi-Speed Parallel Port
- External auto-sensed PS/2 keyboard/mouse port
- Jacks for Stereo Line In/Line Out & Ext. Microphone

Power Management

- Multiple-made power management scheme
- APM 1.1 support
- Static Suspend
- Suspend to HDD
- Modem ring and any key triggered resume
- Battery gas gauge support
- Suspend or warning on low battery

Security

- Kensington Security Cable Lock Anchor
- MASTER Password support
- Password protection for Set-Up entry screen

Operating System/Bundled Software

- Microsoft Windows 95 (with manual/CD)
- Optional MS DOS v6.22/Windows v3.11 (FREE)
- Optional MS NT Workstation upgrade (£99 +VAT)

Weight & Dimensions

- 3.2Kg/7lbs approx
- 299(w) x 230(d) x 56(h)mm

Aries PCMCIA V34 33,600 Baud

PCMCIA Fax/Modem with SuperFox Software. BABT Approved

£99

SPECIAL OFFER*



MS Office 95 £159

*Only available at the time of notebook purchase. Pack shots shown for illustration purposes only.

OPTIONS & UPGRADES

8 to 16Mb RAM Upg.	£198
8 to 24Mb RAM Upg.	£269
8 to 40Mb RAM Upg.	£489
Upgrade to 1Gb HD	£49
Upgrade to 1.35Gb HD	£99
Spare Battery Pack	£89
Additional Power Adaptor	£58
15W External Speakers	£25
Notebook Carrycase	£19
Docking Station	£299
Car Lighter Adaptor	£39

The Intel logo and Pentium® are registered trademarks of Intel Corporation

Description	8Mb RAM 810Mb Hard Disk		MediaBook753 - 120 Power Saving Intel 120MHz Pentium® Processor		MediaBook753 - 133 Power Saving Intel 133MHz Pentium® Processor		MediaBook753 - 150 Power Saving Intel 150MHz Pentium® Processor		
	Price	Finance per month from	Price	Finance per month from	Price	Finance per month from	Price	Finance per month from	
Dual Scan Colour 11.3" Display	£1499	£1761.33 inc.VAT	£57	£1599	£1878.83 inc.VAT	£60	£1699	£1996.33 inc.VAT	£64
TFT Active Matrix Colour 11.3" Display	£1799	£2113.83 inc.VAT	£68	£1899	£2231.33 inc.VAT	£72	£1999	£2348.83 inc.VAT	£76
TFT Active Matrix Colour 12.1" Display	£1999	£2348.83 inc.VAT	£76	£2099	£2466.33 inc.VAT	£79	£2299	£2701.33 inc.VAT	£87

APR 17.9% Finance calculation example: Cash Price: £1499 + VAT = £1761.33 Deposit: 10% £176.13 and 36 equal payments of £56 Total Price: £2200.98
Finance is available subject to status. Be sure you can afford the payments prior to entering into an agreement. Price excludes carriage.

For ordering information, please see page 2

Watford Electronics Ltd SALES HOTLINE: 01582 745555

Order by 4pm for **Next Day Delivery** **FAX: 01582 488588**



Prices exclude carriage, VAT @ 17.5% except where shown

Mail Order & Showroom: Jessa House, Finway, off Dallow Rd, Luton LU1 1TR Showroom only: 250 Lower High Street, Watford, WD1 2AN. Tel: 01923 237774

AMAZING Networking Offers

GENIUS ETHERNET PRODUCTS

GE2000 III Ethernet Adapter

The GE2000 III is a 16-bit Ethernet card which is 100% Novell NE2000 compatible. Installation is simple - just plug in and run the easy to use setup software.

- BNC and UTP connections (AUI optional)
- 35% faster than Novell NE2000 card
- Supports NetWare, WFWG & TCP/IP

Single: £20 5 pack: £96

Personal NetWare & GE2000 Card
Genius GE2000 III Ethernet card
and Novell Personal NetWare software*
SPECIAL OFFER PRICE £42

£49
(£57.58 inc VAT)



E3000 II Parallel Port Adapter

The E3000 II is a parallel port Ethernet adapter offering higher performance than any similar priced model available.

- BNC and UTP connections as standard
- Through connection for local printer
- Simultaneous printer & LAN connectivity
- PS/2 mouse port power lead or mains PSU

Single: £47 5 pack: £227

ME3000 II PCMCIA Ethernet Card

A high performance Ethernet adapter for use in notebooks with a PCMCIA slot. Has both BNC and UTP connections.

SPECIAL OFFER - Single £63 5 Pack £304

GE2500+ PCI Ethernet Adapter

The GE2500+ is a new high performance Ethernet adapter for use in PCI based computers. Uses bus mastering for low CPU & Bus utilization, thus improving overall performance.

- BNC and UTP connections (AUI option)
- Software configurable & auto media detect
- Supports NetWare, WFWG, PCNFS & TCP/IP

Single: £35 5 pack: £166



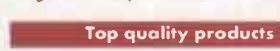
£72
(£84.60 inc VAT)

GF100TX Fast Ethernet Card

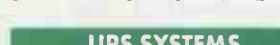
Increase the performance of your network with the Genius GF100TX Fast Ethernet card. Offering both 10Mbps and 100Mbps speeds, you can use it on an existing LAN, and upgrade later.

- 10/100 Mbps speeds
- PCI Local Bus Interface
- RJ45 connection
- Supports NetWare, NFWG, NT & TCP/IP

Single: £79 5 pack: £389



£87
(£102.23 inc VAT)



Top quality products from Genius' No. 1 UK supplier

ETHERNET CABLING

Length	1m	3m	5m	10m	15m	20m	30m	50m	100m	300m
Thin Ethernet	£3	£5	£6	£9	£12	£15	£22	£27	£32	£115
UTP	£3	£6	£9	£11	£13	£16	£19	£27	£32	£122

UPS SYSTEMS

APC BackUPS Pro (with Powerchute)

BK280i PnP	280VA	£105
BK420i PnP	420VA	£155
BK650i PnP	650VA	£187

APC SmartUPS

SU450i	450VA	£213
SU700i	700VA	£225
SU1000i	1.0kVA	£355
SU1400i	1.4kVA	£466
SU2200i	2.2kVA	£830

APC SmartUPS (with Powerchute)

SU700INET	700VA	£239
SU1000INET	1.0kVA	£349
SU1400INET	1.4kVA	£479

APC SmartUPS Value Server

SUVS650i	650VA	£199
SUVS1000i	1.0kVA	£339
SUVS1400i	1.4kVA	£449

TOOLS & CONNECTORS

Connectors

Connectors	1-9	10+
50ohm BNC Male Crimp Plug	£0.95	£0.85
50ohm BNC T-connector	£1.70	£1.60
50ohm BNC In-line Coupler	£1.65	£1.60
50ohm BNC Terminator	£0.90	£0.90
50ohm BNC Terminator & Earth	£1.20	£1.10
RJ45 Male Crimp Plug	£0.35	£0.30

Thin Ethernet Socket Systems

Safertap Outlet - surface or flush mount	£18
Safertap 2.5m drop lead	£17
Safertap Outlet & 2.5m drop lead	£33
AMP Thinner Tap Outlet	£17
AMP Thinner Tap 2.5m drop lead	£15
UTP Cabling Accessories	
Dual RJ45 Outlet - flush mount	£14
24way 19" RJ45 Patch Panel	£124

Tools and Accessories

Thin Ethernet BNC Crimp Tool	£12
Thin Ethernet Cable Stripper	£7
RJ45 Crimp Tool	£12
Round Cable Stripper	£11

NOVELL NETWORK

No of Users	5	10	25	50	100	250	Manuals
NetWare 3.12	£455	£975	£1679	£2140	£3147	£5560	£189
NetWare 4.1 CD	£475	£1082	£1559	£2165	£3132	£5539	£165

Education and Upgrade Packs available - call 01582 745555 for details

ETHERNET ADAPTERS

16-bit ISA Ethernet Adapters	Connections	Single Card Pack	Five Card Pack
3Com Etherlink III - 3C5098-Combo	BNC/UTP/AUI	£73	£318
Aries NE2000 II	BNC/UTP	£20	£97
Intel EtherExpress Pro 10	BNC/UTP	£66	£289
Intel EtherExpress Pro 10 Flash	BNC/UTP	£69	£349
Novell NE2000+	BNC	£48	£224
Novell NE2000+	UTP	£48	£224
SMC Elite 16C Ultra	BNC/UTP/AUI	£62	£344
SMC EtherEZ	BNC/UTP	£63	£329

32-bit EISA Ethernet Adapters

3Com Etherlink III - 3C579B	BNC/AUI	£135	£699
Genius E1320	BNC/UTP/AUI	£125	£615
Intel EtherExpress 32C Flash	BNC/UTP	£149	£799
SMC EtherPower	BNC/UTP	£179	£799

MCA (PS/2) Ethernet Adapters

3Com Etherlink III - 3C529B	BNC/AUI	£142	£689
Genius E1162M	BNC/UTP/AUI	£99	£489

32-bit PCI Ethernet Adapters

3Com Etherlink III - 3C590B-Combo	BNC/UTP	£98	£449
Intel EtherExpress Pro/10	BNC/UTP	£109	£109
SMC EtherPower	BNC/UTP	£89	£415

Parallel Port Ethernet Adapters

D-Link DE-620CT	BNC/UTP	£84	
SMC EliteNote	BNC/UTP	£124	

PCMCIA Ethernet Adapters

3Com Etherlink III - 3C589B-Combo	BNC/UTP	£124	
D-Link DE-650CT	BNC/UTP	£65	
SMC EliteCard	BNC/UTP	£119	



FAST ETHERNET (100baseT) PRODUCTS

Bring 100Mb/s Fast Ethernet to your desktop, simply and economically. With the increased bandwidth it is possible to have video playback

Genius GF100TX 10/100 PCI	£79
Intel EtherExpress Pro 100 PCI	£84
3Com 3C595TX PCI	£85

and video conferencing across the LAN. Existing level 5 UTP cabling can be used so upgrading is easy.

HP AdvanceStack 100VG 15pt	£1699
Genius GF408TX 8 port Hub	£425
Genius GF412TX 12 port Hub	£599

HUBS/REPEATERS

Genius	TP	BNC	AUI	SNMP	Price
GH4080 Palmtop	8	1	-	-	£79
GH4160 19" rack	16	1	-	-	£149
GH1000 19" rack	12	1	1	opt	£249
GR5050 Palmtop	-	3	1	-	£115
ER5020 19" rack	-	2	2	-	£122
ER5040 19" rack	-	4	4	-	£225

Hewlett Packard

AdvanceStack 8U	8	opt	opt	opt	£135
AdvanceStack 12U	12	opt	opt	opt	£349
AdvanceStack 24U	24	-	1	-	£589

SMC

Elite 3812TP	12	1	1	opt	£399
Tiger TP6	6	-	1	-	£145
Tiger TP12	12	-	1	-	£244
Tiger CX3	-	3	1	-	£219

PEER TO PEER NETWORKING

MS Windows 95 Networking Kits

Thinking of upgrading to the new Windows 95 and also networking your PCs? Why not take advantage of these special packs we have put together of very special prices.

Net95 Kit 1 - 2 User Upgrade Kit	£159
Net95 Kit 2 - 3 User Upgrade Kit	£239
Net95 Kit 3 - 5 User Upgrade Kit	£399
Net95 Kit 4 - Additional User Upgrade Kit	£85

Personal NetWare Networking Kits

Link up to 30 PCs with Novell's low cost peer-to-peer software, and have shared access to hard disks, printers, CD ROM all at the click of a mouse button. With support for both DOS and MS Windows, it is the ideal solution for small scale installations.

NetPW Kit 1 - 2 User Kit	£89
NetPW Kit 2 - 5 User Kit	£210
NetPW Kit 3 - Additional User Kit	£49
NetPW Kit 4 - 1 User Notebook Kit	£109
All MS and Novell kits include Ethernet card, software*, 5m cables and connectors. *Software supplied will be cosmetically different from above	

PRINTER SERVERS

Genius GPS300 Pocket NetWare Server	£96
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HBM Print Servers

H8211LC In Line (1 x Parallel)	£259
MultiServe (2 x Parallel, 1 x RS232)	£275

Intel

NetPort Express EL	£245
NetPort Express XL	£285

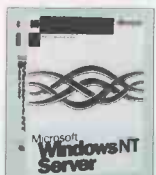
Note: above are for use with Novell NetWare only

MICROSOFT NT SERVER 4.0

...a power, multipurpose network operating system

Its ease of use, flexibility, and expanded internet/intranet and communications services meet the most demanding requirements of today's business computing, whilst providing the best network foundation for the future. Windows NT Server 4.0 can become a partner in productivity for your business.

Its efficient operation and reliability can help you save money on extra equipment and decrease downtime. Plus, its faster communication services and internet/intranet functionality will improve the way your company keeps in touch, resulting in a greater sharing of ideas and information.



5 Licence **£569** £668.58 inc. VAT

10 Licence **£769** £903.58 inc. VAT

Aries A4 SCANNER

Scan-it Pro® 4800P Scanner

The Smallest A4 Professional Flatbed Scanner at the Smallest Price!

- **Parallel connector** - Scan-it Pro doesn't require an interface, the computer doesn't need to be opened so it's very easy to install and your printer connects to the scanner
- **Colour**, single pass scanner at 4800 dpi
- **Copy function** - press a button on the scanner and the image will be sent direct to your printer
- **Fax function** - press a button on the scanner and the software supplied allows you to dial the number and the image is sent direct to your printer
- **OCR function** - press a button on the scanner and the OCR supplied software will read the text straight into your chosen word processing software

Type:	Flatbed with original "One Touch key" function
Scanning speed:	Full colour, 300 dpi 39 seconds (scanning time only)
Max document size:	A4
Optical resolution:	300 x 600 dpi
Max resolution:	4800 x 4800 dpi interpolated
Colour scanning method:	Single pass
Colour mode:	24 bits per pixel
Grey mode:	8 bits per pixel
Bi tone:	1 bit per pixel
Hardware interface:	EPP (Enhanced printer port)
Software interface:	TWAIN compatible
Dimension:	298(w) x 426mm(d) x 78mm(h)
Lamp:	Xenon glow lamp using cold scan technology
Weight:	Only 4.9 Kg
Power:	Standby: 2.5 Watts; Operation: 13 Watts
Software & Documentation on CD:	Image software ImageIn, OCR software RecognitaPlus and Fax-Copy utility Action Manager
System Configuration:	IBM Compatible PC, 386/486/Pentium, CD-ROM drive, Win 3.11 or higher, 4Mb RAM & 20Mb hard disk
Warranty:	1 Year return to base

"The Scan-It Pro is a fantastic tool... a very snazzy compact scanner... easy to set up... the software is excellent"

Computer Shopper

Scan-it Pro scans an A4 size document, full colour, in a single pass. It comes complete with easy-to-use image and OCR software. High resolution produces better image quality. Original "One touch key" function makes it the friendliest scanner to use.



FREE
Xerox Textbridge OCR
plus Serif PagePlus v3 DTP
software.
Worth **£89**
£193.88 inc. VAT

AMAZING PRICE!

£165

£193.88 inc. VAT



Aries Scan-it Pro 4800P

Special Bundles

1 Aries Scan-it Pro + Epson Stylus 500 Printer plus lead

Save £32



£325 £381.88 inc. VAT

2 Aries Scan-it Pro + Epson Stylus 200 Printer plus lead

Save £33



£265 £311.38 inc. VAT

3 Aries Scan-it Pro + HP Deskjet 690 Printer plus lead

Save £32



£325 £381.88 inc. VAT

4 Aries Scan-it Pro + HP Deskjet 870 Printer plus lead

Save £23



£455 £534.63 inc. VAT

5 Aries Scan-it Pro + Aries EnergyPro 15" LR Monitor

Save £45



£339 £398.33 inc. VAT

6 Aries Scan-it Pro + Aries EnergyPro 17" LR Monitor

Save £91



£439 £515.83 inc. VAT

For ordering information, please see page 2

Watford Electronics Ltd **SALES HOTLINE: 01582 745555**

Order by 4pm for **Next Day Delivery** **FAX: 01582 488588**



Prices exclude carriage. VAT @ 17.5% except where shown

Mail Order & Showroom: Jessa House, Finway, off Dallow Rd, Luton LU1 1TR Showroom only: 250 Lower High Street, Watford, WD1 2AN. Tel: 01923 237774

**DON'T FORGET
TO ASK FOR YOUR
FREE CD SOFTWARE
WHEN ORDERING**

SCANNERS & GRAPHICS PAD



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



- **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
- **includes:** Interface card, PhotoFinish 3.0, Media Mate presentation software, Smart Page Direct OCR software, TWAIN compliant software, User's manuals.

800 dpi

SPECIAL OFFER £45 £52.88 inc. VAT

MOUSE 3+ including driver only £12

Designed for maximum comfort with a raised centre that fits the hollow of your palm. Includes powerful imaging software: PC Pointbrush for Windows, Media Mate Presentation Software, MouseMate Driver and Pod.



MOUSE 3+, Drivers and above Software £20

ScanMate Colour Deluxe

24 Bit True Colour Handheld Scanner



NEW! 3200dpi



FANTASTIC VALUE
only £78
£91.65 inc. VAT

- **Up to 3200 dpi resolution**
 - **TWAIN compliant**
 - **Detects up to 16.7 million colours**
 - **Jumperless interface card for easy installation**
 - **PhotoFinish 3.0 image processing software**
- Image conversion from colour to grey scale or B/W
File formats: BMP, EPS, GIF, JPEG, PCX, TGA, TIFF, PCD
Supports Photo CD format
- **SmartPage Direct OCR software**
 - **Advancing Your Desktop Abilities**

The Genius ScanMate/Colour Deluxe package is your connection to the colourful publishing world. With a high resolution up to 3200 dpi, a friendlier user interface, better capability, along with advanced software programs, this package elevates your desktop publishing standards to a higher level of professionalism.

The ScanMate/Colour Deluxe design enhances your ability to scan accurately and superbly. The body shape fits comfortably with the palm of your hand. With the ScanMate/Colour Deluxe scanner, enhance your reports, etc. like a professional



Create a Rainbow World

The KidsPad will enable your children to discover how easy it is to draw, sketch or paint using a computer. The included education and entertainment software on CD is fun to use and will keep you and your children busy for hours.

Designed especially for 4 to 10 year olds.



£45
£52.88 inc. VAT

Compatible with WIN 3.1 and WIN 95.

EPSON

NEW

GT-9500 SCANNER

The highest quality and most affordable colour flatbed scanner in its class.

INCLUDES FREE IMAGING & OCR SOFTWARE



Parallel £522
£613.35 inc VAT

SCSI £525
£616.88 inc VAT

Complete professional mono and colour scanning solutions for PC users.

- High speed and easy to use
- 4800 dpi and 36 bits per pixel in colour providing 68 billion colours
- SCSI and Bi-directional parallel interfaces built-in
- Advanced scanning options - TET, batch, page frame and negative film scanning
- Full support for Windows '95, 3.1x and Mac
- Mac ColorSync 2.0 support and new easy to use colour calibration utility for PC and Mac
- Optional transparency unit and document feeder
- 1 year RTB warranty (optional 3 year on-site)

3 years on-site warranty
Epson CoverPlus - **£149**

GT-5000 SCANNER

Epson quality colour scanning. Made easy, Made affordable

INCLUDES FREE IMAGING & OCR SOFTWARE



Parallel £292
£343.10 inc VAT

SCSI £343
£403.03 inc VAT

In addition to advanced features like Epson Text Enhancement Technology,

a maximum resolution of 2400dpi* - and specially developed user interface the Epson GT-5000 comes complete with dedicated software for both PC and Mac users. Applications that will enable you to take on a wide range of everyday and more demanding DTP tasks.

You can scan everything from photos to magazine cuttings, typed manuscripts to A4 business documents - in colour or high speed mono and with Epson flatbed precision.

* Interpolated

3 years on-site warranty
Epson CoverPlus - **£65**

NEW

EPSON PhotoPC 500

Colour Digital Camera.

The Epson PhotoPC 500 is the ideal way to add high quality colour photos to your computer.



Now you can

add the impact of real life pictures to your letters, documents and presentations quickly and easily with the Epson PhotoPC 500 colour digital camera.

- High quality 24 bit colour images
- Capacity for 30 high resolution or 60 standard images
- Windows and Macintosh compatible
- Twain compliant
- Built-in automatic flash with red-eye reduction feature
- Self timer
- Auto focus from 2 feet to infinity
- Expandable storage for up to 200 images
- PhotoEnhancer photo editing software
- Optional LCD display
- Output your pictures with photo-real quality on an Epson Stylus inkjet printer

PhotoPC 500
£POA

LCD Monitor
£POA

Optional Power Supply
£POA

SCANNERS DIGITISERS INPUT DEVICES

SCANNERS

Aries	
Scan-It Pro 4800P A4 colour	£165
PageWiz A4 Mono Sheet Feeder	£149
ScanMaker E3 SCSI II 2400dpi colour	£225
ScanMaker E6 SCSI II 4800dpi colour	£319
Above E3 & E6 scanners are supplied with Adaptec SCSI II card & Imagen Easy Pack, OmniPage LE OCR & Easy Scan software.	
Epson	
LapCat	£228
Hewlett-Packard	
HP ScanJet	
A4 Flatbed Scanner supplied with Corel PhotoPoint, Corel OmniPage LE, DeskScan II and PaintPart Software	
45 Mono	£130
4P Colour	£312
4C Colour	£549
4Si Mono	£1574
Logitech	
ScanMan Colour 2000	£89
Scanman Pagescan WIN 95/ADF	£235
Scanman Pagescan WIN 3.1	£189
Snappy	£159

DIGITISING TABLETS

Smarter Input - Smarter Output

New Sketch

New Sketch 1212	£115
New Sketch 1812	£179
New Sketch 1812D	£199



EASY PAINTER

£65.80 inc. VAT

Amazing value graphics tablet gives you the chance to exercise your creativity. Includes PC Paintbrush for Windows that provides dozens of natural paint tools, complete Utilities Disk, Stylus Pen and keyboard power adaptor.



MICE

Aries	
Excel MK3 2 Button Serial Mouse	£8
Creative	
Aero Duet	£78
Genius	
EasyMouse Serial 2btn. £8 3btn.	£29
MouseOne 2B - PS/2	£9
Mouse 3+	£12
Serial & PS/2	£17
Logitech	
MouseMan - Bus	£41
MouseMan Cordless - Serial & PS/2	£39
MouseMan Cordless Pro - Serial & PS/2	£45
Pilot Mouse - Serial & PS/2	£16
MouseMan 96 - 3 button Serial & PS/2	£27
Microsoft	
MS Mouse v2 - Serial & PS/2	£33
MS Home Mouse	£16

TRACKERBALLS

Genius	
HiPoint Trackerball - Serial & PS/2	£19
HiTrak Trackerball - Serial & PS/2	£22
Logitech	
Pilot TrackMan	£24
Trackman Voyager	£44
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Trackman Portable - Serial & PS/2	£30
Microsoft	
MS EasyBall	£29

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PCMCIA		
Game Card II - Ideal for Notebook Computers	£45	
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Virtual Pilot Yoke	£53 Pilot Pro Yoke	£61
Excel		
CS200 Analogue	£11	
Gravis		
Analog Joystick	£20 Analog - Pro	£26
Advanced Gamepad	£17	
Thunderbird Flight & Game Controller	£34	
Firebird Programmable Flight & Game Controller	£45	
Phoenix A New Generation Flight & Game Controller	£60	
Logitech		
Thunder Pad	£17.50	
Wingman Light	£19	
Wingman	£22.50	
Wingman Extreme	£29	
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Microsoft		
Sidewinder 3D Standard	£19	
Sidewinder 3D Pro with Hellbender	£39	
Sidewinder GamePad	£25	

Suncom	
FX3000	£25
Command Control Pad	£12
G-Force Flight Yoke	£29

Excel CS200 PC Joystick
A high quality analogue PC joystick with Turbo Switch **Offer Price: £11**

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- Special Offer**
- (3) NEW Aries Ergonomic Windows 95 105 key keyboard **£27**



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Cherry G81-3000 Soft-Touch	£22
MS Natural Keyboard	£45

DIGITAL CAMERAS

Canon	
PowerShot 600	£745
Casio	
QV 10A	£299
QV 100	£449
QG 100 Printer	£179
Kodak	
DC20	£214
DC40	£369
DC50	£629

CASIO

Digital Colour Input...

CASIO QV100 DIGITAL CAMERA

Main Features:

- 640 x 480 VGA Resolution
- 4Mb memory
- 192 images @ Low Resolution VGA
- 64 images @ High Resolution QVGA
- 270 Lens rotation
- Macro Lens facility
- 1.8" TFT low glare lit colour LCD screen
- Pal 1 video output
- AC adaptor option
- Self-timer shutter
- Numerous accessories including:
 - Soft case
 - Hand strap
 - 4 x AA Batteries
 - Cleaning cloth
 - Computer connection



NEW

£449

(£527.58 inc. VAT)

Special Bundle Price

£599

(£703.33 inc. VAT)

Digital Colour Output...

CASIO QG100 COLOUR PRINTER

Specifications

- Printer Type: Dye sublimation thermal transfer colour printer
- Printing System: Colour Cartridge
- Printing Resolution: 200dpi
- Printing Area: Standard Print
 - 18mm tape: 16 x 21.5mm area
 - 36mm tape: 27.5 x 37.0mm area
 - 46mm tape: 41.2 x 55.5mm area
- Number of colours: 64 tones



NEW

• Printing speed:	1st print	Reprints
18mm (x6)	4m 40 sec	4m 13 sec
36mm	2m 41 sec	2m 13 sec
46mm	3m 14 sec	2m 46 sec

£179

(£210.33 inc. VAT)

Additional Tapes

QR18CR	18mm	£12.75
QR36CR	36mm	£16.99
QR46CR	46mm	£21.25

CASIO QV-10A DIGITAL CAMERA

- Built-in high Resolution colour
- 1.8" TFT LCD screen
- 96 image memory
- Transfer images to PC/Windows, Mac compatible
- Ideal for Web page creation, dip, reports, presentations, e-mail etc.



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Special Limited Offer

CASIO QV-10A BUNDLE



Special Bundle Price

£469

(£551.08 inc. VAT)

QG100

QV10A

For ordering information, please see page 2

Watford Electronics Ltd **SALES HOTLINE: 01582 745555**

Order by 4pm for Next Day Delivery **FAX: 01582 488588**



Prices exclude carriage. VAT @ 17.5% except where shown

Mail Order & Showroom: Jessa House, Finway, off Dallow Rd, Luton LUI 1TR Showroom only: 250 Lower High Street, Watford, WD1 2AN. Tel: 01923 237774

MODEMS, PALM TOPS & FAXES

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[Hayes Microcomputer Products]

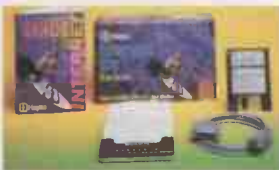


Inventor of the PC Modem

COMPLETE INTERNET SOLUTION

ACCURA Internet Kits

- 14.4 and 28.8 external versions
- All cables included in the box
- Quarterdeck Internet Suit 2 and Webtalk
- Internal 33.6 available



14.4 £74 £86.95 inc VAT	28.8 £91 £106.93 inc VAT	33.6 £107 £125.73 inc VAT
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LOW COST VOICE MODEM

ACCURA 336 Message Modem

- Automatic Voice/Fax Data Discrimination
- Remote collection of Voice and Fax Messages
- Fax Back facility
- Internal 33.6 available

£121
£142.18 inc VAT



PORTABLE MODEMS OPTIMA V.34 Fax PC Card

- PCMCIA REL 2.0/2.1 type II, type III
- New Optional GSM Kits available
- Power Saving Feature
- Will not block other PCMCIA slots with phone connector
- Flash ROM upgradable

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£198.58 inc VAT



ISDN COMMS ULTRA ISDN 64K

- Fast 76,800
- Full V.120 Compliance including error Control
- V.110 Compatible
- Sync & Async Support
- Hayes AT Commands
- Hayes Windows Software



£259
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Hayes
'The Inventor of the PC Modem'

Each Hayes product includes the FREE Hayes CD-ROM which contains:

- 30 days free Internet access via Premier Internet
- 1 month free trial to CompuServe with 10.5 hours usage time
- 1 month free access to AOL with 10 hours usage time
- Quarterdeck Internet-Suite 2 & Webtalk
- Free Netlauncher Internet web software
- Free WinCIM software for e-mail and information service management
- Special offers on Internet magazine and Net Nanny software

ADVANCED BUSINESS MODEMS

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- Dial Back Security
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- Leased Line Support
- Sync and Async Support
- Complete Answerphone Feature



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ISDN Modem **£236**

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Netlink Gold V.32 NEW **£74**
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1030 Microlin NB34 PCMCIA **£169**
0260 Ultralink 32 **£49**

Psion Dacom
Surfer 33.6 £135



U.S. Robotics
Sportster Vi 14,400 Fax/Modem **Ext £76 Int £76**
Sportster Voice 33,600 **£131 £131**
Courier V.34 **£197 £197**
Sportster 28800 Xjack PCMCIA **£135 -**

Zoom
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Panasonic



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UF322E **£675**
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Psion
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US Robotics



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ISDN

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Hayes
Ultra ISDN 64K Modem **£389**
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OFFICEJET FAX SWITCH MODEMS

4 in 1

HP OfficeJet Model 350

The value and integration of a printer, fax, copier and scanner all in one product.

- Saves space and money
- Easy to set up and easy to use
- Provides full office functionality
- Built with HP quality and reliability
- 1 year HP Express Exchange Warranty



The ideal solution for the small business If you have a small business or run a business from home, you need to make the most of your budget, your working space and your time. The HP OfficeJet 350 is the solution that offers great value, while helping to make you and your business more efficient.

Easy to set up, easy to use

The HP OfficeJet 350 is designed to keep things simple. The unique AutoPrompt menu gives you point-and-click control of paper documents that are loaded in the document feeder. HP's fully integrated software makes faxing, copying and scanning your documents quick and easy.

£475
£558.13 inc VAT

A high quality inkjet printer

High quality 600 x 300 dpi inkjet printing with HP's exclusive Resolution Enhancement technology means professional looking documents everytime.

A plain paper fax with PC fax

All the fax features you need with high quality fax output on plain paper.

A convenience copier

The HP OfficeJet makes crisp, 300 dpi copies available right on your desktop. Up to 99 copies can be made from a simple original, and you can reduce text and images by up to 70% of their original size.

A scanner with OCR software

Whether you wish to scan in text, logo's or graphics, the HP OfficeJet makes it easy by providing you with a 300 dpi scanner and OCR software. Which enables you to quickly and easily print, fax, or edit your scan



DON'T FORGET TO ASK FOR YOUR FREE CD SOFTWARE WHEN ORDERING

ARIES INTERNET/ Aries COMMS PACK

V34vi 33600 baud Voice Fax/Modem

3 YEAR WARRANTY



The Easiest way to Connect and Learn the Internet

Aries Internet/Communication Pack consists of: Aries Fax/Modem

Specifications:

- 33,600 V.34bps top data transmission speed
- V.32, V.32bis, V.23, V.22, V.22bis & V.21
- Error Correction to MNP2.5 and V.42 standards
- Data compression to MNP5 and V.42bis standards
- Group 3, Class I & II Fax at up to 14400bps V.17
- Call back security

- Sync & Async Operation
- Group 1 and 2 fax compatible (V.27ter and V.29)
- 16550 UART Buffer (Internal model only)
- Fully Hayes compatible
- 3 years warranty
- BABT Approved plus additional Six European Approvals
- Complete with SuperVoice - Voice/MailBox/Ansaphone Software

Optional serial cable for external versions

INTERNAL £75 £88.13 inc VAT

EXTERNAL £85 £99.88 inc VAT

AVRO PACIFIC

AVRO PACIFIC INTERNATIONAL MODEM ADAPTER KITS

Avro Pacific Kits allow you to connect your modem or PCMCIA card to international telephone systems. Fully modular with smart and convenient carry case.

The International Kit connects you to more than 150 countries including most of Western Europe, Far & Middle East, Scandinavia, USA and Canada.

£42.50
£49.95 inc VAT



The Six Piece Kit covers France, Italy, Holland, Belgium, Germany, North & South America, Spain, Ireland plus many other countries that use USA style plug.

£21.26
£24.95 inc VAT

AVRO PACIFIC AUTOMATIC FAX & MODEM SWITCH



£49.95
£59.00 inc VAT

- **Fax Friend** immediately pays for itself by replacing the need for a new dedicated telephone line for fax or modem.
- Eliminates line rental charges.
- Telephones, answering machine, fax and modem work normally.
- No re-wiring - plugs into any extension. Invisible to the caller with no recorded voices, tones or clicks. All extensions work normally.
- Remote control of fax from any extension.
- Extends the use of fax machines which have built in Fax/Telephone switches which normally only operate with a single telephone.

FREE EASYWEB*
Worth £29.95
With Aries V34vi Modems

Create and set up your own WebSite easily with EasyWeb

AMAZING SPECIAL OFFERS

V32bis 14,400bps

Internal £25
(£29.38 inc VAT)

External £25
(£29.38 inc VAT)

BABT Approved Fax/Modems. External version req. Serial cable

All Fax/Modems supplied by Watford Electronics include:

- **FREE 30** days unlimited access to Internet (via Pipex or AOL)
- **FREE** Netscape World Wide Web Browser software
- **FREE** Subscription to CompuServe includes £10 Credit
- Software supplied in CD

*Trial version. RRP £29.95.



Aries PCMCIA 33,600 baud Fax/Modem



£99
£116.33 inc VAT

- 33.6 Operational modes: V.34 (up to 33.6bps), V.32bis (14400bps), V.32 (9600bps), V.22bis (2400), V.22 (1200), V.23 (1200/75), V.21 (300) Asynchronous data, full duplex over dial-up lines.
- Fax Interface: EIA 578 (Class 1), EIA 592 (Class 2)
- Auto-Dial: Tone dialling, Auto-senses speed of called modem.
- PC Interface: PCMCIA (V2.01).
- Other features: BABT approved, CE approved.

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MULTIMEDIA

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FREE CD SOFTWARE
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Commodore PC Music Keyboards by Evolution

**PC Music Keyboard and Software
Packages for all the family**

Commodore MK149 Full size MIDI keyboard with software



£96.95
£113.92 inc. VAT
Introductory Price

- 49 Full Sized Keys - Velocity Sensitive
- Pitch Bend Wheel
- Modulation Wheel
- Transpose
- Octave Shift
- Program and Bank Change
- 6 Program Memories
- 3 Digit LED Display
- Standard Sustain Pedal Socket
- Standard MIDI connection
- Supplied with PC connector lead
- Includes 256 Track Evolution Audio Sequencer
- Score editing with printing
- Virtual Band with jammer - 16 Funky Styles
- Audio Wave Support
- Drum Editor
- Programmable Chord Track
- Mixer, Piano Roll, Event List Windows
- On-Screen Keyboard

Commodore MK10 MIDI keyboard with software



£40.45
£49.94 inc. VAT
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- 49 Mini Sized Keys
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- Turns your PC into a home keyboard
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- Playright melody correction mode
- Mixer with voice selector
- Easy Single Finger Play Mode
- On-Screen Keyboard
- Record your own melodies



**Commodore by Evolution:
The Christmas PC Music Solution**

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Eight Speed

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Goldstar GCDR850B	£66
Hitachi 8X CDR7930	£69
Panasonic 8X CR583	£65
Toshiba XM5620B 8X	£69

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Aries 10x	£75
Aztech 10x CDA1068-011	£84

Twelve Speed

Aries 12x	£109
Mitsumi FX120 12x	£125

SCSI CD-ROM DRIVES

Six Speed

Toshiba XM3701B 6.7 speed	£125
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Eight Speed

Plextor 8Plex 83CS	£299
Plextor 8Plex External	£350
NEC 8X CDR-1410	£139
NEC 8X External	£139

Twelve Speed

Plextor 12Plex Internal	£259
Plextor 12Plex External	£329

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3COM Power CD/4S External	£119
Amacom 4x external	£129
Amacom 4x external with sound	£194
Backpack 4x	£139
Backpack 4x with Sound	£225
Amacom 6x external	£165
Amacom 6x external with sound	£229
3COM Power CD/8S External	£149
Amacom 8x external	£199
Amacom 8x external with sound	£269
Backpack 8x	£235
Backpack 8x with Sound	£309

PCMCIA CD-ROM DRIVES

Panasonic		
Travelspin KXL-D720X	2X	£239
Travelspin KXL-D740	4X	£269

3COM		
Power CD/PCMCIA	4X	£165
Power CD/PCMCIA	8X	£195

RECORD/WRITE CD-ROM

Writable CD Gold Discs	£7
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HP Surestore 6020i	£509
HP Surestore 6020es	£509
HP Surestore 6020ep	£425

Sony	
External 6X CDU920	£539

Yamaha	
Internal 4X CD Rec.Kit CDR100	£579
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Internal 4X CD Rec.Kit CDR102	£487
External 4X CD Rec.Kit CDR102	£587

JUKEBOX CD DRIVES

Nakamichi NA-MJ44 4X 4 CD EIDE Int.	£85
Nakamichi NA-MJ48 8X 4 CD EIDE Int.	£265

MULTIMEDIA KITS

Aries Multimedia Kit '97

Aries Multimedia kit contains the following:

- 16 bit plug n play sound card
- Aries Stereo Speakers
- Includes Audio & IDE Leads
- CD ROM Drive

Aries Quad Speed Internal	£65
Aries Eight Speed Internal	£85
Aries Ten Speed Internal	£99
Aries Twelve Speed Internal	£129

Creative Labs

Microsoft Family 8X 32 PnP	£219
Discovery 32 8X PnP SPECIAL OFFER	£159
8X CD + Encyclopedia S/W	£99

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Stereo speakers	£9
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15W HiFi speakers	£25
25W Digital speakers	£29
80W Digital speakers	£39
80W UltraPower+ speakers	£42
120W MegaPower speakers	£59
Stereo Headphones	£5
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SOUND CARDS

Aries	
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Creative Blasterkeys	£103
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Sound Blaster 16 SCSI	£49
Sound Blaster 32 PnP	£95
Sound Blaster AWE 32 IDE PnP	£119

Gravis	
UltraSound MIDI Kit	£25
UltraSound PnP	£115
UltraSound PnP Pro	£129
Miro	
SoundPCM20 Radio	£189
Orchid	
NuSound Plug & Play Soundcard	£99
NuSound FM Soundcard	£65
NuPanel	£19

The Aries CD-R Kit package includes:

- Internal CD-Recorder Drive
- Adaptec SCSI-2 Controller Card
- Gear CD-R Software for Win 3.1x & Win 95 (Online Help in English, German, French)
- Cables • Manuals
- 2 High Quality Recordable Media (74 minutes each)

INTRODUCTORY PRICE
£379
£445.33 inc VAT

Aries CD-Recorder Kit

The Aries CD-R Kit provides a CD studio for the desktop which offers 2-speed write and 4-speed read features. With 74 minutes and 42 seconds of recording time, users can make their own audio and video CD files, archive data, create libraries, utilise the media for document distribution or create professional presentations.



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GRAPHICS & VIDEO/TV CARDS

GRAPHICS CARDS

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1Mb Super VGA	PCI	£29	
1Mb Super VGA	ISA	£39	
1Mb Super VGA	VL	£39	
Diamond			
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2Mb Stealth 64 Video DRAM	PCI	£59	
2Mb Stealth 64 Video VRAM	PCI	£129	
4Mb Stealth 64 Video VRAM	PCI	£205	
2Mb Stealth 3D 2000 DRAM PCI		£74	
2Mb Stealth 3D 2000 DRAM PCI + Games		£128	

NEW! Diamond 2Mb Stealth 3D 2000 Multimedia Accelerator £74

2Mb Edge 3D 2200XL DRAM	PCI	£92
4Mb Edge 3D 3400XL VRAM	PCI	£299

Matrox			
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4Mb Millennium	PCI	£162	
2Mb to 4Mb Upgrade		£64	
2Mb to 8Mb Upgrade		£128	
4580 Millennium 4Mb to 8Mb Upgrade		£174	
2Mb Mystique		£105	
4Mb Mystique		£149	

Special Offer

2Mb Thunderbolt DRAM PCI Graphics Card by Techworks £75

Hercules			
Dynamite 128 2Mb		£99	
Dynamite 128 4Mb		£139	
1Mb Hercules Stingray 64 Video PCI Bus		£49	
2Mb Hercules Stingray 64 Video PCI Bus		£64	
2Mb Hercules Graphite Terminator 64 VRAM PCI Bus		£185	
4Mb Hercules Graphite Terminator 64 VRAM PCI Bus		£279	

Number Nine			
2Mb EDO 9FX Reality 332 (S3 Virge)			
PCI + Games Pack		£143	
332 2MB 53 Virge		£99	
332 + Games Pack		£114	
772 2MB 53 Virge VX		£175	
772 4MB 53 Virge VX		£265	
Imagine 128 52e 4MB EDO DRAM		£265	
Imagine 128 52e 4MB EDO VRAM		£468	

Orchid			
2Mb Fahrenheit Video 3D DRAM PCI		£129	
4Mb EDO Righteous 3D DRAM PCI		£189	
Please specify PCI or VL Bus when ordering			

STB			
1Mb Powergraph 64 DRAM PCI		£57	
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2Mb Velocity 64 MPEG VRAM		£175	
4Mb Velocity 64 MPEG VRAM		£265	
2Mb LightSpeed 128 PCI		£112	

VIDEOLOGIC			
1Mb GrafixStar 400 DRAM		£39	
2Mb GrafixStar 400 DRAM		£48	
2Mb GrafixStar 450 DRAM NEW		£69	
2Mb GrafixStar 600 MDRAM		£85	
2Mb GrafixStar 700 VRAM		£168	
4Mb GrafixStar 700 VRAM		£307	
VMC Controller		£38	
1Mb RAM Upgr. GrafixStar 300/400/500		£15	
2Mb RAM U/G GrafixStar 700 Inc VMC		£143	

VIDEO

AZTECH			
Gamma TV Tuner Card & Video Capture Card		£139	
Gamma Teletext Upgrade		£24	
Gamma MPEG Upgrade		£108	
Oscar Pro MPEG Decoder Card		£155	

CONNECTWARE			
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2MB RasterMedia 3 in 1 (Whilst stocks last)		£339	
TV Tuner/Video Card for RasterMedia		£95	

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Video Blaster SE100		£124	
Video Blaster RT300		£199	
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FAST			
FPS60 PowerPack (with MPEG)		£455	
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MPEG Extension for Movie Machine		£222	
MJPEG Extension for Movie Machine		£270	
FPS60 Video Capture Card		£299	
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WinTV WinMotion 60 MJPEG		£319	
WinTV Magic MJPEG		£249	

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MIRO			
Video DC1 Plus ISA		£199	
MEDIA VIEW 2Mb PCI		£225	
MEDIA VIEW 2Mb TV PCI		£369	
TV Upgrade		£155	
Remote Control Upgrade		£49	
Video DC30		£789	

VIDEOLOGIC			
Captivator Pro ISA		£154	
Captivator Pro TV ISA		£178	
MPEG Player		£188	
MPEG Stor		£71	

GRAFIXSTAR 600



Lightning Fast 128bit Windows Acceleration

From Videologic's award-winning accelerator range comes the GrafixStar 600, a high performance graphics accelerator, targeted at the Windows 95 power user and power gamer. Sporting the Tseng ET6000 128-bit graphics engine and the latest MDRAM memory technology, the GrafixStar 600 outperforms VRAM/VRAM cards in both Windows 95 and in DOS. And it's extremely competitively priced.

- Tseng Labs ET6000 graphics accelerator
- 2Mb Multibank DRAM (MDRAM)
- The ultimate DOS and Windows performer
- Integrated full-screen video acceleration
- Free ProLab multimedia software worth over £200
- Free Xing MPEG playback software
- PCI system bus



Now including new GrafixMax drivers to boost performance by up to 35%

GRAFIX MAX DRIVERS

Hauppauge PCI WIN/TV

plus **GRAFIXSTAR 400**

TV/Teletext Card

- 122 Channel Cable ready TV tuner
- Professional Teletext with Print, Save, DDE
- PCI bus architecture supporting resolutions up to 1024x768
- Easy Windows 95 Plug & Play installation
- Compatible with high end video cards supporting Microsoft's Direct Draw drivers
- No cables to VGA card required
- Captures pictures to your PC
- Captures AVI clips at 25 fps



SPECIAL CHRISTMAS OFFER

Hauppauge!



Turn Your PC to **£89**
£104.58 inc VAT

Turn your PC into a 24 hour information centre with a Hauppauge WIN/TV PCI Card

For ordering information, please see page 2

Watford Electronics Ltd SALES HOTLINE: 01582 745555

Order by 4pm for Next Day Delivery FAX: 01582 488588



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**DON'T FORGET
TO ASK FOR YOUR
FREE CD SOFTWARE
WHEN ORDERING**

HEWLETT PACKARD CD-WRITER



**HEWLETT
PACKARD**

SureStore CD-Writer 6020

THE SIMPLEST WAY TO MAKE YOUR OWN CD'S

The HP SureStore CD-Writer 6020 range offers a complete solution for archiving and distributing information - and is compatible with industry standard CD-ROM technology. Whether you need to distribute data-intensive files, such as multimedia presentations and graphics, or archive and retrieve large amounts of data with ease, there is a CD-Writer solution for you.

It's easy to make your own CDs

The range includes three models:

- HP SureStore CD-Writer 6020i: internal SCSI-2 drive.
- HP SureStore CD-Writer 6020es: external SCSI-2 drive.
- HP SureStore CD-Writer 6020ep: external parallel port drive - you can now share easily with almost any PC, including laptops.

Each CD-Writer solution includes a SCSI-2 cable, a blank HP SureStore recordable CD and a comprehensive software suite.

Easy-CD Pro

Full featured authoring software which enables you to copy data or audio files to CD, conforming to Orange Book industry standards.

Alchemy Personal

File archive software allows you to archive documents and create image libraries. A search engine is recorded on each CD so that files can be quickly retrieved when needed.

To ensure worry free operation, the products include telephone support and one year Express Exchange Warranty direct from HP.

System Includes

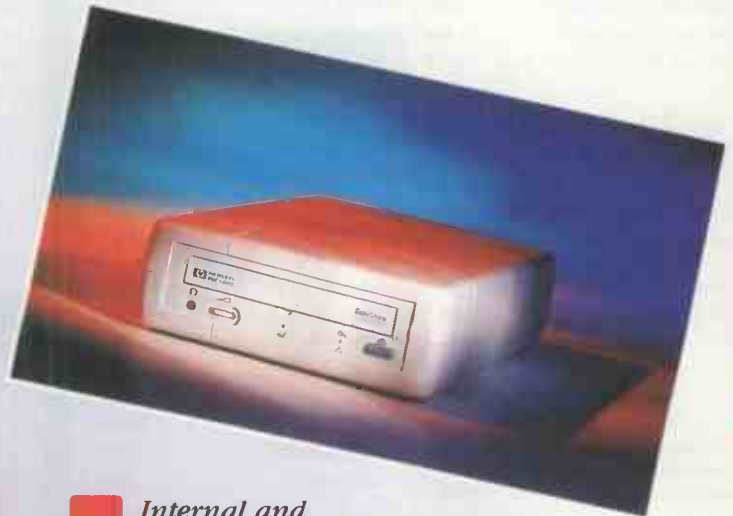
6020i: Internal drive, software, SCSI-2 cable, one blank HP SureStore recordable CD and manuals.

6020es: External drive, software, SCSI data cable, auto-ranging power supply, audio connector cable, blank HP SureStore recordable CD and manuals.

6020ep: External drive, software, parallel convertor cable, auto-ranging power supply, audio connector cable, blank HP SureStore recordable CD and manuals.

Minimum System Requirements

IBM or compatible with 486/66 processor, 8 Mb RAM, recommended 6Mb free space for software and 10Mb/min for audio recording. DS-DOS 6.0 with Windows 95, Windows 3.1 or Windows for Workgroups 3.11.



- *Internal and external 6X Reader/2X Recorder*
- *The easiest way to make your own CDs*
- *Organise distribute and archive your files*
- *Ideal for multimedia*
- *Share up to 650 Megabytes of data or 74 minutes of audio*



6020i **£425** £499.38 inc VAT

6020es **£509** £598.08 inc VAT

6020ep **£509** £598.08 inc VAT

AS SEEN ON WIN TV

**DON'T FORGET
TO ASK FOR YOUR
FREE CD SOFTWARE
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WINDOWS 95 PLUG-n-PLAY

Turn on and tune in to Win/TV CinemaPro! There's no easier or more powerful way for Windows 95 users to put 125 TV channels (and pro Teletext!) on a standard VGA screen. No fiddly switches or cables - just plug-n-Play!

UP TO 16 CHANNELS ON ONE SCREEN

Capture pro-quality stills or motion video in Microsoft AVI. Tune in with the cable-ready tuner and scheduler. All your favourite TV programmes will appear as you wish. Surf channels with a single click.

TRULY MOVING PRESENTATIONS

Make digital movies on your hard disk. Playback from a camcorder or video. Create truly moving presentations on Powerpoint or Compel o multimedia packages such as Authorware. And turn your Home videos into 16-million colour blockbusters!

Check out the specs. Get ready for the spectacular!

...ease of use is
hard to beat.



the card of choice for anyone
who wants 'professional'
Teletext-handling facilities.



WIN/TV CinemaPro

Card Spec:

- 122 Channel Cable ready TV tuner
- Professional Teletext with Print, Save, DDE
- ISA bus architecture supporting resolutions up to 1280x1024
- Easy Windows 95 Plug & Play installation
- Compatible with all video cards
- Captures pictures to your PC
- Captures AVI clips at 25 fps with full screen playback
- Windows 95, Windows 3.11 and Windows NT drivers
- Upgradeable optional MPEG hardware with scaleable Window size

£219
£257.33 inc. VAT



WIN/TV PCI

Card Spec:

- 122 Channel Cable ready TV tuner
- Professional Teletext with Print, Save, DDE
- PCI bus architecture supporting resolutions up to 1024x768
- Easy Windows 95 Plug & Play installation
- Compatible with high end video cards supporting Microsoft's Direct Draw drivers
- No cables to VGA card required
- Captures pictures to your PC
- Captures AVI clips at 25 fps



£89
£104.58 inc. VAT

BRINGING TV TO THE PC FOR ALL THE FAMILY!



Video Magic

MJPEG board:

- ISA bus architecture with 1/2 PAL capture at 25 fps
- MJPEG capture reduces disk space by up to 100:1
- SVideo in and out
- Full screen PAL output
- Bundled with 32 bit digital video software worth over £300
- Connects to all video recorders
- Allows you to create MPEG video clips

£225
£264.38 inc. VAT



Hauppauge!

TUNE YOUR PC TO WIN TV

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MONITORS PCs

DON'T FORGET TO ASK FOR YOUR FREE CD SOFTWARE WHEN ORDERING

CTX

THE MONITOR SPECIALISTS

1569 MS

The Award Winning CTX 1569MS brings you the innovative technology behind a high quality, high specification monitor, combined with the latest multimedia features at an affordable price. The attractive space saving unit is the 15" FST perfect multimedia solution for the home, office, education and entertainment markets.



- 15" FST
- 0.28mm dot pitch
- 30 - 69kHz horizontal freq.
- 50 - 120Hz vertical freq.
- 1280 x 1024 Max Resolution
- On screen display
- TCO Compliance
- Integrated Dome Speakers
- Microphone
- Headphone
- Headphone Jack
- Plug and Play

■ **3 YEAR WARRANTY**

■ **£295**
(£346.63 inc VAT)

1785 XA

PC Magazine - Highly Recommended
"Good viewing" - panel scores and an impressive feature list ensure that the CTX 1785XA is very good value for money.



- 17" Diamondtron Screen
- 0.26mm Aperture Grill
- Antistatic, anti reflection screen
- 30 - 85kHz horizontal
- 50 - 120Hz vertical freq.
- 1600x1200 NI Max Res
- On screen display
- TCO Compliance
- Plug and Play

■ **3 YEAR WARRANTY**

■ **£559**
(£656.83 inc VAT)

Other Monitors Available

14" - 1451CLR	£165	£193.88 inc. VAT
15" - 1565D	£225	£264.38 inc. VAT
15" - 1569S	£259	£304.33 inc. VAT
17" - 1765D	£425	£499.38 inc. VAT
17" - 1785S	£449	£527.58 inc. VAT
20" - 2085 GM	£789	£927.08 inc. VAT

CTX

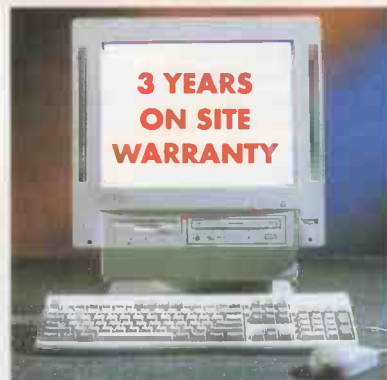
THE MONITOR SPECIALISTS

THE NEW CTX MAXIPUTER

The Maxiputer is a highly sophisticated PC and Monitor, integrating home and office features into a multimedia communication centre that is internet ready. This versatile PC allows the user to run tomorrow's applications such as video conferencing, on-line transactions, fax and data links. With fully interactive entertainment and educational options, this high power PC is a space saving device of unlimited potential.

A combination of all the latest computer technology, into a single ergonomic design that increases your flexibility and maximises operating space and time and by making the user's performance more efficient and effective.

With the advanced Quality Control and Quality Assurance developed from 15 years of manufacturing monitors, CTX also provide the detailed complexity of assured quality throughout the product range and the support that goes with it.



- MAXIMISING POWER
- MAXIMISING SPACE
- MULTIMEDIA
- HI-FI AUDIO FACILITIES
- PENTIUM PROCESSOR
- 15" FST MONITOR
- EASY TO UPGRADE + EXPAND

ENTRY LEVEL

- 15" Super VGA Monitor (1280 x 1024 resolution)
- Intel 120MHz Pentium Processor
- 8MB EDO DRAM (Upgradeable to 128MB)
- 256KB Level 2 async.Cache (Upgradeable to 1MB)
- 1.3GB Hard disk drive
- 16-bit Sound Blaster compatible sound card
- Built-in stereo amplifier and Mic
- Built-in Panasonic DOME speaker system
- 2 ISA Slots, PCI Slot and 1 PCI/ISA Shared Slot
- ATI Mach64 VGA 1 MB VRAM Graphics Card
- 3.5" FDD/HDD floppy disk drive
- Eight speed CD-ROM drive
- Plug & Play (with DDC12B)
- Keyboard & PS/2 mouse interface on board
- Windows 95
- MS Windows 95
- 3 Years on-site warranty

■ **£1089**
(£1279.58 inc VAT)

MID-RANGE

- 15" Super VGA Monitor (1280 x 1024 resolution)
- Intel 133MHz Pentium Processor
- 16MB EDO DRAM (Upgradeable to 128MB)
- 256KB Level 2 async.Cache (Upgradeable to 1MB)
- 1.7GB Hard disk drive
- 16-bit Sound Blaster compatible sound card
- Built-in stereo amplifier and Mic
- Built-in Panasonic DOME speaker system
- 2 ISA Slots, PCI Slot and 1 PCI/ISA Shared Slot
- ATI Mach64 VGA 2 MB VRAM Graphics Card
- 3.5" FDD/HDD floppy disk drive
- Eight speed CD-ROM drive
- Plug & Play (with DDC12B)
- Keyboard & PS/2 mouse interface on board
- Windows 95
- MS Windows 95
- 3 Years on-site warranty

■ **£1279**
(£1502.83 inc VAT)

HIGH-END

- 15" Super VGA Monitor (1280 x 1024 resolution)
- Intel 166MHz Pentium Processor
- 32MB EDO DRAM (Upgradeable to 128MB)
- 256KB Level 2 async.Cache (Upgradeable to 1MB)
- 2.1GB Hard disk drive
- 16-bit Sound Blaster compatible sound card
- Built-in stereo amplifier and Mic
- Built-in Panasonic DOME speaker system
- 2 ISA Slots, PCI Slot and 1 PCI/ISA Shared Slot
- ATI Mach64 VGA 2 MB VRAM Graphics Card
- 3.5" FDD/HDD floppy disk drive
- Keyboard & PS/2 mouse interface on board
- Eight speed CD-ROM drive
- Plug & Play (with DDC12B)
- Windows 95
- 3 Years on-site warranty

■ **£1529**
(£1867.07 inc VAT)

MONITORS

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MONITORS

Aries Monitors

EnergyPro 14" LR SuperVGA
0.28mm dot pitch, EnergyStar compliant,
supports up to 1024x768 resolution
£158
Aries Multiscan Monitors

Aries Alphascan Pro LR
1024 x 768/72Hz (NI) H-Sync 70KHz, Front
Mounted user controls. **£179**

Aries EnergyPro 15" LR
15" Colour Display, 0.28mm dot pitch, 1280 x
1024/60Hz NI, EnergyStar Compliant.
Microprocessor Controls **£219**

Aries EnergyPro 17" LR
17" Colour Display, 0.28mm dot pitch, 1280 x
1024/60Hz NI, EnergyStar Compliant.
Microprocessor Controls **£365**



Samsung Syncmaster Monitors

3NI 800 x 600 CGA 14" **£152**
3NE 1024 x 768 CVP 14" **£164**
15GLE 1024 x 768 15" **£224**
15GLI Plug and Play 280 x 1024 15" **£261**
17GLI NI 1280 x 1024 17" **£464**
17GLSI NI 1280 x 1024 76Hz 17" **£549**

Sony Multiscan Monitors

CPD-155F2 15" **£297**
CPD-155X1 15" **£255**
CPD-175F2 17" **£498**
GDM-17SE2 17" **£1075**
CPD-205F2 20" **£735**

Taxan Ergovision Monitors

EV 410LR 14" **£179**
530TCO 15" **£269**
730TCO 17" **£445**
740TCO95-S M/M 17" **£579**
1080TCO 20" **£775**
2100TCO 21" **£1175**
EV 410LR 14" **£179**



CTX Monitors

1451CLR	14"	£165
1565D	15"	£225
1569S	15"	£259
1569MS MultiMedia	15"	£279
1765S	17"	£439
1785XA	17"	£559
2085GM	20"	£789

Iiyama Monitors

MF-8515F	15"	£249
MF-8617E	17"	£489
MF-8617ES inc. speakers	17"	£499
MT-9017T Diamondtron	17"	£549
MF8221T	21"	£959
MT9021T	21"	£999

NEC Multiscan Monitors

M500	15"	£377
M700	17"	£638
P750	17"	£705
XE21	21"	£1029
XM29 MultiMedia	29"	£2329
XM37 MultiMedia	37"	£5030

Nokia Monitors

447V	17"	£399
447E	17"	£535
417TV	17"	£599
445Xi	21"	£999

Panasonic Monitors: All Panasonic monitor prices include 2 years On-site warranty

TX-D1563	15"	£285
TX-D1565	15"	£219
TX-D1734U	17"	£395
TX-D1753	17"	£529
TX-D2162U	21"	£1049
Panoview 530 9.4" TFT		£1599
Panoview 550 10.4" TFT		£1799

Mitsubishi

SCAN 17HX .26dpi	17"	£499
PRO87TXM .25dpi	17"	£599
PRO21TX .3dpi	21"	£1129



Panasonic

SCREENS

THE ULTIMATE SCREEN

Benefiting from 50 years design and engineering experience with audio visual products, you can be assured that the latest range of Panasonic monitors meet the most stringent European standards, perform to the highest level and come with an outstanding 2 year on-site exchange warranty.

PanaSync 4G (TX-T1565)

15" Digital Chassis, 0.27mm dot pitch, 1024 x 768 @ 80Hz, max 1280 x 1024, Power Save (Energy Star), VESA and TCO'92 standards.

£215 £252.63 inc VAT

PanaSync Pro 4 (TX-T1563)

15" Digital Chassis, 0.27mm dot pitch, 1024 x 768 @ 85Hz, max 1280 x 1024, On Screen Display, Power Save (Energy Star) VESA and TCO'92 standards.

£249 £292.58 inc VAT

PanaSync 5G (TX-D1734)

17" Digital Chassis, 16" viewing area, 0.27mm dot pitch, 1024 x 768 @ 85Hz, max 1280 x 1024, 5 language On Screen Display, Power Saving, Energy Star and TCO'92 compliant.

£389 £457.08 inc VAT

PanaSync Pro/5G (TX-D1753)

17" Digital Chassis, 16" viewing area, 0.27mm dot pitch, 1280 x 1024 @ 81Hz, max 1600 x 1200, 5 language On Screen Display, Power Saving, Energy Star and TCO'92 compliant.

£499 £586.33 inc VAT

PanaSync Pro/7G (TX-D2162) 21" Digital Chassis, 0.25mm dot pitch, 1600 x 1200 @ 75Hz, On Screen Display, Power Saving, Energy Star and TCO'92 compliant.

£1049 £1232.58 inc VAT

PanaSync 15MM and 17MM (TX-D1562F & TX-D1734F)

15" & 17" Multimedia, Built-in stereo 'Top Dome' speakers, microphone and headphone jack, 0.25 dot pitch, 1024 x 768 @ 85Hz, max 1280 x 1024, 5 language On Screen Display, Power Saving, Energy Star and TCO'92 compliant.

15MM £285 £334.88 inc VAT

17MM £465 £546.38 inc VAT



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PRINTING IN STYLE WITH EPSON

Epson - the first name in business printing - is renowned the world over for the quality of its products and services. Epson proudly introduce a range of printers that offer outstanding quality output using the latest inkjet laser or dot-matrix technologies. Epson printers aim to fulfil all of your requirements, whether it be mono, colour or both. Compact, high-speed and super-sharp, Epson printers offer unbeatable value for both home and office users.

EPSON Stylus Color 500

The Epson Stylus Color 500 is a high quality inkjet printer providing 720 x 720 dpi photo-real output. It is the ideal printer to provide brilliant 720 dpi results for in-house desktop publishing, presentation graphics and other business and personal documents, on all types of paper including plain paper.

- Up to 720 x 720dpi photo-real output
- Includes software to monitor and advise on the status of the printer, including ink levels
- Windows 3.1x, 95 & Macintosh compatible
- Epson 'Auto-Colour' function, Windows 95 ICM and Macintosh ColorSync 2.0 compliant
- 1 year RTB warranty with optional 3 year on-site warranty
- Epson CoverPlus three year extended warranty service available - £65

£188

£220.90 inc VAT

3 years on-site warranty
Epson CoverPlus - £149



Complete with **Free**

EPSON T-SHIRT PRINTING FACTORY

Includes good quality T-Shirt, T-Shirt software and media with 1,500 images

EPSON Stylus Color 200



A low cost premium colour inkjet printer

The Stylus Color 200 provides the perfect solution for personal and business use with the flexibility to deliver laser-like mono and photo-real colour printing

With superior colour printing the Epson Stylus Color 200 is the ideal solution for applications such as reports, letters, charts, homework, party invites, etc.

Epson Stylus Color 200

- 720dpi colour
- Prints on plain, coated papers, envelopes and OHP transparencies
- Permanent Piezo print-head
- EPSON 'Auto-Colour' function
- Status monitor, including ink levels
- Video and camera mode
- New Inks
- Windows 95' ICM compliant
- 1 year RTB warranty with optional 3 year on-site warranty

£129

£151.58 inc VAT

Epson CoverPlus - £40

EPSON Stylus Pro

The ultimate 720 x 720 dpi colour inkjet printer for graphics professionals

Epson's new professional colour printer gives 720x720dpi, photo-real colour. Ideal for use in professional in-house printing situations. Epson's unique MicroDot™ ink delivery system, ensures high definition printing and sophisticated image control.

- Enhanced 720 x 720dpi photo real colour output with MicroDot
- Prints on plain, coated and glass papers, envelopes and OHP transparencies
- Ideal for photographic images and high quality business graphics
- Easy to use Windows driver
- Prints on a variety of media
- Full CMYK printing for graphic colour users
- 'Auto-Colour' function
- Windows and Mac compatible
- Optional PostScript emulation and Network Interfaces



£295

£346.53 inc VAT

Epson CoverPlus - £65

EPSON

COVER plus

Epson CoverPlus is a new extended warranty service designed to offer a flexible and comprehensive service for all Epson printers, scanners and video projectors. It gives customers the option with the product to cover them for extra entitlement should their product develop any fault.

Peace of mind through reliability.

- 3 year extended warranty service available on all Epson printers, scanners and video projectors
- Flexible cover - 4 or 8 hour on-site response packages
- Product history known as own product is repaired not replaced
- Warranty is transferable if product is sold on
- Epson trained engineers and Epson spares used
- Options also covered if included with registered product
- Refer to specific product for price

NEW

EPSON EPL-N1200 & EPL-N2000

NEW Low cost high performance work group laser printers

EPL-N1200

- 12 pages per minute
- True 600 x 600 dpi with BiRTech
- 2Mb RAM with MiTech
- 250 Sheet Multi-purpose Tray
- 2 x Hi Speed Bi-directional Parallel Interfaces
- Additional slot for optional Ethernet interface

Epson CoverPlus - £149
3 year on-site warranty

EPL-N2000

- 20 pages per minute
- True 600 x 600 dpi with BiRTech
- 4Mb RAM upgradable to 64Mb
- A3+ Full bleed paper size
- 2 x Hi Speed Bi-directional Parallel Interfaces
- Ethernet network interface

Epson CoverPlus - £259
3 year on-site warranty
(8 hour response)



EPL-N1200 Standard configuration	£839	(£985.83 inc VAT)
EPL-N1200EN Ethernet configuration	£1095	(£1286.63 inc VAT)
EPL-N1200Ps Postscript configuration	£1333	(£1566.28 inc VAT)
EPL-N2000 Standard network ready	£1500	(£1762.50 inc VAT)
EPL-N2000Ps Postscript configuration	£1900	(£2232.50 inc VAT)

EPSON EPL-5500

The little BIG laser from Epson

The Ultra-compact, True 600 x 600dpi, HP PCL5e, high speed business laser, loaded with a powerful RISC processor. With HP PCL5e and 1Mb of memory, and delivers high resolution 600 dpi output at 6ppm, the EPL-5500 offers professional performance standards. It's the ideal laser for use in businesses large and small.

Just half the size of other conventional lasers, the EPL-5500 is compact enough for any desktop.



- World's most compact 6ppm Laser - 5Kg, small footprint
- True 600 x 600dpi - with BiRTech and MicroGray Technology
- HP PCL5e, GL2 - Optional PostScript, Epson FX and LQ, IBM, WPS emulations
- 1Mb (upg. to 32Mb) - with Epson's Memory Improvement Technology
- SparcLite 22.5 MHz RISC CPU - very fast printing
- 150 Sheet Paper Tray - Optional 250 Sheet Paper tray available

1Mb	£328	(£385.40 inc VAT)
2Mb	£372	(£437.10 inc VAT)
5Mb PS	£659	(£774.33 inc VAT)
5500W	£245	(£287.88 inc VAT)

Windows printing system

Epson CoverPlus - £99

QUALITY PRINTERS AT LOW PRICES!

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**HEWLETT
PACKARD**

Affordable quality printing

HP DeskJet 690c



- 600 x 600 dpi black, up to 600 x 300 dpi colour
- HP Real Life Imaging System
- Sharpest Black Printing with HP pigmented inks
- 30 TrueType Fonts
- Up to 5ppm black, 2ppm colour

£186

£218.55
inc. VAT

HP LaserJet 5L



- 600 x 600 dpi laser printing
- HP's Resolution Enhancement technology
- 26 scalable fonts
- 1MB memory, doubles with MET
- Prints 4 pages per minute

£287

£337.23
inc. VAT

HP DeskJet 400c



- 600 x 300 dpi black, 300 x 300 dpi colour
- Windows 95 Plug and Play compatible
- 50 page sheet feeder
- Prints up to 16.7 million colours
- Up to 3ppm in black

£119

£139.83
inc. VAT

HP LaserJet 5



- Fast 12ppm @ 600dpi plus HP RET
- New design
- Latest PCL6 language
- Infra-red communication capability (IrDA)
- HP FontSmart to easily manage more than 100 fonts

£859

£1009.33
inc. VAT

HP DeskJet 870Cxi



- 600 x 600 dpi black, 300 x 300 dpi colour
- Denser, Sharper inks
- Colour RET and ColourSmart Technology
- Laser quality black at 6ppm and high quality colour at 2ppm

£299

£351.33
inc. VAT

HP LaserJet 6P



- Superb 600dpi plus HP RET, 8ppm
- Dual paper bins and manual option
- PC parallel port
- infra-red capability
- At least 128 levels of grey
- 2 paper sources hold a total of 350 sheets

£485

£569.88
inc. VAT

For ordering information, please see page 2

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PRINTERS

Canon Give me 5!

What is PhotoRealism™ ?

The new BJC-240, BJC-4200 and BJC-4550 can produce photo quality images using Canon's new PhotoRealism™ technology.

PhotoRealism™ is a new development from Canon which enables photo quality output, and brings a new standard to Bubble Jet printing. It combines the use of the photo ink cartridge, high resolution paper and new software, 'Canon Colour Imaging Processing System' (CCIPS). The new photo inks have lighter shades, enabling them to be applied from one to three times to the same pixel, giving a greater and more natural tonal range. This means that these inks enable you to produce stunning photo-realistic images from either your scanner, digital camera, photo CD or the Internet.

Canon BJC-240

The BJC-240, the entry fun family printer designed to brighten up your homework and all your work at home! Replacing the highly successful BJC-210, the main differences between it and the BJC-240 are:

- New look compact design
- BC-05 colour cartridge comes as standard
- Optional BC-06 photo cartridge for photo realistic images
- Supports a wide range of media including high resolution paper
- Supports the new Fluorescent ink cartridge for fun fluorescent printing
- Windows 3.1x and '95 drivers

**Mono
£113
£132.76 inc VAT**



Canon BJC-4550

The BJC-4550 is an A3 colour Bubble Jet printer that is designed "for a bigger, brighter impression on paper".

- A3 colour printing at 720 x 360dpi
- Prints on to new A3/A4 media including High Resolution/High Gloss, etc.
- Built-in sheet feeder holds 50 sheets of A3 or 100 sheets of A4 paper
- Supports the new optional BC-22 Photo Cartridge
- Supports the new Fluorescent ink cartridge
- Optional BC-20 high speed, high capacity black ink cartridge
- Windows 3.1x and '95 drivers, plus Mac drivers supplied as standard



**NEW
£171
£200.93 inc VAT**

Canon BJC-4100

The BJC-4100 is perfect for small office or home office users who require a single printer to manage all their printing requirements, whether for mono only or for adding colour into correspondence, spreadsheets, reports, proposals and presentations. The BJC-4100 is also ideal for home users to print letters, invitations, newsletters, graphic designs, homework and home accounts.

- Print speeds - 4.5 ppm mono and 3.4 ppm colour
- 720 x 360dpi colour output onto plain paper
- Resident black and colour cartridges give vibrant colour and true black on the same page
- A patented ink formulation gives bright colour output that is both lightweight and waterfast
- Uses fast-drying inks which enable complex graphic images to be printed
- Simple to use - only two buttons and no dip-switches
- Includes TrueType font disk with 20 typefaces

**NEW
In addition to the BJC-4100,
the new BJC-4200 is now
also available & supports
Canon PhotoRealism™
Call for details**



**£171
£200.93 inc VAT**

Canon BJC-620

Top quality colour printing that improves your bottom line

- 720 x 720dpi resolution on all media inc. plain paper, giving near photographic quality
- The ONLY printer in its class to use a 4 cartridge system. Maximises cost efficiency for colour printing
- High capacity black ink cartridge maximises cost efficiency for monochrome printing
- MS Windows® Printing System means it is easy to use, increases print speeds and gives a faster return to application so you can continue working whilst it's printing



**NEW
£280
£329 inc VAT**

So if you want a dedicated colour printer for top quality colour printing, with cost efficiency in mind, then look no further than the BJC-620 colour Bubble Jet printer

LASER PRINTERS

Brother MFC-6000 Multifunction Laser/Fox	£759
Brother HL730	£268
Brother HL760	£319
Brother HL1260E	12ppm £825
Brother HL1060 New	12ppm £522
Brother HL1060 New	12ppm £967
CanonLP460	4ppm £211
Canon LBP1260+	£860
Epson EPL5500W	6ppm £245
Epson EPL5500 1Mb	5ppm £328
Epson EPL5500 2Mb	5ppm £372
Epson EPL5500 PS 5Mb	5ppm £659
Epson EPL9000 PS	8ppm £1,315
HP LaserJet 5L	4ppm £290
HP LaserJet 5	12ppm £865
HP LaserJet 5N	12ppm £1015
HP LaserJet 5M	12ppm £1,174
LaserJet 4MV	16ppm £2,027
HP LaserJet 5Si	24ppm £1,979
HP LaserJet 5Si MX	24ppm £2,716
HP LaserJet 5 Colour	10ppm £4,175
HP LaserJet 5M Colour	10ppm £5,199
HP LaserJet 6P	£485
HP LaserJet 6MP	£597
Kyocera FS400 S/Bin	4ppm £310
Kyocera FS400 D/Bin	4ppm £432
Kyocera FS1550	10ppm £789
Kyocera FS1600	10ppm £939
Lexmark Optra E Model A	£365
Lexmark Optra R+ 4Mb	£899
Lexmark Optra C	£4,780
NEC SuperScript 660	6ppm £373
NEC SuperScript 660i	6ppm £355
NEC SuperScript 860	£357
NEC SuperScript 3000 Colour	£435
Oki Page 4W	£206
Oki OL600ex	6ppm £251
Oki OL610ex	6ppm £310
Oki OL810ex	8ppm £494
Oki OL1200ex	12ppm £775
Oki PAGE 16N NEW	16ppm £766
Panasonic KXP4430	5ppm £459
Panasonic KXP4440	10ppm £678
Panasonic KXP6100	5ppm £187
Panasonic KXP6150	6ppm £281
Panasonic KXP6300	6ppm £225
Panasonic KXP6500	6ppm £303

LASER RAM UPGRADES

1Mb HP LaserJet III/IIIi/IIID	£102
2Mb HP LaserJet III/IIIi/IIID	£166
1Mb HP LaserJet II/IIi	£70
2Mb HP LaserJet II/IIi	£115
4Mb HP LaserJet II/IIi	£175
4Mb HP LaserJet 4/4M/4P/4MP	£119
8Mb HP LaserJet 4/4M/4P/4MP	£215
1Mb HP LaserJet 4L	£249
1Mb HP LaserJet 5L	£65
2Mb HP LaserJet 5L	£110
4Mb HP LaserJet 5L	£155
1Mb Panasonic KXP4410/4430	£199
2Mb Panasonic KXP4410/4430	£199
1Mb Panasonic KXP4400/5400	£75
2Mb Panasonic KXP4400/5400	£110
2Mb Panasonic KXP4400/5400	£165
1Mb Oki OL400e	£108
2Mb Oki OL400e	£118

LASER CONSUMABLES

Brother HL600 Series Toner	£21
Brother HL600 Series Drum	£99
Canon LBP4/Star LP4/HP IIIiP Toner	£49
Canon LBP8 III/HP III Toner	£46
Epson EPL4000/4100/4300 Toner	£75
Epson EPL4000/4100/4300 Drum	£117
Epson EPL5200 Toner	£89
Epson EPL7100/7500/8100 Toner	£147
Epson EPL5500 Toner	£45
HP III/5i/4Si Toner	£75
HP 4/+/4M+ Toner	£65
HP 4L/4M/4P/4MP Toner	£43
HP 4V/4MV Toner	£91
HP 5L Toner	£39
HP 5P/5MP Toner	£53
Kyocera FS400 Toner	£15
NEC 610 Toner	£75
NEC S60/S62/S90 Toner	£117
Oki OL400/800 Toner	£19
Oki OL400/800 Drum	£165
Oki OL400e Toner	£17
Oki OL400e Drum	£129
Oki 4W TONER	£14
Panasonic KXP4410/4430 Toner	£28
Panasonic KXP4410/4430 Drum	£98
Panasonic KXP4410/4430 Developer	£98
Panasonic KXP4450/4451/4455 Toner	£20
Panasonic KXP4450/4451/4455 Drum	£75
Panasonic KXP4450/4451/4455 Developer	£60
Panasonic KXP4420 Toner	£23
Panasonic KXP4420 Drum	£57
Panasonic KXP4420 Developer	£9
Panasonic KXP4400/5400 Toner	£55
Panasonic KXP4400/5400 Drum	£11
Panasonic KXP6100/6150 Toner	£98
Panasonic KXP6100/6150 Drum	£108
Qume Crystalprint Toner	£189
Star L55 Toner	£68
Star WinType 4000 Toner	£68

LASER ACCESSORIES

HP LaserJet 4 Lower Paper Cassette	£199
HP LaserJet 4 JetDirect Ethernet Card	£339
Panasonic KXP4420 Ozone Filter	£9
Panasonic KXP4450/4455 Ozone Filter	£20

9 PIN MATRIX PRINTER

Citizen 120D+ Parallel	80col	£98
Citizen 120D+ Serial	80col	£109
Epson LX300	80col	£92
Epson LX1050+	132col	£178
Epson FX870	80col	£234
Epson FX2170	132col	£369
Panasonic KXP1150	80col	£87
Panasonic KXP3696	132col	£255

24 PIN MATRIX PRINTER

Citizen ABC Mono	80col	£99
Citizen ABC Colour	80col	£120
Citizen Swift 240 Mono	80col	£155
Citizen Swift 330X	132col	£305
Epson LQ100+	80col	£96
Epson LQ300	80col	£118
Epson LQ570+	80col	£206
Epson LQ870	80col	£365
Epson LQ2170	132col	£465
Epson DLQ3000	132col	£779
Panasonic KXP2023	80col	£108
Panasonic KXP2124	80col	£191
Panasonic KXP2135 Colour	80col	£123
Panasonic KXP3696	132col	£255

INK JET PRINTER

Canon BJ30 Black	80col	£105
Canon BJ30 White	80col	£105
Canon BJ230	132col	£228
Canon BJC240 COLOUR NEW	80col	£199
Canon BJ330	132col	£386
Canon BJC70 Black	80col	£143
Canon BJC70 White	80col	£143
Canon BJC620	80col	£266
Canon BJC4550	NEW 132col	£278
Canon BJC800	80col	£879
Canon BJC820	80col	£1,195
Citizen Printivo 600C	80col	£290
Epson Stylus 200	80col	£101
Epson Stylus 200 Colour	80col	£129
Epson Stylus 1000	132col	£319
Epson Stylus Colour 500	80col	£188
Epson Stylus 1500	132col	£499
Epson Stylus Pro A4	80col	£295
Epson Stylus Pro XL	132col	£785
Epson SQ1500	132col	POA
Epson SQ1170	132col	£590
HP DeskJet 400 MONO	80col	£110
HP DeskJet 400 COLOUR	80col	£119
HP DeskJet 340 NEW	80col	£141
HP DeskJet 690 NEW	80col	£188
HP DeskJet 820 Colour	80col	£254
HP DeskJet 870 Colour	80col	£311
HP DeskJet 1600 Colour	80col	£817
HP DeskJet 1600M Colour	80col	£1,218
HP OfficeJet 350	£465	
HP CopyJet M	80col	£1,199
Lexmark 150C	£195	
Lexmark Jetprinter 1020C	80col	£158
Lexmark WinWriter 2070	80col	£280
Lexmark 2050 ColourJet	£219	
Oki OJ2010 Colour	80col	£199
Star SJ4 Inkjet	£99	

RIBBONS & INK CARTRIDGES

Canon BJ10ex/BJ10ex Black Ink Cartridge	£13
Canon BJ200/BJ230 Black Ink Cartridge	£15
Canon BJC240 Fluorescent Ink Cartridge	£24
Canon BJC4200/4550 Fluorescent Ink Cartridge	£29
Canon BJC240 Photo Ink Cartridge	£24
Canon BJC4200/4550 Photo Ink Cartridge	£27
Canon BJ300/BJ330 Black Ink Cartridge	£11
Canon BJC70/BJ30 Black Ink Cartridge	£25
Canon BJC70 Colour Ink Cartridge	£27
Canon BJC600 Black Ink Cartridge	£8
Canon BJC600 Cyan Ink Cartridge	£6.50
Canon BJC600 Yellow Ink Cartridge	£6.50
Canon BJC800 Black Ink Cartridge	£14
Canon BJC800 Cyan Ink Cartridge	£18
Canon BJC800 Magenta Ink Cartridge	£18
Canon BJC800 Yellow Ink Cartridge	£18
Canon BJC4000 Black Ink Tank	£7
Canon BJ4000 Colour Ink Tank	£13
Citizen 120D+ Black Ribbon	£4
Citizen Swift 24/200/240/ABC Black Ribbon	£4
Citizen Swift 24/200/240/ABC Col. Ribbon	£11
Citizen Swift 24X Black Ribbon	£8
Citizen Swift 24X Colour Ribbon	£16
Epson LX100 Black Ribbon	£4.45
Epson LX400/LX850/FX870 Black Ribbon	£3.95

PRINTERS

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Epson LX1050/FX1170 Black Ribbon	£4.95
Epson LQ100 Black Ribbon	£5.35
Epson LQ150 Black Ribbon	£5.35
Epson LQ150 Colour Ribbon	£15.25
Epson LQ570/LQ870 Black Ribbon	£4.50
Epson LQ1070/LQ1170 Black Ribbon	£5.40
Epson LQ2550 Black Ribbon	£8
Epson LQ2550 Colour Ribbon	£16.20
Epson SQ870/SQ1170 Black Ink Cartridge	£20
Epson Stylus Colour Black Ink Cartridge	£11
Epson Stylus Colour Colour Ink Cartridge	£23
Epson Stylus Colour 820/11/1s Black Ink Cartridge	£13.95
Epson Stylus Colour 11/1s Colour Ink Cartridge	£19.80
Epson Stylus 800/1000 Black Ink Cartridge	£9
Fujitsu B100/B200 Black Ink Cartridge	£18
HP DeskJet 500 Series Black Ink Cartridge	£16
HP DeskJet 500 Series Colour Ink Cartridge	£21
HP DeskJet 600/660 Black Ink Cartridge	£19
HP DeskJet 600/660 Colour Ink Cartridge	£20
HP DeskJet 850/1600 Black Ink Cartridge	£20
HP DeskJet 850 Colour Ink Cartridge	£18
HP DeskJet 1600 Cyan Ink Cartridge	£23
HP DeskJet 1600 Magenta Ink Cartridge	£23
HP DeskJet 1600 Yellow Ink Cartridge	£23
HP DeskJet 1200 Black Ink Cartridge	£19
HP DeskJet 1200 Cyan Ink Cartridge	£21
HP DeskJet 1200 Magenta Ink Cartridge	£21
HP DeskJet 1200 Yellow Ink Cartridge	£21
HP PaintJet Black Ink Cartridge	£16
HP PaintJet Colour Ink Cartridge	£18
HP PaintJet XL300 Black Ink Cartridge	£16
HP PaintJet XL300 Cyan Ink Cartridge	£18
HP PaintJet XL300 Magenta Ink Cartridge	£18
HP PaintJet XL300 Yellow Ink Cartridge	£18
Kago KP810 Black Ribbon	£5
Lexmark 150C/1020C Black Ink Cartridge	£21
Lexmark 150C/1020C Colour Ink Cartridge	£26
Lexmark 2070 Black Ink Cartridge	£24
Lexmark 2070 Colour Ink Cartridge	£26
NEC P3Q/P32Q Black Ribbon	£8
NEC P62/P72/P90 Black Ribbon	£8
NEC P62/P72/P90 Colour Ribbon	£14
Panasonic 1150/1170/1180 Black Ribbon	£7
Panasonic 2180/2123/2124/2135 Black Ribbon	£7
Panasonic 2180/2123/2124/2135 Colour Ribbon	£14
Panasonic 1624/2624 Black Ribbon	£8
Panasonic 3696/3626 Black Ribbon	£11
Star LC10/LC20/LC100 Black Ribbon	£5
Star LC10/LC100 Colour Ribbon	£9
Star LC200 Black Ribbon	£5
Star LC200 Colour Ribbon	£11
Star LC24-200/24-100/24-20 Black Ribbon	£5
Star LC24-200/XB24-200 Colour Ribbon	£12
Star LC24-30 Black Ribbon	£8
Star LC24-30 Colour Ribbon	£12
Star SJ144 Black Ribbon	£6
Star SJ144 Colour Ribbon	£8

SHEET FEEDERS

Canon BJ10ex/BJ10sx CSF - Black	£40
Canon BJ10ex/BJ10sx CSF - White	£40
Canon BJ300 CSF	£86
Canon BJ330 CSF	£96
Epson LX400 CSF	£69
Epson LQ570+/LQ870 CSF	£47
Epson LQ1070+/LQ1170 CSF	£89
Panasonic KXP1170/1180/1123 CSF	£59
Panasonic KXP2135 CSF	£30
HP DJ1600 OPT 500 Sht Paper Tray	£99

ACCESSORIES

BJC30/70 Battery Pack	£45
BJC30/70 Portable Kit	£69
Epson OK Serial Interface	£29
Epson BK Serial Interface	£65
Epson 32K Serial Interface	£75
Epson LQ100 Tractor	£27.50
Epson LX300 Colour Kit	£29
Epson Stylus 820 Colour Kit	£29
HP DeskJet 500 FX Emulation Cartridge	£49
HP DeskJet 500 IBM Emulation Cartridge	£57
HP DeskJet 500 256K RAM Cartridge	£45
HP DeskJet 320/340 Battery Pack	£29
HP DeskJet 320/340 Colour Kit	£28
HP DeskJet 320/340 Parallel Cable	£12
HP DeskJet 600 Colour Kit	£29
HP DeskJet 690C Photo Colour Kit	£39
Panasonic Serial Interface	£49
Panasonic 32K Buffer - Matrix Printers	£16
Star BK Serial Interface	£52

PRINTERS SHARERS/BUFFERS

Manual Printer Sharers	
2in/1out Parallel	£13
2in/2out Parallel	£29
3in/1out Parallel	£17
4in/1out Parallel	£26
All of the above have 36 way Centronics Female Connectors	
2in/1out Serial	£12
2in/2out Serial	£28
3in/1out Serial	£15
4in/1out Serial	£24
All of the above have 25 way Female D'Connectors	
Auto Parallel Printer Sharer Buffers	
2in/1out	£29
2in/2out 256K Buffer	£105
2in/2out 1Mb Buffer	£134
4in/1out	£45
4in/2out	£69
4in/2out 256K Buffer	£124
4in/2out 1Mb Buffer	£149
8in/1out OK	£79
All of the above have 25 way Female D'Connectors	
Auto Serial Printer Sharer Buffers	
2in/1out OK	£27
2in/2out 256K	£124
4in/1out OK	£44
4in/2out OK	£69
8in/1out OK	£62
All of the above have 25 way Female D'Connectors - INPUT & 25 way Male D'Connectors - OUTPUT	
RAM Expansion Cards	
256K Expansion Card	£59
1Mb Expansion Card	£78
2Mb Expansion Card	£124
Pocket Buffers	
256K Parallel Flash Buffer	£65
1Mb Parallel Flash Buffer	£98
2Mb Parallel Flash Buffer	£119
256K Parallel Turbo Flash Buffer	£85
1Mb Parallel Turbo Flash Buffer	£125
2Mb Parallel Turbo Flash Buffer	£158
All of the above have 36 way Female D'Connectors	
256K Serial Plotter Buffer	£155
1Mb Serial Plotter Buffer	£184
2Mb Serial Plotter Buffer	£330
All of the above have 25 way Female D'Connectors	

COMPACT CONVERTERS

Serial to Parallel Converter	£49
Serial to Parallel Converter with 256K Buffer	£55
IEEE488 to Centronics Converter	£49
RS232 to RS422 Converter	£37
Parallel Line Extender	£37

PRINTER LEADS

1.8m 18wire PC Parallel	£4
5m 18wire PC Parallel	£8
10m 18wire PC Parallel	£13
1.8m 25wire PC Parallel	£5
5m 25wire PC Parallel	£10
10m 25wire PC Parallel	£15
1.8m 25 Male 'D' to 25 Male 'D'	£4
25 Male 'D' to 25 Male 'D'	£8
25 Male 'D' to 25 Male 'D'	£13
1.8m 25 Male 'D' to 25 Female 'D'	£5
25 Male 'D' to 25 Female 'D'	£9
10m 25 Male 'D' to 25 Female 'D'	£14
1.8m Centronics Male to Centronics Male	£8
5m Centronics Male to Centronics Male	£10
10m Centronics Male to Centronics Male	£15

PAPER & TRANSPARENCIES

A4 80g White Laser Paper - 500sht	£3
A4 90g White Laser Paper - 500sht	£6
9.5"x11" Fanfold Paper - 1000sht	£6
9.5"x11" Fanfold Paper - 2000sht	£11
14.5"x11" Fanfold Paper - 1000sht	£8
14.5"x11" Fanfold Paper - 2000sht	£14
A4 70g Fanfold Paper - 1000sht	£9
A4 70g Fanfold Paper - 2000sht	£15
A4 DeskJet Transparencies - 50sht	£35
A4 DeskJet Cut Sheet Paper - 200sht	£15
A4 360dpi Epson Stylus Coated Paper - 100sht	£8
A4 720dpi Epson Stylus Coated Paper - 100sht	£10
Canon BJC4550 20 Shts High Glass Film A3	£39
Canon BJC4550 20 Shts Print Film A3	£48
Canon BJC4550 200 Shts Coated Paper A3	£29

LABELS

89 x 36mm Single Row Fanfold Labels - 1000	£4.50
89 x 36mm Twin Row Fanfold Labels - 1000	£4.80
89 x 49mm Twin Row Fanfold Labels - 1000	£4.95
102 x 36mm Twin Row Fanfold Labels - 1000	£4.70
70 x 37mm A4 Laser Labels - 2400	£15.25

HP ON-SITE WARRANTIES

1yr Mono DeskJet	£32.00	3yr Mono DeskJet	£40
1yr Colour DeskJet	£45.00	3yr Colour DeskJet	£65
1yr LaserJet 5L	£110.00	3yr LaserJet 4V/4MV	£200
3yr LaserJet 5/5M/6P/6MP			£180

LEXMARK™

ADVANCING THE ART OF PRINTING

Colour JetPrinter

Multimedia Printer from the World's Fastest Growing Printer Company

Includes
Lexmark Workshop CD



- Greeting Card Maker
- Certificate Maker
- Labels Unlimited
- Photo Impression
- T-Shirt Maker
- Comic Creator
- Video of Install Procedure

WORTH
£99.00

ColorJet 2050

- Upto 600 x 600 dpi - mono & colour
- Two cartridge design
- 4-5 PPM - Mono
- New Super Sharp Waterproof Ink
- 1-2 MPP - Colour
- Lexmark 'Colorfine 2' Windows driver
- 100 sheet paper handling
- 1 year warranty

£228
£267.90 inc VAT



Panasonic LASER PRINTING

ULTRA COMPACT LASER PRINTING FROM PANASONIC

The 6000 series has a unique design enabling it to have a footprint measuring just 13.2cm x 37.8cm and a height equivalent to an A4 sheet of paper. All models are 6ppm with single bin making it the perfect personal printer.

KX-P6100 300dpi, Windows GDI, Edge Enhancement Technology (EET)

£187
£219.73 inc VAT

KX-P6150 300dpi, PCL 4.5 Emulation, Optimum Resolution Technology

£281
£330.18 inc VAT

KX-P6300 True 600dpi, Windows GDI, printing for Workgroups

£225
£264.38 inc VAT

KX-P6500 600dpi, Windows GDI & PCL 4 Emulation EET, printing for Workgroups

£303
£356.03 inc VAT



Panasonic

For ordering information, please see page 2

Watford Electronics Ltd SALES HOTLINE: 01582 745555

Order by 4pm for Next Day Delivery **FAX: 01582 488588**



Prices exclude carriage VAT @ 17.5% except where shown

Mail Order & Showroom: Jessa House, Finway, off Dallow Rd, Luton LU1 1TR Showroom only: 250 Lower High Street, Watford, WD1 2AN. Tel: 01923 237774

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PRINTERS & PERIPHERALS

brother
More than just features

HL-730

The new HL-730 from Brother is the low cost solution for your printing needs - flexible, high print quality at an affordable price. The new HL-730 from Brother offers compatibility within various computing environments.

- 6ppm engine speed
- Straight Paper Path Technology
- Easy to set up and use
- 200 sheet adjustable paper tray



HL-760

The solution to your demanding print needs - flexible, high print quality at an affordable price. The HL-760 offers high performance print speed of 6 pages per minute, with the added benefit of fast 600 dpi output.

- True 1200 x 600 dpi resolution
- Enhanced memory management technology
- Network connectivity
- Sleep mode



HL-1260e

Incorporating Brother's own high speed 12ppm engine and 1200dpi, the Brother HL-1260e delivers superb quality output with stunning graphic and text reproduction, for professional documentation.

- PCL5e/BR-Script
- True 1200 x 600 dpi
- 650 sheet paper input
- 2Mb memory upgrade to 66Mb



NEC - Combining Quality & Innovation

NEC SuperScript 860 GDI Pro Laser Printer

The latest introduction to the best selling NEC SuperScript laser printer range offers high print speed and extremely high print resolutions and can be used with both Windows and DOS applications. Utilising the revolutionary Adobe PrintGear Image Processor, the SuperScript 860 will print at up to eight pages per minute yet costs only as much as a four page per minute laser printer. Faster return to application when printing, a larger sheet feeder and true network printing capability over a variety of operating systems ensure that this product will be ideal for a wide variety of printing tasks.

- 8 pages per minute
- 1,200 x 600 dpi with NEC Sharp Edge
- Printer Languages: Adobe PrintGear, HP PCL 4.5
- 1Mb RAM standard
- 5Mb RAM maximum
- Adobe Memory booster effectively triples your installed memory to ensure the printing of even complex jobs
- 78 Type 1 fonts, 14 Resident PCL fonts
- Interface: Bi-directional parallel
- Standard 200 sheet automatic sheet feeder



MultiSync M Multimedia 15" & 17" Monitors

As usual, when a computing need arises, NEC rises to the challenge delivering the innovation, quality and reliability you've come to expect. This is why NEC have sold more than 10 million monitors over the last 10 years. The intense colour saturation, clarity, contrast and focus of the new MultiSync M monitors will amaze you. And their brighter, clearer, sharper images free from distortion right up to the screen edge, will guarantee a better viewing experience.



- Bright, brilliant and razor sharp, MultiSync M500/700 with CromoClear. For all things bright and beautiful.
- M500 15" (13.8" viewable image size) M700 17" (15.6" viewable image size) 1024 x 768 NI:55 to 86Hz vertical refresh
- Synchronisation Range:
Horizontal: 31kHz to 69kHz
Vertical: 55Hz to 120Hz
- Maximum Video Bandwidth: 85MHz
- Built-in Speakers: Audio Power, 2W peak
- Frequency Response: 300-15,000Hz
- Built-in Microphone: Sensitivity 50dB
- Built-in Headphone Jack: Stereo 3.5mm

NEC 8X SCSI CD-ROM Drive *

Internally mounted eight times spin speed

- CD-ROM Reader.
- 1200 kB/s Sustained data transfer.
- 140 mS Average Access.
- 256kB Cache memory.
- MPC 3 Compliant.
- Kodak PhotoCD (FMV), CD+
- Double Dust Doors & Sealed Mechanism.
- SCSI-2 Interface - SCAM Compliant

£148
£173.90 inc VAT



HEWLETT PACKARD DATA STORAGE

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Internal and External Tape Backup Systems

HP Colorado Travan Drives



Beyond the megahertz and megabytes of your PC, its most valuable component is the information you store on it.

Accidents happen. Fire, floods, theft, disk failure or just plain human error can result in catastrophic data loss. The cost of recreating the data can be enormous and often impossible. Regular backups using a HP Colorado is your insurance that the data is safe in the event of a loss.

When it comes to insuring your data, you know you can trust HP Colorado to back you up.

- One-Button Backup
- Automated Daily Backup
- Unattended Backup
- Tape Librarian
- Complete Solution
- Easy Automated Installation

T1000 800Mb Internal	£85	£99.88 inc. VAT
T1000e 800Mb Parallel	£105	£123.38 inc. VAT
T3000 3.2Gb Internal	£129	£151.58 inc. VAT
T4000es 8Gb External SCSI	£295	£346.63 inc. VAT
T4000s 8Gb Internal SCSI	£233	£273.78 inc. VAT

HP SureStore External Hi Capacity Drives



The highest performance Back-up Solution for High End Server Users'

- High Data Transfer Rates and File Location
 - 2.5/3.0MB / Sec Compressed Transfer Rate (30e/40e)
 - Fast File Location
 - High Data Integrity
- High Capacity
 - 15GB (Native) 30GB Compressed Storage (DLT30e)
 - 20GB (Native) 40GB Compressed Storage (DLT40e)
- 80000 hour MTBF
 - S/W Connectivity to all leading DLT Applications
 - 2 year Express Exchange Warranty

DLT30e (30GB)	£2499	£2936.33 inc. VAT
DLT40e (40GB)	£3675	£4318.13 inc. VAT

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MaxIT Portable Cartridge Drive

5 Year Media Warranty

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- Internal and external versions
- Parallel and SCSI versions
- Supplied with software & connecting cable
- One cartridge supplied with each drive
- 540Mb formatted capacity per disk
- Supported under DOS, Windows, Windows 95 and MAC System 7 and above
- Data rates of up to 10Mb/sec
- 512Kb cache
- 4577rpm disc speed
- Thin film head technology
- MTBF of 200,000 POH
- Automatic power standby
- Automatic head loading and unloading

Small and Lightweight

- MaxIT size: (hwxwd) 39mm x 123mm x 212mm
- Cartridge size: (hwxwd) 10mm x 97.5mm x 99mm
- MaxIT weight: 850g
- Cartridge weight: 85g
- Colours: Navigator Blue and Horizon Yellow (Please state colour preference when ordering)

x y r a t e x .

The MaxIT 540Mb drive combines high volume data storage with portability.

Do existing data storage options meet your needs? Floppy disks, optical and tape drives are removable but lack performance. Move away from conventional storage and get ready for the future demands that software will make on your storage space.

Make The Move To MaxIT
MaxIT is unlike any other drive. It is a portable storage unit that can easily deal with endless amounts of data with all the speed and flexibility you need. MaxIT reads and writes to removable 540Mb cartridges and also supports Syquest 270Mb media.

Freedom To Travel

Around the size of a paperback, the drive is designed to adapt to your work-style. There's no need to worry about compatibility with clients and colleagues - take the disk and drive with you - MaxIT is completely mobile. If you only need to move your data, you can easily install the MaxIT Internal in your PC.

Work The Way You Want To
MaxIT offers you many opportunities for improved performance:

Speed

- Run applications straight from disc
- Instantly access large data files
- Speed up the way you work

Capacity

- Free your hard drive
- Handle large multimedia presentations
- Work with digital images
- Store your hard drives on one disk
- Simplify data management: one disk per client, job or subject
- Use just a couple of disks to back-up your hard drive

Portability

- Exchange files with clients and colleagues
- Small and portable: stand it up, lay it flat, take it with you
- Keep data safe: simply lock your files away

Compatibility

- MaxIT is compatible with:
- Syquest 270Mb media
- 540Mb MCD media

SCSI Internal (inc fitting kit & Cartridge)	£239	£280.83 inc VAT
SCSI External & Cartridge	£295	£346.63 inc VAT
Parallel Port Version & Cartridge	£345	£405.38 inc VAT
Cartridges	£44	£51.70 inc VAT

Fixed Disk Performance, Floppy Disk Flexibility

TAPE STREAMERS

HP Colorado Tape Drives

T1000 800Mb Internal	£85
T1000e 800Mb External	£105
T3000 3.3Gb Internal	£129
T4000s 8Gb Internal SCSI	£233
T4000es 8Gb External SCSI	£295

Accessories

KE-10 ISA External Kit	£59
FC-20 Fast Tape Controller	£44
TC-15 Fast Cont. with H*Ware Comp	£109
SK7 Windows Backup Software	£39
SK1 OS/2 Backup Software	£59

Omega Storage Solutions

DiNo 2Gb Internal NEW	£104
DiNo 2Gb External Parallel Port NEW	£139
DiNo 3200 3.2Gb Internal	£147
DiNo 3200 3.2Gb Parallel Port	£172
ZIP 100Mb External SCSI	£109
ZIP 100Mb Parallel Port	£109
ZIP 100Mb Parallel Port Internal	£109
Jaz 1Gb Internal SCSI	£289
Jaz 1Gb External Parallel	£339

Epson

ZIP 100Mb External SCSI	£POA
ZIP 100Mb Parallel Port	£POA
ZIP 100Mb Parallel Port Internal	£POA

HP SureStore Tape Drives

SureStore 2000 2Gb Internal	£459
SureStore 2000 2Gb External	£545
SureStore 5000 5Gb Internal	£529
SureStore 5000 5Gb External	£615
SureStore 6000 8Gb Internal	£669
SureStore 6000 8Gb External	£749
SureStore DLT30E 30Gb External	£2499
SureStore DLT30E 30Gb Internal	£3675

Seagate TapeStor Tape Drives

TST800 800Mb Travan-Internal	£78
TST800 800Mb Travan-External	£144

TST3200 3.2Gb Travan-Internal

SPECIAL PRICE £138

BALI INT EIDE TST3200-F8XT	£179
FALCON 8000 INT SCSI TST8000R-SBET	£219
FALCON 8000 EXT SCSI TST8000ES-SBET	£329
FALCON 8000 IDE TST8000R-ABET	£252

Data Cartridges/Disks

DC2000	£9	DC2120	£7
DC6250	£11	DC2120XL	£12
MC3000 XL	£15	Travan TR1	£19
Travan TR3	£22	Travan TR4	£26.50
4mm 1.3Gb 5pk	£39	4mm 2Gb 5pk	£45
100Mb ZIP	£9	SYQUEST 135MB	£14
D8-112 2.3Gb 8mm	£8	1Gb Jaz Disk	£89
2Gb Ditto Tape	£17	2Gb Ditto Tape 3pk	£45

BACKUP SOFTWARE

Cheyenne ARCserve for Windows NT 3.51	£659
Cheyenne ARCserve v6.0 for Network Workgroup Edition	£329
Cheyenne ARCserve v6.0 for Network Enterprise Edition	£799
Cheyenne ARCsolo Software for Windows	£93
Cheyenne ARCsolo Software for DOS	£69

REMOVABLE DRIVES

Syquest

EZFlyer 230 Mb External Parallel	£199
EZFlyer 230 Mb External SCSI	£199
EZFlyer 230 Mb Cartridge	£19
135MB Cartridge	£13
270Mb IDE Internal	£195
270Mb SCSI External	£245
270Mb Cartridge	£39

Xyratex

Maxit 540Mb Internal SCSI + Cartridge	£239
Maxit 540Mb External SCSI + Cartridge	£295
Maxit 540Mb External Parallel + Cartridge	£345
Maxit 540Mb Cartridge	£44

CABLES & ACCESSORIES

Single 40w Internal IDE cable	£6
Dual 40w Internal IDE cable	£8
Single 50w Internal SCSI cable	£8
Dual 50w Internal SCSI cable	£9
50w - 50w Amphenol SCSI cable	£16
25w - 50w Amphenol SCSI cable	£16
SCSI 1-2 50W H/D to 50W Amphenol Cable	£25

CONTROLLER CARDS

16-bit ISA Bus

Multi I/O - 2S/1P/G	£12
Multi I/O - IDE/FDD/2S/1P/1G	£11
Multi I/O - 2S (16550) /1P	£18
2 x IDE/2x FDD Controller	£9
Single 16550 RS232 Serial Card	£26
Game (Joystick) Port Card	£8

VESA Local Bus

Multi I/O-IDE/FDD/2S/1P	£12
Enhanced IDE/FDD/2S/1P	£15
IDE/FDD/2S(16550)/1P	£26

PCI Bus

Enhanced IDE Controller	£16
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ADAPTEC CARDS

358 Mini SCSI Plus (ENH SCSI Adaptor) Remote Control	£79
1460 Controller Kit - PCMCIA (inc S/W)	£111
1505 Ultra Total CD Kit	£34
1515 Ultra Total Connect Kit	£55
1542 Controller only - ISA	£120
1542 Controller Kit - ISA *	£165
2742 Controller Kit - EISA *	£224
2920 PCI SCSI Kit	£95
2940 PCI SCSI Ultra Wide Kit	£179
294DAU PCI SCSI Controller Kit	£152
3940 PCI SCSI Multi-Channel Kit	£254
3985 PCI Raid Kit	£482
Adaptec AIRPORT 1000 Infra Red	£28
Adaptec AIRPORT 2000 Infra Red	£41
Adaptec AIRPORT 2500 Infra Red	£64

*includes Cables & Software

FLOPPY, HARD & REMOVABLE DRIVES SPECIAL STOCK OFFERS

FLOPPY DRIVES & DISKS

3.5" 1.44Mb Floppy Drive	£17
5 head Floppy Drive cable	£5
5.25" to 3.5" Drive Fixing Kit	£5
3.5" Pre-formatted Lifetime Warranty Diskettes	
10 x Black Double Sided High Density	£4
50 x Black Double Sided High Density	£15
10 x Multi-colour Double Sided High Density	£5

3.5" IDE HARD DRIVES



THESE WATFORD DRIVES INC. 3 YEAR WARRANTY			
AR850Mb	850Gb		£89
AR1200Mb	1.2Gb	14ms	£111
AR1600Mb	1.6Gb	14ms	£137
AR2000Mb	2.0Gb	12ms	£159

Fujitsu	1.7Gb		£139.95
Maxtor	1.6Gb	11ms	£144
	2.0Gb	11ms	£175
Quantum			
Trailblazer	850Mb	12ms	£99
TM1080AT	1Gb	12ms	£115
TM2110AT	2.1Gb	10.5ms	£169
TM3200AT	3.2Gb	10.5ms	£219

Seagate

ST31276A 3.5"	1.2Gb		£115
ST31621A 3.5"	1.6Gb	10ms	£140
ST32140A 3.5"	2.1Gb	10ms	£172
ST52520A 3.5"	2.5Gb		£219
ST52520A 3.5"	2.5Gb	11ms	POA
ST33440A 3.5"	3.4Gb	10ms	POA
ST34250A 3.5"	4.2Gb	10ms	POA

Western Digital			
1.2Gb	10ms		£129
1.6Gb	10ms		£145
2.1Gb	10ms		£188
2.5Gb	10ms		£225
3.1Gb	10ms		£275

2.5" HARD DISK DRIVES

IBM			
DPRA21215	1.2Gb	11ms	£399
Hitachi			
DK212A-81	810Mb	11ms	£199
DK223A-11	1.0Gb	10ms	£185
DK223A-13	1.3Gb	10ms	£255
DK223A-18	1.8Gb	10ms	£315
Seagate			
ST9816A 2.5"	810Mb	16ms	£245
Toshiba			
MK2720FC	1.35Gb	13ms	£229

3.5" SCSI HARD DRIVES

Fujitsu (2 year Warranty - 2Gb+ - 5 year Warranty)			
M2903SA	2.0Gb	12ms	£429
M2934S	4.3Gb	10ms	£624
M2949S	9.1Gb	10ms	£1225
IBM			
DORS32160	2.0Gb	9ms	£299
Micropolis			
4221 7200rpm	2Gb	8.8ms	£388
4221 AV 7200rpm	2Gb	8.8ms	£438
4345 7200rpm	4Gb	8.8ms	£675
3243 7200rpm	4Gb	8.8ms	£598
3243 AV 7200rpm	4Gb	8.8ms	£648
Quantum			
FB Tempest	1.2Gb	11ms	£179
FB Tempest	2.1Gb	10.5ms	£255
FB Tempest	3Gb	10.5ms	£315
Atlas	2.1Gb	9ms	£425
Atlas	4.3Gb	8ms	£549
Seagate			
ST32151N 3.5"	2.1Gb	9ms	£299
ST15150N 3.5"	4.2Gb	8ms	£649
ST15230N 3.5"	4.2Gb	8ms	£665
ST410800N 3.5"	9.09Gb	8ms	£1265

5.25" SCSI HARD DRIVES

Micropolis			
1991 5400rpm	9Gb	11ms	£1139
1991 AV 5400rpm	9Gb	11ms	£1299

SPECIAL STOCK CLEARANCE

Video & Graphic Cards

Diamond Edge 3D 2MB VRAM PCI	£149
Orchid Kelvin 64 2MB PCI	£65
Orchid Fahrenheit 1MB ISA	£49
Videologic PCI Movie Video 2Mb	£139
Videologic VLB Movie 928 1Mb	£89
Videologic ISA Movie 928 1Mb	£89
Video Seven Mirage 1MB VLB	£39
No9 Motion 771 2MB VRAM VLB	£149

TAPE DRIVES

Iomega Tape 250 External Parallel Port	£59
Iomega Tape 700 External Parallel Port	£75
HP Trakker 120Mb External	£45

CAMERA KITS

Canon ION PC 560I Kit	£325
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CD ROM DRIVES

NEC SCSI 3x Multispin External with LCD	£95
NEC SCSI 4x Multispin External PRO	£125
Toshiba KT3301 SA SCSI External Kit	£139

3 Months Warranty



Removable Storage Made Easy

Insuring your data has never been easier

DITTO Backup Tape Drives

- Universal Travan Drive
- One-step backup
- Plug & go setup

Ditto tape drives makes backing up your stuff easier than it's ever been - without waiting! Backup, restore and copy with one easy step or customise your backup routine however you like. Ditto's 1-step backup sits right on your desktop and is ready whenever you are - what could be easier?



2Gb Internal	2Gb Parallel Port	3.2Gb Parallel Port
£104	£139	£172
£122.20 inc. VAT	£163.33 inc. VAT	£202.10 inc. VAT

ZIP DRIVE - 3 drives in one

- Expand your hard drive without limits (100Mb at a time)
- Take it with you (Zip drive & disks are portable)
- Insure your hard drive (fast and easy)

Increase your storage quickly, easily and economically - as you need it. With 100Mb Zip disks you can add as many disks as you need. The best way to move your information - Zip drive and disks are small, light and convenient. Zip drive weighs about 450g and fits easily in your hand, bag or briefcase.



Zip PC Internal	£109	£128.08 inc. VAT
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Includes 6 Zip Disk Pack worth £69

Zip PC parallel	£170	£199.75 inc. VAT
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Zip Mac SCSI	£109	£128.08 inc. VAT
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Zip Drive	only £109	£199.75 inc. VAT
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6 Zip Disks (PC or Mac)	£69	£81.08 inc. VAT
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JAZZ DRIVE - the ultimate choice in hard drives

- Faster than most hard drives (works as fast as you do!)
- Provides 1Gb of disk space on each compact cartridge (enough to backup your entire hard drive!)
- Insure your hard drive (fast and easy)



Jazz Disk	£89	£104.58 inc. VAT
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Internal 1.Gb SCSI	£289	£339.58 inc. VAT
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External 1.Gb SCSI	£339	£398.33 inc. VAT
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For ordering information, please see page 2

Watford Electronics Ltd **SALES HOTLINE: 01582 745555**

Order by 4pm for Next Day Delivery **FAX: 01582 488588**



Prices exclude carriage & VAT @ 17.5% except where shown

Mail Order & Showroom: Jessa House, Finway, off Dallow Rd, Luton LUT1 1TR Showroom only: 250 Lower High Street, Watford, WD1 2AN. Tel: 01923 237774

MEMORY AND PROCESSORS

DO YOU HATE TO WAIT

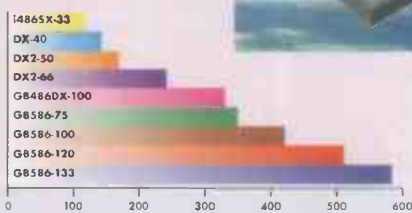
Convert your 486 System into a CPU MAXimiser Upgrade

Maximizer 586 Plug and play module

- Delivers increased CPU performance
- Fifth-generation architecture
- 16K Byte write/back cache
- 168 pin PGA
- Minimum power consumption
- Branch prediction, data forwarding, decoupled low/store unit
- 1 year warranty
- Toll-free technical support



Galnbery Performance Benchmark Testing CPU MAXimizer



Landmark V2.0 (All CPU's running in same system)

Choose the 586 CPU MAXimizer that fits your system

CPU MAXimizer	PROCESSOR	YOUR CURRENT SYSTEM	EXT. CLOCK RATE	PRICE
GB586-133	586-133	486SX-33, DX-33, SX2-66, DX2-66, DX4-100	all 33MHz	£115
GB586-120	586-120	486DX-40, DX2-80, DX4-120	all 40MHz	£115
GB586-100	586-100	486SX-33, DX-33, SX2-66, DX2-66, DX4-100	all 33MHz	£99
GB586-75	586-75	486SX-25, DX-25, SX2-50, DX2-50, DX4-75	all 25MHz	£99

MEMORY (RAM) SIMMS

PRICES SLASHED

RAM Prices Constantly Change Please Call for Latest Prices

30pin SIMM	Price
1M x 8	£17.50
1M x 9	£9
1M x 9 3-chip	£15
1M x 9 9-chip	£25
4M x 9	£16
72pin 32-bit (Non Parity)	£30
1M x 32	£68
2M x 32	£135
4M x 32	£28
8M x 32	£50
72pin 36-bit (Parity)	£85
1M x 36	£169
2M x 36	£16.50
4M x 36	£31
8M x 36	£69
72pin 32-bit EDO	£140
1M x 32	£68
2M x 32	£83
4M x 32	£189
8M x 32	£68
	£83
	£189

DIMMs - Dual In-Line Memory Modules		Price
8Mb 168pin (1 x 64)	3.3v	£68
16Mb 168pin (2 x 64)	3.3v	£83
32Mb 168pin (4 x 64)	3.3v	£189
8Mb 168pin (1 x 64)	5v	£68
16Mb 168pin (2 x 64)	5v	£83
32Mb 168pin (4 x 64)	5v	£189

SIMM Converter

Converts 4 x 30pin SIMMS to 1 x 72pin SIMM. Can use 3 or 9 chip to give 32 or 36bit. Please specify FOWARD or REVERSE version

Special Offer Price **£28**

PROCESSORS

INTEL		Price
Pentium P120		£95
Pentium P133		£145
Pentium P150		£199
Pentium P166		£275
Pentium P200		£360
Pentium Pro 180MHz		£355
Pentium Pro 200MHz		£399
OTHERS		Price
AMD 486DX4-100	3V3	£23
AMD 486DX4-120	3V3	£32
AMD K5 5x86 - P75		£38
AMD K5 5x86 - P90		£48
AMD K5 5x86 - P100		£64
SGS 486DX2-66	5V	£17.50
Texas 486DX2-66	3V3	£17.50
Cyrix 6x 86™ .133		£85
Cyrix 6x 86™ .150		£105
Cyrix 6x 86™ .166		£155
Cyrix 6x 86™ .200		£349

CPU Cooling Fans/Heatsink

486DX	£9
Pentium	£11
Pentium Pro	£15
Intel Overdrives	
486DX4-75 replacement	£87
486DX4-75 upgrade	£87
486DX4-100 replacement	£109
486DX4-100 upgrade	£109
Pentium Overdrives - See advert	

DX4 Adaptor Card

- Fits in a 486DX socket
- Compatible with AMD 486DX4-100, 486DX4-120 & Cyrix 5x86-100
- Low profile & low voltage

£29

intel pentium®
overdrive™
PROCESSOR

Plug-in for
EXTRA POWER

63MHz	£88	(£103.40 inc VAT)
83MHz	£119	(£139.83 inc VAT)
75MHz to 125MHz	£164	(£192.70 inc VAT)
60 or 66MHz to 120/133MHz	£164	(£192.70 incVAT)
90MHz to 150MHz	£225	(£264.38 inc VAT)
100MHz to 166MHz	£299	(£351.33 inc VAT)

Intel OverDrive processors are single-chip CPU upgrades that significantly accelerate all software applications & operating systems.



MOTHERBOARDS, CASES & SECURITY

MOTHERBOARDS

486 VL Bus, 256K Cache, ZIF Socket, 3 VESA, 4 ISA - 2 x 72 & 4 x 30 pin SIMM	£67
486 PCI, 256K Cache, 3xPCI, 5x ISA, IDE/FDD & I/O	£74
QDI Pentium P75 to P200, 256K, PCI & I/O	£79
TMC Pentium P75 to P200, 256K, Triton PCI & I/O	£109
Chaintech Pentium VX Chipset P75 to P200, 256K Cache upgradable to 512K. 4xPCI, 4xISA & 1xSH slots. IDE/FDD & ENH I/O	£89
Chaintech Pentium HX Chipset P75 to P200, 256K Cache upgradable to 512K. 4xPCI, 4xISA & 1xSH slots. IDE/FDD & ENH I/O	£97
Simtech Pentium VX Chipset P75 to P200, 256K Cache upgradable to 512K. 3xPCI, 4xISA, IDE/FDD & ENH I/O	£79
Pentium Pro I440fx chipset Pra 150 to Pro 200 256K Cache, 4xPCI, 4xISA slots 2xIDE, 1xFDD, Super I/O, 2xFast Serial & 1xENH PP	£175

MOTHERBOARDS WITH CPU & MEMORY

Intel Triton Chipset Motherboard Kits

Pentium P75 + M/B + 8Mb EDO	£179
Pentium P133 + M/B + 8Mb EDO	£255
Pentium P150 + M/B + 8Mb EDO	£309
Pentium P166 + M/B + 8Mb EDO	£399
Pentium P75 + M/B + 16Mb EDO	£214
Pentium P133 + M/B + 16Mb EDO	£290
Pentium P150 + M/B + 16Mb EDO	£344
Pentium P166 + M/B + 16Mb EDO	£434

COMPUTER CASES



All cases are CE approved

Desk Top Std Case with PSU	£39
Mini Tower Case with PSU	£39
Midi Tower Case with PSU	£49
Full Tower Case with PSU	£69
Slim Line (Desktop) Case with PSU	£35
200W PSU Unit (Desk/MiniTower)	£24
Workstation Case	£39
Desktop Multimedia Case	£74

Perfecta Cases

Desktop Case	£56
Midi Tower Case	£59
Full Tower Case	£89
High Quality, CE approved, Zinc Plated, 250W PSU Cases.	

Aries Perfecta Case



SecuPlus® Security

SecuKit for desktop PCs

All SecuKits are supplied with one or more metal security plates provided with the professional 3M VHB tape. This adhesive is made specifically for plastics and powder painted surfaces. All SecuKits come with a 40mm, double locked padlock which has a hardened steel shackle. As standard, these locks have different keys. As options, keyed alike and masterkey systems are available.



SecuLock - Kensington Locks for Laptops

SecuLock is suitable for portable and desktop computers provided with a small retention socket, designated by a or symbol. In just a few seconds the equipment to be secured can be chained or (when having the right key) unlocked again. The cable that comes with SecuLock is a 9x17 multistranded steelcable. With SecuLock the cable is locked to the computer. Removal without using the key is not possible, without causing severe damage to the computer.



DisKey 1 - 3.5" Disk DriveLock	£12.50
SecuKit XL II - 2 Security plates, 0.9m Steel cable, 30mm Lock	£25
SecuKit XL III - 2 Security plates, 1.25m Steel cable, 30mm Lock	£28
CompuLock - Security System for Computer Case, Keyboard & Mouse	£19
SecuLock - Kensington lock for Notebook Computers	£35
LockIt Portable - 1 Security Plate, 1.25m SteelCable & 30mm Lock	£24

WOBBLER

THE DEFINITIVE THEFT DETERRENT



Wilbur, (the shady looking character on the left) is one of those people whose job is to relocate computers, high tech equipment and components. The main problem with this is that he does so without the owners permission, and the owner will probably never see the equipment again. A serious problem in itself, but a more damaging problem will be the lost **DATA**, and **CONFIDENTIAL FILES!**

WOBBLER, is a computer and high risk equipment alarm, which works on the principle that any thieves wishing to steal equipment also have to take the alarm. This to any thief is a situation which must be avoided at all costs, as the 115dB alarm will draw attention to them and would likely lead to their being apprehended.

The **WOBBLER** card is fully approved and completely safe to use as it does not interface with any of the systems data or the operation of your computer.



ISA Model 5 featured. PCI Model 6 and an external device are also available

KEY FEATURES OF WOBBLER

- USER FRIENDLY:** Once fitted and armed operation is **fully automatic**.
- POWER PACK:** The power pack provided will allow the unit to remain fully functional for many **years**, and still provide **several hours** of the **115dB sire sound**. This is not the case with rechargeable batteries which discharge within months.
- RELIABLE:** **WOBBLER** auto terminates after a user selectable time period has elapsed following the last detected movement. However to ensure absolute cover age, further movement after this period will cause the alarm to sound once again.
- COVER TAMPER:** Cover tamper protection is provided to alert the user when someone tries to gain access to internal components. It detects the change in the internal ambient light level and is fully adjustable by the user.
- WARRANTY:** All models are Guaranteed for a period of 5 Years. (Excluding batteries)

£59
£69.33 inc VAT

For ordering information, please see page 2

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Prices exclude carriage. VAT @ 17.5% except where shown

8 out of 10 Suite Purchasers choose Microsoft Office.

For the Windows® 95 operating system

Here are all the essential business tools you need to run your office, in a unique, fully integrated package. The standard version includes Microsoft Word word processor, Microsoft Excel spreadsheet, Microsoft PowerPoint presentation graphics and Microsoft schedule. The Professional edition also contains Microsoft Access database management. These applications include OfficeLinks which enable them to work together with superb consistency, making it easy for you to share text, graphics and data between applications and to combine them on the same document, while exclusive IntelliSense™ technology makes routine jobs automatic and simplifies complex tasks.

- IntelliSense™ technology does routine tasks for you with enhanced AutoCorrect and much more.
- Type a help request in your own words and the Answer Wizard gives you the answer you need.
- Share information easier with improved OfficeLinks, including the Office Binder feature that groups files automatically, so you can use them like a single file.
- Gain one-click access to files and programmes with the Microsoft® Office Shortcut Bar.
- Manage and organise files quickly with high performance Find Fast indexing tools.
- Get your work done faster with full 32-bit performance.

Microsoft Office 95 Standard



Version Upgrade CCP 3.5" or CD	Full Version 3.5" or CD
£136	£325
£159.80 inc VAT	£381.88 inc VAT

Competitive Upgrade 3.5" or CD	1 MLP
£161	£275
£189.18 inc VAT	£323.13 inc VAT

Microsoft Office 95 Professional



Version Upgrade CCP 3.5" or CD	Full Version 3.5" or CD
£203	£422
£238.53 inc VAT	£495.85 inc VAT

Competitive Upgrade 3.5" or CD	1 MLP
£241	£370
£283.18 inc VAT	£434.75 inc VAT

In Microsoft® Office for Windows® 95 you get these full featured applications:

- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint
- Microsoft Access (Professional Version only)
- Microsoft Schedule+

TECHNOLOGY GUARANTEE

BUY OFFICE 95 & GET OFFICE 97 FREE!

*Upgrade to Office 97 is free however you will need to pay postage & packing. Available upon release direct from Microsoft on CD only. Offer valid 3/10/96 - 31/3/97.

COMING SOON

Microsoft® Office 97

For the Windows® 95 operating system

Microsoft Office 97 represents a significant research and development effort on the part of Microsoft. This release not only includes many new features, but also introduces a simplified user interface, major architectural improvements, and improved programmability. Users of Office 97 are also able to take advantage of powerful web tools to author information-rich documents that can easily be integrated with and distributed through a private network or the public Internet

In Microsoft® Office 97 for Windows® 95 you get these new full featured applications:

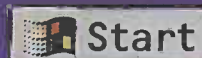
- Microsoft Word 97
- Microsoft Excel 97
- Microsoft PowerPoint 97
- Microsoft Access 97 (Professional Version only)
- Microsoft Outlook 97

NEW



Microsoft SOFTWARE

Unlock the potential of your PC with Microsoft® Windows® 95



Everything you do with your computer will now be **Faster, Easier and more Fun!**

A world of new possibilities.

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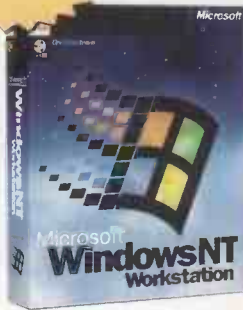
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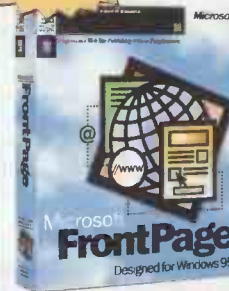
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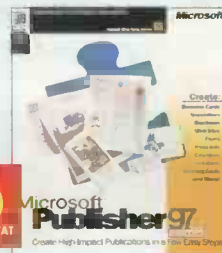
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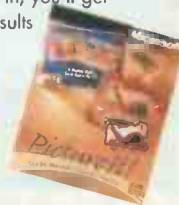


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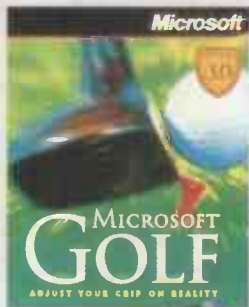
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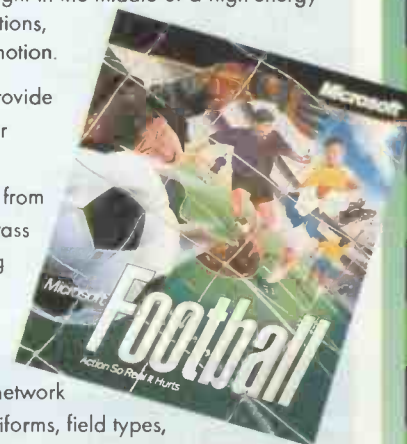


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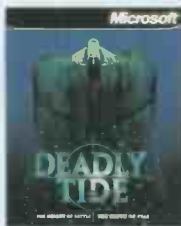
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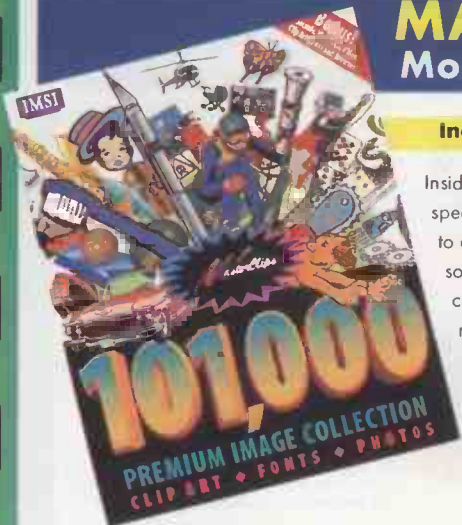
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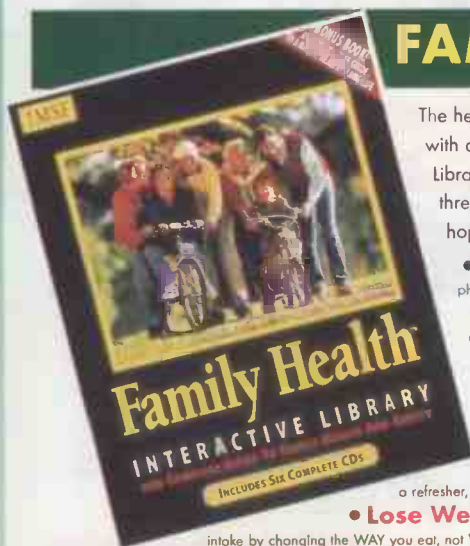


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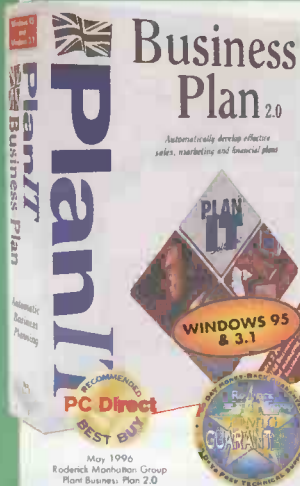
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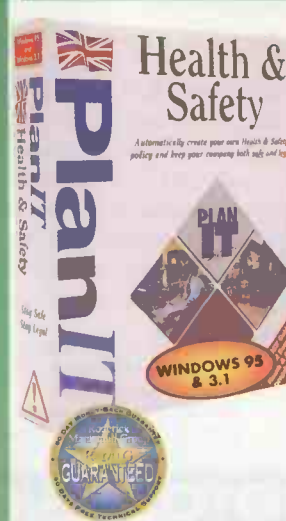
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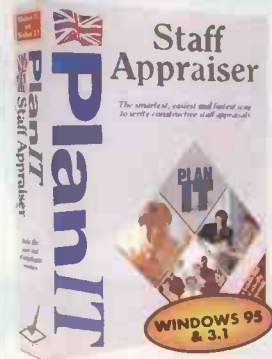
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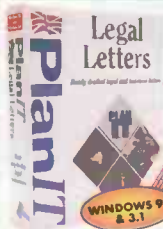
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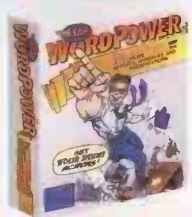
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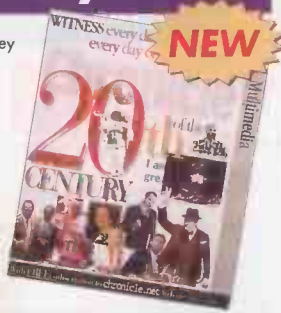


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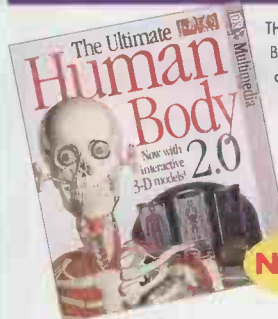
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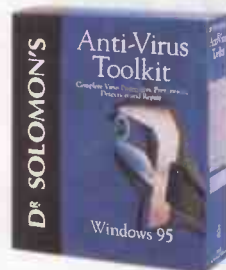
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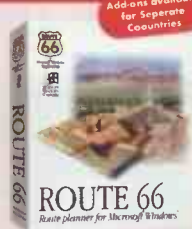
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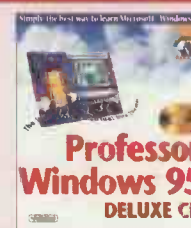
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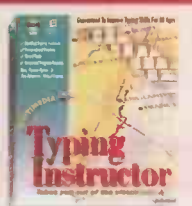


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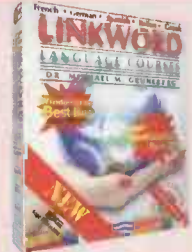
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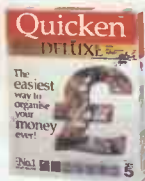
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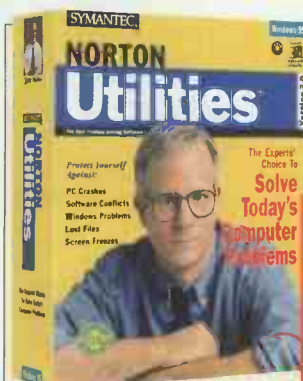
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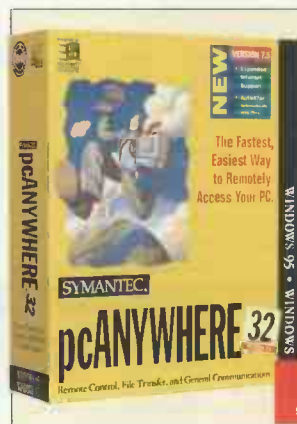
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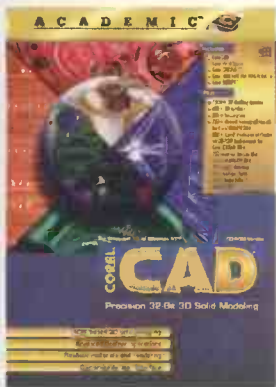
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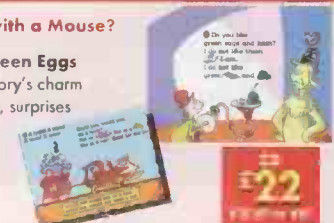


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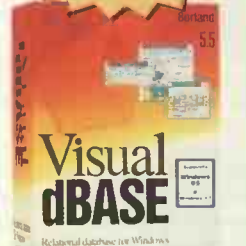
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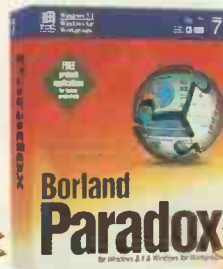
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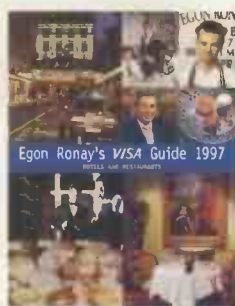


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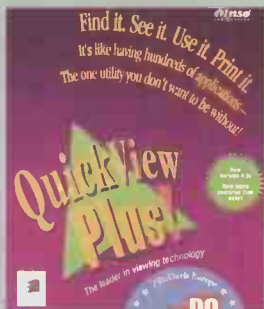
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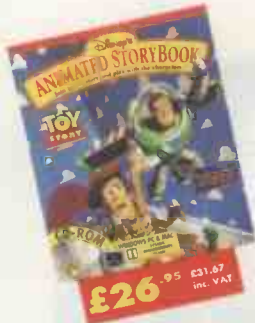
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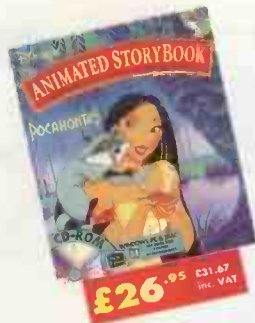
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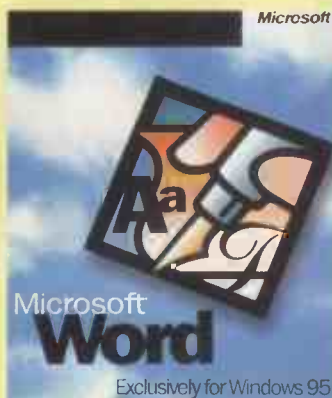
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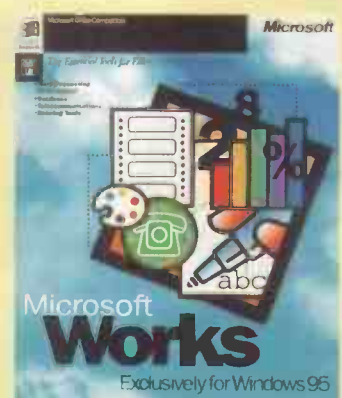
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4

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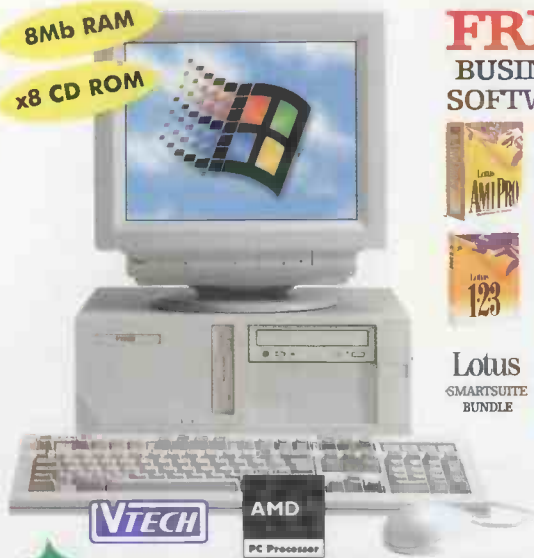
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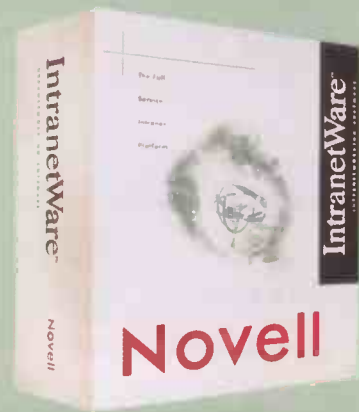
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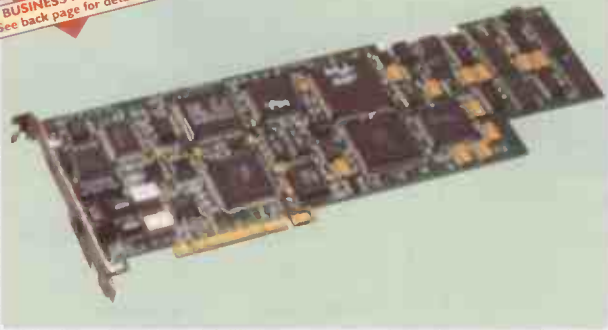
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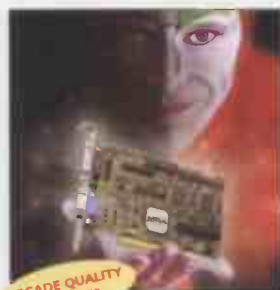
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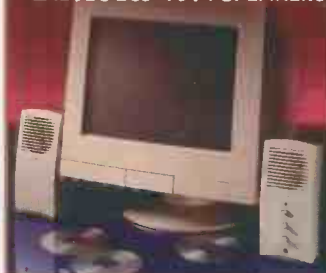
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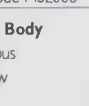
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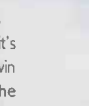
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650CDT



TRAVELMATE 6030

MODEL	PROCESSOR	RAM	HARD DISK	SCREEN	SCREEN SIZE	CD	EXC VAT	INC VAT	CAT CODE
600	P120	8	810	STN SVGA	10.4"	-	£1199	£1408.83	TEX810
600CD	P120	8	810	STN SVGA	11.3"	x6	£1339	£1878.83	TEX811
650CD	P133	16	1200	STN SVGA	12.1"	x8	£1899	£2231.33	TEX812
650CDT	P133	16	1440	TFT SVGA	12.1"	x8	£2199	£2583.83	TEX813

MODEL	PROCESSOR	RAM	HARD DISK	SCREEN	SCREEN SIZE	CD	EXC VAT	INC VAT	CAT CODE
TM6020cd	P120	16	1080	TFT SVGA	11.3"	x6	£2599	£3053.83	TEX800
TM6030cd	P133	16	1350	TFT SVGA	12.1"	x6	£2799	£3288.83	TEX801
TM6050cd	P150	16	1350	TFT SVGA	12.1"	x6	£2999	£3523.83	TEX802

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The CardStation II fulfils a similar function to the CardStation for use in conjunction with the Portégé 650CT, Tecra500CS, Tecra 500CDT, Tecra 710CDT and Tecra 730CDT notebooks. The 2 PC Card Type III slots are CardBus supported. **Cat Code TOS428**

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P100D	P100	8	510	STN SVGA	10.4"	x6	£1129	£1326.58	ECH060
P100E	P100	8	1080	TFT SVGA	10.4"	x6	£1529	£1796.58	ECH063
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LTE5380

MODEL	PROCESSOR	RAM	HARD DISK	SCREEN	SCREEN SIZE	CD	EXC VAT	INC VAT	CAT CODE
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LTE 5250	P120	16	810	STN SVGA	11.3"	OP	£2399	£2818.83	COMP0538
LTE 5380	P133	16	2.1Gb	TFT XGA	12.1"	OP	£4249	£4757.58	COMP0539



4120T

MODEL	PROCESSOR	RAM	HARD DISK	SCREEN	SCREEN SIZE	CD	EXC VAT	INC VAT	CAT CODE
4100	P75	8	630	STN SVGA	10.4"	OP	£1459	£1714.33	COMP0750
4120	P120	16	1Gb	STN SVGA	11.3"	OP	£2269	£2666.08	COMP0752
4120T	P120	16	1Gb	TFT SVGA	11.8"	OP	£2489	£2924.58	COMP0753



1110

MODEL	PROCESSOR	RAM	HARD DISK	SCREEN	SCREEN SIZE	CD	EXC VAT	INC VAT	CAT CODE
1110	P75	8	810	STN	10.4"	-	£1075	£1263.13	COMP0700
1120T	P100	8	810	TFT	10.4"	-	£1159	£1361.83	COMP0701

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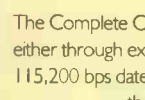


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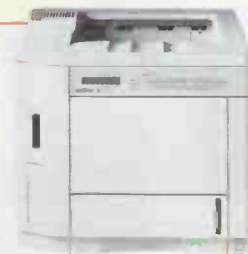


- 6 pages per minute
- Brother's Printing System for Windows®
- 1200 x 600 dpi
- Straight Paper Path

Cat Code
BRO351

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BROTHER HL1260e LASER PRINTER



- 600dpi • 12 pages per minute • Low copy cost
- 1,150 sheet tray • Straight paper path reduces paper jamming and curling
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CANON BJC70

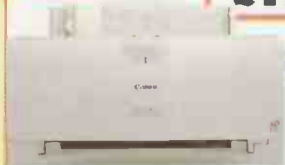
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- 360 x 360dpi color
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- 30 sheet tray feeder • 20 scalable fonts
- Portable kit option • Black or white modes

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- 360 x 360

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Canon

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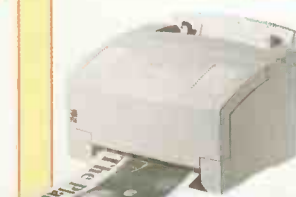
CANON BJC620

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 - Auto loading
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 - Convertible push/pull tractor
 - 2 paper feed paths
 - Autoloading
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hp HEWLETT PACKARD

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If you intend to spend a good deal of time in front of your monitor, it matters which one you choose.

Size is important

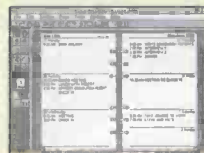
Probably your most important choice is the size of your screen, which is always measured diagonally. Most



Crown systems are specified with 14" monitors which are perfectly adequate for working in DOS or MS Windows®. Frequent users may find a 15" screen more pleasant but for serious DTP work, graphic design or editing a 17" monitor or above is a must for effective working. Industry standard practice is to measure monitors using CRT size. Actual viewing area can be approx. 1" less.

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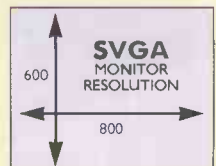
A larger screen size brings greater working flexibility and ease. Think about working in a spreadsheet and you'll see that, with a larger screen you could display many more columns at the same time. When using two applications simultaneously, perhaps word processing and a simple graphics programme, you can display both on screen at the time.



Resolution and other technicalities

The resolution of your monitor screen means the number of pixels or dots that go to make up the

images, the more pixels the better the image. The minimum resolution required by Windows® is 640 pixels horizontally and 480 vertically, but an SVGA monitor supports 800 x 600. Beyond this resolution you will need a monitor bigger than 14" and displays of 1024 x 768 are possible with video cards.



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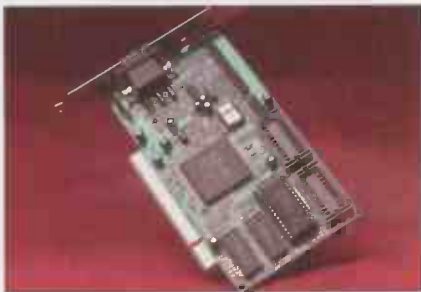
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- Motherboard Bracket Mounting for Half Size to Baby-AT Size Motherboard
- Control Console Power LED, HDD LED Power Switch and Reset Switch
- Others Security Case Lock, Quick Release Drive Bay, Easy Detachable Front Panel, Easy Assembly Motherboard, Mounting Bracket
- FDD Optional

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Equipped with a fast 28.8 modem and the latest Internet software ensuring that your computing surfboard is waxed and ready to go, you are bound to be surfing the net. Built to be upgradeable for the future you are sure to have fun with this internet starter.

- DX4-100 Processor ● 8Mb Non Parity RAM ● 1.2Gb EIDE hdd
- 1Mb DRAM graphics card ● 8 Speed EIDE CDROM Drive
- Internal 28.8 Fax Modem with Internet Software ● MS Mouse
- Choice of Mini Tower/Desktop Case ● 105 Win'95 Keyboard
- 3.5" Floppy Drive ● DOS/Windows 3.x or Windows'95

Ex VAT **£739**
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MIDI MUSIC MACHINE

At the heart of this machine is the widely acclaimed Creative Labs AWE 32 P'N'P sound card and Yamaha speakers. The AWE 32 allows you to compose your own music, with complete wave table, true sound and midi capability your options are vast. The voice assist allows the computer to read back your text while you check your work. Raw samples of instruments are held on the Vienna studio with plenty of room to add your own recordings through the dedicated memory. What musician wouldn't have fun with this?

- Pentium P133 Processor ● 8 Mb EDO RAM ● 1.2Gb EIDE HDD ● Mouse
- 3.5" Floppy Drive ● Soundblaster AWE32+ Sound Card ● 8x EIDE CDROM
- Yamaha 10W speakers ● 105 Win'95 Keyboard ● 2 Mb Dram Graphics Card
- Choice of Mini Tower/Desktop Case ● DOS/Windows 3.x or Windows'95

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Win TV

The TV now really comes to your screen. With the latest Win/TV PCI card you can have TV, Teletext and cable TV all on your monitor. This P133 with 16Mb system is designed as a complete home or office PC with complete sound and graphics, while the TV picture can be viewed as an icon on the desktop or full screen for full viewing pleasure.

- Pentium P133 Processor
- 16Mb EDO RAM
- 1.2Gb EIDE hdd
- 8x speed CDROM drive
- Soundblaster 16 bit Sound Card
- Yamaha 10 Watt speakers
- DOS/Windows 3.x or Windows'95
- TV Capture Card complete with 1Mb Accelerated Graphics Card all-in-one
- Choice of Mini Tower/Desktop Case
- 105 Win'95 Keyboard
- MS Mouse
- 3.5" Floppy Drive
- Monitor Options, See Page 7

Ex VAT £938
Inc VAT £1102.15

Windows Power +

A P166 with high ram for those who use database and spreadsheet programmes in Windows. With this highly intensive windows processing in mind, we have added a high spec graphics card to keep everything running smoothly. An 8 speed CDROM means loading software is easy and any amount of upgrades can be added.

- Pentium P166 Processor
- 32 Mb EDO RAM
- 1.6Gb EIDE Hard Drive
- 2Mb DRAM graphics card
- 8 speed EIDE CDROM
- Choice of Mini Tower/Desktop Case
- 105 Win'95 Keyboard
- MS Mouse
- 3.5" Floppy Drive
- DOS/Windows 3.x or Windows'95
- Monitor Options, See Page 7

Ex VAT £1046
Inc VAT £1229.05



A FEW SAMPLES OF INFINITE SYSTEMS

SPECIFY YOUR OWN PC!..... See back page



Serious Gamer

Built for the real game player who knows how speed can make or break on some of today's and tomorrow's intensive games. We haven't held back as we know what it takes for a serious game machine. The 2Gb drive will hold many of the larger games, a 10x CDROM with 32bit sound card will make for brilliant effect, combined with the latest in graphical technology.

- Pentium P200 Processor ● 32Mb EDO RAM ● 2Gb EIDE Hard Drive
- Matrox Mystique 2Mb Graphics Card ● 10x EIDE CDROM ● MS Mouse
- Soundblaster AWE32+ sound card ● Yamaha 10 Watt speakers
- Choice of Mini Tower/Desktop Case ● 105 Win'95 Keyboard ● 3.5" FDD
- Dos/Windows 3.x or Windows'95 ● See page 7 for monitor options

Ex VAT £1391
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Absolute Beginner

To show we listen to our customers we have put together a system that is specially designed for those home users who are new to the world of computing. We have taken the components you asked for most in your entry level systems in the family environment.

- Pentium P133 Processor ● 16 Mb EDO RAM ● 1.2Gb EIDE Hard Drive
- 2Mb DRAM Graphics Card ● 8 x EIDE CDROM ● Mouse
- Soundblaster 16 bit Soundcard ● Yamaha 10 Watt Speakers
- Choice of Mini Tower/Desktop Case ● 105 Win'95 Keyboard
- 3.5" Floppy Drive ● DOS/Windows 3.x or Windows'95

Ex VAT £888
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Home Director

Ever fancied your chances as the next big name in film directing? They all started somewhere, and where better than here with a complete package for your own home movie studio. Graphics cards enable your pictures to appear on the TV and allow full editing of both video and audio to the large hard drive.

- Pentium P150 Processor ● 16Mb EDO RAM ● 2Gb EIDE Hard Drive
- 2Mb WRAM graphics card ● 8 x EIDE CDROM ● MS Mouse
- 3.5" FDD ● Soundblaster 16 bit Soundcard ● Yamaha 10 Watt speakers
- Videoblaster RT300 Real Time Capture Card and TV Display.
- Choice of Mini Tower/Desktop Case ● 105 Win'95 Keyboard
- DOS/Windows 3.x or Windows'95 ● See page 7 for monitor options

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The new range of ATX & Pentium Pro systems



ATX SYSTEMS

The new ATX motherboard and case design from Intel has been developed with ease of use and expandability and improved reliability in mind. The motherboard has been redesigned so that all the expansion slots are capable of using full length cards. The CPU and SIMM sockets are now repositioned so that they are easily accessible for upgrading. The power supply unit now blows air directly over the processor assisting the heatsink fan, which in turn lowers the noise level. The floppy and EIDE/ATAPI connectors have been repositioned close to the drive bays so there are no untidy cables in the way. The rearrangement inside also means the system produces lower emissions. All these improvements plus support for upcoming technologies such as USB ensure that the systems are easier and more expandable than ever before.

THE NEW PENTIUM P166 ONLY **£1971** PLUS VAT

Take a close look and you'll see why it's achieved a Winstone '96 rating exceeding 90.

- Intel Pentium P166MHz processor
- ATX Midi Tower case
- 8 Speed EIDE CD-ROM
- Pipeline Burst Cache
- 2.5Gb EIDE hard drive
- 17" Iiyama MT-9017E monitor - 0.25mm grille, 1600 x 1200 resolution @72Hz refresh
- Intel 'MARI' ATX motherboard
- 4Mb WRAM Graphics Card
- SoundBlaster AWE32 + PnP Audio card
- 32Mb 60ns EDO memory
- 105 Keyboard & Microsoft Mouse



Pentium Pro 200

The ultimate power tool, ideal for true 32 bit operating systems like Windows NT or even Windows'95. This machine can cope with the most daunting of tasks with performance to spare. Even the Saturn V rocket and the NASA moon missions were successfully manned with less processing power than is available to you with a machine like this!

- ATX Midi Tower Case
- Intel Pentium Pro 200 processor
- 2Gb EIDE HDD
- 32Mb 60ns EDO RAM
- Intel Venus motherboard
- 105 Win'95 Keyboard
- Mouse
- 3.5" Floppy Drive
- Dos/Windows 3.x or Windows'95
- Iiyama 17" monitor
- 4Mb WRAM graphics card
- 8x EIDE CDROM
- SoundBlaster AWE32 + PnP sound card
- Yamaha 10 Watt Speakers

Ex VAT **£2136**
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A FEW SAMPLES OF INFINITE SYSTEMS
CUSTOM BUILT TO SPECIFICATION - TELL US YOURS NOW..... See back page

Pro Starter

This will make for entry level into the realms of the new Pentium Pro and ATX products. Working best with a 32bit operating environment, we have backed it up with the latest high spec graphics and hardware. Ideal for those who work with Windows NT and other high end operating systems. See this months article on page 10 for an insight into ATX technology.

- Pentium Pro 200 Processor ● ATX midi tower case ● Mouse
- Venus Motherboard ● 32Mb EDO RAM ● 2Gb EIDE Hard Drive
- 2Mb WRAM Graphics Card ● 10 speed EIDE CDROM
- 105 Win'95 Keyboard ● DOS/Windows 3.x or Windows'95
- 3.5" Floppy Drive ● See below for monitor options

Ex VAT **£1483**
Inc VAT **£1742.53**



MONITORS

SONY

	Ex VAT	Inc VAT
68-71-1511 - CPD15SX1 - 15 inches, 0.25mm grille, 1024 x 768 Max. res	£254	£298.45
68-71-1501 - CPD15SF2 - 15 inches, 0.25mm grille, 1280 x 1024 Max. res	£299	£351.33
68-71-1703 - GDM17SE2 - 17 inches, 0.25mm grille, 1600 x 1200 Max. res	£725	£851.88
68-71-1731 - CPD17SF2 - 17 inches, 0.26mm dot pitch, 1280 x 1024 Max. res	£495	£581.63
68-71-2032 - CPD20SF2T - 20 inches, 0.30mm grille pitch, 1280 x 1024 Max. res	£1069	£1256.08
68-71-2014 - GDM20SHT - 20 inches, 0.25mm grille pitch, 1600 x 1200 Max. res	£1579	£1855.33



IIYAMA

	Ex VAT	Inc VAT
68-93-9151 - MF-8515F - 15 inches, 0.28mm dot pitch, 1280 x 1024 Max. res	£249	£292.58
68-93-9171 - MF-8617E - 17 inches, 0.26mm dot pitch, 1280 x 1024 Max. res	£489	£574.58
68-93-9175 - MF-8617ES - 17 inches as MF-8617E with built in stereo speakers	£499	£586.33
68-93-9173 - MT-9017E - 17 inches, 0.25mm dot pitch, 1600 x 1200 Max. res	£549	£645.08
68-93-9211 - MF-8221T - 21 inches, 0.28mm dot pitch, 1600 x 1200 Max. res	£959	£1126.83
68-93-9213 - MT-9021T - 21 inches, 0.30mm dot pitch, 1600 x 1200 Max. res	£999	£1173.83

All the above iiyama monitors are supplied with a 3* year back to base warranty ("15" is 2 years).
We can now offer Vision Care, by iiyama - an on-site next day swap-out contract (See Right).



IIYAMA VISION CARE (Extended Warranty Options)

	Ex VAT	Inc VAT
68-93-9915 - 15" Upgrade on MF-8515F - 2 year on-site swap-out	£15	£17.63
68-93-9917 - 17" Upgrade on MF-8617E/ES & MT-9017E - 3 year on-site swap-out	£39	£45.83
68-93-9921 - 21" Upgrade on MF-8221T & MT-9021T - 3 year on-site swap-out	£49	£57.58

Only available when purchasing an Award winning iiyama monitor.

MONITORS

AOC

	Ex VAT	Inc VAT
68-90-1405 - AOC4VLR - 14 inches, 0.28mm dot pitch, 1024x768 Max. res	£155	£182.13
68-90-1505 - AOC5VLR - 15 inches, 0.28mm dot pitch, 1280x1024 Max. res	£209	£245.58
68-90-1715 - AOC7NLR - 17 inches, 0.28mm dot pitch, 1280x1024 Max. res	£389	£457.08

GOLDSTAR

68-26-1468 - GS1468DM - 14 inches, 0.28mm dot pitch, 1024x768 Max. res	£159	£186.83
68-26-1505 - GS1505DM - 15 inches, 0.28mm dot pitch, 1024x768 Max. res	£202	£237.35
68-26-1527 - GS1527DM - 15 inches, 0.28mm dot pitch, 1280x1024 Max. res	£232	£272.60
68-26-1727 - GS1727DM - 17 inches, 0.28mm dot pitch, 1280x1024 Max. res	£402	£472.35
68-26-2010 - GS2010DM - 20 inches, 0.28mm dot pitch, 1600x1280 Max. res	£765	£898.88
68-26-1444 - StudioWorks 44M - 14 inches, 0.28mm dot pitch, 1024x768 Max. res Including built-in Stereo amplifier and speakers	£172	£202.10
68-26-1556 - StudioWorks 56M - 15 inches, 0.28mm dot pitch, 1280x1024 Max. res Including built-in Stereo amplifier and speakers	£244	£286.70
68-26-1778 - StudioWorks 78I - 17 inches, 0.26mm dot pitch, 1600x1280 Max. res Including XGA FST with optional Stereo Speakers	£449	£527.58

PANASONIC

68-57-1734 - TX1734 - 17 inches, 0.27mm dot pitch, 1280x1024 Max. res	£395	£464.13
68-93-1703 - K17EV885 - 17 inches, 0.26mm dot pitch, 1600x1200 Max. res	£545	£640.38
68-93-2003 - K20E1080 - 20 inches, 0.28mm dot pitch, 1600x1200 Max. res	£799	£938.83

PHILIPS

68-59-1402 - 14B - 14 inches, 0.28mm dot pitch, 1024 x 768 Max. resolution	£169	£198.58
68-59-1403 - 14C - 14 inches, 0.28mm dot pitch, 1024 x 768 Max. resolution	£154	£180.95
68-59-1511 - 15A - 15 inches, 0.28mm dot pitch, 1280 x 1024 Max. resolution Including built-in STEREO SOUND	£264	£310.20
68-59-1503 - 15C - 15 inches, 0.28mm dot pitch, 1024 x 768 Max. resolution	£205	£240.88
68-59-1701 - 17A - 17 inches, 0.27mm dot pitch, 1280 x 1024 Max. resolution	£645	£757.88
68-59-1712 - 17B - 17 inches, 0.28mm dot pitch, 1280 x 1024 Max. resolution Including built-in STEREO SOUND	£435	£511.13
68-59-2003 - 20C - 20 inches, 0.31mm dot pitch, 1280 x 1024 Max. res.	£685	£804.88
68-59-2008 - 20T - 20 inches, 0.26mm dot pitch, 1280 x 1024 Max. res.	£989	£1162.08
68-59-2101 - 21A - 21 inches, 0.20mm dot pitch, 1600 x 1200 Max. res.	£1699	£1996.33
68-59-2102 - 21B - 21 inches, 0.28mm dot pitch, 18800 x 1440 Max. res.	£1285	£1509.88
68-59-2112 - 21BA - 21 inches, 0.26mm dot pitch, 1600 x 1200 Max. res.	£1539	£1808.33

All the above monitors are non-Interlaced unless otherwise stated. All monitors are Energy Star compliant.

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DR SOLOMON'S

Dr.Solomon's range of award winning Anti-Virus Toolkits provide comprehensive protection against the threat of viruses. The Toolkit continuously monitors for viruses, no matter how a virus attempts to infect, the Toolkit will stop it: files, disks and internet downloads can all be checked for any sign of a virus. Dr.Solomon's Advanced Heuristic technology identifies new viruses and a comprehensive Virus encyclopedia is included with the Toolkit for in-depth information about the type of virus that you have encountered. The Toolkit accurately detects and eliminates all known viruses (10000+ as of September '96) and FREE technical support is provided for any virus emergency.

The Toolkit is currently available for DOS, Windows 3.x, Windows '95, Windows NT, OS/2, SCO UNIX, Novell NetWare and Apple Macintosh. Updates are available quarterly or monthly.



TITLE	3.5" FLOPPY	CDROM DISC
PUBLISHER/TITLE SPECIAL UTILITIES		
Dr. SOLOMON'S		
01-93-9305 Anti-Virus Toolkit* - WIN 95	£69	£81.08
01-93-9303 Anti-Virus Toolkit* - WINDOWS	£68	£79.90
01-93-9301 Anti-Virus Toolkit* - DOS	£59	£69.33
00-00-0000 Audit Starter Pack (5 Users)	£350	£411.25
00-00-0000 Support Software Starter Pack	£459	£539.33

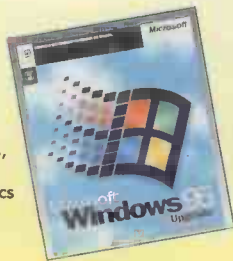
LICENSE PACKS AVAILABLE FOR THE ANTI-VIRUS TOOLKIT. PLEASE CALL.
*Version supplied has 4 quarterly up dates FREE OF CHARGE.

TITLE	3.5" FLOPPY	CDROM DISC
PUBLISHER/TITLE OPERATING SYSTEM SOFTWARE		
MICROSOFT		
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Windows '95 - Full Version	£129 £151.58	£90 £105.75
Windows 3.11	£49 £57.58	£89 £104.58
Windows NT Version 4 Workstation & Server Packs		£214 £251.45

01-50-1957/05-50-9509 WINDOWS '95

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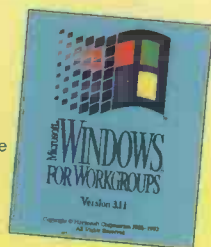
Ex VAT £59 Inc VAT £69.33



01-50-0703 WINDOWS 3.11 FOR WORKGROUPS

The largest selling operating system for the PC environment after DOS. Totally transformed the PC desktop overnight making it more attractive to a wider range of users, more than just an extension to the original DOS only based systems. Opens up a whole new world.

Ex VAT £49 Inc VAT £57.58

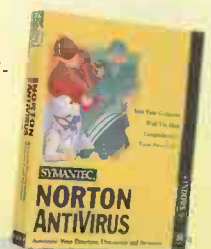


TITLE	3.5" FLOPPY	CDROM DISC
PUBLISHER/TITLE SPECIAL UTILITIES		
NORTON		
01-95-9103 Anti-Virus - Windows	£94	£110.45
01-95-9105 Anti-Virus - WIN 95	£49	£57.58
Navigator 95	£67	£78.73
00-00-0000 Utilities V8	£83	£97.53
Utilities - WIN 95	£99	£116.33

01-95-9105 ANTI-VIRUS

Probably the most widely known of the Anti-Virus products. A hugely popular program that has been continually developed over the years to detect & protect against even the most destructive of viruses. If your software or data is at risk can you afford to be without it? (WIN 95.)

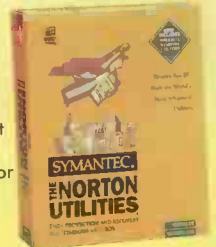
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03-50-0154 Works for Windows 95	£76	£89.30		
03-50-0153 Works for Windows 3.1x	£85	£99.88		
01-50-3133 Office V4.2	£325	£381.88		
05-50-3113 Office V4.2			£325	£381.88
01-50-3135 Office - WIN 95	£325	£381.88		
05-50-3115 Office - WIN 95			£325	£381.88
01-50-3139 Office Professional - WIN 95	£204	£239.70		
05-50-9003 Office Professional - WIN 95			£429	£504.08
00-00-0000 Money	£19	£22.33		
05-50-9307 Money			£19	£22.33
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00-00-0000 Excel V7 - WIN 95	£225	£264.38		
00-00-0000 Access V2.2	£224	£263.20		
00-00-0000 Access V7 - WIN 95	£223	£262.03		
00-00-0000 Powerpoint V4	£224	£263.20		
00-00-0000 Powerpoint V7 - WIN 95	£223	£262.03		
00-00-0000 Project V4	£279	£327.83		
01-50-3151 Project V4.1 - WIN 95	£285	£334.88		
00-00-0000 Schedule+	£79	£92.83		
00-00-0000 Schedule+ V7 - WIN 95	£69	£81.08		
00-00-0000 Visual Basic Std V1 DOS	£79	£92.83		
01-50-9133 Visual Basic Pro V3	£189	£222.08		
01-50-9131 Visual Basic Std V4 - WIN 95	£67	£78.73		
05-50-9113 Visual Basic Pro V4 - WIN 95			£319	£374.83
00-00-0000 Visual FoxPro Std V3 - WIN 95	£121	£142.18		
00-00-0000 Visual FoxPro Std V3 - WIN 95			£121	£142.18

03-50-0154

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05-50-9113

VISUAL BASIC PRO V4

Probably the most popular Windows programming tool, with an easy to use development environment coupled with a powerful version of Microsoft Basic. Allows rapid creation of a variety of custom applications, which can be distributed for free. (WIN 95.)

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00-00-0000 Office Professional 3 Win 3.1x			£POA	£POA
00-00-0000 Office Professional 7 - WIN 95			£329	£386.58
00-00-0000 Quattro Pro Windows 3.1x	£49	£57.58		
00-00-0000 Quattro Pro V7 - WIN 95	£49	£57.58		
00-00-0000 Wordperfect Suite 6.1 Win 3.1x			£182	£213.85
00-00-0000 Wordperfect Suite 7 - WIN 95	£195	£229.13		
00-00-0000 Wordperfect Suite 7 - WIN 95			£179	£210.33

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00-00-0000 Smartsuite V4	£290	£340.75		
00-00-0000 Smartsuite V4			£290	£340.75
00-00-0000 Organiser V2.1	£70	£82.25		

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	99-28-5034	Hewlett Packard DeskJet 340 - 600dpi, 3ppm	£145	£170.38
	00-00-0000	Hewlett Packard DeskJet 600 - 600dpi, 4ppm	£137	£160.98
NEW	99-28-5066	Hewlett Packard DeskJet 660C - 600dpi, 4ppm	£207	£243.23
	99-28-5082	Hewlett Packard DeskJet 820Ci - 600dpi, 5ppm	£255	£299.63
	99-28-5160	Hewlett Packard DeskJet 1600C - 600dpi, 8ppm	£812	£954.10

NEW

NEW  **HEWLETT PACKARD** 99-28-5087
HP 870Cxi DESKJET PRINTER, 600dpi, 7PPM, 100 page feeder £299 £351.33

CANON

	99-91-5030	Canon BJ30 - 360dpi, 277cps	£112	£131.60
	99-91-5070	Canon BJ70C - 360dpi, 376cps	£149	£175.08
	99-91-5230	Canon BJ230 - 360dpi, 248cps	£234	£274.95
	99-91-5210	Canon BJC210 - 360dpi, 3ppm (colour option)	£117	£137.48
	99-91-6410	Canon BJC4100 - 720 x 360dpi, 248cps	£175	£205.63
NEW	99-91-5620	Canon BJC620 - 720dpi, 1ppm (colour)	£269	£316.08
	99-91-5300	Canon BJ300 - 360dpi, 360cps (On site warranty)	£349	£410.08
	99-91-5330	Canon BJ330 - 360dpi, 360cps (On site warranty)	£389	£457.08
	99-91-5800	Canon BJC800 - 360dpi, 600cps (On site warranty)	£889	£1044.58



Canon BJC4100 £175 £205.63
 720dpi x 360dpi, 3ppm, 100 sheet feeder A4, Centronics/Parallel interfaces, Canon enhanced emulation, 1yr Return To Base warranty

EPSON

	99-93-5101	Epson Stylus 820 - 720dpi, 2.5ppm	£105	£123.38
	99-93-5112	Epson Stylus Pro - 720dpi, 3ppm	£297	£348.98
	99-93-5153	Epson Stylus Pro XL+(A3) - 720dpi, 3ppm	£792	£930.60
	99-93-5131	Epson Stylus 1000 - 360dpi, 250cps, A3	£322	£378.35
	99-93-5132	Epson Stylus 200 - 720dpi	£POA	£POA
	99-93-5134	Epson Stylus 200 Colour - 720dpi	£POA	£POA
	99-93-5121	Epson Stylus 500 - 720 dpi	£POA	£POA

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	99-93-0133	Epson FX870 - 80 columns, 9 pin, 342cps, 24Kb Buffer	£237	£278.48
	99-93-0135	Epson FX1170 - 136 columns, 9 pin, 342cps, 24Kb Buffer	£295	£346.63
	99-93-0311	Epson LQ300 - 80 columns, 24 pin, 240cps, 8Kb Buffer	£116	£136.30
	99-93-0313	Epson LQ570+- 80 columns, 24 pin, 210cps, 8Kb Buffer	£208	£244.40
	99-93-0315	Epson LQ870+- 132 columns, 24 pin, 275cps, 8Kb Buffer	£365	£428.88
	99-93-0322	Epson LQ1070 - 132 columns, 24 pin, 210cps, 8Kb Buffer	£321	£377.18
	99-93-0320	Epson LQ2170 - 136 columns, 24 pin, 240cps, 8Kb Buffer	£463	£544.03

EPSON LQ2170 £463 £544.03
 136 Columns, 240cps, Push-Pull Front & Rear Tractor sheet feeder, Centronics/Parallel interfaces 3yr Return To Base warranty

PANASONIC

	99-57-1150	Panasonic KXP1150 - 80 columns, 9 pin, 240cps, 4Kb Buffer	£89	£104.58
	99-57-2023	Panasonic KXP2023 - 80 columns, 24 pin, 192cps, 14Kb Buffer	£109	£128.08
	99-57-2135	Panasonic KXP2135 - 80 columns, 24 pin, 320cps, 20Kb Buffer	£123	£144.53
	99-57-3626	Panasonic KXP3626 - 136 columns, 24 pin, 300cps, 40Kb Buffer	£252	£296.10

Panasonic KXP3626 £252 £296.10
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	99-28-7631	Hewlett Packard- 6MP 600dpi, 8ppm	HG	£599	£703.83
	99-28-7522	Hewlett Packard- 5M 600dpi, 12ppm	HG	£1174	£1379.45



HEWLETT PACKARD

HP LASERJET 5 99-28-7500
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	99-91-7151	Canon LBP460- 600dpi, 4ppm	£215	£252.63
	99-91-7171	Canon LBP1260- 600dpi, 12ppm	£719	£844.33



Canon LBP460 £215 £252.63
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EPSON

	99-93-7151	Epson EPL5500 - 600dpi, 6ppm	£333	£391.28
	99-93-7191	Epson EPL9000 (A3) - 600dpi, 8ppm	£1029	£1209.08
	99-93-7193	Epson EPL9000PS (A4) - 600dpi, 8ppm	£1425	£1674.38



EPSON EPL9000 £1045 £1227.88
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	99-90-0073	Brother HL631 - 300dpi, 6ppm	I	£269	£316.08
	99-90-0067	Brother HL660 - 600dpi, 6ppm	I	£369	£433.58
	99-90-0126	Brother HL1260 - 600dpi, 12ppm	J	£829	£974.08



brother HL 1260 £829 £974.08
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OKI

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	99-93-9610	Oki OL610EX - 600dpi, 6ppm	£345	£405.38
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OKI OL600EX £288 £338.40
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64-19-1532 **Diamond EDGE 3D 2200XL - 2Mb DRAM** - 64bit graphics processor with an SGS Thomson STG2000 chipset. 1280x1024 by 256 colours at 75Hz, 800x600 by 16.7m colours at 120Hz & 1024x768 by 32k at 100Hz. £75 £88.13

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64-19-1634 **Diamond EDGE 3D 3400XL - 4Mb VRAM** - 64bit graphics processor with an nVidia NV1 chipset. 1280x1024 by 32k colours at 75Hz, 1024x768 by 16.7m colours at 100Hz & 800x600 by 16.7m at 120Hz. £169 £198.58

NB: Diamond Edge Graphics Cards are optimised for Windows 95 applications and DOS applications running from Windows 95. It is recommended that only users of Windows 95 purchase this product.

PCI GRAPHICS CARDS

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64-19-1331 **Diamond Stealth 64 Video 2121 - 1Mb DRAM** - 64bit graphics processor with an S3 Trio64 V+ chipset. 1024x768 by 256 colours at 100Hz, 800x600 by 16.7m colours at 90Hz. Upgradeable to 2Mb. £47 £55.23

64-19-1332 **Diamond Stealth 64 Video 2201 - 2Mb DRAM** - 64bit graphics processor with an S3 Trio64 V+ chipset. 1280x1024 by 256 colours at 75Hz, 800x600 by 16.7m colours at 90Hz & 1152x864 by 64k at 75Hz. £57 £66.98

64-19-1001 **Diamond MPEG module (for Stealth 64 Video)** £85 £99.88

64-19-1352 **Diamond Stealth 64 Video 3240 - 2Mb VRAM** - 64bit graphics processor with an S3 Vision968 chipset. 1600x1200 by 256 colours at 76Hz, 800x600 by 16.7m colours at 120Hz & 1024x768 by 64k at 120Hz. Max. 4Mb. £125 £146.88

64-19-1354 **Diamond Stealth 64 Video 3400 - 4Mb VRAM** - 64bit graphics processor with an S3 Vision968 chipset. 1600x1200 by 64k colours at 76Hz, 1280x1024 by 16.7m colours at 90Hz & 1024x768 by 16.7m at 120Hz. £185 £217.38



64-53-1931 **Orchid Kelvin Video, 1Mb DRAM** £59 £69.33

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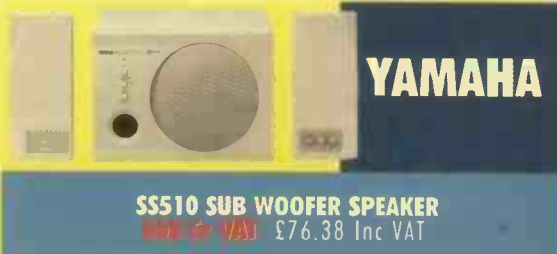
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Video BLASTER

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51-57-0583 **Panasonic CR-583**
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NEW

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51-57-0415	LF1000HBK	External PD drive kit with SCSI adaptor, 1x optical media	£439	£515.83
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Panasonic

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External...£144 £169.20

51-42-0404

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Data cable. **External parallel port**

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51-42-0600 **Backpack Six speed CD ROM** from Micro Solutions-
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Internal

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50-57-1505 **Panasonic LF7300B** - 1.5Gb,
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External...£1475 £1733.13

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Cache, **Internal**

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650Mb, 512Kb Cache, 1Mb/s, 8.3ms

Internal...£1335 £1568.63

50-28-1305 **HEWLETT PACKARD C1716T**
Dual Capacity, 650Mb, 8.3ms, 1Mb/s,
512Kb Cache, **Inc. External Box**

Ex VAT £1429 Inc VAT £1679.08

00-00-0000 **Hewlett Packard C2550A** Dual
Capacity - 1.3Gb, 1.6Mb/s, 1.6ms

External...£1429 £1679.08

OPTICAL MEDIA

Ex VAT Inc VAT

95-97-0230 230Mb for Fujitsu M2512A

Media...£18 £21.15

95-97-0640 640Mb for Fujitsu M2513A

Media...£40 £47.00

00-00-0000 650Mb for Panasonic LF1004

Media...£35 £41.13

95-97-1300 1.3Gb HP C1716T, HP C2550A

Media...£67 £78.73

95-97-1500 1.5Gb for Panasonic LF7304, LF7300B

Media...£95 £111.63

CD ROM ACCESSORIES

Ex VAT Inc VAT

75-95-1402 **EIDE Data Cable** for up to 2 drives

£10 £11.75

51-95-9700 **CD-ROM Caddy** (spare drive caddy)

£9 £10.58

75-51-0310 **Sound cables: NEC**

£8 £9.40

75-57-0570 **Panasonic**

£8 £9.40

75-75-0751 **Toshiba 3x4 for 3xxx series**

£8 £9.40

75-75-0757 **Toshiba 4x4 for 4xxx series**

£8 £9.40

75-75-0753 **Toshiba 4x4 for 5xxx series**

£8 £9.40

75-75-0753 **Gravis Toshiba**

£8 £9.40

These cables are only available when purchasing a CD-ROM Drive.

BLANK RECORDABLE CD WRITER MEDIA (10 pack)

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They may be hard-drives...but they're easy to install!



HARD DRIVE INSTALLATION GUIDE

Thank you for purchasing your new hard drive from SMC Computers. As part of our commitment to total customer service, we have produced this guide to assist you. It contains important information which will give you a smooth and trouble-free installation. This is intended as a guide and, as such, details may vary slightly depending on your hard drive and PC system manufacturers. Make sure you have your system and DOS manuals to hand for reference. The guide covers IDE / EIDE and SCSI drives.

FREE
WITH EVERY HARD DRIVE PURCHASED



When you buy a Hard Drive from SMC you get something no other company offers - a free 16 page, easy to follow Installation Guide containing everything you need to ensure a trouble free set up. It covers:

- Getting started
- IDE/EIDE Hard Drive Installation
- Installing without a translating BIOS
- SCSI Hard Drive installation
- Basic Troubleshooting
- CMOS configuration
- Installing with a translating BIOS
- SCSI Hard Drive configuration
- Creating a bootable floppy disk

What else would you expect from a company that prides itself on always giving its customers more for their money?

IDE/EIDE MOUNTING KITS

79-97-3102 - Removable drive caddy for 3.5" drives.
Requires 5.25" mounting bay.
79-95-1135 - Mounts 3.5" drive into a 5.25" bay.
All screws supplied. No slide rails.

Ex VAT	Inc VAT
£35	£41.13
£10	£11.75

UTILITY SOFTWARE

	Ex VAT	Inc VAT
01-93-8642 Ontrack Disk Manager when purchased with a hard drive	£15	£17.63
01-93-8644 Ontrack Disk Manager full retail version	£35	£41.13
01-93-8402 Ontrack Drive Rocket when purchased with a hard drive	£12	£14.10
01-93-8404 Ontrack Drive Rocket full retail version	£17	£19.98
01-93-8408 Ontrack Drive Rocket tester disk	FREE	



DISK MANAGER
Ideal for systems in which the BIOS does not allow for large hard disk drives.

DRIVE ROCKET
Speed up data transfer rates by up to 80%



IDE/EIDE CABLES

	Ex VAT	Inc VAT
75-95-1401 Single Drive, 40 Way Ribbon, 12.5", 2 x IDC40	£8	£9.40
75-95-1402 Dual Drive, 40 Way Ribbon, 20" (4" gap), 3 x IDC40	£10	£11.75
75-95-0400 Custom made to order, 40 Way Ribbon, up to 20". Per metre.	£POA	£POA

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**EIDE HARD DRIVES
INCLUDE FREE
DISK MANAGEMENT
SOFTWARE**



IDE/EIDE CONTROLLERS

	Ex VAT	Inc VAT
IDE		
24-95-1300 IDESPC, ISA Bus, 2HDD/2FDD, Standard I/O Port	£13	£15.28
24-97-0300 ADP60, ISA Bus, 2HDD, LBA Support	£25	£29.38
24-97-0355 ADP60F, ISA Bus, 2HDD/2FDD, LBA Support	£32	£37.60
24-91-4132 Promise DC - 4030VL2, VESA Bus, 4HDD/2FDD, LBA Support	£35	£41.13
EIDE		
24-97-1360 Promise EIDEMAX, ISA Bus, 2HDD, ATAPI/CD-ROM, LBA Support	£25	£29.38
24-97-1350 EIDEVLB, VESA Bus, 4HDD/2FDD, ATAPI/CD-ROM	£29	£34.08
24-97-1355 EIDEVLB/SUPER I/O, VESA Bus, 4HDD/2FDD, ATAPI/CD-ROM, Fast I/O Port	£35	£41.13
24-97-1365 Promise EIDEPRO, ISA Bus, 4HDD/2FDD, ATAPI/CD-ROM, Fast I/O Port, LBA Support	£39	£45.83
24-91-2300 Promise DC2300 + VESA Bus, 4HDD/2FDD, ATAPI/CD-ROM, Fast I/O Port, LBA Support	£35	£41.13
24-91-4032 Promise 4030 + Cache, 4x HDD, 1x ATAPI/CD-ROM, Fast I/O Port, LBA Support	£85	£99.88
EIDE/CD ROM		
24-91-5171 Future Domain 16002CD, ISA Bus, ATAPI/CD-ROM	£19	£22.33
24-91-5175 Future Domain 16030/CD 32, ISA Bus, 4HDD, ATAPI/CD-ROM, LBA support	£39	£45.83

STEPPING UP TO ENHANCED IDE
Enhanced IDE (or ATA) has been designed to overcome the limitations of the standard IDE interface. It offers some significant advantages:

- Drive capacities over 528Mb
- More than two drives per system
- Other drives inc Tape, CD-ROM & Removable
- Faster transfer rates

You may require software or Bios upgrade to overcome system limitations.
(all SMC EIDE drives supplied with software)



EIDE HARDDRIVES

Ex VAT Inc VAT

3.5" drives All the hard drives come with a 3 year warranty unless otherwise stated

540Mb - 850Mb

00-00-0000	540Mb	Conner	CF5541A	64k Cache	14ms	£94	£110.45
30-24-0547	545Mb	Fujitsu	M1612T	64k Cache	11ms	£99	£116.33
30-70-0630	630Mb	Seagate	ST3630A	120k Cache	14ms	£95	£111.63
30-86-0630	630Mb	Western Digital	AC2635A Caviar	64k Cache	10ms	£99	£116.33
30-13-0850	850Mb	Conner	CFS850A Filepro	64k Cache	12ms	£95	£111.63
30-64-0850	850Mb	Quantum	TB2850AT Trailblazer	128k Cache	14ms	£95	£111.63
30-86-0850	850Mb	Western Digital	AC2850A Caviar	64k Cache	10ms	£103	£121.03

1.0Gb - 1.6Gb

00-00-0000	1.0Gb	Fujitsu	M1614T	64k Cache	14ms	£113	£132.78
00-00-0000	1.0Gb	Seagate	ST31081A Medalist	64k Cache	14ms	£113	£132.78
30-64-1000	1.0Gb	Quantum	TM1080AT Fireball	128k Cache	12ms	£119	£139.83
30-64-1288	1.2Gb	Quantum	BF1280AT Bigfoot	128k Cache	15.5ms	£117	£137.48
30-24-1200	1.2Gb	Fujitsu	M1636T	64k Cache	11ms	£125	£146.88
30-70-1201	1.2Gb	Seagate	ST31276A Medalist	64k Cache	12.5ms	£129	£151.58
30-64-1281	1.2Gb	Quantum	TM1280AT Fireball	128k Cache	11ms	£129	£151.58
30-86-1204	1.2Gb	Western Digital	AC21200A Caviar	128k Cache	10ms	£129	£151.58
30-86-1602	1.6Gb	Western Digital	AC21600A Caviar	128k Cache	12ms	£149	£175.08

1.7Gb-4.2Gb

30-64-1704	1.7Gb	Quantum	SR1700AT Scirroco	128k Cache	11ms	£149	£175.08
30-30-1700	1.7Gb	IBM	29H7188	128k Cache	12ms	£149	£175.08
30-70-2140	2.0Gb	Seagate	ST32140A Medalist	128k Cache	10.5ms	£179	£210.33
30-30-2000	2.0Gb	IBM	45H3424	128k Cache	9.5ms	£177	£207.98
30-86-2005	2.0Gb	Western Digital	AC22100A	128k Cache	12ms	£189	£222.08
30-64-2110	2.1Gb	Quantum	TM2100AT Fireball	128k Cache	10.5ms	£169	£198.58
00-00-0000	2.1Gb	Seagate	ST52160A Medalist	128k Cache	11ms	£POA	£POA
30-64-2558	2.5Gb	Quantum	BF2550AT Bigfoot	128k Cache	15.5ms	£166	£195.05
30-64-2554	2.5Gb	Quantum	SR2550AT Scirroco	128k Cache	11ms	£185	£217.38
30-24-2500	2.5Gb	Fujitsu	M1638T	128k Cache	10ms	£195	£229.13
30-86-2500	2.5Gb	Western Digital	AC32500A Caviar	128k Cache	12ms	£209	£245.58
00-00-0000	2.5Gb	Seagate	ST52520A Medalist	128k Cache	11ms	£POA	£POA
30-30-3000	3.0Gb	IBM	46H3426	128k Cache	9.5ms	£262	£307.85
30-86-3100	3.1Gb	Western Digital	AC33100A Caviar	128k Cache	12ms	£269	£316.08
30-64-3200	3.2Gb	Quantum	TM3200AT Fireball	128k Cache	10.5ms	£222	£260.85
00-00-0000	3.4Gb	Seagate	ST33440A Medalist	128k Cache	10.5ms	£POA	£POA
00-00-0000	4.2Gb	Seagate	ST34250A Medalist	128k Cache	10.5ms	£POA	£POA

EIDE HARDDRIVES

Ex VAT Inc VAT

2.5" drives All the Hard Disk Drives come with a 2 year warranty unless otherwise stated. (These drives have a 44-pin connector. Please check your system for compatibility)

540mb-1.3Gb

00-00-0000	540Mb	Seagate	ST9546A	128k Cache	16ms	£199	£233.83
30-75-0810	810Mb	Toshiba	MK1928FC 2 yr wrnty	128k Cache	13ms	£225	£264.38
30-75-1300	1.3Gb	Toshiba	MK2720FC 2 yr wrnty	128k Cache	13ms	£369	£433.58

73-97-1183

**EIDE PARALLEL PORT
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£79 Ex VAT
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Connect any IDE/EIDE Hard Drive to any standard Parallel Port. Ideal for Notebook/Laptop users & for exchanging/sharing data.

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REMOVABLE DRIVES

IOMEGA ZIP DRIVES

	Ex VAT	Inc VAT
35-35-0100 100Mb, SCSI(External) Interface, 1.24Mb per second	£108	£126.90
35-35-0105 100Mb, SCSI(Insider) Interface, 1.24Mb per second	£108	£126.90
37-35-0100 100Mb, Parallel port, 1.25Mb per second	£109	£128.08

IOMEGA JAZ DRIVES

35-35-1000 1.0Gb, SCSI(Internal) Interface, 10Mb per second	£262	£307.85
35-35-1005 1.0Gb, SCSI(External) Interface, 10Mb per second	£322	£378.35

IOMEGA ZIP CARTRIDGES

95-35-0101 100Mb, Single	£12	£14.10
95-35-0103 100Mb, 6 Pack	£60	£70.50
95-35-0105 100Mb, 10 Pack	£92	£108.10

IOMEGA JAZ CARTRIDGES

95-35-1001 1.0Gb, Single	£75	£88.13
95-35-1003 1.0Gb, 5 Pack	£360	£423.00

For a full range of data storage products see also Tape Back-up for a listing of Iomega Ditto tape drives.



Iomega Value Data Cartridge Packs

UNLIMITED HARDDRIVE SPACE!



zip - 100Mb removable Drive



jaz - 1.0Gb removable Drive

SCSI CONTROLLER CARDS - KITS



Ex VAT Inc VAT

NEW

26-03-2947 AHA2940UW

PCI BUS, ULTRA WIDE SCSI / FAST SCSI 2, FAST/WIDE SCSI, SUPPORTS 7 DEVICES

Ex VAT £189 Inc VAT £222.08



26-03-2920 AHA2920

PCI BUS, MICRO-D INTERFACE SUPPORTS UPTO 7 DEVICES

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26-03-1515 AHA1515UTC, ISA Bus, 25 Pin D-type, max 7 Devices £56 £65.80

26-03-1542 AHA1542CP, ISA Bus, Micro-D, max 7 Devices + FDD £157 £184.48

26-03-2842 AHA2842VL, VESA Bus, Micro-D, max 7 Devices + FDD £149 £175.08

26-03-2825 AHA2825VL, VESA Bus, Micro-D, max 7 Devices (+2 EIDE)+FDD £85 £99.88

26-03-2941 AHA2940U, PCI Bus, Micro-D, Fast SCSI 2, max 7 Devices £157 £184.48

26-03-1640 AHA1640, MCA Bus, Micro-D, max 7 devices £192 £225.60

26-03-2742 AHA2742, EISA Bus, Micro-D, max 14 Devices + FDD £222 £260.85

26-03-2747 AHA2742W, EISA Bus, Wide SCSI, max 14 Devices + FDD £242 £284.35

26-03-1460 APA1460, PCMCIA, Centronics, max 7 Devices £112 £131.60

26-03-3947 AHA3940W, PCI Bus, Wide SCSI, max 14 Devices £309 £363.08

26-03-3940 AHA3940

PCI BUS, MICRO-D INTERFACE SUPPORTS UPTO 14 DEVICES

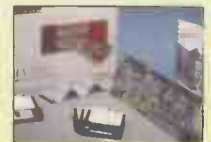
Ex VAT £259 Inc VAT £304.33



26-03-3985 AHA3985 RAID

PCI BUS, MICRO-D INTERFACE RAID (5,1,0,0/1) SUPPORTS 21 DEVICES

Ex VAT £465 Inc VAT £546.38



SCSI CONTROLLER CARDS

Ex VAT Inc VAT

DATA TECHNOLOGIES

26-91-3280 DTC3280, ISA Bus, Centronics 50, max 7 Devices + FDD £39 £45.83

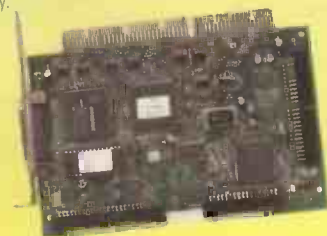
FUTURE DOMAIN

26-91-0853 161DMCD, ISA Bus, 25 pin D-type, supp up to 7 devices £39 £45.83

OTHER

26-97-0382 SP328VL, VESA Bus, Micro-D, supports up to 7 devices + FDD £55 £64.63

Kits are Adaptec products only.



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FAST-SCSI 2 & Audio/Video HARD DISKS

SCSI MOUNTING KITS

Mounts 3.5" drive into a 5.25" bay. All screws supplied.
No slide rails (Part No. 79-95-1135)
Removable drive caddy for 3.5" drives. Requires 5.25"
mounting bay (Part No. 79-97-3502)
Metal version of above plus high performance
drive support (Part No. 79-97-3504)

Removable Caddy accepts 3.5" drives in a 5.25" docking bay. Options for Fast & Wide are available. Can be used as a high security option, allowing quick removal to a secure place, or for easy movement/ and or change of data disks between sites.



	Ex VAT	Inc VAT
No slide rails (Part No. 79-95-1135)	£10	£11.75
Removable drive caddy for 3.5" drives. Requires 5.25" mounting bay (Part No. 79-97-3502)	£39	£45.83
Metal version of above plus high performance drive support (Part No. 79-97-3504)	£69	£81.08

SCSI CABLES

Internal

	Ex VAT	Inc VAT
75-95-1501 Single drive, 19 inches	£8	£9.40
75-95-1502 Dual drive, 38 inches	£10	£11.75
75-95-1503 Triple drive, 38 inches	£15	£17.63
75-95-0500 Custom made to order, as required. Per metre.	£POA	£POA



FAST & WIDE SCSI & Audio/Video HARD DISKS

Guide:

All SCSI Hard Drives marked with (*) are Ultra SCSI compliant.
All SCSI Hard Drives come with a 5 year warranty unless marked with (*) these come with a 3 year warranty.
All SCSI Hard Drives marked with (A/V) are Audio & Video compatible, ideal for recording applications with minimal data loss.



SCSI TOWER AND HARD DRIVE ENCLOSURE

FROM **£79** Ex VAT

Connect any SCSI Hard Drive to any SCSI chain. Ideal for Notebook/Laptop users & for exchanging/sharing data.

SCSI HARD DRIVES

Ex VAT Inc VAT

3.5" - 5.25" drives

1.0Gb - 1.2Gb

35-70-1005 1.0Gb	Seagate	ST51080N Medalist *	128k Cache 12.5ms	£169	£198.58
35-70-1007 1.0Gb	Seagate	ST31051N Hawk **	256k Cache 10.5ms	£225	£264.38
35-64-1280 1.2Gb	Quantum	FBL1280S Fireball*	128k Cache 11ms	£182	£213.85

2.0Gb - 4.4Gb

35-46-2000 2.0Gb	Micropolis	MIC4221 Taurus 2	512k Cache 8.9ms	£365	£428.88
35-46-2009 2.0Gb	Micropolis A/V	MIC4221AV Gold	512k Cache 8.9ms	£396	£465.30
35-70-2175 2.0Gb	Seagate	ST32171N Barracuda	512k Cache 8ms	£525	£616.88
35-13-2107 2.1Gb	Canner	CFP2107S	512k Cache 9ms	£365	£428.88
35-30-2103 2.1Gb	IBM	8563683	512k Cache 8.5ms	£229	£269.08
35-64-2100 2.1Gb	Quantum	XP32150S Atlas	1Mb Cache 8ms	£395	£464.13
35-70-2150 2.1Gb	Seagate	ST32155N Hawk **	512k Cache 10.5ms	£305	£358.38
35-70-2105 2.1Gb	Seagate A/V	ST32550N Barracuda	512k Cache 8ms	£478	£561.65
35-24-2200 2.2Gb	Fujitsu	M2952S *	512k Cache 8ms	£389	£457.08
35-70-4375 4.0Gb	Seagate	ST34371N Barracuda	512k Cache 8ms	£815	£957.63
35-70-4000 4.0Gb	Seagate A/V	ST15230N Hawk	512k Cache 10.5ms	£645	£757.88
35-70-4005 4.0Gb	Seagate A/V	ST15150N Barracuda	1Mb Cache 8ms	£685	£804.88
35-13-4207 4.2Gb	Canner A/V	CFP4207S Filepro	512k Cache 9ms	£595	£699.13
35-30-4300 4.3Gb	IBM	7467045	512k Cache 8ms	£579	£680.33
35-64-4300 4.3Gb	Quantum A/V	XP34300S Atlas	1Mb Cache 8ms	£575	£675.63
35-46-4350 4.3Gb	Micropolis	MIC3243 Copricorn 4	512k Cache 8.9ms	£589	£692.08
35-46-4359 4.3Gb	Micropolis A/V	MIC3243AV Gold	512k Cache 8.9ms	£649	£762.58
35-24-4400 4.4Gb	Fujitsu A/V	M2954S *	512k Cache 8ms	£579	£680.33

9.0Gb - +

35-30-9035 9.0Gb	IBM	9363007	512k Cache 8.5ms	£1229	£1444.08
35-70-9175 9.0Gb	Seagate	ST19171N Barracuda	512k Cache 8ms	£1439	£1690.83
35-24-9100 9.1Gb	Fujitsu A/V	M2949S *	512k Cache 8ms	£1179	£1385.33
35-46-9000 9.1Gb	Micropolis	MIC1991Scarpio 9	512k Cache 12ms	£1125	£1321.88
35-46-9009 9.1Gb	Micropolis A/V	MIC1991AV Gold	512k Cache 12ms	£1199	£1408.83
35-70-9000 9.1Gb	Seagate A/V	ST410800N Elite	1Mb Cache 11ms	£1275	£1498.13

WIDE SCSI HARD DRIVES

Ex VAT Inc VAT

3.5"-5.25" drives All the Hard drives below come with 5 year warranty (These drives have a 68 pin WIDE SCSI Connector)

2.0Gb - 9.0Gb

35-70-2177 2.0Gb	Seagate	ST32171W Barracuda	512k Cache 8ms	£565	£663.88
35-64-2107 2.1Gb	Quantum	XP32150W Atlas	1Mb Cache 8ms	£399	£468.83
35-46-2102 2.1Gb	Micropolis	MIC4221W Taurus 2	512k Cache 8.9ms	£426	£500.55
35-46-2008 2.1Gb	Micropolis A/V	MIC4221WAV Gold	512k Cache 8.9ms	£465	£546.38
35-70-2102 2.1Gb	Seagate A/V	ST32155W Hawk *	512k Cache 10.5ms	£465	£546.38
35-70-2107 2.1Gb	Seagate A/V	ST32550W Barracuda	512k Cache 8ms	£539	£633.33
00-00-0000 2.2Gb	Fujitsu A/V	M2952QA*	512k Cache 8ms	£POA	£POA
35-70-4371 4.0Gb	Seagate	ST34371W Barracuda	512k Cache 8ms	£855	£1004.63
35-70-4002 4.0Gb	Seagate A/V	ST15230W Hawk	512k Cache 10.5ms	£699	£821.33
35-70-4007 4.0Gb	Seagate A/V	ST15150W Barracuda	1Mb Cache 8ms	£735	£863.63
35-46-4357 4.3Gb	Micropolis	MIC3243W Copricorn	512k Cache 8.9ms	£629	£739.08
35-46-4352 4.3Gb	Micropolis A/V	MIC3243WAV Gold	512k Cache 8.9ms	£689	£809.58
00-00-0000 4.4Gb	Fujitsu A/V	M2954QA*	512k Cache 8ms	£POA	£POA
35-30-4500 4.5Gb	IBM A/V	9362961 Scarpio	512k Cache 7.5ms	£699	£821.33
35-30-9037 9.0Gb	IBM	9362962	512k Cache 8.5ms	£1279	£1502.83
35-70-9177 9.0Gb	Seagate	ST19171W Barracuda	512k Cache 8ms	£1479	£1737.83
35-24-9103 9.1Gb	Fujitsu A/V	M2949QA *	512k Cache 8ms	£1239	£1455.83
35-46-9007 9.1Gb	Micropolis	MIC1991W Scarpion	512k Cache 12ms	£1169	£1373.58
00-00-0000 9.1Gb	Micropolis A/V	MIC1991WAV Gold	512k Cache 12ms	£POA	£POA

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"DATA PROTECTION"

Tape Back-Up Solutions..

DAT DRIVES

HEWLETT PACKARD

42-28-0120

C1534 (Replaces HP35470A)

2Gb, 11Mb/min, SCSI interface

Tape G, Internal

Ex VAT £379 Inc VAT £445.33



Ex VAT Inc VAT

- 42-28-0125 C1534, 2Gb, 11Mb/min
 42-28-0130 C1536 (replaces HP 35480A) 4Gb, 22Mb/min
 42-28-0135 C1536, 4Gb, 22Mb/min
 42-28-0160 C1533A, 8Gb, 44Mb/min
 42-28-0165 C1533A, 8Gb, 44Mb/min
 42-28-0485 C1553A Autoloader, 48Gb, 44Mb/min

- External G £469 £551.08
 Internal G £459 £539.33
 External G £539 £633.33
 Internal G,H £579 £680.33
 External G,H £659 £774.33
 External G,H £1529 £1796.58

42-28-0480

C1553A AUTOLOADER

48Gb, 44Mb/min, SCSI interface

Tape G, Internal

Ex VAT £1429 Inc VAT £1679.08



42-28-9505 HP Warranty (Optional 3 year on-site)

£285 £334.88

HEWLETT PACKARD SURESTORE

42-28-2020 Surestore 2000, 2Gb, 11Mb/min,

42-28-2025 Surestore 2000, 2Gb, 11Mb/min,

42-28-2050 Surestore 5000, 4Gb, 22Mb/min,

42-28-2055 Surestore 5000, 4Gb, 22Mb/min,

- Internal G £459 £539.33
 External G £529 £621.58
 Internal G £519 £609.83
 External G £599 £703.83

42-28-2050

SURESTORE 5000

4Gb, 22Mb/min, SCSI interface

Tape G, Internal

Ex VAT £519 Inc VAT £609.83



42-28-3045 (Complete Kit)

42-28-2060 Surestore 6000, 8Gb, 44Mb/min,

42-28-2065 Surestore 6000, 8Gb, 44Mb/min,

42-28-3165 (Complete Kit)

42-28-9503 Surestore Warranty (HP 3 Year on site additional warranty)

- External £1589 £1867.08
 Internal G,H £645 £757.88
 External G,H £715 £840.13
 External £1689 £1984.58
 £115 £135.13

42-28-4120

SURESTORE 12000E AUTOLOADER

48Gb, 44Mb/min, SCSI interface

Tape G,H External

Ex VAT £1739 Inc VAT £2043.33



WANGDAT

42-84-1000 3100, 2Gb, 11Mb/min,

42-84-1005 3100, 2Gb, 11Mb/min,

42-84-2000 3200, 4Gb, 22Mb/min,

- Internal G £379 £445.33
 External G £519 £609.83
 Internal G £449 £527.58

42-84-2005

3200

4Gb, 22Mb/min, SCSI interface

Tape G, External

Ex VAT £539 Inc VAT £633.33



42-84-4000 3400DX, 8Gb, 44Mb/min,

42-84-4005 3400DX, 8Gb, 44Mb/min,

- Internal G,H £555 £652.13
 External G,H £635 £746.13

DAT DRIVES

Ex VAT Inc VAT

CONNER

42-13-0200 4320, 2Gb, 11Mb/min,

Internal G £369 £433.58

42-13-0205 **4350**

2Gb, 11Mb/min, SCSI interface

Tape G, External

Ex VAT £459 Inc VAT £539.33



42-13-0400 4324, 4Gb, 22Mb/min,

42-13-0405 4354, 4Gb, 22Mb/min,

42-13-0800 4326, 8Gb, 44Mb/min,

42-13-0805 4356, 8Gb, 44Mb/min,

- Internal G £439 £515.83
 External G £539 £633.33
 Internal G,H £549 £645.08
 External G,H £659 £774.33

SONY

42-71-0020 SDT-2000E, 2Gb, 11Mb/min,

42-71-0040 SDT-5200, 5Gb, 22Mb/min,

42-71-0090 SDT-5000, 4.8Gb, 22Mb/min,

- Internal G £419 £492.33
 Internal G,H £499 £586.33
 Internal G,H £529 £621.58

42-71-0080

SDT-7000 QUAD

4.8Gb, 44Mb/min, SCSI

interface, Tape G,H Internal

Ex VAT £599 Inc VAT £703.83



42-71-0320 TSL-7000 Autoloader, 64Gb, 22Mb/min

Internal G,H £1679 £1972.83

42-28-9503 HP SURESTORE

3 Year On-Site
 Additional Warranty

£115 Ex.VAT

Inc VAT £135.13



BACK-UP SOFTWARE

Ex VAT Inc VAT

CHEYENNE

01-90-4001 **ArcSolo, DOS**, Single user, Workstation based, Network aware, Will backup any workstation or network.

£66 £77.55

01-90-5001 **ArcSolo, Windows 3.x**, Single user, Workstation based, Supports Windows for Workgroups, Personal Network & Lantastic workgroups and even Server volumes.

£95 £111.63

01-90-6001 **ArcSolo, Windows 95**, Single user, Multi-Threaded operation, Backup Recovery disk - complete restore from one Floppy

£89 £104.58

01-90-6003 **ArcSolo, Windows 95, Upgrade**, Single user Upgrade from previous versions.

£25 £29.38

Arcserve for Network Windows Editions are Server based, will allow automated backup of all connected file servers and workstations running DOS, OS/2 and Windows 3.x. Optional support packs are available for UNIX and Macintosh.

01-90-5005 **ArcServe, Network-Windows, 5 User/server**

£159 £186.83

01-90-5010 **ArcServe, Network-Windows, 10 User/server**

£349 £410.08

01-90-5025 **ArcServe, Network-Windows, 25 User/server**

£588 £690.90

01-90-5050 **ArcServe, Network-Windows, 50 User/server**

£739 £868.33

Note: We can also supply Arc Serve for DOS-based NetWare systems plus 100, 250 and 500 user NetWare networks. Versions for many other operating systems including UNIX & SUN are also available. Please call for more details and prices.

Arcserve 6 for Network, Server based, supports DOS, OS/2, Windows 3.x and Windows 95 workstations (optional support packs for UNIX, Macintosh and Windows NT Servers and Workstations), better support for NetWare 4.1 than previous versions, improved Windows'95 style user interface.

01-90-6001 **Single Server Edition**

£320 £376.00

01-90-6090 **Enterprise Edition** (Supports Multiple Servers).

£789 £927.08

Arcserve 6 for Windows NT. Supports Windows NT, Windows'95 and Windows 3.x. Clients (optional agents available for NetWare, UNIX, OS/2 and Macintosh). Windows NT 4.0 compatible, Built in Virus Scanner.

01-90-6007 **Workstation Edition**

£125 £146.88

01-90-6005 **Single Server Edition**

£330 £387.75

01-90-6003 **Enterprise Edition** (Supports Multiple Servers).

£559 £656.83

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TAPE DRIVES

Ex VAT Inc VAT

Use the Tape Selector chart on page XX to identify the tape you need.

COLORADO
MEMORY SYSTEMS EUROPE LTD

48-10-0800

TRAVAN T1000

800Mb, 9.5Mb/min, Floppy interface,
Optional dedicated controller.

Incl: Dos/Windows software.

FREE Tape A,B. **Internal**

Ex VAT £85 Inc VAT £99.88



48-10-8005

TRAVAN T4000S

8Gb, 62Mb/min, SCSI required,
Incl: Dos/Win3.x, Win'95 software,

1x FREE tape, Tape N. **Internal**

Ex VAT £235 Inc VAT £276.13



jumbo

48-10-1360

JUMBO DJ50

1.3Gb, 17Mb/min, Includes:
dedicated controller, DOS/Win 3.x,
Win'95 software, Tape K, **Internal**

Ex VAT £125 Inc VAT £146.88



COLORADO ACCESSORIES

00-00-0000 Backup Software for Unix/Xenix (Unix/Xenix dedicated backup software) £75 £88.13

00-00-0000 Backup Software for OS/2 (OS/2 dedicated backup software) £79 £92.83

01-50-0703

WINDOWS 3.1x SOFTWARE

Dedicated software for Windows
interface, full backup options incl,
scheduled

Ex VAT £49 Inc VAT £57.58



WANGTEK
A RECON COMPANY

Backup software required. SCSI controller
required. Ask sales contact for options available.

48-84-0525

5525ES

525Mb wide tape, 12Mb/min, SCSI
interface, Tape D,E **Internal**

Ex VAT £295 Inc VAT £346.63



48-84-0525 5525ES, 525Mb, 12Mb/min,
48-84-1000 51000ES, 1Gb, 17Mb/min,

Internal D,E £295 £346.63
Internal D,E,F £365 £428.88

TAPE BACKUP!
Protection against.....
FIRE - THEFT - DAMAGE



TAPE DRIVES

Ex VAT Inc VAT

Use the Tape Selector chart on page XX to identify the tape you need.

CONNER

All drives include Dos/Win 3.x, Win'95 software,
1x FREE tape. TSM3200/400R-A controller card

48-13-0800

TST 800R TRAVAN

800Mb, 9.5Mb/min, Floppy interface,
DOS/Win software, Tape A,B **Internal**

Ex VAT £79 Inc VAT £92.83



48-13-3200 TSM 3200R, 3.2Gb, 19Mb/min,

Internal L £149 £175.08

48-13-8000 TST 8000R-A EIDE, 4.0Gb, 54Mb/min,

Internal M £245 £287.88

48-13-8005 TST 8000R-S SCSI, 4.0Gb, 54Mb/min,

Internal M £252 £296.10

48-13-8015 TST 8000ES-S SCSI, 4.0Gb, 54Mb/min,

External M £299 £351.33

OMEGA

All DITTO drives come with DOS/Win 3.x and Win'95
software. Optional dedicated controller available

46-35-2000

Ditto 2000

2.0Gb Ditto tape, 19Mb/min, Floppy
interface, Tape D,E **Internal**

Ex VAT £99 Inc VAT £116.33



46-35-2009 Ditto 2000, P/Port, 2.0Gb, 19Mb/min

External M £135 £158.63

**CHECK TAPE SELECTOR CHART ON
PAGE. 31 FOR TAPE TYPE & PRICE.**

COLORADO
MEMORY SYSTEMS EUROPE LTD

All Trakker drives include Dos/Win 3.x, Win'95 soft-
ware. T1000E/Travan 800 includes 1x FREE tape.

PARALLEL PORT

All drives run from standard parts and have a pass-through port for printers.

46-10-0800 Trakker T1000E Travan, 800Mb, 8Mb/min External A,B £107 £125.73

46-42-0800

BACKPACK 800 TRAVAN

800Mb, 8Mb/min, parallel port
interface, Backup software,
Tape A,B, **External**

Ex VAT £105 Inc VAT £123.38



46-42-0800 Backpack 800 Travan, 800Mb, 8Mb/min

External A,B £105 £123.38

PARALLEL PORT ACCESSORIES

70-10-0400 Trakker Carry Case £39 £45.83

CONNER

TST800P includes Dos/Win 3.x, Win'95 software.
1x FREE tape.

48-13-0809

TST 800EP TRAVAN

800Mb, 9.5Mb/min, Parallel port
interface, Tape A,B, **External**

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COMPUTERS

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21

We remember when 20Mb was the standard for Hard Drives...

Unfortunately, you can't tell if a memory module is absent-minded just by looking at it.

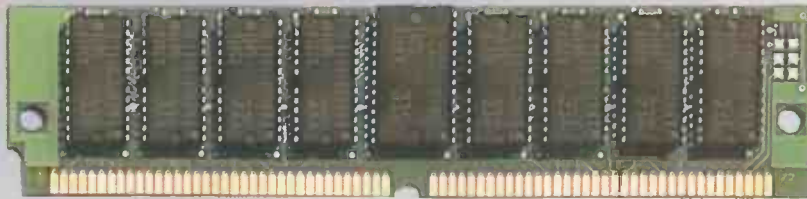
So, it's reassuring to know that at SMC we haven't forgotten the importance of quality control. By instigating more frequent batch checks and tougher tests we aim to maintain the quality of our goods, and safeguard our hard won reputation for reliability.

Our range of SIMMS and Matched Memory is exhaustive. And because we stock in depth we can guarantee swift delivery times and

very competitive prices.

Unlike other suppliers we won't have a convenient memory block if you need our help. All SMC customers have access to a superb level of technical support.

Best of all, you only need to take a glance at our prices to see that you won't pay any extra for an extra special service. In fact, once you've done business with us, we think you'll recall us again and again and again.



72 PIN SIMM ACTUAL SIZE. CHIP CONFIGURATIONS MAY VARY.

How is your Memory?

SIMMS - 30 PIN

Ex VAT Inc VAT

Note: Standard 9 & 36-bit SIMMS have full parity checking. We batch test SIMMS to ensure quality & reliability.

1Mb	60ns	70ns	80ns
Full Parity, 1Mb x 9bit, 3 Chip	10-97-1963 £17 £19.98	10-97-1972 £10 £11.75	10-97-1983 £17 £19.98
Full Parity, 1Mb x 9bit, 9 Chip	10-97-1969 £22 £25.85	10-97-1979 £14 £16.45	10-97-1989 £18 £21.15
4Mb			
Full Parity, 4Mb x 9bit, 3 Chip	10-97-4963 £30 £35.25	10-97-4973 £26 £30.55	
Full Parity, 4Mb x 9bit, 9 Chip	10-97-4969 £32 £37.60	10-97-4979 £32 £37.60	
16Mb			
Full Parity, 16Mb x 9bit, 9 Chip		10-97-7979 £345 £405.38	

ALL OUR MEMORY IS BATCH TESTED TO ENSURE HIGHEST QUALITY... FIRST TIME - EVERY TIME!

Not sure which module to use ?

Our sales staff can quickly identify the right memory for your system. Call SMC for the best in memory upgrades.

EDO MEMORY - 72 PIN

Ex VAT Inc VAT

EDO Memory	60ns		
4 Mb, Non Parity, 1Mb x 32bit	£19 £22.33	13-97-0400	
8 Mb, Non Parity, 2Mb x 32bit	£32 £37.60	13-97-0801	
16 Mb, Non Parity, 4Mb x 32bit	£77 £90.48	13-97-1601	
32 Mb, Non Parity, 8Mb x 32bit	£135 £158.63	13-97-3201	



EDO Memory requires Motherboard support. Offers faster performance.

Buy 5 or more SIMMS and SAVE £0.50 per Mb

Eg: 5 off 1Mb x 3 70ns = **£52.50** (£61.69) Full price = **£55** (£64.63)
Offer only applies when buying SIMMS of the same type

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SIMMS - 72 PIN

Ex VAT Inc VAT

Note: Standard 9 & 36-bit SIMMS have full parity checking. We batch test SIMMS to ensure quality & reliability.

1Mb	60ns	70ns	80ns
Full Parity, 256k x 36bit		13-97-0117 £30 £35.25	
2Mb			
Full Parity, 512k x 36bit		13-97-0217 £48 £56.40	
4Mb			
Non Parity, 1Mb x 32bit	13-97-0406 £19 £22.33	13-97-0407 £18 £21.15	
Full Parity, 1Mb x 36bit	13-97-0416 £26 £30.55	13-97-0417 £25 £29.38	
8Mb			
Non Parity, 2Mb x 32bit	13-97-0806 £30 £35.25	13-97-0807 £29 £34.08	
Full Parity, 2Mb x 36bit	13-97-0816 £52 £61.10	13-97-0817 £48 £56.40	
16Mb			
Non Parity, 4Mb x 32bit	13-97-1606 £76 £89.30	13-97-1607 £75 £88.13	
Full Parity, 4Mb x 36bit	13-97-1616 £94 £110.45	13-97-1617 £88 £103.40	
32Mb			
Non Parity, 8Mb x 32bit	00-00-0000 £165 £193.88	13-97-3207 £163 £191.53	
Full Parity, 8Mb x 36bit	00-00-0000 £170 £191.53	13-97-3217 £165 £199.75	

SDRAM MEMORY - 168 PIN

Ex VAT Inc VAT

8 Mb, Non Parity, 1Mb x 64bit	£99 £116.33	19-95-0821
16 Mb, Non Parity, 2Mb x 64bit	£136 £159.80	19-95-1622
32 Mb, Non Parity, 4Mb x 64bit	£269 £316.08	19-95-3224

SDRAM requires motherboard support - uses dedicated 168 pin connector

Buy 13 or more SIMMS and SAVE £1.00 per Mb

Eg: 13 off 1Mb x 3 70ns = **£130.00** (£152.75) Full price = **£143** (£168.03)
Offer only applies when buying SIMMS of the same type

Kingston

TECHNOLOGY CORPORATION



If all memory is the same, why do some brands fail more often than others?

Increasing memory is the single best way to improve system performance and computing efficiency. PC Computing's recent study on productivity demonstrated how adding just 4Mb of memory increased managers productivity by 26%.

Why Kingston memory?

Kingston makes sure you get the exact product that you need & then guarantees it for compatibility, and value for money - for a lifetime. Every Kingston module is designed for and tested in each specific machine, ensuring total compatibility. Kingston can do this because it is the world's biggest DRAM manufacturer. **Buying Kingston is buying peace of mind.**

Kingston produces memory which is guaranteed compatible with all the major computer manufacturers including:

ACER, ALR, APPLE, AST, AT+T - NCR, BROTHER, CANON, COMPAQ, DELL, DIGITAL, EPSON, EVEREX, GATEWAY, HEWLETT PACKARD, IBM, IBM/ LEXMARK, INTEL, NEC, OKI, PACKARD BELL, PANASONIC, SAMSUNG, SHARP, SILICON GRAPHICS, SUN, TEKTRONIX, TEXAS INSTRUMENTS, TOSHIBA & ZENITH - TO NAME BUT A FEW.

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KINGSTON MOUSEMAT WITH EVERY ORDER OVER 15Mb

APPLIES TO ANY COMBINATION i.e. 4X 4Mb OR 2X 8Mb etc.

KINGSTON GENERIC MEMORY - 30PIN, 72 PIN & EDO Ex VAT Inc VAT

	1 Mb	2 Mb	4 Mb	8 Mb	16 Mb	32 Mb	64 Mb
30 Pin 3 Chip Simms 60 or 70Ns	KTM1100/9-70 £12 £14.10		KTM4000/9-70s £34 £39.90				
30 Pin 9 Chip Simms 60 or 70Ns	KTM1000/9-70s £11 £12.93		KTM4900/9-70 £34 £39.95				
72 Pin Non-Parity Simms 60 or 70Ns			KTM1x32L-60T £29 £34.08	KTM2x32L-60T £57 £66.98	KTM4x32L-60T £104 £122.20	KTM8x32L-60T £207 £243.23	KTM16x32L-60T £445 £522.88
72 Pin Parity Simms 60 or 70Ns			KTM1x36L-60T £39 £45.83	KTM2x36L-60T £76 £89.30	KTM4x36L-60T £118 £138.65	KTM8x36L-60T £235 £276.13	KTM16x36L-60T £502 £589.85
72 Pin EDO Non-Parity Simms 60Ns			KTM1x32L-60ET £29 £34.08	KTM2x32L-60ET £57 £66.98	KTM4x32L-60ET £104 £122.20	KTM8x32L-60ET £207 £243.23	KTM16x32L-60ET £445 £522.88

KINGSTON MEMORY

SYSTEM	4 Mb	8 Mb	16 Mb	32 Mb	64 Mb	KIT
AST						
Advantage, Adventure! & Pro, Bravo LC/ LCIV/CIII, LP, MS-, MS-, MT	KST0987/4 £29 £34.08	KST0987/8 £57 £66.98	KST0987/16 £104 £122.20	KST0987/32 £207 £243.23	KST0987/64 £467 £795.48	YES on 8Mb & 32Mb
Manhattan G, V, Premier, MTE, SE		KST486P/8 £79 £92.83	KST486P/16 £150 £176.25	KST486P/32 £235 £276.13	KST486P/64 £468 £549.90	YES
Ascentia 800N, 810N Series	KST800N/4 £49 £57.58	KST800N/8 £79 £92.83	KST800N/16 £150 £176.25			
Ascentia 900N, 910N Series	KST1392/4 £89 £104.58	KST1392/8 £130 £152.75	KST1392/16 £243 £285.53			
COMPAQ						
Deskpro XL, ProSignia 300/500 Series		KTC1481/8 £76 £89.30	KTC1481/16 £150 £176.25	KTC1481/32 £235 £276.13	KTC1481/64 £468 £549.90	YES
LTE 5000, 5100, 5200, 5300		KTC-E5000/8 £85 £99.88	KTC-E5000/16 £150 £176.25	KTC-E5000/32 £292 £343.10	KTC-E5000/64 £558 £655.55	YES
Presario S/7/9000 Series, 972/978/982 CDS & 992 CDS, ProLinea 575e, 5100e, 5120e	KTC-PNP/4T £45 £52.88	KTC-PNP/8T £90 £105.75	KTC-PNP/16T £170 £199.75	KTC-PNP/32T £339 £398.33		
Presario CDS 510/520/524/526/720/724 CDS 774/860/920, ProLinea Desktop 450	KTC-PNP/4 £45 £52.88	KTC-PNP/8 £90 £105.75	KTC-PNP/16 £170 £199.75	KTC-PNP/32 £339 £398.33		
Presario 800 c/4's Series, Deskpro 486XE ProSignia VS, ProLinea MT/CDS/Net/Enhanced	KTC-PL433/4 £56 £65.80	KTC-PL433/8 £111 £130.43	KTC16K/PS £190 £223.25	KTC32K/PS £379 £445.33		
DELL						
Dimension XPS P166C, OptiPlex GL, GM, GMT, GL, GXM, GMT		KTD-OPGI/8 £98 £115.15	KTD-OPGI/16 £195 £229.13	KTD-OPGI/32 £367 £431.23	KTD-OPGI/64 £734 £862.45	YES
Dimension XPS P75, P90, P100, P100 to 133C OptiPlex XL, XM, XMT Pentiums		KTD-NPOP/8 £90 £105.75	KTD-NPOP/16 £180 £211.50	KTD-NPOP/32 £339 £398.33	KTD-NPOP/64 £677 £795.48	YES
Dimension XPS 486, XPS P60FS, NetPlex 486, Omni & OptiPlex/Performance/PowerEdge 486s, Latitude 433m, 433mc, 450mc, 450mx, 475mc, Latitude LX 4750, 41000, 4100T	KTD-LMT/4 £29 £34.08	KTD-LMT/8 £57 £66.98	KTD-LMT/16 £104 £122.20	KTD-LMT/32 £207 £243.23		
OptiPlex GX Pro Series	KTD-LTDW/4 £58 £79.90	KTD-LTDW/8 £115 £135.13	KTD-LTDW/16 £212 £249.10	KTD-GXPRO/32 £296 £347.80	KTD-GXPRO/64 £641 £753.18	
IBM						
Aptiva 486 Series, PC 300-330/350 Series	KTM-APTIV/4 £29 £34.08	KTM-APTIV/8 £57 £66.98	KTM-APTIV/16 £104 £122.20	KTM-APTIV/32 £207 £243.23		
PC 300 Series 300-6576, 350-6586 range	KTM-APTIV/4T £45 £52.88	KTM-APTIV/8T £90 £105.75	KTM-APTIV/16T £170 £199.75			
PS/1 486 Series, PS/ValuePoint 486 Series, PS/2 Model 53,56,57,76,77,90X/95XP 486s	KTM-0128 £58 £79.90	KTM-0130 £111 £130.43	KTM-0160 £190 £223.25			
ThinkPad 340,345,355,360,370,730 Series	KTM-TP360/4 £74 £86.95	KTM-TP360/8 £125 £146.88	KTM-TP360/16 £227 £266.73			
ThinkPad 760 Series		KTM-TP760/8 £130 £152.75	KTM-TP760/16 £315 £370.13	KTM-TP760/32 £1476 £1734.30		
ThinkPad 750, 755 Series	KTM-TP750/4 £99 £116.33	KTM-TP750/8 £176 £206.80	KTM-TP750/16 £258 £303.15	KTM-TP750/32 £494 £580.45		
PC365 5180 6589-10U, 6589-17U, S200 6589-12U, 6589-18U			KTM0274/16 £155 £182.13	KTM0274/32 £301 £353.68		
TOSHIBA						
T2100, T2105, T2110, T2115, T2130, T2135, T2150 & T2155 Series, Satellite Pro 410CDT, 410CS, 415CS, Portege 610CT, T4400, T6400 & T6600 Series, T1900, T1910, T1950, T1960 Series, T4500, T4600, T4700, T4800, T4850 Series	4 Mb KTT2100/4 £49 £57.58	8 Mb KTT2100/8 £81 £95.18	16 Mb KTT610/8 £85 £99.88	24 Mb KTT2100/24 £216 £253.80	32 Mb KIT KTT610/32 £320 £376.00	
	KTT4400SV/4 £109 £126.08	KTT4400SV/8 £197 £231.48	KTT4400SV/16 £227 £266.73		KTT4400SV/32 £422 £495.85	
	KTT4600/4 £79 £92.83	KTT4600/8 £135 £158.63	KTT4600/16 £248 £291.40			

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Making the perfect match

Matched memory modules from SMC are designed to the original manufacturers specifications. So they will slot perfectly into your PC with the minimum of fuss. It's important to remember that although some system modules may look similar they are generally specifically configured for a particular system.

All our matched memory upgrades are supplied with a full 5 year warranty. When ordering don't forget to ask about our free anti-static wrist straps to ensure safer installation.



Right across the board

We can supply system matched memory for PCs built by the world's leading manufacturers - including AST, Ambra, Apple, Apricot, Canon, Compaq, Dell, Elonex, Escom, Gateway, Hewlett Packard, IBM, NEC, Toshiba and Zenith. Don't worry if your PC isn't listed here. We cater for many more systems and our memory module experts will be only too happy to help.

Memory upgrades for all popular PCs.

We can supply memory modules for PCs from all the major manufacturers. If you cannot find your system listed here, please call our components sales team.

PLEASE NOTE: Prices are set according to the PC's requirements. Kits are complete upgrades which often include several modules.

IBM MEMORY

SYSTEMS	Ex VAT Inc VAT					
	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb
APTIVA 300, 500 & 700 486s		13-97-0407 £20 £23.50	13-97-0807 £38 £44.65	13-97-1607 £76 £89.30	13-97-3207 £156 £183.30	
APTIVA PENTIUM Series (Kit of 2)			13-97-0807 £38 £44.65	13-97-1607 £76 £89.30	13-97-3207 £156 £183.30	00-00-0000 £332 £390.10
IBM PC300, 330, 350 486s		13-97-0407 £20 £23.50	13-97-0807 £38 £44.65	13-97-1607 £76 £89.30	13-97-3207 £156 £183.30	
IBM PC300, 330, 350 Pentiums (Kit-2)			13-97-0807 £38 £44.65	13-97-1607 £76 £89.30	13-97-3207 £156 £183.30	00-00-0000 £332 £390.10
IBM PC700, 730, 750 Pentiums (Kit-2)			17-30-9108 £60 £70.50	13-97-1617 £158 £185.65	13-97-3217 £192 £225.60	00-00-0000 £398 £467.65
PC SERVER 77i (ECC)		00-00-0000 £69 £81.08	00-00-0000 £135 £158.63	00-00-0000 £489 £574.58		
PC SERVER 300, 320, Server 85 (Kit-2)			17-30-9108 £60 £70.50	13-97-1617 £158 £185.65	13-97-3217 £192 £225.60	00-00-0000 £398 £467.65
PC SERVER 95 & 500 Series (ECC) (Kit-2)			17-30-2908 £138 £162.15	17-30-7816 £270 £317.25	17-30-7832 £978 £1149.15	
PC SERVER 486 & Pentium Series (Kit-2)		00-00-0000 £60 £70.50	17-30-9108 £158 £185.65	00-00-0000 £192 £225.60	00-00-0000 £398 £467.65	
PS/1 486 Series with IBM 72pin slots	17-30-9302 £42 £49.35	17-30-9204 £37 £43.48	17-30-9208 £79 £92.83	17-30-1516 £189 £222.08	00-00-0000 £199 £233.83	
PS/1 486 Series with IBM 30pin slots		17-30-1404 £94 £110.45		10-97-4973 x4 £136 £159.80		
PS/1 2011 & 2121 286/386sx Series	17-30-1202 £59 £69.33	17-30-1304 £99 £116.33				
PS/1 2123 PRO 386SX	17-30-9302 £42 £49.35	17-30-9204 £37 £43.48	17-30-9108 £79 £92.83			
PS/1 386SX Series	17-30-9102 £69 £81.08	17-30-9204 £37 £43.48	17-30-9108 £79 £92.83			
PS/2 SERIES - PLEASE CALL - MODEL SPECIFIC						
PS/VP 6382, 6384, 6387 with IBM 72pin slots	17-30-9302 £42 £49.35	17-30-9204 £37 £43.48	17-30-9108 £79 £92.83	13-97-1617 £96 £112.80		
PS/VP 6384 Series with IBM 30pin slots		17-30-1404 £94 £110.45		10-97-4973 x4 £136 £159.80		
PS/VP 6384 C00, C20, C40 Series	17-30-9102 £69 £81.08	17-30-9304 £45 £52.88	17-30-9208 £205 £240.88			
PS/VP 6381 SI Series		00-00-0000 £30 £35.25		13-97-1617 £96 £112.80		
ValuePoint Performance 6472, 6482, 6484, 6492, 6494 Series		00-00-0000 £30 £35.25	17-30-9108 £79 £92.83	13-97-1617 £96 £112.80	00-00-0000 £199 £233.83	
ValuePoint P60/D 6384 189, 193, 199, 1A3, 1A9 (Kit-2)			17-30-9108 £226 £265.55	17-30-1516 £158 £185.65	00-00-0000 £378 £444.15	00-00-0000 £384 £451.20
LAPTOPS						
PS/2 Model L40 SX, N33 SX, C157 SX	17-30-7502 £55 £64.63	17-30-7504 £89 £104.58	17-30-7508 £199 £233.83			
PS/2 Model N51 SL, SX	17-30-5102 £55 £64.63	17-30-5104 £79 £92.83	17-30-5108 £99 £116.33			
PS/Note 182, 2141 N82 Series	17-30-7502 £55 £64.63	17-30-7504 £89 £104.58	17-30-7508 £199 £233.83			
PS/Note 2618 C45, E35, M40		17-30-7504 £89 £104.58	17-30-5108 £99 £116.33	17-30-0416 £225 £264.38		
PS/Note N45 SL (Call)	00-00-0000 £POA £POA					
Portable PS/2 Model P70-C31, 061, 121	17-30-9202 £49 £57.58					
Portable PS/2 Model P75-161, 401	17-30-9302 £42 £49.35	17-30-9204 £37 £43.48				
ThinkPad 340, 355, C/CS, 360 Series	17-30-0902 £99 £116.33	17-30-0504 £79 £92.83	17-30-0508 £129 £151.58	17-30-0516 £185 £217.38		
ThinkPad 350, 350C		17-30-7504 £89 £104.58	17-30-5108 £99 £116.33	17-30-0416 £225 £264.38		
ThinkPad 500, 500CS, 510CS		17-30-0704 £95 £111.63	17-30-0708 £175 £205.63	17-30-0716 £395 £464.13		
ThinkPad 700, 700C, 720, 720C		17-30-4204 £99 £116.33	17-30-4208 £175 £205.63			
ThinkPad 701C, 701CS		00-00-0000 £POA £POA	17-30-0898 £119 £139.83	00-00-0000 £POA £POA		
ThinkPad 750, 755 Series		17-30-4204 £99 £116.33	17-30-4208 £175 £205.63	15109 £199 £233.83		
ThinkPad 760 Series (Call)			00-00-0000 £249 £292.58	00-00-0000 £468 £549.90		

SMC PROVIDES A 7 DAY NO QUIBBLE REFUND GUARANTEE

This does not apply to PC systems, printers, software and carriage charges. E&OE. Prices and specifications subject to change without notice. Please ask our advice before ordering to avoid any foreseeable incompatibility problems. All trademarks acknowledged. SMC Computers PLC terms and conditions on request. This does not effect your statutory rights. Prices exclude delivery.

NO HIDDEN EXTRAS FROM SMC

Prices in RED Exclude VAT
Prices in Black Include VAT

COMPAQ MEMORY

Ex VAT Inc VAT

SYSTEMS	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb
Deskpro 286e, 386/20, 25, 20e, 25e	17-09-0301 £56 £65.80		17-09-0304 £75 £88.13					
Deskpro 386/25M, 33M	17-09-0701 £43 £50.53	13-97-0217 £56 £65.80	17-30-9204 £37 £43.48	13-97-0817 £56 £65.80				
Deskpro 486e/16M, 25M, 33M, 50M, 66M	00-00-0000 £43 £50.53	00-00-0000 £56 £65.80	00-00-0000 £37 £43.48	00-00-0000 £56 £65.80				
Deskpro 3/25i, 33, 4/25i5, 33i, 66i			17-30-9204 £37 £43.48	13-97-0817 £56 £65.80				
Deskpro 386/33		17-09-1002 £84 £98.70						
Deskpro 386S/16, 386s	17-09-0601 £64 £75.20		17-09-0405 £105 £123.38					
Deskpro 386S/20, 20N, 386N		13-97-0217 £56 £65.80	17-30-9204 £37 £43.48					
Deskpro 386/33L, 486/25, 33L, 50L		17-09-1002 £84 £98.70		17-09-1008 £149 £175.08		17-09-1032 £625 £734.38		
Deskpro 450, 466, 4100			13-97-0407 £20 £23.50	13-97-0807 £38 £44.65	13-97-1607 £78 £91.65	13-97-3207 £166 £195.05		
Deskpro MX 590MX, 575MX (Kit-2)				13-97-0407 x2 £40 £47.00	13-97-0807 x2 £76 £89.30	13-97-1607 x2 £156 £183.30	13-97-3207 x2 £332 £390.10	
Deskpro XE 560, 5/60M, 5/66M Kit				17-09-8008 £139 £163.33	17-09-8016 £195 £229.13	17-09-8032 £329 £386.58	17-09-8064 £575 £675.63	17-09-8088 £1095 £1286.63
Deskpro 575, 590, 5100, 5120, 5133 (Kit-2)				13-97-0407 x2 £40 £47.00	13-97-0808 x2 £76 £89.30	13-97-1607 x2 £156 £183.30	13-97-3207 x2 £332 £390.10	
Deskpro XE 4/33, 33S, 50, 66, 100	17-09-0102 £47 £55.23	13-97-0417 £30 £35.25	13-97-0817 £56 £65.80					
Deskpro XL 450, 466, 560, 566, 575, 590, 5100, 5120, 5133 Kit		17-09-0804 £109 £128.08	17-09-0808 £135 £158.63	17-09-0816 £175 £205.63	17-09-0832 £215 £252.63	00-00-0000 £POA £POA		
Enhanced Prolinea 425, 433, 33s, 50, 50s, 66, 100	17-09-0102 £47 £55.23	13-97-0417 £30 £35.25	13-97-0817 £56 £65.80	13-97-1617 £96 £112.80	13-97-3217 £199 £233.83			
Presario 425, 433		13-97-0417 £30 £35.25	13-97-0817 £56 £65.80					
Presario 633, 650, 660	17-09-0102 £47 £55.23	13-97-0417 £30 £35.25	13-97-0817 £56 £65.80	13-97-1617 £96 £112.80	13-97-3217 £199 £233.83			
Presario 833 CDS, 850, 866 C/F/S Series	17-09-0102 £47 £55.23	13-97-0417 £30 £35.25	13-97-0817 £56 £65.80	13-97-1617 £96 £112.80	13-97-3217 £199 £233.83			
Presario 520, 720, 744, 920, 924, 954 Series		13-97-0407 £20 £23.50	13-97-0807 £38 £44.65	13-97-1607 £78 £91.65	13-97-3207 £166 £195.05			
Presario CDS-510, 520, 524, 526, 720, 724, 860, 920, 924 Series		13-97-0407 £20 £23.50	13-97-0807 £38 £44.65	13-97-1607 £78 £91.65	13-97-3207 £166 £195.05			
Presario CDIV-520, 528, 920 Series		13-97-0407 £20 £23.50	13-97-0807 £38 £44.65	13-97-1607 £78 £91.65	13-97-3207 £166 £195.05			
Presario 7170, 7180, 9546, 9548, 9564 Series (Kit-2)			13-97-0807 £40 £47.00	13-97-1607 £76 £89.30	13-97-3207 £156 £183.30	00-00-0000 £332 £390.10		
Presario CDS-774, 972, 982, 992, CDIV-978 Series (Kit-2)			13-97-0807 £40 £47.00	13-97-1607 £76 £89.30	13-97-3207 £156 £183.30	00-00-0000 £332 £390.10		
Proliant 1000 486DX2/66, 1000R			13-97-0817 £56 £65.80	13-97-1617 £96 £112.80	13-97-3217 £199 £233.83			
Proliant 1000 5/60, 2000 486/50, 5/66, 90, 2000R Kit				17-09-8016 £195 £229.13	17-09-8032 £329 £386.58	17-09-8064 £575 £675.63	17-09-8088 £1095 £1286.63	
Proliant 4000 486/50, 4000 5/66, 90, 100, 4000R 5/66, 5/100, 4500 133, 4500R Kit				17-09-8016 £249 £292.58	17-09-8032 £395 £463.63	17-09-8064 £588 £690.90	17-09-8088 £1175 £1380.63	
Proliant 1500 & 1500R 5/75, 100, 120 Kit			17-09-0808 £135 £158.63	17-09-0816 £175 £205.63	17-09-0832 £215 £252.63	00-00-0000 £POA £POA		
Prolinea 3/25s, 3/25s Kit	17-09-0002 £39 £45.83		17-09-0004 £88 £103.40					
Prolinea Net 1/25s, 33s	17-09-0102 £47 £55.23	13-97-0417 £30 £35.25	13-97-0817 £56 £65.80					
Prolinea 4/25s, 33, 33s, 50, 66 CDS	17-09-0102 £47 £55.23	13-97-0417 £30 £35.25	13-97-0817 £56 £65.80	13-97-1617 £96 £112.80	13-97-3217 £199 £233.83			
Prolinea Desktop 450, 466, 4100	17-09-0102 £47 £55.23	13-97-0407 £20 £23.50	13-97-0807 £38 £44.65	13-97-1607 £78 £91.65	13-97-3207 £166 £195.05			
Prolinea 575, 590, 5100, 5133 Series (Kit-2)			13-97-0807 £38 £44.65	13-97-1607 £78 £91.65	13-97-3207 £166 £195.05	00-00-0000 £332 £390.10		
Prolinea 575e, MX, 590MX, 5100e, 5120e, MX Series (Kit-2)			13-97-0807 £38 £44.65	13-97-1607 £78 £91.65	13-97-3207 £166 £195.05	00-00-0000 £332 £390.10		
Prolinea MT 4/33s, 50, 66	17-09-0102 £47 £55.23	13-97-0417 £30 £35.25	13-97-0817 £56 £65.80	13-97-1617 £96 £112.80	13-97-3207 £199 £233.83			
Prosignia PC Server 486/33, 486DX2/66		17-30-9204 £37 £43.48	13-97-0817 £56 £65.80	13-97-1617 £96 £112.80	13-97-3207 £199 £233.83			
Prosignia 300 5/75, 5/90, 5/120, 500 5/90 Kit			17-09-0808 £185 £217.38	17-09-0816 £429 £504.08	17-09-0832 £795 £934.13	00-00-0000 £POA £POA		
Prosignia VS 486SV/33, DV/33, DX2/66			13-97-0417 £30 £35.25	13-97-0817 £56 £65.80	17-09-6216 £96 £112.80	17-09-6232 £199 £233.83		



SMC'S 5 YEAR WARRANTY PROVES THE QUALITY OF ALL MEMORY SUPPLIED



Not sure which module to use?

Our sales staff can quickly identify the right memory for your system. Call SMC for the best in memory upgrades.

30 PIN SIMM ACTUAL SIZE. COMP CONFIGURATIONS MAY VARY.



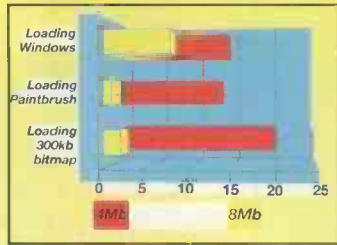
Being the Best takes power

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The difference 4MB makes



To find out the difference that 4Mb of memory can make, SMC conducted a series of tests using one of its own 486DX2-66 PCs. The results were startling. As the graph above shows, adding just 4Mb of memory to the system resulted in a dramatic speed increase.

With more and more power hungry software packages being released every day, it makes sense to consider a memory upgrade now. To find out how even a small increase in your PC's RAM capabilities can dramatically improve its performance, call our Technical Sales line today.



Static Electricity WARNING

Memory modules and processor chips are particularly sensitive to static electricity and can easily be damaged. When fitting memory you should ensure that you have discharged any static. The most effective way of ensuring this is to wear an anti static wrist strap. Alternatively you can touch the casing of your PC (provided it is connected to the mains but NOT turned on.)

Anti-Static Wrist Strap

Anti-static wrist-straps will protect your memory modules during installation - earthing your body by connecting it with a metal object such as your PC. These straps are free and available on request from SMC when ordering your memory modules.

DELL MEMORY

SYSTEMS	Ex VAT Inc VAT						
	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb
4000/XE Series 486/3350,66 Kit Dimension 425s, 433v/s, 450, 466, XPS 450V, 466V				17-20-1208 £129 £151.58		00-00-0000 £370 £434.75	13-97-3217 x2 £474 £556.95
Dimension XPS 486 Midsize 466, 4100			13-97-0407 £20 £23.50		17-20-1416 £155 £182.13		
Dimension XPS P60 FS (Ki-2) Dimension XPS P60, P90, P100,C, P120C/T (Ki-2)			13-97-0407 £20 £23.50		17-20-1416 £155 £182.13		
Dimension P75T, P90T etc., EDO Kits				17-20-3108 £40 £23.50	17-20-1416 £130 £152.75	17-20-3132 £310 £364.25	00-00-0000 £530 £622.75
Low Profile Power Desktop 486 P Series			17-20-1704 £90 £105.75	17-20-3108 £130 £152.75	17-20-1716 £298 £350.15	17-20-3132 £530 £622.75	
NetPlex 486/25s, 33s, 33d, 50d, 66d				00-00-0000 £44 £51.70	00-00-0000 £80 £94.00	00-00-0000 £164 £192.70	00-00-0000 £336 £394.80
OmniPlex 433ME, 450ME, 466ME, 4100ME			13-97-0418 £34 £39.95		13-97-1617 £96 £112.80		
OmniPlex 560/ME, 566/ME, 590/ME Kit			13-97-0407 £20 £23.50	17-20-3108 £65 £76.38	17-20-1416 £155 £182.13		
OptiPlex 433e, 450e, 466e, 4100e, 466v(E)			13-97-0407 £20 £23.50	17-20-3108 £65 £76.38	17-20-1416 £155 £182.13	17-20-3132 £265 £311.38	
OptiPlex (V) Series 486 v/L, s/MX, MX Series			13-97-0407 £20 £23.50	17-20-1208 £129 £151.58	17-20-1416 £155 £182.13		13-97-3217 x2 £474 £556.95
OptiPlex DGX 590, 5100, 5120, 5133 Kit			17-20-1704 £90 £105.75	17-20-3108 £90 £105.75	13-97-0817 x2 £130 £152.75	00-00-0000 £298 £350.15	00-00-0000 £530 £622.75
OptiPlex XL/MX/MXT 575, 590, 5100, 5120, 5133 (Ki-2)			00-00-0000 £20 £23.50		17-20-1416 £155 £182.13		
Performance 486 v/L, s/M, M.T Series				17-20-1208 £129 £151.58		00-00-0000 £370 £434.75	
Performance 425s/ME, 433/ME, 433s/ME, 450/ME, 466/ME Kit			00-00-0000 £34 £39.95		13-97-1617 £96 £112.80		
Power Desktop 486 D Series				17-20-1208 £129 £151.58	13-97-0817 x2 £238 £279.65	00-00-0000 £370 £434.75	13-97-3217 x2 £474 £556.95
PowerEdge SP 433, 450, 466 Kit				17-20-1208 £129 £151.58	13-97-0817 x2 £238 £279.65	00-00-0000 £370 £434.75	13-97-3217 x2 £474 £556.95
PowerEdge SP 560, 566, 590, 5100 Pentium Series Kit			00-00-0000 £20 £23.50	17-20-3108 £65 £76.38	17-20-1416 £155 £182.13	17-20-3132 £265 £311.38	
PowerEdge XE 433, 433s, 450, 466				17-20-1208 £129 £151.58	13-97-0817 x2 £238 £279.65	00-00-0000 £370 £434.75	13-97-3217 x2 £474 £556.95
PowerEdge XE 560, 566, 590, 5100 Kit			17-20-1004 £79 £92.83	17-20-1008 £95 £111.63	17-20-1016 £169 £198.58		
Powerline Workstation 486 DE, DE/2 Series Kit		17-20-1002 £62 £72.85	17-20-1004 £79 £92.83	17-20-1008 £95 £111.63	17-20-1016 £169 £198.58		
Powerline Workstation 486 SE, SE/2 Series Kit			13-97-0407 £20 £23.50		13-97-1607 £78 £91.65		
Precision 486				17-20-0202 £39 £45.83			
System 31 6SX, 320SX (Rev.1), 325SX Kit		17-20-0501 £35 £41.13		13-97-0418 £34 £39.95			
System 320SX (Rev.2), 325D/P, 333D/P, 433P				17-20-1004 £79 £92.83	17-20-1008 £95 £111.63	17-20-1016 £169 £198.58	
System 425TE, 433TE Kit							
LAPTOPS		2Mb	4Mb	8Mb	16Mb		
System 31 6LT, 320LT, 320LX Kit		17-20-0202 £39 £45.83					
System 325N, 325NC		17-20-0602 £85 £99.88					
Latitude M 433m/mc, 450m/mc, 475mc Series			00-00-0000 £85 £99.88	00-00-0000 £159 £186.83	£279	00-00-0000 £327.83	
Latitude 425, 433, 450 v/ax Series Kit			17-20-5104 £85 £99.88			17-20-5116 £279 £334.88	
Latitude LX 475D, 4100D, 4100T			00-00-0000 £POA	00-00-0000 £POA	00-00-0000 £POA	00-00-0000 £POA	
Latitude XP 450C, 475C, 4100CX			00-00-0000 £POA	00-00-0000 £POA	00-00-0000 £POA	00-00-0000 £POA	
Latitude XPI P75, P90, P90S1, P120			00-00-0000 £POA	00-00-0000 £POA	00-00-0000 £POA	00-00-0000 £POA	

Not sure which module to use ?

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SMC PROVIDES A 7 DAY NO QUIBBLE REFUND GUARANTEE

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NO HIDDEN EXTRAS FROM SMC

Prices in RED Exclude VAT
Prices in Black Include VAT

AST
COMPUTER

Canon

DELL

Panasonic

TOSHIBA

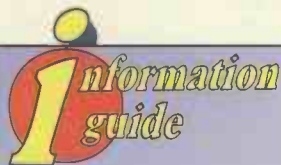
COMPAQ

LEXMARK

IBM

hp HEWLETT
PACKARD

ZENITH
DATA SYSTEMS



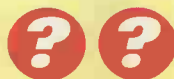
Windows '95 requires a minimum of 8Mb of RAM memory. An upgrade now will do wonders for your systems performance.

'BP' memory simulates parity with 'logic parity' and may cause compatibility problems with some systems that require standard 9bit or 36bit SIMM's that have full parity, self checking built in. Check system requirements, or ask your sales contact who can advise you.

TOSHIBA MEMORY

Ex VAT Inc VAT

LAPTOPS	2Mb	4Mb	8Mb	16Mb	24Mb	32Mb
Portege 610CT/Satellite Pro 410, 415			00-00-0000 £89 £104.58	00-00-0000 £259 £304.33		00-00-0000 £495 £581.63
Satellite 100, 105 Series			17-75-6108 £89 £104.58	17-75-6116 £259 £304.33		17-75-6132 £495 £581.63
Satellite PRO 400, 405 Series			17-75-6108 £89 £104.58	17-75-6116 £259 £304.33		17-75-6132 £495 £581.63
T1000LE	17-75-1302 £59 £69.33	17-75-2004 £69 £81.08	17-75-2008 £145 £170.38			
T1000SE, T1000XE	17-75-1302 £59 £69.33					
T1600	17-75-1202 £69 £81.08					
T1800, T1850, T1850c	17-75-1002 £76 £89.30	17-75-2004 £69 £81.08	17-75-2008 £145 £170.38			
T1900, C, T1910, CS, T1950, C, CS, CT, T1960C, CS, CT		17-75-1904 £49 £57.58	17-75-1908 £85 £99.88	17-75-1916 £185 £217.38		
T200, T200CS (Dynapod)		17-75-1904 £49 £57.58	17-75-1908 £85 £99.88	17-75-1916 £185 £217.38		
T2000, T2000SX	17-75-1002 £76 £89.30	17-75-2004 £69 £81.08	17-75-2008 £145 £170.38			
T2000SxL, T2200SX	17-75-1002 £76 £89.30	17-75-2004 £69 £81.08	17-75-2008 £145 £170.38			
T2100, CS, CT, T2105, CS, CT, T2150CDS, CDJ, T2155 CDS		17-75-2104 £65 £76.38	17-75-2108 £85 £99.88	17-75-2116 £135 £158.63	17-75-2124 £749 £880.08	
T2110, T2115, T2130, T2150		17-75-2104 £65 £76.38	17-75-2108 £85 £99.88	17-75-2116 £135 £158.63	17-75-2124 £749 £880.08	
T2400CS, CT, T2450CT (24Mb, T2450 only)		17-75-3604 £65 £76.38	17-75-3608 £85 £99.88	17-75-3516 £255 £299.63	00-00-0000 £POA £POA	
T3100e	17-75-3202 £55 £64.63					
T3100SX	17-75-3002 £79 £92.83	17-75-3004 £97 £113.98				
T3200, T3200SX	17-75-3102 £65 £76.38	17-75-3304 £85 £99.88				
T3200SXC	17-75-3202 £59 £69.33	17-75-3204 £69 £81.08				
T3300 SL		00-00-0000 £POA £POA		00-00-0000 £POA £POA		
T3400, CT, T3600CT		17-75-3604 £65 £76.38	17-75-3608 £85 £99.88	17-75-3616 £255 £299.63		
T4400SX, SXC, C, DX, C, SX	17-75-4402 £75 £88.13	17-75-4404 £89 £104.58	17-75-4408 £185 £217.38	17-75-4416 £235 £276.13		17-75-4432 £439 £515.83
T4500, C, T4600, C, T4700CS, CT, T4800CT, T485CT, 4900CT		17-75-1904 £49 £57.58	17-75-1908 £85 £99.88	17-75-1916 £185 £217.38		17-75-4732 £1195 £1404.13
T5200, C, T5200/100, 200	17-75-5202 £69 £81.08		17-75-5208 £269 £316.08			
T6400SX, SXC, DX, DXC	17-75-4402 £75 £88.13	17-75-4404 £89 £104.58	17-75-4408 £185 £217.38	17-75-4416 £235 £276.13		17-75-4432 £439 £515.83
T6600C, C/CD, C/CDV		17-75-4404 £89 £104.58	17-75-4408 £185 £217.38	17-75-4416 £235 £276.13		17-75-4432 £439 £515.83
T8500 Desktop	17-75-5202 £69 £81.08		17-75-5208 £269 £316.08			
TECRA 500CS, 500COT Series			17-75-6508 £185 £217.38	17-75-6516 £229 £269.08		17-75-6532 £515 £605.13
TECRA 700CS, 700CT Series			17-75-6308 £185 £217.38	17-75-6316 £229 £269.08		17-75-6332 £515 £605.13
TECRA 710 / 720 Series			17-75-6108 £185 £217.38	17-75-6116 £229 £269.08		17-75-6132 £515 £605.13



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Intel overdrive options for many of the systems listed.



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486 PCI motherboards are fitted with Controllers for Floppy Drives, 4 EIDE devices, 1 Enhanced Parallel and Fast Serial Ports. VESA motherboard versions of TMC 486 based boards require a separate controller.

MOTHERBOARDS - TMC 486

Ex VAT Inc VAT

07-97-0355 **VLB MOTHER BOARD** - TMC 3 x VESA Bus, 4 x ISA Bus, 486 CPU, B socket, OPTI Chipset, AMI/Award BIOS, 4 x 30 pin, 2 x 72 pin, 128Mb max memory, 256Kb cache.

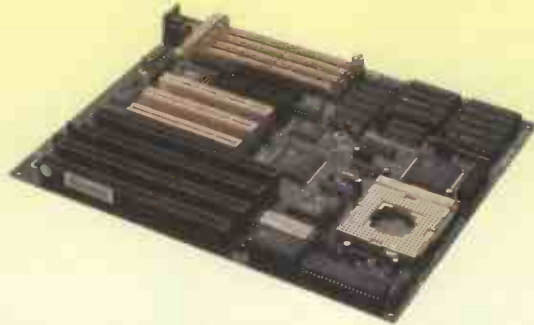
£65
£76.38

MOTHERBOARDS - TMC 486

Ex VAT Inc VAT

07-97-0571 **PCI MOTHERBOARD** TMC 3 x PCI Bus, 4 x ISA Bus 486 CPU, B socket, ALI Chipset, AMI/Award BIOS, 4 x 72 pin, 128Mb max memory, 256Kb cache

£72
£84.60



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MOTHERBOARDS - PENTIUM

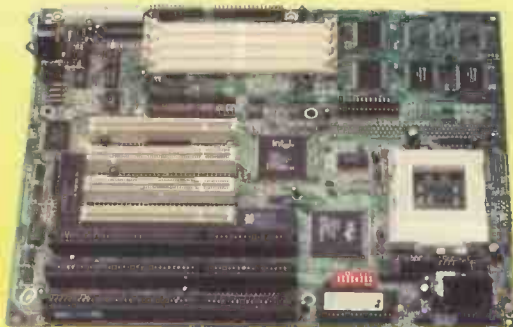
All Pentium motherboards are fitted with controllers for Floppy Drives, 4 EIDE devices, 1 Enhanced Parallel & Fast Serial Ports. They all support pairs of 32bit, 36bit or EDO SIMMs. Windows 95 Plug & Play.

MOTHERBOARDS - TMC PENTIUM

Ex VAT Inc VAT

07-97-5177 TMC 4 x PCI Bus, 3 x ISA Bus, Pentium CPU, C socket 7, Intel VX Chipset, AMI/Award BIOS, 4 x 72 pin, 128Mb max memory, 256Kb Burst Pipeline cache. SDRAM socket.
(TMC 512Kb cache upgrade - part no. MBT-C256-B/VX)

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£104.58



**VX - Designed for SDRAM memory.
Excellent entry level motherboard.**

MOTHERBOARDS - PENTIUM

All Pentium motherboards are fitted with controllers for Floppy Drives, 4 EIDE devices, 1 Enhanced Parallel & Fast Serial Ports. They all support pairs of 32bit, 36bit or EDO SIMMs. Windows 95 Plug & Play.

MOTHERBOARDS - INTEL PENTIUM

Ex VAT Inc VAT

07-31-2031 **Intel 'Marl' ATX*** - P75-P200 Pentium CPU, C socket 7, 3 x PCI, 2 x ISA, 1 x shared PCI/ISA Bus, Intel Triton II, HX Chipset, AMI BIOS, 4 x 72 pin, 128Mb max memory, 256Kb Pipeline Burst cache soldered on, no additional CELP socket.

£105
£123.38

07-31-2041 **Intel 'Tucson' ATX*** - P75-P200

£145 **£170.38**

MOTHERBOARDS - PENTIUM PRO

MOTHERBOARDS - INTEL PENTIUM

Ex VAT Inc VAT

07-31-2051 **Intel 'Venus' ATX*** - Pentium Pro Socket 8, D Socket, 150/180/200MHz, 4 x 72 pin SIMM, 128 Mb max memory, 4 x PCI 2/3 ISA Slots, Intel Natoma chipset, PS2 Mouse/Motherboard style connector, 2 x Serial, 1 x Parallel Port.

£209
£245.58

Cache memory for Atlantis, Endeavour, TMC only available when purchasing Motherboard.

07-95-0251 - 256Kb Asynchronous	£24	£28.20
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07-95-0257 - 256Kb Pipeline burst for 07-97-5177 M/board	£POA	£POA
07-97-0256 - 256Kb Pipeline burst for 07-97-5175 M/board	£30	£35.25
07-95-0513 - 512Kb Pipeline burst	£59	£69.33

CPU SOCKET TYPES

A = ZIF-DX2 + Pentium Overdrive. B = ZIF-DX4 + Pentium Overdrive.
C = Pentium processor. D = Pentium Pro Processor.

***ATX MOTHERBOARDS REQUIRE ATX CASES (SEE CASES PAGE) PHONE TODAY FOR DETAILS AND PRICING.**

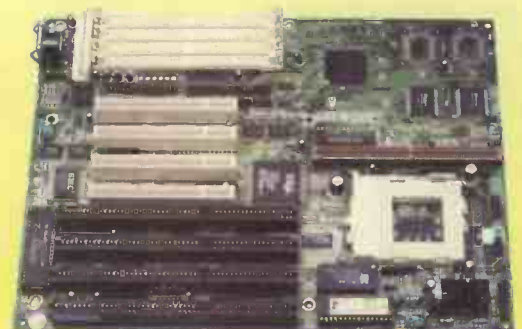
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MOTHERBOARDS - TMC PENTIUM

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07-97-5175 TMC 4 x PCI Bus, 3 x ISA Bus, Pentium CPU, C socket 7, Intel Triton II HX Chipset, AMI/Award BIOS, 4 x 72 pin, 128Mb max memory, 256Kb Burst Pipeline cache, upgradable to 512Kb with separate CELP socket. (TMC 512k upgrade part no. MBT-C256-B)

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£111.63



**HX - Triton II, optimised for EDO memory.
Latest chipset available.**

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PENTIUM P75,P90,P100 (3V)

09-31-5123 Pentium 125MHz OverDrive, 296-pin, 3v, built on fan, for a PENTIUM running at 75MHz with a Socket 5 or 7 ZIF

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09-31-5163 Pentium 166MHz OverDrive, 296-pin, 3v, built on fan, for a PENTIUM running at 100MHz with a Socket 5 or 7 ZIF
FOR PENTIUM P75, P90, P100 BASED SYSTEMS (3V)

£299 £351.33

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09-31-5105 Pentium 120/133MHz OverDrive, 273-pin, 5v, built on fan, for a PENTIUM running at 60 or 66MHz with a Socket 4 ZIF
For Pentium P60, P66 based systems (5v)

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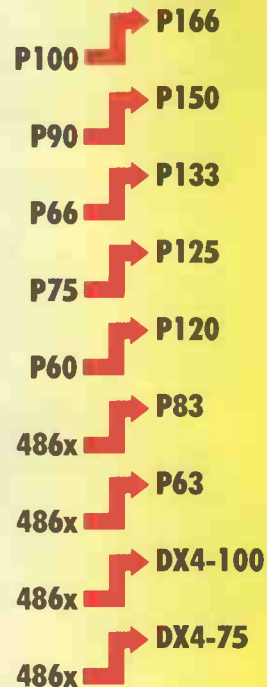
STEP 3



STEP 4



OVERDRIVES



PROCESSORS

PENTIUM PRO PROCESSORS

09-31-3200 Intel Pentium Pro 200MHz - with 256k cache

Ex VAT Inc VAT

£399 £468.83

486

09-17-4066 Cyrix 486DX2-66 - 66MHz, 168-pin, 5V
09-05-4100 AMD 486DX4-100 - 100MHz, 168-pin, 3.3v
09-17-4105 Cyrix 5X86-100 - 100MHz, 168-pin, 3.3v

Ex VAT Inc VAT

£19 £22.33

£23 £27.03

£42 £49.35

PENTIUM PROCESSORS

09-17-5106 Cyrix 6X86-100 - P120, 296-pin, 3.3v

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09-31-2133 Intel Pentium P133 - 133MHz, 296-pin, 3.3v

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09-31-2200 Intel Pentium P200 - 200MHz, 296-pin, 3.3v

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HEAT SINKS

Fan assisted units only available when purchasing CPU. We recommend the use for all CPUs.
09-95-4240 486 processor low profile £7 £8.23
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The Sportster Voice will automatically detect an incoming fax or voice call and switch functions to detect it.

Multiple voice mailboxes:

Allows each person in your home or office to retrieve messages conveniently and even listen to their messages at another location.

Fax on demand:

Up to 100 preconfigured faxes can be directed instantly to the callers fax machine for popular information such as price lists etc.

Hands free telephone:

The speaker phone facility allows the Sportster Voice to be used as a telephone.*

*A Soundcard, external speaker or headset is required to utilise all voice features including hands-free.

In the world of modems, it's one of the most impressive performers around, capable of **running up to 33,600bps.** Which is why SMC has come up with an equally impressive price - "IT's good to talk".

MODEMS

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US Robotics - SPORTSTER Range - 5YR Warranty, free Lifetime tech. support

Features and benefits:- Compact, easy to use products designed to offer the fastest connection to the outside world. Based on an Award winning series - their performance, features, reliability & low price are hard to beat.

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91-79-2892 Sportster 33.6 Voice, 33,600bps Data Speed, Internal 14,400bps Fax Speed, with Data and Fax software	£133	£156.28
91-79-1466 Sportster 14.4 VI, 14,400bps Data/Fax Speed, External personal voice messaging (with voice mail/Data/Fax/Internet software & cables)	£76	£89.30
91-79-2896 Sportster 33.6 Voice, 33,600bps max. Data Speed, External 14,400bps Fax Speed, (with voice mail/Data/Fax/Internet software & cables)	£133	£156.28
91-79-4288 Sportster 28.8 PCMCIA XJACK, 28,800bps Data Speed, 14,400bps Fax Speed uses standard PCMCIA Type II/III slot, inc. software	£131	£153.93

US Robotics - COURIER Range - 5YR Warranty, free Lifetime tech. support

Features and benefits:- Dial security with passwords for optimum security, Adaptive Speed Levelling (reduces speed in the transmit & receive channels when line conditions are poor), automatic Fax/Data selection, Universal Connect - automatically detects & connects at the fastest speed. Upgradable flash memory. For the communications professional looking for advanced performance at an affordable price - the COURIER delivers.

91-79-3402 Courier Dual Standard V34 + Fax, 33,600bps Data Speed, Internal 14,400bps Fax Speed, with Data and Fax software	£197	£231.48
91-79-3406 Courier Dual Standard V34 + Fax, 33,600bps Data Speed, External 14,400bps Fax Speed, with Data and Fax software	£197	£231.48

Creative Labs

57-15-5111 Creative Labs PhoneBlaster message centre, 28,800bps, with built in 16-bit stereo, Voicemail & music on hold. IDE CD int., 14,400bps Fax Speed, Internal

91-91-1342 Linnet 34FX, 28.8Kbps Data Speed, 14,400bps Fax Speed, External	£135	£158.63
91-91-1340 Linnet 34FX, 28.8Kbps Data Speed, 14,400bps Fax Speed, Internal	£149	£175.08
91-91-3206 Microlin NB34 PCMCIA, 28,800bps Data Speed, 14,400bps Fax Speed, External	£135	£158.63
91-91-1362 Message Desk 34, 28.8Kbps Data, 14.4Kbps Fax Speed & Voice, External	£155	£182.13

MODEMS

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Pace

91-91-1360 Message Desk 34, 28.8Kbps Data, 14.4Kbps Fax Speed & Voice, Internal	£155	£182.13
91-91-2022 Netlink Gold, 28,800bps Data Speed, 14,4Kbps Fax Speed, Internet Bundle, External	£119	£139.83
91-91-2020 Netlink Gold, 28,800bps Data Speed, 14,4Kbps Fax Speed, Internet Bundle, Internal	£119	£139.83

Modular Technology

91-97-2400 V32 Plus Fax, 14,400bps Data/Fax Speed, External	£115	£135.13
91-97-2402 V32 Plus PC, 14,400bps Data/Fax Speed, External	£115	£135.13
91-97-2620 V34 Plus Fax, 28,800bps Data Speed, 14,400bps Fax Speed, External	£199	£233.83
91-97-2622 V34 Plus PC, 28,800bps Data Speed, 14,400bps Fax Speed, External	£205	£240.88
91-97-2624 V34 Plus PCMCIA, 28,800bps Data Speed, 14,400bps Fax Speed, External	£185	£217.38

Motorola

91-97-5128 3400 Online, 28,800bps Data Speed, 14,400bps Fax Speed (with Internet Software), External	£112	£131.60
91-97-5328 3400 Pro, 28,800bps Data Speed, 14,400bps Fax Speed, External	£105	£123.38

Hayes

91-95-1314 Accura 14.4, 14,400bps Data/Fax Speed, External	£77	£90.48
91-95-1328 Accura 28.8, 28,800bps Data Speed, 14,400bps Fax Speed, External	£116	£136.30

NETWORK CABLES

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86-95-1371 Thin Ethernet cable, segments made to order	£0.90/metre	£1.06
86-95-1311 BNC solderless crimp connectors	£2.50	£2.94
86-95-1353 BNC Ethernet terminator	£5	£5.88
86-95-1331 BNC T piece	£6	£7.05

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- QUALITY** - unparalleled Motorola quality and reliability
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KEYBOARDS & MICE Ex VAT Inc VAT**KEYBOARDS****GENERIC**

82-50-3505 iFor Windows 95 - 105 keys, 5-pin DIN connector £19 £22.33

CHERRY

82-91-3595 Cherry G81 3000 Lamb - 105 keys, 5-pin DIN connector, soft touch £27 £31.73

82-91-3597 Cherry G80 - 3000HFM - PS/2, 102 keys, 6-pin DIN connector, click touch £45 £52.88

82-91-3599 Cherry G80 3000 HPM- 105 keys, 5-pin DIN connector, click touch £48 £56.40

MICE**GENERIC**

82-53-3151 Mouse - 9-pin serial, 2 buttons £11 £12.93

MICROSOFT

82-50-3192 Microsoft 'Home' - 9-pin serial, 2 buttons £25 £29.38

LOGITECH

82-97-1511 Pilot Mouse, New shape - 9-pin serial, 3 buttons £16 £18.80

82-97-1531 MouseMan 96 - 9-pin serial, 3 buttons, designed to be faster for Windows (Win 3.1x & W95) use £32 £37.60

82-97-0202 Pilot Trackball - 9-pin serial, 2 buttons, 200dpi £25 £29.38

82-97-1317 Trackman Live - 9-pin serial, 3 buttons, 400dpi £102 £119.85

82-97-1315 Trackman Portable - 9-pin serial, 3 buttons, 200dpi £32 £37.60

82-97-1319 Trackman Vista - 9-pin serial, 3 buttons, 320dpi £42 £49.35

82-97-1313 Trackman Voyager - 9-pin serial, 3 buttons, 250dpi £45 £52.88

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84-91-2011 Novell NE 2000+ - 16-bit ISA Bus, for workstations/small servers	£49	£57.58	
SMC			
SMC E16 - 16-bit ISA Bus, for workstations/small servers	84-93-1611 £55	84-93-1631 £64.63	84-93-1651 £56
	84-93-2411 £58		84-93-2451 £65
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84-93-1811 SMC E16/MCA - MCA Bus, for IBM workstations/small servers	£125	£146.88	
3COM			
3COM 509 - 16-bit ISA Bus, for high end workstations/servers	84-90-0911 £65	84-90-0931 £76.38	84-90-0951 £75
84-90-8951 3COM 589 - PCMCIA Bus, for laptops			£88.13
00-00-0000 3COM 590 - PCI Bus, for high end workstations/servers			£129
00-00-0000 3COM 595 - PCI Bus, for high end workstations/servers			£116.33
			£POA
			£POA
COMPEX			
00-00-0000 Compex V16 - 16-bit ISA Bus, for workstations/small servers.	£33	£38.78	

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70-97-1000 Standard Desktop, 200w PSU, 2 x 3.5" bays, 3 x 5.25" bays	£39	£45.83
70-97-1510 Mini Tower, 200w PSU, 3 x 3.5" bays, 2 x 5.25" bays	£39	£45.83
70-97-1730 Midi Tower, 200w PSU, 5 x 3.5" bays, 3 x 5.25" bays	£55	£64.63
70-97-1910 Full Tower, 200w PSU, 3 x 3.5" bays, 6 x 5.25" bays	£65	£76.38
70-97-3730 AIX - Midi Tower, 200w PSU, 4 x 3.5", 3 x 5.25" bays	£119	£139.83
70-97-3930 AIX - Full Tower, 200w PSU, 5 x 3.5" low profile, 5 x 5.25" bays	£135	£158.63

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A 95-95-0805 T1000 (TR1)	£21	£24.68
B1 95-95-0250 DC2120 unformatted	£8	£9.40
B2 95-95-0125 DC2120 pre-formatted	£12	£14.10
C 95-95-0150 DC6150	£10	£11.75
D 95-95-0250 DC6250	£14	£16.45
E 95-95-0520 DC6525	£14	£16.45
F 95-95-1000 DC9100	£23	£27.03
G 95-95-9409 DAT 4mm 90metre	£7	£8.23
H 95-95-9412 DAT 4mm 120metre	£14	£16.45
I 00-00-0000 DC2120XL pre-formatted	£16	£18.80
J1 95-95-0680 DC3000XL unformatted	£15	£17.63
J2 00-00-0000 DC3000XL pre-formatted	£22	£25.85
K 95-95-1365 DC1400	£26	£30.55
L 95-95-3405 TR3	£25	£29.38
N 95-95-8005 TR4	£POA	£POA
M 95-95-4005 DC3080XLF	£26	£30.55

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95-95-9130 DAT (4mm TCDAT) 4mm Tape Cleaner	£12	£14.10
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SCSI MOUNTING KITS Ex VAT Inc VAT

79-97-3502 Removable drive caddy for 3.5" drives. Requires 5.25" mounting bay.	£39	£45.83
79-97-3504 Metal version of above plus high performance drive support.	£69	£81.08
79-95-1135 Mounts 3.5" drive into a 5.25" bay. All screws supplied. No slide rails.	£10	£11.75

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MEMORY SIZE

- 4Mb 32Mb
 8Mb 64Mb
 16Mb 128Mb

MEMORY TYPE

- Non-Parity
 Parity
 EDO
 SDRAM (VX Chipset)

SOUND CARD

- SoundBlaster**
 SB16+ - PNP
 SB32+ - PNP
 AWE32+ - PNP
 Other (please specify)

MONITORS

- All monitors are SVGA non-interlaced
- 14" 15"
 17" 20"
 21" Other (please specify)

GRAPHICS CARD

- 1Mb DRAM
 2Mb DRAM
 2Mb VRAM
 4Mb VRAM
 2Mb MYSTIQUE
 4Mb MYSTIQUE
 2Mb MILLENIUM
 4Mb MILLENIUM
 Other (please specify)

OPERATING SYSTEM

- DOS-6.22 & Windows 3.11
 Windows 95 (CD)

PRINTER Please specify your choice

HARD DRIVE

- Interface**
EIDE **SCSI-2**
 540Mb
 1.0Gb
 1.2Gb
 1.7Gb
 2.1Gb
 2.5Gb
 4.3Gb

Other (please specify)

PROCESSOR

- 486**
 DX2-66
 DX4-100
Intel Pentium®
 P100 P150
 P120 P166
 P133 P200

FLOPPY DRIVE

- 3.5" DUAL

CD ROM DRIVE

- Interface**
EIDE **SCSI-2**
 6X Speed
 8X Speed
 10X Speed

CASE

- Desktop
 Mini Tower
 Full Tower

KEYBOARD

- Win 95 Ready 105 Key
 Cherry 105 Key

SPEAKERS

- None
 10 Watt
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MODEM

- Internal** **External**
 14.4Kb/s
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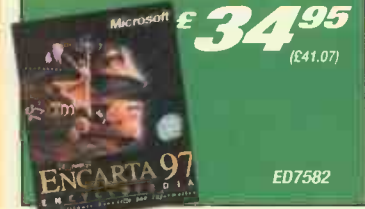
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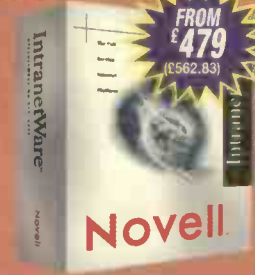
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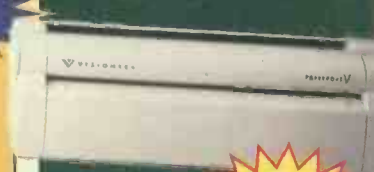
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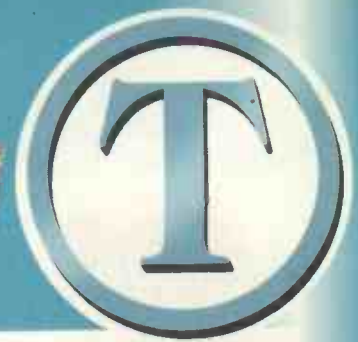


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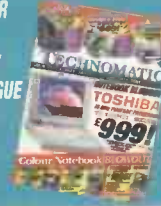
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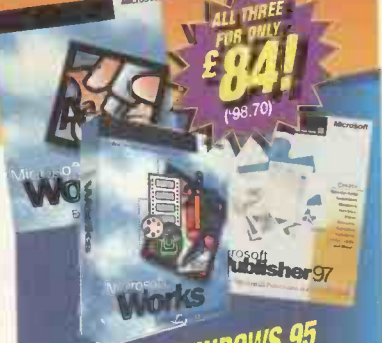
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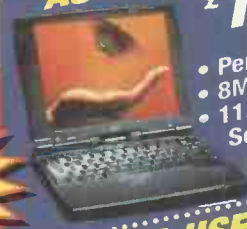
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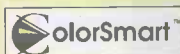
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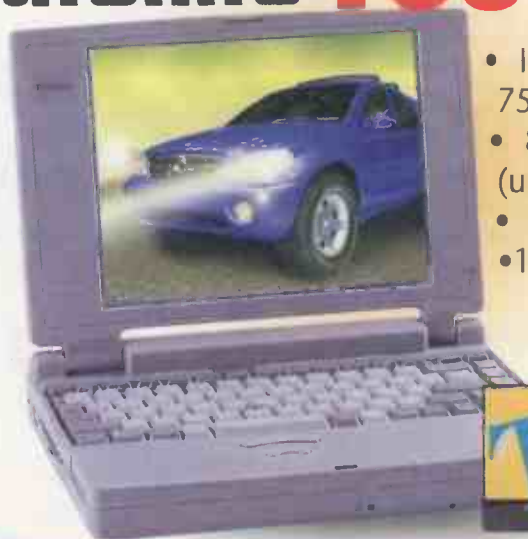
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Satellite 110cs



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Item	Model	Screen	CPU	RAM/MAX	HDD (MB)	Price	Inc VAT
EURCP3040	Sat 100CS	10.4 STN	5/75	8MB/40MB	520	£999	£1173.83
EURCP3581	Sat 110CS	11.3" STN	5/100	8MB/40MB	810	£1099	£1291.33
EURCP3580	Sat 110CT	11.3" TFT	5/100	8MB/40MB	810	£1525	£1791.88
CP3893	Sat 2000CDS New	11.3" STN	5/100	8MB/40MB	1350	£1355	£1592.13
CP3899	Sat 2000CDT New	11.3" TFT	5/100	8MB/40MB	1350	£1779	£2090.33
EURCP3582	420CDS	11.3" STN	5/100	8MB/40MB	810	£1525	£1791.88
EURCP3583	420CDT	11.3" TFT	5/100	8MB/40MB	810	£2119	£2489.83
EURCP3579	420CDT	11.3" TFT	5/100	8MB/40MB	1350	£2289	£2689.58
CP3898	Sat Pro 430CDS New	11.3" STN	5/120	16MB/48MB	1350	£1865	£2191.38
CP3897	Sat Pro 430CDS New	11.3" TFT	5/120	16MB/48MB	1350	£2545	£2990.38
EURUP1670	8MB Memory Upgrade Module for Satellite Series					£225	£264.38
EURMY1671	16MB Memory Upgrade Module for Satellite Series					£425	£499.38

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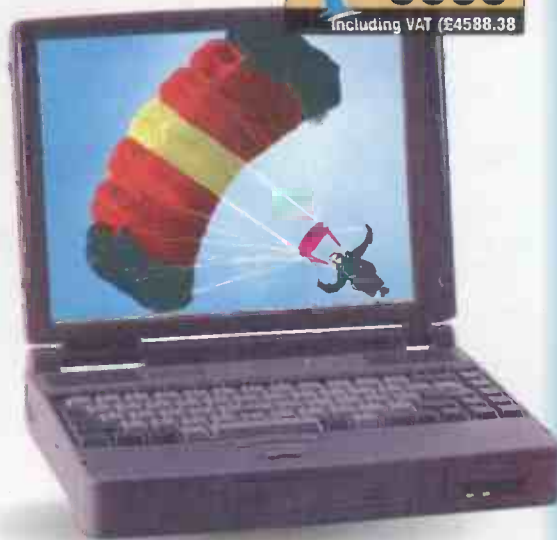
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EURCP3332	500CDT	12.1" TFT	5/120	16MB/144MB	1350	£2759	£3241.83
CP3896	Tecra 510CDS New	12.1" STN	5/133	16MB/144MB	1350	£2289	£2689.58
CP3895	Tecra 510CDS New	12.1" TFT	5/133	16MB/144MB	1350	£3395	£3989.13
CP3541	720CDT	12.1" TFT	5/133	16MB/144MB	2168	£3565	£4188.88
CP3687	730CDT	12.1" TFT	5/150	16MB/144MB	2168	£3905	£4588.38
EURCP3578	620CT	10.4" TFT	5/100	8MB/40MB	1350	£1836	£2157.30
EURCP3576	650CT	11.3" TFT	5/133	16MB/80MB	1350	£2799	£3288.83
CP3894	Portege 660CDT New	11.3" TFT	5/150	16MB/80MB	1440	£3395	£3989.13
MY6234	8MB Memory Upgrade Module for Tecra 500					£219	£257.33
MY6255	16MB Memory Upgrade Module for Tecra 500					£425	£499.38
EURUP1670	8MB Memory Module for Tecra 700 series					£225	£264.38
EURMY1671	16MB Memory Module for Tecra 700 series					£425	£499.38

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THINKPAD 700,700C,720,720C,750,755 PS/2 CLS75X	4MB	EURMY1017	£89	£104.58
	8MB	EURMY1018	£159	£186.83
THINKPAD 330/340/355/360/730C/370	4MB	EURMY1019	£69	£81.08
	8MB	EURMY1020	£159	£186.83
THINKPAD 701C SERIES, 701CS SERIES	4MB	EURMY1012	£79	£92.83
	8MB	EURMY1013	£99	£116.33
	16MB	EURMY1014	£189	£222.08
THINKPAD 760C, 760CD	8MB	EURMY1570	£139	£163.33
	16MB	EURMY1571	£299	£351.33
	32MB	EURMY1572	£939	£1103.33
THINKPAD 820, 850 POWER SERIES INSTALL IN PAIRS	4MB	EURMY1579	£79	£92.83
	8MB	EURMY1585	£149	£175.08
	16MB	EURMY1584	£229	£269.08
PS/2 L405X,PS/NOTE 182, PS/NOTE 2141,N82 THINKPAD 350/C,710T	2MB	EURMY1015	£39	£45.83
	4MB	EURMY0998	£79	£92.83
	8MB	EURMY1000	£119	£139.83
	16MB	EURMY1001	£229	£269.08
PC 700 SERIES	4MB	EURMY1028	£69	£81.08
	8MB	EURMY0981	£119	£139.83
	16MB	EURMY1025	£209	£245.58
	32MB	EURMY1594	£419	£492.33
PS/2 EXP-BOARD FOR PS/2 70 & 80 SERIES ADD ON	2MB	EURMY1030	£139	£163.33
	4MB	EURMY1029	£199	£233.83
ADD ON	2MB	EURMY0988	£39	£45.83
ADD ON	4MB	EURMY0957	£89	£104.58
PS/VP 6381-FY1/FYE/KYO/MYO/MY1/VYO,433DX/SI	4MB	EURMY1028	£69	£81.08
	16MB	EURMY1025	£209	£245.58
PS/VP 6382-C20/C21/C41/C2A/C4A/F3C/K3C/MSC/AWSC/MSD/WSD/C/K/F/W	4MB	EURMY0974	£89	£104.58
	8MB	EURMY0981	£119	£139.83
	16MB	EURMY1025	£209	£245.58
PS/VP 6384 F/M/W SERIES (EXCEPT F00/F20/F23/F40/F43/M00/M20/M40/M43/M50/M53/W40/W53)	4MB	EURMY0974	£89	£104.58
	8MB	EURMY0981	£119	£139.83
	16MB	EURMY1025	£209	£245.58
PS/VP 6384 F00/F20/F23/F40/F43/M00/M20/M40/M43/M50/M53/W40/W53	4MB	EURMY0965	£98	£115.15
	16MB	EURMY0967	£298	£350.15
PS/VP C00/C2A/C20/C4A/C40	2MB	EURMY1002	£35	£41.13
	4MB	EURMY0957	£89	£104.58
	8MB	EURMY1009	£119	£139.83
PS/1 2133-C43/W43/S43/174/154, 2155-C44/W44/S44	4MB	EURMY0965	£98	£115.15
	16MB	EURMY0967	£298	£350.15
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	£29	£34.08
	2MB	EURMY1002	£39	£45.83
	4MB	EURMY0974	£89	£104.58
	8MB	EURMY0981	£119	£139.83
PS/1 2133-S71/642/652, PS/1 2168-S74/584/594/653/873 PS/1 2155-S82/S92/S93	4MB	EURMY0996	£49	£57.58
	8MB	EURMY0997	£89	£104.58
	16MB	EURMY1239	£238	£297.65
APTIVA	4MB	EURMY1245	£22	£25.85
	8MB	EURMY1249	£43	£50.53
HURDLA 486 SERIES SPRINTA 486DX/DX2/SX	4MB	EURMY0698	£98	£115.15
	16MB	EURMY0699	£238	£297.65
SPRINTA II	4MB	EURMY0701	£49	£57.58



SYSTEM	SIZE	CODE	PRICE	INC VAT
ASCENTIA 800N,810N	4MB	EURMY1333	£99	£116.33
	8MB	EURMY1334	£159	£186.83
	16MB	EURMY1339	£279	£327.83
ASCENTIA 900N, 910N	4MB	EURMY1501	£99	£116.33
	8MB	EURMY1502	£149	£175.08
	16MB	EURMY1503	£269	£316.08
ASCENTIA 950N	8MB	EURMY1631	£155	£182.13
	16MB	EURMY1503	£299	£351.33



SYSTEM	SIZE	CODE	PRICE	INC VAT
LTE 5000, 5100, 5200	8MB	EURMY1491	£109	£128.08
	16MB	EURMY1492	£199	£233.83
CONTURA 400/410 420/430	4MB	EURMY0808	£79	£92.83
	8MB	EURMY0809	£179	£210.33
CONTURA 4/25,CX,EX	4MB	EURMY0821	£69	£81.08
	8MB	EURMY0822	£99	£116.33
	16MB	EURMY0823	£199	£233.83
CONTURA AERO	4MB	EURMY0830	£59	£69.33
	8MB	EURMY0831	£99	£116.33
CONCERTO ,LTE ELITE	4MB	EURMY0824	£79	£92.83
	8MB	EURMY0825	£119	£139.83
	16MB	EURMY0826	£199	£233.83
LTE LITE 4/25,4/25C, 4/25E,4/33C	4MB	EURMY0802	£79	£92.83
	8MB	EURMY0803	£119	£139.83
	16MB	EURMY0804	£199	£233.83
DESKPRO XL 450, 466, 5100 S120, S75, S90	8MB	EURMY0832	£138	£162.15
	16MB	EURMY1599	£238	£297.65
	32MB	EURMY1600	£418	£491.15
DP 3/25I, 3/33I,4/25IS, 4/33I,4/66I	1MB	EURMY0782	£29	£34.08
	2MB	EURMY0760	£39	£45.83
	4MB	EURMY0772	£69	£81.08
	8MB	EURMY0812	£119	£139.83
NEW PROLINE 4/50,4/66,4/100 NEW DP 4/66,4/100	4MB	EURMY0827	£69	£81.08
	8MB	EURMY0828	£119	£139.83
	16MB	EURMY0829	£209	£245.58
PROLINE 3/25S,32S2S	2MB	EURMY0800	£48	£56.40
	8MB	EURMY0801	£158	£185.65
PROLINE 4/25S,4/33,4/50, 4/66,CDS,PRESARIO	1MB	EURMY0784	£29	£34.08
	2MB	EURMY0786	£39	£45.83
	4MB	EURMY0790	£69	£81.08
	8MB	EURMY0795	£119	£139.83
PROLIANT 1000 486DX2-66	1MB	EURMY0784	£29	£34.08
	2MB	EURMY0786	£39	£45.83
	4MB	EURMY0790	£69	£81.08
	8MB	EURMY0795	£119	£139.83
PROLINE MT 4/33S,MT 4/50, MT 466	1MB	EURMY0784	£29	£34.08
	2MB	EURMY0786	£39	£45.83
	4MB	EURMY0790	£69	£81.08
	8MB	EURMY0795	£119	£139.83
PROSIGNIA PC SERVERS	4MB	EURMY0772	£69	£81.08
	8MB	EURMY0812	£119	£139.83
	16MB	EURMY0805	£209	£245.58
PRESARIO 720CDS, 724CDS, 744, 744CDS, 920CDS, 924, 954, 972CDS, 978CDTV, 982CDS, 992CDS	4MB	EURMY827	£69	£81.08
	8MB	EURMY826	£119	£139.83
	16MB	EURMY829	£209	£245.58
	32MB	EURMY1609	£419	£492.33
P486,P486/66,P486C,P486C/66 PORTABLES	2MB	EURMY0760	£39	£45.83
	4MB	EURMY0772	£69	£81.08
	8MB	EURMY0812	£119	£139.83
DESKPRO XE 433S,450,466	2MB	EURMY0760	£39	£45.83
	4MB	EURMY0772	£69	£81.08
	8MB	EURMY0812	£119	£139.83
PROLINE MT	2MB	EURMY0786	£39	£45.83
	4MB	EURMY0790	£89	£104.58
	8MB	EURMY0795	£119	£139.83
	16MB	EURMY0805	£209	£245.58
PROLINE NET 1-25S/E/TR	2MB	EURMY0786	£39	£45.83
	4MB	EURMY0790	£89	£104.58
	8MB	EURMY0795	£119	£139.83
PRESARIO CDS 633,CDS 860,660	4MB	EURMY0790	£89	£104.58
	8MB	EURMY0795	£119	£139.83
	16MB	EURMY0805	£209	£245.58



SYSTEM	SIZE	CODE	PRICE	INC VAT
SATELLITE PRO 400, PORTEGE 610C(EDO)	8MB	EURMY1309	£175	£205.63
	16MB	EURMY1308	£299	£351.33
	32MB	EURMY1462	£429	£504.08
TECRA 700CS, 700CT	8MB	EURMY1610	£199	£233.83
	16MB	EURMY1611	£299	£351.33
	32MB	EURMY1612	£659	£774.33
T2000/SX/SXC,T2200SX,T1800, T1850,T1850C,T1000LE	2MB	EURMY1142	£69	£81.08
	4MB	EURMY1146	£89	£104.58
	8MB	EURMY1176	£119	£139.83
T2100 SERIES,T2150	4MB	EURMY1172	£69	£81.08
	8MB	EURMY1173	£139	£163.33
	16MB	EURMY1304	£199	£233.83
T2400/T3600/T2450	4MB	EURMY1165	£79	£92.83
	8MB	EURMY1168	£119	£139.83
	16MB	EURMY1170	£199	£233.83
T3400	4MB	EURMY1165	£79	£92.83
	8MB	EURMY1168	£119	£139.83
	16MB	EURMY1169	£199	£233.83
T4400C/SX/SXC,T6400 T6600 SERIES	2MB	EURMY1144	£69	£81.08
	4MB	EURMY1149	£89	£104.58
	8MB	EURMY1177	£129	£151.58
	16MB	EURMY1159	£199	£233.83
T4500,T4600,T1900C,1910 1950C,1960,T4700 SERIES T4800,4850 SERIES,DYNAPAD	4MB	EURMY1161	£79	£92.83
	8MB	EURMY1163	£119	£139.83
	16MB	EURMY1164	£249	£292.58
TS200/TS200C/T8500	2MB	EURMY1154	£69	£81.08
	8MB	EURMY1178	£149	£175.08



SYSTEM	SIZE	CODE	PRICE	INC VAT
VECTRA 486 VL	1MB	EURMY0892	£29	£34.08
	2MB	EURMY0894	£35	£41.13
	4MB	EURMY0899	£69	£81.08
	8MB	EURMY0902	£119	£139.83
VECTRA VL2/VL3	4MB	EURMY0916	£49	£57.58
	8MB	EURMY0917	£89	£104.58
	16MB	EURMY0918	£169	£198.58
VECTRA VL4, VECTRA 500 TOWER, VE PENTIUM SERIES EDO MEMORY	8MB	EURMY1624	£108	£126.90
	16MB	EURMY1623	£188	£220.90
	32MB	EURMY1622	£358	£420.65
VECTRA 486-25N/33N/50N/66N NETSERVER LE SERIES 486XM SERIES	2MB	EURMY0894	£49	£57.58
	4MB	EURMY0899	£69	£81.08
	8MB	EURMY0902	£119	£139.83
	16MB	EURMY0907	£209	£245.58
NETSERVER LC, INSTALL IN PAIRS LH PENTIUM SERIES	4MB	EURMY1621	£69	£81.08
	8MB	EURMY1617	£119	£139.83
	16MB	EURMY0918	£209	£245.58
	32MB	EURMY1618	£419	£492.33
OMNI BOOK 530,600C	4MB	EURMY1318	£139	£163.33
	8MB	EURMY1319	£269	£316.08



SYSTEM	SIZE	CODE	PRICE	INC VAT
486P/66/50/33/25/20/16, 486D/66/50/33/25/20D/16	1MB	EURMY0847	£29	£34.08
	4MB	EURMY0849	£89	£104.58
	16MB	EURMY0852	£209	£245.58
PERFORMANCE ME SERIES	8MB	EURMY0863	£138	£162.15
	32MB	EURMY0865	£418	£491.15
PERFORMANCE T/L/M SERIES, 466I,433/SI	4MB	EURMY0860	£49	£57.58
	16MB	EURMY0861	£169	£198.58
DIMENSION XPS P100, P100C, P120C, P133C, P60, P75, P90, OPTIPLEX XL/XM/XMTS90, S100, S120, S75	8MB	EURMY1613	£108	£126.90
	16MB	EURMY1614	£188	

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Code	Configuration	Price	Inc	VAT
30 PIN PARITY SIMMS				
EURMY1219	1MB X 9-60NS 3 CHIP	£19.95	£23.44	
EURMY1221	1MB X 9-70NS 9 CHIP	£15.95	£18.74	
EURMY1222	1MB X 9-70NS 3 CHIP	£13.95	£16.39	
EURMY1225	1MB X 9-80NS 3 CHIP	£22.95	£26.97	
EURMY1229	4MB X 9-60NS	£49.95	£58.69	
EURMY0405	4MB X 9-70NS 9 CHIP	£45.95	£53.99	
EURMY1230	4MB X 9-70NS 3 CHIP	£39.95	£46.94	
CACHE RAM (SRAM)				
EURMY1189	32K X 8-20NS (28PIN)	£5.95	£6.99	
EURMY1190	32K X 8-15NS (28PIN)	£4.95	£5.82	
EURMY1192	128K X 8-20NS (32PIN)	£17.95	£21.09	
DRAM				
EURMY1194	1MB X 1-70NS (DIL)	£4.50	£5.29	
EURMY1208	256K X 4-60NS (DIL)	£5.50	£6.46	
EURMY1210	256K X 4-70NS (DIL)	£4.95	£5.82	
EURMY1212	256KX16-70NS (SOI)	£14.95	£17.57	
EURMY1559	256K X 16-60NS (SOI)	£19.95	£23.44	

Code	Configuration	Size	Price	Inc	VAT
72PIN NON PARITY SIMMS					
EURMY1244	1MB X 32-60NS	4MB	£19.95	£23.44	
EURMY1245	1MB X 32-70NS	4MB	£17.95	£21.09	
EURMY1250	2MB X 32-60NS	8MB	£39.95	£46.94	
EURMY1249	2MB X 32-70NS	8MB	£36.95	£43.42	
EURMY1253	4MB X 32-60NS	16MB	£84.95	£99.82	
EURMY1252	4MB X 32-70NS	16MB	£79.95	£93.94	
EURMY1293	8MB X 32-60NS	32MB	£189.00	£222.08	
EURMY1254	8MB X 32-70NS	32MB	£179.00	£210.32	
72PIN EDO SIMMS					
EURMY1336	1MB X 32-60NS	4MB EDO	£19.95	£23.44	
EURMY1332	2MB X 32-60NS	8MB EDO	£39.95	£46.94	
EURMY1555	4MB X 32-60NS	16MB EDO	£89.95	£105.89	
EURMY1647	8MB X 32-60NS	32MB EDO	£199.00	£233.82	
72PIN PARITY SIMMS					
EURMY1235	1MB X 36-70NS	4MB	£32.95	£38.72	
EURMY1237	2MB X 36-70NS	8MB	£64.95	£76.32	
EURMY1238	4MB X 36-60NS	16MB	£119.00	£105.69	
EURMY1239	4MB X 36-70NS	16MB	£109.00	£128.08	
EURMY1241	8MB X 36-70NS	32MB	£219.00	£257.33	

Matched Memories for Printers



SYSTEM	SIZE	CODE	PRICE	INC	VAT
LASERJET IIP/II+/III/IIID/IIP	1MB	EURMY0929	£59	£66.33	
	2MB	EURMY0931	£95	£111.63	
	4MB	EURMY0941	£165	£193.88	
LASERJET II/IIID	1MB	EURMY0928	£65	£76.38	
	2MB	EURMY0935	£99	£116.33	
	4MB	EURMY0940	£169	£198.58	
DESIGNJET 200/600/650C	4MB	EURMY0939	£45	£52.88	
	8MB	EURMY0945	£79	£92.83	
PAINTJET XL300 (EXP. BOARD REQUIRED)	1MB	EURMY0924	£29	£34.08	
	2MB	EURMY0932	£49	£57.58	
	4MB	EURMY0936	£45	£52.88	
	8MB	EURMY0942	£79	£92.83	
EXP. BOARD	0MB	EURMY0950	£45	£57.58	
LASERJET 4/4M/4SI/4SIMX/5SI III/SI, DESKJET 1200C	1MB	EURMY0924	£29	£34.08	
	2MB	EURMY0932	£49	£57.58	
	4MB	EURMY0936	£45	£57.58	
	8MB	EURMY0942	£79	£92.83	
LASERJET 5L	1MB	EURMY1328	£39	£45.83	
	2MB	EURMY1329	£59	£69.3e	
	4MB	EURMY1327	£99	£116.33	
LASERJET 4L	1MB	EURMY0927	£35	£41.13	
LASERJET 4P/4MP/4+4M+/4V/4MV/S V/5MV/5P/5MP/COLOR/D11600C/CM	1MB	EURMY0926	£29	£34.08	
	2MB	EURMY0934	£35	£41.13	
	4MB	EURMY0938	£29	£34.08	
	8MB	EURMY0944	£59	£69.33	
NOT FOR L/4P/MP/5P/5MP	16MB	EURMY0946	£99	£116.33	
DESKJET 500,500C,510,520,550C	256KB	EURMY0951	£35	£41.13	



SYSTEM	SIZE	CODE	PRICE	INC	VAT
IX-9500/E/H/9700	1.5MB	EURMY1123	£119	£139.83	
	4MB	EURMY1124	£195	£229.13	
IX-9400,9460,9600,9600PS, IX-9660,9700E	1MB	EURMY1125	£65	£76.38	
	2MB	EURMY1126	£99	£116.33	
	4MB	EURMY1127	£179	£210.33	
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HL4/PS/V/E	1MB	EURMY0721	£79	£92.83	
	2MB	EURMY0727	£125	£146.88	
	4MB	EURMY0729	£185	£217.38	
HL6 SERIES	2MB	EURMY0722	£79	£92.83	
	4MB	EURMY0723	£115	£135.13	
HL8-D/E/V	1MB	EURMY0726	£79	£92.83	
	2MB	EURMY0728	£115	£135.13	
HL10-V/DV/PS/DPS	2MB	EURMY0730	£89	£104.58	
	4MB	EURMY0731	£149	£175.08	
HL10-H	1MB	EURMY0732	£29	£34.08	
	2MB	EURMY0733	£49	£57.58	
	4MB	EURMY0734	£69	£81.08	
	8MB	EURMY0735	£119	£139.83	



SYSTEM	SIZE	CODE	PRICE	INC	VAT
F1200S/2000S/2200S/3000A/3300	1MB	EURMY1049	£79	£92.83	
	2MB	EURMY1055	£115	£135.13	
	1MB	EURMY1050	£65	£76.38	
ADD ON					
FS1500A (ECOSYS) EXP. BOARD	1MB	EURMY1047	£79	£92.83	
	1MB	EURMY1050	£65	£76.38	



SYSTEM	SIZE	CODE	PRICE	INC	VAT
LP8	1MB	EURMY1130	£79	£92.83	
	2MB	EURMY1135	£115	£135.13	
	4MB	EURMY1138	£195	£229.13	
LS-S/SEX/STT EXP. BOARD	1-5MB	EURMY1131	£76	£89.30	
	2-6MB	EURMY1136	£115	£135.13	
	1MB	EURMY1132	£55	£64.63	
ADD ON					
ADD ON					



SYSTEM	SIZE	CODE	PRICE	INC	VAT
KXP-4440/S410	1MB	EURMY1106	£59	£69.33	
	2MB	EURMY1107	£89	£104.58	
	4MB	EURMY1108	£149	£175.08	
ADD ON					
ADD ON					
KXP-4400, KXP-5400 2MB ONLY	1MB	EURMY1090	£49	£57.58	
	2MB	EURMY1091	£69	£81.08	
4MB	EURMY1092	£99	£116.33		



SYSTEM	SIZE	CODE	PRICE	INC	VAT
OL400	1MB	EURMY1061	£69	£81.08	
	2MB	EURMY1062	£99	£116.33	
	0MB	EURMY1069	£29	£34.08	
OL400E/EX,410E/EX	1MB	EURMY1063	£69	£81.08	
	2MB	EURMY1064	£109	£128.08	
	4MB	EURMY1065	£179	£210.33	
OL410,OL810	1MB	EURMY1066	£75	£88.13	
	2MB	EURMY1067	£115	£135.13	
	4MB	EURMY1068	£185	£217.38	
	0MB	EURMY1070	£32	£37.60	
OL800,OL820	1MB	EURMY1072	£69	£81.08	
	2MB	EURMY1073	£109	£128.08	
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0MB	EURMY1071	£28	£32.90		
OL830,OL840	2MB	EURMY1075	£89	£104.58	



SYSTEM	SIZE	CODE	PRICE	INC	VAT
EPL-5000/S200	1MB	EURMY0872	£49	£57.58	
	2MB	EURMY0877	£69	£81.08	
	4MB	EURMY0885	£139	£163.33	
EPL 5600, 1600, 9000	1MB	EURMY1345	£29	£34.08	
	2MB	EURMY0878	£39	£45.83	
	4MB	EURMY1358	£49	£57.58	
EPL8000/EPL8100	1MB	EURMY0874	£70	£82.25	
	2MB	EURMY0880	£111	£130.43	
	3MB	EURMY0883	£155	£182.13	
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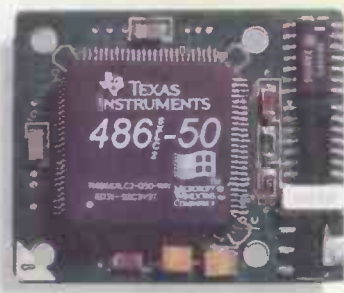
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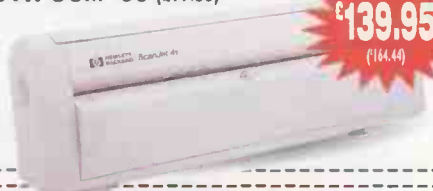
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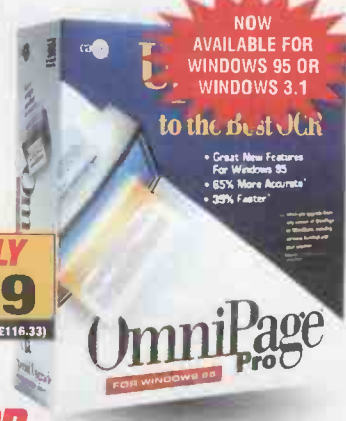
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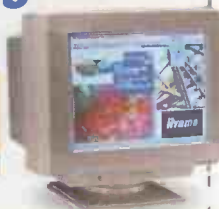
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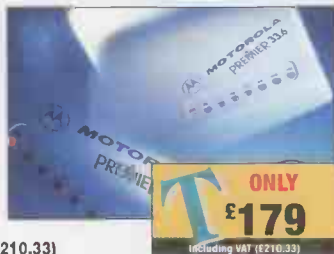
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- MNP2.4: V.42/V.42bis
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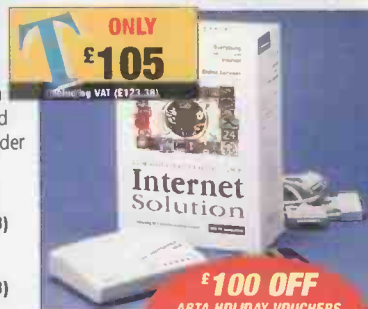
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OPTIMA 336 Business	E	✓	✓	✓	230.4	✓	✓	✓	✓		DMD1546	£215	£252.63
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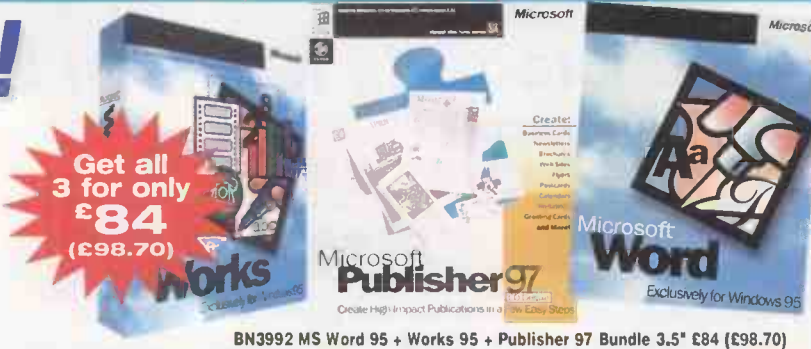
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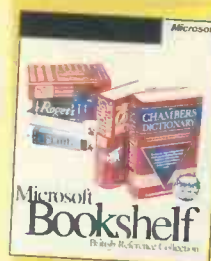
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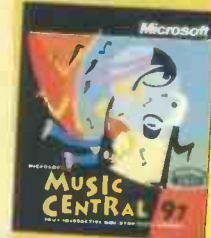
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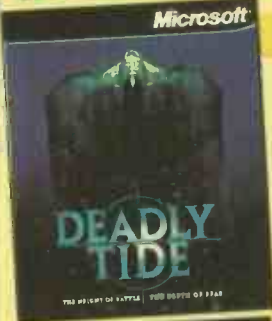
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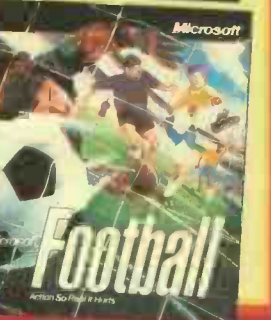
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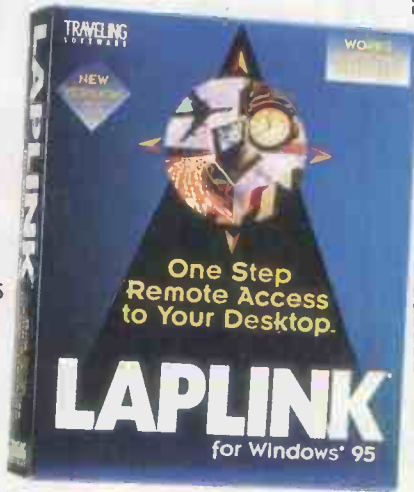
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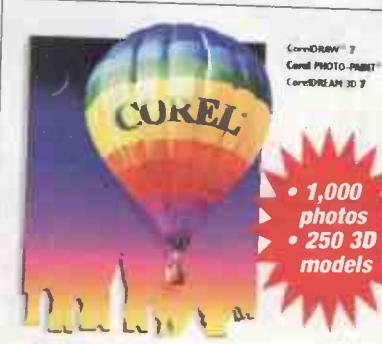
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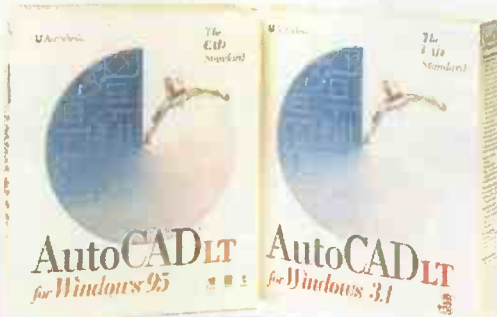
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"In the low-cost CAD software bracket AutoCAD LT comes top"
Personal Computer Magazine, December 1995

"Excellent entry-level CAD package, that is now even easier to learn"
Martyn Day, Personal Computer Magazine, December 1995

"I have no hesitation in recommending AutoCAD LT for Windows 95 - it's a superb product."
CAD User, October 1996

Check out these powerful Features for AutoCAD LT for Windows 3.1

- The most comprehensive Editing tools, e.g. Copy, Move, Erase, Rotate, Scale, Stretch, Break, Trim, Explode, Edit, Mirror, Divide, Measure, Offset, Array, Chamfer, Fillet, plus more
- Snap modes, e.g. Endpoint, Intersection, Node, Midpoint, Centre, Tangent, Quadrant, Perpendicular, plus more
- 256 colours and much more

AutoCAD LT FOR WIN 95 HAS ALL 3.1 FEATURES PLUS...

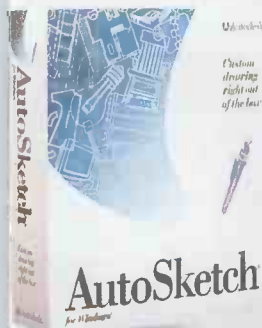
- Construction lines
- TrueType font support
- Complex linetypes
- Windows 95 and Windows NT compliant
- OLE 2.0 container and server
- Long file name support
- Acceleration keys
- Real-time Pan & Zoom
- 100% compatible with AutoCAD Release 13. DWG files
- Property Painter
- Drawing preview & much more

MEDIA AVAILABLE - CD ROM ONLY (VOUCHER INCLUDED WITH SOFTWARE FOR 3.5" DISKS)

AutoSketch Release 2.1

For Windows 3.1 & Windows 95

The power of CAD with the flexibility of an illustration program - at an amazing price!



AutoSketch Release 2.1 gives you the drawing power you need from day one. Bring your ideas to life immediately with this powerful new version of AutoSketch that gives you the results you want. If you can think it, AutoSketch can draw it. Rapidly explore the widest variety of design options and create unique designs to precise scale using the powerful feature set of AutoSketch. Select pre-drawn symbols from the extensive library or create your own, saving them for use in other drawings. Quickly add patterns and textures for realistic detail. And customise the toolboxes and templates for the way you work. It all adds up to real power at an entry level price.

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AutoSketch Release 2.1 has the drawing tools you need...

- Lines, Arcs, Curves (Bezier, B-spline, Freehand), Box, Circle, Ellipse, Polyline, Polygon etc
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- Aerial viewer
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Media Availability - 3.5" DISKS & CD ROM (IN SAME BOX)

Autodesk View Release 1.1

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The ultimate CAD viewing, plotting and redlining software



Autodesk View is the fastest, most accurate and cost-effective solution for CAD viewing, plotting and redlining. Autodesk View can read over 170 different file formats, from CAD drawings and image files to word-processor, spreadsheet and database documents. With Autodesk View you can distribute AutoCAD and AutoCAD LT drawing files and related documents to anyone who needs to view and comment on them, extending your design office. And because it's from Autodesk, the maker's of AutoCAD and AutoCAD LT, you're guaranteed 100% accuracy.

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*SmartSuite 96 currently includes 16 bit versions of Lotus 123, Organiser & Screencam. A coupon in the box allows you to upgrade to the 32 bit version when they become available

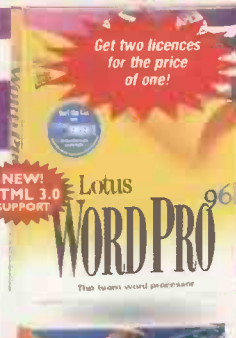
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Productivity for teams, power for individuals

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Lotus SmartSuite 96 Windows 95 Upg/Comp Upg (3.5" or CD).....	£112	(£131.60)
Lotus Approach v3 Windows 3.1 (3.5".....)	£81	(£95.18)
Lotus Approach 96 Windows 95 (3.5".....)	£81	(£95.18)
Lotus Word Pro 96 Windows 3.1 (3.5".....)	£79	(£92.83)
Lotus Word Pro 96 Windows 95 (3.5".....)	£79	(£92.83)
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Lotus 123 Spreadsheet has everything you need to make your everyday spreadsheet tasks easier. With Lotus 1-2-3, Lotus redefines spreadsheet productivity - again.



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ORGANIZER V2.1 for Windows

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Why retype - just scan and edit with this award-winning OCR software

With Xerox's award-winning TextBridge Pro OCR you can reproduce the paper documents that you use every day (including faxes, photocopies, and dot matrix documents) into electronic text. At the touch of a button you can scan, proof and edit even the most complex documents without leaving your word processor. In Word 6.0a/WordPerfect 6.1 or higher TextBridge recreates documents with pictures, cell-tables with lines and even multi-columns - and retains the page layout and free-flow text of the original document. TextBridge combines its simple 'one-button' operation with the accuracy, speed and power needed for the most demanding document entry tasks.



FEATURES

- HTML output for creating your own Web pages
- Retains your original document layout and text flow with full editability - even for documents containing pictures, tables and text. (For MS Word and WordPerfect 6)
- Retains table formatting and allows you to fully edit the data.
- Instant Access OCR™ lets you easily scan and recognise documents from any of your favourite applications.
- In-Place Proofreader™ provides powerful proofing and editing tools that are accessible directly from your favourite word processing application.
- DocuRT™ recognition engine for superb accuracy, speed and auto-processing.
- Dynamic training helps improve accuracy for extra-tough documents. Training information is completely re-usable for batches of similar documents.

Awards

- PC User Gold Award November 1995
- PC Pro Recommended Product August 1995
- What PC? Best Buy March 1994, April 1995
- WordPerfect Magazine - Top Pick January 1996
- Personal Computer Best Value for the Money
- Computer Shopper Best Budget Buy August 1993

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OC0076	TextBridge V3 WIN 3.5"	£65	(£76.38)
EUROCO183	TextBridge Pro 96 Win/Win 95/NT CD	£269	(£315.08)
EURS11213	TextBridge Pro 96 Win/Win 95/NT COMP UPG CD	£129	(£151.58)
EURUP2023	TextBridge Pro 96 Win/Win 95/NT UPG CD	£129	(£151.58)

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Image Resource

DB0703	Photo Album v2.2 Win/Win 95 CD	£69	(£81.08)
DB0705	Photo Album CD-ROM Authoring Kit CD	£89	(£104.58)
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 - Instant Document preview without launching Word
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 - Fully integrated with Microsoft Office

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- Spreadsheet with Charting
- Database
- Communications Tools
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Create high impact publications in a few easy steps

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- The Design Checker ensures a great looking publication by correcting common design problems

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You can upgrade Word 95 to Word 97 free of charge with the Microsoft Technology Guarantee. This also applies to all versions of Office 95. To qualify, you must purchase before 31/3/97. Shipping charges will have to be paid directly to Microsoft. The product will be sent to you directly from Microsoft on CD-ROM with on-line documentation within 28 days of product release. Proof of purchase will be required.

PerfectPartners! Get MS Publisher 97 and Office 95 CCP upgrade with this UNIQUE opportunity for only £219! and remember you can even upgrade your Office to Office 97 free* when it becomes available.

Option 1: MS Publisher 97,

Word 95, Works 95 + MS Office Std 95 £219 (£257.33)

Option 2: MS Publisher 97 Word 95, Works 95 + MS Office Pro 95 £285 (£334.88)

Microsoft Windows NT Server V4.0

- Enhanced file and print services
- Comprehensive support for mission critical applications
- Ease of installation, system management and use
- Easy integration and interoperability with existing systems
- The ability to readily incorporate new technology as it becomes available
- Free Internet Information Server Software

DCS2947	MS Windows NT Server v4.0+5 users Upg CD	£289	(£339.58)
DCS2944	MS Windows NT Server v4.0+5 users CD	£549	(£645.08)
DCS2945	MS Windows NT Server v4.0 +10 users CD	£769	(£903.58)
DCS3119	MS Windows NT Server v4.0 Client Licence 1 MLP	£35	(£41.13)
DCS3120	MS Windows NT Server v4.0 Client Licence 20 MLP	£479	(£562.83)

Microsoft Windows NT Workstation V4.0

DCS2943	MS Windows NT Workstation v4.0 Upg CD	£99.95	(£117.45)
DCS2949	MS Windows NT Workstation v4.0 CD	£219	(£257.33)
DCS3127	MS Windows NT Workstation v4.0 Upg 1 MLP	£95	(£111.63)
DCS3126	MS Windows NT Workstation v4.0 1 MLP	£195	(£229.133)

NOVELL

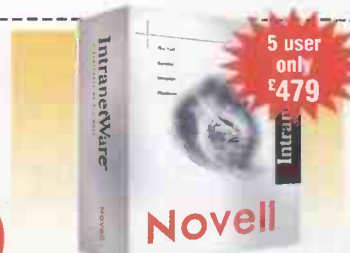
IntranetWare

Includes NetWare 4.11 Plus this FREE suite of internet products.

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- Netscape Navigator
- Multiprotocol Router
- Novell's IPX/IP Gateway
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Novell's new IntranetWare continues the evolution of NetWare, the worlds leading network operating system, into a full-service Intranet and Internet access platform for business of all sizes. IntranetWare 4.11 builds on the distributed services found in Novell NetWare 4.11 and integrates new intranet and internet technologies.



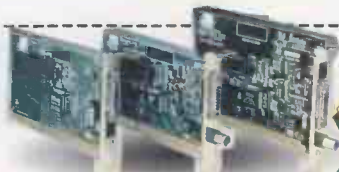
5 user only £479

No. User	Code	Price £'s (Inc VAT)
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10	DCS3219	£929 (£1091.57)
25	DCS3220	£1649 (£1937.57)
50	DCS3221	£2249 (£2642.57)
100	DCS3222	£3149 (£3700.07)

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NEW! *Parallel Tasking Architecture and dynamic self-tuning drivers
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DEC1473	3COM ETHERLINK III ISA TPO	3CS09B-TPO	£62.95	(£73.97)	£269.95	(£317.19)	£979	(£1150.33)
DEC1466	3COM ETHERLINK III ISA BNC	3CS09B	£66.95	(£78.67)	£294.95	(£346.57)	£1149	(£1350.08)
DEC1470	3COM ETHERLINK III ISA TP	3CS09B-TP	£64.95	(£76.32)	£289.95	(£340.69)	£1049	(£1232.58)
DEC1477	3COM ETHERLINK III ISA BNC/TP	3CS09B-COMBO	£74.95	(£88.07)	£319.95	(£375.94)	£1239	(£1455.83)
DEC2235	3COM ETHERLINK III XL PCI NTP ONLY 3C900 TPO		£68.95	(£81.02)	£329.95	(£387.69)	£1249	(£1467.58)
DEC2338	3COM ETHERLINK XL 10/100 PCI CARD 3C905(TX)		£84.95	(£99.82)	£399.95	(£469.94)	£1549	(£1820.00)
OEC1481	3COM ETHERLINK III PCMCIA TP	3CS89B-TP	£94.95	(£111.57)	£459.95	(£540.44)		
DEC1483	3COM ETHERLINK III PCMCIA BNC/TP	3CS89C-COMBO	£124.95	(£146.83)	£599.95	(£704.94)		
OEC2269	3COM ETHERLINK III PCMCIA 28.8 Faxmodem & Ethernet 299.00			(£351.33)				

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	Each	Each
	1st item	Additional
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Small accessory	£5 (£5.88)	£2 (£2.35)
Small Software package	£5 (£5.88)	£2 (£2.35)

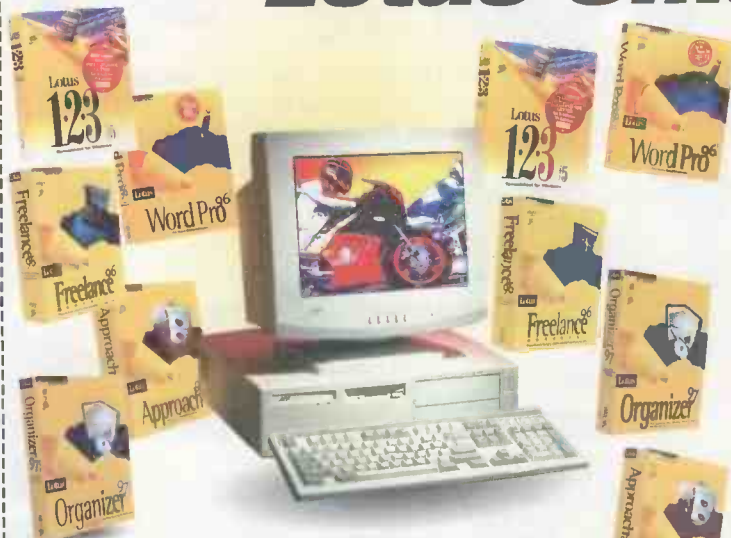
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- Lotus WordPro 96
- Lotus Approach 96
- Lotus Freelance Graphics 96
- Lotus Organizer 2.1
- Lotus ScreenCam 2.1

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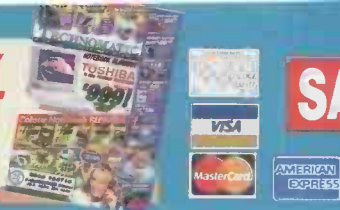
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- Exceptional power of high-end Intel Pentium processors
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Item	Model	CPU	Hard Drive	RAM/Max	Screen	Price	(Inc VAT)
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EURCP3226	J30	5/100	800Mb	8Mb/40Mb	10.4" DSTN	£1359	£1596.83
BN3881	J30	5/100	800Mb	8Mb/40Mb	10.4" TFT	£1619	£1902.33
	J40	5/120	1Gb	16Mb/40Mb	11.3" DSTN	£1485	£1744.88
BN3883	J50	5/133	800Mb	8Mb/40Mb	10.4" TFT	£1869	£2196.08
CP3758	J55	5/133	1Gb	16Mb/40Mb	11.3" TFT	£1799	£2113.83
EURMY1567	8Mb Memory Upgrade Module					£115	£135.13

Item	Model	CPU	Hard Drive	RAM/Max	Screen	Price	(Inc VAT)
BN3884	P31	5/100	800Mb	8Mb/40Mb	11.3" TFT	£2209	£2595.58
CP3757	P41	5/120	1Gb	16Mb/40Mb	11.3" TFT	£2209	£2595.58
CP3756	P41	5/120	2.1Gb	16Mb/40Mb	11.3" TFT	£2379	£2795.33
BN3885	P50	5/133	1.2Gb	8Mb/40Mb	11.3" TFT	£2549	£2995.08
CP3755	P55	5/133	1Gb	24Mb/40Mb	12.1" TFT	£2805	£3295.88
CP3754	P55	5/133	2.1Gb	24Mb/40Mb	12.1" TFT	£2975	£3495.63
CP3802	A41	5/120	1Gb	16Mb/40Mb	11.3" TFT	£1615	£1897.63
CP3803	A42	5/120	1Gb	16Mb/40Mb	1.21" TFT	£2039	£2395.83
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TI takes notebook power to a new level!

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11.3" SuperVGA active matrix colour with 2MB video RAM

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• Software flexibility:

Pre-installed with Windows 95 and Windows for Workgroups

**ONLY
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Fast just got faster: The TravelMate 5300 features a new 133MHz Pentium processor, with a large, vivid 11.3" SuperVGA active matrix colour display.

The TravelMate 5300's extraordinary performance is matched by a brilliant 11.3" SuperVGA active matrix colour display. The SuperVGA display shows 65,000 simultaneous colours and includes 2MB of video RAM and a high-speed video bus for exceptional graphics and multimedia performance. The TravelMate 5300 brings a new level of desktop power and performance to notebook computers, but it weighs just 6.7 pounds. For even greater flexibility and extended capabilities, choose one of TI's DockMate docking systems, including the DockMate Multimedia with PCI-enhanced CD-ROM drive and stereo speakers.

Item	Model	Processor	HDD	RAM/Max	Price	Inc VAT
CP3690	TM5300	Pentium 133	1.2Gb	8Mb/32Mb	£1649	£1937.58
MY5778	8Mb Memory module				£99	£116.33
MY6452	16Mb Memory module				£489	£574.58
AC20604	TM5300 Dockmate				£169	£198.58
AC20603	TM5300 Dockmate Plus				£359	£421.83
AC20602	TM5300 Extra Internal Li-ion battery pack				£125	£146.88
MM3989	TM500 series modem kit (Windows 95)				£239	£280.83

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Item	Model	Processor	HDD	RAM/MAX	Monitor	Price	Inv VAT
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CP3614	Vectra VL4	Pentium 133	1.2Gb	16MB/128MB EDO	15"	£999	£1173.83
CP3615	Vectra VL4	Pentium 166	1.2Gb	16MB/128MB EDO	15"	£1219	£1432.33
CP3617	Vectra XM4	Pentium 166	1.2Gb	16MB/128MB EDO	15"	£1269	£1491.08

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The HP Vectra Performance PCs with Intel Pentium® Processors inside - ready for Microsoft Windows 95. The new Vectra VL4 range has leading edge components, a high level of base specifications to ensure a good level of future-proofing and out-of-the-box ability to run the latest resource-intensive applications. Monitors are optional.

- Blazing Fast Intel Pentium® Processors: 100 to 166MHz
 - 8MB RAM or 16MB standard, expandable up to 128MB
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 - MS Windows for Workgroups 3.11 preloaded - network ready (Windows 95 option on 16MB models)
 - 256 KB L2 Cache standard
 - PCI architecture with local bus IDE & Graphics (1MB RAM)
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Allied Telesyn Unmanaged Hub AT3024TR (24 ports-RJ45, 1xAUI+1xBNC)	£289.95	(£340.69)

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Venus 5 PORT HUB	£44.95	(£52.82)
ETHERHUB 8ST 8 PORT HUB	£89.00	(£104.58)

D-Link

DE805TP 5 PORT HUB	£59.95	(£70.44)
DE809TP 9 PORT HUB	£109.95	(£129.19)
DE809TC 9 PORT HUB	£109.95	(£129.19)

Kingston

Description	Each	(Inc VAT)
EtherRx 8 Port Workgroup Hub	£69.00	(£81.08)
EtherRx 8 Port Stackable Hub	£89.00	(£104.58)
EtherRx 16 Port Workgroup Hub	£129.00	(£151.58)

Managed Ethernet Hubs

Linkbuilder FMS II Stackable Hubs

Linkbuilder FMS II is part of 3Com SuperStack architecture that allows stackable hubs, bridges, routers and switches to be easily integrated and managed as one system. They keep your investment low allowing you to add SNMP management and bridging/switching when you need it.

Description	Price	Inc. VAT
3Com LinkBuilder FMS II 12 port TP Hub	£369	(£433.58)
3Com LinkBuilder FMS II 24 port TP Hub	£599	(£703.83)
3Com LinkBuilder FMS II Management Module	£299	(£351.33)
3 Com SuperStack II 12 Port TP Hub	£349	(£410.08)
3 Com SuperStack II 24 Port	£599	(£703.83)
3 Com SuperStack II Management Module	£299	(£351.33)

HP Advance Stack

J2600A 12 PORT HUB	£359.00	(£421.83)
J2630A 12 PORT HUB W/SNMP	£549.00	(£645.08)
J2601A 24 PORT HUB	£569.00	(£668.58)

BAY NETWORKS Bay Stack

12 PORT STACKABLE HUB	£419.00	(£492.33)
24 PORT STACKABLE HUB	£699.00	(£821.33)

Fast Ethernet Hubs

3COM SUPERSTACK		
3C250A-TX/I-XX 12 PORT 100TX	£1269.00	(£1491.08)
3C250-T4-XX 12 PORT 100T4	£1299.00	(£1526.33)

D-LINK		
DFE-812TX12 PORT 100TX	£859.00	(£1009.33)
INTEL		
Express 12 port 100Base-T Stackable Hub	£1239.00	(£1455.83)

Ethernet Switches

3C30500 LinkSwitch 500 10 Port	£1899.00	(£2231.33)
3C16901 LinkSwitch 1000 12 Port	£1899.00	(£2231.33)
D-LINK		
DES-2205 5 PORT Switch	£1299.00	(£1526.33)
DES-2208 6 PORT Switch	£1499.00	(£1761.33)
U.S.Robotics		
TOTALSwitch 4-slot base chassis w/NMC	£579.00	(£680.33)
TOTALSwitch 8 port 10Base-T system	£1209.00	(£1420.58)
TOTALSwitch 16 port 10Base-T system	£1939.00	(£2278.33)

Premium Shielded Parallel cables

Length (M)	Order No	1 (Inc VAT)	2-5 (Inc VAT)	6+ (Inc VAT)
1.5	073810	£6.49 (£7.62)	£6.29 (£7.40)	£5.99 (£7.04)
2.5	073811	£8.99 (£10.56)	£8.79 (£10.33)	£8.59 (£10.09)
1.5 Right exit	050041	£10.95 (£12.87)	£9.95 (£11.70)	£8.95 (£10.52)
2.5 Right exit	050042	£12.95 (£15.21)	£11.95 (£14.04)	£10.95 (£12.27)
1.5 Left exit	050043	£10.95 (£12.89)	£9.95 (£11.70)	£8.95 (£10.52)
2.5 Left exit	050044	£12.95 (£15.21)	£11.95 (£14.04)	£10.95 (£12.87)



Print Servers HP JetDirect Ex Plus 3

Description	Order No	Price (Inc VAT)
JetDirect EX Plus 3 for Ethernet Lans (10-BaseT/10-Base2)	234886	£299 (£351.33)
JetDirect EX Plus for Ethernet Lans (10-BaseT/10-Base2)	2000262	£219 (£257.32)
JetDirect EX Plus 3 for Token Ring Lans (DB9)	234887	£349 (£410.08)

Intel		
Netport Express Pro 10T/BNC	£269.95	(£317.19)
Netport Express Pro Token Ring	£399.95	(£469.94)
D-Link		
DE-950 Ethernet Print Server	£189.95	(£223.19)
DE-960 Multi-Protocol Print Server	£239.95	(£281.94)

Remote Access

Motorola BitSURFR Pro ISDN Office Solution	£299.00	£351.33
RacalDatacom DAPV 6300 Lite	£369.00	£433.58
Shiva LanRover/E 4.0 4 port	£2099.00	£2466.33
Shiva LanRover/T 4.0 4 port	£3199.00	£3758.83
Perle 833/4e 4 port	£1830.00	£2150.25

Category 5 Patch Cables

Colour	Length			
	0.6m	1.5m	3.0m	7.6m
Platinum	100721	100722	100723	100724
BLUE	100801	100811	100821	100831
RED	100803	100813	100823	100833
GREEN	100802	100812	100822	100832
YELLOW	100804	100814	100824	100834
Price ea (1-2)	£4.49	£4.99	£5.99	£8.49
(Inc VAT)	(£5.28)	(£5.28)	(£7.04)	(£9.98)
Price ea (3-5)	£4.29	£4.79	£5.79	£8.29
(Inc VAT)	(£5.04)	(£5.63)	(£6.80)	(£9.74)
Price ea (6+)	£4.09	£4.59	£5.59	£8.09
(Inc VAT)	(£4.80)	(£5.39)	(£6.57)	(£9.50)

Category 5 Bulk Cable Price per 100 metre

Description	Colour	Order No	Price per 100 metre		
			1 (Inc VAT)	2-5 (Inc VAT)	6+ (Inc VAT)
Solid Conductor,	Grey	10062S			
4 Twisted	Red	10206R			
Pair polyelin insulated	Green	10207S	£35	£34	£33
PVC Jacket 24 AWG	Yellow	10208R	(£46.13)	(£39.95)	(£38.78)
	Blue	10209R			
Stranded Conductor	Grey	10127			
4 Twisted	Red	10261			
Pair polyelin insulated	Green	10263	£39	£38	£37
PVC Jacket 24 AWG	Yellow	10264	(£45.83)	(£44.65)	(£43.48)
	Blue	10262			

Ethernet Thick/Thin Price per 100 metre

Description	Order No	Price per 100 metre		
		25-149 (Inc VAT)	150-449 (Inc VAT)	500+ (Inc VAT)
Coaxial Backbone (IEEE 802.3)	1784-3	£1.49 (£1.75)	£1.47 (£1.73)	£1.45 (£1.70)
(50 ohms) Solid CU conductor, cell PE dielectric, 2 x comp alum/braid shields, PCV jacket, yellow, 80°C, C12				
Thin Ethernet (50 ohms) Stranded T/C conductor, PE	1788-E Yel	£0.28 (£0.33)	£0.27 (£0.32)	£0.26 (£0.31)
dielectric, T/C braid shield 96%, PVC jacket, 80°C MIL-C 17/288	1687 Black	£0.28 (£0.33)	£0.27 (£0.32)	£0.26 (£0.31)

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Windows NT Server 4.0 w/5 client access licenses	£549	(£645.08)
Windows NT Server 4.0 w/10 client access licenses	£769	(£903.58)
Windows NT Server upg from 3.51 to 4.0 w/5 client licenses	£289	(£339.58)
Windows NT Workstation 4.0	£219.95	(£258.44)
Windows NT Workstation upg from v3.51 to v4.0	£99.99	(£117.49)

Novell NetWare & IntranetWare

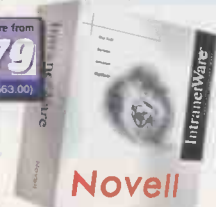
No. Users	NetWare 4.11 Full Product (VAT)	IntranetWare Full Product (VAT)	Like-for-Like Upgrades from 2.0, or 4.x (VAT)	from 4.x (VAT)	Additive Licensing (VAT)
5	£479 (£563)	£479 (£563)	£189 (£222.08)	£179 (£210)	-
10	£929 (£1092)	£929 (£1,092)	£329 (£386.58)	£269 (£316)	£579 (£680)
25	£1,649 (£1,938)	£1,649 (£1,938)	£549 (£645.08)	£319 (£375)	£1,299 (£1,526)
50	£2,249 (£2,643)	£2,249 (£2,643)	£729 (£856.58)	£449 (£528)	£1,949 (£2,290)
100	£3,149 (£3,700)	£3,149 (£3,700)	£1,229 (£1,444.08)	£629 (£739)	-
250	£5,500 (£6,570)	£5,500 (£6,570)	£2,249 (£2,642.58)	£1,129 (£1,327)	-



Please call for all NetWare pricing

IntranetWare from £479
(Inc. VAT £563.00)

Cheyenne Arcserve from £349
(Inc. VAT £410.00)



Network Backup Software

Cheyenne		
ARCserve 6.0 F/NT Single Server	£349.00	(£410.08)
ARCserve 6.0 F/NT Enterprise Edition	£639.00	(£750.83)
ARCserve 6.0 F/Netware Workgroup Edition	£339.00	(£398.33)
ARCserve 6.0 F/Netware Enterprise Edition	£779.95	(£915.30)

Seagate Software		
BackUP Exec for NT Single Server	£319.00	(£374.83)
BackUP Exec for NT Enterprise Edition	£589.00	(£692.08)
Backup Exec for Netware Single server	£229.00	(£269.08)
Backup Exec for Enterprise Edition	£629.00	(£739.08)

Storage

Colorado T4000S
£235.95
(Inc. VAT £277.24)



Colorado 200 of unattended backup in just over three hours
HP's reliable DAT technology
Industry standard DDS format

Hewlett Packard		
C4322AT Colorado T4000S	£235.95	(£277.24)
C1520F SureStore 200 External	£545.00	(£640.38)
C4320A Colorado T1000i Internal	£109.95	(£129.19)
Memory Technology		
DATShuttle 4000	£815.00	(£957.63)
TAPEShuttle 850MC	£229.00	(£269.08)
CDSshuttle P	£219.00	(£257.33)

AS LOW AS £79
(Inc. VAT £92.83)

Back-UPS

UPS

Description	Price	(Inc VAT)
Back-UPS 250	£79	(£92.83)
Back-UPS 400	£129	(£151.58)
Back-UPS 600	£189	(£222.08)
Smart-UPS 700 INET*	£279	(£327.83)
Smart-UPS 1000 INET*	£419	(£492.33)

*Includes Powerchute software for NT, Novell, OS2 and SCO Networks

Emerson		
Powersure 250va	£84.95	(£99.82)
Powersure 400va	£124.95	(£146.82)
UGX1000	£545.00	(£640.38)
UGX1500	£675.00	(£793.13)

Ethernet Adapter Cards

3Com Cards from **£48.95**
(£37.52 when purchased at 20 Packs)



3COM Part #	1 Single (VAT)	5 Pack (VAT)	20 Pack (VAT)
3C509B TPO	£62.95 (£73.97)	£269.95 (£317.19)	£979.00 (£1150.33)
3C509B TP/AUI	£64.95 (£76.32)	£289.95 (£340.69)	£1049.00 (£1232.58)
3C509B BNC/AUI	£66.95 (£78.67)	£294.95 (£346.57)	£1149.00 (£1350.08)
3C509 Combo	£74.95 (£88.07)	£319.95 (£375.94)	£1239.00 (£1455.83)
3C900 TPO PCI	£68.95 (£81.02)	£329.95 (£387.69)	£1249.00 (£1467.58)
3C592 TPO EISA	£114.95 (£135.07)	£519.95 (£610.94)	-
3C905-TX 10/100	£84.95 (£99.82)	£399.95 (£469.94)	£1549.00 (£1820.08)
3C589B TP	£94.95 (£111.57)	£459.95 (£540.44)	-
3C589 Combo	£129.95 (£152.69)	£619.95 (£728.44)	-

Allied Telesyn NE2000 cards as low as £19 (€22.33) each!

AT-2000T PLUS RJ45	£22.95	(£26.97)
AT-2000T PLUS RJ45/BNC/AUI	£28.95	(£34.02)
BUY 5 AT2000T PLUS RJ45 GET 1 FREE	£114.00	(£133.95)
BUY 5 AT2000T PLUS RJ45/BNC/AUI GET 1 FREE	£144.00	(£169.20)

Intel Etherexpress Pro		
Etherexpress Pro/100B	£89.95	(£105.69)
EtherExpress Pro/100B	£439.95	(£516.94)

D-LINK		
DE220ET RJ45	£32.95	(£38.72)
DE220ET RJ45 6 PACK	£189.95	(£223.19)
DE220ECT RJ45/BNC	£34.95	(£41.07)
DE220ECT RJ45/BNC6 PACK	£199.95	(£234.94)

MICRODYNE		
EAGLE NE2000TPLUS RJ45	£44.95	(£52.82)
EAGLE NE2000TPLUS RJ45 5PK	£209.95	(£246.69)
EAGLE NE2000TPLUS COMBO	£54.95	(£64.57)
EAGLE NE2000TPLUS COMBO 5PK	£259.95	(£259.95)

Addron		
Addron Ethernet Card TAN 16CT Jumperless	£19.95	(£23.44)
Addron Ethernet Card 200 PMP-C Combo	£24.95	(£29.32)
Addron Ethernet Card 200 PMP-C 5 Pack	£129.95	(£152.69)

PCMCIA Adapters



Xircrom		
CreditCard Ethernet/V34 Modem RJ45	£249.00	(£292.58)
CreditCard Ethernet/V34 Modem RJ45/BNC	£269.00	(£316.08)
CreditCard PCMCIA V34 Modem 28.8	£169.95	(£199.69)

TDK		
DF2814 GLOBAL CLASS Modem Card	£149.00	(£175.08)
3410 Ethernet/Modem RJ45	£249.00	(£292.58)
3412 Ethernet/V34 Modem BNC	£249.00	(£292.58)

Grey Cell		
GCS3420 Ethernet/V34 Modem RJ45/BNC	£285.00	(£334.88)
GCS3410 Ethernet/V34 Modem RJ45	£249.00	(£292.58)

Pision Dacom		
MM3963 GOLDCARD Ethernet/Modem	£259.00	(£304.33)

D-LINK		
PE 650CT PCMCIA Adapter RJ45/BNC	£79.95	(£93.94)

Allied Telesyn Transceivers

Description	Price	IncVAT
Single Micro-Transceiver,BNC	£17.95	(£21.09)
Single Micro-Transceiver,10BaseT	£17.95	(£21.09)
Micro-Transceiver,10BaseFL/FOIRL	£99.95	(£117.44)
Apple AUI Transceiver,10BaseT	£24.95	(£29.32)
Apple AUI Transceiver,BNC	£24.95	(£29.32)

Transceivers from **£17.95**
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- UMAX POWERLOOK 2 - 600 x 1200 optical **£1599** £1878.82
- UMAX POWERLOOK 2000 - 1000 x 2000 optical **£2995** £3519.13

PRO versions include transparency adaptor and full Adobe Photoshop
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- S6E PRO £655 plus v.a.t. **£233.83 inc vat**



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- Umax Vistascan software as standard
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- Portable 24-bit colour scanner
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- The ideal solution for portable PC's
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- Parallel port connection
- User friendly software **£164 ex vat**
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- Handheld 24-bit colour scanner
- Versatile sheetfed convenience
- Document management software
- The ideal solution for portable PC's
- Xerox Textbridge OCR software
- Simple parallel port connection
- User friendly software **£78 ex vat**
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 - HP 4C **£538** 632.15
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- Includes PhotoImpact SE editing software
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- Optional LCD Display
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- Designed for output to Epson printers
- Autofocus from 2 feet to infinity
- Optional external power supply



EPSON GT-5000

- 24-bit entry level colour flatbed scanner
- 300 dpi optical (2400 dpi interpolated)
- Easy single or three pass scanning
- Adobe Photoshop LE & Xerox TextBridge OCR
- All cables and SCSI cards included
- Upgradeable 12 month warranty **£293 ex vat**
- Parallel version £243 + VAT **£344.28 inc vat**



EPSON GT-8500

- 30-bit high quality colour flatbed scanner
- 400 dpi optical (3200 dpi interpolated)
- Easy single or three pass scanning
- Adobe Photoshop LE & Xerox TextBridge OCR
- All cables and SCSI cards included
- Upgradeable 12 month warranty **£429 ex vat**
- Parallel version £390 + VAT **£504.08 inc vat**



EPSON GT-9500

- Brand New 36-bit colour flatbed scanner
- 600 dpi optical resolution (4800 dpi interpolated)
- PhotoShop LE & Xerox TextBridge OCR
- Optional transparency unit and document feeder
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- Upgradeable 12 month warranty **£550 ex vat**
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- Intel Pentium 100MHz with 8Mb Ram (upgrade to 40Mb)
- 11.3" SVGA STN colour screen and 1MB Video Ram
- 84 full size keys with Mousepoint & 12 function keys
- 810Mb Hard Disk and Internal 3.5" floppy drive
- Optional port replicator, optional spare batteries
- 3.2kg with built-in AC adaptor
- One year worldwide warranty
- Please call for carry case options

£1079 ex vat
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PORTEGE 620CT

- Intel Pentium 100MHz with 8Mb Ram (upgrade to 40Mb)
- 10.4" TFT colour screen (800 X 600) for up to 16.7M colours
- 84 full size keys with Mousepoint & 12 function keys
- 1.35Gb Hard Disk and 1Mb Video Ram
- Ultra-Slim Ultra-Lightweight model
- Dimensions: 251 x 201 x 48 mm
- Three year worldwide warranty
- 2.2kg ultra light notebook

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£2149.08 inc vat

TECRA 500CS

- Intel Pentium 120MHz with 16Mb Ram (upgrade to 144Mb)
- 12.1" STN Dual Scan colour screen and 2MB Video Ram
- 84 full size keys with Mousepoint & 12 function keys
- 1.35Gb Hard Disk and internal 3.5" floppy drive
- Optional port replicator, optional CD ROM Drive
- 3.6kg with FDD Module fitted
- Three year worldwide warranty
- Dimensions: 299 x 235 x 58 mm

£1913 ex vat
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ECHOS P100D

- Pentium 100MHz processor with 8Mb Ram (upgrade to 40Mb)
- 10.4" SVGA DSTN back-lit colour screen (16 Million colours)
- PCI Local Bus, 16KB cache, optional 4 speed CD Rom Drive
- 540Mb Hard Disk and point-pad integrated pointing device
- SoundBlaster compatible 16-bit audio card and speakers
- Dimensions: 286 x 228 x 49mm
- Windows 95 or Windows 3.11
- Optional mini docking station

£1079 ex vat
£1267.83 inc vat

ECHOS P100C

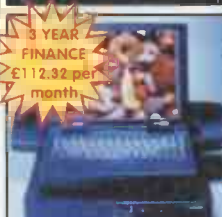
- Pentium 100MHz processor with 8Mb Ram (upgrade to 40Mb)
- 11.3" SVGA DSTN back-lit colour screen (16 Million colours)
- PCI Local Bus, 16KB cache, 256KB Level 2 cache
- 810MB Hard Disk and point-pad integrated pointing device
- SoundBlaster compatible 16-bit audio card and speakers
- Dimensions: 286 x 228 x 49mm
- Windows 95 or Windows 3.11
- Optional mini docking station

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ECHOS PRO 150S

- Pentium 150MHz processor and 16Mb Ram (upgrade to 128Mb)
- 12.1" TFT SVGA back-lit colour screen (800 x 600)
- PCI Local Bus and 2Mb Video Ram, optional 2nd Hard Disk
- 2.0Gb removable Hard Disk and 8 speed CD-ROM
- SoundBlaster compatible 16-bit audio card and speakers
- Dimensions: 310 x 230 x 47.5 mm
- Windows 95 or Windows 3.11
- Optional "hot" docking station

£3120 ex vat
£3666.00 inc vat



Satellite 200CDS	£1329	1561.58	Sat Pro 430 CDT	£2496	2932.80
Satellite 110CT	£1496	1757.80	Portege 650CT	£2746	3226.55
Satellite 200CDT	£1746	2051.55	Portege 660CDT	£3329	3911.58
Sat Pro 420CDS/810	£1496	1757.80	Tecra 510CS	£2246	2639.05
Sat Pro 430CDS	£1829	2149.08	Tecra 500CDT	£2708	3181.90
Sat Pro 420CDT/810	£2079	2442.83	Tecra 510CDT	£3329	3911.58
Sat Pro 420CDT/1.35	£2246	2639.05	Tecra 730CDT	£3829	4499.08

Echos P100E, 10.4" SVGA TFT, 8Mb Ram, 1.0Gb, 16-bit stereo	£1399	1643.83
Echos P100E, 10.4" SVGA TFT, 8Mb Ram, 1.0Gb, 4 x CD, 16-bit stereo	£1530	1797.75
Echos P100C, 11.3" SVGA DS, 8Mb Ram, 1.0Gb, 4 x CD, 16-bit stereo	£1365	1603.88
Echos P120E, 11.3" SVGA TFT, 8Mb Ram, 810Mb, 16-bit stereo	£1572	1847.10
Echos P120E, 11.3" SVGA TFT, 8Mb Ram, 1.2Gb, 4 x CD, 16-bit stereo	£1737	2040.98
Echos P133S, 11.8" SVGA TFT, 16Mb Ram, 1.2Gb, 6 x CD, 16-bit stereo	£2234	2624.95
Pro P133S, 12.1" SVGA TFT, 2Mb Vram, 16Mb Ram, 2Gb, 8 x CD, 16-bit stereo	£2819	3312.33
Pro P150X, 12.1" XGA TFT, 2Mb Vram, 16Mb Ram, 2.0Gb, 8 x CD, 16-bit stereo	£3679	4322.83

Xircom

The Mobile Networking Experts

CREDITCARD ETHERNET 33.6

The ONLY 10/100 ethernet-upgradeable adapter at the same price as a regular 10Mbps PC Card, with most drivers supported, including Windows 95/NT and auto negotiation of 10 or 100Mbps speed.

Ready or upgradeable as follows:

10/100 for 100BTX	£159	186.83
10/100 for 10BaseT (10Mbps)	£98	115.15
10/100 for Combo (10Mbps)	£118	138.65
10/100 upgrade to 100Mbps	£69	81.08

CREDITCARD MODEM 33.6

- The only modem with a lifetime warranty
 - Free Compuserve trial-offer
 - Multi-lingual user guide
 - Future-proof upgrade program
 - Delrina Winfax Lite and WinComm Lite
 - "Plug-and-play" for Windows 95
 - Approved in Europe, Asia & America
 - Digital Line Protection built-in to unit
 - Cost-effective 6 and 20-packs available
- CreditCard Modem 33.6 £164 £192.70



MITAC

All MITAC products include 12 months warranty and lifetime technical help!!

5024 133MHZ PENTIUM

- Intel Pentium 133 processor with 8Mb Ram (upgrade to 32Mb)
- 10.4" Dual Scan colour screen with 1MB Video memory
- Built-in 16-bit SoundBlaster Pro compatible sound card
- 810Mb Hard Disk and removable 3.5" floppy drive
- Optional quad speed CD-ROM or second battery
- W280mm x D220mm x H46mm
- Integral stereo speakers
- Microsoft Windows 95 pre-loaded

£1379 ex vat
£1620.33 inc vat



P133, 10.4" Dual Scan, 8Mb Ram, 810Mb HD, 16-bit sound	£1379	1620.33
P133, 10.4" Dual Scan, 8Mb Ram, 1.1Gb HD, 16-bit sound	£1399	1643.83
P133, 11.3" TFT screen, 8Mb Ram, 810Mb HD, 16-bit sound	£1599	1878.83
P133, 11.3" TFT screen, 8Mb Ram, 1.1Gb HD, 16-bit sound	£1649	1937.58

AST NOTEBOOKS

J10 P75 10.4" DS, 8/800Mb	£1030	1210.25
J20 P100 11.3" DS, 8/800Mb	£1252	1471.10
J30 P100 10.4" DS, 8/800Mb	£1299	1526.33
J30 P100 10.4" TFT, 8/800Mb	£1356	1593.30
J40 P120 11.3" DS, 8/1.0Gb	£1472	1729.60
J50 P133 10.4" TFT, 8/800Mb	£1847	2170.23
P31 P100 11.3" TFT, 8/800Mb,CD	£2184	2566.20
P41 P120 11.3" TFT, 16/1.0Gb	£2794	3282.95
P50 P133 11.3" TFT, 8/800Mb,CD	£2399	2818.83
P50 P133 11.3" TFT, 8/1.2Gb,CD	£2519	2959.83



TARGUS

Targus is the recognised world leader in the design, development and distribution of computer related business luggage. Targus products are supplied with a lifetime replacement warranty as standard.



Universal Notebook Case	£59	63.23
Business Traveller Case	£149	149.55
Notepac Green Case	£29	29.33
Premier Leather Deluxe Case	£139	139.33
ABS Universal Case	£69	69.33
Leather Notebook Case	£79	79.33
Foliopac 3 Case	£39	79.33
Pilot Carry Case	£99	85.33
Premier Leather Case	£109	152.33

ETHERNET & MODEM

- Only one slot and one configuration
- Two functions simultaneously
- Free Netcomplete trial offer
- Ethernet & 33.6 high speed modem

MULTIPOINT MODEM

- No external boxes and clutter
- 4 x V34 modems on one ISA card
- Supports Windows NT RAS
- Supports Netware connect
- A reliable internal modem solution

Combined 33.6 10BT	£234	274.95	Multipoint Modem	£1195	1404.32
Combined 33.6 Combo	£265	311.38			

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PRINTERS • PRINTERS • PRINTERS • PRINTERS • PRINTERS • PRINTERS

SHARP

SHARP JX-9200



- The compact laser printer from Sharp
- Fully compatible with Windows 95
- Microsoft's Windows Printing System
- A laser printer for an inkjet price!
- 300 dots per inch x 300 dots per inch
- PCL 4 soft emulation for DOS printing
- Spacesaving design for personal use
- 100 sheet multi-purpose paper tray
- Toner Self-recycling technology
- 4 pages per minute print speed
- Lowest ever pricing!!

£185 ex vat
£217.38 inc vat

SHARP JX-9680



- 12 page per minute high speed laser
- True 600 dpi printing + enhancement
- Windows driver with status monitor
- With two 250-sheet paper cassettes
- Quiet energy saving desktop design
- PCL 5e emulation for DOS printing
- 2Mb memory expandable to 50Mb
- Lowest priced dual bin 600 dpi laser!!
- Optional Postscript Level 2 board
- Optional Network interface card
- Optional serial port

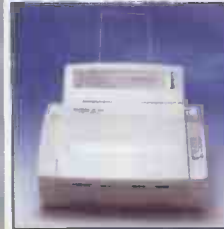
£699 ex vat
£821.38 inc vat

brother

HL630
HL631
HL660

6 pages per minute, 300 dpi, 0.5Mb
6 pages per minute, 300 dpi, 1Mb
6 pages per minute, 600 dpi, 2Mb

£169 198.58
£189 222.08
£325 381.88



BROTHER HL-730

- New 6 page per minute improved personal laser
- True 600 dpi printing in Windows (300 dpi in DOS)
- Microfine toner for sharp text and crisper graphics
- Straight Paper Path is ideal for thicker papers
- Enhanced Memory Management Technology
- 200 sheet multi-purpose feeder
- TrueType scaleable fonts on disk

£265 ex vat
£311.38 inc vat



BROTHER HL-760

- New 6 page per minute enhanced laser printer
- 1200 x 600 dpi printing in Windows (600 dpi DOS)
- Microfine toner produces improved resolution
- Straight Paper Path is ideal for various papers
- Enhanced Memory Management Technology
- 200 sheet multi-purpose feeder
- TrueType scaleable fonts on disk

£315 ex vat
£370.13 inc vat



BROTHER HL 1260e

- 12 page per minute high volume laser printer
- True 600 X 600 dpi with resolution enhancement
- Standard 2Mb RAM is upgradeable to 26Mb
- HP Laserjet 4 emulation for easy DOS printing
- Networking options are easily added
- Economic separate toner & drum
- Duplex option also available

£809 ex vat
£950.57 inc vat

OKI

For printer consumables, warranties and dot matrix please turn to last page

OKI 610ex - 600 x 600 dpi, 6 ppm, PCL5e, 2Mb Ram
OKI 400W - 300 x 300 dpi, 4 ppm, PCL4.5, GDI
OKI 1200ex - 600 x 600 dpi, 12 ppm, PCL5e, 2Mb Ram
OKI 2010 - 600 x 300 dpi colour inkjet with dual head
OKI 16N - New high speed laser printer

£313 367.78
£247 290.22
£828 972.90
£234 274.95
£769 903.58

OKIPAGE 4W



- The popular LED personal page printer from OKI
- Fast high quality text and graphics output
- Easy on screen software control from Windows
- 600 dpi class printing from within Windows
- Will print to DOS via a Windows DOS box
- Economic Laser-quality output
- Compact space saving design

£198 ex vat
£252.65 inc vat

OKI 600EX



- 6 page per minute low cost laser
- 600 x 600 dpi with improved Microfine toner
- GDI Mode for rapid Windows printing
- HP PCL 4 emulation for direct DOS printing
- High resolution printing at a low price
- Economic separate toner & drum
- Straight through paper path

£249 ex vat
£292.58 inc vat

OKI 810EX



- Fast 8 page per minute low cost laser printer
- 600 x 600 dpi with improved Microfine toner
- GDI Mode for faster Windows printing
- HP PCL5e emulation for direct DOS printing
- Networking options are available
- Economic separate toner & drum
- Straight through paper path

£589 ex vat
£692.08 inc vat

EPSON

STYLUS 200
STYLUS 1500
EPL5500 2Mb
EPL5500 PS
EPL-N1200
EPL-N1200PS

£98 115.15
£499 586.33
£369 433.58
£657 771.98
£Call
£Call

STYLUS COLOUR 200
STYLUS PRO XL+ A3
EPL9000
EPL9000 PS
EPL-1200 EN
EPL-N2000

£127 149.23
£793 931.78
£1080 1269.00
£1474 1731.95
£Call
£Call

Free T-Shirt printing factory - includes good quality T-shirt, T-shirt media, and T-shirt software with 1,500 images

STYLUS COLOUR 500

- New Improved model for Windows 3.x and 95
- 'Auto-Colour' function & free PrintArtist software
- 720 x 720 dpi colour and true black printing
- Improved version of the Epson Stylus Colour II
- Handles 720 dpi, 360 dpi and glossy papers
- One year standard warranty
- 3 year on-site warranty £65

£186 ex vat
£218.55 inc vat

EPSON STYLUS PRO A4



- The professional desktop publishing answer
- 720 x 720 dpi with Epson Microdot technology
- 4 colour PIF20 high quality Epson print head
- Takes plain, 360 dpi, 720 dpi, & gloss papers
- Includes parallel and high speed serial port
- One year standard warranty
- Ideal for pre-press proofing

£292 ex vat
£343.10 inc vat

EPSON EPL-5500 LASER



- Handles A4 printing at 6 pages per minute
- Small compact desktop designed footprint
- True 600 x 600 dpi with BiRiTech enhancement
- 1Mb memory for DOS and Windows printing
- High speed bi-directional parallel interface
- 150 sheet universal paperfeed
- Postscript and 2Mb versions

£326 ex vat
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PRINTERS • PRINTERS • PRINTERS • PRINTERS • PRINTERS • PRINTERS



- High quality laser printers
- Award winning inkjet range
- Networked options available

OPTRA E PRO	£549	£645.08	LEXMARK 2070	£259	£304.33
OPTRA R+	£865	£1016.38	OPTRA LX+	£1319	£1549.82
OPTRA RT+	£1024	£1203.20	OPTRA LX+	£1729	£2031.57
OPTRA N	£2054	£2413.45	OPTRA C	£4749	£5580.08
OPTRA N PRO	£2509	£2948.08	OPTRA C PRO	£5955	£6997.13

LEXMARK 1020



- Brand new compact inkjet from Lexmark!
- Improved version of popular 150C model!
- 600 x 600 dpi colour and black printing
- Free CorelDraw 4.0 software (on CD only)
- Even higher resolution!
- Ready for Windows 95
- 3 year warranty included

£129 ex vat
£151.58 inc vat

LEXMARK 2050



- Brand new model just launched by Lexmark
- 7 pages per minute mono, fast 1p.p.m. colour
- An ideal colour solution for the home or office
- Free CorelDraw version 4.0 software included
- Windows 95 and Windows 3.x compatible
- 600 dpi in colour or black
- Three year warranty included

£199 ex vat
£233.83 inc vat

LEXMARK OPTRA E



- The compact class leading laser from Lexmark!
- True 600 x 600 dots per inch microfine printing
- Windows 95, Windows 3.x and NT compatible
- 6 pages per minute desktop printing
- High speed 16bit RISC processor
- Fully networkable office printer
- One year warranty

£299 ex vat
£351.33 inc vat



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PACKARD**



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For Hewlett Packard Plotters and 3 year warranties please turn to page 6 of this advert

HP INKJET PRINTERS



HP DESKJET 400 MONO	£108	126.90
HP DESKJET 400 INC COL	£114	133.95
HP DESKJET 690 NEW!	£183	215.03
HP DESKJET 820Cx	£245	287.88
HP DESKJET 870Cx	£292	343.10
HP DESKJET 340 INC COL	£140	164.50
HP DESKJET 1600C	£805	945.88
HP DESKJET 1600CM	£1207	1418.23
HP DESKJET 1600CN	£1207	1418.23
HP OFFICEJET 350 NEW!	£458	538.15
HP COPYJET COLOUR	£1085	1274.88

HP DESKJET 820

£245 ex vat
£287.88 inc vat

HP LASER PRINTERS



HP LASERJET 5L	£284	333.70
HP LASERJET 6P	£482	566.35
HP LASERJET 6MP	£594	697.95
HP LASERJET 5	£854	1003.45
HP LASERJET 5N	£1011	1187.93
HP LASERJET 5M	£1169	1373.58
HP LASERJET 5SI	£1957	2299.48
HP LASERJET 5SIMX	£2659	3124.33
HP LASERJET 4V	£1367	1606.23
HP LASERJET 4MV	£1979	2325.33
HP LASERJET 5 COLOUR	£4154	4880.95
HP LASERJET 5M COLOUR	£5124	6020.70

HP LASERJET 5L

£284 ex vat
£333.70 inc vat



For printer consumables, warranties and dot matrix please turn to last page

FS-400 Twin Bin	£429	£504.07	SPECIAL OFFER - UNTIL 31/12/96 The two special bundles shown below include a free ethernet card and extra 4Mb Ram (making 6Mb in total).
FS-1600+	£934	£1097.45	
FS-3400+	£1152	£1353.60	
FS-3600+	£1394	£1637.95	
FS-6500+ MEMORY	£1399	£1643.82	
FS-1600NS+	£1029	£1097.45	
FS-3600NS+	£1489	£1637.95	

KYOCERA FS400



- 4 pages per minute personal printing
- Enhanced 300 x 1200 dpi printing
- Drum guaranteed for 100,000 pages
- 79 bitmap and 13 scalable fonts
- Optional Postscript emulation
- Optional further paper trays
- Extra memory available
- Networking options
- Low cost per page
- No cartridge !!
- Toner £15 + vat

£305 ex vat
£358.38 inc vat

KYOCERA FS1550+



- 10 pages per minute office laser
- Enhanced 300 x 1200 dpi printing
- 79 bitmap and 13 scalable fonts
- Optional Postscript emulation
- Optional further paper trays
- HP Laserjet III emulation
- Extra memory available
- Networking options
- Low running costs
- No cartridge !!
- Toner £44 + vat

£785 ex vat
£922.38 inc vat



PANASONIC KX-P6100



- Compact Windows laser printer
- 6 pages per minute print speed
- 100 sheet multi-purpose input tray
- 300 x 300 dpi resolution
- 1 year on-site warranty
- Separate toner & drum

£159 ex vat
£186.83 inc vat

PANASONIC KX-P6150



- Compact DOS/Windows laser printer
- 6 pages per minute print speed
- 100 sheet multi-purpose input tray
- 50 sheet face down output tray
- 300 x 300 dpi enhanced resolution
- 1 year on-site warranty
- Separate toner & drum

£279 ex vat
£327.83 inc vat

PANASONIC KX-P6300



- High resolution Windows laser printer
- 6 pages per minute print speed
- 100 sheet multi-purpose input tray
- HP PCL4.5 emulation
- 600 x 600 dpi resolution
- 1 year on-site warranty
- Separate toner & drum

£169 ex vat
£198.58 inc vat

PANASONIC KX-P6500



- Compact DOS/Windows laser printer
- 6 pages per minute print speed
- 100 sheet multi-purpose input tray
- 50 sheet face down output tray
- 600 x 600 dpi enhanced resolution
- 1 year on-site warranty
- Separate toner & drum

£299 ex vat
£351.33 inc vat

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SOFTWARE • SOFTWARE • SOFTWARE

Windows 95		Microsoft Windows 95		Desktop Publishing	
Win 3.x to Win 95 3.5"	58 68.15	Access 7 Win 95	225 262.02	Page Maker 6	380 446.50
Win 3.x to Win MLP	55 64.62	Access 95 CCP u/g	81 95.17	Page Maker 6 Win u/g	99 116.32
MS-DOS to Windows 95	111 130.42	Access 95 Comp u/g	101 128.07	FrameMaker	440 527.57
MS Plus! for Windows 95	26 30.55	Access 95 1MLP	194 229.12	Illustrator v4.1	230 276.12
Intuit		Access 95 D.Toolkit	385 457.07	Photoshop v3.0	399 468.82
Quicken Windows 5 Disk	26 30.55	Excel v7 Win 95	222 260.85	Adobe Collection	899 1056.32
Quicken Windows 5 CD	26 30.55	Excel v7 95 CCP u/g	81 95.17	Acrobat 2.1	95 116.62
Quicken Deluxe 5 CD	46 54.05	Excel v7 Comp u/g	105 123.37	Corel Ventura V5	234 274.95
Quick Books v3.0	81 95.17	Excel v7 1MLP	195 229.12	Corel Ventura V5 CD	199 233.82
Corel		Money 95	19 22.32	Pressworks2 WIN	22 25.85
CorelDraw 3CD	35 41.13	Office v7 Win 95	325 381.87	Pressworks2 P/Pack	38 44.65
CorelDraw 4CD	64 75.20	Office 95 V update	138 159.80	Publisher V2.0 Win	75 88.12
CorelDraw 5CD	137 160.98	Office 95 C u/grade	159 186.82	Publisher V2.0 Design	17 19.97
CorelDraw 6CD	259 304.32	Office v7 Win 95 Pro	419 492.33	OCR	
CorelDraw 3-6 upgd CD	224 263.20	Office v7 95Pro V update	195 233.83	OmniPage Direct	58 66.15
CorelDraw 4-6 upgd CD	224 263.20	Office v7 95Pro C u/g	239 280.82	OmniPage Pro 7	320 356.57
CorelDraw 5-6 upgd CD	97 113.98	Word v7 95	222 260.85	OmniPage Pro CCP u/g	119 139.82
Corel Gallery 2 CD	50 58.75	Word v7 95 vers update	80 94.00	Wordscan + Win v4	289 339.58
Corel Flow 3 CD Win 95	84 98.70	Works 4.0	65 76.37	Wordscan + v4 Com u/g	129 151.57
Corel Visual Cad	215 252.62	Powerpoint Win 95	229 269.07	TextBridge Win v3	65 76.37
Corel PrintHouse	18 21.15	Powerpoint 1MLP	195 229.12	TextBridge Pro	225 269.07
Corel PhotoPaint 5+	45 52.87	Powerpoint CCP u/g	81 95.18	TextBridge Pro 96 CD	250 304.32
Corel Presentations	45 52.87	Powerpoint Comp u/g	10 125.72	TextBridge Pro Com u/g	129 151.57

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Kodak NEW DC25 MODEL NOW IN STOCK £319 + VAT

DC50 ZOOM CAMERA

- Winner of Computer Shopper 'Best Buy' award
- 756 x 504 resolution digital camera
- Close-up, telephoto and wide-angle
- Uses PCMCIA Type I and II cards
- Infrared autofocus sensors
- DC40 model £365 + vat
- DC20 model £208 + vat

£623 ex vat
£732.03 inc vat

CASIO QV-100 £425 + VAT
QG100 £165 + VAT

QV-10A DIGITAL CAMERA

- New lightweight digital camera
- 24 bit, 16.7 million colours
- 96 image built-in 16Mbit memory
- Connects to PC/Mac or TV/VCR
- Rotatable lens and LCD display
- Compact and simple to use
- Software and cables included

£279 ex vat
£327.83 inc vat

POLAROID SONY

PDC-2000T	1699	1996.33	SONY DK-1	1349	1585.0
PDC-2000/40	2399	2818.83			
PDC-2000/60	2985	3507.38			

EPSON PHOTOPC 500 **Call**

Nikon COOLPIX 100 **359** 421.83
E2N (35mm) **6999** 8223.83

SANYO VPC-GI **339** 398.33

Canon POWERSHOT 600 **636** 747.30

EXTERNAL CD-ROM DRIVES



External PCMCIA Quad Speed CD ROM	£188	220.90
External PCMCIA Six Speed CD ROM	£237	278.47
External PCMCIA Eight Speed CD ROM	£277	325.47
External PCMCIA Dual Speed CD ROM/Audio CD	£188	220.90
External PCMCIA Quad Speed CD ROM/Audio CD	£237	278.47
External Parallel Six Speed CD ROM	£188	220.90
External Parallel Eight Speed CD ROM	£228	267.90
External Parallel Quad Speed CD ROM with sound	£203	238.52
External Parallel Six Speed CD ROM with sound	£253	297.27
External Parallel Eight Speed CD ROM with sound	£293	344.27

PRINTERS • PRINTERS • PRINTERS • PRINTERS • PRINTERS • PRINTERS

GCC TECHNOLOGIES NEW A3 EDGE-TO-EDGE PRINTING AT 1200 DPI !!

GCC XL608 LASER

- Unique A3 Edge-to-Edge laser printing
- Up to 8 pages per minute rapid printing
- 800 x 800 dpi from 25MHz RISC processor
- Ideal professional proofing laser
- Postscript Level II as standard
- Free 8MB Ram upgrade
- Free Ethernet 10 Base-T/2 port

£1999 ex vat
£2348.83 inc vat

GCC XL1208 LASER

- True 1200 x 1200 dots per inch printing
- Up to 8 pages per minute print speed
- A3, A4, Letter, Legal, Ledger, envelopes
- PCL 5 emulation with HP-GL/2
- 250 TrueType and Type 1 fonts
- 24Mb RAM expandable to 64Mb
- 25MHz RISC processor

£3849 ex vat
£4522.58 inc vat

Tally

- Fully featured high speed lasers
- Designed for both DOS and Windows

T9108 LASER

- 8 page per minute low cost laser
- 600 x 600 dpi resolution printing
- 1Mb memory as standard
- 4Mb Ram upgrade just £35 + vat
- Windows printing system
- Real HP PCL 4.5 for DOS
- Small compact design

£324 ex vat
£380.70 inc vat

Canon LOWER PORTABLE PRICED MODELS

BJ30	£99	116.33	BJC70	£138	162.15
BJ210	£94	110.45	BJ230	£226	265.55
BJC4100	£168	197.40	BJ300	£343	403.02
BJ330	£384	451.20	BJC620	£266	312.55
BJC800	£878	1031.65	BJC820	£1198	1407.65
BJC4550	£273	320.78	BJC4200	£Call	
LBP460	£209	245.58	LBP1260	£718	843.65

NEC FANTASTIC NEW MODEL OUT NOW FROM NEC!

NEC SUPERSCRIPT 860

- New 8 page per minute true laser printer
- 600dpi quality with SET for 1200 x 600 resolution
- Includes CD-ROM with 78 Type 1 fonts and clipart
- Compatible with MS Windows, DOS and others
- 200 sheet feeder & 5000 page toner
- Networking capability
- 50MHz processor

£314 ex vat
£368.95 inc vat

STAR			EPSON			OKI		
LC90	59	69.32	LX-300	91	106.93	ML280	190	223.25
LC100 COL	69	81.07	LX-1050	178	209.16	ML320	299	351.33
LC240	69	81.07	FX-870	233	273.78	ML321	359	421.83
LC240C	79	92.82	FX-2170	368	432.40	ML380	215	252.63
LC-7211	249	292.57	LO-100	86	101.05	ML385	310	364.25
LC-4511	243	285.53	LO-300	111	130.43	ML395 M	635	746.12
LC-1521	292	343.10	LO-570	205	240.88	ML395 C	715	840.12
XB24/250C	399	468.82	LO-870	289	338.58	ML520	329	386.58
WIN 4000	205	240.88	LO-2070	319	374.82	ML521	389	457.08
TALLY			LO-2170	463	544.03	ML590	435	511.12
MT83	175	205.62	DLQ-3000	780	915.50	ML591	499	586.32
MT135	195	229.12	DFX-5000	1169	1373.57	ML3410	799	938.83
MT84	205	240.87						
MT136	275	323.12	PANASONIC			PANASONIC		
MT150/9	285	334.07	KX-P1150	90	105.75	KX-P2023	108	128.90
MT150/24	399	468.82	KX-P2124	191	224.42	KX-P2135C	123	144.52
MT151/9	339	398.32	KX-P3626	259	304.32	KX-P3696	262	307.81

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MODEMS AND INTERNET KITS



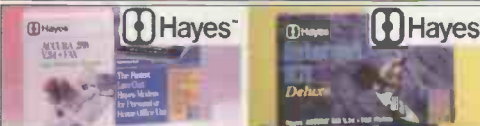
The Intelligent Choice in Information Access



The Sportster Voice 33,600
 Faxmodem shown on the left provides internet access, fax, e-mail, personal voice mail and speakerphone facilities all in one compact unit from the big name in modems!!

Sportster Voice 14.4 Ext	74	86.95
Sportster Voice 33.6 Ext	128	150.40
Sportster 14.4 Int	74	86.95
Sportster 33.6 Int	128	150.40
Courier ISDN	193	226.78
Courier V34	196	230.30
Sportster 28.8 PC Card	128	150.40

£128 ex vat
 £150.40 inc vat



Accura 14.4 Internet	74	85.78
Accura 28.8 Message	132	155.10
Optima 28.8 Business	199	233.83

Accura 28.8 Internet	110	129.25
Optima 14.4 Business	149	175.08
Optima PCMCIA 28.8	149	175.08

British Telecom Pro V34 External	154	180.95
Pro V32bis PC Card	148	173.90
Pro V34 PC Card	198	232.65

Internet Blaster Internal	99	116.33
Modem Blaster Internal	135	158.63
PhoneBlaster 34 28.8	199	233.83

Zoom 28.8 Internal	87	102.23
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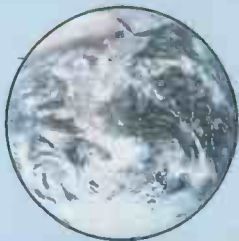
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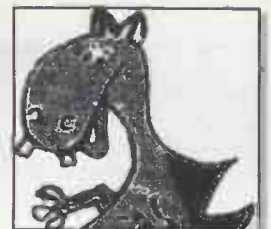
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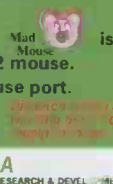
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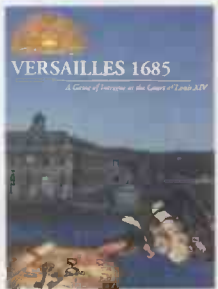
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Considered better than Quake, Realms

of the Haunting involves combat, exploration and puzzle-solving interspersed with over 90 minutes of high-res full-motion video. You can seek advice from different characters you meet along the way to help you survive this surreal experience.

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6	Tomb Raider	Sega	Saturn
7	Tekken 2	Namco	PlayStation
8	Flight Sim 6.0	Microsoft	PC CD-ROM
9	Formula 1	Psygnosis	PlayStation
10	Worldwide Soccer '97	Sega	Saturn
11	Worms United	EA	PC CD-ROM
12	Tie-Fighter: White Label	Virgin	PC CD-ROM
13	Fighting Vipers	Sega	Saturn
14	Indycar: White Label	Virgin	PC CD-ROM
15	Wallace & Gromit	BBC Multimedia	PC CD-ROM
16	Network Q Rally	Europress	PC CD-ROM
17	Tunnel B1	Ocean	PlayStation
18	Bubble Bobble & Rainbow Islands	Acclaim	PlayStation
19	Actua Golf	Gremlin	PlayStation
20	Civillization 2	Microprose	PC CD-ROM

Flight Simulator 6 for Windows 95

More joy for jet jockeys: new planes to fly to new cities with more detail, and it's all on the Windows 95 interface.

The long-awaited Windows 95 version of Flight Simulator has finally arrived. I had a list of niggles with the last version, so I was keen to see what Microsoft had been developing over the last year or so.

Flight Simulator 6 boasts many new cities including London, Paris, New York, San Francisco and Tokyo. All are rendered with good detail, and the new surface, enhanced textures of the land in-between, is more convincing than previous editions.

The engine sound effects have been improved, especially when changing the position of the landing gear and flaps.

For those who like the larger, more commercial aircraft, the new Boeing 737 series 400 is waiting in the wings. Being a big fan of the more substantial airliner, I was keen to take it for a spin. I won't say that it's impossible to fly; just that I haven't exactly landed it yet — on the runway, that is. The characteristics of this plane are different to the other aircraft, as you might imagine. Because of its size, it's slow to react and then slow to stop reacting, which makes lining up for landing after banking round into final approach almost impossible. Still, practice makes perfect.

If all that lumbering mass has worn you out, get an adrenaline burst from the other new recruit, the Extra 300S, a nippy little high-performance aerobatics aeroplane. You can take this baby through its paces for sheer excitement, or you can learn how to do aerobatics properly with the famous female flyer, Patty Wagstaff, in the pilot's help flight school.

Installation is easy. Windows 95 starts the setup and progresses smoothly while

displaying new features accompanied by aeroplane sound effects whizzing between the speakers. You can select three types of installation: the first, a mere 40Mb of disk space, is ideal for notebooks. The second is "Typical", loading 85Mb in total.



The last, "Custom", a massive 140Mb (probably most of the CD-ROM) is copied onto your hard disk which enables better scenery display and refresh.

Launching Flight Sim only takes seconds, like a usual Windows 95 application. Gone are the days of that extremely distressing DOS memory requirement message, often seen while loading previous versions.

The new Windows 95 interface is brilliant: all the preferences and situations are accessed within a true Windows environment, which makes the set-up far easier. Those of you with joysticks can now enjoy calibration within windows.

Well-presented online help files replace much of the old Pilot's Handbook, and



Above Fly the Boeing 737, a new recruit in the hanger

Left Happy landings!

there's a useful flight school provided by text display while the voice of instructors can guide you through the manoeuvres. The audio is particularly useful for freeing up your eyes and checking the dials.

I ran the game on a Pentium 133MHz PC with a lot of scenery detail loaded and it moved along quite quickly, except for the occasional momentary freeze while it read from disk.

Now I can say Flight Simulator is almost perfect thanks to its ease of use, extra detail and stability. The one downside was that it insisted on changing my graphics driver from a Diamond to a generic S3 after I switched into the preferred 256-colour mode, but this is only a small niggle.

Darrell Kingsley

PCW Details

Price £49.99 (incl VAT)

Contact Microsoft 0345 002000

System Requirements 486DX/66 or higher, Windows 95, 16Mb RAM, 40Mb hard disk space (min), double-speed CD-ROM, SVGA card, and 16-bit sound card.

★★★★

p530 >

Network Q RAC Rally Championship 5

Realistic rallying in fully-specced cars, spitting gravel all the way.

I love arcade-style driving games. The last decent driving game for the PC was Gremlin's Fatal Racing, but this has been toppled from its throne by the superb Network Q RAC Rally Championship, from Europress.

The only game to be officially endorsed by the RAC Motorsport Division, Network Q RAC Rally features all 28 stages of the RAC Rally — just under 300 miles of the official



RAC route. Choose from six fully-specified rally cars: Subaru Impreza Turbo, Ford Escort Cosworth 4x4 Turbo, Renault Maxi Megane, Proton Wira, VW Golf GTi 16 Valve, and Skoda Felicia, all with sound effects recorded from the genuine vehicles.

The realism is to be applauded: it could be sunny and dry, chucking it with rain or pitch black, and Rally will make you feel like you're actually there. The cars are animated beautifully, the road and landscapes look great, and the handling of the vehicles is convincing as you slide around a wet gravelly corner. Beware of the over-enthusiastic computer cars flipping and blocking the track.

Sound effects and music tracks are excellent, and there's samples of TV's rally commentator Tony Mason yelling co-driver

Put your foot down and overtake that Cosworth

route advice. It ran beautifully in high-resolution mode on a 16Mb Pentium 166, but Rally requires at least a 486 DX2/66 with 8Mb RAM to make it worthwhile. As you'd expect, you can race against the computer, or with up to eight players over a network in four modes of play.

Rally is easy to get into, it's addictive, and offers tougher levels for the experienced gamer. Perfect for the rally enthusiast or any arcade driving fanatic.

Gordon Laing

•PCW Details

Price £39.99 (incl. VAT)

Contact Europress 01625 859333

System Requirements 486 DX2/66 or better, Windows 95 or DOS 6.22, 8Mb RAM, SVGA graphics with 1Mb memory, 2x CD-ROM drive.

★★★★★

Monopoly

A CD version of the well-loved game.

When I was young I loved playing Monopoly, especially against my sister as I always won. However, one day she caught me with my hand in the bank and refused to play me ever again. I swear to this day that it was the first time I had ever done this. But the damage was done — she never trusted me again.

She wouldn't trust this new electronic version of the property-trading game. It gives you an option of letting the computer cheat, which presumably means it can dip into the bank's vaults without you noticing.

Apart from that, Hasbro's online interpretation of Monopoly is faithful to the original. It adds annoying music and 3D animations of your piece moving around the board, and some idiosyncratic interpretations of the famous landing sites.

Oxford Street is depicted as an idyllic mountain scene and Whitechapel Road looks like it's been hit by a nuclear strike. The playing area is small and cannot run full-screen. I pity anyone who ends up squinting at their 14in monitor.

Playing the game is a doddle. Select which piece you want and choose your opponents — either the built-in AI players, other humans or a remote player on the net. Then you simply click on the dice, wait for the character in the top hat to throw, and watch your piece move around the board. Then it's up to you to buy or defer.

As Brucie would say, that's pretty much all there is to it. Playing Monopoly this way was cool, but I missed the banknotes and property cards stuffed under the board and



Watch the dice roll and your players move.

Always keep an eye on the banker

the plastic hotels and houses. I can move my racing car faster than any 3D animation.

PJ Fisher

•PCW Details

Price £39.99 (Incl. VAT)

Contact Hasbro Interactive 0181 569 1234

System Requirements 486 DX/33 with 8Mb RAM, 13-27Mb of hard disk space, Windows 3.11 or Windows 95.

★★

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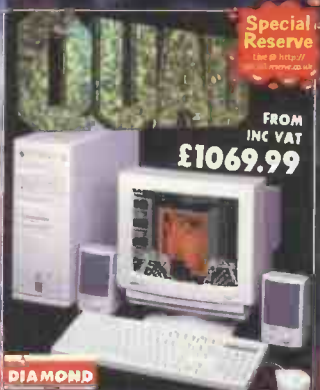
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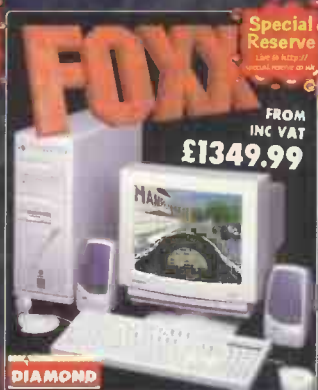
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Starting from scratch

Tony Sale wanted to prove that the electronic computer was a British invention, not American, so he rebuilt the Colossus, originally used to crack Nazi codes. Simon Rockman reports.

Tony Sale was a man with a mission: one which is now complete but spiced with technology and patriotism. He wanted to prove that the electronic computer was a British invention, so to this end he rebuilt the first-ever computer, at its home just outside Milton Keynes. In doing so, he proved that Britain was two years ahead of America, which had previously claimed its ENIAC machine was the first.

The man who originally built Colossus, and thus the first person to build a computer, was Dr Tommy Flowers, together with his team at the Post Office Research Laboratories at Dollis Hill, north London. The original Colossus was built in 1943 and was operational by February 1944. It wasn't a computer as we know it. It had one job: to crack codes from the German Lorenz SZ42 cipher machines. Some of the programming was completely hardwired (part of the design of the machine) and some was changeable, using plugs and sockets. There was no software.

Not all the code cracking was done by Colossus; a good deal had to be done by hand. The Lorenz SZ42 used the international 5-bit Baudot teleprinter code and enciphered the text by adding two characters to it, successively, before transmission. This technique relied on random numbers for the two characters, but distributing books or tapes of the random characters was difficult in the middle of a war and prone to interception. So the Germans designed the Lorenz machine with a complicated set of mechanical gears to give a possible 10^{18} combinations.

They reasoned that to try all these combinations by hand, when there was a lot of coded traffic, would take so long that the information would be redundant by the time the code was cracked. As a result, the German high command (from Hitler

downwards) thought Lorenz was uncrackable. But the interception and deciphering of their messages gave allied generals vital information prior to, and after, D-Day.

Ten machines were eventually built, each one taking about two hours to crack the wheel settings. Colossus was technically digital (although it had no clock speed), its actual processing speed governed by the 5,000 characters per second of the optical tape reader which used five-hole paper tape. This essentially made the machine a parallel processor, since the operations took place together. The information was held in valves as five characters of five bits in a shift register. Each possibility would need up to 100 operations to be performed on the number. Special hole combinations indicated the beginning and end. The need to store 501 bits for the L2 Lorenz valves meant there were 2,500 valves.

In these days of 3.3v computers, the Colossus lives up to its name in power usage alone. It takes between +200v and -150v (to power the Logic as well as the tape reader) and consumes 4.5kW of power. The machine is huge. The room it fills would now be considered large enough for the computer department of a multinational corporation.

Rebuilding a machine which had been kept secret, and whose original plans had been destroyed in 1960, was no mean feat and cost Tony Sale many thousands of pounds as well as two years' of hard work.



The Colossus, the world's first digital electronic computer, could break German codes varying up to 10^{18} combinations, all with vacuum tubes. Not bad hitting for the first of its kind!

He began with a series of official photographs, taken in 1945. The first stage was to produce accurate machine drawings of the Colossus frames. This involved three months' of eyestrain poring over the photographs and using 3D projections to transfer the details to a CAD system called EasyCad, running on a 486 PC. The optical paper tape reader system was not shown in any of the photographs but Sale managed to locate Dr Arnold Lynch, who designed the reader system in 1942. "Although well into his eighties, Dr Lynch came to my house and, using my CAD system, we re-engineered the reader system to his original specifications," says Sale. ■

● If you have parts: EF36, 37 or 37A pentodes, 6J5 triodes, 6V6 tetrodes (should be the large glass versions to look right) or GT1C gas-filled triode thyatrons, the 6J5's and 6V6's; please send any contributions, valves or money to Tony Sale at The Colossus Rebuild Project, 15 Northampton Road, Bromham, Beds MK43 8QB. (Phone 01234 822788 or email TSale@qufaro.demon.co.uk)

Brainteasers

Although this is the January issue, I am aware that most of you get your copy of the magazine in early December, so Happy Christmas and a great New Year to you all.

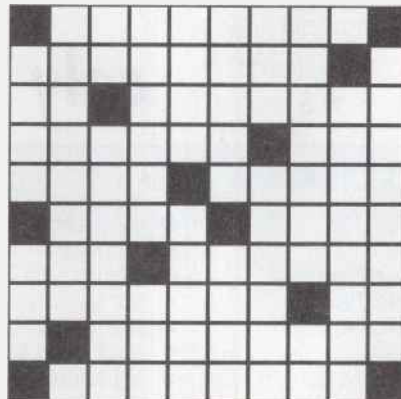
Quickie

Here is the usual not-too-difficult number puzzle to do over the party season. One chocolate bar costs three times as much as a candycane. If I buy one chocolate bar and one candycane, and the sum of the digits of the total number of pence that I spend is 14, how much change will I get from a pound?

This Month's Prize Puzzle

Arrange the numbers shown (right), into the grid — some across and some down — in the manner of a crossword.

When you've done that, cut out (or photocopy) the completed grid and stick it on a postcard, or onto the back of a sealed



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52	8899	6544048
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695	228947	29561997
843	318990	44594632
1195	786951	63603022
2433	969921	89283259

envelope, and send it to: *PCW Prize Puzzle January 1997, P.O. Box 99, Harrogate, North Yorkshire HG2 0XJ*. Entries should arrive no later than 20th January 1997.

October 1996 Prize Puzzle

The problem about the distances from the Baron's house in gallimeters was a little bit harder than usual and, as a result, just under 90 entries were received in all.

I realised, from the entries, that two answers were possible, depending on which direction the cyclists took. Anyway, the answer I wanted was ten gallimeters, but I was willing to accept the alternative, equally correct, answer of 243.1 gallimeters.

The winning entry came from Mr J Connolly of Plymouth. Congratulations, Mr Connolly, your prize will be with you shortly. To all the others — keep trying, you could be the next winner.

JJ Clessa ■

Computations

Soaring on tax dollars

Imperial Airways, forerunner of BA, flew on a subsidy of £380,000 plus a year. British buses today pay four times more for fuel than BA. US federal spending on major companies' aerospace programmes nearly doubled in the 15 years running up to GATT. Success in space exploration was patchy, with a 12.6 percent failure rate overall. 144 out of 1,154 US spacecraft failed to achieve orbit. Boeing is planning to cash in by launching up to 1,000 satellites from a converted oil-rig in the mid-Pacific. Should it not be paying back out of its annual turnover, which is bigger than Egypt's, some of the public funding it has received?

What a gas

Keeping the average American comfortable in Hollywood-type surroundings takes the equivalent of seven Olympic swimming pools of gas a year. Each American's average share of US energy consumed in 1990 was 328 million Btu. Per capita

Statellite

If the British Film Institute raises the £20 million it wants from lottery funds and puts its 275,000 archived movie and TV titles online, a film student could watch a different clip every five minutes of the working day for 13 years. ■ Source: BFI

energy consumption has decreased by 0.6 percent since 1970, but the consuming population has increased by 53 million, or 25 percent. Humanity has used 1,100 trillion cubic metres of gas, which would fill Olympic swimming pools stretching to the moon and back 28,000 times.

■ Sources: Statistical Abstract of the US/Donella Meadows: Amicus Magazine

Power surge

It has been calculated in California (by the Air Resources Board) that 10 percent of smog-forming non-automotive hydrocarbons come from personal consumer products. About 2,600 products

are involved, including cleansers, fixatives and aerosol insecticides. I have not seen a similar calculation for electrical appliances, which are subject to no controls at all, with the result that their use is, er, out of control.

A chilling thought

Statistics show that in 1985 Americans bought 2.9 million air-conditioning units, but in 1989, they bought 4.9 million.

The 70 percent increase must be proof of the greenhouse crisis. It partly reflected the building programmes in the sun-belt, but also demonstrated the vicious circle of electrical cooling: A/Cs export heat to the outside, making warm towns and cities warmer, prompting more people to install air-conditioning. A/Cs boost demand for coolants, most of which are ozone-layer destructive and increase electricity consumption. This forces the climate change people seek to escape. Heat exchangers and adaptive architecture are the only way to redevelop sun-belt suburbs.

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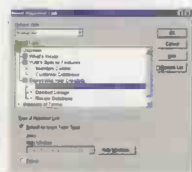
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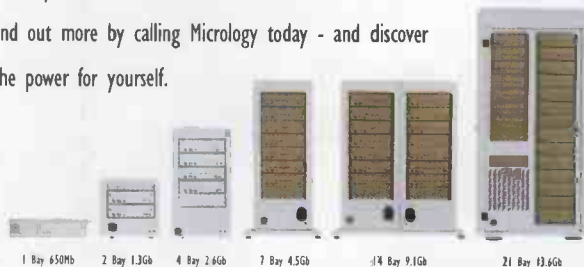
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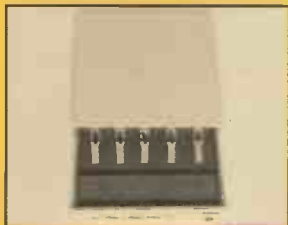
Our most compact POS keyboard, the 8001 packs 105 programmable keys into the smallest footprint. Magnetic card reader option and serial interface option.



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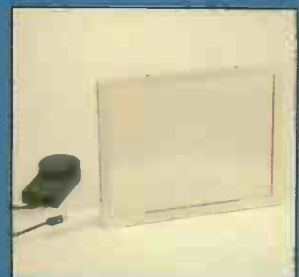
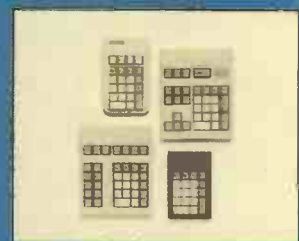
Our new trackball range features the new infrared Star Track for remote control of presentation, demonstration and any other mouse applications. Two desktop models offer the choice of thumb or finger operations with two enclosure styles. All trackballs can directly replace a serial mouse.

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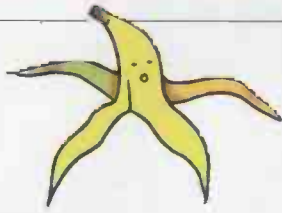
The latest Keyports now include a full PC keyboard wedge interface – just plug into the keyboard port, with or without your keyboard attached, and you're ready to programme your own layout. Software to download programme and design overlay included.



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ChipChat



Oops!

- The Hayes Optima V.34+ Fax PC card review in last month's modem group test stated that it came with an EZJack connector. This is only available with the US versions, not the UK ones. We regret any confusion this may have caused.
- Novell's phone number was printed incorrectly on page 164 of our last issue. It should have been 01344 724000.

Techie humour

How many technical support staff does it take to change a light bulb?

1. "Well, we have an exact copy of your light bulb here and it seems to work fine. Can you be more specific about the problem?..."
2. "I'm sorry, we don't support that kind of lighting technology."
3. "Our engineers are busy at the moment... We have assigned query number 7869800783 to your question and will call you back within half an hour."

Ten for the Ladies

Ten reasons why computers must be male:

- 1 They have a lot of data but are still clueless.
- 2 A better model is always around the corner.
- 3 They look nice and shiny until you bring them home.
- 4 It's always necessary to have a back-up.
- 5 They'll do whatever you say if you push the right buttons.
- 6 The best part of having one are the games you can play.
- 7 In order to get their attention, you have to turn them on.
- 8 The lights are on but nobody's home.
- 9 Big power surges knock them out for the night.
- 10 Size does matter.

Mythical tales

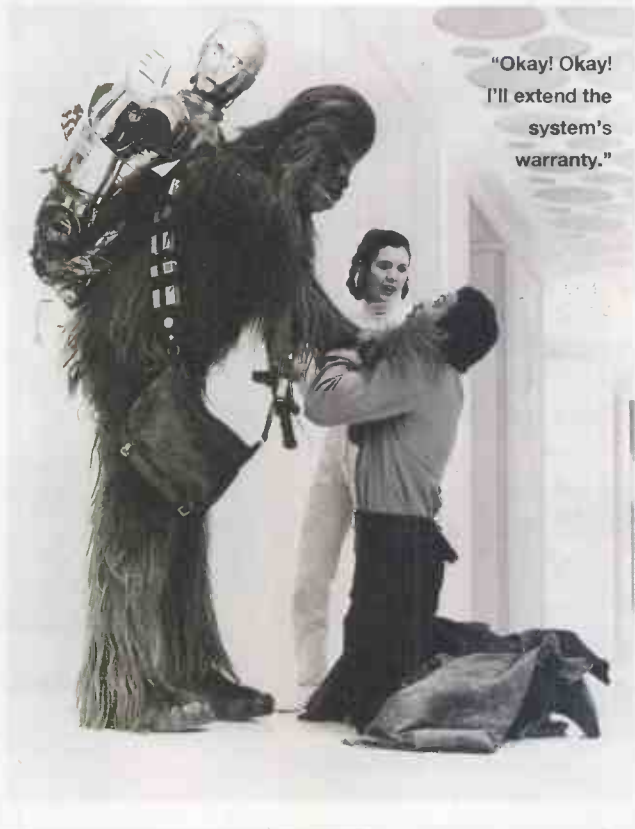
A computer once billed a man for \$0.00. He dutifully wrote to the company telling them about this absurd bill and they promised to

Caption competition

Congratulations to Caption winner Brian Salter, of London, who won November's Caption competition (lady with rolling pin) with this: "OK, wise guy. Gimme the dough for a flatbed or I'll let you have a taste of my handheld."



Think you can do better? Email captions@vnu.co.uk or write to the usual PCW address with your own captions on a postcard marked "Captions Compo", before 18th January. We'll print the funniest entry and the winner will get a £20 book token.



"Okay! Okay! I'll extend the system's warranty."

correct the problem. But the next month, he got another bill for \$0.00.

This went on for months. The computer thought he'd defaulted on the bill so a five percent penalty was added, bringing the total to, you guessed it — \$0.00.

Calls and letters to the company failed to correct the problem. Finally, the man gave up and wrote a cheque for \$0.00 and the bills ceased.

■ Thanks to Steve Oulline

Just fancy that...

PCW news editor Clive Akass was pleased to be invited to a Microsoft developers conference in California recently. A highlight of the conference was a speech by Bill Gates. Bill, it turned out, was being beamed live by satellite from 6,000 miles away. In fact, from the Lanesborough Hotel in London, which is all of one mile from the PCW office...

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- Intel Pentium[®] Processor 120MHz ■ 8MB EDO RAM ■ 1.2GB Hard Drive ■ 8 Speed CD ROM
- 1MB fast PCI Graphics ■ Ports: 2 serial, 1 parallel, 1 PS/2 ■ Sound Card ■ Microphone ■ 14" Colour Monitor* with built-in stereo speakers ■ Keyboard
- Microsoft[®] Mouse ■ Microsoft[®] Windows[®] 95
- Microsoft[®] Works[®] ■ Family Bundle A (see software packages)

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1A HOME 120S PLUS

Same as above but with the following differences:

- 16MB EDO RAM ■ 256K Cache

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2 PERFORMANCE 133 PLUS

The Performance 133 plus brings together the fast 133MHz Pentium[®] Processor along with a 3D sound card and Internet access to provide one of the best value multimedia PCs around.

Same as the Home 120 but with the following differences:

- Contender[®] ATX Desktop (Large) ■ Intel Pentium[®] Processor 133MHz ■ 16MB EDO RAM ■ 256K Cache ■ 1.6GB Hard Drive
- 8 Speed CD ROM ■ 2MB Fast PCI Graphics
- 15" Colour Monitor* with built in speakers
- 3D sound card with wave table ■ Yamaha stereo speakers ■ 28.8kbps voice/fax modem with Internet Access
- Family bundle B (see software packages)

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2A ULTIMATE 166 PLUS

Same as above but with the following differences:

- Contender[®] ATX Medium Tower ■ Intel Pentium[®] Processor 166MHz ■ 32MB EDO RAM ■ 2GB Hard Drive
- 3D Ultra Fast Graphics with 2MB
- Yamaha stereo speakers with subwoofer

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3 AWESOME 200 PLUS

The Awesome 200 plus as the name suggests is one of the most powerful and feature packed multimedia PCs imaginable. Check out the 3D graphics and sound, 33.6 kbps voice/fax modem, 12 speed CD ROM and the only PC in UK with a photo scanner drive (a must for your photos and web pages).

Same as the Performance 133 plus but with the following differences:

- Genie[®] ATX Medium Tower ■ Intel Pentium[®] processor 200MHz ■ 32MB EDO RAM ■ 256K Cache
- 3GB Hard Drive ■ 12 Speed CD ROM ■ 3D Ultra Fast Graphics with 2MB
- 17" Colour Monitor* with built in speakers ■ 3D Sound Card with wave table
- Yamaha stereo speakers with subwoofer
- 33.6kbps voice/fax modem with Internet access
- Photo scanner drive ■ Upgradeable to Intel Pentium[®] processor with MMX Technology

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Maintenance options

Every Viglen PC comes with lifetime technical support and a 12 months parts and labour repair and return warranty (which is better than most of our competitors 'so called' on-site warranty). For an additional cost of only £45.00 inc VAT, you can convert this to our **PREMIUM** service with a 12 month next business day on-site repair warranty. That's not all, as an additional option we can continue this service for up to five years.

5486

Software packages

The Viglen configurations shown are bundled with different software packages. Each package is outlined here to help you choose the configuration that's right for you.



Microsoft[®] Works for Windows[®] 95

Five essential tools for easier everyday computing. Word processing, spreadsheet, database, graphics and communications tools.

Family bundle A

The Family Bundle A includes the following:



Microsoft[®] Works for Windows[®] 95

As above.



ENCARTA[®] '96 (US version) 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!



Microsoft[®] Money A complete set of financial management and planning tools to manage your investments and expenditure.



Fine Artist (US version) Create everything from multimedia picture shows to posters and other cool stuff. Fine Artist has the tools every artist needs for drawing and painting plus a few surprises like animation, sound, high quality graphics, tips and tricks.



Microsoft[®] Dangerous Creatures Get close to more than 250 of the wildest creatures on earth through 800 detailed articles, hundreds of full colour photographs, and hours of sounds and narration, all reviewed by the World Wildlife Fund.



Microsoft[®] Explorapedia: The world of nature Information on animals, insects, oceans, rocks and minerals, weather, ecology, the food web, continents, microscopic life and much more.



Microsoft[®] Arcade Microsoft[®] Arcade takes you back to the fun-filled days of video arcades without ever leaving home! You'll have hours of fun with five exact replicas of your favourite video games and you can set the parameters and customise each game.



Microsoft[®] Wine Guide A multimedia guide to wine appreciation and selection, hosted by Oz Clarke.



Easy Tutor A comprehensive interactive tutorial guide to learn Windows[®] 95.

Family bundle B

The Family bundle B is the same as the Family bundle A but with Fine Artist, Dangerous Creatures, Explorapedia and Arcade replaced with the following:



Microsoft[®] Publisher This desktop publishing software is the key to producing professional quality output, layouts and clip art.



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.



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.

Software bonus upgrades

All the 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+. Order code **WAPMMY9A Bonus Upgrade Price £169 inc VAT (CD version with concise manual).**



Microsoft[®] Office Professional for Windows[®] 95 This is the same as Microsoft[®] Office for Windows[®] 95 with the addition of the latest version of Access for Windows[®] 95 the powerful yet simple to use Windows[®] based database. Order code **WAPMMY9B Bonus Upgrade Price £229 inc VAT (for CD version with concise manual).**

Microsoft[®] Office Pro Education license only £89 inc VAT.

Please call for details.

Please note some software may be supplied in Viglen OEM packaging.

Monitor upgrade

You can upgrade the monitor in the specific configuration to a higher model by adding the following prices:

Upgrade from	to	Price inc vat
14"	15"	£105
14"	17"	£344
15"	17"	£239
17"	17" Enhanced	£95

*MONITOR VIEWING AREA

14" = 13.2" viewable
15" = 14" viewable
17" = 15.3" viewable



JAW 97

Why choose Viglen?

Best Products

Viglen PCs are consistently winning industry awards and are in the top league of most won awards and acclaims. The latest being the 1996 Gold Computing Award for Excellence for the Multimedia PC of the year.

Best Reliability

Viglen PCs are renowned for having one of the best reliability figures in the industry and have topped reliability charts year after year. In this years independent reliability survey by PC Magazine, users voted Viglen top for overall satisfaction with system reliability, top for overall satisfaction with repairs and the lowest percentage of PC failure for systems under 18 months.

Best Quality

The quality of our systems stand out from the crowd in review after review. Added to this our BS EN ISO 9002: 1994 quality accreditation, means that every PC that leaves our factory is manufactured to the highest quality standards possible.

Best Support

Viglen's technical support is renowned for being one of the best in the industry. With our "Customer First" philosophy, when you buy a Viglen PC, we make sure that customer satisfaction is at the top of our priorities.

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Best Delivery

Viglen has one of the most modern build to order PC manufacturing plants in the UK, and therefore even the most complicated custom configuration can be shipped within 10 working days. However, to speed this even further, the Business and Personal systems can be delivered within 3 working days from clearance of payment.

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Viglen is not only the best choice now, but for the future too. Should you need to upgrade your PC in the future we offer a full upgrade service which is competitively priced.

Best Value

Our Business and Personal systems combine the highest quality with the best possible value, to bring you a range of systems to suit your exact needs.

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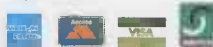
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EDI. Purchase orders via electronic data interchange accepted using INS Tradanet service.

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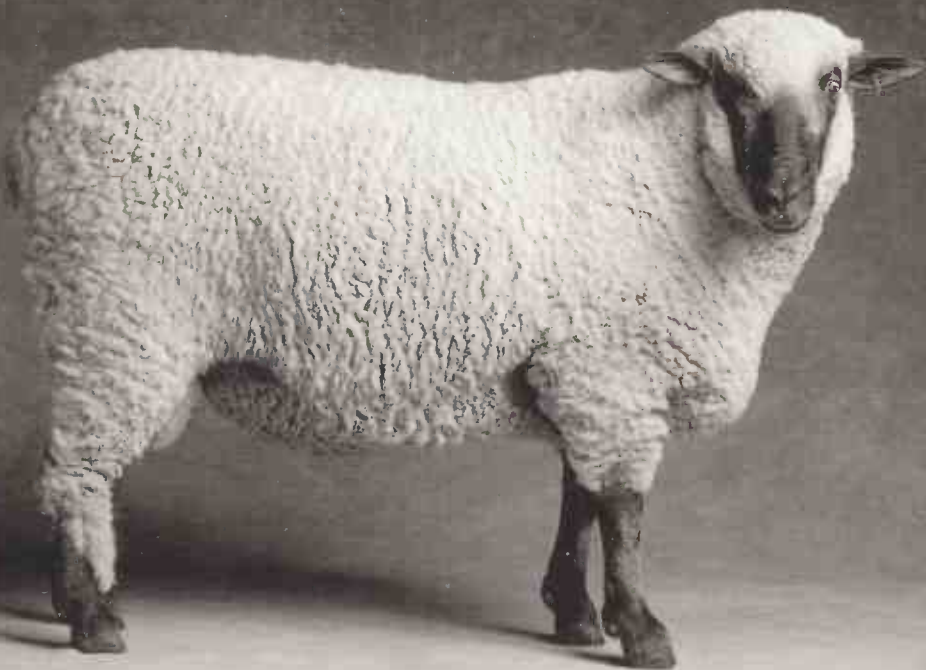
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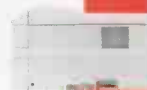
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