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**Win A Lexmark
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page 557**

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Notebook

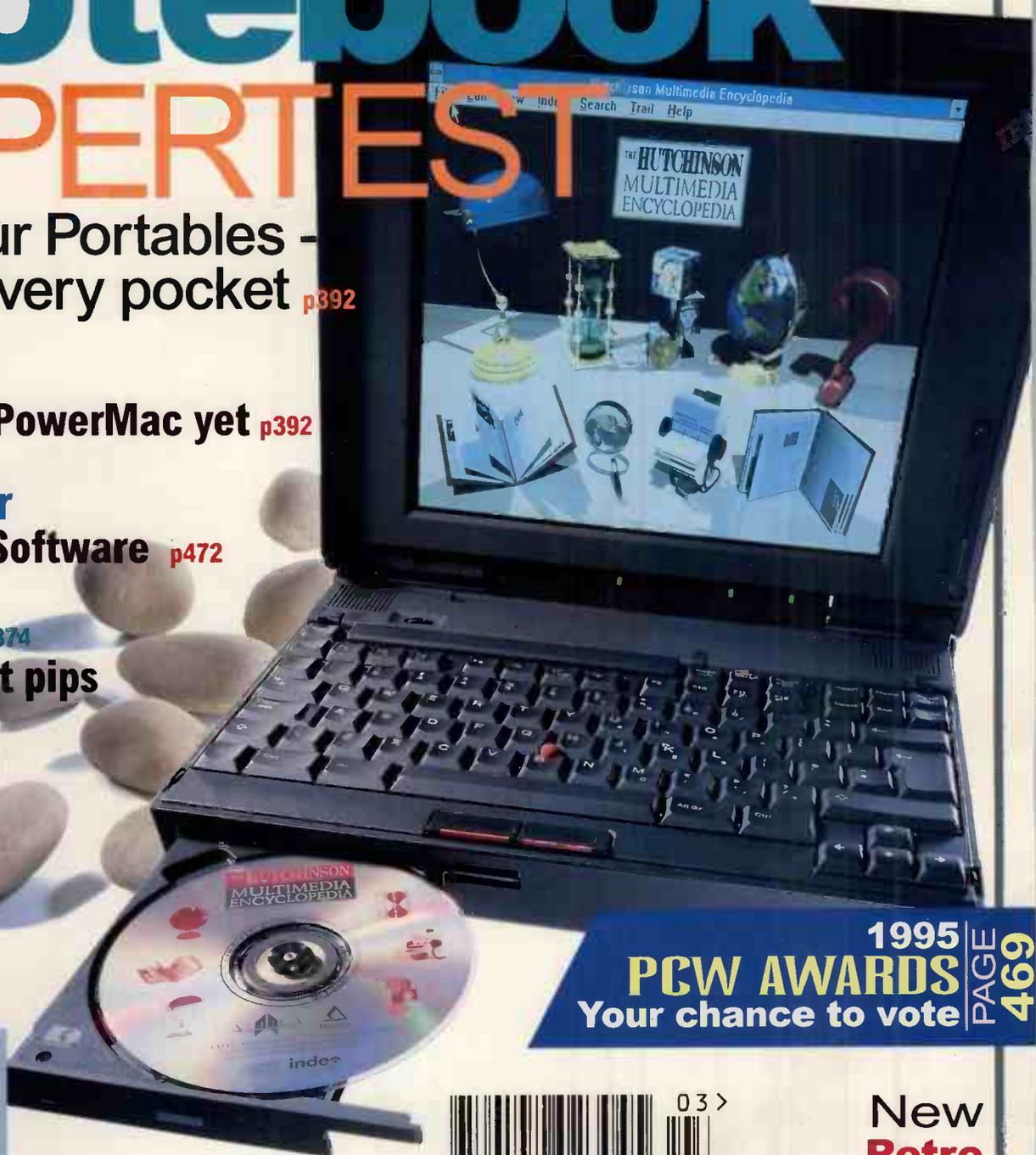
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40 Colour Portables -
one for every pocket **p392**

110MHz
The fastest PowerMac yet **p392**

Top Drawer
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Cyrix 586 **p374**
The chip that pips
the Pentium



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Your chance to vote **PAGE 469**

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**New
Retro
Computing**
p 533

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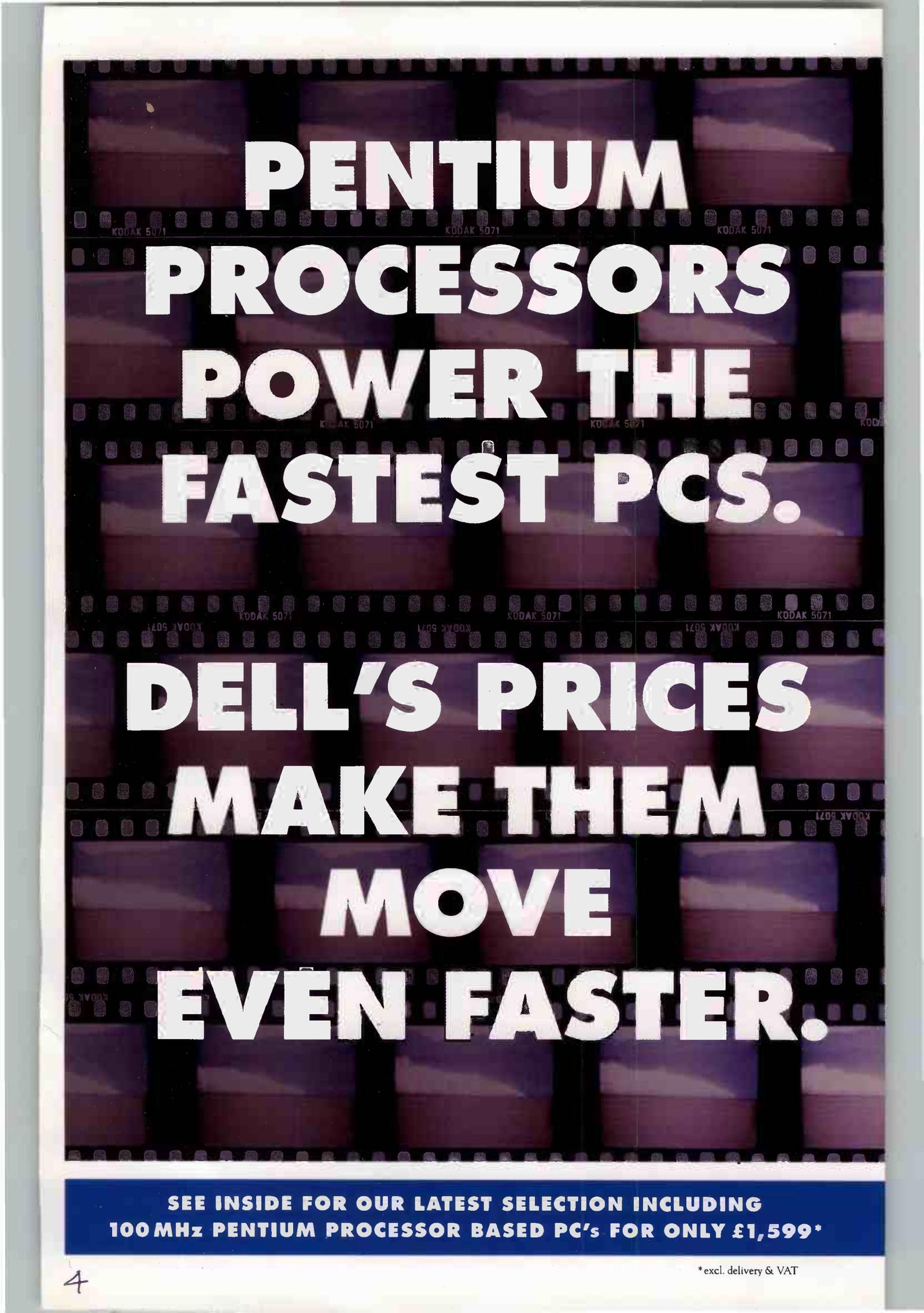
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40 colour notebooks to suit every pocket

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PCW Cover Photography by David Whyte



Cover Disk or CD-ROM

- **Cover Disk**
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- **This month's PCW Interactive CD-ROM** **1 2**
Masses of games, software, music and movies — now with an improved interface

CUTTING EDGE

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CD-ROMs: Encarta 95



Screenplay: Klik & Play

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Genealogy software

3 6 4

by PAUL BEGG

If tracing family trees is your bag, one of the new crop of Windows genealogy packages will be right up your street.



Pentium notebooks

3 7 0

by SIMON ROCKMAN

Faster, cooler Pentium notebooks have allowed a new generation of super-notebooks. We look at two of the first from Toshiba and Viglen.

Chips

3 7 4

by SIMON ROCKMAN

The M1 586, Cyrix's answer to the Pentium, is vital to the future of the company, but it's running late. We explain why and home in on how the chip works.

Media Day at MIT

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by WENDY M GROSSMAN

On Media Day at MIT leading technologists, musicians, performance artists and media people gather to discuss where creativity and technology meet.

Compaq

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by GEOFF WHEELWRIGHT

Compaq is on a roll with record-breaking sales and profits and a new-found position as the world's number one PC vendor.

Video on Demand

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by TIM FROST

It's all the rage to talk about Video on Demand, but what is it and how does it work?

PC/TVs

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by CHRIS MELLOR

PC and TV technology is converging. We explain why it's happening and preview manufacturers' first attempts at finding the winning PC/TV formula.

Ventura Publisher 5.0

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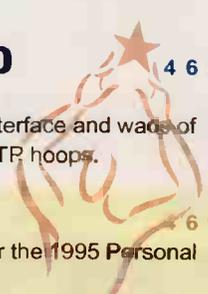
by KATHY LANG

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Personal Computer World



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Editor Ben Tisdall
Deputy Editor Simon Rockman
News Editor Clive Akass
Features Editor David Brake
Technical Editor Karl Dunkerley
International Editor Tim Bajarin
Senior Staff Writer Chris Cain
Technical Writer Gordon Laing
Staff Writers Eleanor Turton-Hill
 Steven Helstrip
Editorial Assistant Adele Dyer

Columnists Nick Beard
 Barry Fox
 Michael Hewitt
 Tim Nott

Contributors

Tim Anderson • Nick Beard • Paul Begg •
 Chris Bidmead • Ian Brockbank • JJ Clessa •
 Stephen Cobb • George Cole • Simon Collin •
 Tim Frost • David Gristwood • Wendy M Grossman •
 Michael Hewitt • Chris Hill • Kathy Lang •
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 Robin Nixon • Tim Nott • Stephen Rodda •
 Jelena Rupnik • Hugh Saunders • Jack Schofield •
 Stephen Wells • Geof Wheelwright • Mark Whitehorn •
 David Whyte •

Editorial Phone **0171 439 4242**
 Editorial Fax **0171 895 8098**
 Editorial Email **first_name_last**
name@pcw.ccmil.compuserve.com

Production

Production Editor Lauraine Lee
Senior Sub-Editor Nicky Glatter
Sub-Editor Mark Monahan

Design

Art Editor Darrell Kingsley
Designer Jonathon Mason

VNU Labs

Group Editor John Barnes
Labs Editor Julian Evans
Labs Assistant Paul Philip

Lab Phone **0171 927 9273**
 Lab Fax **0171 734 2838**

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Circulation

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Subscriptions Supervisor Joanne Nicholls **0171 927 9286**

Publishing

Founder Angelo Zgorelec

Marketing Manager Juliet Parker **0171 927 9133**
Publishing Director Peter Goldstein **0171 439 4242**
Publisher Jon Ross **0171 927 9306**

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Editorial

The departure of Philippe Kahn from the day-to-day running of the company marks the end of an era for Borland. Five years ago Borland was the darling of the computer industry: loved for its desktop accessory Sidekick, respected as an author of development tools, admired for its Paradox database and Quattro Pro spreadsheet, and with a share price which just kept on rising.

Not for Borland the gradual drift into a downhill slide; no, with Borland it's possible to pinpoint the exact moment things went disastrously wrong. The moment, in July '91, when Borland announced its decision to buy Ashton Tate, author of dBase. Ironically, many industry watchers completely misread the implications of the takeover. In Newsprint we said, "Borland may just be on the point of becoming the new Microsoft — the drummer who decides the pace the industry marches". How could we have got it so wrong? In hindsight it's easy to see that Borland should have killed dBase there and then, at the same time persuading dBase users to move across to Paradox. Borland didn't, but struggled on trying to develop both products and perhaps because of this, was desperately late to release Windows versions of either.

Three and a half years on and Borland is a shadow of its former self. It has virtually dropped out of the office application market by selling Quattro Pro, and none of its products are market leaders. Ironically, Kahn's move is probably good news for Borland and will allow newcomer Gary Wetsel to get on with restructuring the company, but it's sad news for the software industry. And the new Borland, if it survives at all, will be a much smaller, more minor company. The days when people mentioned Borland in the same breath as Microsoft and Lotus are long gone.



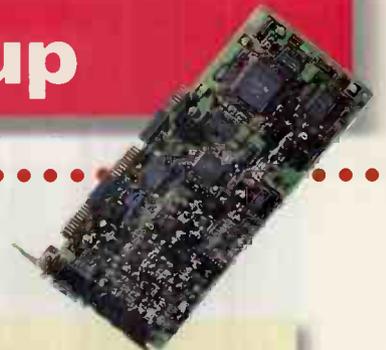
BEN
TISDALL
Editor

Next Month



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April issue

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May issue

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PCW Cover Disk

Robin Nixon introduces a playable demo version of **Transport Tycoon** from MicroProse and, for the first time, Mac software on the disk. That's right, from now on, if you have a Mac and a copy of Apple's PC Exchange utility you'll have access to a growing catalogue of the best Mac software around, as well as all the quality PC programs you're used to! We've also included the Visual Basic listings for this and last month's Low Level.

Installing and running the PCW Cover Disk

To install this month's cover disk programs, insert the disk in drive A: (or B: — whichever drive you normally use for installing software) and from either DOS or Windows run the file **INSTALL.EXE** in the root directory of the floppy disk. Please note that due to space constraints, and seeing as the only PC program on this month's disk is for DOS, we have used a simple DOS installer which can be

accessed using the cursor keys and return or a mouse.

• **Transport Tycoon**
[MicroProse — Minimum requirements: 4Mb RAM, SVGA Graphics, 386 processor, 2Mb free hard disk space, sound card (optional)]

The object of **Transport Tycoon** is in many ways similar to two other popular games; **SimCity 2000** and **Railroad Tycoon**, except that this game is mainly based on planes, trains and boats, in other words, various forms of transport.



Transport Tycoon is like SimCity with planes, trains and automobiles — but watch out for gridlock

In it your task is to build towns, malls, factories, power stations, airports and so on, and build and maintain the transport links between all the major locations in order for your world to thrive. To assess how well you are doing

you start off with a £100,000 loan which you must pay back and then turn into as big a profit as you can by creating lucrative freight and passenger services.

In this demo version you get to try out the game in quite a lot of detail as the main restrictions are the ability to work only on the railway, and a reduced (but still very large) world to build on. Buses, planes, boats and so on are still part of the game, but you will not be able to manipulate them.

Even so, you'll still find there's enough in this demo to keep you enthralled for hours — the animation and scrolling windows alone are a delight to watch.

To play the game click on the icons at the top of the screen to open up various windows or dialogues. To follow a vehicle, double-click on it and a scrolling window will



appear. For help click on the top righthand Help icon.

If you enjoy playing this demo, you may wish to know the full game is available from your local software dealer at a recommended retail price of £44.99. Even at that price, if you like this type of game, you're guaranteed dozens of hours (and probably a whole lot more) of value for money.

Visual Basic listings

Copy the file VBH-SFX.EXE to a suitable sub-directory on your hard disk, then run the file to extract the listings.

Important Details About The Cover Disk

If you have problems with the cover disk such as receiving a "Cannot read from drive A:" error, send the disk with a stamped addressed envelope to TIB PLC (PCW), TIB House, 11 Edward Street, Bradford, BD4 7BH.

However, you should note that if a phone number is shown for the publisher of any cover disk program then it will probably be quicker for you to call them first as they will be able to provide direct assistance on their own programs more quickly than might otherwise be possible. Alternatively you can ring our hotline on weekdays between 10.30 and 12.30 on 01274 736 990.

The PCW cover disk is virus checked at every stage of production. However, neither VNU nor PCW can be deemed liable for any problems arising from the use of the disk. Installing or

running any of the programs on the disk indicates your agreement to this condition.

You are advised not to install any software on a networked PC before checking the disk. While PCW maintains a high standard of quality control, disks may be damaged in transportation. Check the disk shutter before putting disks in the drive.

If you have received the cover disk but would prefer the CD-ROM, please write to: KP Mailing, Block D, Unit 15, Barwell Business Park, Leatherhead Road, Chessington, Surrey KT9 2NY, enclosing a cheque or PO for 80p made payable to VNU Business Publications Ltd, to cover post and packing. Please allow up to 14 days for the receipt of your CD-ROM. Alternatively, why not subscribe and save money at the same time?

Macintosh Software

In response to all the readers who have asked us to publish Mac software, here are three of the best Shareware games available on the Mac.

To install the programs you will need a copy of PC Exchange installed in the system folder of your Mac. Please remember that it *must* be PC Exchange and that PC Access or any other utilities for reading IBM-compatible disks will not work with the cover disk.

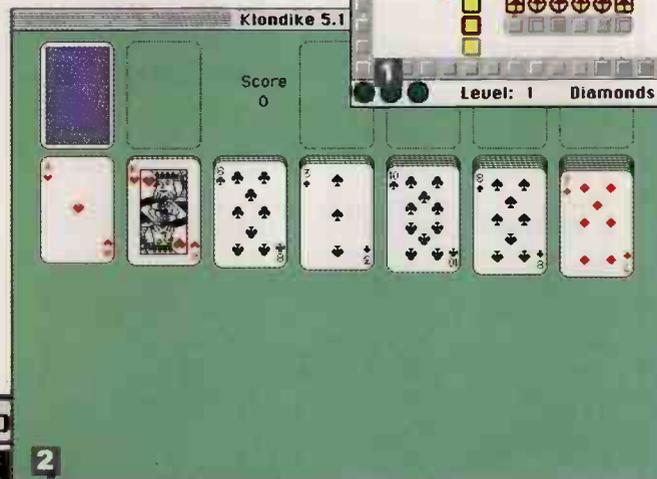
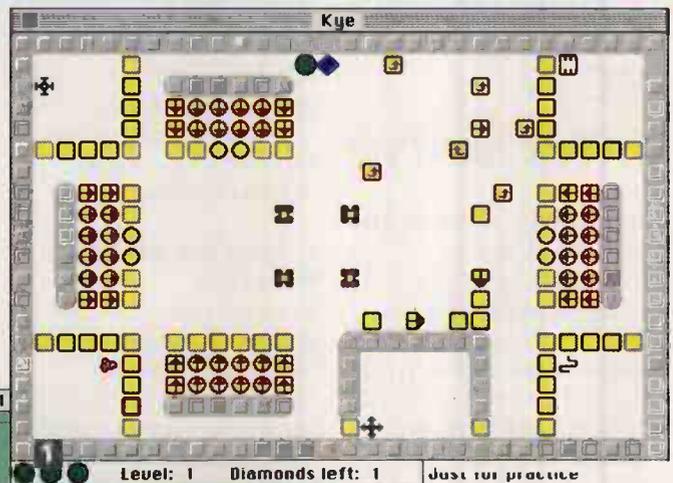
PC Exchange has been available since mid-1992 and is now installed with System 7 on most new Macs. The new System 7.5 also comes with a copy of PC Exchange version 2.0.

Installation and use

Assuming PC Exchange is installed on your Mac, insert

the cover disk into the drive and then double-click on the floppy disk icon that appears. When the disk opens up you will see two Mac-related icons towards the top, and five PC-related icons at the bottom, which you should completely ignore as they are irrelevant to the Mac.

For a brief introduction to the disk double-click on the



- 1 Named after a pet dog, there are no fleas on this Mac game
- 2 Klondike, a patience game
- 3 A Curious game with a curious name — another Mac favourite

document icon entitled "Read me first". This is a TeachText document which you will then be able to view (as long as you have TeachText on your Mac).

To install the games double-

click on the Mac Software icon and when asked, specify a destination folder in which to de-archive the files. Once they're de-archived, you can run them in the usual way, or double-click on the documentation.

The three games are: Klondike (Mike Casteel), a great cards patience game; Kye (Colin Garbutt), a cunning strategy/skill game; and Jsokoban, (Jason Townsend), another strategy game, but with fiendish features all of its own. Please remember to register any Shareware programs you continue to use after evaluation.

We plan to feature many more Mac programs on future disks, but if there are any specific programs (or types of programs) you'd like to see on the PCW cover disk (or CD-ROM), please drop us a line.

PCW Interactive CD-ROM

CD-ROM editor Robin Nixon introduces the 500Mb of software, demos, animations, videos and music on this month's CD-ROM, including Monty Python and Transport Tycoon demos, two brand new doom-a-like Shareware games, five digital movies on John Lennon, Prince and others, royalty-free photos and much, much more.

Installing and running PCW Interactive

[Minimum Requirements: 4Mb free RAM (swapfile acceptable), 386 SX/33 processor, Windows 3.1. (Users with less than this should at least be able to run the DOS programs on the CD-ROM using the batch file DOSMENU.BAT.) Recommended: 8Mb installed RAM, 486 DX/50 processor, Windows 3.11.]

To run PCW Interactive you no longer need to install any part of it to your PC (other than Video for Windows if you wish to view the movies). All you need to do is select your CD-ROM drive and run the file PCWI.EXE in the root directory for PCWI to run.

• Using the CD-ROM from DOS

If you don't have Windows, or experience any problems running some of the DOS software from Windows, you can run the batch file \DOS\MENU.BAT from DOS, but don't try running it from a Windows DOS prompt. It will then display a menu from which



you can select any of the DOS programs and run them, using either the cursor keys and Return, or a mouse. You

The all-new opening screen of PCW Interactive

On This Month's Packed CD-ROM

Demos

- CorelDraw
- Harry & the Haunted House
- Little Monster
- Monty Python
- New Kid on the Block
- Novastorm
- OS2 Warp
- Overdrive
- Ruff's Bone
- Sierra Collection
- The Discoverers
- Tortoise & the Hare
- Transport Tycoon

Communications

- Internet Jargon Buster

Audio

- Mod music
- Ultimod

- Whoop it up

- Wowll

Games

- Atoms
- Bats
- Carnage
- Descent
- Heretic
- Skunny Kart
- Wizard
- World Quest
- Xatax
- Xmas Jazz Jack Rabbit

Utilities

- Axicon
- Axshell
- CD Label
- Control Bar
- Neobook

- Neopaint

- Photolab

- Telix

Suite

- Thompson Partnership Suite

Movies

- John Lennon
- Magic Bus
- Nautilus CD
- Prince Interactive
- Tommy

Animations

- Hi-Tech Collection

Magazine

- February and March 1995
- "Hands On" Low level code

Gallery

- 10 royalty-free photos

can even play the animations from DOS (without the music). The programs you can run are: Animations, Carnage, Descent, The Discoverers, Heretic, Novastorm, Neobook, Neopaint, OS/2 Warp, Overdrive, Skunny Kart, Transport Tycoon, Colour Wizard, World Quest, Xatax and Xmass Jazz Jack Rabbit.

• Macintosh Software

Mac users will have noticed we have starting putting Mac software on our floppy cover disks. Well, CD-ROM owners will not be left out as we are in the final stages of preparing a dual Mac/PC format CD-ROM, the first issue of which should appear next month.

Using PCW Interactive

The magazine has been designed to look and feel like you're reading a printed publication. For example, at the bottom left and right of each page you'll find a Page Turn icon for turning backwards or forwards a page. In addition, there's a set of 10 tabs which appear down the left and righthand side of each page. Clicking on any of these will take you directly to the page in the magazine where the indicated magazine section begins.

Seeing as the only PC program on the floppy cover disk this month is the Transport Tycoon demo, there is no Cover Disk page in PCWI this month as it would merely duplicate the Transport Tycoon page, which you should select instead.

• Video for Windows

On page 1 you'll have the opportunity to install the latest version of Video for Windows, so that you can view the digital movies on the CD.

If you haven't installed Video for Windows from a PCW Interactive CD before, then you *must* install this new version, as it contains the latest drivers which deliver higher quality, a larger size and a faster playback rate. If you don't install the new version, some videos will display the message "Cannot display this video", or similar.

We strongly recommend you install this every time you use a new issue of PCW Interactive as we always try to ensure the very latest programs and drivers are on the CD-ROM.

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

MOVIES

IMAGINE - JOHN LENNON

Still sadly missed by millions, John Lennon's music is still going strong, with even a new Beatles album released last Christmas! And now fans can use their computers to examine Lennon's life in closer detail than a book, a video or a record alone could do.

Virtually every aspect of Lennon's life and career is examined by this CD, from his childhood, through to the Quarrymen, the Beatles, Wings, Yoko Ono, Lennon's painting and poetry and much more.

His Estate have also provided some never-seen-before material for this CD, which should make it a must for collectors.

To play and pause this movie just click on it.

World - Interactive

is click once on it to activate the choice.

• Getting Help

Detailed help on most of the programs is available when you run them. For further details on using the magazine itself click on the Help side tab at the top right of any page.

• Troubleshooting

• The videos are jerky
If you have a single-speed CD-ROM drive consider upgrading to a double-speed or faster drive. You could also try selecting Control Panel | Drivers | Video for Windows.

Then uncheck the "Skip frames if behind" entry. We would also suggest that seeing as the very latest version of Video for Windows is on this month's disc (version 1.1d, released less than 10 days before the CD-ROM was pressed), you should install it over your old copy in order to gain higher quality playback with less jerkiness.

• DOS programs will not run

You must have at least 575kb free RAM in a Windows DOS box in order to run all the software on this CD. If you have less, much will work but some won't, so you may prefer to quit from Windows and (if you have DOS 6.0), use MEMMAKER.EXE to increase the free base RAM. If you don't have DOS 6.0, try removing all TSRs and unused drivers from your AUTOEXEC.BAT and CONFIG.SYS files by placing a REM command in front of them. Alternatively, you could boot up from a backup of your DOS System disk, which will

Above Ten more royalty-free photographs

Left A digital movie about the new Imagine John Lennon CD-ROM

give you just about the maximum amount of free base RAM possible without using a memory manager.

• The computer crashes or hangs

• Sound effects and music stop playing

Neither of these should happen. However, with the huge amount of software supplied on this CD and the inherent instability of Windows, after using several of the programs in a single session, any unexpected problems can generally be corrected by simply exiting from and restarting Windows.

• PCW Interactive runs slowly

We are now using Macromedia Director as the multimedia engine for PCWI as it offers a speed increase of several hundred percent over the previous system. However, to achieve this speed it requires 4Mb free RAM. So, if you have 4Mb or less RAM you may experience delays when turning pages as up to half of this RAM may already be in use by Windows and DOS. The solution is to add additional RAM to your PC (which will also make all your other CD-ROMs run much faster), or, at least, to ensure you have a permanent swap file of an additional 4Mb RAM.

CD-ROM Advice & Contacts

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

For technical support on the CD and the programs on it call Advice by Telephone on 01708 641 454, or email them at PCWCE@MFL.ORG.

For non technical support enquiries or feedback on the CD-ROMs or Cover Disks you can email Robin Nixon at either: rnixon@cix.compulink.co.uk or CompuServe: 70007,5547

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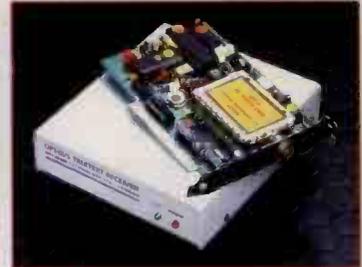
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- Automated page saving and printing
- Save pages as ASCII, BMP or 'Raw'
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- Free Windows Developers Toolkit now available on request - phone for details

The image displays several screenshots of the OPT-III teletext software interface. The top left shows a Microsoft Excel spreadsheet with a 'PORTFOLIO' sheet containing columns for stock names and prices. The top right shows a 'Prices' window with a table of stock prices. The middle section features a 'Teletext on 3' window with a 'Sport Index' and a 'Prices' window. The bottom left shows a 'Financial' window with a line graph. The bottom right shows a 'Teletext on 4' window with a 'Worldwide by Jet Holidays' section.



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The image shows screenshots of the 'Shares' and 'Invest' software. The top left shows a list of shares with columns for name, price, and change. The top right shows a line graph of a share's price over time. The bottom left shows a 'Financial' window with a line graph. The bottom right shows a 'Teletext on 4' window with a 'Worldwide by Jet Holidays' section.

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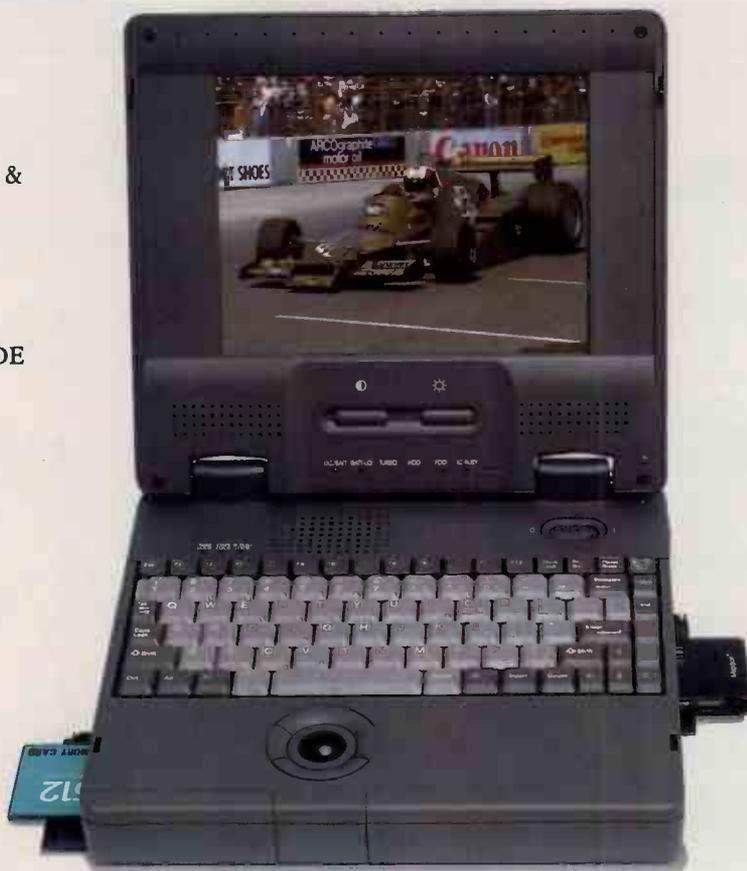


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AJP 3600

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PC Magazine September 1994

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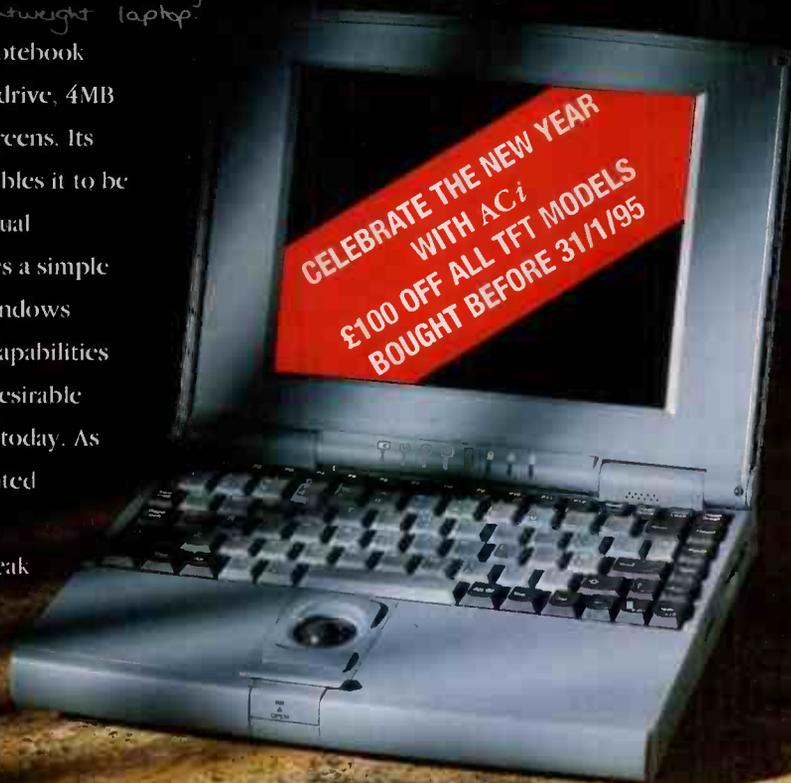
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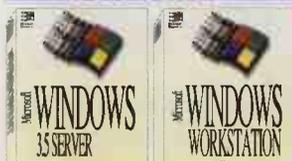


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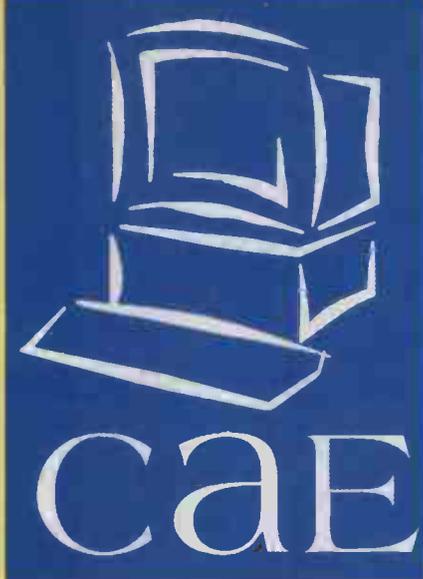
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- MOUSE ● WINDOWS v3.1
- MS OFFICE v4.2

ONLY **£1299.00**



Bravo LC 4/33s, Model 170	£660.00
Bravo LC 4/33s, Model 270	£857.00
Bravo LC 4/50s, Model 170	£765.00
Bravo LC 4/50s, Model 270	£999.00
Bravo LC 4/33DX, Model 170	£1062.00
Bravo LC 4/66, Model 270	£1145.00
Bravo LC 4/100, Model 270	£1415.00

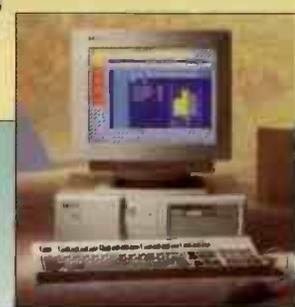


(INCLUDES SVGA MONITOR)

IBM Aptiva 2144-744 486s/25, M170	£705.00
IBM Aptiva 2144-754 486s/33, M270	£805.00
IBM Aptiva 2144-853 multimedia	£1040.00
IBM Aptiva 2144-766 486s/23, M270	£950.00
IBM Aptiva 2144-887 multimedia	£1414.00

IBM PS/VP Family	£POA
IBM PS/2 Desktop Family	£POA
IBM PS/2 Server Family	£POA
IBM Thinkpad Family	£POA

PLEASE CALL FOR PRICING ON THE ABOVE IBM SYSTEMS



HP (MONITOR NOT INCLUDED)

Vectra VL2 4/33s, Model 270	£855.00
Vectra VL2 4/50, Model 270	£943.00
Vectra VL2 4/66, Model 270	£1009.00
Vectra VL2 4/100, Model 270	£1152.00

PLEASE CALL FOR OTHER HP SYSTEM & PRINTER PRICES

ENHANCED PROLINEA, FAMILY

141684-001 CAE 3rd party 4Mb memory	£129.00
141685-001 CAE 3rd party 8Mb memory	£259.00
190747-001 CAE 3rd party 16Mb memory	£485.00

PROLINEA MT FAMILY

141684-001 CAE 3rd party 4Mb memory	£129.00
141685-001 CAE 3rd party 8Mb memory	£259.00
190747-001 CAE 3rd party 16Mb memory	£515.00

DESKPRO XL, FAMILY

118690-001 CAE 3rd party 4Mb memory (2x2)	£138.00
148188-001 CAE 3rd party 8Mb memory (2x4)	£279.00
148189-001 CAE 3rd party 16Mb memory (2x8)	£540.00

PROSIGNIA FAMILY

118690-001 CAE 3rd party 4Mb memory	£138.00
128877-001 CAE 3rd party 8Mb memory	£279.00
149320-001 CAE 3rd party 16Mb memory	£539.00

COMPAQ MEMORY

NB all 3rd party memory is a brand name such as NEC, Hitachi or Samsung.

PROLINEA NET 1 FAMILY

163679-001 CAE 3rd party 4Mb memory	£129.00
163680-001 CAE 3rd party 8Mb memory	£259.00

DESKPRO XE FAMILY

118690-001 CAE 3rd party 4Mb memory	£138.00
128877-001 CAE 3rd party 8Mb memory	£289.00

PROSIGNIA VS FAMILY

141684-001 CAE 3rd party 4Mb memory	£123.00
141685-001 CAE 3rd party 8Mb memory	£279.00
190747-001 CAE 3rd party 16Mb memory	£559.00

PROLIANT FAMILY

141684-001 CAE 3rd party 4Mb memory	£138.00
141685-001 CAE 3rd party 8Mb memory	£279.00
190747-001 CAE 3rd party 16Mb memory	£539.00


01923 210923

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cae

OFFICE SUPPLIES
40 CLARENDON ROAD
WATFORD, HERTS, WD1 1HA



ALL PRICES EXCLUDE VAT & DELIVERY. PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE. E&OE

PLEASE CALL FOR OTHER MANUFACTURERS PRICES AND FULL RANGE OF CONSUMABLES

"YOU'LL NOT BE DISAPPOINTED IF YOU BUY A dan SYSTEM"

Service and Reliability Survey '94, PC Magazine, August 1994.

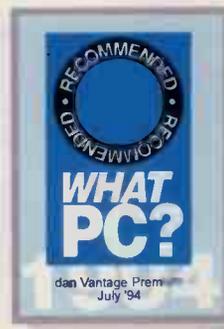
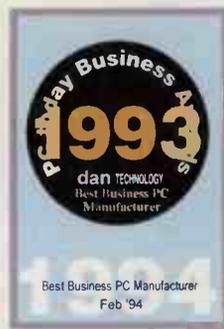
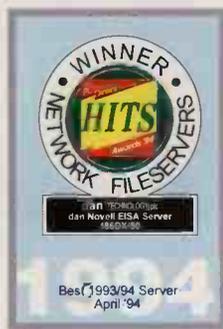
"dan Technology is the Readers' Choice in the Desktop category of PC Magazine's 1993 Service & Reliability survey. This excellent result makes dan Technology the standard-setter for the rest of the industry in 1993."

PC Magazine, August 1993



"dan wins the Overall Satisfaction with Service and Reliability in the Desktop Category again, validating the survey methodology we've used and proving beyond doubt that you'll not be disappointed if you buy a dan System."

PC Magazine, August 1994.



dan
technology plc

Special Configurations

Dan technology has developed personal computers with set configurations which are even better

Dan technology's commitment to continuous improvement and total customer satisfaction has resulted in numerous awards and accolades, both from customers and industry experts.

During 1993 **dan** received a total of twenty six awards, more than any other UK computer company. This year our reputation is still second to none and we are continuing to win recognition in the computer press.

With all the **dan** set configuration systems you receive the same award-winning specifications together with the unrivalled **dan** customer support. The only difference is that the specifications of Special Offer Systems are not variable. They are, of course, fully upgradable in the future.

Intel Verified:
for the Pentium® OverDrive® Processor
(dan Premium & dan for Windows)



NEW DAN SYSTEMS FOR '95

Dan is introducing two brand new Personal Computers to its range of Special Offer Systems. These have been designed to work exceptionally well with the higher demands of the new Windows '95 software.

The **dan '95** systems are available in two versions - the **dan 95 PCI/s** is based on the classic Intel 486DX2-66 CPU while the **dantium 95 PCI/s** is based on the 90MHz Pentium® processor.

Both computers use the PCI BUS and include 16MB RAM with parity, large fast hard disk drives and new PCI Stealth 64 video cards with 2MB VRAM for outstanding speed and colour capability.

dan 95 /s PCI Special Offer 486 Power System

- ▶ 16 MB RAM with Parity
- ▶ 256KB Cache Memory
- ▶ Intel 486 DX2-66 or DX4-100 CPU
- ▶ 4 PCI Local Bus Slots (1 VL shared)
- ▶ 2MB Stealth 64 VRAM (S3964) Accelerator
- ▶ Fast PCI IDE Hard Disk Controller
- ▶ 525MB / 12ms IDE Hard Disk
- ▶ 15" Microprocessor controlled non-interlaced Low Radiation Monitor
- ▶ 1.44MB Floppy disk Drive
- ▶ Mini Tower Case w/200W PSU
- ▶ 1 Parallel & 2 Fast Serial Ports
- ▶ 102 Key UK Keyboard
- ▶ New Microsoft Mouse
- ▶ Windows for Workgroups 3.11
- ▶ MS DOS 6.22
- ▶ LOTUS Organizer for Windows

486DX2-66	£ 1444
486DX4-100	£ 1514

dantium 95 /s PCI Special Offer Pentium® Processor System

- ▶ 16 MB RAM with Parity
- ▶ 256KB Cache Memory
- ▶ PENTIUM® Processor
- ▶ 3 PCI Local Bus Slots (1 ISA shared)
- ▶ 2MB Stealth 64 VRAM (S3964) Accelerator
- ▶ Fast PCI IDE Hard Disk Controller
- ▶ 525MB / 12ms IDE Hard Disk
- ▶ 15" Microprocessor controlled non-interlaced Low Radiation Monitor
- ▶ 1.44MB Floppy disk Drive
- ▶ Desktop Case w/200W PSU
- ▶ 1 Parallel & 2 Fast Serial Ports
- ▶ 102 Key UK Keyboard
- ▶ New Microsoft Mouse
- ▶ Windows for Workgroups 3.11
- ▶ MS DOS 6.22
- ▶ LOTUS Organizer for Windows

75MHz	£ 1663
90MHz	£ 1856

▶ Indicates differences between configurations

dan Multimedia

The last year has seen one of the most exciting periods in PC development. The ready availability of advanced sound cards and CD-ROMs has engendered a new wave of software exploiting this new technology.

Multimedia applications on CDROM can allow you to use an interactive

encyclopedia, proofread a spreadsheet or give a command to your PC.

Add a **dan Multimedia Kit** to your **dan** personal computer to create exciting sound and CD Rom capability. It includes Encarta, Microsoft's acclaimed interactive encyclopedia, MS Works, MS Money and MS Scenes.

Price £187

Upgrades from Advanced speakers
Power Speakers (20W PMPO) £ 15

Hi-Fi Power Speakers (80W PMPO) £ 40



Delivery cost to most of UK for one system is £15. £30 alteration charge is payable for any changes or upgrades to Special Offer Systems. (Excludes Multimedia Kit, Speakers & Monitors). All prices exclude VAT @ 17.5%. E.&O.E.



"The dantium 90 machine may look like all other dans, but its turn of speed and software bundle gives it an edge. We must put the dan at the top of the value league and it gets our recommendation for an excellent value Pentium PC". **RECOMMENDED, PC Plus, (dantium 90MM), October '94**

dan
technology plc

at Special Offer Prices

value for money. These systems are based on our best selling models and the prices are unbeatable.

dan Premium/s

Special Offer 486 Windows System

- 8 MB RAM with Parity
- 256KB Cache Memory
- Pentium® Overdrive® Processor Upgradable
- Local Bus Slots
- 1MB Windows Accelerator
- Fast IDE Hard Disk Controller
- 420MB / 14ms IDE Hard Disk
- 15" Microprocessor controlled non-interlaced Low Radiation Monitor
- 1.44MB Floppy disk Drive
- Desktop Case w/200W PSU
- 1 Parallel & 2 Serial Ports
- 102 Key UK Keyboard
- New Microsoft Mouse
- Windows for Workgroups 3.11
- MS DOS 6.22
- LOTUS Organizer for Windows

486DX2-66	£ 1055
486DX4-100	£ 1125

dan for Windows/s

Special Offer 486 Power System

- 8 MB RAM with Parity
- 256KB Cache Memory
- Pentium® Overdrive® Processor Upgradable
- Local Bus Slots
- 1MB Stealth 64 DRAM Accelerator
- 2MB VL IDE Cache Controller
- 525MB / 12ms IDE Hard Disk
- 15" Microprocessor controlled non-interlaced Low Radiation Monitor
- 1.44MB Floppy disk Drive
- Desktop Case w/200W PSU
- 1 Parallel & 2 Fast Serial Ports
- 102 Key UK Keyboard
- New Microsoft Mouse
- Windows for Workgroups 3.11
- MS DOS 6.22
- LOTUS Organizer for Windows

486DX2-66	£ 1232
486DX4-100	£ 1302

dantium/s

Special Offer Pentium® Processor System

- 8MB RAM with Parity
- 256KB Cache Memory
- 66,75 or 90MHz PENTIUM® Processor
- 3 PCI Local Bus Slots
- 2MB Stealth 64 VRAM (S3964) Accelerator
- Fast IDE Hard Disk Controller
- 525MB / 12ms IDE Hard Disk
- 15" Microprocessor controlled non-interlaced Low Radiation Monitor
- 1.44MB Floppy disk Drive
- Desktop Case w/200W PSU
- 1 Parallel & 2 Fast Serial Ports
- 102 Key UK Keyboard
- New Microsoft Mouse
- Windows for Workgroups 3.11
- MS DOS 6.22
- LOTUS Organizer for Windows

66MHz	£ 1373
75MHz	£ 1443
90MHz	£ 1636

What makes dan systems better than others

All systems have DOS & Windows installed "Ready to Run" and include:

MEMORY WITH PARITY
WE DO NOT CUT CORNERS!
DISCOVER MEMORY FAULTS BEFORE IT'S TOO LATE

Parity checking is a hardware technique that alerts you to hardware memory faults before potential damage of data can occur through memory corruption of your software.

15"
High Resolution
MVP-II

15" Non-Interlaced Low Radiation Monitor with Microprocessor

FAST graphics

Fast 32-bit Local BUS Windows Accelerators from DIAMOND (except Premium)

525MB
Hard Disk

Large Fast IDE (420MB with Premium) Hard Disk Drive

New Microsoft Ergonomic Mouse

New Microsoft Ergonomic Mouse

PC Today
August 1994

The unparalleled dan Service & Support that has won dan Technology more awards than any other computer

PC Today
August 1993
dan Desktop Systems

Upgrade Kit



Double Speed CD-ROM
SoundBlaster 16
Advanced Speakers
(10Watts PMPO)
Microphone
dan Software Bundle
(Encarta, Works, Money & Scenes)

Multimedia PC Level MPC2



Monitor Upgrade



add £ 312

LIFETIME GUARANTEE: First year back-to-base parts & labour. Thereafter labour (excludes monitors and printers) and Hotline telephone support only. Optional 8-working hour response ON-SITE maintenance (£30 first year). **14 DAY MONEY BACK GUARANTEE IF NOT SATISFIED** (excludes printers & Software). 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. Intel, Pentium and OverDrive are trademarks of Intel Corporation in the USA and other countries.



"Dan really have got things down to a fine art, taking in all aspects of Pentium processing by combining it with powerful components. Add to this a collection of useful software and a comprehensive manual, I do not hesitate in offering the dantium 90 a well deserved best buy" *PC Today, BEST BUY (dantium 90MM), November '94*



"Yet again it seems dan technology has come up with a winner in the PC performance/price stakes. This is a system which any PC user would be proud to own. From its excellent keyboard and Microsoft mouse, to the 17" clear and stable monitor, the dantium/PCi66 exhibits quality all the way. Couple this to an extremely clean pair of heels throughout the Windows User benchmark tests and you have a great system." *Windows User, BEST on TEST (dantium66), September '94*

London: 0181 830 1100 Leeds: 0113 259 1200

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LEEDS: 10 Feastfield, Town Street, Horsforth, Leeds LS18 4TJ. FAX: 0113-239 0652



Opening Hours / Showroom: Mon-Fri 10am-6pm



1993 Best Business PC Manufacturer Award

"For sheer quality of build, price, performance and reliability we have no hesitation in recommending dan Technology"

"1993 Awards" PC Today, March '94



dan Technology plc
Desktops, Aug '93

Intel Verified: for the Pentium® OverDrive® Processor
(dan Premium & dan for Windows)

Windows is a complex operating system and it needs personal computers with advanced technology to make the most of its potential.

dan has created three distinct ranges suitable for all levels of Windows and DOS users. They combine high performance, superb reliability and quality, together with excellent value for money. All dan systems, irrespective of price, are built with the highest quality components and are fully upgradable.

Three ranges of PCs for Windows

The dan Premium is an entry level Windows system for the value conscious Windows user. The Local Bus Video and Hard Disk Controller give excellent performance in programs that are graphics oriented, including entry level CAD, Windows and desktop publishing, e.g. Microsoft Publisher.

dan Premium VL PCI Entry Level 486 Windows System

- 8 MB RAM with 256KB Secondary Cache Memory
- 14" Low Radiation Monitor
- 1.44MB Floppy Disk Drive
- Desktop Case w/200W PSU
- 102 Key UK Keyboard
- New Microsoft Mouse
- Windows for Workgroups 3.11
- MS DOS 6.22
- LOTUS Organizer for Windows



- dan Premium VESA Local Bus Models only
- 2 VESA Local Bus (VL) Slots
 - 1MB Vesa Local Bus Windows Accelerator
 - IDE Vesa Local Bus Hard Disk Controller
 - 1 Parallel & 2 Serial Ports
- dan Premium PCI Local Bus Models only
- 4 PCI Local Bus Slots (1 VL shared)
 - 1 VESA Local Bus (VL) Slot
 - 1MB Stealth 64 DRAM PCI Win Accelerator
 - IDE PCI Local Bus Hard Disk Controller
 - 1 Parallel & 2 FAST Serial Ports

VESA Local Bus Intel486 Processor

	DX4/100	DX2/66	DX2/50	SX/33
260MB VL	£ 1083	£ 1011	£ 964	£ 947
420MB VL	£ 1096	£ 1024	£ 977	£ 960
525MB VL	£ 1115	£ 1043	£ 996	£ 979

PCI Local Bus Intel486 Processor

	DX4/100	DX2/66	DX2/50	SX/33
525MB PCI	£ 1147	£ 1075	£ 1028	£ 1011
700MB PCI	£ 1203	£ 1131	£ 1084	£ 1067
1GB PCI	£ 1306	£ 1234	£ 1187	£ 1170



Mini Tower Case available as an upgrade

dan Technology Multimedia upgrade

The last year has seen one of the most exciting periods in PC development. The ready availability of advanced sound cards and CD-ROMs has engendered a new wave of software exploiting this new technology.

Multimedia applications on CD ROM can allow you to use an interactive encyclopedia, proofread a spreadsheet or give a command to your PC.

Add a dan Multimedia Kit to your dan personal computer to create exciting sound and CD Rom capability. It includes Encarta, Microsoft's acclaimed

interactive encyclopedia, MS Works, MS Money and MS Scenes.



dan Multimedia Kit	
Double Speed CD-ROM	✓
SoundBlaster 16	✓
Advanced Speakers(10Watts PMPO)	✓
Microphone	✓
dan Software Bundle (Encarta, Works, Money & Scenes)	✓
Multimedia PC Level	
Price	£ 187

Power Speakers Upgrade (20Watts PMPO) £ 15
Hi-Fi Power Speakers Upgrade (80Watts PMPO) £ 40

"It has to be said that the dan is the best Windows computer if you are using Windows all day"

"486 Guide: SHOPPER LABS" Computer Shopper, May '94

available from dan Technology

The dan for Windows delivers advanced technology and high performance to create the perfectly optimised Windows solution. This system is for the power user who is running graphics intensive programs and the most demanding Windows applications such as Pagemaker, Corel Draw and AutoCad, which make the most advantage of caching controllers and powerful video accelerators.

The dantium/PCi personal computer is the ultimate power system. It uses PCi Local Bus, the latest in computer architecture together with the incredible processing power of the Pentium® Processor. Dan has already received five awards during 1994 in this brand new category. Dan has obviously come up with yet another star performer!

dan for Windows VL..PCi

486 Windows Power System

- 8 MB RAM with 256KB Secondary Cache Memory
- 14" Low Radiation Monitor
- 1.44MB Floppy Disk Drive
- Desktop Case w/200W PSU
- 102 Key UK Keyboard
- New Microsoft Mouse
- Windows for Workgroups 3.11
- MS DOS 6.22
- LOTUS Organizer for Windows
- 1 Parallel & 2 FAST Serial Ports
- 2MB IDE Vesa Local Bus Cache Hard Disk Controller



dan for Windows VESA Local Bus Models only

- 2 VESA Local Bus (VL) Slots
- 1MB Stealth 64 DRAM PCi Win Accelerator

dan for Windows PCi Local Bus Models only

- 4 PCi Local Bus Slots (1 VL shared)
- 1MB Stealth 64 DRAM PCi Win Accelerator

VESA Local Bus Intel486 Processor

	DX4/100	DX2/66	DX2/50	SX/33
260MB VL	£ 1248	£ 1176	£ 1129	£ 1112
420MB VL	£ 1261	£ 1189	£ 1142	£ 1125
525MB VL	£ 1280	£ 1208	£ 1161	£ 1144

PCi Local Bus

	DX4/100	DX2/66	DX2/50	SX/33
525MB PCi	£ 1280	£ 1208	£ 1161	£ 1144
730MB PCi	£ 1336	£ 1264	£ 1217	£ 1200
1GB PCi	£ 1439	£ 1367	£ 1320	£ 1303

Delivery cost to most of UK for one system is £15. All prices exclude VAT @ 17.5%. E. & O.E.

➤ Indicates differences between configurations

Video Card upgrades from 1MB Stealth 64 DRAM

2MB Stealth 64 DRAM Windows Accelerator Card	£ 36
2MB Stealth 64 VRAM (S3 964) Windows Accelerator	£ 123
4MB Stealth 64 VRAM (S3 964) Windows Accelerator	£ 243
also	
IDE HDD VL CACHE Controller with 2MB Cache	£ 133

LIFETIME GUARANTEE: First year back-to-base parts & labour. Thereafter labour (excludes monitors and printers) and Hotline telephone support only. Optional 8-working hour response ON-SITE maintenance (£30 for first year). **14 DAY MONEY BACK GUARANTEE IF NOT SATISFIED** (excludes printers & Software). 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. Intel, Pentium and OverDrive are trademarks of Intel Corporation in the USA and other countries.

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dantium PCi

Ultimate Windows System

- 8 MB RAM with 256KB Secondary Cache Memory
- 14" Low Radiation Monitor
- 1.44MB Floppy disk Drive
- Desktop Case w/200W PSU
- 102 Key UK Keyboard
- New Microsoft Mouse
- Windows for Workgroups 3.11
- MS DOS 6.22
- LOTUS Organizer for Windows
- 66, 75 or 90MHz PENTIUM® Processor
- 3 PCi Local Bus Slots
- 1MB Stealth 64 DRAM PCi Win Accelerator
- FAST IDE Hard Disk Controller or NCR PCi SCSI Hard Disk Controller
- 1 Parallel & 2 Serial Ports



For Novell, OS/2, Unix, & Windows NT we recommend you use the Adaptec PCi SCSI (AHA-2940) controller available as an upgrade.

PCi Local Bus PENTIUM® Processor

	90MHz	75MHz	66MHz
260MB/13ms IDE	£ 1473	£ 1272	£ 1199
420MB/14ms IDE	£ 1486	£ 1285	£ 1212
525MB/12ms IDE	£ 1505	£ 1304	£ 1231
730MB/12ms IDE	£ 1561	£ 1360	£ 1287
1.04GB/12ms IDE	£ 1664	£ 1463	£ 1390
1.04GB/11ms SCSI	£ 1963	£ 1762	£ 1689
2.10GB/11ms SCSI	£ 2344	£ 2143	£ 2070
4.10GB/9ms SCSI	£ 2969	£ 2768	£ 2695

We recommend a mini or full size tower case for a 2.10GB or 4.10GB hard disk drive because the physical size of these drives means expansion is limited in a desktop case.



dan Technology plc
Desktops, Aug '94

from £947

What the experts said ...

"I had the opportunity to try dozens of their machines over the years and I can honestly say that I have never seen a bad one. The network PC was no exception. When manufacturers take the time, effort and pride in their product to make it as easy as possible for the end user to upgrade, they deserve to be praised. All in all, a typical example of dan's commitment to quality product at reasonable prices." dan Vantage DX2/50, BEST BUY, Network Ready PCs, PC Today, Feb '94.



"As its name suggests, dan for Windows is designed primarily as a Windows workstation. It's certainly a capable Windows PC, but it turns out to be even better under DOS. It is highly recommended. Its Promise cacheing disk controller with 2MB of RAM delivers compelling performance. Images from the monitor are crisp, while the SPEA V7 S3-based graphics adapter is an established Windows favourite. In Brief: An excellent Windows System with DOS performance to match, this PC has good components and expansion potential." dan for Windows 66, EDITORS' CHOICE - BEST VALUE, PC Magazine, May '94



"dan Technology have configured this computer to be the near perfect Windows machine. Not surprisingly the dan computer shows up top in all of our performance tests. It is in short the computer you would be looking for if you are going to be using Windows for arduous tasks most of the day - a Windows grafter's computer to be sure." 486 GUIDE, Computer Shopper, May '94



DISCOVER MEMORY FAULTS BEFORE IT'S TOO LATE

MEMORY WITH PARITY Parity checking is a hardware technique that alerts you to hardware memory faults before potential damage of data can occur through memory corruption of your software.

WE DO NOT CUT CORNERS!

dan
technology plc

"dan is recognised as a solid company with a good background. The dantium/PCi should be on your shortlist"

Pentium Group Test, Highly Commended, dan dantium/PCI, PCW, April '94



DISCOVER MEMORY FAULTS BEFORE IT'S TOO LATE

MEMORY WITH PARITY Parity checking is a hardware technique that alerts you to hardware memory faults before potential damage of data can occur through memory corruption of your software.

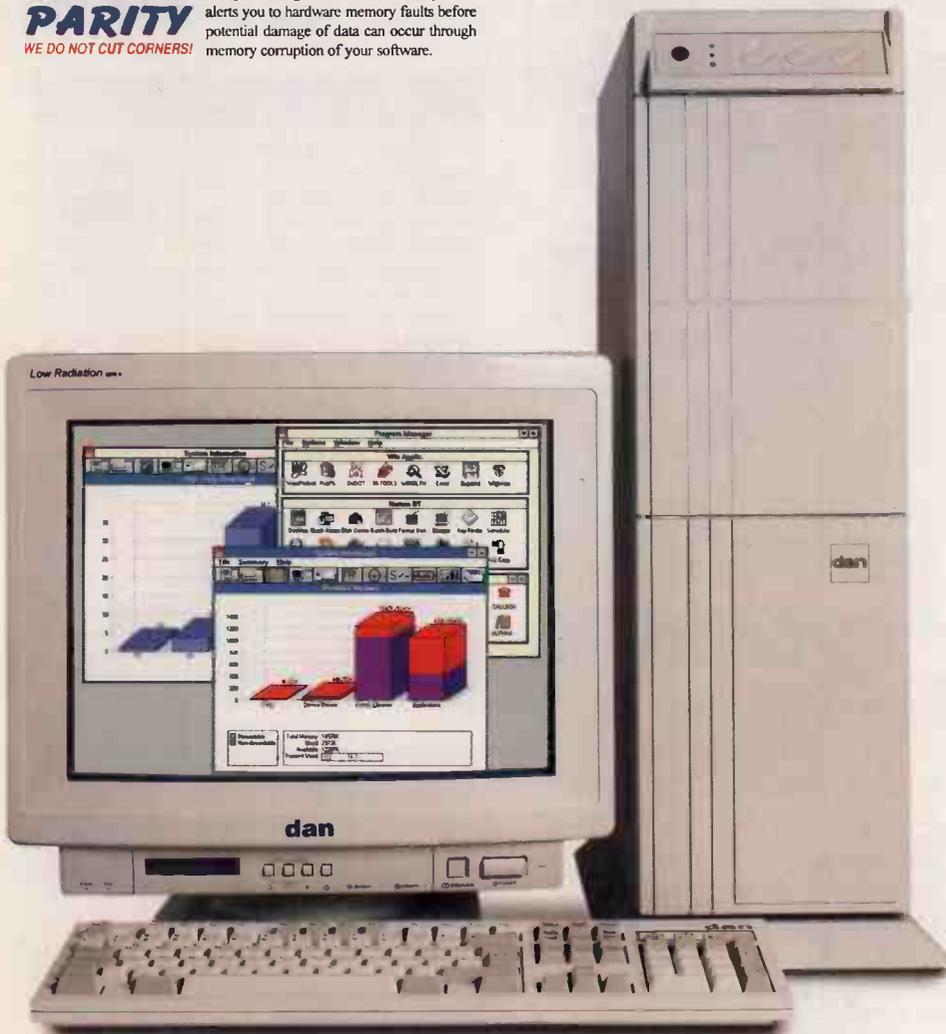
WE DO NOT CUT CORNERS!

Dan Servers for Novell and other Networks

When so much depends on one machine, it makes sense to go for the best in reliability and quality, as well as price and performance. In short, you have to choose the right supplier.

Award Winning

If you are looking for a complete Novell network, dan can provide the correct solution with its award winning file servers. For simple networks up to 20 users, choose the dan Server, an entry level file server which is based on ISA and VESA Local Bus technology.



Full Tower Case available as an upgrade

dan VL Novell Server

Excellent Network Server Performance

- ▶ 8 MB RAM - 256KB Secondary Cache Memory
 - ▶ Intel486 DX, DX2 or DX4 Processor
 - ▶ 2 VESA Local Bus (VL) Slots
 - ▶ 512KB Video Graphics Card
 - ▶ IDE Hard Disk Controller or SCSI 16-bit HDD Controller - Adaptec 1542 with Adaptec drivers
 - ▶ 14" Mono Low Radiation Monitor
 - ▶ 1.44MB Floppy disk Drive
 - ▶ Full Size Tower Case w/250W PSU
 - ▶ 1 Parallel & 2 Serial Ports
 - ▶ 102 Key UK Keyboard
 - ▶ Windows for Workgroups 3.11
 - ▶ MS DOS 6.22
 - ▶ 16-bit Ethernet Card
- (Novell NE 2000 compatible)



3COM Network Card available as an upgrade

	Intel486 Processor		
	ISA Bus	DX4/100	DX2/66 | DX/50
260MB/13ms IDE	£ 1030	£ 958	£ 1037
420MB/14ms IDE	£ 1043	£ 971	£ 1050
525MB/12ms IDE	£ 1062	£ 990	£ 1069
1.04GB/11ms SCSI	£ 1545	£ 1473	£ 1552
2.10GB/11ms SCSI	£ 1926	£ 1854	£ 1933
4.10GB/9ms SCSI	£ 2551	£ 2479	£ 2558

Add-ons with all dan systems

MultiMedia - CD ROM - Sound Cards

Multimedia MPC 2 Upgrade Kit (Sound Blaster 16, 2x Speed CD-ROM, Advanced Speakers, Software Drivers, Mic Plus ENCARTA Encyclopedia, MS Works, Money & Scenes)	£ 187
Sound Blaster 16 / Advanced Speakers / Mic	£ 72
Sound Blaster AWE 32 upgrade from SB16	£ 158
Sound Blaster 16 with ASP upgrade from SB16	£ 57
Power Speakers upgrade (20Watts PMPO)	£ 15
Hi-Fi Power Speakers upgrade (80Watts PMPO)	£ 40
2x Speed AT CD-ROM with controller	£ 99
2x Speed SCSI CD-ROM w/o controller	£ 113
4x Speed AT CD-ROM upgrade from 2xSpeed CD-ROM	£ 138

Network Cards

16-Bit Network Card Ethernet (Novell NE2000 Compatible - Thin Ethernet & Twisted Pair)	£ 21
16-Bit Network Card Ethernet (3 COM 509)	£ 71
32-bit Ethernet Card for EISA Servers Upgrade	£123

Miscellaneous

1MB Additional Memory Upgrade	£ 29
5.25" 1.2Mb Floppy Disk Drive	£ 39
Monitor & Keyboard Extension Leads (pair)	£ 20
On-Site Maintenance First 12 Months (form provided with system)	£ 30

Monitors (Low Radiation - MPR II) Upgrades

17" TRINITRON Monitor LR Upgrade from 14"	£ 385
20" TRINITRON Monitor LR Upgrade from 14"	£1144
15" XGA N/I Monitor LR Upgrade from 14"	£ 73
14" Colour Monitor from 14" Mono (for Servers)	£ 97

Uninterruptible Power Supplies - UPS

600VA UPS Off-Line from APC	£ 293
Auto Shut down Software	£ 58
600VA UPS ON-LINE	£ 580
Auto Shut down Software	£ 89

Tape Streamers (tapes not included)

250MB Floppy Tape Streamer with Software	£ 109
250/500MB Tape Streamer Kit incl controller & SYTOS Software - 500MB via compression	£ 374
All SCSI Tape Streamers require SCSI Controllers	
500MB SCSI Tape Streamer for DOS and Windows with SYTOS Software	£ 471
2GB DAT Tape Streamer for Windows with Corel SCSI	£ 681
2GB DAT Tape Streamer for Novell Server No Software. Use Novell's SBACKUP	£ 614

Case Upgrades from Desktop Case

Mini Tower Case	£ 15
Full Tower Case	£ 35

Modem

Internal PC SuperGEM fax/Modem from Dataflex	£ 154
Internal dan fax/Modem (V 32 bis)	£ 99

"The dan server offered the best all-round deal for speed, upgradability, price and on-site maintenance"

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What the experts said ...

"If you're looking for an outright winner from this survey of PCI Pentiums, look no further. The dan produced the fastest overall results on the Wintach Windows performance tests, and matched that with the best disk performance of the bunch. Interestingly, it's also the design that has eschewed the obvious in terms of components. ... the results (of the tests) are dramatic: a local bus controller clearly turbocharges disk performance, especially dan's SCSI controller. And, when it comes to video performance, two features stand out: a good software driver paired with a high-speed graphics controller on the local bus. This system is about as PCI-ish as you can get, and it's a great performer." *What Personal Computer, Best Buy, dantium/PCI, March '94*

"The dan was very nearly the winner (second to Compaq), coming from a company with a history of good support and which we know understands the product it sells. We've seen plenty of dan machines, enough to counter any worries we might have about buying from a company which doesn't have international R&D or manufacturing. Its performance was particularly impressive for a 60MHz machine. The dantium/PCI earns the highly coveted PCW Highly Commended award." *Personal Computer World, Highly Commended, dantium/PCI, April '94*

"It may look just like an average desktop PC, but hidden underneath the lid is a very powerful engine indeed. If you really want serious number-crunching power the Pentium is way ahead." *PC Today, dantium/PCI, Dec '93*



A Personal Computer World Reader's Long Term Test

Personal Computer World

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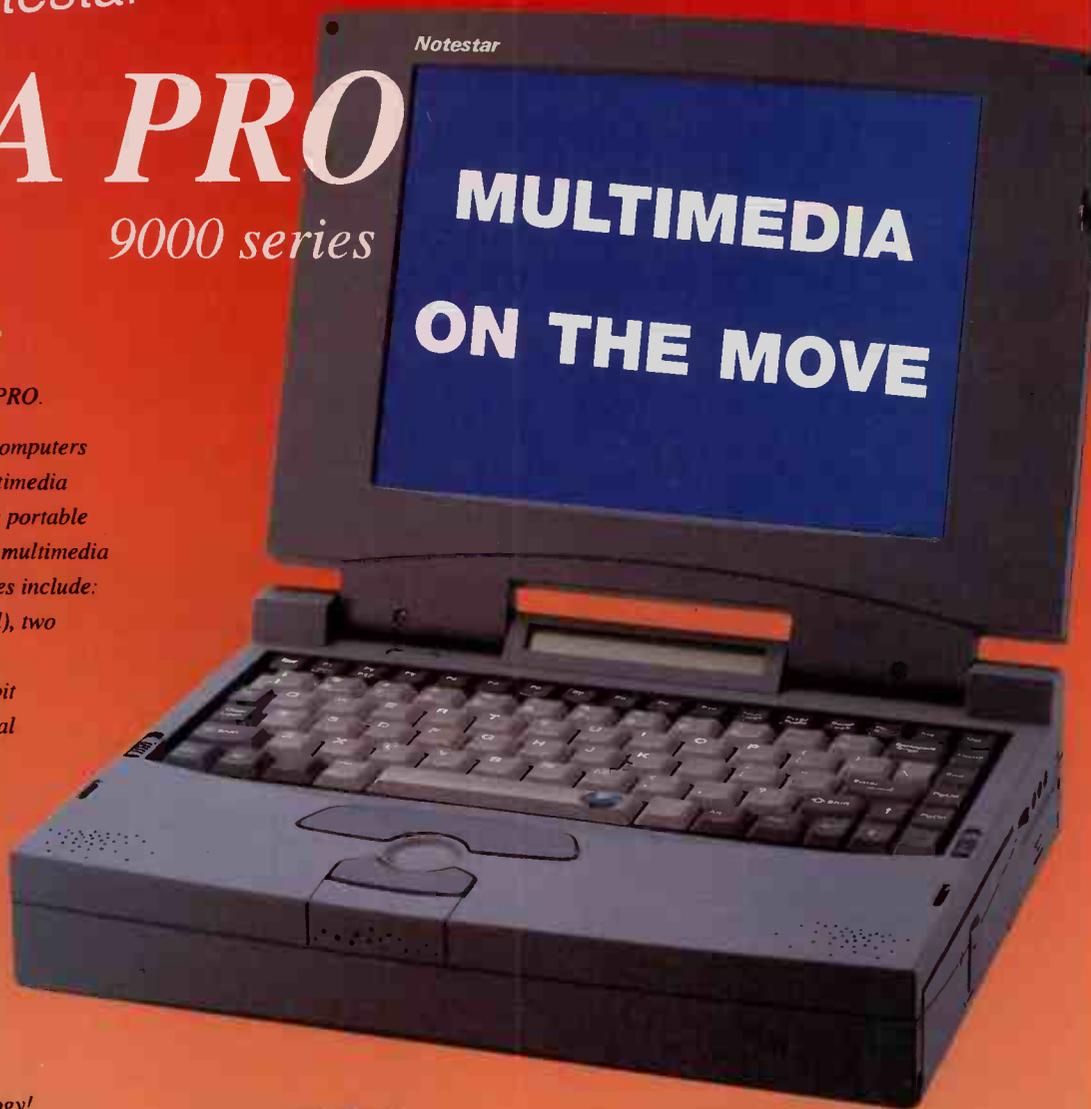
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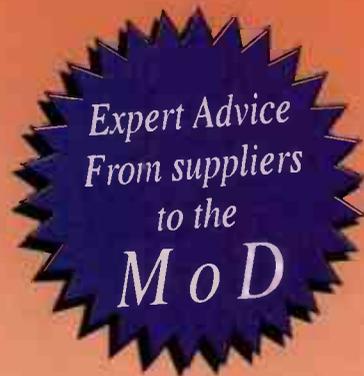
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MP9090	486DX4-100MHZ	£1,799	£2,099	£2,699

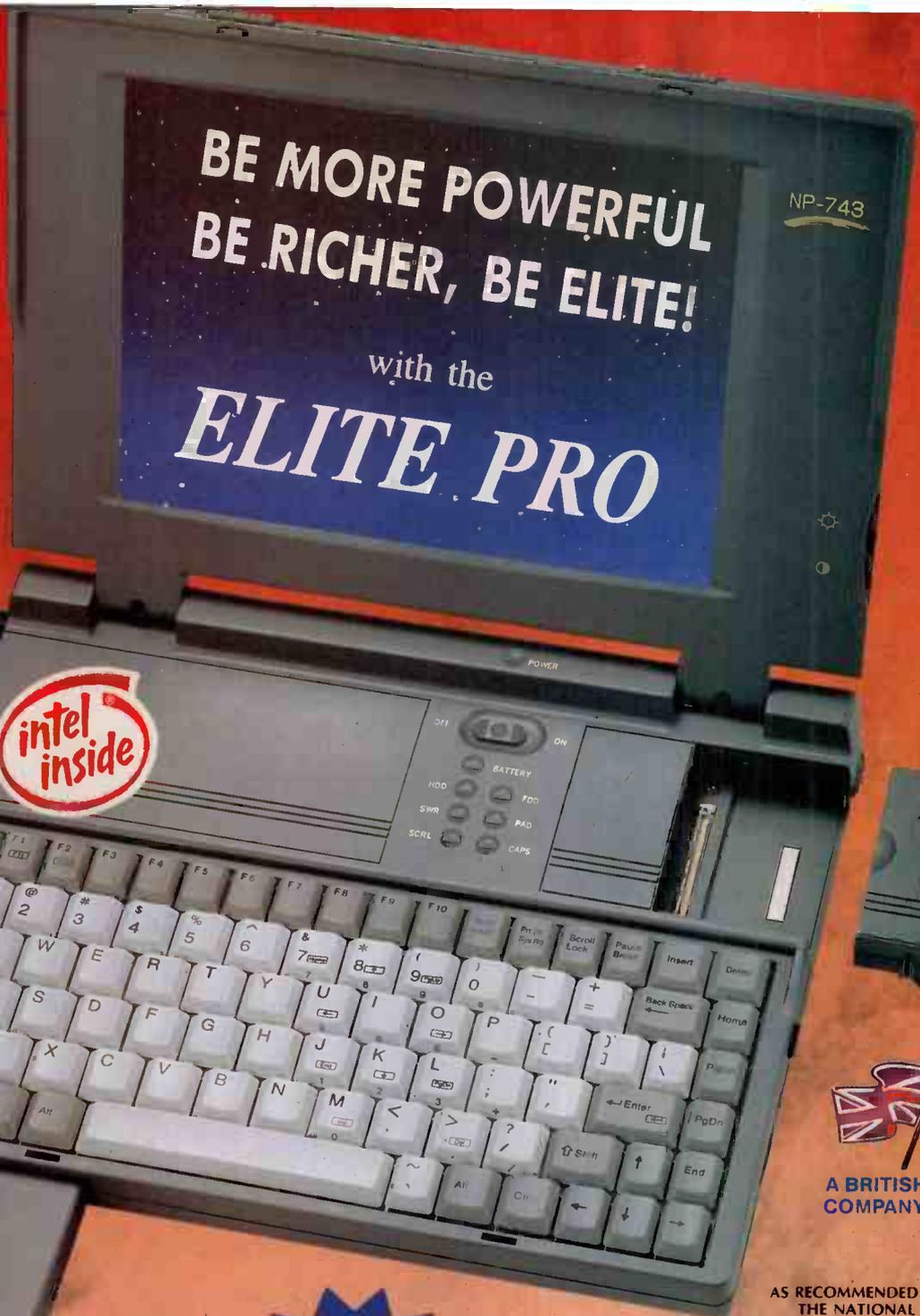
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EP7460	486DX2-66MHZ	£1049.00	£1,399.00	£1,939.00

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PCMCIA - Your Questions Answered

What are PCMCIA Cards?

Also called PC Cards, they are the size of a credit card. PC Cards enhance your computers capabilities. All PC Cards conform to the PCMCIA standard making it possible in theory to swap from one machine to another. In practice, as with any any evolving standard, there are some compatibility issues.

What Is Type I, II and III?

There are three types of PC Card with varying thicknesses, which determines its peripheral function.

Type I Cards - (3.5mm thick) are used for memory expansion (DRAM) to give your notebook extra memory to run programs. SRAM or Flash Cards give you additional data storage. These work in the same way as floppy disks.

Type II Cards - (5mm thick) are the most versatile. Generally used for products such as modems, network connections, sound cards and SCSI connections for CD ROM and Multimedia.

Type III Cards - (10mm thick) are the newest introduction to the PC Card technology. The extra thickness of this card allows it to have rotating parts, and are thus used for mini hard disks.

What are Card and Socket Services?

In the same way that attaching a network card or another peripheral to your PC requires software to operate the device, Card and Socket Services are the software drivers which control the PC Cards. There are three main vendors of this software: Phoenix, Systemsoft and Award. This software allows you to configure your card to suit your machine and system setup.

My PCMCIA Modem can be installed without Card and Socket services, I thought I always needed Card and Socket Services?

Some PC cards have software direct enablers which mean they do not need Card and Socket Services. This makes installation even easier and also saves on system memory.

Can I use my PC Card on my PC?

Simply add a PCMCIA slot to your PC with a card reader, either internally through an interface adaptor or externally through the parallel port. The slots act as additional drives, so you can copy and fax to your PC Card. To run Type II products through your PC you need an internal PCMCIA reader.

How do I link my mobile system to a CD ROM using my PCMCIA slot?

Use a PCMCIA SCSI card link to a CD ROM drive or other SCSI devices such as scanners, cameras and multimedia products.

What is the difference between SRAM and Silicon disk?

SRAM cards are battery backed storage cards with a battery life of over 2 years. Silicon disks have no battery and operate like mini hard disks.

I have heard people mention 32 bit bus cards & Berlin. What's it all about?

The PCMCIA committee will soon issue the next release of specifications (Version 3, code-named BERLIN and now called the PC Card standard) and this will bring with it several new and exciting features. The most important of these are 32 bit card bus capabilities and dual function cards. Basically 32 bit will give faster throughput than the current cards which are 16 bit. As is implied, dual function cards will be able to perform more than one task.

I'm very confused about the whole issue of PCMCIA cards, Socket Services, enablers, SRAM, Flash. What happens if I need help? Simply ring and speak with our Technical support department, who will be able to give both Pre & Post sales advice and support. And don't forget we guarantee that all the PC Cards listed and sold by Pico Direct will work with the appropriate card slot.

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Zap!

The New Year is well and truly here. This is the first advert that we've produced in 1995 and we must admit we are very excited! Many things have been happening at Adams and we'll try and tell you all about them in this column.

Our new three year parts and labour warranty* includes the first year's BS5750 approved service on site service with ICL. After this your machine is covered for a further 2 years on a return to base service. If you want to you can upgrade to a full 3 year on site service. We have also further improved technical support (hardware) services and have added a technical information line for more routine enquiries.

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- Accutouch 102 key UK keyboard
- Win OS/2 V3.0 with Bonus Pack preloaded and running
- Microsoft Ergonomic Mouse
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Thunderbolt

OS/2 will run all your OS/2. Windows and DOS software in a stable crash free environment, without having to buy any additional operating system. The IBM Bonus Pack is included with all systems.

Lotus Smart Suite for OS/2 is included with many of our Premium range. This gives you AMI Pro, Lotus 1-2-3, Lotus Freelance Graphics and cc:Mail. A complete suite of applications with many more features than offered by the equivalent Windows version.

Premium Our Premium systems are the quality and value for money compromise that we all want. With Win OS/2 Warp and Lotus Smartsuite they are even better value.

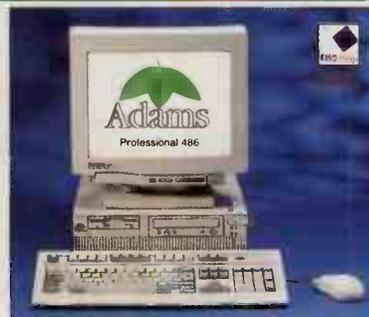
Professional The top of the heap Professionals are for those who require the best, period. The very best components making the best systems. In 1995 we have our new redundant, fault tolerant servers with internal or external RAID arrays.

PS: Call us now to see what else Adams has new for you in 1995!

Accura *Professional*

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486



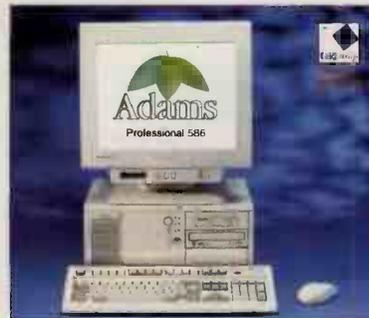
486DX2-66 £1349

486DX4-100 £1549

- Intel® 486DX2-66 or 486DX4-100
- Fully EPA energy star compliant
- Micronics X30 chipset
- 256k external cache
- 8mb RAM (max 64mb)
- 540mb sub 12ms IDE with 32 bit local bus mode 3 enhanced IDE controller
- Quad speed multi session CD-ROM drive
- 3.5" 1.44mb floppy drive
- ATI Mach 64, 64-bit graphics engine with 2mb RAM
- 15" Accuscan energy saving, MPR-II monitor, NI, max res 1280 x 1024
- 2 serial (16550), 1 parallel port (EPP/ECP)
- Slim desktop case
- Accutouch 102 key UK keyboard
- Win OS/2 V3.0 with preloaded and running
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)

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586



P5-60 £2649

P5-90 £2849

P5-100 £3049

- Intel® P54C 90/100mhz or P5 60mhz CPU
- Intel Neptune 3.3v or Saturn II chipset
- Plug and play compatible with auto configuration
- 256k external cache (upgradeable to 512k)
- 16mb RAM (max 192mb)
- 1gb 8.5ms IDE hard drive with PCI 32bit mode 3 enhanced IDE controller
- Quad speed multi session CD-ROM drive
- Soundblaster® AWE32 sound card and speakers
- 3.5" 1.44mb floppy drive
- Diamond Stealth 64-bit PCI graphics card with 2mb RAM
- 17" Idek MF8617 energy saving, MPR-II monitor, NI, max res 1600 x 1200, max refresh 100hz
- 2 serial (16550), 1 p/port (EPP/ECP)
- Desktop Case with 200w PSU
- Accutouch 102 key UK keyboard
- Win OS/2 V3.0 with preloaded and running
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)

superb quality and value for money



Accura

options

Premium 586



P5-60 £1649

P5-90 £1849

P5-100 £2049

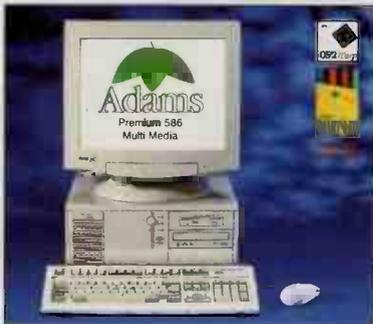
Work Station

- Intel® P5 60mhz or P54C 90/100mhz CPU
- PCI local bus
- 256k external cache
- 8mb RAM (max 128mb)
- 730mb 10ms IDE hard drive with PCI 32-bit IDE controller
- D/speed M/session CD-ROM drive
- 3.5" 1.44mb floppy drive
- Diamond Stealth 64 PCI graphics card with 2mb RAM
- 15" Accuscan energy saving, MPR-II monitor, NI, max res 1280 x 1024
- 2 serial, 1 parallel port
- Desktop case with 200w PSU
- Accutouch 102 key UK keyboard
- Win OS/2 V3.0 with Bonus Pack preloaded and running
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Lotus Smart Suite for OS/2 preloaded and running

Premium

425mb IDE → 540mb sub 12ms IDE HDD	£39
540mb IDE → 1gb 10ms IDE HDD	£259
Memory upgrades per 1mb	£31
Fast PCI graphics 2mb → Diamond Stealth 64 with 2mb DRAM	£69
1mb → 2mb DRAM graphics upgrade	£59
Stealth 64 2mb DRAM → 2mb VRAM	£109
14" → 15" Accuscan Monitor 1280 x 1024, MPR-II	£80
15" → 17" Accuscan Monitor 75hz refresh, MPR-II	£269
Conner TapeStor 420mb tape backup	£179
Standard CD-ROM → quad speed CD-ROM with 8 bit SCSI controller	£189
Sound Blaster Pro 16 (includes Speakers)	£109

Premium 586



P5-60 £2399

P5-90 £2599

P5-100 £2799

Multi Media

- Intel® P5 60mhz or P54C 90/100mhz CPU
- PCI local bus
- 256k external cache
- 16mb RAM (max 128mb)
- 1gb 10ms IDE hard drive with PCI 32-bit IDE controller
- Quad speed, multi session CD-ROM drive
- Soundblaster® 16ADV and speakers
- 3.5" 1.44mb floppy drive
- Diamond Stealth 64 PCI graphics card with 2mb RAM
- 17" Accuscan MPR-II monitor, NI, max res 1280 x 1024
- 2 serial, 1 parallel port
- Desktop case with 200w PSU
- Accutouch 102 key UK keyboard
- Win OS/2 V3.0 with Bonus Pack preloaded and running
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Lotus Smart Suite for OS/2 preloaded and running

Professional

1gb IDE → 1gb 8.5ms fast SCSI-II including 32 bit DPT 2024 PCI fast SCSI-II controller (cache and RAID u/g)	£299
1gb fast SCSI-II → 2gb 9ms fast SCSI-II	£399
RAID arrays and enclosures (fault tolerant with redundant power supplies)	ECALL
DPT CM4000 cache module (0 mb)	£369
Memory for CM4000 per 1mb	£36
DPT DM4000 RAID module	£369
Diamond Stealth 64 2mb DRAM → Matrox Impression 2+, 2mb VRAM	£109
2mb → 4mb VRAM upgrade	£175
17" Idek → 21" Idek MF-9121 Diatron Pro 1600 x 1200, MPR-II	£899

PLEASE CALL FOR MANY MORE OPTIONS

& Lightning!

the best system no compromises system

Professional



P5-90 £2999

P5-100 £3199

586 Server

- Intel® P54C 90/100mhz CPU
- Intel Neptune 3.3v chipset
- Plug and play compatible with auto configuration (PCI and ISA bus)
- 512k external cache
- 16mb RAM (max 192mb)
- 2.0gb 8.5 fast SCSI-II hard drive with DPT PCI 32-bit bus mastering SCSI controller (caching and RAID u/g)
- Quad speed multi session 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)
- 32bit PCI bus mastering ethernet card
- Tower case with 250w PSU
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Operating systems: OS/2, Novell, SCO Unix, Windows NT (not supplied).



ordering

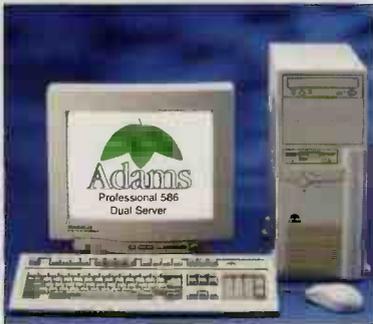
Adams Technology sales lines are open from 9am till 6pm from Monday to Friday and on Saturday from 10am till 2pm. Technical sales staff are available to answer questions on any of our products to help you with any differing requirements that you might have. Please add VAT to all prices quoted. We welcome payment by Mastercard and Visa or on a cheque with order basis. We charge £15 for carriage on systems and £12 for portables. A 14 day money back guarantee* is offered on all purchases.

All sales are subject to Adams Technology Ltd's terms and conditions of sale. These are available on request. Please call for any further information you may require.



Adams' are the official computer supplier to Williams Renault for 1995

Professional



P5-90 £3799

P5-100 £4399

586 Dual Server

- Two Intel® P5-90 (P54C and P54CM) CPU's 90mhz
- Intel Neptune 3.3v chipset
- Plug and play compatible with auto configuration (PCI and EISA bus)
- 512k external cache
- 16mb RAM (max 192mb)
- 2.0gb 8.5 fast SCSI-II hard drive with DPT PCI 32-bit bus mastering SCSI controller (caching and RAID u/g)
- Quad speed multi session 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)
- 32bit PCI bus mastering ethernet card
- Server case with 300 W PSU (not shown)
- Accutouch 102 key UK keyboard
- Microsoft Ergonomic Mouse
- 3 year parts and labour warranty (first year on site)
- Operating systems: OS/2, SCO Unix, Windows NT 3.5 (not supplied).

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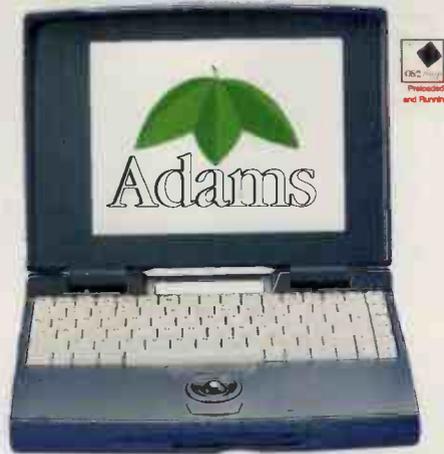
CREATING TECHNOLOGY

ADAMS TECHNOLOGY LTD, CITY POINT, CHESTER RD, OLD TRAFFORD, MANCHESTER M32 0RW UK. FAX: 0161 877 8884

Our new Accura 100, represents the *best* in value for money Notebooks. A complete full featured 3.3v CPU based machine with local bus graphics, 2 PCMCIA slots, Ni MH battery and Windows sound system built in. A front mounted trackball and LCD status display rounds off the feature list on the best value for money portable computer available today. The Accura 1000 comes preloaded with Win OS/2 Warp 3.0 and Bonus Pack.

Accura 1000 features

- 3.3v 486SX-33 SL enhanced CPU upgradeable to 486DX4-100
- 4mb standard memory upgradeable to 32mb
- Quick removable 250mb 2.5" fast IDE hard drive upgradeable to 540mb.
- Sound Blaster® audio compatibility with built in speaker and microphone
- 9.5" Mono LCD with 64 grey levels, Dual Scan Passive Colour or TFT active colour displaying 256 colours, quickly interchangeable
- Local bus graphics accelerator with 1mb RAM giving simultaneous LCD/CRT display and CRT resolutions up to 1024 x 768
- 1.44mb floppy disk drive built in
- BIOS controlled power management with SMM stop clock, suspend to disk function and APM support
- Built in LCD status indicator
- 19mm trackball built in
- 2 PCMCIA type II and 1 type III slot (type IV slot)
- Ni MH battery standard
- 1 serial port, 1 enhanced parallel port (EPP/EPS), external CRT port, external keyboard port
- Docking Station port
- Full function 84 key UK keyboard
- Multi voltage 90-240v charger power supply (2 hour charge time)
- Weight 2.7kgs with hard drive and battery
- 1 year parts and labour warranty
- 14 day money back guarantee of satisfaction.



Accura 1000 prices

Model	486SX-33	486DX2-50	486DX4-75	486DX4-100
Standard	£999	£1049	£1349	£1449
Quick Scan Colour	£1349	£1399	£1699	£1799
TFT Active Colour	£1999	£2049	£2349	£2449

Accura 1000 options

Memory upgrade to 8mb	£169
Memory upgrade to 12mb	£325
Memory upgrade to 20mb	£695
Upgrade HDD from 250mb - 340mb	£99
Upgrade HDD from 250mb - 520mb	£135
Additional main battery	£89
Car power adaptor	£55
Docking station	£399
Deluxe carry case	£39
PCMCIA 9600/2400 modem	£149
PCMCIA V32bis fax modem c/w Winfax	£229
PCMCIA ethernet card	£189
PCMCIA SCSIAdaptor	£229

Win OS/2 3.0 features

- Fast! Full 32 bit operating system
- Windows kernel included, no need to load Windows applications without having to load another operating system!
- Crash proof! If an application fails to respond simply close the Window you are working in and continue working with OS/2
- Full intuitive tutorial that lets you "have a go" with any feature

Win OS/2 bonus pack features

- IBM works (word processor, spread sheet, database, charting tool and report writer)
- IBM Personal Information Manager (Diary, calendar etc)
- Fax Works (send a fax at the press of a button!)
- Also: Internet, Compuserve, Multimedia, Person to Person



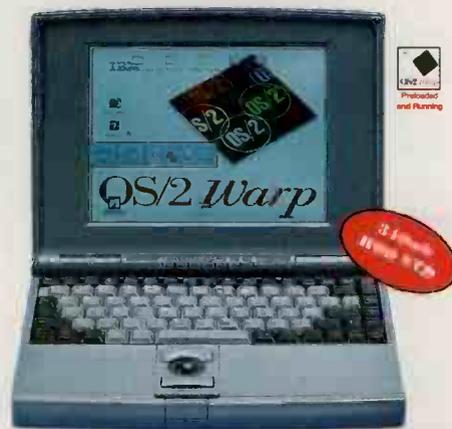
Lightweight?

Accura Portable

The Accura Portable has proved to be one of the best selling computers we've ever sold. Many customers who would only buy big brand names are buying the Accura Portable...why? It truly represents outstanding value for money, with a construction quality better than many of the larger manufacturers, blindingly fast performance with a fully modular design. The Accura Portable is preloaded with Win OS/2 Warp and Bonus Pack

Accura Portable features

- 486SX2-50 SL 'enh CPU upgradeable to 486DX4-100
- 4mb standard memory upgradeable to 20mb
- Quick removable 340mb 2.5" fast IDE hard drive upgradeable to 810mb.
- Yamaha audio chip providing Sound Blaster® compatibility with built in speaker and microphone
- 9.5" Mono LCD with 64 grey levels, Dual Scan Passive Colour or TFT active colour displaying 256 colours, quickly interchangeable
- Local bus graphics accelerator (WD Rocket Chip) with 1mb RAM giving simultaneous LCD/CRT display and CRT resolutions up to 1024 x 768
- Removable 1.44mb floppy disk drive
- "PICO Power" chipset featuring BIOS controlled power management with SMM stop clock and suspend to disk function and built in battery meter
- 19mm Logitech trackball built in
- 2 PCMCIA type II and/or 1 type III slot
- Ni MH battery standard (quickly interchangeable)
- 1 serial port, 1 enhanced parallel port (EPP/EPS), external CRT port, external keyboard/mouse port, d/station port
- Full function 86 key UK keyboard
- Multi voltage 90-240v charger power supply (1.5 hour charge time)
- Weight 2.4kgs mono, 2.7kgs colour
- Carry slip and utility disk included
- 1 year parts and labour warranty
- 14 day money back guarantee of satisfaction



Accura Portable Prices

Model	486SX2-50	486DX2-50	486DX2-66	486DX4-75	486DX4-100
Standard	£1149	£1199	£1249	£1499	£1599
Quick Scan Colour	£1499	£1549	£1599	£1849	£1949
TFT Active Colour	£2099	£2149	£2199	£2449	£2549

Our best selling modular notebook

Accura Portable options

Memory upgrade to 8mb	£169
Memory upgrade to 12mb	£299
Memory upgrade to 20mb	£699
Upgrade HDD from 340mb - 520mb	£135
Upgrade HDD from 340mb - 810mb	£479
Additional main battery	£89
Docking station	£375
Deluxe carry case	£39
PCMCIA 9600/2400 modem	£149
PCMCIA V32bis fax modem c/w Winfax	£229
PCMCIA ethernet card	£189
PCMCIA SCSIAdaptor	£229

Adams warranties

Desktop systems: For your peace of mind Adams are pleased to announce our new 3 year parts and labour warranty on all desktop systems. The first year of this warranty is on-site with BS750 standard eight hour response provided by our partner ICL. All main system components are covered except monitors which are covered by their own manufacturers guarantees. This package is one of the best warranties on the market. The on site service can be extended up to 3 years. Please call for specific system quotations.

Portables: Your portable system is covered by a 1 year back to base warranty. We have found that in the majority of cases it is quicker and easier to have your notebook returned to our workshop for any service that might be necessary. The exception is the Accura 1000 which has a manufacturers option of a 3 year on site warranty (listed above)

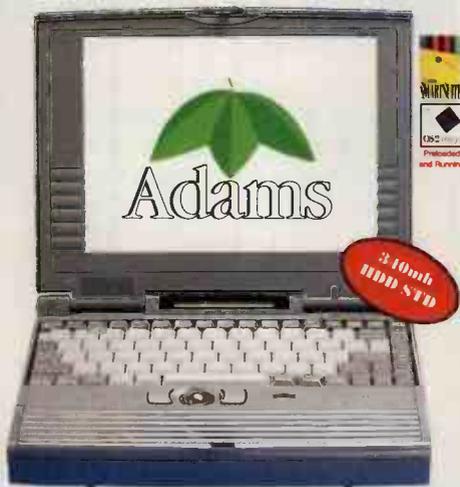
We hope you get many years of satisfaction from your Adams Accura Portable or Desktop System

Accura 5000

Accura 5000. Fitted with either 75 or 90 mhz Pentium CPU. With a new 10.3" double refresh colour STN or 10.4" TFT active matrix display, 256k level 2 CPU cache, supports the PCI local bus, hard drive interface and graphics controller. 3 PCMCIA slots, 8mb of RAM, full Soundblaster® compatibility combine to make the Accura 5000 one of the highest performing portable computers available today. The Accura 5000 is preloaded with Win OS/2 Warp and Bonus Pack, together with and Lotus Smart Suite for OS/2.

Accura 5000 features

- Intel Pentium P75 or P90 CPU
- 16k level 1 and 256k level 2 cache
- 8mb standard memory upgradeable to 40mb
- PCI local bus controller with 340mb 2.5" fast IDE hard drive upgradeable to 720mb.
- Sound Blaster® 16 bit stereo compatibility with built in speakers and microphone
- 10.3" STN double refresh (Quad Scan) Passive Colour or 10.4" TFT active colour displaying 256 colours
- PCI 32 bit local bus graphics accelerator (C&T 65545) with 1mb RAM giving simultaneous LCD/CRT display and CRT resolutions up to 1024 x 768
- 1.44mb floppy disk drive
- Jade GL829X chipset featuring BIOS controlled power management with suspend, suspend to disk function
- 16mm trackball built in
- 2 PCMCIA type 2 and 1 type 3 slot and/or 1 type 4 slot
- Ni MH battery standard (quickly interchangeable)
- 1 serial port, 1 enhanced parallel port (EPP/EPS), external CRT port, external keyboard/mouse port, d/station port
- Full function 86 key UK keyboard
- Multi voltage 90-265v charger power supply (2.0 hour charge time)
- Dimensions(mm) 279w x 218d x 51.5h Weight 3.09kgs
- Carry slip and utility disk included
- 1 year parts and labour warranty
- 14 day money back guarantee of satisfaction



P75	£2599	£3899
P90	£2799	£3699

Pentium 90 Notebook

Accura 5000 options

Memory upgrade to 12mb	£189
Memory upgrade to 16mb	£329
Memory upgrade to 32mb	£1079
Upgrade HDD from 340mb - 520mb	£99
Upgrade HDD from 340mb - 710mb	£250
Additional main battery	£95
Docking station	£CALL
Deluxe carry case	£39
PCMCIA 9600/2400 modem	£149
PCMCIA V32bis fax modem c/w Winfax	£229
PCMCIA ethernet card	£189
PCMCIA SCSI Adaptor	£229

Lotus SMARTSUITE features

- Lotus 1-2-3
- Lotus Freelance Graphics
- Lotus AMI Pro
- Lotus cc:Mail
- Adobe Type Manager included
- Lotus Smart Suite for OS/2 3.0 has more easy to use features than the Windows version
- The same easy to use interface is shared with all Smart Suite applications. Similar menu's, commands and SmartIcons dramatically reduce the learning curve.
- Unique Integration: share all Smart Suite files, create hot live links between applications
- Mail enabled: One click access to cc:Mail from any application
- Drag and drop files into applications to open them
- Drag and drop graphics into frames.
- File names up to 254 characters
- Right mouse button single click access to Workplace Shell
- Crash protection! Crashes don't bring down entire system

Heavyweight!

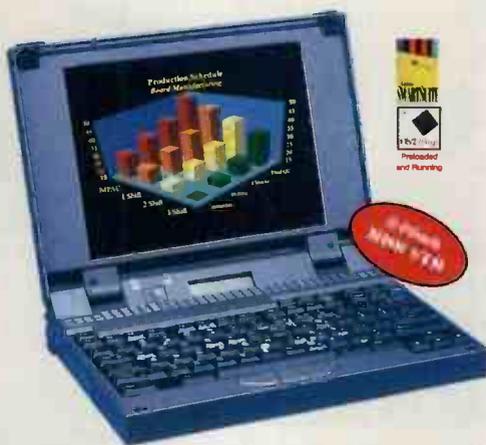
Accura 6000

Pentium 100 Superbook

Accura 6000. The ultimate Pentium® notebook. The only 100mhz P5 Notebook in production currently. Probably the most expensive notebook available? This machine brings workstation performance to the portable PC. A complete desktop replacement computer with the CPU running on a 64 bit bus linking the 256k cache and 8mb RAM standard memory, a 32 bit PCI bus controls the 340mb fast SCSI-II hard drive and very fast graphics accelerator. The 10.4" TFT LCD displays 65,536 colours, with simultaneous CRT display and with integrated 16 bit stereo sound provides the ideal presentation machine. There are no problems with cooling as heat is dissipated to the cast magnesium alloy case. The Accura 6000 is loaded with Win OS/2 Warp and Bonus Pack, together with and Lotus Smart Suite for OS/2.

Accura 6000 features

- Intel Pentium 100mhz CPU
- 16k level 1 and 256k level 2 cache
- 8mb standard memory upgradable to 128mb (64 bit)
- 32 bit PCI local bus controller with 340mb 2.5" fast SCSI-II hard drive upgradeable to 810mb.
- Sound Blaster® 16 bit stereo compatibility with built in speakers and microphone
- 10.4" TFT active colour displaying 65,536 colours
- PCI 32 bit local bus graphics accelerator (WD90C24A2) with 1mb RAM giving simultaneous LCD/CRT display and CRT resolutions up to 1024 x 768
- External 1.44mb ultra-low profile floppy disk drive
- BIOS controlled power management with sleep, suspend & resume functions
- Trackpoint, pointing device integrated into keyboard
- 2 PCMCIA type 1/2 or 1 type 3 slot
- Ni MH battery standard (quickly interchangeable)
- 1 serial port, 1 enhanced parallel port (EPP/EPS), external CRT port, external keyboard/mouse port, d/station port
- Full function 82 key Lexmark UK keyboard
- Multi voltage 110-240v charger power supply (2.0 hour charge time)
- Dimensions(mm) 300w x 216d x 51h Weight 3.4kgs
- Leather carrying case included
- 1 year parts and labour warranty



Made in England for Adams

Accura 6000 options

P100	£5495
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Please call for details on the full range of Accura 6000 configurations and accessories

Terms and conditions: *14 day money back guarantee does not apply to special orders - 3 year warranty subject to warranty terms and conditions. Carriage charges. Notebooks £12. Systems £15. All prices quoted are subject to change without notice, availability and VAT. Payment by cleared funds. VISA or Mastercard. P.O. is welcome from FTSE 100 companies, universities, government departments and local authorities. Adams Technology was established in 1989 and is already a corporate, university and MOD supplier. E & O E. Fax Number 0161 877 8824.

Our pledge

Adams Technology pride ourselves on our products and service. We offer a 14 day money back guarantee* on all Accura Portables and most systems. A direct technical support line and technical information line are available during business hours. We do our best to ship notebooks within 2-3 days and desktops within 7-10 days. Please don't forget to add VAT to all prices quoted. See previous page for ordering details.

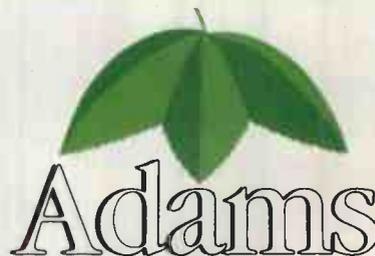
We will keep you up to date with the latest technological advances and where possible offer advantageous upgrades to your Accura Computer

Try something different, try Adams Technology for quality, value for money products and a service second-to-none.



Adams' are the official computer supplier to Williams Renault for 1995

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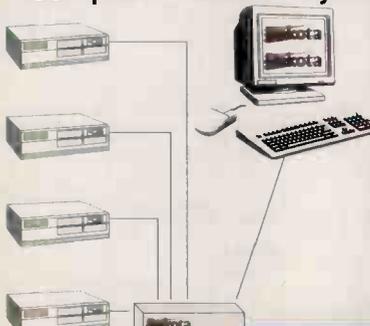


CREATING TECHNOLOGY

ADAMS TECHNOLOGY LTD, CITY POINT, CHESTER RD, OLD TRAFFORD, MANCHESTER M32 0RW UK. Fax: 0161 877 8824

DAKOTA KEYBOARD, MONITOR & MOUSE SWITCHES

Our Dakota Keyboard, Monitor and Mouse switches allows you to control a number of computers with 1 Keyboard, Monitor and Mouse.



- 2, 4, 8 or 12 Computers controlled from 1 Keyboard, Monitor and/or Mouse
- VGA and SVGA Compatible (Up to 1280 x 1024)
- Works with AT/XT & PS/2 Keyboards
- Supports DOS, Windows, Windows NT and OS/2

2 Device Option £29
2 Computers to 1 Keyboard & Monitor

4 Device Option £49
4 Computers to 1 Keyboard & Monitor

8 Device Option £179
8 Computers to 1 Keyboard & Monitor

12 Device Option £249
12 Computers to 1 Keyboard & Monitor

2 Device Option £49
2 Computers to 1 Keyboard, Monitor & Mouse

4 Device Option £69
4 Computers to 1 Keyboard, Monitor & Mouse

12 Device Option £329
12 Computers to 1 Keyboard, Monitor & Mouse

SERVEVIEW - KEYBOARD, MONITOR & MOUSE - AUTOMATIC BOOTUP

Our ServeView automatic switch is the ultimate in computer switching devices. Fully expandable, it allows for automatic booting for both keyboards and mice on AT and/or PS/2 computers. A must for anyone where reliability is of prime importance.



- 4, 8, 12 or 16 Computers controlled from 1 Keyboard, Monitor and Mouse
- VGA, SVGA & EGA Compatible (Up to 1280 x 1024)
- Automatic booting with AT/XT & PS/2 Keyboards
- Automatic booting on Serial & PS/2 Mice
- Scan mode automatically switches between CPUs
- Num Lock, Scroll Lock & Caps Lock for all keyboards
- Supports up to 256 computers
- All commands can be done directly from the keyboard
- Non-Volatile memory stores configuration setup

4 Device Option £595
4 CPUs to 1 Keyboard, Monitor & Mouse

8 Device Option £995
8 CPUs to 1 Keyboard, Monitor & Mouse

12 Device Option £1395
12 CPUs to 1 Keyboard, Monitor & Mouse

16 Device Option £1795
16 CPUs to 1 Keyboard, Monitor & Mouse

6 Device - Non PS/2 Type £395
6 CPUs (non-PS/2) to 1 Keyboard, Monitor & Mouse

MULTI-ACCESS PC SHARERS

Dakota Multi-Access PC Sharers enable one computer to be shared by up to 4 Keyboards, Monitors and Serial Mice.



- Extend up to 75 metres away
- VGA & SVGA Compatible
- Up to 1280 x 1024 resolution
- Supports DOS, Windows, OS/2 & NT

2 Site Option £99

2 Keyboards & 2 Monitors to 1 Computer

2 Site Option £129

2 Keyboards, 2 Monitors & 2 Mice to 1 Computer

4 Site Option £199

4 Keyboards, 4 Monitors & 4 Mice to 1 Computer



MULTI-DISPLAY DEVICES

Dakota Monitor Splitters allow up to 8 Monitors to display identical images. Perfect for exhibitions, training, presentations and demonstrations.



- Extend up to 75 metres away
- VGA & SVGA Compatible
- Supports up to 1280 x 1024
- Display on up to 8 Monitors
- Supports DOS, Windows, OS/2 and Windows NT

2 Monitors £149

4 Monitors £199

8 Monitors £299

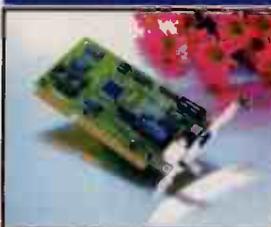


MONITOR & KEYBOARD EXTENDERS

Dakota Extenders enable Monitors and/or Keyboards to be used up to 150 metres for Monitors and 75 metres for Keyboards.

Monitor Extender **£79** Keyboard Extender **£79**

NETWORKING PRODUCTS



- Thin Ethernet or Twisted Pair
- Supports 8 interrupts and 8 I/O addresses
- Auto-sensing 8 or 16 bit
- Complies with IEEE 802.3
- 10 Mbs transmission rate
- Auto configuration setup
- Easy to Install

£35
NE2000 Compatible Ethernet Card. Ideal for Novell, IPX, ODI, NDIS & Windows Network Card

£89
Plugs directly into a Parallel Port, has a printer pass through & does not require an external power supply. Pocket LAN

PRINTER NET PLUS - PRINTER SHARING

Connect up to 32 PCs to 6 Parallel Printers.

Our Printer Net+ printer sharing devices allows you to connect 32 PCs to 6 printers up to 400m away using cheap telephone type cable. Simultaneous printing and data transfer between PCs.

Starter Kit **£149** Transmitters **£49** Receivers **£49**
2 Tx 2 Rx 1 per computer 1 per printer

SOLIDEX NOTEBOOK CARRY CASES



- Notebook Computer & Printer Compartments
- File/Document Compartment
- Meshed Accessory Pocket
- Meshed Disk Pocket
- Shoulder Strap Included
- Extremely Durable
- 2 Different Sizes

£49
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A Treasury of Accessories

SOFTWARE

All Gateway 2000 systems are preloaded with Microsoft MS-DOS 6.22 and Windows for Workgroups 3.11. Software comes complete with master diskettes and documentation (either printed or on CD-ROM). Software is tested and optimally configured for your system, eliminating potential installation and set-up errors.

■ Microsoft® Works for Windows™

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

■ Microsoft Office Professional™

Some of our systems now include Microsoft Office Professional 4.3 on CD-ROM as standard. This package contains all of Microsoft's most popular applications: Word, Excel, PowerPoint and Access.

■ Family PC Software Bundle

Gateway 2000 Family PCs come with Microsoft Works, Money, Golf, Publisher and Musical Instruments – something for everyone.

NEW Software Bonus

New this month, many Gateway desktop PCs come with Microsoft Money, and all multimedia systems have Microsoft Encarta '95. We also have new titles for kids. Call for details!

PERIPHERALS

■ Basic Audio Multimedia Kit

Creative Labs 16-bit Sound Blaster sound card, 2 Labtec speakers and CD-ROM. **£169**

■ Wavetable Audio Multimedia Kit

Ensoniq Soundscape 16-bit Wavetable sound card (compatible with MT-32, FM mode and General MIDI Sound Blaster, AD Lib, Roland MPU 401), MS Windows Sound System, Altec Lansing ACS31 speakers and CD-ROM. **£269**

If your system includes a CD-ROM drive, you can purchase the Basic Audio Multimedia Kit for **£70** and the Wavetable Audio Multimedia Kit for **£170**.

■ Quad-Speed CD-ROM/Disk Changer

Internal quad-speed CD-ROM drive with IDE interface and 3 bay CD magazine changer. Average access time 330ms. **£189**

■ CH FlightStick

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

■ TelePath™ II Fax/Modem

Internal fax/modem, 14,400bps modem, V.32bis, 14,400bps fax capability. Software included. **£145**

■ Network Cards

Call for Ethernet or Token Ring adaptors.

■ Colorado Memory Systems® TBU

250MB internal automatic tape backup unit which copies up to 9.5MB per minute. Software, tape and cable included. **£109**

■ Vivitron™ Monitor Upgrades

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

- 15" Vivitron colour monitor for **£80**
- 17" Vivitron colour monitor for **£340**
- 20" Vivitron colour monitor for **£1160**

■ Hewlett Packard DeskJet 520

Here's a high-quality business printer at a great Gateway price. Gives you sharp images at 600 x 300dpi, up to 3ppm. **£199**

■ Hewlett Packard DeskJet 560C

Superb high-resolution black print quality plus ability to add rich colour to documents easily. Prints at 600 x 300dpi, 3ppm black print and about four minutes per page colour. **£399**

■ Hewlett Packard LaserJet 4L

HP's best value-for-money laser printer, the 4L runs at 300 dpi, 4ppm. With 1MB memory. **£499**

■ Adaptec PCI SCSI Controller

The AHA-2940 brings high-performance SCSI I/O technology for the PCI local bus. **£129**

■ 1 GB SCSI Hard Drive. £549

■ SCSI DAT Tape Drive

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

PORTABLE OPTIONS

- PCMCIA Fax/modem. **£199**
- PCMCIA VGA adaptor. **£149**
- Memory upgrades.
- ColorBook 250MB removable hard drive.
- Liberty 720MB removable hard drive.
- 3.5" 1.44MB external floppy drive for HandBook and Liberty.
- Padded, soft-sided cases custom designed for the ColorBook and HandBook.
- Additional batteries for portables.

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

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

If our technical support staff determines that an on-site service call is needed, we will send a technician to most locations in the UK at no charge during the warranty period. We regret that you must pay shipping if you return your system within the 30-day guarantee period. Please call for more information on our guarantee, warranty and on-site service programmes.

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	1 Year	2 Years	3 Years
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Same Day On-Site Repair Service	£40	£105	£210



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1.7GB	LT1700	£709
2.0GB	LT2000	£749
3.0GB	LT3000	£1256
4.0GB	LT4000	£1690
4.3GB	LT4300	£1705
9.0GB	LT9000	£2589

BACK-UP SUB SYSTEMS (DAT)		
CAPACITY	PART CODE	PRICE
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4.0GB	LT400DAT	£705
16GB	LT1600DAT	£775

OPTICAL DISK SUB SYSTEM		
Capacity	Part Code	Price
Re-writable MO Drives		
230GB	LT230MO	£599
1.3GB	LT521MO	£1430

HARD DRIVES

SCSI

Fujitsu			
264MB	M2681S		£122
352MB	M2682S		£130
532MB	M2684S		£188
1.0GB	M2694S		£395
Quantum			
Maverick			
270MB	MAV270S		£127
540MB	MAV540S		£185
Lightning			
365MB	LGT365S		£135
540MB	LGT540S		£185
730MB	LGT730S		£225
Empire			
1.0GB	1080S		£395
1.4GB	1440S		£620
2.1GB	2160S		£765
IBM			
1.0GB	Pegasus		£395
1.0GB	45G9504		£398
2.0GB	86F0102		£775
4.0GB	90F0780		£1505
Micropolis			
1.0GB	MIC4110		£375
1.7GB	MIC2217		£575
2.0GB	MIC4221S		£849
4.0GB	MIC3243S		£1550
9.0GB	MIC1991S		£2350
AV Drives (Micropolis)			
2.0GB	MIC4221AV		£920
4.0GB	MIC3243AV		£1675
9.0GB	MIC1991AV		£2575

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Hyundia
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Model	Size	Resolution	Price
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HL 5864	15"	1280 x 1024	£255
HL 7682	17"	1600 x 1280	£554

SONY			
Model	Size	Resolution	Price
CDPD 155F1	15"	1280 X 1024	£310
CDPD 1730	17"	1024 X 768	£649
GDM17SE1T	17"	1600 X 1200	£849
GDM 20SE1VT	20"	1280 X 1024	£1349

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Model	BUS	DRAM	Resolution	Refresh	Price
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Horizon VL	VESA	1MB	1024 x 768	72Hz	£87
LightSpeed VL	VESA	2MB	1280 x 1024	90Hz	£147
PowerGraph	PCI	1MB	1024 x 768	75Hz	£103
Velocity64	PCI	4MB	1600 x 1200	75Hz	£257

CONTROLLERS

ADAPTEC		
Model	Bus	Price
1515(kit)	ISA	£73
1542+(kit)	ISA	£199
2814VL(kit)	VESA	£190
1640(kit)	MCA	£220
2940(kit)	PCI	£240

FUTURE DOMAIN		
Model	Bus	Price
TMC1680SVP	ISA	£180
TMC7000EX	EISA	£399
MCS7000SVP	MCA	£149

RE-WRITABLE OPTICAL

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Capacity	Manufacturer	Model	Price
128MB	Fujitsu	M2511A	£475(int)
230MB	Fujitsu	M2512A	£499(int)
1.3GB	Sony	SMO-521	£1250

TAPE BACKUP SYSTEMS

TAPE STREAMERS				
make	model	capacity	int	int kit
Wangtek	5150S	250MB	£360	£450
Wangtek	5525ES	525MB	£475	£565

DAT					
make	model	DDS2	native	comp	int kit
HP	35470	no	2.0GB	£655	£805
HP	3548	no	2.0GB	4.0GB	£705
Sony	SDT 5200	yes	4.0GB	£655	£725
Sony	SDT 5000	yes	4.0GB	16GB	£735
Wangdat	3100	no	2.0GB	£695	£785
Wangdat	3200	no	2.0GB	8GB	£745

IDE

Fujitsu			
264MB	M2681T		£112
352MB	M2682T		£124
528MB	M2684T		£170
Quantum			
270MB	MAV270AT		£119
365MB	LGT365AT		£143
540MB	MAV540AT		£169
730MB	LGT730S		£235
Micropolis			
1.0GB	MIC4110AT		£375
1.7GB	MIC2217AT		£570

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Centronic 50 - Centronic 50	£15
Centronic 50 - 25 Pin D Type	£20
Centronic 50 - Micro D 50	£40
Ribbon Cables	
Single Drive Internal	£7.50
Dual Drive Internal	£9.50
Triple Drive Internal	£15
Terminators	
External Active	£36
External Passive	£9
Mounting Frames	
Standard 3.5" 5.25" Hard drive mounting kit	£10

MULTIMEDIA UPGRADE KITS

Includes: Creative 563 CD Drive, SoundBlaster16 Headphones, Microphone Microsoft Office	£429
Includes Creative 563 CD Drive, SoundBlaster 16, Speakers, Joystick and 8 Games Titles.	£249
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Orchid		
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SoundWave 32 SCSI	£175	
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Pioneer		
DR106	Quad Speed SCSI Int, Drive Only	£299
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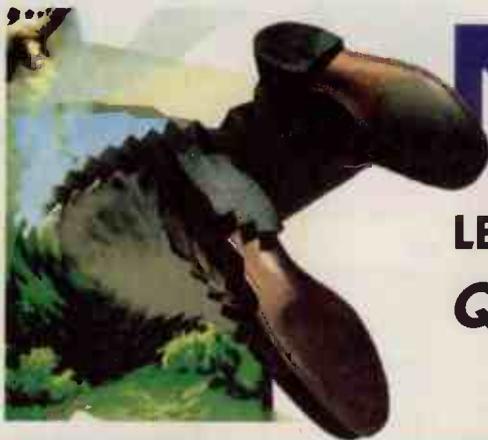
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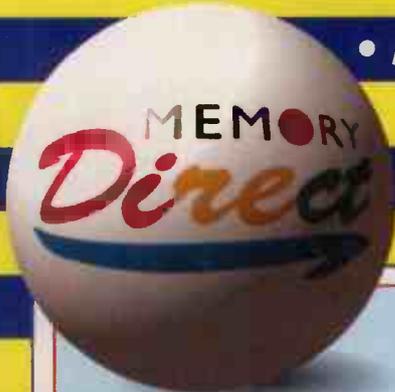


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AST

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COMPAQ

Contura 400 series

16Mb module

DIGITAL

DECpc 425SL, 425SLC, 433SL

16Mb module

IBM Aptiva 4Mb, 8Mb, 16Mb & 32Mb Modules

IBM

PS/2 Server 95 and PS/2 Server 95 Array

32Mb Module

NEC

Versa M series

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1MB x 9 (9cs) - 70ns £35.00
1MB x 9 (9cs) - 60ns £35.00
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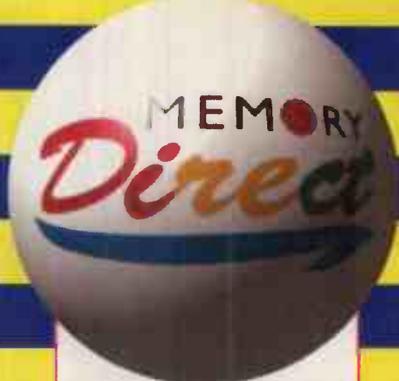
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 All of our products come with full manufacturers guarantees.

DEPENDABILITY
 At any one time we carry in excess of £3 million worth of upgrades. In fact in 1993 over 98% of all orders placed were dispatched the very same day. Special volume pricing and international orders are always welcome.

QUALITY
 We are a BSI registered stockist and conform to BS5750 and ISO9002 quality standards. That's why Local & Health Authorities, Government and Educational establishments choose us. You can be sure of the highest standards at all times.

TECHNICAL SUPPORT
 Should you at anytime have installation or technical problems our technical helpline is available with on-line information completely FREE.

SATISFACTION GUARANTEED
 Vote with your feet! If for any reason you are unsatisfied with the quality of the product or the level of service, we are happy to offer a 14 day moneyback guarantee.

DONT SETTLE FOR ANYTHING LESS!

- SALES LINE 0800 636679
- FAX LINE 0252 338224
- OPEN Saturdays 9:30-2:00
- OPEN 8am to 7pm weekdays
- DELIVERY-NEXT DAY £6.00

Prices exclude carriage & VAT unless indicated. Goods may be paid for by credit card, cheque or bankers draft and payable to Memory Direct and must include delivery and VAT. Prices are correct at time of going to press. All orders accepted are subject to our standard terms & conditions which are available on request. Carriage is non-refundable. All postal enquiries should be addressed to:

Memory Direct, 31-33 Grosvenor Road, Aldershot, Hants. GU11 3DP
 Guarantee We offer a 14 day moneyback guarantee on all hardware & peripherals we sell. If you are not happy with your purchase in any way call us to obtain a returns number, return your purchase in an "as new condition" & your money will be refunded promptly or a replacement product sent to you straight away.

NETWORKS

NE2000 Combo cards- Only £45



NE2100 CARDS OFFER 30% PERFORMANCE INCREASES

Using Bus Mastering Technology. These cards are designed for customers for whom 'SPEED' is of paramount importance, conforming to NE2100 standards and running at between 500 & 600Kbps.

FROM £45



32bit EISA NETWORK CARDS

Kingston introduce two new high performance EISA Ethernet Network Interface cards which feature direct bus mastering technology for increased throughput of up to 16% faster than competing products. Kingston offers a choice of either a dual interface unit or a 3-In1 option to optimise network configurations.

FROM £132



Kingston's EtherX EISA card offers solid performance, excellent documentation and a good price.

Token Ring 16/4 ISA

This Neat design (TROPIC chipset) uses shared memory to improve performance. Designed to run with the IBM Token Ring drivers (so, for example, TOKEN.COM for ODI Netware users).

£219



The Kingston Token Ring 16/4 ISA card also comes with a simple, very clear manual. Pricewise, the Kingston card is very competitive within the Token Ring market.

At workstation level, the Kingston adapter performed particularly well, and at a keen price, November '94

ETHERNET CARDS



MODEL	BNC	RJ45	AUI	ISA-16bit	MCA	EISA	PRICE	
							Single	6 pack
KNE2000T	•	•	•	•	•	•	£49	£198
KNE2002	•	•	•	•	•	•	£49	£252
KNE2031 Combo	•	•	•	•	•	•	£45	£245
KNE2100T	•	•	•	•	•	•	£45	£252
KNE2109	•	•	•	•	•	•	£49	£282
KNE2121	•	•	•	•	•	•	£59	£342
KNE3221	•	•	•	•	•	•	£129	£762
KNE3233 Combo	•	•	•	•	•	•	£139	£816
KNE PC/M/M	•	•	•	•	•	•	£145	£804
KNE PKL2	•	•	•	•	•	•	£145	£870
KTR MC16/4	•	•	•	•	•	•	£240	
KTR ISA16/4	•	•	•	•	•	•	£250	

PCMCIA Ethernet Kingston delivers leading portable performance!

PCMCIA Ethernet is available in 10base-T & Combo versions, supports the widest range of Type II compliant notebook & laptop systems and is compatible with all leading network operating systems.

FROM £139



PORTABLE UPGRADES

DATAPAK 170Mb

Kingston's DataPak 170. A high performance PCMCIA type III 170Mb hard drive designed for increased disk capacity and portability.

HOW SPECIAL?

- With a 170Mb capacity DataPak 170 is the highest capacity PCMCIA Type III hard drive available today.
- Optimum power management enables DataPak 170 to draw only .025 watts of power in sleep mode and 1.30 watts when accessed.
- Rugged design to endure up to 100G non-operating shock.
- Includes SystemSoft card and Socket Services setup utility for easy installation.



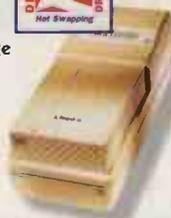
£372

DATATRAVELER High performance external removable hard disk drive.

Using Quickswap Technology for disk drive "hot swapping". DataTraveler easily installs into the parallel printer port of any desktop, laptop or notebook system providing increased storage capacity, portability and security. **Package contains:** Data Traveller base, Data Traveller battery, Data Traveller parallel to IDE adapter, Data Carrier (in either 127Mb or 209Mb capacity), Data Carrier Carrying Case, Data Carrier labels, AC adapter, utility diskette and installation manual.



USA



127MB

£329

209MB

£399

DATAREX- KINGSTON TECHNOLOGY DISCOVERS THE MISSING LINK

PCMCIA TYPE II 14.4Kbps MODEM

Send/Receive- Data Rates: v.22bis, v.22, v.32, v.32bis, v.23, v.21. Fax rates: v.17, v.29, v.27ter, v.21.

The Leading edge of speed and efficiency supports most computers including: Compaq Concerto, Reno 4/25, Dell 320 SLI, 325SLI, IBM Thinkpad 350, 500, 710T, 720C, 750CS, 755C. NEC-Vera, Toshiba T1900, T3300SC, T3400, T4500, T4600, T47 00CS and many more.



BABT APPROVAL SOUGHT

£159

CREDIT CARDS ACCEPTED (no surcharges)



Code MD7P2&3231194

FREE on (0800) 63 66 79



Sound

BLASTER



Creative Labs are the established market leader in multimedia with the SoundBlaster product as the de-facto standard by which other sound cards are judged.



- SoundBlaster 16 Value **£65**
- SoundBlaster Multi CD **£95**
- SoundBlaster Multi CD Adsp **£117**
- Sound Blaster SCSI-2 **£125**
- SoundBlaster SCSI-2 Adsp **£135**
- SoundBlaster AWE 32 **£175**

CREATIVE
CREATIVE LABS

CREATIVE LABS AND MICROSOFT KITS



SOUNDBLASTER 16 FAMILY PACK
This amazing Family package includes;

- Creative Labs 563 CD ROM Drive
- SoundBlaster 16 Value
- Labtec power speakers
- **Microsoft Family CD's** Encarta 2.5, Golf, Money, Dangerous Creatures and Works • Aldus PhotoStyler
- Virgin 7th Guest

£239

GAMEBLASTER CD16 ENHANCED
This amazing Family package includes;

- Creative Labs 563 CD ROM • SoundBlaster 16 • Power speakers & Joystick
- **Microsoft** : Encarta 2.5, Golf, Money, Dangerous Creatures & Works • Theme Park • Strike Commander • Beneath A Steel Sky • Rebel Assault • SimCity 2000 • Pagan Ultima VIII • Syndicate with American Revolt • Wing Commander 2



SOUNDBLASTER 16 MULTIMEDIA OFFICE
This amazing value package includes;

- Creative Labs 563 CD ROM Drive
- SoundBlaster 16 with AdSP upgrade
- Stereo headphones and hands free microphone
- **Microsoft Office Professional** Word for Windows 6.0, Excel 5.0, Access 2.0, Powerpoint 4.0, Mail 3.2, Encarta 2.4, & Office Made Easy.



£399

CALL FOR FULL LISTING OF MICROSOFT & CREATIVE BUNDLES

CD ROM DRIVES

NEC

LEAP INTO THE WORLD OF MULTISPIN

From the entry level dual speed SCSI 2Xi to the ultra fast new **Quad-X IDE** drive, NEC have the drive for you!



- DUAL SPEED**
- NEC 2Xi internal **£122**
 - NEC 2Xe external **£199**
- TRIPLE SPEED**
- NEC 3X drive internal triplespin plus 7th Guest & Groliers Encyclopedia **£199**
 - NEC 3Xp portable **£265**
 - NEC 3Xe external **£345**
- QUAD SPEED**
- NEW NEC 4Xi internal **£299**
 - NEW NEC 4Xe external **£419**
 - NEW NEC Quad-X IDE internal **£199**

- NEC SCSI OPTIONS**
- Standard ISA Kit £49**
Suitable for all SCSI drives
 - Advanced ISA Kit £139**
Recommended for Quad spin
 - Parallel Port Kit £99**
Ideal for portables & externals
 - 3Xp battery pack £75**
Makes a true portable

SONY



- DUAL SPEED**
- 562B internal **£90**
 - 562EX parallel **£189**
- OPTIONS**
- ISA interface card **£12**
- Beware of grey imports as they do not carry the Panasonic 2 year warranty*
- SONY CDU 33A**
CDI compatible, MPC2 compliant **£85**
- SONY CDU 33EX**
Connects via the parallel port **£185**
- 2.5 x SPEED**
- NEW SONY 55S 2.5 x spin SCSI drive **£115**
 - NEW SONY 55E 2.5 x spin IDE drive **£99**

Panasonic

- DUAL SPEED**
- 562B internal **£90**
 - 562EX parallel **£189**
- OPTIONS**
- ISA interface card **£12**
- Beware of grey imports as they do not carry the Panasonic 2 year warranty*



- SONY OPTIONS**
- ISA interface card **£12**
For the CD33A
 - ISA interface IDE card **£19**
For the CD55E
 - ISA advanced SCSI card **£139**
For the CD55S

PIONEER

- QUAD SPEED**
- NEW DRU-104X **£299**
Fast 190 ms access, SCSI drive
- OPTIONS**
- Advanced SCSI intfce **£139**

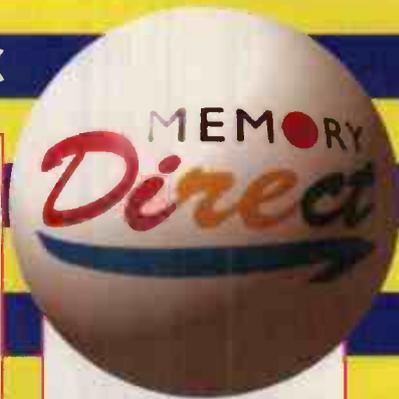
CD ROM & SOUND CARD BUNDLES

	NEC 2Xi	NEC 3Xi	Panasonic 562B	Panasonic 563	Sony CDU33A	NEC 2Xe	NEC 3Xp	NEC 3Xe	Panasonic 562B	Sony CDU33A
EXTERNAL										
Interface	-	-	-	-	-	£248	£299	£366	-	-
Parallel Port	-	-	-	-	-	-	£349	£414	£189	£185
INTERNAL										
Interface	£169	£281	£99	-	£95	-	-	-	-	-
MV Prosonic	£196	£299	£159	-	-	-	-	-	-	-
SB 16Value	-	-	£190	£179	-	-	-	-	-	-
SB 32AWE	-	-	£299	-	£285	-	-	-	-	-
SB 16SCSI-ASP	£345	£429	-	-	-	-	-	-	-	-
SB 16 MCD	-	-	£238	-	£220	-	-	-	-	-
SV Gold	-	-	£165	-	£154	-	-	-	-	-

All CD ROM kits that include sound cards also include power speakers, Headphone, Photo Access software, microphone where necessary and all required manuals, cables and drivers disks.

Our parallel port interface is the ideal solution for laptop users and those with slimline desktop cases or MCA architectures.

CALL THE UPGRADE EXPERTS



SCANNERS



LOGITECH

You'll get professional results when you scan with Logitech.

The hand-held scanner is designed for use in the office or home as an input device for photos, images and text. For the latter it is used in conjunction with OCR software which is available separately.



- Scanman Colour **£219**
- Scanman 256 Grey **£103**
- Scanman Easytouch **£139**
- Pilot II Serial mouse **£17**
- Pilot II PS/2 mouse **£17**
- Mouseman RH combo **£31**
- Mouseman cordless **£52**
- Trackman portable **£37**
- Trackman voyager **£59**

14,400 FAX MODEMS

Memory Direct have a range of fast desktop, pocket, internal and external 14,400bps Fax/modems. All BAPT approved and include power supply where necessary.

- V21 •V22 •V22bis •V32 •V32bis •MNP2-4
- V42 •V42bis •MNP5 •Fax software

Dynalink

- External **£124**
- Internal **£124**
- Pocket **£139**



- Pkt 14.4 **£156**
- Pkt 96/24 **£56**



- V22bis **£169**
- V32 **£199**
- V32bis **£209**
- VFAST **£299**
- V34 **£379**



VIDEO PLAYBACK

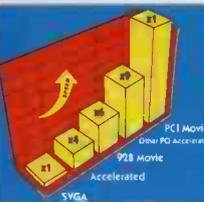
928MOVIE

- Incredibly fast - up to 6x performance over ordinary SVGA's
- Postage stamp-sized video become high quality full screen movies
- Faster windows, more colours, higher resolutions
- CD Quality sound with 16 bit stereo output (optional)
- ISA or VL Bus options
- CD Quality sound with 16 bit stereo output (optional)
- **Microsoft Video for Windows FREE**
- **Optional MPEG controller available**

Videologic



- Videologic 928Movie **£225**
- ISA or VLBus with sound **£269**
- ISA or VLBus with MPEG **£449**



PCIMOVIE Videologic

- Uses PCI fast interface
- 16 times faster than ordinary SVGA's
- Amazing refresh rates of 120Hz
- Microsoft Video for Windows **FREE**

Videologic PCIMovie **£349**

GRAPHICS ACCELERATORS



Orchid Technology has been a leading manufacturer of hardware and peripherals for personal computers since its incorporation in 1982, and is noted for introducing new standards to the personal computer industry.

NEW!



- Kelvin EZ - VL or PCI **1Mb £99**
- Kelvin 64 - ISA, VL or PCI **1Mb £109 2Mb £145**
- Fahrenheit 64 - VL or PCI **2Mb £145**
- Fahrenheit PRO 64 - VL or PCI **2Mb £245**

CD TITLES

- 5'10" Pack - Ten separate CDs
- 5'10" Pack - Vol II Ten separate CDs **£28.00**
- Comptons Interactive Encyclopedia 94 **£19.00**
- Day of the Tentacle **£16.00**
- Family Doctor **£19.00**
- Grolier's Multimedia Encyclopedia **£16.00**
- Just Grandma & Me **£18.00**
- Megarace **£15.00**
- Microsoft Bookshelf Retail **£45.00**
- Return to Zork **£14.00**
- Star Trek 25th Anniversary **£18.00**
- TFX **£16.00**
- Shareware titles -from **£5.00!**

PLUS MORE

TITLES ARE ONLY SUPPLIED WITH CD ROM DRIVES

WE SET THE STANDARDS:

INTEGRITY

Memory Direct is part of a £60 million plc. UK company and is the most professional mail order supplier in Europe. We have been supplying upgrades for over 6 years.

RELIABILITY

All our products are user installable and we even test everything before dispatch to ensure your complete satisfaction.

WARRANTY

All of our products come with full manufacturers guarantees.

DEPENDABILITY

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Code MD7P&5231194

FREE on (0800) 63 66 79



Seagate
THE DATA TECHNOLOGY COMPANY

BUSLOGIC

Kingston
TECHNOLOGY CORPORATION

DATA EXPRESS

NEW FROM KINGSTON TECHNOLOGY

The Kingston Data Express subsystem (container) allows you to add removable 2.5" or 3.5" devices to your PC, workstation or mini computer internally or externally.



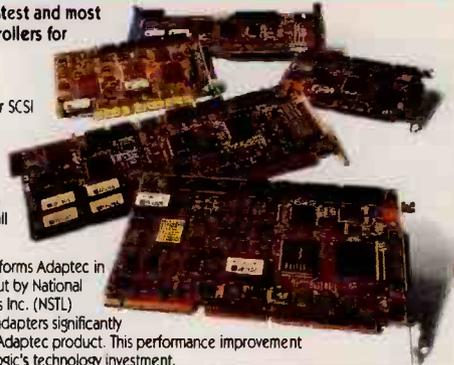
£169

For internal frame & carrier

- Consisting of a device carrier and receiving frame i.e. a box to put the HDD or DAT in, and a frame to slide the box in and out of the machine.
- Fits into a standard 5.25" bay of a PC for 3.5" technology.
- Accommodates single-ended (narrow + wide) and differential (narrow + fast wide) SCSI drives, or IDE drives
- Internal (IDE or SCSI) or external (SCSI only) solutions available.
- Features unit select number, drive power and device activity indicator.
- Data Express also features a key lock to prevent unauthorised or untimely removal.
- Ruggedised & waterproof.
- Transportable - enables you to move large chunks of data around the office without using a network. **BUY WITH DRIVES INSTALLED!**

BUSLOGIC SCSI

BusLogic provide the fastest and most cost effective SCSI controllers for all the available PC architectures.



High performance Bus-Master SCSI host adapters for the most demanding applications. BusLogic adapters utilise powerful bus master technology that speeds data transfers and improves overall system throughput.

BusLogic consistently outperforms Adaptec in independent tests carried out by National Software Testing Laboratories Inc. (NSTL) showing that BusLogic host adapters significantly out perform the equivalent Adaptec product. This performance improvement is directly as a result of BusLogic's technology investment.

- ISA16bit **£120**
- EISA **£239**
- VL-Bus **£149**
- MCA **£239**
- Fast PCI **£189**

The BusLogic price/performance commitment offers you the FAST SCSI BusLogic equivalent to the Adaptec product at the same price; up to 60% performance increase for the same price as the Adaptec equivalent.

SEAGATE HARD DRIVES

SEAGATE TECHNOLOGY FAST ATA & FAST ATA-2



The Medalist Family, including the 545xe and 1080 are 3.5-inch low profile, high capacity, Fast ATA hard disc drives.

Fast-ATA is an enhancement to the disc drive electronics that allows the host system to take advantage of the peripheral transfer rates available under Local bus.

Maximum data transfer rates are increased from 4Mb/sec to 13.3Mb/sec (VL bus DMA Mode 1) or 11.1ms/sec (PCI bus PIO Mode 3). Effectively the drive mechanics stay the same.

The benefit is that higher data transfer rates allow access to larger amounts of data making the drive ideal for intensive applications (e.g. multimedia).



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COMPUTER SHOPPER July '94 "DRIVE TIME" Page 462

IDE

Model	Size - MB	Access Time	3.5"	Price
ST3250A	214	14	•	£129
ST3290A	263	16	•	£139
ST3491A	428	14	•	£179
ST5660A	545.5	12	•	£239
ST31220A*	1083	12	•	£365

* Optional ATA software driver available to access drive capacities greater than 528Mb

SCSI

Model	Size - MB	Access Time	3.5"	Price
ST3660N	545.3	12	•	£289
ST31200N	1052	9/10.5	•	£489
ST12400N	2,148	9/10.5	•	£899
ST12550N	2,139	8/9	•	£1010

PARALLEL LINES

Portable Drive kits- mobilising your data via the parallel port.

Lightweight and easy to use, this parallel port solution provides you with a portable hard disk drive or CD ROM Drive suitable for palmtop, notebook and desktop PC's in the home, and office.

Transporting the data between the system is easy and simple. Only one single step for installation. It adds another hard disk drive or CD ROM Drive via the parallel port to your system.



SEAGATE & BUSLOGIC BUNDLES

Huge leaps in storage capacity and reductions in cost per Mb have made the SCSI market more accessible to you, the user.

As more and more peripheral devices are required by our customers the demand for both internal and external SCSI solutions has exploded.

BusLogic and Seagate bundles enables you to benefit from these improved performances. The grid opposite lays out the required FAST SCSI-2 drive and the appropriate controller for the common architectures now available.

All you need do is specify the drive and the architecture.



Additional kits including cables, fixing brackets & external housings are always available.



Hard Drive	Architectures			
	ISA	EISA	VL-BUS	PCI
ST5660N 545.3Mb	KT-545C £353	KT-747C £470	KT-445C £385	KT-946C £419
ST31200N 1052Mb	£530	£648	£560	£597
ST12400N 2148Mb	£855	£973	£887	£921
ST12550N 2139Mb	£994	£1109	£871	£1059

Please call for up to date options and pricing!

SEAGATE SOLUTION

Model	Size - MB	Price
ST3250A	214	£199
ST3290A	263	£209
ST3491A	428	£259
ST5660A	545.5	£319
ST31220A*	1083	£439

CD ROM SOLUTION

Model	Price
Panasonic 562B	£189
NEC 3Xp	£349

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MOTHERBOARDS

486 Green Board



The ideal entry level Local Bus motherboard offering combined 30 pin and 72 pin memory slots

MB486VLG-256

- 6 ISA and 3 VL Bus slots
- ZIF Socket
- 30 pin & 72 pin SIMM sockets
- SIS chipset
- 256k cache
- Green Bios

MOTHERBOARD WITH INTEL 486 PROCESSOR

SX25	£125
SX2/50	£152
DX33	£189
DX2/50	£189
DX50	£279
DX2/66	£209

486 PCI, VL Bus & ISA board



The ideal "future proof" solution, use as VL Bus today and take advantage of PCI tomorrow

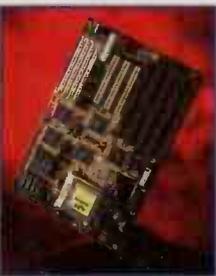
GA-4861M

- 4 PCI, 2 VL, 4 ISA slots
- ZIF Socket
- Up to 128Mb DRAM
- Uses 72 pin SIMMS
- 256K cache
- Fan included

MOTHERBOARD WITH INTEL 486 PROCESSOR

SX25	£135
SX2/50	£159
DX33	£197
DX2/50	£197
DX50	£289
DX2/66	£219
DX4/75	£332
DX4/100	£456

Intel Pentium 60/66



Pentium 60/66 Mhz PCI - EISA solution for demanding environments eg OS/2 and Windows NT

GA-5861M

- 3 PCI, 5 EISA slots
- Up to 192Mb DRAM
- Flash Award BIOS
- 256K cache
- 512K cache upgrade kit available
- Fan included

MOTHERBOARD WITH INTEL PENTIUM PROCESSOR

PENTIUM 60	£530
PENTIUM 66	£599

Intel Pentium 90



90 MHz Intel Pentium Board offering Intel Neptune chipset

GA-5861P

- 4 PCI, 4 ISA slots
- Up to 768Mb DRAM
- Flash Award BIOS
- 256K cache
- 512K cache upgrade kit available

MOTHERBOARD WITH INTEL PENTIUM PROCESSOR

PENTIUM 90	£759
------------	------

Please be aware due to the complexities of particular technologies some of our upgrades require a certain level of technical experience to install and configure. In some instances we may advise the use of an on-site installation service.

D.I.Y. KITS

FLOPPY DRIVES

From the makers of The ALPINE stereo range ALPS bring you 3.5" high quality FDD's. £22

Universal fixing kit for above. £9

KEYBOARDS

Also made by ALPS these keyboards are available in 3 styles:

- Original- Tactile £39
- Clara- Membrane £24
- Komfort- Membrane with adjustable wrist rest £35

PC ACCESSORY KIT includes: Microsoft DOS & Windows, Alps Clara keyboard, Microsoft Version 2 mouse & mouse mat. £110

MONITORS

14" SVGA 0.28 dot pitch TUV approved £179

CASES

- High quality cases including PSUs Desktop £49
- Mini-Tower £59
- Full-Tower £79
- Fan £15

MICE & TRACKBALLS

- From LOGITECH Pilot II Serial/PS2 mouse £17
- Mouseman RH combo £31
- Mouseman cordless £52
- Trackman portable £37
- Trackman voyager £59
- Microsoft V2 £24



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To: Memory Direct, 31-33 Grosvenor Road, Aldershot, Hants, GU11 3DP

Qty	Description	Price
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		£
		£
		£
		£
		£

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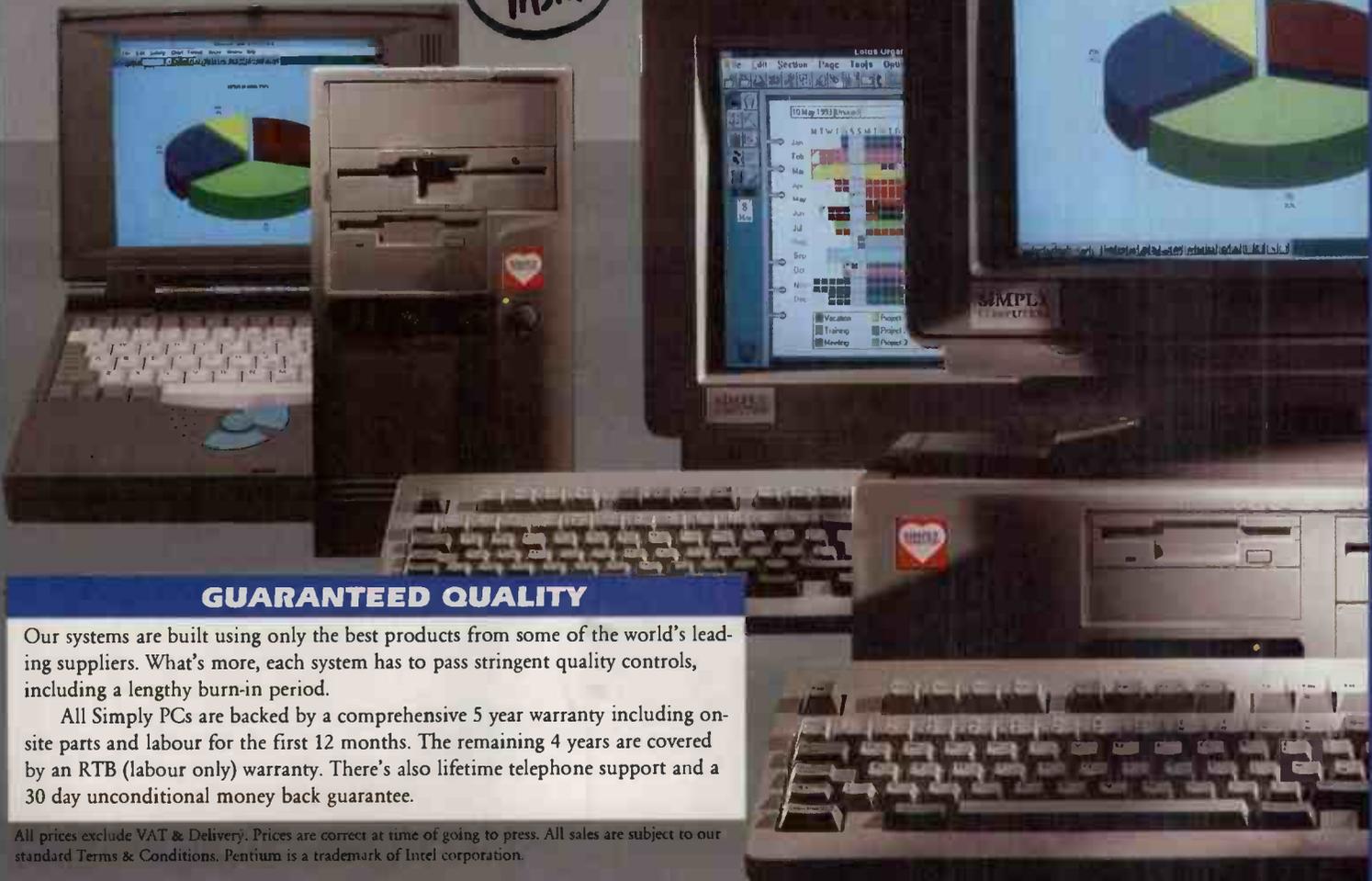
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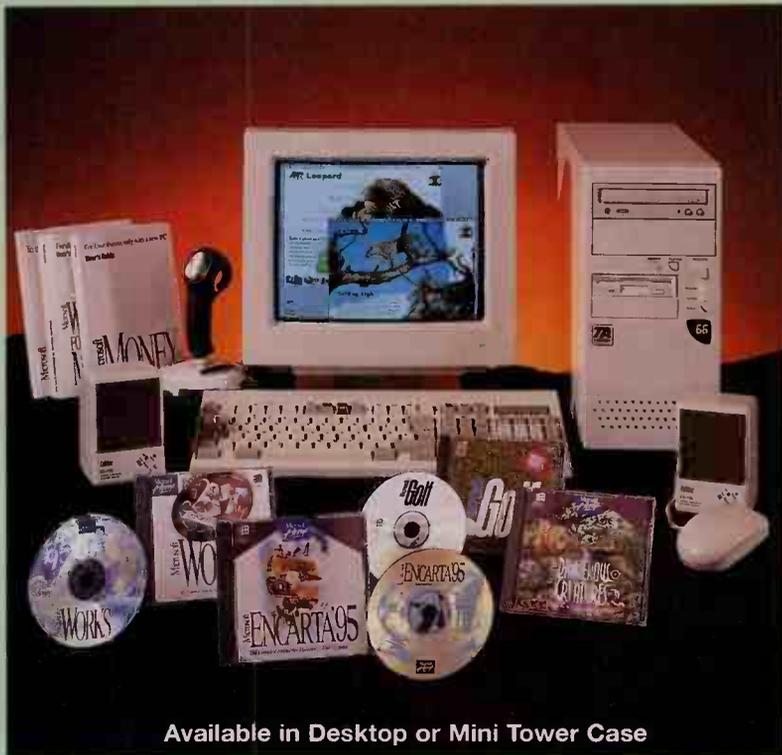
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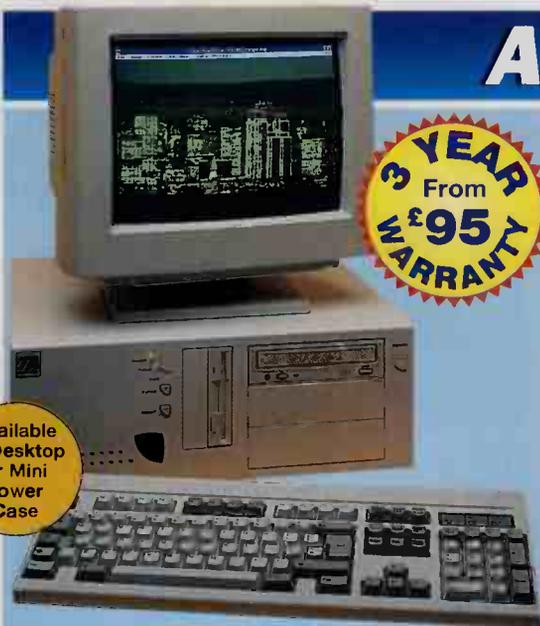
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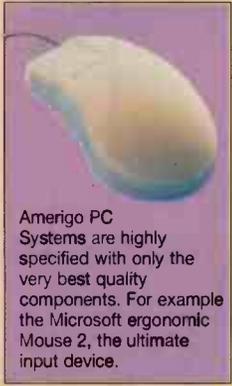
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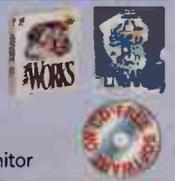
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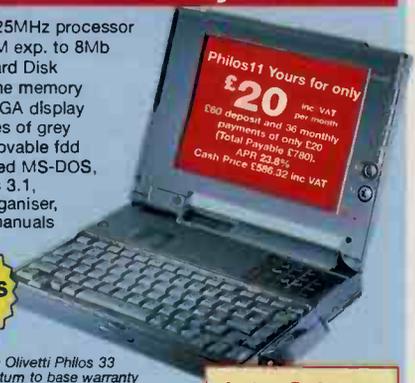


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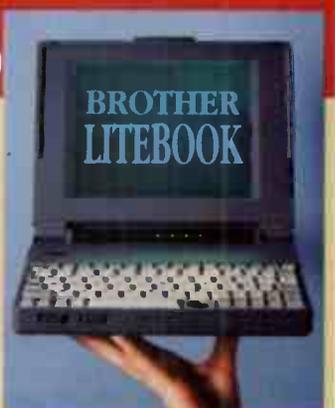
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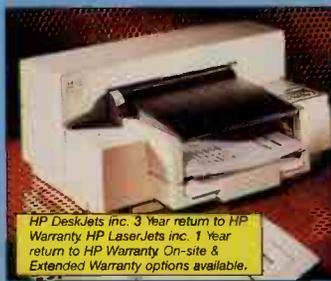


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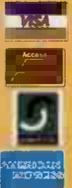
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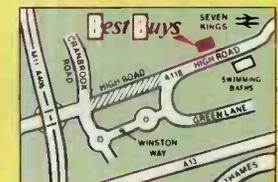
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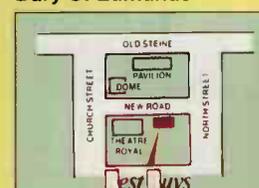
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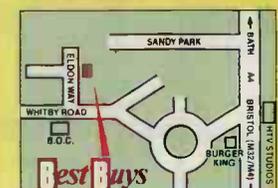
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The same model was praised by *PC Magazine* (November 1994) for its "very good all-round performance, high-spec components and good build quality." A review in *Personal Computer World* the same month found that, of 25 machines tested, the Winputer DX2-66 gave the fastest Windows performance.

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Choice of desktop or mini-tower case

Price £1,120



Introline 486SX-33W

Intel 80486SX processor
33MHz clock speed
Industry Standard Architecture/VESA local bus
AMI BIOS
4Mb RAM expandable to 128Mb
128K cache memory expandable to 256K
3.5" 1.44Mb floppy disk drive
260Mb hard disk drive, 12ms
IDE hard disk drive interface
2 serial ports, 1 parallel port
5 16-bit slots (3 free)
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Adaptec 2940 SCSI controller
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MS-DOS 6.22, Windows 3.1

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Mitac 486 DXII/66 Price Breaker

£799



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- 4MB RAM expandable to 64MB
- 540 MB HDD
- 3.5" 1.44MB floppy disk drive
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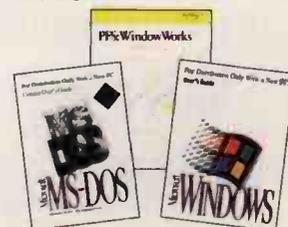


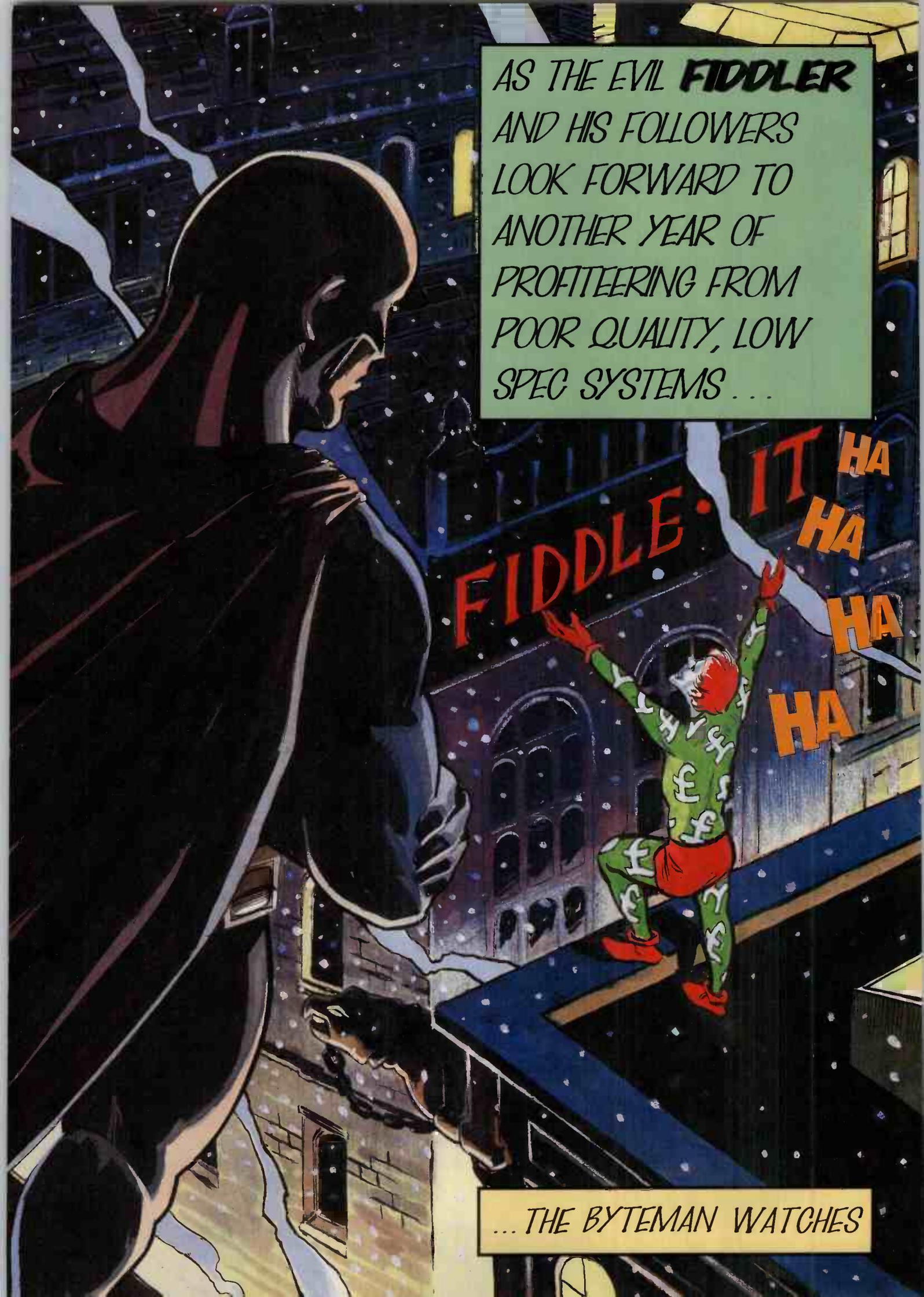
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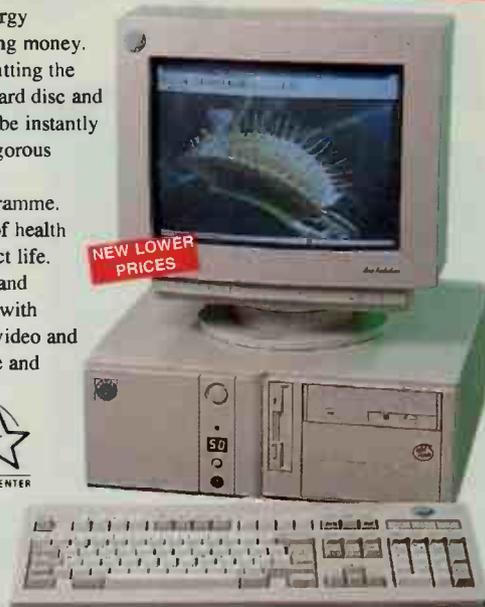
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- 3 Second quick Scan
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- 28 Page memory
- Modular paper cassette units
- Snap-in memory Cards, 60 or 120 pages
- All-in-one cartridge for maximum ease of use
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It's a convenience copier

The UF 755 can be used as a copier...

- Up to 99 copies of one original
- 50 Page automatic document feeder
- Documents are printed at 5PPM
- High quality laser printing (400 x 400dpi)
- All in one laser cartridge and low cost per copy

It's a Lan/Fax

With the PCLAN fax interface option the UF755 can be used directly on Local Area Networks including Novell, Banyon Vines or Windows for Work groups. You can send, receive and view faxes without ever having to leave your workstation...

- No need to print a hard copy
- No need to walk to the fax machine and wait
- Broadcasting is quick and easy
- Incoming fax documents can be shared with any network user
- Fax machines can still be used as a standalone fax machine

It's a Printer

The UF 755 has the ability to be used as a Windows compatible plain paper laser printer (400 x 400dpi)

- Back up Windows compatible network laser printer
- No need to purchase additional laser printer
- Not confined to one standard font when printing

It's a Scanner

The UF 755 can also function as a stand alone or network scanner (200 x 400dpi) giving you the ability to scan documents into the UF 755 for immediate viewing, editing and re-routing through the network...

- Store scanned documents in PCX, BMPorTIFF formats
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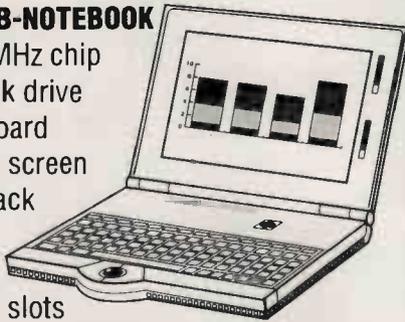
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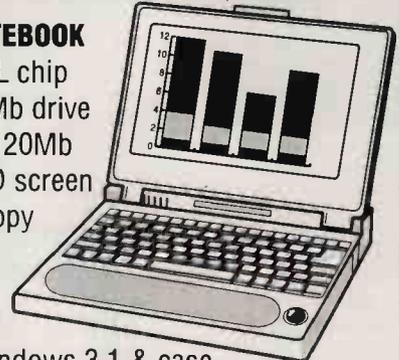
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- Spare NiMH Battery .£35
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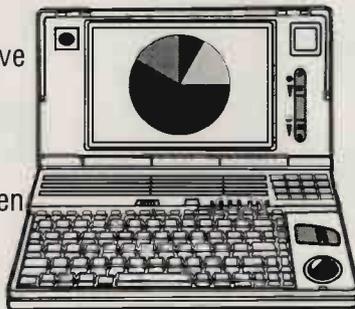
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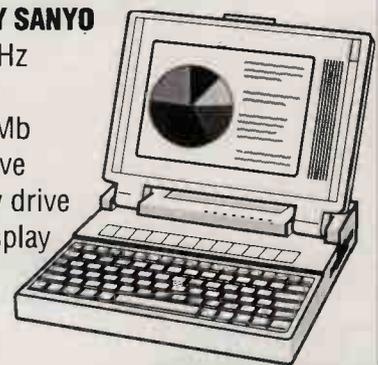
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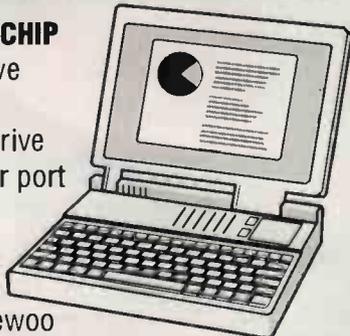
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- Supplied unbadged in plain packaging
- MS-DOS 5 and SuperStor
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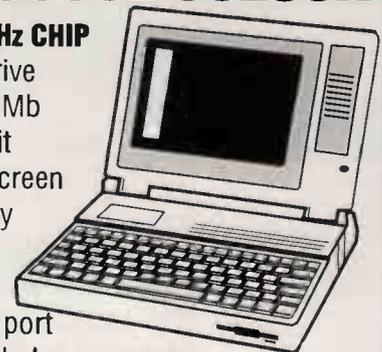
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- SPORTSTER 14.4 + Fax Int** £126
- SPORTSTER 14.4 Mac & Fax** £139

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Quite simply, the faster you send your data or fax, the less time you spend on-line with the result that you save on telephone bills! 14,400 bps modems with the latest compression techniques are up to 15 times faster than similarly priced 2400 bps modems.



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Sportster 2400	●																		
Sportster 14.4	●																		
Courier V32 Terbo	●																		
Courier V.Fast	●																		
WorldPort 14.4	●																		
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LX300	£88
LX1050	£172
FX870	£221
FX1170	£279



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LC24-300 Colour	£179

No of * = No of years On-Site Maint.

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1.8 M Bi-Centronics Cable	£4
3 M Printer Cable	£6
5 M Printer Cable	£10
10 M Printer Cable	£15

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3 Metre M-M	£8
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2 Way Manual switch Box	£17

All Cables are fully shielded

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CANON	
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BJ10SX Sheet Feeder	£42
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BJ200	£184
BJ230	£245



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BJ300	* £309
BJ330	* £369
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DeskJet 320 Cut Sheet Feeder	£49
DeskJet 320 Battery Pack	£27
DeskJet 520	£193
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PaintJet XL300 Pscript	£2569
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HP for APPLE MAC	
DeskWriter 320	£169
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Deskwriter 520	£197
Deskwriter 560C	£389

No of * = No of years On-Site Maint.

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HL631	* £poa
HL660	* £poa
HL660	* £poa

CANON	
LBP4i	* £409
LBP8 Mk4	* £907

EPSON	
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EPL5200	* £462
EPL5600	* £594
EPL9000 12ppm A3	* £Call

HEWLETT PACKARD	
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LaserJet 4ML	£734
LaserJet 4P	£593
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LaserJet 4+	£938
LaserJet 4M+ Pscript	£1258
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NEC	
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SuperScript 660i	* £569
SuperScript Color 3000	* £669

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KX-P4430	** £479
KX-P4440	** £708

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PS1660 A3 1200x600 12Mb	£2891
ColourScript 1000	* £7100

STAR	
Wintype 4000	£288

STAR	
Wintype 4000	£288

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Plotters

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DXY1150	A3	£568
DXY1250	A3	£718
DXY1350	A3	£939

HEWLETT PACKARD	
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DesignJet 650C A4-A0	* £4541
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SF505	* £228
SF1505	* £269
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GS1455D 14" 800x600	£144
GS1466DM 14" 1024x768 NI LR	£177
GS1520DM 15" 1024x768 NI LR	£252
GS1725DM 17" 1024x768 NI LR	£490
GS1730DM 17" 1280x1024 NI LR	£536

PHILIPS

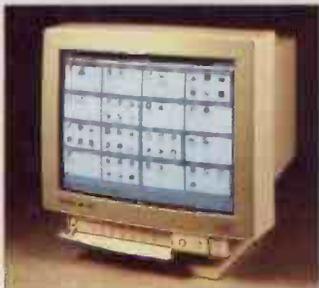
14M 14" VGA Mono LR	£89
14C 14" 1024x768 I LR	£168
14A 14" 1024x768 NI LR	£207
15B 15" 1024x768 NI LR Stereo	£254
17C 17" 1024x768 NI LR	£427
17A 17" 1280x1024 NI LR	£663

SONY

CPD-15SF1 1024x768 NI LR	£287
CPD-1730S 1024x768 NI LR	£598
GDM 17SE1 1280x1024 NI LR	£827
GDM 20SE11280x1024 NI LR	£1419

TAXAN

400 LR 14" 1024x768 I LR	£187
410 LR 14" 1024x768 NI LR	£195
580 LR 15" 1024x768 NI LR	£284



865+LR 17"	£499
880 LR 17"	£525
885 LR 17"	£626
895 LR 17"	£839
1080 LR 20"	£911



Keyboards

Cherry 102 Key Tactile	£42
Mitsumi 102 Key Compact	£15



MS Natural Keyboard £64



Scanners

CANON

Ion PC Camera RC260 Kit	£359
IX-4015 Colour + SCSI Interface	£529

EPSON Colour Scanners



GTX PC PACKAGES

Includes Scanner with all interfaces, cables & software required +

- Adobe Photoshop LE
- Omni Page Direct OCR
- Page Keeper SE Document Manager

GTX6500 Parallel	£497
GTX6500 SCSI	£561
GTX8000 Parallel	£652
GTX8000 SCSI	£711
GTX9000 SCSI	£854

GTI PC PACKAGES

Includes Scanner with all interfaces, cables & software required +

- Adobe Photoshop

GTI6500 SCSI	£702
GTI8000 SCSI	£855
GTI9000 SCSI	£1008

HEWLETT PACKARD

ScanJet 3P PC	£338
ScanJet IIcx	£674

Please specify interface - PC, MCA, or MAC

LOGITECH

ScanMan 32 for Dos + OCR	£56
ScanMan 32 for Wind OCR	£56
ScanMan 256 PC	£78
ScanMan EasyTouch	£86



ScanMan COLOUR £169
PowerPage £299

PLUSTEK

ScanPlus 6000 Colour <i>New!</i>	£295
----------------------------------	------

A4 Sheef fed includes Pict Pub LE & WordScan OCR



Modems

US ROBOTICS



Sportster 28.8+fax	£191
Sportster 14.4+fax	£125
Sportster 14.4+fax Internal	£126
Worldport Dual Standard	£168
Worldport PCMCIA 2496+fax	£129
Worldport PCMCIA Dual Standard	£194
Courier V.Fast external	£262
Courier v.Fast internal	£328

Modem Cable	£9
High Speed Serial Card	£45

APPROVED connection to telecommunication services specified in the instructions subject to the conditions listed in them



Tape Streamers

COLORADO

DJ-20 250Mb Internal	£95
DJ-35 340Mb Internal <i>New!</i>	£115
DJ-65 680Mb Internal <i>New!</i>	£199
KE-10 PC External kit	£69
FC-20 Tape Controller	£58
Trakker 250Mb External	£190
Trakker 340Mb External <i>New!</i>	£219
Trakker 680Mb External <i>New!</i>	£304



Interface Cards

CONTROLLER CARDS

IDE 2Hdd 2Fdd 1Parr 2 Ser 1Game	£14
VL Bus Multi I/O	£29
Promise DC200 IDE Cache	£69
Promise DC4030VLB IDE Cache	£84
Promise DC4030PCI IDE Cache	£109

ADAPTEC SCSI Controllers

1522 Hdd/Fdd	£95
1542C kit ISA Hdd/Fdd	£179
2742kit EISA Hdd/Fdd	£259
2842kit VL Bus Hdd/Fdd	£172
2940kit PCI Hdd/Fdd	£194
T460kit PCMCIA fast SCSI2	£179



Hard Drives

CONNER

CFA420	420Mb	12ms	£119
CFA540	540Mb	12ms	£155

SEAGATE IDE



ST3290A	261Mb	13ms	£105
ST3491A	428Mb	12ms	£119
ST3660A	545Mb	12ms	£165

WESTERN DIGITAL IDE

AC-2420	420Mb	13ms	£144
AC-2540	540Mb	11ms	£177
AC-2700A	730Mb	10ms	£210
AC-3100A	1Gb	10ms	£339

IDE MODE 3 CONTROLLER £19



Graphics Cards

ORCHID



Kelvin EZ VLB 1Mb	£82
Kelvin EZ PCI 1Mb	£82
Kelvin 64 ISA 1Mb	£103
Kelvin 64 ISA 2Mb	£134
Kelvin 64 VESA 1Mb	£103
Kelvin 64 VESA 2Mb	£134
Kelvin 64 PCI 1Mb	£103
Kelvin 64 PCI 2Mb	£129

DIAMOND

Stealth 64 1Mb DRAM VLB	£106
Stealth 64 2Mb DRAM VLB	£159
Stealth 64 1 Mb DRAM PCI	£107
Stealth 64 2 Mb DRAM PCI	£161

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Accounts

- Microsoft Money 3 £25
- Quicken Deluxe Home Pack £46**
- Make more of your finances in 1995!



Quicken Deluxe Business Pack £46

Make more of your business finances in 1995!

- Quicken for Windows 3.0 £29
- Quicken for DOS £29
- Quicken Invoice Win £27
- Quick Books v 2.0 £88

SAGE STERLING for DOS

- Book Keeper £56
- Accountant £160
- Accountant Plus £242
- Financial Controller £319
- Financial Controller LAN £506
- Payroll II £138

STERLING + 2 for Windows

- Book Keeper +2 £79
- Accountant +2 £190
- Accountant Plus +2 £272
- Financial Controller + 2 £354
- Payroll for Windows £138
- MoneyWise for Windows £19
- Instant Accounting for Windows £99

Languages

- Borland Turbo C++ v3 Dos £45
- Borland Turbo C++ v3 Windows £64
- Borland C++ Visual Solutions £64
- Borland Pascal v7 Dos £64
- Borland Pascal for Windows £78
- MS Visual C++ £50
- MS Visual C++ Pro CD for Win NT £253



- MS Visual Basic £78**
- MS Visual Basic Pro £193

WP

- Lotus Ami Pro v3.1 £85
- Locoscript Pro 2 £62
- MS Creative Writer £29
- Word for Windows 6 £221**
- Word for Windows 6 CCP Upg £78**
- WordPerfect 6.1 Dos £210
- WordPerfect 6.1 Dos Ver Upgrade £74
- WordPerfect for Windows 6.1 £210
- WP Windows 6.1 Ver Upgrade £74

Databases

- Lotus Approach r3 £82
- CA Clipper 5.2 £292
- DataEase 5.0 Windows £372
- DataEase 5.0 Dos £372
- DataEase 4.53 LAN 3 User £449
- DataEase Developers Edition £1213
- dBase 5 Windows £228**
- dBase 5 Windows Upg £89**
- dBase 5 Dos £298
- dBase 5 Dos Ver Upg £89
- MS Access v2.0 £221
- MS Access v2.0 CCP Upgrade £78

Graphics

- Adobe Photoshop v3.0 £467
- Aldus Page Maker Classic £52
- Aldus Page Maker 5 £399



- Coral Draw 3 CD only £69**
- Corel Draw 3 CD & 3.5" floppy £82**
- Corel Draw 4 CD Only £164**
- Corel Draw 5 CD Only £289**
- Corel Draw 3 - 5 Upg CD Only £208**
- Corel Draw 4 - 5 Upg CD Only £117**
- Corel Ventura 5 CD only *New!* £224
- Corel Gallery £26
- Corel Flow £49
- GST 1st Press + 1st Design £29
- GST DesignWorks 2 £65
- Designworks 2 & Pressworks 2 £79
- Microsoft Publisher 2 £63
- MS Creative Artist £29
- Quark Express v3.3 £554

Spreadsheet

- Microsoft Excel 5 £219
- Microsoft Excel 5 CCP Upgrade £78
- Lotus 123 for Windows 5 £221
- Quattro Pro 5 Dos £35
- Quattro Pro 6 Windows £155
- SuperCalc for Windows £39**

Utilities

- Borland Sidekick + Dashborad £39
- Dr Solomons Anti Virus Dos £62
- Dr Solomons Anti Virus Windows £72
- Norton Utilities v8 £85
- Stacker 4.0 £62
- Stacker 4.0 Upgrade £38
- S&S Check-It Pro £61
- QuarterDeck Gemm v7 £45

Integrated

- Borland Office 2.0 £295
- Borland Office Upgrade 2.0 £199
- Claris Works + Quicken Windows £59
- Lotus SmartSuite 2.1 £315
- Lotus SmartSuite 2.1 Ver Upg £163
- Lotus SmartSuite 2.1 Comp Upg £243



- Microsoft Office 4.2 £324**
- MS Office 4.2 CCP Upgrade £151
- MS Office v4.2 Trade In £230
- MS Office Professional v 4.3 £423
- MS Office Prof v4.3 Upgrade £227
- MS Office Prof v4.3 TradeIn £267
- MS Works 3 for Dos £83
- MS Works for Windows v3 £82
- MS Works for Windows v3 CD £82
- MS Works for Win 3 Tech Upg £44

Systems

- MS DOS 6.22 Upgrade £37
- Microsoft Windows 3.1 £64
- MS WorkGroups for Windows 3.11 £91
- MS WFWG 3.11 Add On £43
- Novell Personal Netware £44
- OS/2 WARP 3.5" *New!* £64
- OS/2 WARP CD *New!* £58

Edutainment

- MICROSOFT**
- Ancient Lands £32
- Art Gallery £32
- Bookshelf £61
- Cinemania 1995 £32
- Dangerous Creatures £32
- Dinosaurs £32



- Encarta 1995 £58**
- Beethoven £32
- Mozart £32
- Musical Instruments £32

Top 20 Games

- IBM PC CD ROM**
- Under a Killing Moon £35
- Doom 2 £35
- Rebel Assault £35
- Theme Park £28
- Myst for Windows £35
- PGA Tour Golf 486 £32
- OutPost £29
- TFX £29
- Comanche £24
- Chessmaster 4000 Windows £29
- MegaRace £24
- Guest/Dune £29

- IBM PC 3.5" Disk**
- Doom 2 £33
- Theme Park £26
- OutPost £24
- Colonization £26
- X-Wing £26
- Tie Fighter £29
- System Shock £26
- Chessmaster 4000 Windows £24
- MegaRace £24
- Microsoft Flight Simulator 5 £25
- Microsoft Space Simulator £25
- Civilisation £24
- Elder Scrolls the Arena £27
- Lemmings 2 The Tribes £24
- Tornado £27
- Sim City 2000 £27
- Tornado £27
- Alone in the Dark 2 £27
- Secret Monkey Island 2 £27

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Soundcards

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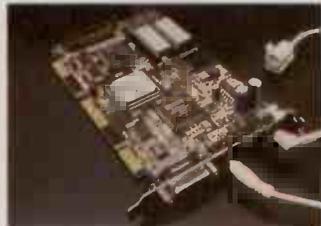
SoundBlaster Sound Cards
Sound Blaster v2 £41
Sound Blaster Pro Value £57



Sound Blaster 16 Value £65
Sound Blaster 16 MCD AdSP £117
Sound Blaster 16 SCSI AdSP £135
Sound Blaster AWE32 £175
Zi-Fi Speakers £25
Zi-Fi Pro Speakers £39

ORCHID

Soundwave E2 £62
Soundwave E2 SCSI £76
GameWave 32 inc Speakers £69



SoundWave 32 £117
SoundWave 32 + SCSI 2 £139



Mice

LOGITECH

Pilot Serial Mouse £17
Mouseman Serial (Rht Hand) £33
Mouseman Cordles £49
Trackman II £43
Trackman Portable £35

MICROSOFT

Mouse 2 Serial & PS/2 Intellipoint £35
Home Mouse £29



Joysticks

CH

Flight Stick £27
Flight Stick Pro £49
Virtual Pilot Yoke £63

Multi I/O with Game Port £14



CD Drives

BLUEPOINT

ICD300 Double Speed IDE £79

CREATIVE LABS

563 MultiMedia Upgrade £92
Includes Grolier Ency + PhotoStyler

NEC

2Xi £123
3Xi £219



3Xp £248

3Xe £306

4Xi *New!* £262

4Xe *New!* £373

4XPro £505

NEC Interfaces

AT Bus SCSI £43

MCA Bus SCSI £79

Parallel to SCSI £95

PANASONIC Multi-SessionCD

CR562 Bare Drive £89
Interface Kit inc Cables £8

TOSHIBA

XM5201B Bare Internal Drive £152



XM3501B Int Quad speed £264

PIONEER



DRU - 104X Quad Speed Bare £179
DRM-602X 6CD Double Speed £487



CD Kits

CREATIVE LABS

Sound Blaster 16 Cracker Pack £169
16 Bit Stereo Sound Card
Panasonic Dual Speed CD Rom
Aldus PhotoStyler SE
Grolier Encyclopaedia
Speakers

Discovery CD16 £224

16 Bit Stereo Sound Card
Panasonic Dual Speed CD Rom
Aldus PhotoStyler SE
Grolier Encyclopaedia
3D Dinosaur, Kid Pics, Scooters Castle
Conspiracy, Syndicate
Speakers & Microphone

Digital Edge £399

16 Bit Stereo Sound Card
NEC SCSI Triple Speed CD Rom
Aldus PhotoStyler SE
Grolier Encyclopedia
Altimira Composer, Digital Morph
Asymetrix Presentations, Gallery
Conspiracy, Syndicate
Rebel Assault, Speed
Speakers & Microphone

Sound Blaster MultiMedia Office £412



16 Bit Stereo AdSP Sound Card
Panasonic 563 Dual Speed CD Rom
Microsoft Office Pro 4.3 CD
Microsoft Encarta CD Beat
Headphones & Microphone



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Video Spigot £149

ORCHID

Videola £247

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Drives Plus...

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Controller cards

DTC3280	Kit	16bit	£99
Adaptec 1510		16bit	£59
Adaptec 1515	Kit	16bit	£69
Adaptec 1542	Kit	16bit	£175
Adaptec 1542+	Kit	16bit	£215
Adaptec 2842VL	Kit	VESA	£199
Adaptec 1640	Kit	MCA	£225
Adaptec 2742	Kit	EISA	£275
Adaptec 2940	Kit	PCI	£225
SP360VL		VESA	£129
SP382VL	128k buffer	VESA	£179
SP296	Cache	EISA	£279
MCS700DNK	PS/2	MCA	£69



SMC

The SCSI interface is necessary for very large drives or certain multi-user operating systems. SCSI is ideal for controlling multiple devices such as hard drives, CD-ROMS, tape drives and optical drives from one controller card as you can mix up to seven different drives from various manufacturers. Please note: Active terminators are recommended for SCSI-2 and Wide SCSI devices and essential for Fast SCSI devices.

Terminators

External		
Active		£25
Passive		£10

Hard disk drives

Corel software

Version 2	£67
Network manager	£285

Cables

Single drive internal	£8
Dual drive internal	£10
Triple drive internal	£15
Centronic 50 - Centronic 50	£18
Centronic 50 - 25 pin	£18
Centronic 50 - Micro D 50	£35
Micro D 50 - Micro D 50	£38

Floptical Drives

Iomega Drive	£195
Kit	£259
Parallel port kit	£399

These 21Mb optical-based drives are ideal for storing large graphics or database files for quick and easy access. Having both read and write compatibility with standard 1.44Mb floppy disks they can replace your existing floppy drive.

Floppy Disk Drives

3.5" 1.44Mb	£29
5.25" 1.2Mb	£39
3.5" / 5.25" Dual	£89
Single drive cable 5.25"	£8
Dual drive cable 3.5"/5.25"	£10
Bracket and fascia - fits 3.5" drive into 5.25" bay	£8



External Drive Boxes

- Prices from £85 - Phone us for advice and pricing
- For 1 to 4 SCSI devices
- Choice of open or closed front panels
- Suitable for:
 - Hard drives
 - Tape drives
 - Optical drives
 - CD ROM
 - DAT drives
 - Floptical drives
 - Syquest drives
- Available with Centronics 50 way, Wide SCSI and Micro D interfaces
- 3 year warranty
- UL / TUV / CSA approved
- Free fitting of any SCSI device when purchased at the same time

Size	Manufacturer	Model	Access time	Cache / buffer	Fast SCSI-2	Warranty	Price
264Mb	Fujitsu	M2681S	14ms	256k	•	2yr	£117
270Mb	Quantum	LPS270S	12ms		•	2yr	£117
270Mb	Quantum	MV270S					£129
290Mb	Maxtor	7290S	16ms	64k		1yr	£165
345Mb	Seagate	ST3390N	12ms	256k	•	3yr	£219
353Mb	Fujitsu	M2682S	14ms	256k	•	2yr	£127
365Mb	Quantum	LT365S	12ms	128k	•	2yr	£139
528Mb	Seagate	ST5660N	12ms	256k	•	3yr	£226
532Mb	Fujitsu	M2684S	14ms	256k	•	2yr	£178
540Mb	Conner	CFA540S	12ms	256k	•	1yr	£235
540Mb	Quantum	LT540S	11ms	128k	•	2yr	£189
540Mb	Quantum	MV540S					£183
730Mb	Quantum	LT730S	11ms	128k	•	2yr	£249
1.0Gb	Conner	CFP1060	9ms	512k	•	1yr	£425
1.0Gb	Digital	DSP3107	11ms	512k	•	5yr	£419
1.0Gb	Fujitsu	M2694ESA	10ms	256k	•	5yr	£385
1.0Gb	HP	C3323S	11ms	512k	•	5yr	£399
1.0Gb	IBM	Pegasus	9ms		•	5yr	£385
1.0Gb	Micropolis	MIC4110	9ms	512k	•	5yr	£425
1.0Gb	Quantum	LPS1080S	10ms	512k	•	2yr	£425
1.0Gb	Seagate	ST31200N	9ms	256k	•	3yr	£385
1.6Gb	Digital	DSP3160	12ms				£589
1.6Gb	Micropolis	MIC2217	10ms	512k	•	5yr	£595
2.0Gb	Fujitsu	M2903S	11ms	512k	•	5yr	£825
2.0Gb	Micropolis	MIC4220	9ms	512k	•	5yr	£945
2.0Gb	Fujitsu	M2654SA	12ms			5yr	£1085
2.0Gb	IBM	Alleycat	9ms	512k	•	5yr	£759
2.1Gb	Digital	DSP3210					£849
2.1Gb	HP	C2490S	9ms	256k		5yr	£785
2.1Gb	Quantum	LPS2100	10ms	512k		2yr	£745
2.1Gb	Seagate	ST12400N					£745
2.1Gb	Seagate	ST32430N	9ms	256k	•	3yr	£775
2.1Gb	Seagate	ST32550N	8ms				£799
2.1Gb	Seagate	ST32550N	8ms	1Mb	•	3yr	£859
3.0Gb	Digital	DSP5300	11ms				£989
3.0Gb	Fujitsu	M2909S	11ms	512k	•	5yr	£1085
3.0Gb	Micropolis	MIC1936	13ms	256k	•	5yr	£1025
4.0Gb	Digital	DSP5400	11ms				£1695
4.0Gb	IBM	Wildcat	9ms	512k	•	5yr	£1575
4.0Gb	Seagate	ST15150N					£1745
4.35Gb	Micropolis	MIC3243	9ms	512k	•	5yr	£1545
9.0Gb	Seagate	ST410800N	9ms	1Mb	•	5yr	£2575

Audio / Video drives

These high-performance drives are designed to give higher data transfer rates for multimedia applications. Ideal for animations, audio and MIDI recordings, digital video editing etc.

1.0Gb	Micropolis	MIC2210AV	10ms	512k	•	5yr	£499
1.6Gb	Micropolis	MIC2217AV	10ms	512k	•	5yr	£695
3.0Gb	Micropolis	MIC1936AV	13ms	512k	•	5yr	£1465

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E&OE: Prices and specifications subject to change without notice. Please ask our advice before ordering to avoid any foreseeable incompatibility problems.

Your 1st choice for hard drives



WARNING!

There are an increasing number of direct suppliers of hard disk drives who lack the financial resources and the commitment to carry stocks of the products they advertise.

All hard disk drives carry a unique serial number. If you wish to establish whether your chosen supplier has the stock on the shelf, ask for the serial number of the drive that will be despatched to you. This procedure will take only a minute for a well organised company.

Ask yourself this: If a supplier is unable or unwilling to even carry stocks of the products they sell, what kind of future support can you expect?



SMC configuration guide with every hard drive

3.5" hard disk drives

Size	Manufacturer	Model	Access time	Cache / buffer	E-IDE F-ATA	Warranty	Price
210Mb	Conner	CFS210A	13ms	32k		1yr	£101
210Mb	Western Digital	AC1210A	12ms	64k	•	3yr	£105
214Mb	Seagate	ST3250A	14ms	120k	•	3yr	£101
245Mb	Maxtor	7273A	13ms	64k	•	1yr	£119
261Mb	Seagate	ST3290A	16ms	64k	•	3yr	£105
264Mb	Fujitsu	M2681T	14ms	256k	•	2yr	£105
270Mb	Western Digital	AC1270A	12ms	64k	•	3yr	£115
270Mb	Quantum	LPS270AT	16ms	128k	•	2yr	£115
270Mb	Quantum	MV270AT					£122
320Mb	Maxtor	7345A	15ms	64k	•	1yr	£129
340Mb	Western Digital	AC2340A	12ms	64k	•	3yr	£129
352Mb	Fujitsu	M2682T	14ms	256k	•	2yr	£122
365Mb	Quantum	LT365AT	11ms	128k	•	2yr	£129
420Mb	Conner	CFS420A	13ms	32k	•	1yr	£129
425Mb	Western Digital	AC2420A	12ms	64k	•	3yr	£135
428Mb	Seagate	ST3491A	15ms	120k	•	3yr	£129
532Mb	Fujitsu	M2684T	14ms	256k	•	2yr	£155
540Mb	Conner	CFA540A	15ms	256k	•	1yr	£159
540Mb	Western Digital	AC2540A	12ms	128k	•	3yr	£159
540Mb	Quantum	LT540AT	10ms	128k	•	2yr	£159
540Mb	Quantum	MV540AT					£155
545Mb	Seagate	ST3660A	14ms	120k	•	3yr	£155
540Mb	Maxtor	7540A	12ms	256k	•	1yr	£169
725Mb	Seagate	ST3780A	12ms	256k	•	3yr	£233
730Mb	Quantum	LT730AT					£208
730Mb	Western Digital	AC2700A	10ms	128k	•	3yr	£205
850Mb	Conner	CFA850A	12ms	256k	•	1yr	£279
1.0Gb	Conner	CFA1080A	12ms	256k	•	1yr	£425
1.0Gb	Micropolis	MIC4110A	9ms	512k	•	5yr	£425
1.0Gb	Seagate	ST31220A	12ms	256k	•	3yr	£385
1.0Gb	Western Digital	AC31000A	10ms	128k	•	3yr	£327
1.6Gb	Micropolis	MIC2217A	10ms	512k	•	5yr	£595

2.5" hard disk drives

127Mb	Seagate	ST9150AG	16ms	32k		3yr	£159
135Mb	Toshiba	MK1522FC	15ms			1yr	£182
172Mb	Seagate	ST9190AG	16ms	128k		3yr	£182
209Mb	Seagate	ST9240AG	16ms	64k		3yr	£209
262Mb	Seagate	ST9300AG	16ms	120k		3yr	£279
262Mb	Toshiba	MK1724FC	13ms			1yr	£215
340Mb	Toshiba	MK1824FC	12ms			1yr	£255
532Mb	Toshiba	MK2428FC	12ms			1yr	£399



Speed up data transfer rates by up to 80%
£12

When purchased with a hard drive
Available separately £17

IDE

Break your BIOS limitations



ADP60

The remarkable ADP60 card contains its own intelligent BIOS which allows IDE drives up to 512Mb to run on any PC - no more configuration worries!

If your PC does not have a 'user definable' option for hard disk drives then you need the ADP60. Available with or without floppy control, the card will fit into any AT ISA bus on 286, 386 or 486-based systems.

ADP60 HDD £35
ADP60F HDD/FDD £39

Disk Manager



Ideal for 'branded' PC systems - such as those by Compaq, IBM, Amstrad etc - and other manufacturers whose BIOS does not allow for large hard disk drives.

This easy to install software will initialise, partition and prepare virtually any hard disk drive. Disk Manager eliminates restrictions set by DOS and CMOS, allowing you to extend partitions beyond the parameters set by DOS and giving you complete storage access without the need for additional drivers.

DOS version

£29

When purchased with a hard drive
Other versions available are:
DOS £49
Novell £249
Macintosh £39

IDE Upgrade Kits

Each kit contains all you need to upgrade to an IDE drive including:- Multi I/O controller, cable and 3.5" to 5.25" adaptor brackets.

ISA £30
VESA £45

Cables

Single drive £8
Dual drive £10
Note: Dual drive cables are 14" long with a space of 3.5" between connectors. Please check for compatibility with your system before ordering. We can custom make cables to order - please call with measurements.

Controller Cards

C&C ISA Multi I/O £15
C&C VESA Multi I/O £29
Seagate ST08A ISA £25
Promise DC-200 ISA cache £89
Promise DC-4030 VESA cache £95

Corporate and Government accounts welcome

30-day accounts opened the same day
Subject to status

Get it right first time...

- ✓ Low, low prices
- ✓ Credit cards not debited until despatch
- ✓ Massive stocks
- ✓ Rapid despatch

Talk to us and we'll show you real service.

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Drives Plus...

DAT DRIVES



Hewlett Packard

SMC INFO GUIDE

Digital Audio Tape (DAT) offers fast, high quality, secure backups to those with large data archiving needs. DAT drives are very compact making them ideal for sharing between several computers and their capacity will suit almost any network.

C1553A Autoloader £1575

- Holds up to 6 tapes
- Up to 48Gb data storage
- Cartridge swap in under 15 seconds
- File access in average 90 seconds including tape swaps
- 10 character status display on front panel

Note: Termination not supplied with internal version. See SCSI hard disk drive page.

For external versions of any HP DAT drive add £100

HP external kits

These kits are direct JetStor equivalents and are supplied complete with Adaptec controller, backup software and all necessary cables and manuals.

HP2000-1	2.0Gb 1 user	£999
HP2000-25	2.0Gb 25 user	£1199
HP5000-25	4.0Gb 25 user	£1339
HP5000-UL	4.0Gb unlimited	£1679
HP6000-25	8.0Gb 25 user	£1559
HP6000-UL	8.0Gb unlimited	£1899

35470A £549

- 2Gb data storage capacity
- 183 Kb/s (max) transfer rate (11Mb per minute)
- Fastsearch feature finds any file in an average 30 seconds
- Supports both 60m and 90m cartridges

35480A £635

- Up to 8Gb data storage capacity
- Up to 732Kb/s (max) transfer rate (44Mb per minute)
- Can store 1Gb in under 30 mins
- Fastsearch feature finds any file in an average 30 seconds

C1533A £759

- Up to 16Gb data storage capacity
- 1.5Mb/s (max) sustained transfer rate (90Mb per minute)
- 200,000 MTBF rating
- Files accessed in an average 40 seconds
- Fully compatible with all DDS, DDS-2 and DDS-DC format drives
- Can use 120m, 90m and 60m cartridges

Note: Termination not supplied with internal version. See page 4.

Jetstor drives

JS2000	2.0Gb	£685
JS5000	4.0Gb	£725
JS6000	8-16Gb	£925

External options for above add: £100

Jetstor external kits		
JS2000XK	ARC Solo s/w	£885
JS5000XKD	ARC Serve DOS	£1645
JS5000XKW	ARC Serve Win	£1845
JS6000XKW	ARC Serve Win	£2325

WangDAT 3100

- 2Gb capacity
- Built-in self-activated head cleaner
- 30 second file search time

3200 £679

- Up to 8Gb capacity with compression
- Up to 732Kb/s data transfer rate
- Built-in self-activated head cleaner

External versions add £100



OPTICAL DRIVES

SMC INFO GUIDE

The development of re-writeable technology has provided us with a high-capacity, reusable media which can be used time and time again with no deterioration in the media itself. Ideal for large data archives requiring fast access and updating.

Hewlett Packard

C1716T	1.3Gb	Int	£1625	• Up to 1.6Mb/s reads and 0.8Mb/s writes
C2550A	1.3Gb	Ext kit	£1825	• 23.5ms average access time
OM 1300	1.3Gb	Media	£95	• Reads and writes to 630Mb and 1.3Gb cartridges

3 year on-site warranty from Hewlett Packard available for these drives for just £290

- Standard SCSI interface
- Read and write buffering (read aheads, write re-ordering and immediate reporting)
- 80,000 (MTBF)
- External kit includes drive, HP case, terminator, 1.3Gb media cartridge and DOS/Mac software

Fujitsu

M2511A

- Low profile
- Fixed optics
- 30ms access time
- Embedded SCSI-2 controller
- ISO-standard format
- Up to 4Mb/s transfer rate

M2512A

- Up to 2.1Mb/s transfer rate
- Reads and writes 128Mb and 230Mb disks
- 237Kb buffer memory
- ISO-standard format
- 3,600 RPM rotational speed

M2511A	128Mb	Int	£425	M2512A	230Mb	Int	£540
M2511AX	128Mb	Ext	£525	M2512AX	230Mb	Ext	£640
LMD300	128Mb	Media	£22	OM230	230Mb	Media	£35

PANASONIC



- Up to 1.56Mb/s sustained transfer rate
- 45ms access time
- Compatible with DOS, Windows, Macintosh, OS/2 and Unix
- 80,000 hours MTBF (mean time before failure)
- Can use both standard WORM and phase change cartridges
- Automatic lens cleaning mechanism
- 512Kb memory buffer

LF7304	1.5Gb	Int	£1489
LF7300	1.5Gb	Ext	£1549
LMR1500A	1.5Gb	Media	£99

Tapes

DC2060*	60/120Mb	£10
DC2120*	120/250Mb	£10
DC48M - QIC80	170/340Mb	£17
DC68M - QIC3010	350/700Mb	£25
DC6150	150Mb	£14
DC6250	250Mb	£16
DC6525	525Mb	£18
DC9100	1.0Gb	£24
PT25 media	1.2Gb	£28
PT50 media	2.0Gb	£38
DAT 4mm	90metre	£12
DAT 4mm	120metre	£16

*Available pre-formatted to QIC standard. Please add £4.

Backup software

CHEYENNE

ARCSolo	DOS	Win
Single user	£88	£109
ARCserve	5 user	£185 £195
	10 user	£345 £395
	25 user	£525 £615
	50 user	£640 £740
	100 user	£765 £865
	250 user	£845 £1065

ARCserve upgrades available. Please call for details.

Fax order line

01753524443

Switch / Access / Visa / AmEx Cards Welcome



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Your **1st** choice for data storage

FIRE FLOOD THEFT POWER FAILURE

Research has shown that companies that suffer total data loss - for whatever reason - generally collapse within six months. Your data is VITAL to your business and regular, proper backup procedures are the ONLY guaranteed method of protecting

your data and your business. We have tape systems from just £93 for 250Mb together with DAT, optical and removable systems to suit all needs, what are you waiting for? Call us today - before it's too late!

TAPE DRIVES



Colorado Jumbo

DJ20 120/240Mb
DJ35 170/340Mb
DJ25 350/700Mb
External versions

- All drives offer up to 6:1 compression with an average of 2:1
- Uses QIC format compatible tapes
- Internal versions can be attached to floppy controller - even with two floppy drives installed
- Dedicated controllers are available for top performance

Jumbo accessories

AB 11	External port	£25
FC-20	8bit controller	£49
TC-15	16bit controller	£115
SK7	Windows software	£45
SU53J	Unix/Xenix software	£79
SK1	Syτος Plus for OS/2	£85

Wangtek

£93	5150PK kit	£325
£115	5525ES	£389
£199	51000ES	£559
add £75	External versions	add £100

Wangtek's 5000 Series tape drives offer you leading price/performance in advanced quarter-inch tape drives. With capacities from 150 megabytes to 1 gigabyte, 5000 Series drives are an ideal match to a wide range of system data backup requirements.

- Uses QIC format compatible tapes
- Quick-File-Access (QFA) feature for fast data retrieval
- Compatible with most popular data backup software packages
- PK kits are supplied with controller card, software, data cartridge and cable

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Drives Plus...

REMOVABLE DRIVES



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Unlimited hard disc drive space!

With one of our Syquest system installed, you have an ever-expanding hard disc drive. Fast-access, low-cost cartridges mean you can build a library of applications that can be used and changed in seconds without turning your system off.

Suitable for PC and Macintosh systems.

Syquest 3.5"

105Mb IDE drive	£145
SCSI drive	£185
Parallel port	£389
Media	£42
270Mb IDE drive	£292
SCSI drive	£306
Parallel port	£473
Media	£52

Syquest 5.25"

88Mb SCSI drive	£199
200Mb SCSI drive	£298
Media 44Mb	£47
88Mb	£65
200Mb	£73

- 14.5ms access time
- 32k intelligent look-ahead buffer
- Up to 4Mb/s transfer rate
- Air filtration system provides Winchester Class environment

- 88Mb drive unit can read and write to 44Mb cartridges
- 20ms access time
- Less than 1 non-recoverable error in 10¹² bits read
- Over 4 million cartridges sold worldwide
- 32k intelligent look-ahead buffer

For external drives - any size - add: **£100**

SPECIAL OFFER

Buy 5 or more media cartridges and get **£2 off** each

Fax order line

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PARALLEL PORT DRIVES

SMC INFO GUIDE



These compact, portable units connect to any standard parallel port making them ideal for notebooks and laptops with no or little expansion capabilities. The easy to install software can be loaded on to several systems allowing units to be transferred between systems. All these devices have a pass-through port to connect parallel printers.



Colorado Tracker

250Mb tape drive	£188
350Mb tape drive	£218
700Mb tape drive	£305
Tracker carry case	£39

- Conforms to QIC standards
- Supplied with DOS and Windows backup software
- Up to 8Mb/min backup speed



Backpack CD ROM drive

Dual speed	£269
Single speed	£219

- Up to 300kb/s transfer rate
- 250ms access time
- Dust proof mechanism
- Built-in audio circuit with headphone and line out sockets
- Motorised tray loading
- Photo CD compatible
- Weighs only 4lb



Backpack tape drive

240Mb	£225
-------	------

- Conforms to QIC standards
- Weighs only 5lb
- Macro recording for unattended backup
- Novell Netware compatible



Backpack floppy drives

3.5" 1.44Mb	£125
3.5" 2.88Mb	£175
5.25" 1.2Mb	£125

- 1.44Mb model also accepts 720k disks
- 2.88Mb model also accepts 720k and 1.44Mb disks
- 1.2Mb model also accepts 360k disks
- Background formatting software included
- 32k data buffer



Backpack hard disk drives

210Mb	£282
420Mb	£332

- 14ms access time
- Security password option
- Automatic support for enhanced parallel ports (EPP)
- Up to 600kb/s transfer rate
- Switching power supply reduces heat and power consumption
- Weighs less than 3lbs
- Chains to any other Backpack product

Notes:
360Kb disks that have been written by a 1.2Mb drive may not be readable on a 360Kb drive.
2.88Mb format requires special extra density diskettes

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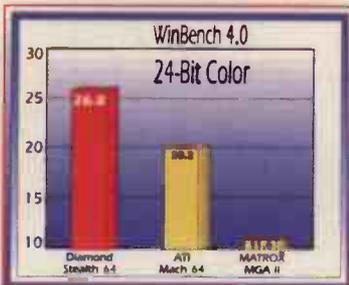
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Your **1st** choice for components

GRAPHIC CARDS



WINDOWS



Diamond Stealth 64

- VESA & PCI versions
- 65k colours at 1280x1024 (4Mb only)
- Refresh rates up to 120Hz
- Windows Virtual Desktop

DRAM	1Mb	£99	VRAM	2Mb	£239
	2Mb	£139		4Mb	£355

Orchid Kelvin 64

1Mb	£108
2Mb	£138

- VESA & PCI versions
- Up to 1280x1024 resolution
- Upgradeable from 1Mb to 2Mb DRAM
- 16.7 million colours at 800x600 (2Mb DRAM required)
- Green PC (energy saving) compliant

TMC P426AV

1Mb	£69
------------	------------

- Resolutions up to 1280x1024 with 256 colours
- 16.7 million colours at 640x480 resolution
- Standard VESA 26-pin feature connector for future add on cards
- Easy-to-use utility for changing Windows resolutions

Budget ISA options

These ISA cards are ideal for network workstations, DOS applications and non-windows users.

C&C 1024	1Mb	£55
C&C 512	512k	£39
C&C 256	256k	£29

Diamond Speedstar 64

1Mb	£95
2Mb	£199

- ISA, VESA & PCI versions
- 65k colours at 1280x1024 (4Mb only)
- Refresh rates up to 120Hz
- Windows Virtual Desktop

MONITORS



AOC

MM413S	14"	£95
CM335	14"	£169
CM346	14"	£195
CM536FST	15"	£285
CM736FST	17"	£499

Goldstar

GS1455DM	14"	£159
GS1462DM	14"	£179
GS1466DM	14"	£189
GS1520DM	15"	£269
GS1725DM	17"	£525



Sony

with Trinitron tubes

CPD1420S	14"	£279
CPD1430	14"	£412
CPD1730	17"	£699
GDM17SE1	17"	£889
GDM2036	20"	£1545
GDM2038	20"	£1675

Philips

PHL14C	14"	£205
PHL14A*	14"	£269
PHL15B	15"	£339
PHL17C	17"	£489
PHL17T*	17"	£765
PHL20C	20"	£945
PHL20T*	20"	£1449
PHL21B	21"	£1555

* = Trinitron tube



R03R

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Drives Plus...

*See below

SOUND CARDS



SoundBlaster AWE-32 £169

- Creative Labs' latest sound card
- Built-in AdSP and EMU 8000 sound processors
- 512K RAM - upgradable to 28Mb
- 32-voice wave table built-in
- CD ROM interfaces for Panasonic, Mitsumi and Sony drives

SoundBlaster v:2 £33

- 'De facto' standard for hundreds of programs
- The best selling sound card in the world
- Ideal low cost games or business tool
- 2 FREE games



SoundBlaster Pro £52

- Stereo recording and playback
- 20-voice FM synthesizer
- CD ROM interface
- Programmable mixer
- Superb value multimedia card
- 2 FREE games



SoundBlaster Office £389

The ultimate upgrade for the home or small business office. We just don't have the space to list all the features. Please call for more information.



- SoundBlaster 16 Value pack £65**
- MultiCD £89**
- SCSI £112**
- Multi CD/ASP £111**
- SCSI/ASP £134**

- 16-bit stereo recording and playback
- MultiCD version supports: Panasonic, Mitsumi and Sony drives
- SCSI version supports up to seven SCSI-2 devices
- AdSP upgrade sockets on SCSI and MultiCD versions



Orchid SoundWave 32 £129

- Compatible with: SoundBlaster, Adlib, Windows SoundSystem, General MIDI, Roland MT 32
- Built-in Digital Signal Processor
- over 100 digital recordings in wavetable ROM
- SCSI version supports up to seven devices

Sound Producer Pro £71

- Stereo recording and playback
- Speakers supplied
- 20-voice FM music synthesizer
- Built-in 4watt amplifier
- CD ROM interface for Panaonic drives



WaveBlaster £99

- Attaches to SoundBlaster 16 cards (not value)
- EMU wave table synthesis
- General MIDI compatible
- Ideal for music and sound effects

MULTIMEDIA KITS



Digital Edge 3x £365

- (Pictured left)
Contains:
- SoundBlaster 16 SCSI AdSP sound card
 - NEC CDR510 triple speed SCSI CD ROM drive
 - Pro-Digital speakers
 - Hands-free microphone
 - 11 CD ROM titles including Rebel Assault, Grolier and Syndicate
 - Creative software
- For the serious multimedia user.

GameBlaster CD £222

- Contains:
- SoundBlaster 16 sound card
 - Creative CR563 CD ROM drive
 - CT-38 speakers
 - Joystick
 - 6 CD ROM titles including 4-title CD and Rebel Assault
 - Free Games
 - Creative software
- Perfect for the dedicated games player.

CD16 Discovery Int: £222 Ext: £322

- Contains:
- SoundBlaster 16 sound card
 - Creative CR563 CD ROM drive
 - Microphone
 - SBS30 Speakers
 - 9 CD ROM titles including Grolier
 - Creative software
- Ideal general use internal multimedia kit with a superb mix of educational and entertainment CD ROM titles.

MIDI



MIDI Blaster £99

- MTC32 MIDI compatible
- Can be used as a stand-alone device on PC or MIDI
- Plays up to 20 notes simultaneously
- Includes 9v adaptor, cable and software

Cables

- Connect your sound card to any MIDI keyboard or device. Our kit contains cables and software for recording and playback.
- SoundBlaster MIDI cable set £16**
 - SoundBlaster MIDI kit £49**

Gravis Ultrasound £99

- Stereo recording and playback
- 256k RAM upgradeable to 1Mb
- Real recorded sounds for wave table synthesis
- CD ROM interfaces for Sony, Mitsumi and LMSI drives



SPEAKERS

Creative Labs Pro Digital £29

- 4 watt
- Mains powered
- Magnetically shielded to protect monitors
- Suitable for all popular audio cards

Fax order line 01753 524443



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Your 1st choice for multimedia

CD ROM DRIVES



Toshiba

XM3401B Ext drive **£302**
XM3401B Ext kit **£359**

- 330kb/s transfer rate
- 200ms access time
- 256k buffer
- High 50,000 hours MTBF
- Sealed enclosure

XM3501B Internal **£249**
XM3501S External **£349**

- Up to 684Kb/s sustained data transfer rate
- 150ms access time
- 256Kb data buffer
- Sealed enclosure
- Front panel headphone socket and audio volume control
- Fully compatible with MPC2, Photo CD, CD ROM XA, CD-I etc



NEC Multispin 4x

4xi Internal **£425**
4xe External **£525**

- Four times normal spin speed
- 600Kb/s transfer rate
- 180ms access time
- Full function audio controls
- LCD display
- Auto lens cleaning



NEC Multispin 3x

3xi Internal **£215**
3xe External **£309**
3xp Portable **£245**

- Three times normal spin speed
- 450Kb/s transfer rate
- 250ms access time
- Full function audio controls
- LCD display
- Auto lens cleaning (not Portable)
- Battery option (Portable only)
- Portable weighs 2.4lbs (1080g) excluding battery



Mitsumi

FX001D **£85**

- Dual speed drive
- Tray loading
- Includes controller, cables and drivers



Panasonic

CR562 **£85**
Controller card **£10**

- 320ms access time
- 300kb/s transfer rate
- 64k buffer memory
- Embedded lens cleaning mechanism
- Headphone socket with volume control

Goldstar

GCD-R400

- 300ms access time
 - 150kb/s transfer rate
 - Multisession Photo CD compatible
 - Complete kit with controller, cables and drivers
 - Ideal for entry-level CD applications and business data access
- Buy this CD ROM drive now and get Kodaks Photo Access software for just £5**

Now only £59



Orchid

CDS-3110 **£99**

- 300kb/s transfer rate
- 350ms access time
- Sleep circuit to maximise laser life and reduce power consumption
- Kit include interface card, cables and drivers

Backpack CD ROM

Dual speed **£269**
Single Speed **£219**

- Connects to any standard parallel port
- Up to 300kb/s transfer rate
- Photo CD compatible
- Weighs only 4lbs



SoundBlaster

Omni CD ROM kit **£119**

- Includes
- CR 563 drive
 - Interface card
 - Free software

CD ROM upgrade kit **£95**

- Includes
- CR 563 drive
 - Free software

VIDEO IMAGING



Orchid

Vidiola **£245**



VideoBlaster

FS200 **£219**
RT300 **£265**

CD ROM SOFTWARE

Special CD ROM bundle prices.

Because of the very low prices of these top-class CD titles, only SMC Customers who choose one of our large range of CD ROM drives may take advantage of this offer at the time of their purchase. Don't pay more for your new CD software, call our sales team today and join the multimedia revolution tomorrow!

Here is a selection of the titles available. Please call for our full list.

- | | |
|-----------------------------|-----|
| Kodak Access Photo CD | £15 |
| Grolier Encyclopaedia | £32 |
| Microsoft Encarta '95 | £52 |
| World Atlas | £15 |
| Solar System | £15 |
| Battlechess MPC | £17 |
| Mavis Beacon Teaches Typing | £20 |
| Clipart Heaven | £18 |
| Animals Encyclopaedia | £27 |
| 7th Guest | £29 |

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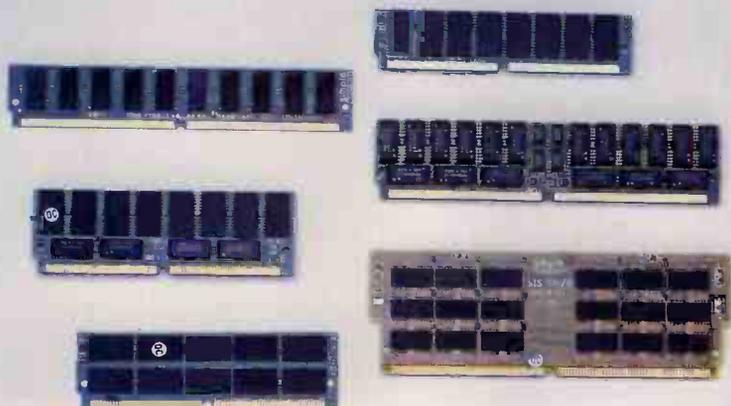
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Drives Plus...

*See below

MEMORY MODULES



IBM

Toshiba

Dell

N33SX, L40SX notebook

2Mb	Module	£99
4Mb	Module	£175
8Mb	Module	£330

PS/2 35SX, 35LX, 40SX

2Mb	Module	£89
4Mb	Module	£159
8Mb	Module	£315

PS/2 50, 50Z, 55SX, 55LS, 60, 65SX

1-16Mb	Board	£165
2-16Mb	Board	£232
4-16Mb	Board	£292
2Mb	Module	£79
4Mb	Module	£130

PS/2 P70 portable

2Mb	Module	£79
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PS/2 P75 portable

2Mb	Module	£85
4Mb	Module	£150

PS/2 90, 95

2Mb	Module	£93
4Mb	Module	£150
8Mb	Module	£290

PS/ ValuePoint 6382, 6384, 6387

2Mb	Module	£93
4Mb	Module	£150
8Mb	Module	£290

PS/1 286, 386, Pro

2Mb	Module	£85
4Mb	Module	£159

PS/1 486

4Mb	Module	£156
16Mb	Module	£596

Thinkpad 700, 720, 750

2Mb	Module	£160
4Mb	Module	£200
8Mb	Module	£376
16Mb	Module	£748

Thinkpad 350, 350C

8Mb	Module	£375
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T1200XE

2Mb	Module	£92
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T1600

2Mb	Module	£95
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T1000LE, T1800, T1850, T2000, T2000SX, T2200SX

4Mb	Card	£175
8Mb	Card	£275

T3100e

2Mb	Kit	£95
-----	-----	-----

T3100SX

2Mb	Module	£85
4Mb	Module	£159

T3200

3Mb	Module	£175
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T3200SX

4Mb	Kit	£170
-----	-----	------

T3200SXC

4Mb	Kit	£168
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T4400, T6400, T6600

4Mb	Module	£169
8Mb	Module	£318
16Mb	Module	£620

T1900, T1950, T4500, T4600, T4700

4Mb	Card	£195
8Mb	Card	£375
16Mb	Card	£755

T5100

2Mb	Module	£99
-----	--------	-----

T5200, T8500

2Mb	Kit	£95
8Mb	Kit	£330

SuperSport 286

1Mb	Module	£62
2Mb	Module	£97
4Mb	Module	£169

SuperSport 286e, SlimSport 286

1Mb	Module	£62
2Mb	Module	£97
4Mb	Module	£169

SuperSport SX

2Mb	Module A	£125
2Mb	Module B	£125

MasterSport 286

1Mb	Module	£75
-----	--------	-----

MasterSport 386SX

2Mb	Module	£94
-----	--------	-----

MasterSport 386SL, SLe, SLC

2Mb	Module	£92
4Mb	2x2Mb Modules	£184

NL20, NL25 notebook

2Mb	Module	£105
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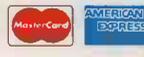
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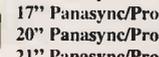
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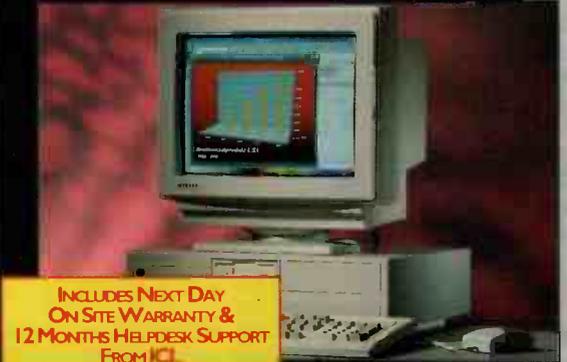
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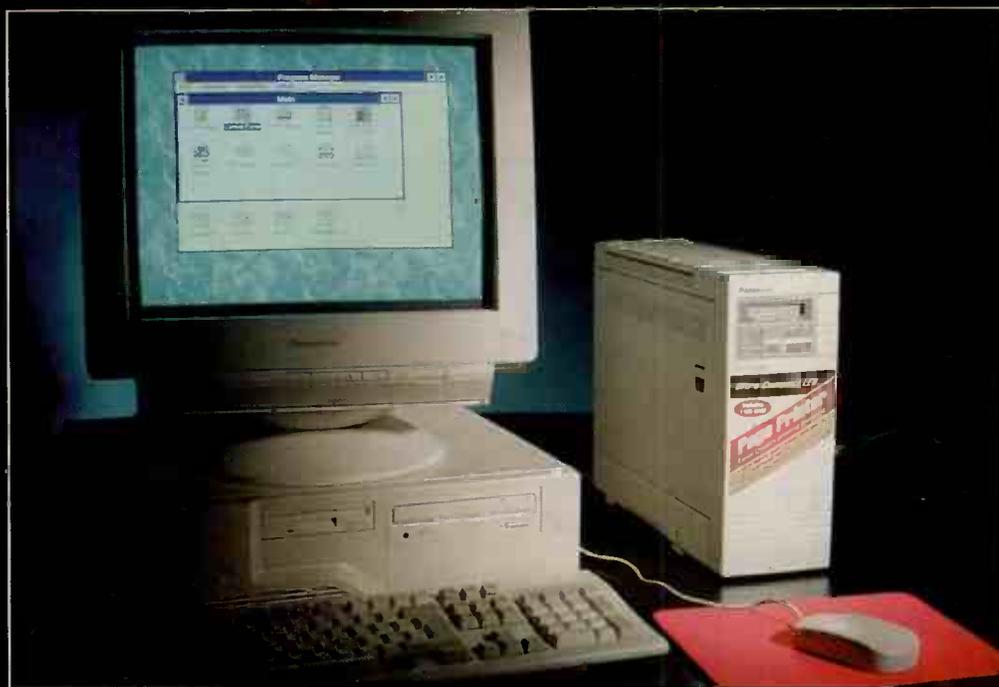
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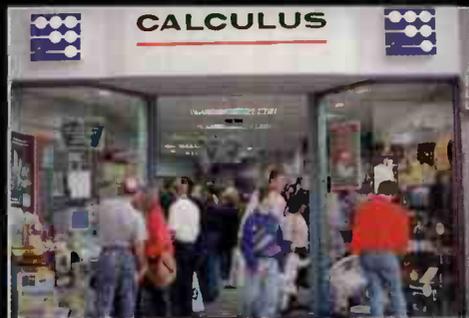
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The ThinkPad 360 is a feature packed notebook which, with its excellent power management, can give up to 7 hours battery life. Designed for flexibility it has a modular design with a lift up keyboard for easy access and a fast 32-bit local bus screen giving a sharp 256 colours as standard.

- Intel 33MHz 486 SX Processor, SL Enhanced
- 4Mb RAM Upgradable to 20Mb
- 340Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 8.4" VGA TFT Colour Display
- 256 Colour Local Bus Graphics
- PCMCIA Rel. 2.0 Type II/III Slots
- Modular Design
- PC DOS and MS Windows 3.1 or IBM OS/2, Lotus Organizer
- Up to 7 Hours Battery Life
- Weighs 2.8Kg
- International Warranty



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SPECIFICATIONS

- Processors from 25MHz 486 to 60MHz Pentium
- 4Mb or 8Mb RAM Upgradable
- Hard Drives from 170Mb to 420Mb
- 3.5" 1.44Mb Floppy Disk Drive
- Local Bus Graphics Card
- 14" SuperVGA Colour Monitor
- 3 Free Expansion Slots
- 102 key Keyboard and Mouse
- 12 Months Warranty

MULTIMEDIA PACK (ON 853MM AND 887MM)

- Double Speed CD-ROM Drive
- 16 bit Sound Card
- Twin Stereo Speakers and Microphone



SOFTWARE SUITE

- PC DOS
- MS Windows 3.1,
- MS Works
- Index
- First Steps
- Custom Tools
- Personal Desktop
- Learning Library
- Rapid Resume
- Scheduler

Aptiva 2168 Mini Tower

SPECIFICATIONS

- 33MHz 486 SX or 66MHz 486 DX2 Processor
- 4Mb RAM Upgradable
- 270Mb or 420Mb Hard Drive
- 3.5" 1.44Mb Floppy Drive
- Local Bus Graphics Card
- 14" SuperVGA Colour Monitor
- 8 Expansion Slots
- 102 key Keyboard and Mouse
- 12 Months Warranty

- Model 755 (SX/33, 4Mb, 270Mb HD) £999
- Model 789 (DX2/66, 4Mb, 420Mb HD) £1299



SOFTWARE SUITE

- PC DOS
- MS Windows 3.1,
- MS Works
- Index
- First Steps
- Custom Tools
- Personal Desktop
- Learning Library
- Rapid Resume
- Scheduler

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Model 744 (SX/25, 4Mb, 170Mb HD)	£699
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Model 853MM (SX/33, 4Mb, 270Mb HD)	£999

Model 766 (SX/25, 4Mb, 270Mb HD)	£925
Model 887MM (DX2/66, 8Mb, 420Mb HD)	£1399
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- 3.5" 1.44Mb Floppy Disk Drive
- 9.5" Dual Scan or 8.4" VGA TFT Colour Display
- PCMCIA Rel. 2.0 Type II/III Slots
- 84 key Keyboard with integral Mouse
- MS DOS 6.2 and MS Windows for Workgroups 3.11
- Long Life NiMH Battery
- Weighs 2.9Kg
- 12 months Warranty

CD-ROM DOCKING STATION

- Fully Portable with its own NiMH Battery
- Internal CD-ROM Drive
- Stereo Speakers
- Tone and Balance Control
- External Microphone and Headphones
- Weighs less than 2Kg
- Compact Size

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- 3 ISA slots/3 drive bays

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- Super VGA Colour Monitor
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- MS Works for Windows 3.0

- MS Money 3.0
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- MS Encarta CD
- The Ultimate Human Body CD
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COMPAQ ProLinea

The Compaq ProLinea range of PC's are ideal for word processing and Windows based applications. They can also handle database management, graphics, DTP and even CAD/CAE. The ProLinea offers outstanding price and performance.

- Intel 486 Processors from 25MHz up to 100MHz
- 4MB or 8MB RAM upgradable to 128MB
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- 3.5" 1.44MB Floppy Disk Drive
- Enhanced Local Bus Graphics
- 102-Key keyboard & Mouse
- MS DOS 6.2, Windows 3.1
- 3 year warranty (1st year on-site)



FROM **£635**
4/25s Model 120W

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ProLinea 4/33s M340W	£755	ProLinea 4/50 8MB, M200W	£995	ProLinea 4/66 8MB, M340W	£1125	ProLinea 4/100 M340W	£1295
ProLinea 4/50s M200W	£760	ProLinea 4/50 8MB, M340W	£1075	ProLinea 4/66 8MB, M525W	£1185	ProLinea 4/100 M525W	£1355
ProLinea 4/50s M340W	£840	ProLinea 4/66 M200W	£885				
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Compaq Monitor Options

14" SVGA Colour Monitor	£209	15" 151FS Colour Monitor	£349	QVision 172	£829
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COMPAQ Portables



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Models

4/25 Model 170	£869
4/33C Model 170	£1229
4/33C Model 250	£1399

Upgrades

4MB 32-bit memory card	£125
8MB 32-bit memory card	£315

Docking Bases

Convenience	£60
Mobile Port Expander	£25

Contura 400



Models

400 Model 170	£1299
400C Model 250	£1749
400CX Model 250	£2279

Upgrades

4MB 32-bit memory card	£169
8MB 32-bit memory card	£329
16MB 32-bit memory card	£979

Docking Bases

Standard	£105
With Ethernet	£175

LTE Elite



Models

Elite 4/50E M250W	£2245
Elite 4/40C M170W	£2345
Elite 4/40CX M170W	£2795
Elite 4/40CX M340W	£3045
Elite 4/50CX M340W	£3675
Elite 4/75CX M340W	£3995
Elite 4/75CX M510W	£4375

Upgrades

4MB 32-bit memory card	£195
8MB 32-bit memory card	£395
16MB 32-bit memory card	£1425

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COMPUTER
SPECIFICATIONS

- 66MHz 486DX2 Processor
- 8Mb RAM Upgradable to 32Mb
- 270Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 16 bit Local Bus Graphics with 1Mb VRAM
- 14" Super VGA Colour Monitor
- 2 Free ISA Expansion Slots
- 102 key Keyboard and Mouse
- Pentium OverDrive Upgrade Support

MULTI-MEDIA PACK

- Double Speed CD ROM Drive
- 16 bit SoundBlaster Sound Card
- Twin Stereo Speakers and Microphone

SOFTWARE SUITE

- MS DOS 6.21
- Windows 3.1
- AST Works!
- Lotus Organizer
- MS Works
- Intuit Quicken
- MS Encarta CD
- MS Golf CD
- MS Cinemania CD

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6050d 50MHz 486DX2
4Mb RAM, 270Mb HD

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SPECIFICATION

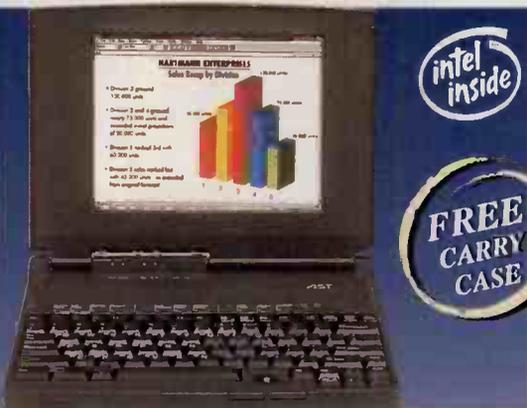
- Intel 33MHz 486SX Processor
- 8Kb Cache
- 4Mb RAM Expandable to 20Mb
- 120Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 16 bit Local Bus Graphics
- 9.5" Dual Scan Colour Display
- PCMCIA Type III Slot
- Full 83 Key Keyboard
- Integrated Trackball Mouse
- Parallel & Serial Ports
- External SuperVGA Monitor Port
- Set - Up Password Security
- MS DOS 6.21 & MS Windows 3.11
- Weighs 2.8Kg
- 1 Year Warranty

486 COLOUR
NOTEBOOK



MS DOS
6.21

MS WINDOWS
3.11



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inside

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SPECIFICATION

- Intel 60MHz Pentium Processor
- 8Mb RAM Upgradable to 256Mb
- 256Kb Cache
- 420Mb Hard Disk Drive
- 3.5" 1.44 Floppy Disk Drive
- 32 bit Local Bus Graphics with 1Mb VRAM
- 14" Super VGA Colour Monitor
- 2 PCI and 4 ISA expansion slots
- 102 key Keyboard and Mouse

SOFTWARE SUITE

- MS DOS 6.21
- Windows 3.1
- AST Works!
- Lotus Organizer
- MS Works
- Intuit Quicken
- MS Encarta CD
- MS Golf CD
- MS Cinemania CD

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PACK**

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- 16 bit SoundBlaster Sound Card
- Twin Stereo Speakers and Microphone

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HEWLETT PACKARD LaserJet 4V

- Up to 16ppm rated engine speed 33MHz
- 180960 RISC processor
- 600dpi X 600dpi resolution
- Enhanced HP PCL 5 with HP GL/2
- 45 scalable typefaces
- Standard 100-sheet multi-purpose tray
- Economode - produces draft-quality documents that reduce toner consumption by up to 50%
- Weight 23.2Kg, Width: 459mm (16.1")
Depth: 522mm (20.6") X Height: 317mm (12.5")
- Supports DOS and Windows 3.1
- 1 Year HP Warranty



HP Product	
HP LaserJet 4V	£1425
HP LaserJet 4MV	£2069
HP Product Plus Support Pack	
HP LaserJet 4V	£1629
HP LaserJet 4MV	£2275

**HEWLETT
PACKARD**

LaserJet
4 Plus

- 600dpi with Resolution Enhancement technology.
- 2MB Exp. to 66MB
- Automatic I/O switching
- 45 scalable fonts
- Microfine Toner
- 12ppm Print Speed
- Network flexibility
- 100 & 250 sheet input trays
- 25MHz RISC processor
- 1 year HP Warranty with support pack option

WITH HP SUPPORT PACK	
HP LaserJet 4 Plus	£979
HP LaserJet 4M Plus	£1285
HP LaserJet 4 Plus	£1135
HP LaserJet 4M Plus	£1449

**HEWLETT
PACKARD**

LaserJet 4L

- 300dpi with Resolution Enhancement technology
- 1MB Std. with Memory Enhancement technology
- 1-100 sheet input trays as standard
- Microfine Toner
- 4ppm Print Speed
- Network flexibility
- Enhanced HP PCL 5
- 26 scalable fonts
- 1 year HP Warranty with support pack option

WITH HP SUPPORT PACK	
HP LaserJet 4L	£410
HP LaserJet 4ML	£765
HP LaserJet 4L	£495
HP LaserJet 4ML	£859

**HEWLETT
PACKARD**

LaserJet 4P

- 600dpi with Resolution Enhancement technology
- 2MB Std. with Memory Enhancement technology
- 1-250 sheet input trays as standard
- Microfine Toner
- 4ppm Print Speed
- Network flexibility
- Enhanced HP PCL 5
- 45 scalable fonts
- 1 year HP Warranty with support pack option

WITH HP SUPPORT PACK	
HP LaserJet 4P	£625
HP LaserJet 4MP	£879
HP LaserJet 4P	£755
HP LaserJet 4MP	£999

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DeskJet
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- 3ppm Print Speed
- 600dpi x 300dpi with Resolution
- HP PCL 3 with extensions
- 48 KB of memory
- 84 Bitmapped Fonts
- 14 Typefaces

WITH HP SUPPORT PACK
£177

HP DeskJet 500C

- 3ppm Print Speed
- 300dpi
- Quality Colour Printing
- 100 Sheet Paper Tray
- Supports scalable fonts on Windows

WITH HP SUPPORT PACK
£210

HP DeskJet 520

- 3ppm Print Speed
- 600dpi x 300dpi with Resolution Enhancement technology
- 14 Scalable Fonts
- Whisper quiet operation
- Supports DOS and Windows

WITH HP SUPPORT PACK
£209

HP DeskJet 560C

- 3ppm Print Speed
- 600dpi x 300dpi Colour Printing
- 14 Scalable Fonts
- Whisper quiet operation
- Supports DOS and Windows

WITH HP SUPPORT PACK
£265

ACCESSORIES

HP TONER CARTRIDGES	
LaserJet II/III/IIIi	£49
LaserJet IIIi/4Si	£89
LaserJet 4L/4ML/4P/4MP	£47
LaserJet 4/4M/4 Plus/4M Plus	£65

HP MEMORY UPGRADES

1MB for LaserJet 4L	£49
1MB for LaserJet 4	£59
2MB for LaserJet 4	£103
4MB for LaserJet 4	£155
8MB for LaserJet 4	£289

Canon

BJ-10sx	£149
BJ200	£189
BJ230	£249
BJ300	£335
BJ330	£389
BJ600	£349
BJ800	£1099

EPSON

Stylus 400	£139
Stylus 800	£169
Stylus 800+	£179
Stylus 1000	£329
Stylus Colour	£349

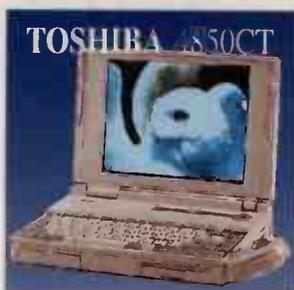
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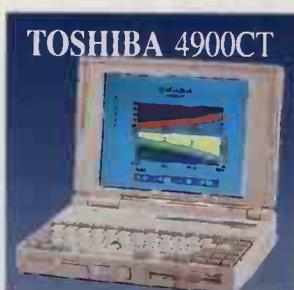
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- Intel 75MHz 486 DX4 Processor
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- 3.5" 1.44Mb Floppy Disk Drive
- 64K Colour Graphics
- 10.4" VGA TFT Colour Display
- PCMCIA Rel. 2.0 Type II/III Slots
- 84 key Keyboard, 12 function keys
- MS DOS 6.2, MS Windows for Workgroups 3.11
- MS Windows Sound System 2 with Microphone and Speaker
- 3.5 Hours Battery Life
- Weighs 3.2Kg
- 3 Year Warranty

T4850CT/500 with TFT display
£3819



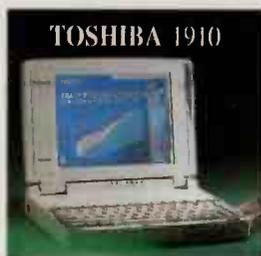
- Intel 75MHz Pentium Processor
- 8Mb RAM Upgradable to 40Mb
- 770Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 64K Colour Graphics
- 10.4" VGA TFT Colour Display
- PCMCIA Rel. 2.0 Type II/III Slots
- 84 key Keyboard, 12 function keys and Ballpoint Mouse
- MS DOS 6.2, MS Windows for Workgroups 3.11
- MS Windows Sound System 2 with Microphone and Speaker
- 3 Hours Battery Life
- Weighs 3.2Kg
- 3 Year Warranty

T4900CT/770 Pentium
£4579

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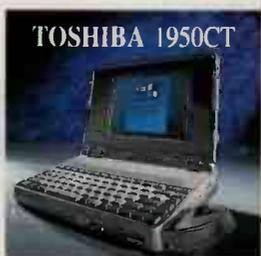
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- PCMCIA Rel. 2.0 Type II/III Slots
- 84 key Keyboard, 12 function keys with Ballpoint Mouse
- MS DOS 6.2, MS Windows 3.1
- 3.5 Hours Battery Life
- Weighs 2.9Kg
- 1 Year Warranty

T1910/120 £845
T1910/200 £929
T1910CS/200 £1345



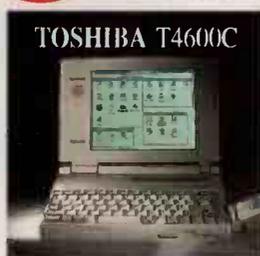
- Intel 40MHz 486 DX2 Processor
- 4Mb RAM Upgradable to 20Mb
- 200Mb or 320Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 8.4" VGA TFT Colour Display
- PCMCIA Rel. 2.0 Type II/III Slots
- 84 key Keyboard, 12 function keys with Ballpoint Mouse
- MS DOS 6.2, MS Windows 3.1
- 4 Hours Battery Life
- Weighs 3.2Kg
- 1 Year Warranty

T1950CT/200 £1859
T1950CT/320 £1995



- Intel 33MHz 486 SX Processor, SL Enhanced
- 4Mb RAM (8Mb RAM on T3600) Upgradable to 20Mb
- 120Mb or 250Mb Hard Disk Drive
- External 3.5" 1.44Mb Floppy Disk Drive
- 8.4" VGA TFT Colour Display
- PCMCIA Rel. 2.0 Type II Slot
- 84 key Keyboard, 12 function keys with Mousepoint
- MS DOS 6.2, MS Windows 3.1
- 4 Hours Battery Life
- Weighs 2Kg • 1 Year Warranty

T3400CT/250 £2119
T3600CT/250 £2629



- Intel 33MHz 486 DX Processor, SL Enhanced
- 4Mb RAM Upgradable to 20Mb
- 200Mb or 320Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 9.5" VGA TFT Colour Display
- PCMCIA Rel. 2.0 Type II/III Slots
- Deskstation IV Compatible
- 84 key Keyboard, 12 function keys with Ballpoint Mouse
- MS DOS 6.2, MS Windows for Workgroups 3.11
- 3.5 Hours Battery Life
- Weighs 3.3Kg • 3 Years Warranty

T4600C/200 £2199
T4600C/320 £2369

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- Intel 50MHz 486 DX2 Processor, SL Enhanced
- 4Mb RAM (8Mb on T2400CT)
- Upgradable to 20Mb (24Mb for T2400CT)
- 250Mb or 320Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 8.4" VGA TFT or 9.5" STN Colour Display
- PCMCIA Rel. 2.0 Type II/III Slots
- SCSI 2 Port
- 84 key Keyboard, 12 function keys with Ballpoint Mouse
- MS DOS 6.2, MS Windows for Workgroups 3.11
- 3.5 Hours Battery Life
- Weighs 2.95Kg • 3 Years Warranty

T2400CS/250 £1859
T2400CS/320 £1995
T2400CT/320 £2545



- Intel 75MHz 486 DX4 Processor
- 8Mb RAM
- Upgradable to 20Mb
- 320Mb or 500Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 9.5" TFT Colour Display
- PCMCIA Rel. 2.0 Type II/III Slots
- SCSI 2 Port
- 84 key Keyboard, 12 function keys with Ballpoint Mouse
- MS DOS 6.2, MS Windows for Workgroups 3.11
- 3.5 Hours Battery Life
- Weighs 2.95Kg
- 3 Years Warranty

T2450CT/320 £2849
T2450CT/500 £3099



- Intel 50MHz 486 DX2 Processor, SL Enhanced
- 8Mb RAM Upgradable to 24Mb
- 200Mb or 320Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 9.5" VGA TFT Colour Display
- PCMCIA Rel. 2.0 Type II/III Slots
- Deskstation IV Compatible
- 84 key Keyboard, 12 function keys with Ballpoint Mouse
- MS DOS 6.2, MS Windows 3.1
- MS Windows Sound System
- 3.5 Hours Battery Life
- Weighs 3.5Kg • 3 Years Warranty

T4700CT/200 £2549
T4700CT/320 £2699



- Intel 75MHz 486 DX4 Processor
- 8Mb RAM Upgradable to 24Mb
- 500Mb Hard Disk Drive
- 3.5" 1.44Mb Floppy Disk Drive
- 9.5" VGA TFT Colour Display
- PCMCIA Rel. 2.0 Type II/III Slots
- Deskstation IV Compatible
- 84 key Keyboard, 12 function keys with Ballpoint Mouse
- MS DOS 6.2, MS Windows 3.1
- MS Windows Sound System
- 3 Hours Battery Life
- Weighs 3.2Kg
- 3 Years Warranty

T4800CT £3099

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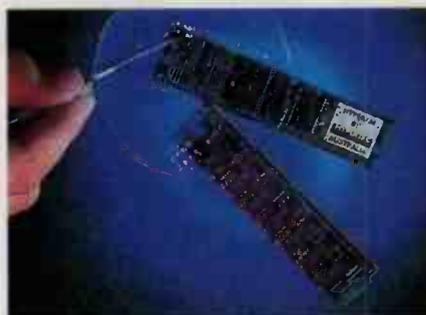
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NEW PRODUCT



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- Includes free OmniPage Direct 2.0 OCR
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BEST VALUE EVER!

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The Dexxa A4 colour scanner will connect to any IBM compatible 386 or 486 PC with 4Mb of RAM (or above), running Windows 3.0 or higher.

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TV and Teletext for your PC.



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Pilot Trackball



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"928Movie...probably the finest multimedia card in the world..." (CD-ROM User, October 1994)

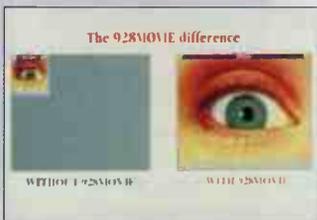
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CD ROMS

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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

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, DR Multi-User DOS and more.

- PC/4 4-Port RS232 Card £295
- PC/8 8-Port RS232 Card £395
- PC/16 16-port RS232 Card £750

Add £10 per channel for 16550 option

DigiBoard PC/8e Card

The DigiCHANNEL PC/8e is an intelligent 8-port RS232 high speed communication board with on-board processor and memory for increased throughput. Drivers available for DOS, Windows NT, Windows, OS/2, Xenix and UNIX.

- ▼ 8 RS232 serial ports
- ▼ 8MHz 80186 processor
- ▼ 64K RAM
- ▼ 16 bit AT bus

£495

Also DigiBoard 2PORT Intelligent £189

DigiBoard ISDN Card

Enables remote users to log in to a Novell File Server over a Digital Telephone Line (ISDN). Requires one card for the remote user and one card for the Server.

- ▼ Transfer rate 128Kbps
- ▼ Support for Novell Network and Windows NT Remote Access Server
- ▼ Transparent connection
- ▼ BT Approved

£699

AT bus Serial Card

Provides access to additional interrupts and any port address

- ▼ 2 RS232 serial ports
- ▼ 16 bit AT bus
- ▼ Interrupts IRQ2-7, 10-12, 14-15
- ▼ Selectable and shareable Interrupt features

£89

Add £20 for 16550 option

Also AT Bus RS422 Card £120

Also AT Bus RS485 Card £120

Dual RS422/RS485 Card

Offering 2 high speed serial ports for transmissions up to 4000 feet

- ▼ Short card
- ▼ 2 RS422/RS485 serial ports
- ▼ Up to 56K baud
- ▼ COM1 to COM4 selectable or any port address
- ▼ IRQ2 - IRQ7 selectable

£85

Also Isolated RS422/RS485 Card £99

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, let them independently provide intelligent signal conditioning, analog I/O, digital I/O, data display and RS485 Communication.



Isolated RS232/RS485 Converter

ADAM modules need just 2 wires to communicate with their controlling host computer over a multidrop RS485 network. Their ASCII based command and response protocol lets them talk with virtually any computer system.

- ▼ Automatic control of data flow
- ▼ Input RS232 (4-wire)
- ▼ Output RS485 (2-wire)
- ▼ Baudrate 1.2K to 38.4K

£99

Analog Input module

What makes ADAM modules really special is their ability to accommodate multiple types and ranges of analog input. You select type and range remotely by issuing commands from the host computer.

- ▼ 16 bit resolution
- ▼ Input for thermocouple, mV, V, or mA
- ▼ Input range 15mV to 2.5V, 20mA
- ▼ 10 samples/second
- ▼ 1 digital input/event counter
- ▼ 2 digital outputs/ high and low alarms
- ▼ Baudrate 1.2K to 19.2K

£165

Analog Output Module

ADAM modules accept any unregulated power source between + 10V and + 30V and are protected against accidental power supply reversals.

- ▼ Output range 0 to 10V, 20mA
- ▼ Programmable output slope

£165

Analog Input Module with LED display

With ADAM modules you can use just one type of unit for many different tasks, greatly simplifying design and maintenance. You can standardise on a single module to handle the measurement needs of the entire plant.

- ▼ 4 1/2 digit LED display
- ▼ Input for mV, V and mA
- ▼ Input range 150mV to 10V, 20mA
- ▼ 500V isolation
- ▼ 10 samples/second
- ▼ 1 digital input/event counter
- ▼ 2 digital outputs/ high and low alarms
- ▼ Baudrate 1.2K to 19.2K

£210

Digital I/O Module

The ADAM modules are compact Industrial units which let you easily mount them on a DIN rail, panel or stackthrough. You make signal connections through plug-in screw terminal blocks, ensuring simple installation, modification & maintenance.

- ▼ 7 digital input channels
- ▼ Input voltage level 0 to 30V
- ▼ 8 open collector digital output channels

£119

Relay Output Module

With ADAM I/O Modules there are no pots or switches to set. You can remotely configure ADAM modules for various sensor types and input/output ranges merely by issuing commands from your host computer.

- ▼ 2 form A relay outputs
- ▼ 2 form C relay outputs
- ▼ Contact rating
AC: 125V @ 0.6A, 250V @ 0.3A
DC: 30V @ 2A, 110V @ 0.6A
- ▼ Relay on time 3msec
- ▼ Relay off time 1msec

£119

Counter/Frequency Module with LED Display

ADAM modules use the EIA RS485 communication protocol, industry's most widely used bidirectional balanced transmission line standard.

- ▼ 5 digit LED display
- ▼ 2 independent 32 bit counters
- ▼ Programmable digital filter
- ▼ Programmable threshold for digital input
- ▼ 2 digital outputs/high and low alarms
- ▼ 500V Isolation

£210



Multifunction DAS Card

Versatile fully integrated low cost Multifunction AD/DA 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

£199

Add £40 for Wiring Terminal Board

High Performance DAS 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
- ▼ Timer/counter
- ▼ Pacer Clock
- ▼ DMA and Interrupt
- ▼ Wiring Terminal Board

£395

Digital I/O and Counter Card

The simple solution for providing digital I/O and timer functions.

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- ▼ 32 digital outputs TTL
- ▼ 3 channel programmable counter/timer
- ▼ User configurable clock source
- ▼ Breadboard area

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144 bit Digital I/O Card

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- ▼ Buffered circuits for higher driving capacity than the 8255
- ▼ Interrupt handling
- ▼ Output status readback

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Industrial I/O Cards

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D/A Output Card 12ch	£450
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48 bit Digital I/O Card	£80
10 Channel Counter/Timer Card	£229
4 1/2 Digit Voltmeter Card	£295
Stepping Motor Control Card	£295

Data Acquisition Card PCMCIA Type II

The DACpad is a type II PCMCIA data acquisition card for laptop computers and other computers with a PCMCIA slot. Ideal for field data logging and portable measurement systems.

- ▼ Low power consumption
- ▼ 12-bit A/D, 30KHz data transfer
- ▼ 8 differential input channels
- ▼ Input range +/- 10V or 0-10V
- ▼ Programmable gain of 1,2,4,8
- ▼ Daughter board with enclosure and plug-in terminal block included
- ▼ CJC reference output
- ▼ 4 digital inputs TTL
- ▼ 4 digital outputs TTL

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Relay Actuator 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

£149

IEEE-488 Interface Card

Provides complete IEEE-488 functionality on a half size board. Includes cable.

- ▼ Powerful, easy to use software command set
- ▼ National Instrument PC-II 488.1 compatible mode
- ▼ DMA & Interrupt
- ▼ On-board firmware driver
- ▼ 16 digital outputs
- ▼ Basic, Pascal and C drivers included

£220

Wiring Kit & Relay Boards

Wiring Terminal Board	£40
Industrial Wiring Kit	£40
Isolated Digital input board 16ch	£109
Isolated Digital input board 24ch	£129
Relay Board 16ch, 120V 1A	£125
Relay Board 24ch, 120V 1A	£150
Relay Board 16ch, 250V 5A	£149
SSR Module Carrier Board 8ch	£80
SSR Module 280V AC 3A	£10
SSR Module 60V DC 3A	£10
Metal Enclosure Box for Boards	£69

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 switching power supply (250W) in a dual-fan cooled chassis.

- ▼ Supports 286/386/486 CPU Cards, Optional ISA/PCI bus for Pentium
- ▼ 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 CPU Cards

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 on-board watchdog timers, ROM disk, IDE drive interface and parallel and serial ports.

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CPU Card 486SX/33	£395
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CPU Card Pentium/66 256K cache	£1550

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- ▼ Simple installation
- ▼ No software required

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- Removable 540Mb IDE hard disk
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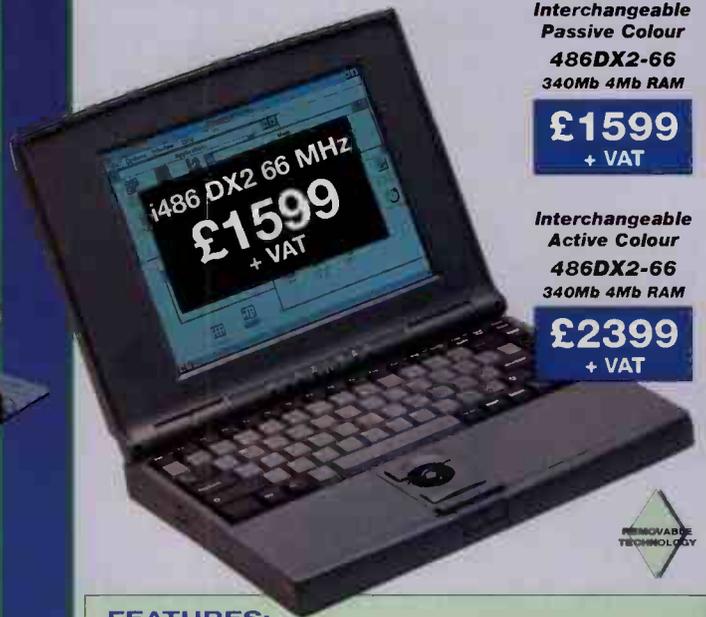
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- Total 4 drive bays
- 1.44Mb floppy disk drive
- Built in enhanced IDE interface with fast serial port (16550)
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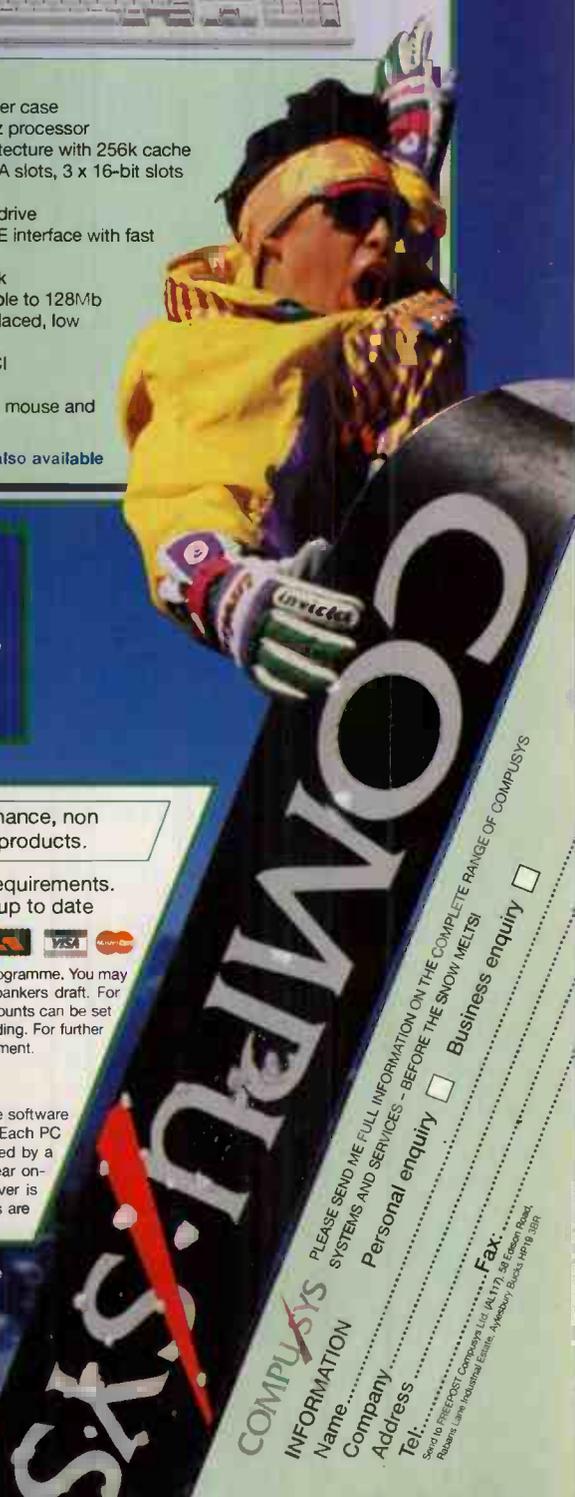
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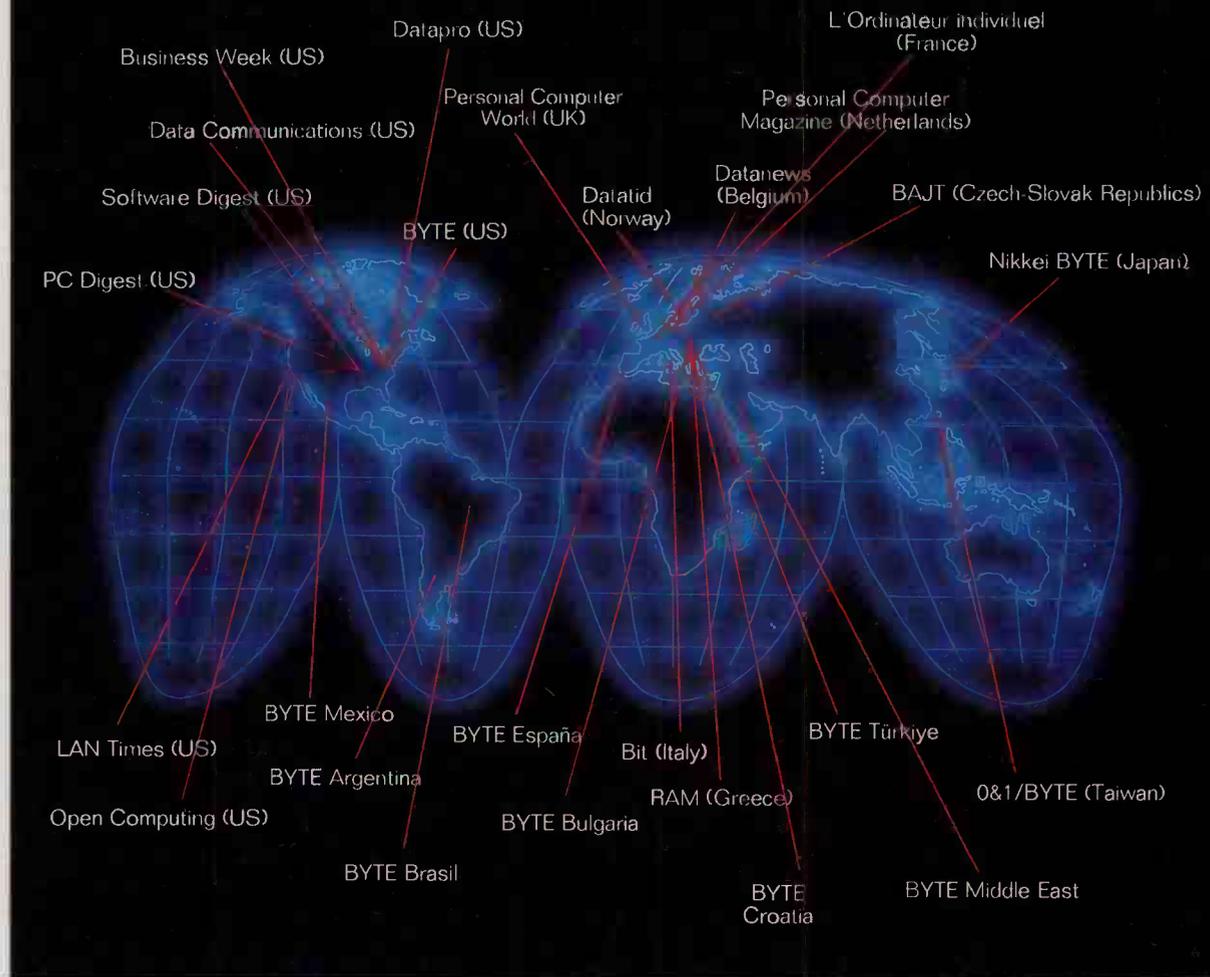
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T1910	486SX/33	4MB	200MB	MONO	72806-N	£930	T3600CT (ex.FDD)	486DX2/50	8MB	250MB	TFT COL	75480-N	£2630
T1910CS	486SX/33	4MB	200MB	STN COL	72808-N	£1355	T4600C	486SL/33	4MB	200MB	TFT COL	91661-N	£2499
T1950CT	486DX2/40	4MB	200MB	TFT COL	74004-N	£1865	T4700CT	486DX2/50	8MB	200MB	TFT COL	74599-N	£2545
T1950CT	486DX2/40	4MB	320MB	TFT COL	74005-N	£1995	T4700CT	486DX2/50	8MB	320MB	TFT COL	74600-N	£2715
T2400CS	486DX2/50	4MB	250MB	STN COL	75481-N	£1865	T4800CT	486DX4/75	8MB	500MB	TFT COL	75321-N	£3099
T2400CT	486DX2/50	8MB	320MB	TFT COL	75482-N	£2545	T4850CT	486DX4/75	8MB	500MB	TFT COL	76569-N	£3820
T2450CT	DX4/75	8MB	320MB	TFT COL	76999-N	£2845	T4900CT	PENTIUM/75	8MB	810MB	TFT COL	76570-N	£4585
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- ✓ Pace Mobi Fax 144 **LOW PRICE**
- ✓ Sportster 28.8 with Fax **LOW PRICE**
- ✓ HP Omnibook 600 series portables **NEW**
- ✓ HP Flatbed Scanners
- ✓ Mannesmann Tally T-Win **GDI**
- ✓ Brother HL-630 Printer **GDI**
- ✓ Texas Instruments Printers
- ✓ Corel Software
- ✓ How To: Computing
- ✓ SpellWrite for Windows **ALL SORTS OF SOFTWARE**
- ✓ Alpha Five for Windows
- ✓ FastCad Design Software
- ✓ Borland Dashboard & Sidekick **NEW**
- ✓ Win/TV Video grabbers **FREE OS/2 WARP**
- ✓ Latest PC games on CD **NEW RANGE**
- ✓ Microsoft software **INTRO OFFER**
- ✓ IBM OS/2 Warp V3.0

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T1950CT

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'Best Buy' Which Computer - April 1994

The T1950CT incorporates an i486DX2 low voltage clock-doubled processor to deliver impressive processing speed. It also includes a PCMCIA R2-0 Type III expansion slot, a VESA local bus and TFT colour screen for outstanding graphics and digital video presentation.

Features:

- ✓ Processor: 486DX2 (40MHz), 3.3v (numeric coprocessor)
- ✓ RAM: 4MB expandable to 20MB
- ✓ Hard Disk: 200MB or 320MB
- ✓ Graphics: VGA/SVGA, VESA Local Bus support
- ✓ Display: TFT colour LCD; (640 x 480 pixel) and 8.4" diagonal size
- ✓ Internal 3.5" floppy drive
- ✓ PCMCIA expansion: 1 x R2.0 III or 2 x R2.0 II
- ✓ Battery: NiH₂ (up to 4 hours continuous use)
- ✓ Ops System: Toshiba DOS 6.2, MS Windows 3.11 with CardWare PCMCIA card support software
- ✓ Dimensions (WxDxH): 300 x 214 x 53mm
- ✓ Weight 3.2kg
- ✓ Warranty: 12 months international (return to base)
- ✓ Warranty: optional extra 24 month warranty available

T1950CT/200MB
£1865
Item No. 74004-N



T1950CT/320MB
£1995
Item No. 74005-N

Toshiba Accessories for the T1950CT - Ready To Go!

MEMORY EXPANSION	TOSHIBA PART NO.	ITEM NO.	PRICE
T1950CT 4MB	PA2012U	71807-N	£197
T1950CT 8MB	PA2013U	71812-N	£345
T1950CT 16MB	PA2014U	72949-N	£1489

BATTERIES	TOSHIBA PART NO.	ITEM NO.	PRICE
T1950 Battery pack (NiH ₂)	PA2420U	73103-N	£89
T1950 Battery charger	PA2422U-E	73444-N	£125

CALL FOR AC ADAPTORS

GENERAL TOSHIBA ACCESSORIES

CONNECTIVITY



Advanced PCMCIA 2.0 + FAX (TPCV32BFUK)

- ✓ Fits all current models
- ✓ 14,400 bps
- ✓ Asynchronous
- ✓ Group 3
- ✓ BABT Approved

Toshiba Modem
£215
Item No. 71814-N

DIRECT CONNECT



Direct Connect Mouse (PA2805U)

- ✓ Fits T1900S, T1910, T1950, T4600, T4700 & T4800
- ✓ QuickPort I/F
- ✓ 400dpi
- ✓ 2 button
- ✓ MS Mouse compatible

Direct Connect
£82
Item No. 75612-N

ABS CARRY CASE



ABS Rigid Carry Case (T202L)

- ✓ For use with all Toshiba notebooks
- ✓ Internal dimensions (W x D x H) 360 x 270 x 70mm

ABS Carry Case
£40
Item No. 75399-N
2YR WARRANTY
£80
Item No. 75800-N

CALL FOR ALL TOSHIBA ACCESSORIES • FULL SPECIFICATIONS ARE ALWAYS AVAILABLE

DESCRIPTION	PROCESSOR	RAM	DISK	SCREEN	ITEM NO.	PRICE	DESCRIPTION	PROCESSOR	RAM	DISK	SCREEN	ITEM NO.	PRICE	DESCRIPTION	PROCESSOR	RAM	DISK	SCREEN	ITEM NO.	PRICE	
T1910	486SX/33	4MB	120MB	MONO	72805-N	£845	T2400CS	486DX2/50	4MB	250MB	STN COL	75481-N	£1865	T4700CT	486DX2/50	8MB	320MB	TFT COL	74600-N	£2715	
T1910	486SX/33	4MB	200MB	MONO	72806-N	£930	T2400CT	486DX2/50	8MB	320MB	TFT COL	75482-N	£2545	T4800CT	486DX4/75	8MB	500MB	TFT COL	75321-N	£3099	
T1910CS	486SX/33	4MB	200MB	STN COL	72808-N	£1355	T3400CT	486SX/33	4MB	250MB	TFT COL	74598-N	£2545	T4850CT	486DX4/75	8MB	500MB	TFT COL	76569-N	£3280	
T1950CT	486DX2/40	4MB	200MB	TFT COL	74004-N	£1865	T3400CT (ex.FD0)	486SX/33	4MB	120MB	TFT COL	75479-N	£2129	T4900CT	PENTIUM/75	8MB	810MB	TFT COL	76570-N	£4585	
T1950CT	486DX2/40	4MB	320MB	TFT COL	74005-N	£1995	T3600CT (ex.FD0)	486DX2/50	8MB	250MB	TFT COL	75480-N	£2630	T6600C	486DX2/66	8MB	510MB	TFT COL	74012-N	£4135	
T2450CT	DX4/75	8MB	320MB	TFT COL	76999-N	£2845	T4600C	486SL/33	4MB	200MB	TFT COL	91661-N	£2499								
T2450CT	DX4/75	8MB	500MB	TFT COL	77004-N	£3055	T4700CT	486DX2/50	8MB	200MB	TFT COL	74599-N	£2545								

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The Ultimate in Portability **COMPAQ**

The Contura Aero now comes complete with it's external floppy drive at no extra cost at unbelievably low prices

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Compaq continues to lead where others dare to follow. New low prices provide you with a winning combination of mobile computing power and value for money.

Contura Aero Highlights

1. Touch typeable keyboard, integrated trackball
2. Easy to read brilliantly crisp backlit VGA displays in both mono and colour
3. Integrated software includes MS-DOS, Windows, Lotus Organizer and WinLink transfer utility
4. Ease of use features – Hot keys, fail-safe hibernation file transfer utility and Instant ON

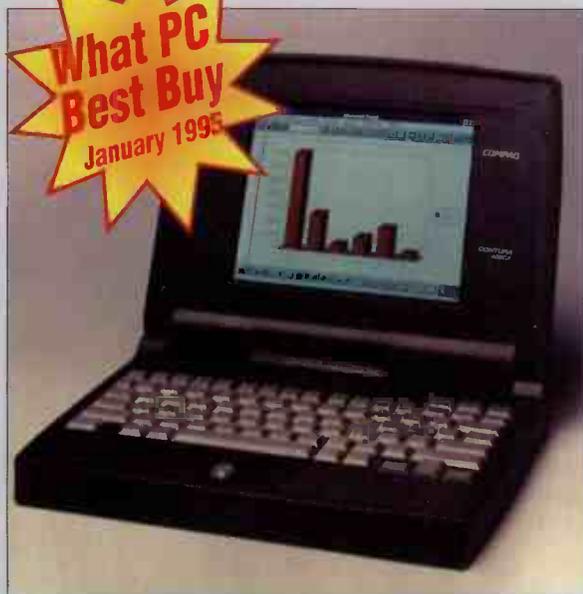
Basic Specifications:

- ✓ Processor: SX/25MHz or SX/33MHz
- ✓ RAM: 4MB expandable to 12 MB
- ✓ Floppy Drive: PCMCIA external drive
- ✓ Keyboard: 78 key
- ✓ Ports: Serial, parallel, convenience base/port expander and PCMCIA Type II
- ✓ Battery: Rechargeable NiMH
- ✓ Operating System: DOS 6.0 and Windows 3.1
- ✓ Warranty: 36 month worldwide (return to base)



DESCRIPTION	HARD DRIVE	ITEM NO	PRICE
CONTURA AERO 4/25 M170	170MB	76020-N	£849
CONTURA AERO 4/33C M170	170MB	75468-N	£1189
CONTURA AERO 4/33C M250	250MB	76021-N	£1349

What PC Best Buy
January 1995



The Compaq Contura 400 Family

Easy to use Notebook PCs, legendary for quality and value

These latest members of the Contura family offer:

- ✓ improved 486 performance
 - ✓ larger hard drives
 - ✓ integrated trackball
 - ✓ Two Type II PCMCIA slots
- all at a price to give you the best value ever in a full function notebook.

CALL FOR LATEST MODEL NEWS

Basic specification:

- ✓ Processor: DX2/(40 MHz)
- ✓ Ram: 4MB expandable to 20MB
- ✓ Floppy drive: internal 3 1/2" 1.44MB
- ✓ Keyboard: 79 key with integrated numeric keypad
- ✓ Ports: Serial, parallel, mouse (PS/2) or keyboard and VGA monitor
- ✓ Battery: Rechargeable NiCad or NiMH
- ✓ Operating System: MS DOS 6.2 & Windows 3.1
- ✓ Warranty: 36 months world-wide – 1st 12 months on-site upon registration.

DESCRIPTION	DISPLAY		HARD DRIVE	ITEM NO.	PRICE
	SIZE	TYPE			
CONTURA 400	9.5"	mono STN	170MB	76039-N	£1275
CONTURA 400C	9.5"	colour STN	250MB	76040-N	£1695
CONTURA 400CX	8.4"	colour TFT	250MB	76041-N	£2215

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Triumph Adler Notebooks

Features:

- ✓ Processor: 486SX (25 or 33MHz) or 486DX2 (50MHz)
- ✓ RAM: 4MB (expandable to 12MB)
- ✓ Floppy Drive: Internal 3 1/2" 1.44MB
- ✓ Display: 9.5" diagonal, VGA liquid crystal display
- ✓ PCMCIA Expansion: 1 x Type III or 2x Type II
- ✓ Ports: Parallel, Serial, VGA monitor, keyboard, mouse, pointing device
- ✓ Battery: NiMH up to 4 hours (486SX/25 & SX/33 Mono are NICAD)
- ✓ OPS System: MS DOS 6.2 and MS Windows 3.1
- ✓ Accessories Included: Trackball, Universal Power Supply
- ✓ Warranty: 12 month (UK return-to-base)

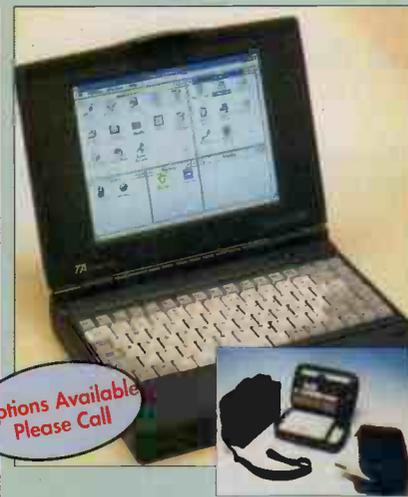
PRICES FROM

£829

Special Offer
(While Stocks last)
TA 486 SX/33C with dual scan colour screen, 4MB RAM and 250MB hard disk for only £1,299 with a FREE luxury carry case
Item No. 75787-N

MODEL	RAM	Hard Disk	Display	Item No.	Price
TA 486SX/33M	4MB	120MB	MONO	75783-N	£829
TA 486SX/33M	4MB	250MB	MONO	75784-N	£929
TA 486SX/33M	4MB	340MB	MONO	75785-N	£1029
TA 486SX/33C	4MB	120MB	DSTN COL	75786-N	£1199
TA 486SX/33C	4MB	250MB	DSTN COL	75787-N	£1299
TA 486SX/33C	4MB	340MB	DSTN COL	75788-N	£1399
TA 486DX2/50C	8MB	250MB	DSTN COL	75789-N	£1699
TA 486DX2/50C	8MB	340MB	DSTN COL	75790-N	£1799

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LOW PRICES

PORTABLES

SEE PAGE 8 FOR PCMCIA MODEMS

CANON PRINTBOOKS

LOW PRICES

CANON	RAM/HD	Item No.	Price
486SLC2/50 COLOUR	4MB/260MB	75379-N	£2875
CANON BN100C			
486SX/25 COLOUR	4MB/120MB	72970-N	£1495
486SX/25 COLOUR	4MB/200MB	72971-N	£1885
CANON BN120C			
486SX/33 DUAL COLOUR	4MB/200MB	76392-N	£1925
486SX/33 DUAL COLOUR	4MB/340MB	76393-N	£2189

TEXAS INSTRUMENTS

SEE FEATURE

TRAVELMATE 4000M	RAM/HD	Item No.	Price
SK2/50 486SX2/50 DUAL COL	4MB/200MB	76087-N	£1789
SK2/50 486SX2/50 TFT COL	4MB/340MB	76089-N	£2389
DX4/75 486DX4/75 TFT COL	4MB/340MB	76091-N	£3175

CALL FOR ALL BRANDED ACCESSORIES

COMPAQ PORTABLES

SEE FEATURE

CONTURA 400	RAM/HD	Item No.	Price
400 486DX2/40 MONO	4MB/170MB	76039-N	£1275
400C 486DX2/40 DS COL	4MB/250MB	76040-N	£1695
400CX 486DX2/40 ACT COL	4MB/250MB	76041-N	£2215
AERO with 3 1/2" External Floppy drive			
AERO 4/25 MONO 486SX/25	4MB/170MB	76020-N	£849
AERO 4/33C COLOUR 486SX/33	4MB/170MB	75468-N	£1189
AERO 4/33C COLOUR 486SX/33	4MB/250MB	76021-N	£1349

IBM PORTABLES

NEW

12 months international off-site warranty is standard.

THINKPAD	RAM/HD	Item No.	Price
340 M01 486SLC2/50 MONO	4MB/125MB	75894-N	£985
360 M01 486SX/25 MONO	4MB/170MB	75423-N	£1375
360 M02 486SX/25 MONO	4MB/340MB	75424-N	£1525
360 DS3L 486DX2/250 COLOUR	4MB/170MB	76497-N	£1925
360 DS4L 486DX2/50 COLOUR	4MB/340MB	76498-N	£2049
360 IF3L 486DX2/50 ACTIVE COL	4MB/170MB	76499-N	£2345
360 IF4L 486DX2/50 ACTIVE COL	4MB/340MB	76500-N	£2475
755 CD3 486DX4/100 ACTIVE COL	8MB/540MB	76504-N	£5225
755 CD4 486DX4/100 ACTIVE COL	8MB/810MB	76505-N	£5675

NEC VERSA

LOW PRICES

VERSA	RAM/HD	Item No.	Price
S/33M 486SX/33 MONO	4MB/210MB	75191-N	£845
S/33D 486SX/33 DUAL COL	4MB/210MB	75359-N	£1065
S/33C 486SX/33 TFT COL	4MB/210MB	75192-N	£1539
V/50D 486DX2/50 DUAL COL	4MB/250MB	75193-N	£1775
V/50C 486DX2/50 TFT COL	4MB/340MB	75361-N	£2299
M/75D 486DX4/75 DUAL COL	8MB/340MB	75794-N	£5794
M/75C 486DX4/75 TFT COL	8MB/540MB	75196-N	£4049
M/100C 486DX4/100 TFT COL	8MB/540MB	75795-N	£3799
M/100T 486DX4/100 TFT COL	8MB/540MB	75796-N	£4049

SEE FEATURE IN PCW OR SHOPPER

COMPAQ

PRESARIO	RAM/HD	Item No.	Price
460 486SX2/66 14" SVGA LOCAL	4MB/270MB	76223-N	£935
660 486SX2/66 14" SVGA LOCAL	4MB/200MB	75347-N	£1197
720 486SX2/66 14" SVGA LOCAL	4MB/420MB	76225-N	£1191
920 486SX2/66 14" SVGA LOCAL	8MB/420MB	76227-N	£1361
PRESARIO CDS (Multimedia)	RAM/HD	Item No.	Price
510 AMD 486SX2/66 14" SVGA LOC	4MB/270MB	76229-N	£1191
520 AMD 486SX2/66 14" SVGA LOC	4MB/420MB	76231-N	£1276
720 AMD 486SX2/66 14" SVGA LOC	4MB/420MB	76232-N	£1361
920 AMD 486SX2/66 14" SVGA LOC	8MB/420MB	76233-N	£1531

PROLINEA

MONITORS REQUIRED	RAM/HD	Item No.	Price
4/33S 486 SX	4MB/200MB	75324-N	£669
4/33S 486 SX	4MB/340MB	75325-N	£745
4/50S 486 SX 2	4MB/200MB	75326-N	£755
4/50S 486 SX 2	4MB/340MB	75327-N	£825
4/50 486 DX 2	8MB/200MB	76559-N	£989
4/50 486 DX 2	8MB/340MB	76560-N	£1065
4/66 486 DX 2	8MB/200MB	76561-N	£1045
4/66 486 DX 2	8MB/340MB	76562-N	£1125
4/66 486 DX 2	8MB/525MB	76563-N	£1175
4/100 486 DX 4	8MB/200MB	75333-N	£1205
4/100 486 DX 4	8MB/340MB	75334-N	£1279
4/100 486 DX 4	8MB/525MB	75335-N	£1345

PACKARD BELL

FORCE MULTIMEDIA	RAM/HD	Item No.	Price
SK2/50 486SX2/50 14" SVGA LOC	4MB/340MB	76033-N	£1042
SK2/50+TV8.RADIO 486SX2/50 14" SVGA LOC	4MB/340MB	76035-N	£1297
DX2/66 486DX2/66 14" SVGA LOC	4MB/420MB	76036-N	£1255
FORCE	RAM/HD	Item No.	Price
486SX2/50 14" SVGA LOC	4MB/340MB	76037-N	£829
486DX2/50 14" SVGA LOC	4MB/340MB	76032-N	£974

IBM APTIVA

MODEL	CPU/MHz	RAM/HD	Item No.	Price
2144-754	486SX/33	4MB/270MB	76172-N	£759
2144-853	486SX/33	4MB/270MB	76173-N	£999
2144-766	486DX2/66	4MB/270MB	76174-N	£895
2144-887	486DX2/66	4MB/420MB	76175-N	£1285
2168-789	486DX2/66	4MB/420MB	76176-N	£1195

CALL FOR APTIVA AVAILABILITY

MONITORS

COMPAQ	Model	Size	Display	Item No.	Price
	143800-502	14"	SVGA	71647-N	£215
	1024 Colour	LR14"	1024x768 ni	74934-N	£255
	151PS Colour	LR15"	1024x768 ni	71641-N	£359
	171FS Colour	LR17"	1024x768 ni	74789-N	£675
GOLDSTAR	Model	Size	Display	Item No.	Price
	GS1462 DM	14" LR	SVGA	75166-N	£169
	GS1520 DM	15" LR	1280x1024 ni	75168-N	£259
	GS1725 DM	17" LR	1280x1024 ni	75169-N	£499

NEC	Model	Size	Display	Item No.	Price
	2V	14" LR	MultiSync	75625-N	£229
	XV-15	15" LR	MultiSync	76970-N	£285
	XE-15	15" LR	MultiSync	76971-N	£389
	XV-17	17" LR	MultiSync	76972-N	£565
	XE-17	17" LR	MultiSync	75973-N	£695
	XP-17	17" LR	MultiSync	76974-N	£895
	XE-21	21" LR	MultiSync	76975-N	£1355
	XP-21	21" LR	MultiSync	76976-N	£1749

PHILIPS	Model	Size	Display	Item No.	Price
	14C/7CMS279 LR	14"	1024 x 768	75318-N	£175
	14A/4CM4279 LR	14"	1024x 768 ni	75317-N	£210
	15A/4CM8274 LR	15"	1024x768 ni	75654-N	£289
	17C/4CM4770 LR	17"	1024x768 ni	75655-N	£445
	17T/4CM6088 LR	17"	1280x1024 ni	75320-N	£615
	17A/4CM6282 LR	17"	1280x1024 ni	75656-N	£659

TAXAN

Model	Size	Display	Item No.	Price
Ergovision 400 LR	14"	1024 x 768	75659-N	£209
Ergovision 410 LR	14"	1024 x 768	75660-N	£205
Ergovision 420 LR	14"	1280 x 1024	76300-N	£239

Ergovision 580 LR	15"	1280 x 1024	72720-N	£319
Ergovision 880 LR	17"	1280 x 1024	76301-N	£549
Ergovision 885 LR	17"	1600 x 1200	93812-N	£669
Ultravision 1075 LR	20"	1280 x 1024	73923-N	£1349

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SCANNERS

DEXXA	Model	Item No.	Price
	Colormedia Hand Scanner WIN (w/o S/F)	76989-N	£114
	Colormedia Hand Scanner (with S/F)	76990-N	£189
	EPSPON (Parallel I/F)		
	GT6500 PC, Parallel (inc. Photoshop LE)	73771-N	£559
	GT6500 PC, Parallel (inc. Photoshop LE)	65175-N	£652
	HEWLETT PACKARD		
	ScanJet 3P AT MONO	75999-N	£352
	ScanJet 3P PS/2 MONO	76001-N	£352
	ScanJet IICX AT COLOUR	76004-N	£686
	ScanJet IICX PS/2 COLOUR	76005-N	£686
	SICOS COLOUR PAGE SCANNER - ISA	75165-N	£249
	LOGITECH		
	Scanman EASYTOUCH	74056-N	£129
	Scanman 32 DOS/CATCHWORD	74438-N	£63
	Scanman 32 WIN/CATCHWORD	74439-N	£63
	Scanman PC COLOUR WIN	92797-N	£206
	Scanman 256 WIN	71064-N	£102

UPS/ELECTRICAL PROTECTION

APC SMART SCENES (LINE INTERACTIVE)	Model	Item No.	Price
	250VA Low Profile	73132-N	£159
	400VA Low Profile	92617-N	£199
	600VA Tower	92477-N	£212
	1250VA Tower	92691-N	£495
	APC BACK-UPS (OFF-LINE)		
	250VA	92686-N	£76
	400VA	92687-N	£104
	600VA	92688-N	£145
	900VA	92689-N	£255
	24 MONTH WARRANTY WITH SWAP OUT SERVICE		
	APC PowerChute Plus for Novell(DIM)	92478-N	£44

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SURGE PROTECTION

Bowthorpe 423 - 4 way strip	70707-N	£25
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See earlier pages for complete Toshiba Range

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TravelMate 4000M - Multimedia-ready Notebooks

A NEW Dimension in Notebook Computing

TEXAS INSTRUMENTS



MOVING
MULTIMEDIA

Texas Instruments powerful range of notebook PCs offers many unique features and is available at very competitive prices.

The **TravelMate 4000M** is a state of the art Multimedia PC offering the processing power and specifications to more than match its competitors. It is available with a variety of processor options and it is supplied with built in 16-bit sound card which is SoundBlaster Pro compatible, a 16-bit MIDI port, a fast SCSI II port plus an internal speaker and microphone. Versions are available with both colour dual scan and active matrix LCD displays. Plus it features an integrated pointing device conveniently located at the base of the keyboard. The above processing power and features make it ideal for use with multimedia presentations. If you wish to connect a CD-ROM drive the TravelMate 4000M offers a unique solution. Its Docking Station features an internal CD-ROM drive, stereo speakers and NiMH battery. All this is contained in a package weighing under 2kgs and it shares the same footprint as the 400M making this one of the neatest multimedia solutions available.



PRICES FROM
£1789



CD-ROM Docking Station

Model	4000M SX2/50	4000M DX4/75
Processor (speed)	486SX2 (50MHz)	486DX4 (75MHz)
RAM	4MB expandable to 20MB	
Hard drive	200MB or 340MB	455MB or 340MB
Floppy drive	3.5" 1.44MB	
Display	Colour dual scan LCD or colour active matrix LCD	
Keyboard	84 key with integrated numeric keypad	
Ports	Parallel, serial, SVGA, PS/2 mouse, SCSI II, audio in/out	
Power supply	100-240V AC auto-sensing adaptor	
Battery	Rechargeable NiMH	
Operating System	DOS 6.2 and Windows for Workgroups V3.11	
Dimensions (W x D x H)	279x216x49mm	
Weight	2.9kg	
Warranty	12 months return-to-base	

EXPANSION SLOTS

- 1 x PCMCIA type III or
- 2 x type II

ACCESSORIES SUPPLIED

- AC adaptor and mains lead
- Rechargeable NiMH battery
- DOS 6.2, Windows for Workgroups V3.11

Call for full
DX2/50 & DX4/100
specification

TRAVELMATE 4000M	DISPLAY	RAM/HD	ITEM NO.	PRICE
486SX2/50	9.5" Dual Scan Colour	4MB/200MB	76087-N	£1789
486SX2/50	8.2" TFT Colour	4MB/340MB	76089-N	£2389
486DX2/50	9.5" Dual Scan Colour	4MB/340MB	76583-N	£1989
486DX2/50	8.4" TFT Colour	4MB/455MB	76584-N	£2589
486DX4/75	9.5" Dual Scan Colour	4MB/455MB	76090-N	£2589
486DX4/75	8.4" TFT Colour	4MB/340MB	76091-N	£3175
486DX4/100	9.5" TFT Colour	4MB/520MB	76585-N	£3675

ACCESSORIES	ITEM NO.	PRICE
4MB RAM Upgrade	76277-N	£170
16MB RAM Upgrade	76279-N	£1039
Rechargeable NiMH Battery	76280-N	£99
CD-ROM Docking Station	76281-N	£620
Deluxe Carry Case	76282-N	£49.50

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Sound Galaxy Voyager Double Speed Multimedia Upgrade Kit



Sound Galaxy

Aztech CDA268-031 EP IDE CD-ROM



- ✓ Sound Galaxy NOVA 16 Stereo CD-Quality multimedia sound card
- ✓ Aztech CDA 268-01A Double Speed Internal CD-ROM Drive
- 25 times faster data transfer rate and less than 60 msec access speed with UltraCD cache utility allows faster retrieval on information
- Listen to contemporary music on CD
- Soft eject motorized tray loading mechanism
- Full Kodak Photo CD compatible, both single and Multi-Session
- ✓ 7 CD Titles:
 - Macromedia Action!™, Professor Multimedia™, The Software Toolworks® Multimedia Encyclopedia, Learn To Use Windows, Wired For Sound PRO™CD, Comanche™ Maximum Overkill and Indiana Jones® And The Fate Of Atlantis™
- ✓ Over 15 multimedia programs for DOS and Windows 3.1
- ✓ Microphone and Powered Amplified Stereo Speakers

- ✓ Easy to install
- ✓ Internal, double speed
- ✓ 350ms average access time
- ✓ 337ms seek time
- ✓ Audio CD compatible
- ✓ Tray loading mechanism
- ✓ Low noise levels
- ✓ Ultra CD cache
- ✓ Cables & Software provided

Voyager
£219
Item No. 76026N

IDE CD-ROM Drive
£87⁵⁰
Item No. 72234-N

Other Sound Galaxy Products CD-ROM Drives & Upgrade Kits

DESCRIPTION	ITEM NO	PRICE
Aztech CDA 268-031-EP IDE internal CD-ROM drive	72234-N	£87.50
Voyager Multimedia Kit (dual Drive, 8 bit ISA I/F 16 bit Sound Card, microphone, Speakers, Cable, 15 software & 7 CD titles)	76026-N	£219
Explorer Multimedia Kit (external dual Drive, 8 bit ISA I/F, Sound Card, Speakers, Cable & 4 CD titles)	76028-N	£245
Sound Cards		
Waverider 32+ (inc. mic., headphones & software)	76540-N	£97.50
BXII Extra, 8 bit sound (inc. Speakers & Software)	76022-N	£37
Pro 16, 16 bit sound; (4 software titles)	76023-N	£63
Nova 16 Extra, 16 bit sound; (headphones, mic & 15 software titles)	76024-N	£80

Hauppauge! - Video Capture Cards

view Teletext, TV or video on your PC at home or at work

Win/TV Cinema

- Features:**
- ✓ SVGA compatible; requires feature connector
 - ✓ Resolution support - from 640 x 480 up to 800 x 600
 - ✓ Video input for Camcorder, Video Recorder connection
 - ✓ 122 Channel PAL tuner with on-board Teletext
 - ✓ DDE and Subpage support allows fast Teletext information retrieval
 - ✓ 4.1.1 YUV colour separation for home presentations
 - ✓ Audio-Line-Out requiring no extra sound card
 - ✓ Video for Windows Compatible
 - ✓ US designed and manufactured



Win/TV Cinema
£182
Item No. 75012-N

Win/TV Celebrity

- Features:**
- ✓ 16.7m colours
 - ✓ Video-out option
 - ✓ SVGA compatible; no feature connector required
 - ✓ Resolution from 640 x 480 up to 1280 x 1024, 100HZ
 - ✓ 122 channel PAL tuner with on-board Teletext
 - ✓ DDE and Subpage support allows fast Teletext information retrieval
 - ✓ Reuters 1000 ready (subscription service available on CNN text)
 - ✓ 4.2.2 YUV colour separation for high impact presentations
 - ✓ Two additional video inputs and Audio-Line-Out requiring no extra sound card
 - ✓ Full-screen AVI playback
 - ✓ US designed and manufactured



Win/TV Celebrity
£262
Item No. 75197-N

CELEBRITY
Full Working copy of OS/2 Warp available FREE upon registration

MULTIMEDIA

CD ROM DRIVES

Model	Item No.	Price
Aztech CDA 268-031, 350ms, 305KB/sec Internal, IDE	72234-N	£87.50
Mitsumi FX-300, 250ms, 450KB/sec, Internal, IDE	76761-N	£122
NEC (SCSI 1 & 2 I/F)		
3Xp + Portable	76194-N	£249
3xi Internal	74361-N	£225
4xe External	76196-N	£375
4xi Internal	76195-N	£269
NEC (SCSI 1 & 2 I/F KITS)		
AT ISA Bus	73050-N	£41
Parallel Port	72930-N	£85
PANASONIC (without I/F kit)		
CR-503, 320ms, 306KB/sec, Internal SCSI-2	75665-N	£145
CR-562, 320ms, 306KB/sec Internal, ISA	75664-N	£95
PIONEER (6 disc Multichanger)		
DRM-604X, 300ms, 614KB/sec External	75175-N	£769
SONY (with IDE I/F)		
CDU-55E, Internal, 250ms, 300KB/sec, IDE	76982-N	£94
TOSHIBA		
CD 400A Portable (SCSI-2 I/F kit inc.)	75615-N	£337
XM-3501B, 150ms, min 600 KB/sec, Internal, SCSI-2 (w/out I/F)	76618-N	£259
XM-3501S, 150ms, min 600 KB/sec, Internal, SCSI-2 (w/out I/F)	76619-N	£289
KT-3501BA, 150ms, min 600 KB/sec, Internal, SCSI-2 (with AT I/F)	76620-N	£315
KT-3501SA, 150ms, min 600 KB/sec, Internal, SCSI-2 (with AT I/F)	76621-N	£349

SOUND CARDS, SPEAKERS & UPGRADE KITS

CREATIVE LABS (12 months warranty)		
SoundBlaster Pro Value, 8-bit	75338-N	£57
SoundBlaster 16 Value, 16-bit	75374-N	£70

SoundBlaster 16 Multi-CD Value, 16-bit	75375-N	£95
SoundBlaster 16 Multi-CD Value, 16-bit with ASP75928-N		£115
SoundBlaster 16 SCSI-2 Value, 16-bit	75376-N	£115
SoundBlaster 16 SCSI-2 Value, 16-bit with ASP75929-N		£139
SoundBlaster AWE32	91926-N	£182
Midi Adaptor (1 in, 1 out)	74342-N	£18
MICROSOFT SOFTWARE		
MS Sound System 2 (3 1/2" disks)	31988-N	£39
ORCHID (4 year warranty)		
SoundWave 32, 16-bit + speakers + mic	75170-N	£139
CREATIVE LABS		
Pro Digital Speakers	75780-N	£29
Screenbeat speakers for Sound Blaster only	74625-N	£15
Creative Labs Multimedia Office-Kit	75994-N	£412
SoundBlaster CD 16 Discovery Kit	75398-N	£219
SoundBlaster Digital Edge 3x	76241-N	£358

VIDEO CAPTURE CARDS

HAUPPAUGE (See feature above)		
Win/TV Celebrity	75197-N	£262
Win/TV Cinema	75012-N	£182
VIDEOLOGIC		
Capivator +VPW	74780-N	£166

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MODEMS

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DATAFLEX - 5 year warranty		
GEM PCMCIA 2.11-V22BIS, FAX	72228-N	£117
RAPHER PCMCIA 2.11-V32BIS, FAX	72232-N	£239
EUROVIVA - 5 year warranty		
14.4i-V32bis, ISA, FAX	75038-N	£130
HAYES		
Optima 144 PCMCIA 2.11 V32bis, FAX	76129-N	£208
PACE - 5 year warranty		
MICROLIN FX 32 +, PC B-BIT ISA		
V32BIS, FAX	73889-N	£139
MICROLIN FX NB32 PCMCIA 2.11	74703-N	£189
V32BIS, FAX		
PSION DACOM - 2 year warranty		
GOLD CARD QUAD PCMCIA 2.11	74971-N	£139
V22BIS, FAX		
GOLD CARD V32bis PCMCIA 2.11-V32BIS, FAX	74526-N	£195
TOSHIBA - 1 year warranty		
ADVANCED PCMCIA 2.11-V32BIS, FAX	71814-N	£215
WORLDPORT - 5 year warranty		
2496 PCMCIA 2.11-V22BIS, FAX	74301-N	£139
DUAL STANDARD CELLULAR PCMCIA 2.11	76611-N	£198
US ROBOTICS - 5 year warranty		
SPORTSTER 14.4 WITH FAX V32bis, FAX	91885-N	£129
SPORTSTER 28.8 WITH FAX VFAST ISA	76714-N	£239
ZOOM - 5 year warranty		
ZOOM 14.4i V32BIS, FAX	74186-N	£125

PORTABLE

DATAFLEX - 5 year warranty		
GEM V22BIS, FAX	73107-N	£75
SUPER GEM V32BIS, FAX	73752-N	£119
PACE - 5 year warranty		
MICROLIN QUAD FX V22BIS, FAX	94835-N	£98
MICROLIN FX 32 PLUS V32BIS, FAX	72169-N	£159
MOBI-FAX 96	75580-N	£79
MOBI-FAX 144	76397-N	£112
ZOOM - 5 year warranty		
ZOOM 14.4X - V32BIS, FAX	74185-N	£125
DESKTOP		
CRAY (was DOWTY) - 1 year warranty		
QUATTRO 144 V32BIS, FAX	72953-N	£245
EUROVIVA - 5 year warranty		
EUROVIVA 14.4 V32BIS FAX	72919-N	£134
HAYES - 2 year warranty		
ACCURA 144, V32BIS, FAX	75092-N	£139
ACCURA 288, VFAST, FAX	75093-N	£179
OPTIMA 96, V32, FAX	74773-N	£292
OPTIMA 144, V32BIS FAX	74774-N	£299
OPTIMA 288, VFAST FAX	74775-N	£489
OPTIMA 96 V32	92654-N	£289
OPTIMA 144 V32BIS	92654-N	£312
ESP COMMUNICATIONS ACCELERATOR V2.0 (16-BIT SERIAL BOARD, ISA PC'S & WINDOWS)	74307-N	£59
MULTITECH - 2 year warranty		
MT1432BLK V32BIS, FAX	91011-N	£325
MT1932 ZDKX V32bis, FAX	74941-N	£119
MT2834BLK VFC - VFAST, FAX	76234-N	£395
PACE - 5 year warranty		
LINNET 24 V22BIS	73446-N	£82
LINNET QUAD V22BIS, FAX	74345-N	£114
LINNET 32 PLUS V32BIS, FAX	74346-N	£159
LINNET 32 PLUS V32BIS, VOICE/FAX	76592-N	£162
LINNET 34 VFC - VFAST FAX	75661-N	£292
ULTRALINK 32 PLUS V32BIS	94527-N	£349
US ROBOTICS - 5 year warranty		
SPORTSTER QUAD WITH FAX V22BIS, FAX	73091-N	£78
SPORTSTER 14.4 WITH FAX V32BIS, FAX	91017-N	£109.99
SPORTSTER 28.8 WITH FAX	76610-N	£198
COURIER VFC PLUS DUAL STD-VFAST, FAX	75573-N	£258

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Sportster 28.8 + Fax



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£198
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The Versa S offers you an unbeatable package combining powerful processing with high portability.

You enjoy a choice of mono or colour dual scan (DSTN) and active matrix colour (TFT) screens, various hard disk combinations and an up-to-date specification including full PCMCIA expansion.

Features:

- ✓ Processor: i486SX (33MHz) or i486DX2 (50MHz)
- ✓ RAM: 4MB expandable to 12MB
- ✓ Hard Drive: 210MB
- ✓ Floppy Drive: External 3 1/2" 1.44MB
- ✓ Display: 9 1/2" diag. VGA liquid crystal display
- ✓ Keyboard: 79 keys
- ✓ Ports: Parallel, Serial, VGA monitor, keyboard, mouse, pointing device.

- ✓ PCMCIA Expansion: 1 x V2.0 III or 2 x V2.0 II
- ✓ Power Supply: Auto-sensing 100-240V AC adaptor
- ✓ Battery: NiMH up to 4 hours
- ✓ OPS System: MS DOS 6.2 and MS Windows 3.1
- ✓ Max Dimensions: W 274mm x D 211mm x H 41mm
- ✓ Max Weight: 2.27Kg (5lbs)
- ✓ Warranty: 12 month international (return-to-base)



VERSA S/33M £845 Item No. 75191-N	VERSA S/33D £1065 Item No. 75359-N	VERSA S/33C £1539 Item No. 75192-N
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VERSA V - The upgradable alternative for power users requiring longer battery life and network connectability



The Versa V is designed for users who require the power of the VERSA S but require more network connectability. Removable hard drive, floppy drive and battery pack modules provide unsurpassed flexibility in configuration for users at the most competitive prices. A choice of dual scan (DSTN) and active matrix colour (TFT) screens, 250MB or 340MB hard disk, full PCMCIA expansion with docking station connection.

Features:

- ✓ Processor: i486DX2 (50MHz)
- ✓ RAM: 4MB expandable to 20MB
- ✓ Hard Drive: Removable 250MB or 340MB
- ✓ Floppy Drive: Removable 3 1/2" 1.44MB
- ✓ Display: 9 1/2" diagonal, VGA liquid crystal display
- ✓ Keyboard: 79 keys
- ✓ Ports: Parallel, Serial, VGA monitor, keyboard/mouse, pointing device, Docking Station
- ✓ PCMCIA Expansion: 1 x V2.0 III or 2 x V2.0 II

- ✓ Power Supply: Auto-sensing 100-240V AC adaptor
- ✓ Battery: Removable NiMH up to 5 hours second option extends life to 10 hours
- ✓ OPS System: MS DOS 6.2 and MS Windows 3.1
- ✓ Max Dimensions: W 297mm x D 244mm x H 51mm
- ✓ Max Weight: 3.13Kg (6.9lbs)
- ✓ Warranty: 12 month international (return-to-base)

VERSA NOTEBOOK PC

VERSA	RAM/HD	Item No.	Price	VERSA	RAM/HD	Item No.	Price	VERSA	RAM/HD	Item No.	Price
S/33M i486SX/33 MONO	4MB/210MB	75191-N	£845	V/50D i486DX2/50 DUAL COL.	4MB/250MB	75193-N	£1775	M/75C i486DX4/75 TFT COL.	8MB/540MB	75196-N	£4049
S/33D i486SX/33 DUAL COL.	4MB/210MB	75359-N	£1065	V/50C i486DX2/50 TFT COL.	4MB/340MB	75361-N	£2299	M/100C i486DX4/100 TFT COL.	8MB/540MB	75795-N	£3799
S/33C i486SX/33 TFT COL.	4MB/210MB	75192-N	£1539	M/75D i486DX4/75 DUAL COL.	8MB/340MB	75794-N	£2725	M/100T i486DX4/100 TFT COL.	8MB/540MB (16.7H COLS)	75796-N	£4049

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5ppm Laser for only £328

- ✓ 5ppm
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- ✓ 26 bit-mapped fonts
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- ✓ Uses your PC's memory



£328
Item No. 93749-N

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MANNESMANN Tally T-WIN

- ✓ 4ppm ✓ 300dpi
- ✓ Uses your PC's memory
- ✓ GDI (Windows) & HP PCL4
- ✓ All Windows fonts
- ✓ 12 months on-site warranty



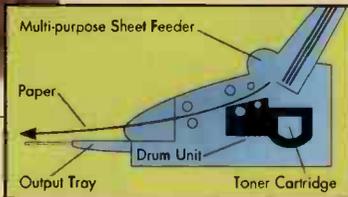
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Brother's latest laser printer offers you GDI flexibility and with PCL 4 emulation the ability to work within a DOS environment. All you need is a Windows PC and it's GO GDI.

Brother HL-630
£353
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FEATURES:

- ✓ 6ppm
- ✓ 300dpi resolution with Microfine toner
- ✓ 512Kb RAM (plus the RAM in your PC)
- ✓ HPIIP, Epson FX-850, IBM ProPrinter XL emulations
- ✓ All Windows fonts
- ✓ High Speed, Bi-Directional Parallel I/F
- ✓ Energy Star Compliant to help save the environment
- ✓ Straight Paper Path for problem free printing
- ✓ 200 A4 sheet input, 100 A4 sheet output
- ✓ 12 months Return-To-Base Warranty
- ✓ Optional On-Site Alternatives

INKJET

CANON	ITEM NO.	PRICE
BJ10SX Black	71605-N	£1137
BJ10SX White	71606-N	£1137
BJ200	71112-N	£1180
BJ230	91525-N	£1239
BJ300	71393-N	£344
BJ330	71394-N	£389
BJC-4000 Colour	76084-N	£310
BJC600 Colour	73863-N	£328
BJC800 Colour	94805-N	£1065

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STYLUS 400	76050-N	£1139
STYLUS 800+	75400-N	£1172
STYLUS 1000 (A3)	73842-N	£1318
STYLUS COLOUR	75397-N	£1342

HEWLETT PACKARD

Deskjet 320	76042-N	£1169
DeskJet 320 with Support	76263-N	£205
DeskJet 320 & CSF	76125-N	£198
DeskJet 320 & CSF with Support	76264-N	£215
DeskJet 520	72904-N	£1199
DeskJet 520 with Support	76078-N	£237
DeskJet 500C Col	94080-N	£199
DeskJet 500C with Support	76242-N	£256
DeskJet 560C Col	72905-N	£345
DeskJet 560C with Support	76092-N	£395
DeskJet 1200C/PS	71750-N	£1012
DeskJet 1200C Col	71694-N	£650
DeskJet 1200C with Support	76093-N	£729
DeskJet 1200C/PS Col	74010-N	£1298
PointJet XL300 Col	71569-N	£1212
STAR Star S1144	73981-N	£178

See Warranty Key Below

LASER/THERMAL PRINTERS

Make/Model	ITEM NO.	PRICE
Brother HL-6 1MB, 6ppm	72827-N	£428
Brother HL-6V, 6ppm	74085-N	£463
Brother HL-630, 6ppm	76038-N	£353
Brother HL-660 GDI	76595-N	£474
Brother HL-1260 GDI	76596-N	£945
Brother HL-10H, 10ppm	73224-N	£983
Epson EPL-5200, 6ppm	71436-N	£469
Epson EPL-5600, 6ppm	75350-N	£594
Epson EPL-9000 A3 8ppm	76686-N	£994
Epson EPL-9000PS A3 8ppm	76687-N	£1275
Fargo PrimeraPro Col. Therm.	76725-N	£1099
HP LaserJet 4L, 4ppm	71690-N	£389
HP LaserJet 4L & Support	73002-N	£483
HP LaserJet 4ML, 4ppm	73283-N	£741
HP LaserJet 4P, 4ppm	74212-N	£598
HP LaserJet 4P & Support	72719-N	£715
HP LaserJet 4 MP, 4ppm	74274-N	£855
HP LaserJet 4 Plus, 12ppm	75158-N	£946
HP LaserJet 4 Plus & Support	75159-N	£1090
HP LaserJet 4V 16ppm	76029-N	£1425
HP LaserJet 4V with Support	76131-N	£1575
HP LaserJet 4MV 16ppm	76030-N	£2049
HP LaserJet 4MV & Support	76464-N	£2199
HP LaserJet 4M Plus, 12ppm	75106-N	£1270
HP LaserJet 4M Plus & Support	76463-N	£1405
HP LaserJet 4Si 16ppm	71692-N	£2099
HP LaserJet 4Si with Support	76113-N	£2525
HP LaserJet 4Si/MX, 16ppm	71756-N	£2999
HP LaserJet 4Si/MX & Support	76462-N	£3385
HP Colour LaserJet A3	76698-N	£4375
Man Tally T9005, 5ppm	93749-N	£328
Man Tally T-Win, 4ppm	75455-N	£249
NEC SuperScript Color 3000GDI Thermal	76775-N	£CALL
NEC SuperScript 610+, 6ppm	76558-N	£279
NEC SuperScript 660, 6ppm	76565-N	£405
NEC SuperScript 660i, 6ppm	76566-N	£545
OKI OL400ex, 4ppm	71495-N	£279
OKI OL410ex, 4ppm	74833-N	£385
Panasonic KX-P4400, 4ppm	72716-N	£284
Panasonic KX-P4401, 4ppm	75743-N	£350
Panasonic KX-P4430, 5ppm	94780-N	£489
Panasonic KX-P4440, 10ppm	74084-N	£775
QMS CS210 - Color Thermal	73495-N	£1895

QMS CS230 - Color Thermal	73496-N	£5475
Star WinType 4000, 4ppm	75478-N	£297
Star WinType 800C Thermal	75700-N	£595

See Warranty Key Below

DOT MATRIX PRINTERS

EPSON	ITEM NO.	PRICE
LX-300 9 Pin	75451-N	£90
LX-300 Colour Kit	75452-N	£29
LX-1050 9 Pin	94390-N	£173
FX-870 9 Pin	71036-N	£224
FX-1170 9 Pin	71018-N	£282
LQ-100 24 Pin	92089-N	£98
LQ300 24 Pin	76651-N	£146
LQ 150 Mono Pin	75956-N	£116
LQ-570+ 24 Pin	71610-N	£188
LQ-870 24 Pin	94019-N	£352
LQ-1070+ 24 Pin	73860-N	£283
LQ-1170 24 Pin	94020-N	£406
Epson DLQ-3000 24 Pin	75959-N	£672
NEC		
PinWriter P2Q 24 Pin	72782-N	£99
PinWriter P3Q 24 Pin	75589-N	£178
PinWriter P72 24 Pin	71499-N	£372
OKI		
ML321 9 Pin	71317-N	£365
ML395B 24 Pin	71795-N	£635
ML520 9 Pin	71482-N	£359
ML521 9 Pin	71483-N	£395
ML591 24 Pin	71020-N	£499
PANASONIC		
KX-P1150 9 Pin	72974-N	£91
KX-P3696 9 Pin	76648-N	£278
KX-P2023 24 Pin	73145-N	£119
KX-P2135C 24 Pin	76144-N	£129
KX-P3626 24 Pin	76649-N	£285
STAR		
LC100 9 Pin Col.	92667-N	£90
LC15 9 Pin	71797-N	£177
LC24-300	74065-N	£179
LC24-15 Mk II	72783-N	£234
LC24-20 Mk II	72290-N	£113
LC-240 24 Pin Mono	76354-N	£90
LC-240 24 Pin Colour	76355-N	£103

See Warranty Key Below

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THERMAL	ITEM NO.	PRICE
BT DF100, Alpine	93668-N	£195
BT DF100, Dark grey	93614-N	£195
BT DF300, Alpine	76115-N	£325
BT DF300, Dark grey	76118-N	£389
Panasonic UF-V40	93938-N	£275
Panasonic UF-V60	93939-N	£359
SAMSUNG SF 40	93801-N	£199
SAMSUNG SF 500	92016-N	£198
FAX/ANSWERING		
Panasonic UF-V60	93939-N	£359
BT DF200 Alpine	93618-N	£249
BT DF200 Dark grey	93669-N	£249
BT DF400, Dark grey	76116-N	£325
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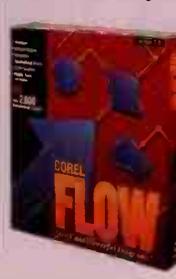
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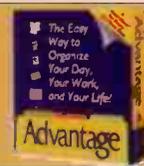
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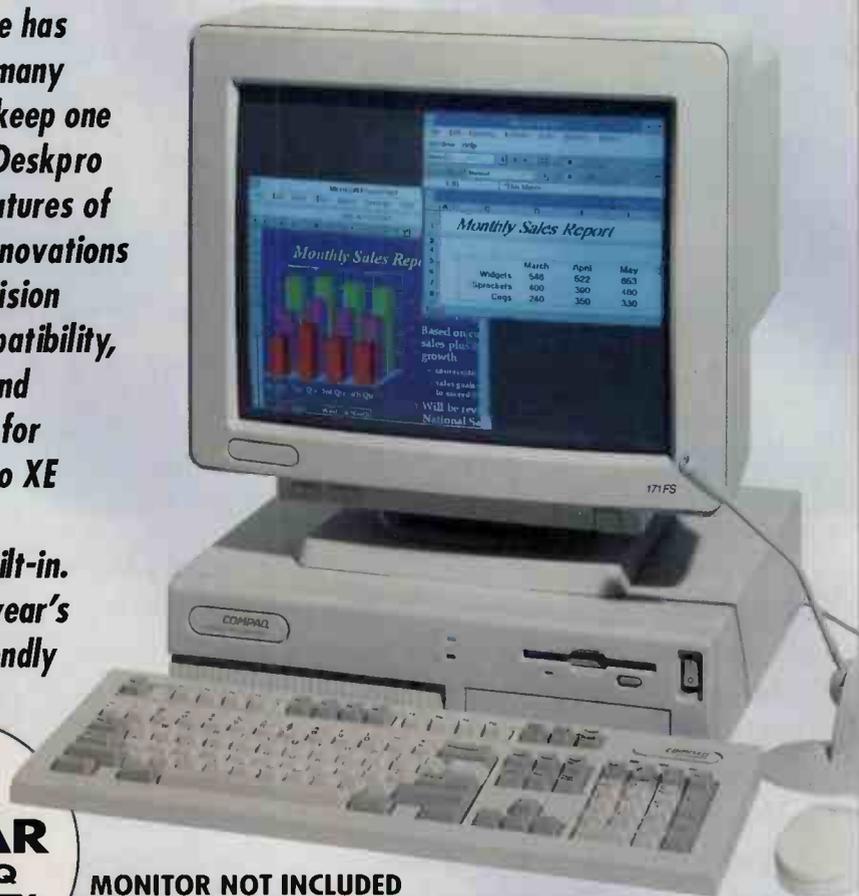


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MORE VERSATILITY

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MORE WAYS TO WORK

Windows is easy when you've got the choice of mouse, trackball or the integrated pen interface which not only makes 'mouse' operations quicker and more intuitive, it also means you can use your Compaq Concerto as a notetaker in meetings. The Compaq Concerto is much more than a standard notebook - the future is already built-in.

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- i486DX 25MHz processor with 8Kb cache and integral co-processor
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- 120Mb Hard Disk (250Mb option)
- 3.5" 1.44Mb floppy drive
- 2 PCMCIA Type II slots (or one Type III)
- 9.5" Compaq Maxlight VGA Mono Screen (supports simultaneous external display)
- Local Bus Video Graphics
- Integrated Detachable Keyboard
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- Enhanced Parallel, Serial, Mouse, VGA CD-ROM, Flexconnect Interfaces
- Mouse (P&P selected)
- NiMH Battery (3.5-4hrs)
- Energy Star Compliant
- MS-DOS 6.0, Windows for Pen, PenPower, InkWare NoteTaker pre-loaded*
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- Dimensions (mm) 305x229x51

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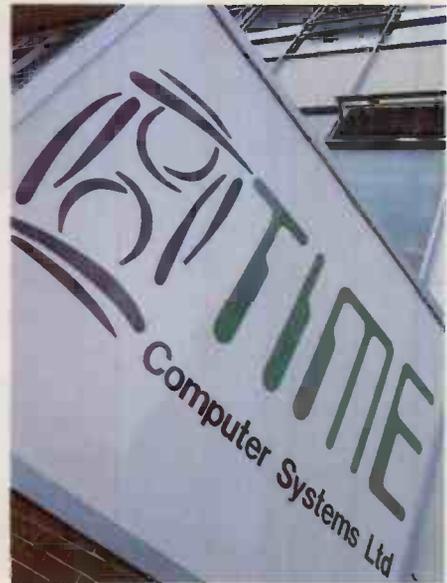
We were the first company to offer complete bundled solutions at affordable prices, the first to offer interest free credit in the direct PC market and the first in partnership with Ryman to successfully develop the direct retail showroom concept.



Time computers 'invented' the bundled PC solution for the mass market

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To ensure the satisfaction of our customers, we have developed a pre-sales advice and after-sales customer and technical support service that's second to none. We have invested heavily in our personnel and operations, to ensure our customers



The Time Logo is synonymous with Quality, Service and Value amongst consumers and small businesses (SOHO market).

receive the best service available from every department in the company. Staff are trained to be efficient and helpful, and we always endeavour to achieve complete customer satisfaction.

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Upgrade service enables you to keep your system future-proof

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- TOTTENHAM COURT RD
- KNIGHTSBRIDGE
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- CRAWLEY
- AYLESBURY
- MANCHESTER
- DARLINGTON
- IPSWICH
- BIRMINGHAM
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HOW TO ORDER

Look through the offers and decide on the solutions which interest you most. Then call our sales team on (01282) 777 111. They can provide further advice and clarify any points. You can place your order directly with your sales contact over the phone and give details of the system you require. Payment can be made using Access, Visa, Switch or American Express. You can also send your order by fax, or post, if more convenient, including a cheque for the full amount



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Time Computers have a showroom presence in the major Ryman Stores.

made payable to Time Computer Systems Ltd (please allow 5 working days for cheques to clear).

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After your order is placed and payment cleared (or credit agreement approved), your system will be tested and despatched by courier to your preferred address. If you are not in to receive the system, the courier will leave a message for you to contact the local depot and re-arrange delivery.

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£ 15 plus VAT (£ 17.63) for Printers and Peripherals

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INTEREST FREE EXAMPLE

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All these interest free prices include delivery & VAT

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Laser Pack £486.45	Laser Pack	£54.45	£18	£486.45
Total (Inc. Del & VAT) £1858.85	Totals	£250.85	£67	£1858.85

TOTAL CASH PRICE = TOTAL CREDIT PRICE
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.
The deposit may be paid by credit card or cheque. Most customers also purchase other options (e.g. floppy discs, 3 year extended warranty, Multimedia kit etc). Most of these are also available on Interest Free Credit whilst others can be paid for by increasing the deposit. Please call for details.



Lotus Time Machines

State of the art high performance 486 Local Bus systems (manufactured by IBM UK) complete with the best business, leisure and educational software at truly remarkable prices available direct from the UK's leading PC supplier. These new offers are available on Interest FREE Credit for a limited period only.

Time Machine 1MT



A powerful high specification Local Bus 486 PC system (manufactured by IBM) with 50MHz processor, at an amazing price of only £949 + VAT (£1137.40 inc. delivery & VAT) or just £29 per month on Interest Free Credit over 2 years.

PC Specification

- 50MHz 486 processor with 16k internal cache (IBM Blue Lightning) or 486DX2-66 processor (£148 +VAT extra)
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- 32-bit VESA Local Bus Windows Accelerator with 1Mb video RAM
- 14" 1024 X 768 0.28 dot pitch high resolution MPRII low radiation SVGA colour screen
- Mini-Tower (MT) case with 6 drive bays and 8 free expansion slots
- 4Mb RAM expandable to a 64Mb
- 3.5" 1.44Mb floppy drive
- Parallel port, mouse port and 2 serial ports
- IBM Mouse and 102 key keyboard
- Latest PC DOS 6.3 and Microsoft Windows 3.1 are preloaded
- 12mth warranty extendable to three years
- Manufactured by IBM UK
- Time Machine 1 normal price £989+VAT on limited offer at £949+VAT

Software (see page 12 for details)

- 5 Lotus pre-loaded Applications: Lotus 1-2-3, Ami Pro, Approach, Organizer & SmartPics.
- 7 Additional Business Applications: Pressworks, Designworks, TurboCAD, AutoRoute, Sidekick, Masterclips SE & Paciolli.
- 5 PC & Software Training Products: Windows Tutorial, Keyboard & Typing Tutorial, Individual Training for 1-2-3, Approach & Ami Pro.
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£29

per month. Interest FREE
Credit APR 0% over 2 years*

£129.40 deposit and 24 monthly payments of £42
or
£441.40 deposit and 24 monthly payments of £29
Total price £949 + VAT =
£1137.40 inc delivery & VAT

Time Machine 2



An expandable Colossus VESA Local Bus 486-50 PC system (manufactured by IBM) with 250Mb hard drive at an amazing price of only £999 + VAT = £1196.15 inc. delivery & VAT) or £39 per month on Interest Free Credit over 2 years.

PC Specification

- Super fast IBM 486-50 processor with 16k internal cache (IBM Blue Lightning)
- 250Mb hard disk (340Mb £70 + VAT extra)
- 4Mb RAM expandable to a 64Mb
- State of the art 32-bit VESA Local Bus Windows Accelerator with 1Mb video RAM
- 14" 1024 X 768 0.28 dot pitch high resolution MPRII low radiation SVGA colour screen
- Desktop case with 4 drive bays and 5 free expansion slots (2 VESA free)
- 3.5" 1.44Mb floppy drive
- Parallel port, mouse port and 2 serial ports
- IBM mouse and 102 key keyboard
- Latest PC DOS 6.3 and Microsoft Windows 3.1 are pre-loaded
- 12mth warranty extendable to three years
- Manufactured by IBM UK

Software (see page 12 for details)

- 5 Lotus pre-loaded Applications: Lotus 1-2-3, Ami Pro, Approach, Organizer & SmartPics.
- 7 Additional Business Applications: Pressworks, Designworks, TurboCAD, AutoRoute, Sidekick, Masterclips SE & Paciolli.
- 5 PC & Software Training Products: Windows Tutorial, Keyboard & Typing Tutorial, Individual Training for 1-2-3, Approach & Ami Pro.
- 7 Educational/Leisure Products: Fun School 4, Maths, Art & Letters Draw & the best arcade graphics games including DOOM, Raptor, Blake Stone & Pinball.

£39

per month. Interest FREE Credit
£260.15 deposit and 24 monthly payments of £39
Total price = £999+VAT = £1196.15 inc
delivery & VAT. APR 0%

Time Machine 3

The very expandable Colossus Tower Systems (manufactured by IBM) with a massive 8Mb RAM, large 340Mb hard drives and fast 486 processor at a truly amazing price of only £1149 +VAT = £1372.40 inc. delivery & VAT) or £49 per month on Interest Free Credit over 2 years.

£49

APR 0%
Interest Free Credit
LIMITED OFFER



per month. Interest FREE Credit

£196.40 deposit and 24 monthly payments of £49.
Total price = £1149+VAT = £1372.40 inc delivery & VAT. APR 0%

PC Specification

- Super fast IBM 486-50 processor with 16k internal cache (IBM Blue Lightning) or 486DX2-66 processor
- 340Mb 13ms fast IDE hard disk
- State of the art 32-bit VESA Local Bus Windows Accelerator with 1Mb video RAM
- 14" 1024 X 768 0.28 dot pitch high resolution MPRII lowradiation SVGA colour screen
- Versatile expandable Mini-Tower case with 6 drive bays and 8 free expansion slots
- Massive 8Mb RAM expandable to a 64Mb
- 3.5" 1.44Mb floppy drive
- Parallel port, mouse port & 2 serial ports
- IBM mouse and 102 key keyboard
- Latest PC DOS 6.3 and Microsoft Windows 3.1 are preloaded
- 12mth warranty extendable to 3 years
- Manufactured by IBM UK

Software

(see page 12 for details)

- 5 Lotus pre-loaded Applications: Lotus 1-2-3, Ami Pro, Approach, Organizer & SmartPics.
- 7 Additional Business Applications: Pressworks, Designworks, TurboCAD, AutoRoute, Sidekick, Masterclips SE and Pacioli.
- 5 PC & Software Training Products: Windows Tutorial, Keyboard & Typing Tutorial, Individual Training for 1-2-3, Approach and Ami Pro.
- 7 Educational/Leisure Products: Fun School 4, Maths, Art & Letters Draw and the best arcade graphics games including DOOM, Raptor, Blake Stone & Pinball.

486DX2-66 340Mb 8 Mb Model

£370.30 deposit and 24 monthly payments of £49.

Total price £1297+VAT = £1546.30

inc delivery & VAT.

Time Machine 4

A powerful high specification Pentium processor based PC system with 520Mb hard drive, PCI Local Bus, 8Mb RAM and superb 15" screen together with 24 of the world's best software programs at an amazing price of only £1799 +VAT (£2136.15 inc. delivery & VAT) or just £79 per month on Interest Free Credit over 2 years*.

£79

per Month. Interest FREE Credit

£240.15 deposit and 24 monthly payments of £79.
Total price = £1799 +VAT
= £2136.15 inc delivery & VAT.
APR 0%



PC Specification

- Intel Pentium 60MHz processor
- 8Mb RAM upgradeable to 128Mb
- 3.5" 1.44Mb floppy drive
- 520Mb 11ms fast PCI IDE hard disk
- 1024 X 768 PCI Local Bus Graphics with Windows Accelerator
- 15" Non-Interlaced high resolution 0.28 dot pitch, MPR II low radiation SVGA colour screen
- Desktop case with 5 drive bays and 8 slots (3 PCI)
- Parallel and two serial ports
- Microsoft compatible mouse & 102 keyboard
- MS DOS 6.22 & Microsoft Windows 3.11 for Workgroups pre-loaded
- 12mth warranty extendable to 3 years
- Manufactured in the UK by Mitac

Software (see page 12 for details)

- 5 Lotus pre-loaded Applications: Lotus 1-2-3, Ami Pro, Approach, Organizer & SmartPics.
- 7 Additional Business Applications: Pressworks, Designworks, TurboCAD, AutoRoute, Sidekick, Masterclips SE and Pacioli.
- 5 PC & Software Training Products: Windows Tutorial, Keyboard & Typing Tutorial, Individual Training for 1-2-3, Approach and Ami Pro.
- 7 Educational/Leisure Products: Fun School 4, Maths, Art & Letters Draw and the best arcade graphics games including DOOM, Raptor, Blake Stone & Pinball.

OPTIONS

These items can be ordered by increasing the deposit.

RAM upgrade per 4Mb	£160 +VAT
486DX2-66 upgrade	£148 +VAT
Maths co-processor for 486-50	£49 +VAT
256k Cache	£49 +VAT
Lotus bundle manuals	£69

INTEREST FREE OPTIONS (See Pages 15 & 16)

	Deposit	24 monthly payments	Total
HP Deskjet 520 pack	£35.00	£12.75	£275.21 +VAT & Del
HP Deskjet 560C pack	£63.00	£23.00	£513.51 +VAT & Del
NEC/STAR Laser pack	£54.45	£18.00	£399 +VAT & Del
Double speed CD ROM	£19.08	£6.50	£149 +VAT
CD Multimedia pack 3	£64.32	£10	£259 +VAT
CD Multimedia pack 4	£39.32	£13	£299 +VAT
540MB mega bundle	£23.83	£8.75	£199 +VAT
Fax & Internet pack	£23.83	£8.75	£199 +VAT

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Sat. 9am-5pm



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*Interest Free Credit is available subject to status. Written quotations are available on request. Be sure you can afford the payments before entering into a credit agreement. See page 3 for ordering information and interest free example.



0% Home Office £49

Home Office 1: £196.40 deposit and 24 monthly payments of £49.
Total price £1149 +VAT = £1372.40 Inc. delivery & VAT.

PC Specification

- Super fast 50MHz 486 processor (Home Office 1) or 486DX2-66 processor (Home Office 2)
- 4Mb RAM (Home Office 1) or 8Mb RAM (HomeOffice2) expandable to a massive 64Mb
- 340Mb 13ms fast IDE hard disk
- State of the art 32-bit VESA Local Bus graphics with Windows accelerator and 1Mb video RAM.
- 14" high resolutions 0.28 dot pitch non-interlaced MPRII low radiation SVGA colour screen
- Colossus Mini-Tower case with 6 drive bays and 8 free expansion slots (2 VESA and 6 16-bit).
- 3.5" 1.44Mb floppy drive
- 2 serial, parallel, mouse & keyboard port
- 102 key keyboard and Microsoft compatible mouse
- PC DOS 6.3 and Microsoft Windows 3.1
- 12mth warranty extendable to 5 years
- Manufactured by IBM UK
- Microsoft Office and additional Microsoft Applications preloaded with on-line help (see below)
- 16 additional software applications (see below)

Limited Offer

Very expandable Mini-Tower systems (manufactured by IBM) with large 340Mb hard drive and fast 486 processors complete with Microsoft Office, other Microsoft Software and additional programs for just £49 per month on Interest Free Credit

Software Applications

Microsoft software together with 16 additional business, leisure and educational programs are preloaded on your Home Office bundle and the systems are ready for use.

Microsoft Software

- Microsoft Excel v5 for Windows
- Microsoft Word v6 for Windows
- Microsoft Powerpoint v4 for Windows
- Microsoft Mail for Windows licence only
- Microsoft! Works v3 for Windows
- Plus choice of ONE extra package (by voucher redemption; not pre-loaded) Offer ends 1st March.

Additional Software

- IMSI Windows Training Package
- Autoroute Express v3 for Windows
- DesignWorks v2 for Windows
- PressWorks for Windows
- Pacioli 2000
- TurboCAD v2 for Windows
- Borland Sidekick for Windows
- MasterClips SE
- Flying Fingers Typing Tutorial
- Arts & Letters Draw for Windows
- Fun School 4
- Fun School Merlin Maths
- DOOM
- Raptor
- Pinball
- Blake Stone

* For further details on software available refer to pages 12 onwards

HOME OFFICE 2

As Home Office 1 but with 486DX2-66 processor and 8Mb RAM £250.15 deposit and 24 monthly payments of £59.
Total price £1399 +VAT = £1666.15 Inc. delivery & VAT APR 0%.

INTEREST FREE OPTIONS

Please call for details of the following options which can also be purchased on Interest Free Credit with above systems.

(See Pages 15&16)

- CD Multimedia Pack 3
- CD Multimedia Pack 4
- Fax & Internet Pack
- HP DeskJet 520 Printer Pack
- HP DeskJet 560 Colour Pack
- NEC or Star Laser Pack

Winstations

High performance tower systems with Lotus software suite from just £599 +VAT!

PC Specification

- Intel 486sx-25 or 486DX2-66 Processor
- 4Mb RAM expandable to 32Mb (8Mb models at extra cost)
- 3.5" 1.44Mb floppy drive
- 127Mb or 340Mb IDE hard disks
- 32-bit local bus graphics with windows accelerator
- 14" 0.28dp Non-Interlaced SVGA MPRII low radiation colour screen
- Colossus Mini-tower case with 6 drive bays and 8 16-bit free slots
- Parallel, mouse and 2 serial ports
- 102 keyboard and Mouse
- PC DOS 6.3 and Windows 3.1

WinStation 1 486SX-25 127Mb.....£599
WinStation 2 486DX2-66 127Mb ...£699
WinStation 3 486SX-25 340Mb.....£698
WinStation 4 486DX2-66 340Mb ...£798

Software

(see page 12 onwards for details)

The following software applications are preloaded. Lotus backup disks and printed manuals are available as options.

- Lotus 123 v5 Spreadsheet
- Lotus Ami Pro v3.1 Wordprocessor
- Lotus Approach v3 Database System
- Lotus Smartpics Graphics
- Lotus Organizer Personal Information Manager
- Autoroute Express v3 for Windows Electronic Road Atlas
- Pacioli 2000 Accounts
- 340Mb models come with extra software including:-
- Individual Training for Lotus 1-2-3, Ami Pro and Approach
- Lotus Smart-text On-line documentation
- GST PressWorks v2 for Windows
- GST DesignWorks for Windows

VESA WINSTATIONS

High performance 486-50 and 486DX2-66 VESA tower models with additional software. Also available on Interest free credit. Please call for details.

£599
£726.15 Inc. Delivery & VAT

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BUY NOW

* Pay only £130.75 deposit with NOTHING more to pay for 6 months

PC SPECIFICATION

Superb 486-50 system manufactured by IBM with 340Mb hard drive, 256K cache, fast VESA graphics and excellent screen.

- Fast 50 MHz 486 processor with 16K internal cache and fitted maths co-processor
- 256K high speed external CPU cache
- 340Mb 13ms super fast IDE hard disk
- 4Mb RAM expandable to 64Mb
- 32-bit VESA local bus 1024 x 768 graphics with 1Mb video RAM
- Expandable Mini-Tower case with 6 bays and 8 free slots
- 14" high resolutions 0.28 dot pitch MPRII low radiation non-interlaced SVGA colour screen
- 3.5" 1.44Mb floppy drive
- 2 serial ports, parallel port, mouse port & keyboard port
- 102 key keyboard and IBM mouse
- Latest PC DOS 6.3 and Microsoft Windows 3.1 pre-loaded
- 12mth warranty extendable to 3 years
- Manufactured by IBM UK

Time Machine 3s

A superb IBM manufactured Colossus system with the world's best software available on an incredible Interest Free Credit offer



SOFTWARE

The following state of the art software applications are pre-loaded and are ready for use. Documentation and on-line help is also pre-loaded in electronic format making it easy to learn these powerful applications**. See page 12 for details

- Lotus 1-2-3 v5 for Windows
- Lotus Ami Pro v3.1 for Windows
- Lotus Approach v3 for Windows
- Lotus SmartPics for Windows
- Lotus Organizer for Windows
- IMSI Windows Training Package
- Individual Training for 1-2-3
- Individual Training for Ami Pro
- Individual Training for Approach
- AutoRoute Express v3 for Windows
- Designworks v2 for Windows
- Pressworks for Windows
- Pacioli 2000 Accounts
- TurboCAD v2 for Windows
- Borland Sidekick for Windows
- MasterClips SE Clip Art
- Flying Fingers Typing Tutorial
- Arts & Letters Draw for Windows
- Fun School 4
- Fun School Merlin Maths
- DOOM Virtual Reality Game
- Raptor Flight Action Game
- Pinball Simulation Game
- Blake Stone Graphics Game

... PAY LATER £ 48.70 Per Month

* After 6 months pay just £48.70 per month over 2 years on Interest Free Credit.
Total price £1087 +VAT = £1299.55
Inc delivery & VAT APR 0%

66MHz 8Mb Time Machine 3s

As above specification but with 66MHz 486DX2 processor and 8Mb RAM £156.65 deposit, no further payments for 6 months, then 24 monthly payments of £58.00 Total price £1299 + VAT = £1548.65 inc delivery and VAT.

540Mb Mega Bundle

This upgrade is available for most Time Machine and PowerStation systems at point of ordering only. It provides an upgrade to a 540Mb hard disk and additional software. The Mega Bundle Includes:

1. 540Mb 11ms IDE hard disk upgrade instead of the 340Mb drive
2. Additional Software

This software is IN ADDITION to all the software coming with your Time Machine or PowerStation Bundle. See software pages for details.

- PC PaintBrush for Windows
- Picture Thist for Windows
- Bodyworks 3 for Windows
- Windelete for Windows
- Organize Your Way
- EZ Language Learn German
- EZ Language Learn French
- EZ Language Learn Spanish
- PFS: CV & Job Search Pro
- Computer Works
- Auto Works

540Mb Mega Bundle Upgrade is only available for the following 340Mb systems:-
On Interest Free Credit at £8.75/Month with the following Time Machines:-

- Time Machine 1 MT
- Time Machine 2 340
- Time Machine 3
- Time Machine 3S

(NOT available for Time Machine 4 or Home Office bundles) for £199 +VAT with the following PowerStation Bundles

- PowerStation 4
- PowerStation 3C

(Not available for Multimedia PowerStation Bundles)

The 540Mb Mega bundle upgrade for PowerStation bundles also includes TurboCAD for Windows, WindEASE, Masterclips SE, DOOM, Raptor, Blake Stone, Pinball and Arts & Letters Draw.



Per Month. £23.83 deposit and 24 monthly payments of £8.75.
Total price £199 +VAT = £233.83 Inc. VAT



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Tel: 01282 777 111. Fax No: 01282 770 701. All prices exclude delivery and VAT (17.5%). Business user prices shown. End user enquiries welcome. Mainland courier delivery is £19 + VAT. Visa /Access/ American Express /Switch, Government, Educational and Corporate orders welcome. Prices, specifications and offers are subject to change, availability, and subject to our conditions of sale copies of which are available on request. Mail order only. Goods are normally despatched within 7 days. All orders will be fulfilled within 28 days unless otherwise specified. All trademarks acknowledged. **All software applications are preloaded. Pack shots are shown for illustration only. Microsoft printed manuals and backup disks are available as options. E&OE.



PowerStation

4 LIMITED OFFER



£799
 £961.15 inc del & VAT
 486DX2-66 E899+VAT

A truly amazing high performance Colossus Tower PC (manufactured by IBM) with massive expansion potential, VESA Local Bus, 340Mb hard disk, Pentium upgradeability, and fitted with some of the fastest 486 processors currently available. All this together with the latest Lotus applications and other leading business products for an amazing £799 + VAT.

PC Specification

- Mini-Tower case with 6 drive bays and 8 free expansion slots
- 4Mb RAM expandable to 64Mb
- 340Mb 13ms Super fast IDE hard disk
- IBM 486-50 processor (enhanced 486-50 with 16k internal cache-IBM Blue Lightning) or 486DX2-66 processor (at extra cost)
- State of the art 32-bit VESA Local Bus Windows accelerator with 1Mb video RAM
- 14" Non-Interlaced high resolutions 0.28 dot pitch MPRII low radiation SVGA colour screen
- 3.5" 1.44Mb floppy drive
- 2 serial ports, parallel port, mouse port & keyboard port
- 102 Key keyboard and IBM mouse
- Latest PC DOS 6.3 and Microsoft Windows 3.1 are pre-loaded
- 12mth warranty extendable to three years
- Manufactured by IBM UK

Software Applications

The following state of the art software applications are pre-loaded on all the systems and are ready for use. Documentation and on-line help is also pre-loaded in electronic format making it easy to learn these powerful applications*. See pages 12 onwards for details.

- Lotus 1-2-3 v5 for Windows
- Lotus Approach v3 for Windows
- Lotus Ami Pro v3.1 for Windows
- Lotus SmartPics for Windows
- Lotus Organizer for Windows
- Individual Training for Lotus
- AutoRoute Express for Windows
- GST Pressworks for Windows
- GST Designworks v2 for Windows
- Pacio! 2000 Accounts

10 QUESTIONS TO ASK BEFORE YOU CONSIDER ANY OTHER BUNDLE

1. Are the systems manufactured in the UK? Our Power Stations are made by IBM in the UK (not in the far east by clone builders).
2. Is there enough hard disk space? We recommend 340Mb or more. 200Mb systems will probably need to be upgraded in the future. Remember a hard disk is the most difficult part to upgrade, whereas RAM & upgrade processors can easily be added later.
3. Is the monitor supplied high resolution with 0.28 dot pitch giving a sharp crisp image? A 0.39 dot pitch monitor gives a dotted image not suitable for SVGA.
4. Is the monitor supplied SVGA non-Interlaced giving you a flicker-free SVGA display?
5. Is the system expandable with plenty of drive bays and free expansion slots? This system has 6 drive bays and 8 free expansion slots including 2 free VESA slots.
6. Is the processor 50MHz or better? We recommend a 50MHz or 66MHz processor for Windows applications.
7. Is the RAM upgradeable beyond 32Mb and the system upgradeable to Pentium Technology?
8. Are Lotus 1-2-3 v5 spreadsheet (the most expensive Lotus product) and Lotus SmartPics Graphics included in any Lotus bundle?
9. Are comprehensive training applications included to enable you to get the most out of the main Lotus applications?
10. Do not be tempted by systems priced lower than £799 as these may compromise on quality, performance, specification, expandability, screen or software bundle.



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Tel: 01282 777 111 Fax: 01282 770 701. See Page 3 for ordering information. All prices exclude delivery and VAT (17.5%). *All software applications are preloaded. Pack shots are shown for illustration only.

MULTIMEDIA PowerStation

These include the PowerStation 4 Mini-Tower system bundle fully fitted with a high performance CD multimedia kit and CD software.

Multimedia PowerStation A

This costs only £898 +VAT (486-50 Models) or £998 +VAT for 486DX2-66 Model and includes the following:-

- All the features and software bundle of PowerStation 4 system opposite
- Double-speed multi-session CD-ROM drive, fitted and ready to use
- High performance 16-bit stereo soundcard and utilities
- High quality PC joystick
- Twin stereo speaker system
- Shareware CD with hundreds of megabytes of the best programs and games

Multimedia PowerStation B

These models are £40 extra to A models and include:-

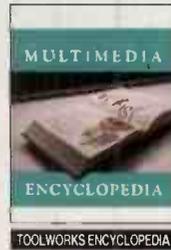
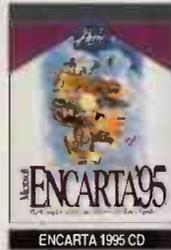
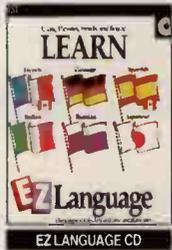
- All the features of multimedia PowerStation A
- IMSI EZ Language CD with French, German, Spanish, Russian, Italian and Japanese
- Zool 2 multimedia platform CD game
- Play and Learn educational CD for the home
- WordPerfect Mainstreet; Wallobee Jack CD-ROM, 'The Bingi Burra Stone' educational adventure
- WordPerfect Mainstreet; Wallobee Jack CD-ROM, 'The Thai Sun' educational adventure

£898

£1077.48 Inc. Delivery & VAT
486DX2-66 Model £998 +VAT



* The Software Toolworks Grollier Multimedia Encyclopedia on CD ROM is available with either model A or B for only £29 +VAT extra. Microsoft Encarta 1995 CD is only £59 +VAT extra.



PowerStations 1,2&3 £669

High specification Desktop VESA Local Bus systems manufactured by IBM with 486-50 or 486DX2-66 processor, various hard disks and bundled with superb Lotus and other applications. All this from just £669 +VAT!

£808.40 inc. Delivery & VAT



PC Specifications

- Desktop case with 3 bays and 3 free slot (1 VESA free)
- Super fast 486-50 processor (IBM Blue Lightning with 16K Cache) or 486DX2-66 processor
- 256K high speed cache on 3c model
- 4Mb RAM expandable to 64Mb
- 170Mb, 250Mb or 340Mb Super fast IDE hard disk
- State of the art 32-bit VESA Local Bus Windows accelerator with 1Mb video RAM
- 14" high resolutions 0.28 dot pitch MPRII low radiation Non-Interlaced SVGA colour screen
 - 3.5" 1.44Mb floppy drive
 - 2 serial ports, parallel port, mouse port & keyboard port
 - 102 Key keyboard and IBM mouse
- Latest PC DOS 6.3 and Microsoft Windows 3.1 are pre-loaded
- 12mth warranty extendable to 3 years
- Manufactured by IBM UK

Software Applications

Please see page 12 onwards for details:

- Lotus 1-2-3 v5 Spreadsheet
- Lotus Ami Pro v3.1 Word processor
- Lotus Approach v3 Database System
- Lotus SmartPics Graphics
- Lotus Organizer Personal Information Manager
- Individual Training for Lotus 1-2-3, Ami Pro and Approach
- AutoRoute Express v3 for Windows Electronic Road Atlas
- GST Pressworks v2 for Windows Art & Graphics
- GST Designworks for Windows Desktop Publishing
- Pacioli 2000 Accounts

PowerStation Models

- PS 1 170 486-50 170Mb£669
- PS 1 200 486-50 200Mb£699
- PS 2 486-50 250Mb£739
- PS 3c 486-50 340Mb£779
- PS 3c 486DX2-66 340Mb ...£879
- RAM upgrade to 8Mb£160
- 540Mb Mega Bundle for PS3c £199

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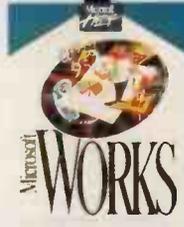
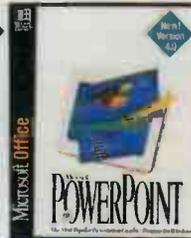
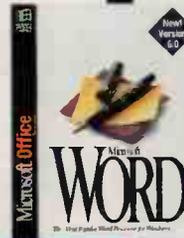


Office Suite 1

£ **899**
 £1078.65 Inc. Delivery & VAT



A high performance, high quality PC manufactured by IBM together with Microsoft® Office™ software and other superb Microsoft packages for a remarkable £899 +VAT!



PC Specification

- 486-50 processor (IBM Blue Lightning with 16k internal cache) or 486DX2-66 processor (at extra cost)
- 340Mb 13ms super fast IDE hard disk
- Colossus Mini-Tower case with 6 drive bays and 8 free expansion slots
- 4Mb RAM expandable to 64Mb (8Mb models at extra cost)
- 32-bit VESA local bus graphics with 1Mb VRAM and Windows accelerator
- 14" Non-Interlaced high resolution 0.28 dot pitch MPR11 low radiation SVGA colour screen monitor
- 3.5" 1.44Mb floppy drive
- Parallel port, mouse port and 2 serial ports
- 102 keyboard and IBM mouse
- PC DOS 6.3 and Microsoft Windows 3.1 are preloaded
- 12mth warranty extendable to 3 years
- Manufactured by IBM UK
- Please call for details of CD, Multimedia and Fax/Internet options

This superb Microsoft software bundle is preloaded on the hard disk of your PC system. It is ready to use complete with on-line help.*

Microsoft Software Suite

- Microsoft Excel v5 for Windows
- Microsoft Word v6 for Windows
- Microsoft Powerpoint v4 for Windows
- Microsoft Mail for Windows (Licence only)
- Microsoft Works v3 for Windows
- Microsoft Windows 3.1

Plus choice of ONE from selection (by voucher redemption; not pre-loaded) Microsoft Bookshelf, Microsoft Publisher, Microsoft Money, Microsoft Office Assistant, Microsoft Arcade & Entertainment Pack, Microsoft Scenes or Microsoft Office Training Video. Offer ends 1st March 1995.

Mitac 586

£ **1499**

£1783.65 inc Delivery & VAT

High performance Mitac Pentium Power Station System with the latest Lotus applications and other leading business products for an amazing £1499 + VAT (£1783.65 Inc. Delivery & VAT)

PC Specification

- Intel Pentium 60MHz processor
- 16K Internal and 256K external Cache
- 8Mb RAM upgradeable to 128Mb
- PCI Local Bus technology
- 3.5" 1.44Mb floppy drive
- 500Mb 11ms fast IDE hard disk
- 1024 X 768 PCI Local Bus Graphics with Windows Accelerator.
- 15" Non-Interlaced high resolution 0.28 dot pitch, MPR II low radiation SVGA colour screen
- Desktop case with 5 drive bays and 8 slots (3 PCI).
- Parallel and two serial ports
- Microsoft compatible mouse & 102 keyboard
- MS DOS 6.2 & Microsoft Windows for Workgroups 3.11 pre-loaded
- 12mth warranty extendable to 3 years
- Manufactured in the UK by Mitac

Software Application

- The following state of the art software applications are pre-loaded with all the systems and are ready for use.
- Lotus 1-2-3 v5 for Windows
 - Lotus Ami Pro v3.1 for Windows
 - Lotus Approach v3 for Windows Database
 - Lotus Organizer for Windows
 - Lotus Smartpics for Windows Graphics
 - GST Pressworks for Windows
 - GST Designworks for Windows v2
 - Autoroute Express v3 for Windows
 - Pacioli 200 Accounts
 - Individual Training for 1-2-3
 - Individual Training for Approach
 - Individual Training for Ami Pro

* For further details on software available refer to pages 12 onwards

Pentium 60 CD £1599 + VAT

As above specification but with the following enhancements

- Intel PCI Motherboard
- Intel PCI hard disk
- Diamond stealth PCI card
- Colossus 5 bay desktop case
- Larger 540Mb hard drive
- Double speed CD ROM controller
- Additional software
- Larger Time Machine Bundles of software

Pentium 90 CD £1899+VAT



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TWINHEAD

TOSHIBA

COMPAQ



Small lightweight Twinhead Subnotebook with Intel 486DX processor, 120Mb hard drive and 1.44Mb floppy drive together with the best Business Software Applications for only-

£799 + VAT
(£961.15 Inc. Delivery & VAT)

NOTEBOOK SPECIFICATION

- Intel 486DX-25 Processor
- Low power consumption SL Technology
- 4Mb RAM upgradeable to 12Mb
- 3.5" 1.44Mb External Floppy Drive
- 120Mb Removable IDE hard disk
- PCMCIA type II slot
- Built-in Trackball
- Superb 7.2" Crisp VGA Mono Screen
- Parallel, Mouse, Serial, Ext. Keyboard and Ext. SVGA Ports
- Powered by Battery or AC/Power Adaptor
- Carry Case
- Dimensions: 10x7x1.6 inches, Weight 3.9lb.
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TIME
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The Toshiba T1910 486 Notebook with the latest features together with Microsoft Windows and the best Windows Business Software Applications for only

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The amazing Compaq Contura TFT Colour notebook with Intel 486DX processor and the best Business Software Applications for only

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£1599

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Lotus General Business Applications

The following pages describe the software applications which may be included with your PC system. Please refer to the individual system offer to see which applications are included. In most cases software is pre-loaded with on-line help with an easy to use menu system enabling you to be productive instantly.

When it comes to general business applications, Lotus leads the world in high quality state of the art software products. Innovative preloaded Lotus Doc-on-line provides the complete set of Lotus manuals in electronic format to enable you to learn these applications quickly. The latest releases of these award winning applications incorporate all the advanced features to enable you to get the most out of your PC system. We firmly believe that the Lotus Suite of products is the best you can buy at ANY price and we recommend this range for your general business applications.

Lotus Ami Pro for Windows

Lotus Ami v3.1 for Windows is the latest version of this superb easy to use wordprocessing package that lets you write letters, produce documents and even write books. It includes advanced features such as different headers and footers on alternate page, outlining, and generation of a table of contents plus much more.

- **POWERFUL WORD PROCESSING**
SmartMerge provides a step-by-step guide to mail merge. Proof-read your work with the Spell Checker, Thesaurus and Grammar Checker. Produce an outline, table of contents and index in seconds.
- **GIVE YOUR DOCUMENT THE PERSONAL TOUCH**
With over 55 professionally designed style sheets that you can customise to suit your needs, it's easy to produce professional looking documents; everytime.
- **COMPATIBILITY WITH OTHER APPLICATIONS**
Read documents from a wide variety of sources, including WordPerfect, Microsoft Word and more. Do not worry if your company uses another brand, the built-in Switch Kit makes the transition to Lotus Ami Pro simple. You can also read a variety of spreadsheet, database and graphic files.
- **Drawing, Charting & Page Layout**
Create frames in your document for flexible placement of editable text and graphics, or create your own graphics with the built-in freehand drawing tools and over 25 different chart types.

Lotus 1-2-3 for Windows

Lotus 1-2-3 Release 5 for Windows (RRP £ 365 +VAT) spreadsheet is one of the most flexible applications available and will enable you to do virtually anything with numerical information.

It includes database functions as well as a wide range of scientific and financial ones. WYSIWYG will let you see the typefaces that you have included in your sheet on the actual sheet. Its' macro language will enable you to automate operations when performing complicated calculations and it can generate charts or graphs automatically, simply by highlighting an area of data on the sheet.

- **INCREASED PRODUCTIVITY**
SmartMaster templates give you a head start producing forecasts, financial statements and more. Lotus Maps displays your spreadsheet data on a colour-coded map. One-Step Charting creates a chart with a single click of the mouse.
- **THE LATEST IN SPREADSHEET PUBLISHING**
Multi-Page Print Preview displays up to 9 spreadsheet pages before printing. Fast Format copies formatting information from one range to another. Designer Frames give charts and tables a professional look.
- **DATABASE POWER AT YOUR FINGERTIPS**
Unique integration with Lotus Approach's data management capabilities lets you easily build forms and customised reports or rearrange views using Dynamic Crosstabs. You can now open dBase and Paradox files directly into your spreadsheet.
- **OLE2 SUPPORT**
Drag and drop. Move or copy your data between Lotus 1-2-3 files with visual mouse cues to assist you. No other spreadsheet can do this.
- **WORKGROUP READY NOW**
Version Manager allows multiple sets of data to be saved in the same cell, along with the "who, what, when and why" of each version. New Range Routing lets you mail a range to colleagues for input, then roll everyone's ideas back into your file.

Lotus Approach for Windows

New Lotus Approach v3 for Windows is basically a computerised filing cabinet but with very advanced features which allows you to handle any information with ease.

- **GETS YOU STARTED QUICKLY**
No other database will help you get started faster. You don't have to be a programmer to use Lotus Approach. Lotus Approach includes SmartMaster, templates for popular database applications and Assistants to quickly build your reports, mailing labels, forms, crosstabs and charts.
- **KEEPS YOU PRODUCTIVE**
With features such as NoteTab interface, Query by Form and SmartSummary calculations, Lotus Approach's built in usability keeps you productive as your requirements grow and change.
- **POWERCLICK REPORTING**
Generate professional reports with unprecedented ease. Customise reports with a WYSIWYG report writer that lets you see the changes as you make them.
- **UNRIVALLED INTEGRATION**
Lotus Approach offers transparent access to popular PC databases such as dBase, Paradox, FoxPro, Oracle, Access, and SQL Servers. Unrivalled integration enables you to report and analyse live Lotus 1-2-3 data.
- **POWER AND SPEED**
Full relational power. X10 speed technology, automatic record locking, crosstabs, charting and advanced macro capabilities ensure the ability to build powerful, customised applications.

Lotus Organizer for Windows

Lotus Organizer for Windows is a full-feature Personal Information Manager that allows you to manage your time & work. It is effectively your own personal secretary with some very advanced features.

- **PERSONAL ORGANIZER**
On-screen book appearance with section tabs and pages that turn to make you feel at home from the start.
The Calendar lets you arrange appointments and confirm meetings
The To Do List helps you keep track of every last detail.
The Planner gives the broader picture, making it easier to plan and monitor long term projects.
- **EASY LINKING**
Link entries from different sections for easy cross-referencing, then move freely and instantly among linked entries.
- **FLEXIBLE PRINTING**
Print in any page in formats designed to fit your manual planner. Create mailing labels sorted by specific criteria.

Lotus SmartPics for Windows

Lotus SmartPics Graphics consist of the finest Clipart, i.e. high quality images that can cover a wide range of topics and which can be easily incorporated into documents created by a wordprocessor, Spreadsheet, Desktop Publishing or Drawing Package.

Use these amazing colourful and versatile images when you need to add that extra sparkle to business presentations, or enhance memos, reports, overheads and handouts. Thirty general business categories include: realistic people, business symbols, international icons, computers, military, medical illustration, backgrounds and memorable cartoons - just to name a few.

Lotus Training for 1-2-3

Lotus Training for Ami Pro

Lotus Training for Approach

Individual Training Packages are provided for Lotus 1-2-3, Lotus Approach and Lotus AmiPro. The packages cover up to the previous version of each of the Lotus products. Lotus On-Line help covers the latest information on the new Lotus releases.

These packages help you master your PC and software in less time than any other method. They include high quality graphics and sharp screen displays and a glossary of key terms. Individual Training offers you complete step-by-step training to teach you everything you need to know, from the basics to the most advanced topics. These programs provide you with a quick and easy method to master new skills and to advance in the software applications.

Individual Training offers extensive topic coverage and helps you understand basic to advanced skills, concepts, menus and on-screen messages. Guided Lessons allow you to advance at your own pace and provide practice sessions with useful examples, illustrations and helpful hints to make learning easy. Quiz sections at the end reinforce learning.

Other Business Software Applications

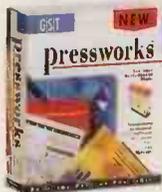
In addition to the main-line business application (such as Word-processing, Spreadsheet, Database etc.) there are other programs which are very useful for business and professional use. We have selected the best products to be included with some of our systems.



GST DesignWorks v2 for Windows

GST Designworks v2 for Windows (RRP £ 149 +VAT) is a powerful drawing package like CorelDRAW that allows you to create logos and other business graphics. Drawings created can also be used in other applications such as a Desktop Publisher or a Wordprocessor.

DesignWorks is the ideal design tool for adding flair and impact to your work. Whether you want to create a logo for your newsletter, add professional graphics to presentations and reports, or create a colourful poster or eye-catching invitation. DesignWorks gives you the power to do all of this quickly and easily.

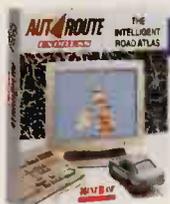


GST PressWorks for Windows

PressWorks (RRP £ 149) Is a full-feature Desktop Publishing Program (DTP) with a wealth of powerful features and lets you produce full colour reports, memos, presentations, advertisements, brochures and catalogues. In fact, just about any printed page where good presentation is important. PressWorks supports OLE2, text, graphics, colour, word processing, spell check with thesaurus, paragraph styles, powertext, typefaces, templates, language support, clip art, text run-around, typography, photo CD and screen snapshots.

Some other GST utilities are included with GST PressWorks and DesignWorks:-

- **GST SNAPSHOT**
allows you to create a snap of all or part of the screen which can be saved, imported into a document or drawing package and edited or printed.
- **GST CLIPART BROWSER**
allows you to look at the clipart supplied.
- **GST PHOTO CD BROWSER**
lets you search through and select Photo images stored on a Photo CD-ROMs which can then be exported (as windows bitmaps) to other applications.
- **GST KEYPAD**
helps you to insert non-keyboard characters and symbols into documents in your windows application E.g. Maths symbols and accents.



Autoroute Express UK v3 for Windows

Autoroute Express for Windows (RRP £ 99 +VAT) is a colourful, computerised road atlas, with simple-to-read maps and easy-to-follow directions. Forget fumbling with fold out maps or messing with mileage charts. Autoroute takes all the trouble out of travel. Just tell Autoroute when and where you're starting and where you're heading. Just set your driving style and speed. Autoroute takes it from there, showing the quickest routes, fastest routes, country routes, most economical routes - in fact, which ever route is right for you. So before you hit the road on business or head off on holiday, check the route with Autoroute.



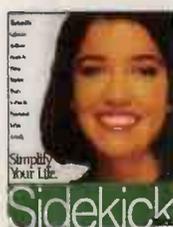
Pacioli 2000 Accounts

Pacioli 2000 is a full featured accounting software package that combines ease-of-use with the power and features required by most businesses. Help is given so that people who are not fully fledged accountants, can use this program. Pacioli features eight fully featured modules including Nominal Ledger, Stock Control, Invoicing and Budgeting. This package outperforms many accounting systems costing over £500.



IMSI TurboCAD v2 for Windows

TurboCAD v2 for Windows (RRP £99 +VAT) is a full-featured desktop drawing and drafting (CAD) software that will have you creating professional drafting, plans and drawing with ease and with incredible speed. It is very advanced and powerful yet very easy to use. Now everyone can do Home Designs (Kitchens, Bathrooms) Business Floorplans, Landscapes and much more. Optional extra libraries of drawings are available for specialist use. Unlike other CAD programs, a maths co-processor is NOT required to run this excellent CAD program.



Borland Sidekick for Windows

Borland Sidekick is another excellent Personal Information Manager with a different flavour to Lotus Organizer. Sidekick is an all-in-one personal organiser that's fast, functional and friendly. It helps you keep on top of everything you've got going on. Keep appointment schedules, manage addresses and phone numbers, create To-Do lists, and track telephone calls.

IMSI Masterclips SE

Masterclips SE Intro is not an application but a collection of drawings. It includes some of the highest quality and creative clip art available. This can be used to highlight and enhance presentations, reports, proposals newsletters and other materials. Images are provided for use with most graphics software applications. The images are full colour and vector art files which allows the graphics to be recoloured, rotated, manipulated, and resized without jagged lines.

IMSI Windows Training

IMSI Wind Ease allows you learn Windows in less than One Hour. Wind Ease is perfect for beginners, allows you to start with the basic lessons and move to advanced Windows features at your own pace. There are dozens of tips and techniques that even the experienced Windows user can learn from. You will find loads of information on features you may never have used before. You are shown how to install and use other applications, how to set up printers and fonts, how to create time saving macros, and how to set up and run a DOS application under Windows.

Arts & Letters Draw

Arts & Letters Draw for Windows is another drawing package that is remarkable easy to use and which has a complete set of drawing tools, allows curve editing, 300 clipart images, 8 True Type fonts, and symbol libraries. WinDelete

WinDelete

WinDelete is the safe and simple Windows Uninstaller. When windows applications are installed, files may be placed in several directories. WinDelete tracks and logs all the files placed on your hard disk and allows you to uninstall these programs easily thereby making room for new programs and speeding up Windows performance. Incorporates easy point and click options with context-sensitive help.

Picture This! for Windows

Picture This! is the complete professional image manager and editor for anyone working with any type of images. It is the fastest, easiest way to organize and enhance your Images. This one package helps you keep track of your image files; organize them into albums; convert graphics files between popular formats (E.g. BMP, GIF, JPEG, PCX, TIFF and more); capture screen images on your computer; even do professional photo retouching (overlay, edge, sculpt, emboss and adjust colour and sharpness) and special effects. It supports Photo CDs and TWAIN scanners.

Organise your Way

Things to Do! Places to Go! & People to Seel
Organize your Way v4 for Windows bridges the gap between personal information managers (e.g. Sidekick) and complex contact managers by combining both of these functions to produce an easy, yet powerful information and contact manager. It includes a database, calendar, to-do-list, and a contact manger that offers unmatched ease-of-use and flexibility.

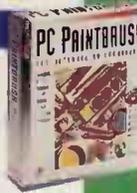
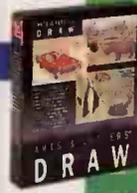
PFS: CV & Job Search Pro

CV & Job Search Pro for Windows enables you to tackle those job interviews with confidence. Create impressive CVs and cover letters that stand out. It incorporates a flexible CV Builder, a Job Search Manager as well as comprehensive wordprocessing features.

CV Builder automatically formats entire CV and includes templates for Business, Academics, Recent Graduates and more. Job Search Manager includes prospects database and allows scheduling of interviews and follow-ups.

PC Paintbrush for Windows

PC Paintbrush for Windows is the latest version of this classic professional painting package that includes very advanced features. This superb package is the ultimate in creativity and lets you create, edit, manipulate, colourize, texturize and Paint anything you can imagine! It ranks as No.6 on the IDC list of best selling software of all time. Other painting programs only give you a small taste of how much fun painting can be. PC Paintbrush is the ultimate and the art form of the future. Includes 87 painting tools; 14 kinds of paintbrushes, 5 kinds of air brushes, 4 spraycans, 6 pens, 4 markers, 4 crayons and much more

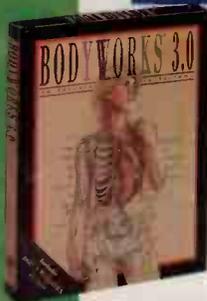


Educational & Leisure Software

The PC is quickly becoming the ideal vehicle for education. The latest educational programs provide all the information needed by children and make learning fun.

The latest multimedia PC games have overtaken the games consoles in quality and features. Some of the best educational programs and games are included with certain PC systems from Time Computers.

BodyWorks



BodyWorks v3 for Windows is the best selling interactive science adventure that lets you explore the human body. For all the fascinating "inside" information - how the eye sees, the inner workings of the heart, the different stages of pregnancy, experience Bodyworks and discover the miracle of the human machine.

- Colourful, photoquality graphics and vast database lets you study different internal systems (skeletal, muscular, respiratory, reproductive etc)
- Magnified views and cutaways reveal even the most elaborate cell structure and detailed animations bring the intricate functions of the body to life.
- Phonetic "Smart search" directs you to any part of the body and advanced "speech back" lets you hear the correct pronunciation
- Complete Health Section includes information on first aid, fitness, sports injuries, common illness, nutrition and more.
- Lesson plans and quizzes to enhance knowledge of the human anatomy
- Easy exporting of text and graphics to a wide range of printers for creation of customized reports for school and college.

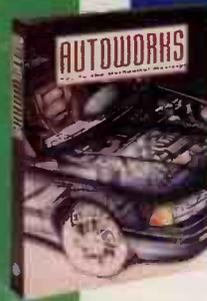
ComputerWorks



Computers have revolutionised the way we work, learn and play. Now you can explore the universe of microchips and megabytes on your own computer. From hard disks to software, ComputerWorks is your high-tech tour guide.

- Colourful animated graphics and comprehensive information highlight each component of the computer system, including the inner workings of monitor, drives, printers, CD-ROM, mice and other peripherals.
 - In-depth history of the computer covers the evolution of computers from 500BC to the present day.
 - Special "related topics" section explores key subjects including artificial intelligence, virtual reality, multimedia viruses, hacking, computer viruses and much more.
 - Detailed lesson plans and challenging quiz sections provide helpful instruction, teaching you all about computers.
 - Advanced interface lets you export text and graphics to create your own customized reports and print documents.
- Whether you are new to computers or just wanting to know more about how a CD-ROM works, how a CPU "thinks" and interacts with the main circuitry, ComputerWorks is your High-Tech Tour Guide.

AutoWorks



If you've ever looked under the hood at an engine and wondered what makes a car go... AutoWorks is your key to the mechanical mystery. Explore the world of spark plugs and pistons, fan belts and brakes, all without getting your hands greasy.

- Three-dimensional animated graphics bring to life the systems, structures and functions of your car with full-view displays, including top and side angles, show entire systems and how their parts interact.
- Detailed sections cover Engine (pistons, timing chain, camshaft, engine block) Drive train (Automatic transmission, Manual transmission, clutch, differential); Steering/Suspension (Ride joints, stabiliser bars, control arms, ball joints, shock absorbers); Exhaust/Emissions control (catalytic converter, alternative fuels, muffler/tailpipe); Fuel system (injection system, Turbocharger/supercharger); Cooling system (Thermostat, Radiator, water pump); Climate control (heating, air conditioning); brakes (disc/drum, anti-lock brakes, master cylinder); Electrical (starter, ignition, alternator, battery, spark plug); Safety system (air bags, seat belts)
- Fun car quiz tests your automotive knowledge and special trivia sections explore fascinating topics and print-out graphics and text for customized reports, and all graphics are exportable to PC files.

Fun School for Windows



Fun School 4 for children aged 7 to 11, contains six of the best selling Fun School series which will delight, entertain and, most importantly, educate your children in a wide variety of skills. Each of these programs has been designed by a team of educationalists following guidelines laid down by the National Curriculum. Fun School 4 is a unique learning package. It uses a variety of colourful and stimulating graphics along with numerous sounds which will encourage children's progress. There are three areas covered by this pack, Mathematics, Geography and History.

Fun School Merlin Maths



Fun School Maths (Merlin's Maths) has been carefully designed to help children aged 7 and over with simple mathematical concepts and calculations whilst at the same time, having fun playing the six games. Each of the games has three difficulty levels and within each level the questions get harder the longer the child plays.

EZ Language

The simple vocabulary and pronunciation tutor EZ Language is the fun and easy vocabulary and pronunciation tutor. In just minutes you'll be learning over 400 new words and phrases. It's like having your own personal language instructor available at your command. See pictures with the words and listen to native speakers' voices. This interactive program makes learning fun, fast and easy. Perfect for travellers, students, and others wishing to communicate in a new language.

- EZ Language French
- EZ Language German
- EZ Language Spanish

- A picture is worth a thousand words
- Colourful, descriptive graphics make learning fun and easy. Words and phrases appear in both English and the foreign language to help you learn.
- Hear the correct pronunciation and record your own voice
- Your PC speaker or soundcard lets you hear native language speaker say the word or phrase properly. Then you can practice speaking by recording your own voice with a microphone and sound card.
- Measure your success
- Multiple choice tests at the end of each section let you gauge your success. Review any areas where you need more practice or move on to the next lesson. You'll soon be speaking a new language.



Flying Fingers Typing Tutor



Flying Fingers is an interactive typing course which operates within Windows. It is designed to improve your keyboard skills with the minimum of effort. It's built in family of tutors will give advice, encouragement so that you can develop your word processing skills. You will learn how to create immaculate layouts for letters and other documents. Also lessons can be planned in advance with its built in timeplan.

DOOM



Knee-Deep in the Dead
Doom is the ultimate 3D adventure, bringing virtual reality action to your PC. This version includes 9 levels of 3D action and superb graphics. DOOM is the world's best selling graphics game! (Warning: This program may not be suitable for young children as it contains frightening monsters and violence! Delete DOOM facility is included for you to delete this game.)

Blake Stone



The Star Institute
Error reigns in this 3D action adventure. Set in a space station, you are British military agent Blake Stone, put into deadly combat with a mad scientist and his mutant army. Blake Stone uses the award winning technology from Wolfenstein 3D, plus added strategy and new graphical effects.

Raptor



Bravo Sector
ca (The Raptor is a warship, and you have been chosen to pilot it into enemy territory. With each ship and ground target you destroy, you will earn the cash to buy new technology for the next wave. Raptor offers 256-colour VGA smooth scrolling graphics.

Epic Pinball



Epic Pinball allows you to play pinball right on your PC. Smooth scrolling, lights, beacons and digital sound effect this game the best in its class. Epic Pinball bring ramps, sink holes, kickbacks, drop targets and multiple-ball play.

Multimedia Software & Hardware

Multimedia is the combination of standard text and graphics with sound, animation and video to produce a new generation of educational, business and leisure applications.

As a minimum hardware requirement a multimedia system should be a powerful 486 windows system with plenty of storage and include a soundcard and a double speed CD ROM drive. A wide range of multimedia software is available, usually on CD's as these provide enough capacity to store animation, sound and video data files. Examples of popular multimedia applications include interactive games, encyclopedias, educational/training software and presentation software.

CD ROM Multimedia Software



IMSI EZ Language (6 pack) Multimedia CD

Using pictures, words, and sound you can learn French, German, Spanish, Italian, Russian and Japanese. EZ Language is a simple vocabulary and pronunciation tutor on CD. You actually hear the correct pronunciation of word using this multimedia language product. Perfect for travellers, students and others wishing to communicate in a new language. Simple tests at the end of each section let you gauge your success.



Zool 2 Multimedia CD

The latest CD version of this excellent platform game is better than ever. Zool 2 features the Ninja of the Nth dimension, a karate expert living on planet Loox, and his female partner Zooz. Their mission is to defeat the evil Krool who wants to conquer the known universe.



WordPerfect Wallobee Jack Educational Adventures

These CD based educational adventures are suitable for young children.

1. The Bing Burra Stone CD

Help Wallobee Jack and his friends search for the mysterious Bing Burra Stone in Australia. Sydney Airport and Ayers Rock are just some of the destinations your children will learn about as they try to outwit the nasty Dragon and find the precious stone.



2. The Thai Sun Adventure CD

Your children learn about the Far East with more Wallobee Jack adventures as he and his friends try to stop evil Buffalo Bart from taking over Thailand.



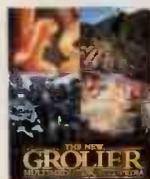
ShareWare CD

The Shareware CD is packed with over 600Mb of the best Shareware programs covering every topic. Simply install the programs you need onto your hard disk. Amazing value for money.



Play & Learn Multimedia CD

Play and learn has been developed for children between the ages of four to ten. It contains many excellent programs including ten colourfully animated games and a series of learning modules covering spelling and maths.



Software Toolworks Multimedia Encyclopedia

The amazing power of multimedia CD Rom technology has never been more evident than the Software Toolworks Grolier Multimedia Encyclopedia. Forget printed encyclopedias and get the best and most comprehensive multimedia encyclopedia available. Based on the contents of a 21 volume encyclopedia with over 33,000 articles. Five search and browse facilities enable you to source information quickly and easily.



Microsoft Encarta 1995

Microsoft Encarta 1995 is another superb multimedia encyclopedia based on the contents of a 28 volume encyclopedia. It includes over interactive charts & tables, stunning animation, videos, maps, charts, sounds and pictures. Available for a small extra cost with most multimedia bundles.

CD Multimedia Pack 3

£10.00

MTH INTEREST FREE CREDIT

£259 +VAT = (£304.32 Inc. VAT)

Also available on Interest Free Credit when bought with Interest Free Systems. £64.32 deposit and 24 monthly payments of £10. APR 0%

0% APR

The CD Multimedia Packs converts any of our standard systems into a full-feature multimedia PC. All the components are fitted and tested so that you can start using multimedia software immediately. Pack 3 includes the following:-



1. The latest Multi-session, Double Speed CD-ROM Drive that is fully Kodak phot-CD compatible.
2. Superb 16-bit stereo soundcard with excellent CD quality sound and integral Joystick port
3. Twin high quality speaker system
4. High quality PC games Joystick
5. Shareware CD of the best programs available
6. Wordperfect Wallobee Jack "The Bing Burra Stone" CD - children's educational adventure game.
7. Wordperfect Wallobee Jack "The Thal Sun" CD - children's educational adventure game.
8. Zool 2 Multimedia CD: Superb action packed platform game
9. IMSI EZ Language Multimedia CD: Using pictures, words and sound learn French, German, Spanish, Italian, Russian and Japanese.

CD Multimedia Pack 4

£13.00

MTH INTEREST FREE CREDIT

£299 +VAT = £351.32 Inc. VAT

Also available on Interest Free Credit when bought with Interest Free Systems. £39.32 deposit and 24 monthly payments of £13. APR 0%

The CD Multimedia Pack 2 includes everything in Pack 1 and further items including the Software Toolworks Multimedia Encyclopedia.

CD ROM Drives

£6.50

MTH INTEREST FREE CREDIT

Also available on Interest Free Credit when bought with Interest Free Systems.

£19.08 deposit and 24 monthly payments of £6.50. APR 0%

If you not wish to purchase one of the Multimedia Packs, A CD-ROM drive alone can be fitted to a 5.25" free drive bay within your system. All our CD-ROM's are designed to meet the requirements of the next generation Multimedia applications (MPC2 compatible). The unit combines double speed data transfer capability with fast access times and 16-Bit interface, providing leading edge performance, which are also Kodak Photo CD compatible. Double Speed CD ROM Drive Fitted

£149 +VAT = £175.08 Inc. VAT



16-Bit High Performance Sound Card

Fully MPC2 compatible with CD quality sound. CD-ROM Interfaces included
All necessary ports including speakers, CD Audio Input & Microphone, Line Input / Output and Joystick Port. Compatible with all popular standards including Adlib and SoundBlaster.

OUR PRICE £79.00 + VAT

Multimedia Options

- Standard Speakers...£ 18 +VAT
- Large Speakers.....£ 39 +VAT
- PC Joystick.....£ 19 +VAT
- Microphone.....£ 9 +VAT

TIME
Computer Systems Ltd.

Granville House,
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Fax & Internet Pack

£23.75 deposit & 24 monthly payments of £8.75
Total price £199+VAT=£233.82inc. VAT.APR 0%*

£12.75 MTH INTEREST
FREE CREDIT
Only with IF systems

Printer Packs

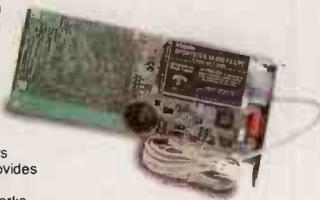
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APR

Our Fax & Internet Pack will be very useful to all PC users and we strongly recommend this option to enable you to get the most out of your PC. It includes the following:-

1. FAX & DATA MODEM

A high specification BABT Approved Sportster 14.4 V32bis modem from US Robotics which functions both as a Data Modem and a Fax Modem. It includes the following features: V32bis (high speed 14,400 bps speed and lower speeds for compatibility), full fax support, Error correction (to V42 & MNP 2-4 standard), Data Compression (to V42bis & MNP 5 standards), Auto answer/autodial and much more. This modem comes with a 5 year warranty from US Robotics in the UK.



2. QUICK LINK II FAX SOFTWARE

This comprehensive program works under DOS or Windows and features an easy to use Windows interface with context sensitive on-line help. It provides comprehensive features such as:-

- Foreground and background fax capability (works whilst you use other applications)
- Sends faxes from almost any application that has printing capability either immediately or at scheduled times (e.g. at cheap telephone rates)
- Broadcast faxes to multiple recipients in one operation
- Cover Pages Option which can include high quality customised graphics
- Printing received faxes is easy and can be done immediately or later
- Fax Phone List is maintained for sending faxes to frequently used numbers
- Export fax capabilities to save them as PCX, TIFF or other graphics files for editing in drawing programs such as Designworks

3. QUICK LINK II COMMUNICATIONS SOFTWARE

Quick Link Comms Software will also run under DOS and Windows and includes the following features:-

- Background file transfer with uploading and downloading of files whilst you use your PC for other uses
- Comprehensive Transfer Protocols available e.g. ASCII, Kermit, Super Kermit, Xmodem, Ymodem etc
- Terminal Emulation for ANSI, TTY, VT52, VT100 and VT102
- Complete Scripting Language lets you automate your log-on to on-line services
- 16c550 UART support to increase performance

4. MEMBERSHIP OF COMPUTSERVE ON-LINE SERVICES WITH INTERNET MAILBOX

- CompuServe Introductory Membership for the first month
- Usage credit of £10 to explore the chargeable services available
- WinCIM Windows Software that allows linking to CompuServe and enables you to use the services easily
- CompuServe user booklet (Membership Guide for Windows)

Here are just some examples of the CompuServe services available:-

- Electronic Mail, Communications and Bulletin Board facilities
- Links to Internet with Internet mailbox
- CompuServe Support Forums with free support & updates provided by major software and hardware companies such as Lotus, Microsoft, IBM and Novell
- News, Weather and Sports Services which is updated continually and access to Newspapers such as The Daily Telegraph, Guardian, Times etc
- Travel services with updated information on Airline schedules and fares with flight booking option. Information also provided on world-wide hotel rates, car hire, AA information on accommodation in UK, and advice on Visas, Immigration etc
- Electronic Shopping allows you to buy virtually anything
- Money Matters, Markets and Information Services with data on stocks, commodities and Money Markets. CompuServe's on-line brokerage facility allows you to buy and sell
- Entertainment and Games with access to many programs and multiplayer games
- Research, Reference and Health with access to over 900 databases including services such as MEDLINE

APPROVED for computer telecommunication systems specified in the conditions for use subject to the conditions set out in them

Scanners

A scanner allows you to input printed graphics and text into your applications. Logitech hand held scanners provide a convenient way to scan images as graphics files and text into wordprocessors via OCR software (Optical Character Recognition Software).



■ SCANMAN 32

- The Scanman 32 scale mono scanners are available with Catchword DOS or Windows software.

DOS Version

£89 +VAT

Windows Version at

£99 +VAT

■ SCANMAN 256

- The Scanman 256 features 256 grey scales (mono) and Phototouch Windows software

£129 +VAT

■ SCANMAN COLOUR

- Scanman Colour offers 24-bit true colour scanning as well as 256 grey scales, Phototouch Colour and AutoStitch software at

£329 +VAT

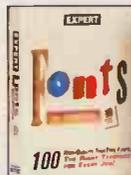
Tel: 01282 777 111. Fax No: 01282 770 701. All prices exclude delivery and VAT (17.5%). Interest Free Prices include delivery & VAT. Mainland Courier Delivery is £19 + VAT for systems and £15 +VAT for printers. Visa / Access / American Express / Switch, Government, Educational and Corporate orders welcome. Prices, specifications and offers are subject to change, availability, and subject to our conditions of sale copies of which are available on request. Mail order only. Goods are normally despatched within 7 to 10 days. All orders will be fulfilled within 28 days unless otherwise specified. All trademarks acknowledged. On bundled systems software applications are preloaded. Pack shots are shown for illustration only. Printed manuals and backup disks are available for a small extra charge. *Interest Free Credit available subject to status. Written details are available on request. Be sure you can afford the payments before entering into a credit agreement. Interest free example shown on page 3. E&OE.

Printer packs include leading inkjet and laser printers and come ready to use complete with PC printer cable and 4 excellent software packages. These packs are available on interest free credit from as little as £12.75 per month*



Intuit Quicken for Windows

Intuit Quicken v2 for Windows is the program that will help you to organise your personal finances. It looks and works just like your bank statement and cheque book - so there is nothing new to learn, no unfamiliar accounting terms and no complicated instructions.



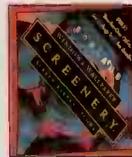
100 Fonts for Windows

Expert 100 fonts for windows contains a selection of 100 Serif, Sans Serif and Display fonts that are fully scalable and will work with all your windows applications that support fonts and will enhance the output from these printers.



Labels for Windows

Labels for Windows Labels, envelopes and bar codes - all in one simple package that runs under windows and supports these windows printers. Choose from over 120 label formats or create your own in any size. A program that will be useful for all users.



Borland Screenery

This amazing program provides superb wallpaper and screen savers when using windows. Make your windows desktop bright and colourful.

HP DeskJet 520 Pack

£12.75 MTH INTEREST
FREE CREDIT

£35 deposit and 24 monthly payments of £12.75.
Total price £275.21 + VAT = £341 inc. Delivery & VAT. APR 0%*

The HP DeskJet 520 mono printer offers 600 x 300dpi mono print quality with Hewlett-Packard's Resolution Enhancement technology, which offer 256 levels of greyscale for dramatic black graphics for Windows. Printing at up to 3 pages per minute in mono, depending on the complexity of the document. Our pack includes DeskJet 520 printer with auto sheet feeder, drivers for both DOS and Windows, 3 year limited Hewlett-Packard warranty, a shielded printer cable, and the above software



HP DeskJet 500C Pack

£16.00 MTH INTEREST
FREE CREDIT

£43.70 deposit and 24 monthly payments of £16.
Total price £349 + VAT = £427.70 inc Delivery & VAT. APR 0%*

The HP DeskJet 500C colour printer offers 300 x 300dpi mono and colour print quality. Printing at up to 3 pages per minute in mono and 4 minutes per page in colour depending on the complexity of the document. Our pack includes DeskJet 500C printer with auto sheet feeder, drivers for both DOS and Windows, 3 year limited Hewlett-Packard warranty, a shielded printer cable, and the above software.



HP DeskJet 560C Pack

£23.00 MTH INTEREST
FREE CREDIT

£69 deposit and 24 monthly payments of £23.
Total price £513.51 + VAT = £621 inc Delivery & VAT. APR 0%*

The HP DeskJet 560C colour printer offers 600 x 300dpi mono print quality and ColorSmart technology for clear, vivid colour output. The 560C has resident black and colour ink cartridges for convenient black and colour printing with switching cartridges. Printing at up to 3 pages per minute in mono and 4 minutes per page in colour depending on the complexity of the document. Our pack includes DeskJet 560C printer with auto sheet feeder, drivers for both DOS and Windows, 3 year limited Hewlett-Packard warranty, a shielded printer cable, and the above software.



NEC or STAR Laser Pack

£18.00 MTH INTEREST
FREE CREDIT

£54.45 deposit and 24 monthly payments of £18.
Total price £399 + VAT = £486.45 inc. Delivery & VAT. APR 0%*

The NEC SuperScript or the Star Winprinter are amongst the first personal laser printer designed specifically for Windows. Incorporating leading technology in a simple, compact design, these are the first laser printers that are driven by your PC's processor rather than their own. They offer ultra fast printing, with the first page printed faster than any conventional printer because of the PC-based GDI (Graphical Device Interface - which is Windows native language). Using resolution enhancement technology, these printers produce outstanding printer quality at a virtual 600dpi with solid blacks and fine half tones. Our packs include laser printer, a shielded printer cable, and the above software.

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Powerful PCD PCs

with **FREE On-Site Warranty**

All PC Depot systems come with a free one year on-site warranty with an 8 hour call out which covers anywhere in the UK and Ireland. An extended warranty is available for another one and two years. Please contact our sales team for further details.



pcD4000 Series

The **pcD4000** series features 486 sx, dx and dx-2 processors running at 33, 50 and 66MHz.

- 4Mb RAM (expandable)
- 486 VL-Bus Motherboard
- VLB IDE Enhanced Controller (2 x Serial, 1 x Parallel and one Games Port)
- 256k Cache
- 3.5" 1.44Mb Floppy Drive
- 1Mb VL-Bus SVGA Graphic Card
- Desktop Mini Tower Case
- 14" SVGA Colour Monitor
- 102 Key Keyboard
- 1 Year On-Site Warranty (optional 2 or 3 Year)

Model	Processor	250Mb	420Mb	520Mb	1.0Gb
pcD4330sx	486sx 33MHz	£639.00	£689.00	£719.00	-
pcD4500sx2	486sx2 50MHz	£659.00	£709.00	£739.00	-
pcD4330dx	486dx 33MHz	£679.00	£729.00	£749.00	-
pcD4500dx2	486dx2 50MHz	£699.00	£749.00	£769.00	-
pcD4660dx2	486dx2 66MHz	£729.00	£779.00	£809.00	£999.00

pcD5000 Series

The **pcD5000** Series features the startlingly fast Intel Pentium® processor running at 60, 66 or 90MHz and include:

- Intel CPU with Heat Sink and Fan
- 8Mb RAM (expandable)
- 256k Cache
- IDE Enhanced Controller (2 x FDD, 2 x Serial and 1 x Parallel Port)
- 3 x PCI and 4 x 16bit ISA Slots
- 3.5" 1.44Mb Floppy Drive
- 1Mb PCI Graphic Card
- Desktop or Mini Tower
- 15" SVGA colour Monitor
- 3 Button Serial Mouse
- 102 Key Keyboard
- 1 Year On-Site Warranty (extendable to 2 or 3 years)

Model	Processor	520Mb	1.0 Gb
pcD5900	Pentium® 90MHz	£1499.00	£1749.00

Value Multimedia Option

Our Value Multimedia option takes advantage of all the features of the **pcD4000** and **pcD5000** Series adding the following features:

- Desktop case
- External 25W Active speakers
- Panasonic dual speed internal CD-ROM
- Creative Labs SoundBlaster 16 Value
- Groliers Encyclopaedia CD
- Aldus PhotoStyler CD

Model	Processor	250Mb	420Mb	520Mb	1.0Gb
pcDM4330sx	486sx 33MHz	£839.00	£889.00	£919.00	-
pcDM4500sx2	486sx2 50MHz	£859.00	£909.00	£939.00	-
pcDM4330dx	486dx 33MHz	£879.00	£929.00	£949.00	-
pcDM4500dx2	486dx2 50MHz	£899.00	£949.00	£969.00	-
pcDM4660dx2	486dx2 66MHz	£929.00	£979.00	£1009.00	£1199.00
pcDM5900	Pentium® 90MHz	-	-	£1449.00	£1749.00

MultiMedia Bundles

- Bundle 1** Creative Labs SoundBlaster 16 Value
Panasonic 563 CD ROM
Groliers Encyclopaedia CD
Aldus PhotoStyler CD **Only £169**
- Bundle 2** Creative Labs SoundBlaster 16 Value
Panasonic 563 CD ROM
Microsoft Encarta '95 CD **Only £189**
- Bundle 3** Creative Labs SoundBlaster 16 Value
Panasonic 563 CD ROM
Speakers and Microphone
Microsoft Encarta '95 CD
Microsoft Works Version 3 CD
Microsoft Money Version 3 CD
Microsoft Golf Version 1 CD
Microsoft Scenes
Microsoft Ancient Lands **Only £249**

PC DEPOT

Units 7&8, 25 Greenhill Crescent,
Watford Business Park, Watford,
Herts WD1 8XU Fax: 01923 218876

Options

- MS-DOS V6.2 & Windows V3.11 **£75**
Upgrade to 8Mb **£109**
Upgrade to 16Mb (Pentium® PC only) **£209**

For other Multimedia options please call

Monitors

- 14" Super VGA** low radiation monitor. Features .39 dot pitch and a maximum res of 1024x768, Unbeatable value! **£129**
- 14" SVGA** Low Radiation.28DP Colour Monitor **£149**
- 14" SVGA**
Non Interlaced 1024x768, 0.28 low radiation, MPRII **£169**
- 15" SVGA** Energy saving * approved, flat screen, Non Interlaced FST 28DP, 1024x768 & 1280x1024, low radiation, MPRII **£259**
- 17" Idek Colour Monitor**
26DP, low radiation. Microprocessor for power control. **£569**



Components

VLB Green Motherboards

- 256K Cache, Upgradeable to 64Mb RAM, two 72 pin SIMMS & 30 pin SIMM sockets. 6 x 16Bit (ISA), 3 x 32Bit (VESA) Expansion slots. Ziff socket expandable to Intel DX4
- 486SX 33MHz VLB 256K Cache **£124**
 - 486SX2 50MHz VLB 256K Cache **£134**
 - 486DX 33MHz VLB 256K Cache **£164**
 - 486DX2 50MHz VLB 256K Cache **£154**
 - 486DX2 66MHz VLB 256K Cache **£179**

386DX 40MHz **£68**

Intel Pentium® PCI Motherboards

Includes 4 x PCI and 4 x 16Bit ISA slots, 256K, built in enhanced IDE controller, Pentium® overdrive Zif upgrade Pentium® 90MHz 256K/OK Motherboard **£685**

Green Motherboards without CPU

- 486 VLB 256K Cache (Spec. as VLB above) **£68**
- 486 VLB 8 x 30 pin sockets, 2 x 72 pin sockets **£78**
- 486 PCI/ISA Motherboard Onboard enhanced IDE, Fas serial card. **£129**

Intel Pentium® Motherboards

4xPCI and 4x16 bit ISA slots. 256K Cache and a Pentium® overdrive ZIF upgrade, built in enhanced IDE, serial, parallel ports

- Intel Pentium® Plato 90/100 Motherboard **£269**
- Pentium® 90/100 Motherboard, 256K Cache, SIS Chipset, 256K Cache (without built in enhanced controller) **£189**
- Dual Pentium® 90/100MHz Motherboards Call

Pentium® 75MHz Motherboard Please Call

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CPU Intel Processors

- 486SX 33MHz **£59**
- 486SX2 50MHz **£69**
- 486DX 33MHz **£99**
- 486DX2 50MHz **£89**
- 486DX2 66MHz **£115**
- Pentium® 90MHz **£429**

Cooling Fans

- 486DX **£8**
- Pentium®: 60/66MHz **£9**
- 90MHz **£9.50**

Hard Drives

- 260Mb IDE **£109**
- 340Mb IDE **£129**
- 420Mb IDE **£145**
- 520Mb IDE **£159**
- Seagate 1Gb **£379**
- 540Mb SCSI **£189**
- 1.0Gb SCSI **£379**
- 2.0Gb SCSI **£799**

CD ROMs

- Mitsumi FX300 CD ROM Triple speed internal, includes interface **£85**
- Only **£149**
- Panasonic CR-562B Internal Dual Speed 320ms. Motorised Tray, MPC and Photo CD Standard **£89**
- Blue Point ICD-300 Internal IDE Dual Speed. No interface required. Just plug into your IDE controller and play! **£85**

CD Software Game Packs

- 5T 10 Pack Volume 1**
- Kings Quest: V
 - Siskier 7
 - Time
 - Man of the year
 - World Fact Book Enhanced
 - Best of Media Clips
 - World Vista Atlas
 - PC Karaoke Classics
 - CD-ROM of CD-ROMs
 - PC Animation Festival
 - Doom (Shareware)
 - Episode One: Knee Deep in the Dead
- 5T 10 Pack Volume 2**
- Sherlock Holmes Consulting Detective Vol.1
 - Space Quest: IV
 - Battle Chess
 - PC Karaoke - Family Fun
 - Rock Rap 'n' Roll
 - Multimedia Jumpstart
 - Move Select for MPC
 - Home Medical Advisor V3.0
 - Arts & Letters War Birds
 - 2000 Fonts by Fantasia
- MegaMedia 11 Mega Pak**
- Mike Ditka Ultimate Football
 - F-14 Tomcat
 - Links - The Challenge of Golf
 - The Savage Empire
 - Dinosaur Safari
 - Imagination
 - Frealon! Funky Fuzz Balls
 - Audubon's Birds
 - Audubon's Mammals
 - Magic Death: Virtual Murder II
 - The Passion

Memory

- 1Mb SIMMS 70ns (3 Chip) **£27**
- 1Mb SIMMS 70ns (9 Chip) **£35**
- 4Mb SIMMS 70ns (3 Chip) 30 Pin **£99**
- 4Mb SIMMS 70ns (72 Pin) **£99**
- 8Mb SIMMS 70ns (72 Pin) **£209**
- 16Mb 70ns (72 Pin) **£399**
- 32Mb SIMMS 70ns (72 Pin) **£850**

Graphics Cards

- ISA 256K VGA **£23**
- 512K VGA **£29**
- 1Mb SVGA Trident **£43**
- 1Mb SVGA Cirrus Logic AVGA3 **£49**

VLB/PCI

- 1Mb SVGA Cirrus Logic 5428 **£59**
- 2Mb Upgrade For above **£35**
- 1Mb Diamond Stealth 64 VLB/PCI **£105**
- 2Mb Diamond Stealth 64 VLB/PCI **£139**
- 2Mb VRAM Diamond Stealth 64 VLB/PCI **£239**
- 4Mb VRAM Diamond Stealth 64 VLB/PCI **£349**
- 1Mb Thunderbolt VLB **£99**
- 2Mb Thunderbolt VLB **£139**
- 1Mb Thunderbolt PCI **£75**
- 2Mb Thunderbolt PCI **£119**

For other cards please call

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BABT Approved Internal V32 Bis Fax Modem
14,400bps, 16550 UART for fast transfer, call back fast security, sync capability, error correction to MNP2-5 and V42 standards, data compression to MNP5 and V42 Bis standard. Complete with WinFax Lite **£85**

Controller Cards

- ISA Super IDE I/O Card 2 x HDD, 1 x Parallel, 2 x Serial, 1 x Game **£9**
- Parallel Card **£10**
- Fast Serial Card **£28**
- SCSI HDD/FDD Future Domain Compatible **£59**
- Mode 3 Multi I/O Controller **£29**

VLB Enhanced IDE I/O

- 2 x HDD, 1 x Parallel, 2 x Serial and 1 x Game **£19**
- Enhanced IDE I/O With two high speed 16550 UART **£49**

PCI PCI IDE (Mode 3) 4 x HDD (CMD 6400)

- PCI SCSI-2 (CMD 6500) **£169**

Cases

- Desktop Case 3 Digit LED Display, 8 Add on Card Slots. Dimensions: 41.5 x 36 x 16.5cm (d x w x h). Drive Capacity: 3 x 5.25", 2 x 3.5" 200W TUV Approved PSU **£49**
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- Hard Disk Fitting Kit **£8**

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- 3-Button Mouse **£8**
- ONLY £8 +VAT**

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To place your order or reserve your catalogue



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Bristol

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Bristol BS1 3LZ
Tel. 0272 304 804

Manchester

Centurion House,
129 Deansgate,
Manchester M3 3WR
061 831 7779

Birmingham

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Windows Problems? - Don't Panic!

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- ✓ FIRST AID tells you what caused the problem and fixes it at your request
- ✓ First AID explains problems in simple English
- ✓ FIRST AID provides solutions "on the spot"
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- ✓ FIRST AID has built-in support for multimedia and network environments
- ✓ FIRST AID is easy to use, it pops up automatically when there's a problem



FIRST AID's easy to use interface makes solving problems a snap!



ESSENTIAL for all non-techies!

What if your computer could fix itself?

FIRST AID is the first software package that will fix technical problems for you. It's like having a tech. support expert inside your computer! It's the essential utility for all "Non-Techies".

How does it work?

When an error message appears, FIRST AID pops up, analyses and explains the situation in plain English, then offers to fix it automatically. If you agree to FIRST AID's suggestion and click the 'Fix' button the problem will be corrected immediately. Rewriting system or configuration files need never be a nightmare again. BUT DON'T WORRY, all the changes you make are logged so you can print or even undo them later if you change your mind.

What sort of problems will it fix?

Every time a new application is installed on a Windows PC the configuration files (such as WIN.INI) are automatically modified and conflicts may occur. FIRST AID has a knowledge base that can detect and fix over 1,000 of these common configuration problems such as:

- Sound card and CD-ROM drive configurations
- OLE registration problems
- Errors in WIN.INI and SYSTEM.INI problems
- Network access
- Printing problems
- Misplaced drivers and DLLs
- Incorrect Parameter settings
- Bad Path settings

FREE BONUS - HyperText User Guide

In addition to FIRST AID's powerful problem fixing tools, there is also included a unique HyperText on-line user guide.

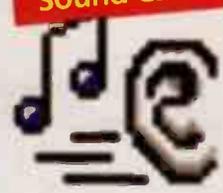
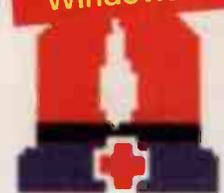
Packed with useful information, hints, tips and the accumulated wisdom of thousands of Windows experts, this HyperText guide acts as an invaluable reference as well as an effective learning tool.



Whether you need advice on hardware, software, printing or network issues - the HyperText User Guide tells you how to get the best performance from your system.



D.I.Y Windows Support...

<p>FIXES CD-ROMS</p> 	<p>CONFIGURES Sound Cards</p> 	<p>RESTORES Software Apps</p> 	<p>OPTIMISES Windows™</p> 
<p>Resolve CD configuration problems instantly!</p> <p>CD-ROM drives, interfaces and drivers are notoriously difficult to install and configure. FIRST AID will test, configure and explain (in plain English) what it suggests is done and what will happen.</p>	<p>Test and optimise your Soundcard</p> <p>FIRST AID's Problem Panel will show any Driver problems and then solve any conflicts with a click of the Fix button. Then simply press the Test button and hear the results!</p>	<p>Solve application and setup operation conflicts</p> <p>FIRST AID fixes problems with INI files and missing application components for: Microsoft Office, Lotus SmartSuite, Quicken, CorelDraw, Fox Pro, Harvard Graphics, WordPerfect, Perfect Office, and many more!</p>	<p>Windows fonts, printing and drivers made easy!</p> <p>FIRST AID will check and fix your entire Windows environment: Display, mouse, fonts, keyboard as well as File Manager, Program Manager and Program Embedding and more!</p>

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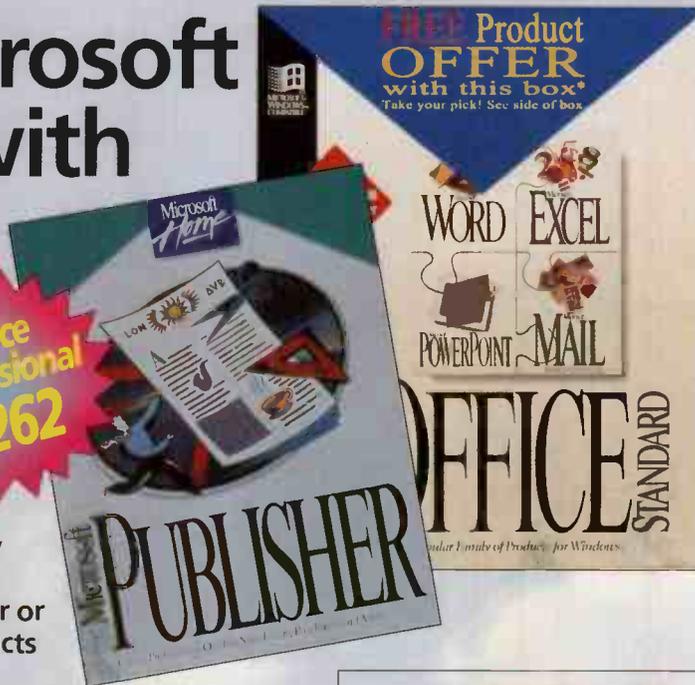
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User	1 Upgrade	2 Trade-up	3 New
Standard 4.2	£164	£264	£325
Professional 4.3	£262	£322	£425

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WinDelete is simply the best way to tidy-up your hard disk and improve the performance of Windows on your PC.

Microsoft

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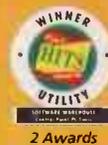
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4 Awards



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We currently have five stores nationwide offering a wide range of software at the lowest prices in any UK computer store!

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061 831 7779
- Birmingham**
6 Roman Way,
Coleshill Industrial
Estate, Coleshill,
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Tel. 0675 466 467
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28 Eastgate,
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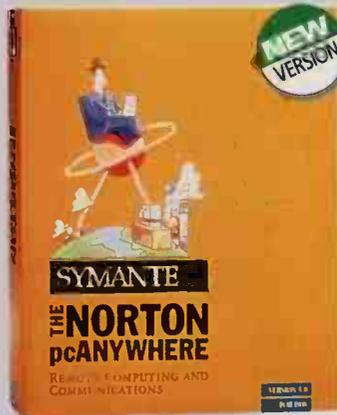
All prices are plus VAT and delivery. E & OE.

SOFTWARE WAREHOUSE

Even more great utilities from Symantec™!

There are 1, 25 and 50-pack licenses available on all Symantec products.

UTILITIES



Norton pcAnywhere V2 for Windows

pcAnywhere is the most reliable and easy-to-use software, trusted by over 1.4 million users!

pcAnywhere is invaluable to anyone who runs a network and demands the highest standards in productivity. pcAnywhere gives remote end users instant access to critical data and applications at their home, office or, indeed, anywhere! pcAnywhere is the proven leader in remote communications - with the proven reliability and security that you need.

NEW Features:

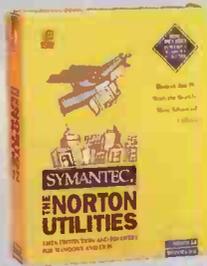
- *It's easier to Use.* 'Cue-Cards' displays help information automatically, depending upon the location of the user's

cursor. The Norton Assistant™ walks users through the configuration process and other common tasks. 'File Manager' now includes File Synchronisation, Clone and Compare to automatically synchronize files and directories on remote and office pcs.

- *Installation is easy and reliable.* 'Smart Setup' detects system configuration automatically, thereby minimising potential system conflicts.
- *You get reliable network access.* Supports all popular networks. Plus new TCP/IP support allows fast and reliable access to data across networks and improved integration of workgroups.
- *Improved security.* pcAnywhere provides password protection, data encryption, restrictable drive access, restrictable file transfer rights, host logs and can deny or acknowledge a call.
- *Designed to run under Windows 3.1 and Windows '95!*
- *Runs 25% faster than pcAnywhere 1.0!*

PC Anywhere V2 win	£95
PC Anywhere V5 DOS (NOR026)	£85

UTILITIES



Norton Utilities V8

The standard in PC desktop utilities.

The Norton Utilities is the award-winning program for data recovery, protection and system diagnostics. Aimed at enabling you to run your PC in tip top condition, it is designed to prevent problems before they occur, and to rescue you in case of a data emergency.

Incorporating classic data protection utilities such as Disk Doctor and Speed Disk and Calibrate, the Norton Utilities checks for problems on your hard disk before they occur, and optimises disk access times, to keep your computer running trouble-free and at peak performance.

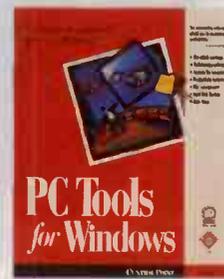
With the Norton Utilities, you will work with greater speed and safety on your PC than ever before.

Features:

- Powerful hardware diagnostics
- Exclusive data recovery and fast optimisation of DOS 6.0 Doublespace, Stacker, and Superstor compressed drives
- Repairs and optimises disks up to 2 gigabytes

Norton Utilities Version 8 (NOR022)	£85
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UTILITIES



PC Tools

The number one-selling utilities package for Windows.

There has never been an easier way to increase your productivity, protect your data and tune your system for maximum performance in Windows. Building on the success of the award-winning version 1.0, PC Tools for Windows 2.0 introduces many new features to improve the performance of your PC, whilst maintaining standards of quality and ease-of-use.

The favourite features from version 1.0 are still available, including MultiDesk for optimum organisation, Anti-Virus and Backup for data protection, file viewers including Word-Perfect DOS 6.0 and support for PKZip 2.x.

NEW Features:

- *CrashGuard* warns you before system resources reach critical levels and a crash is likely
- *System Consultant* now has a "Do-It" button to implement recommendations for better Windows performance
- *INI-Consultant* provides plain English descriptions of cryptic system files
- *File Companions* puts file management where you need it most - inside applications

PC Tools (Win) (PC0008)	£57
PC Tools (DOS) (PC0002)	£79

SYMANTEC TOP 10

Top 10 Selling Symantec Products

The Software Warehouse best-sellers.

1. PC Tools **£57**
2. Norton Utilities V8 **£85**
3. XTree GOLD 3.0 (DOS) **£69**
4. Act! for Windows **£149**
5. Norton SPEEDRIVE **£35**
6. First Act! Windows **£49**
7. Symantec C++ **£79**
8. Norton AntiVirus **£89**
9. Symantec C++ Prof. **£169**
10. First Aid **£49**

UTILITIES



XTree Gold Version 4 for Windows

The fastest way to manage and find your files in Windows.

XTree Gold for Windows performs file management just like XTree Gold for DOS. Same keystroke sequences, same menus, same commands. So if you already use XTree Gold for DOS, you'll find it really easy to use XTree Gold for Windows.

In addition, there are a host of new features. Like WYSIWYG file viewers for over 120 applications including Word v6 and Lotus 1-2-3 v4. SmartTabs give you access to user defined views of the file. File Companions let you manipulate files from within other Windows applications. Other features include PKZip 2.x support for file compression, SmartFind to locate the files you want and Undelete to recover them.

XTree Gold for Windows is ready to work with Windows '95, the next version of Windows, offering built in support for Windows '95's long filenames.

NEW Features:

- A Windows interface that uses the same keystroke sequences, menus and commands as XTree Gold for DOS
- Over 120 WYSIWYG file viewers
- SmartTabs & File Companions
- Support for Chicago (Windows '95)

XTree Gold for Windows (XTR005)	£59
XTree Gold for Networks (XTR003)	£139
XTree Gold for DOS (XTR004)	£69

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NEW LOTUS PRODUCTS!

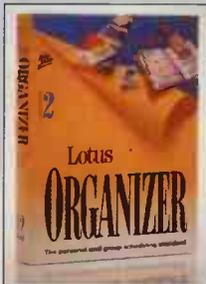
PIMS

Now, More Than Just a Personal Organiser!



Lotus Organiser 2.0

New Version 2.0 includes more flexible interface and greater workgroup productivity including calendaring, tracking to-do's, address keeping, an additional call logging section, a notepad for storing text + graphics, a yearly planner and anniversary reminder.



The No.1 selling Personal Information Manager now has over 100 new features including: Group scheduling for Lotus Notes and CC:Mail users; A thirty day calendar view; The ability to book conflicting and overlapping appointments; Attach files when scheduling a meeting; A "Calls" section for management of incoming and outgoing phone calls; On-the-fly views across all Organiser sections; Ability to categorise all entries; Over two dozen new print layouts; New Windows-based Organiser administration program and much, much more.

Version Upgrade (L07079) **£44.90**

STOCK CODE... L07088
CD RRP..... £99
OUR PRICE £89.00!
PRICE (INC. VAT)..... £104.58



SOFTWARE SUITES

NEW!! The No.1 Software Suite AND Lotus Notes Together!



Lotus NotesSuite for Windows

NotesSuite is the only group of applications designed to improve the productivity and responsiveness of teams by delivering true workgroup and multi-ser solutions

By combining the unique collaborative power of Notes with the familiar desktop tools of SmartSuite, Lotus NotesSuite provide s corporate teams with instant groupware solutions. With NotesSuite, companies can build effective office and business support systems.

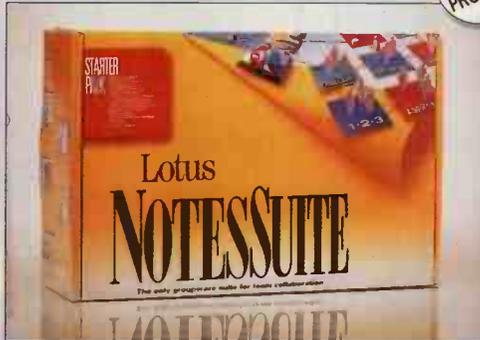
Including Lotus Notes Rel. 3.2 and the latest versions of SmartSuite applications: Lotus 1-2-3 Rel.5, AmiPro 3.1, Approach 3.0, Freelance Graphics 2.1, ScreenCam 1.1 and Lotus Organiser 2.0, NotesSuite features the NotesSuite Application Collection:

Introductory Application

This database contains descriptions of Notes, Notes/FX and specific Notes/FX applications to new users. It includes a full introduction to Notes infrastructure, a description of the business process capabilities and a listing of resources within the Notes community.

Library Application

These databases serve as corporate information sources that store everything from customised document templates to past and present sales presentations. Both SmartMaster and Freelance libraries use Notes to ensure that new or updated libraries are deployed throughout the organisation.



Business Process Applications

These databases leverage SmartSuite and Notes to automate business processes that manage the workflow for tasks such as Expense reports and Contact management. features include fully shared Workgroup Documents, Expense Reports, Contact Management, Customer Price Quoter and Customer Suggestions.

Information Services Applications

These databases provide up-to-the-minute news, financial and industry information that can be included in reports, competitive analysis and sales alerts.

License Pack (L07081) **£529**
License Pack Upgrade (L07082) **£429**

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OUR PRICE £849!
PRICE (INC. VAT)..... £997.58



SOFTWARE SUITES

Lotus SmartSuite 3.0 - Best-selling suite now available in NEW CD Version

We will not be beaten on Lotus!

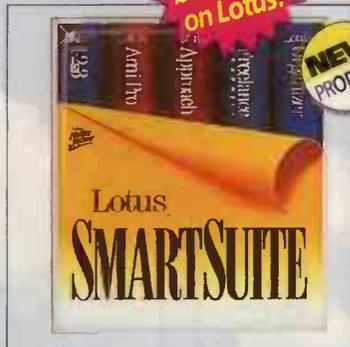


The best-selling software suite is now available on disk or CD. New version includes multimedia-help and quicker installation - ideal for multi-site license users.

The SmartSuite 3.0 CD-ROM Edition includes the 1-2-3 Release 5 spreadsheet, the Approach 3.0 database, the AmiPro 3.1 word processor and the Freelance Graphics presentation application, all specifically designed to take advantage of Notes /FX 1.1, the Lotus facility for exchanging data bi-directionally between desktop applications and Lotus Notes.

The SmartSuite CD-ROM also includes Lotus Organiser 1.1, the information manager and the multimedia screen and sound-capture utility ScreenCam 1.1. The SmartCenter Icon Palette is included and allows easy switching and drag and drop copying between applications.

The new CD version of SmartSuite offers MS managers all the software included in the disk-based version but with the added benefit of considerable time savings on installation and the time spent looking for Viruses, which are eradicated by virtue of the technology.



CD packaging may vary

Version Upgrade Disk (L07052) **£179**
Version Upgrade CD (L07076) **£179**
Comp. Upgrade Disk (L07052) **£249**
Comp. Upgrade CD (L07076) **£249**
Lotus SmartSuite CD (L07075) **£335**

STOCK CODE... L07065
RRP..... £399
OUR PRICE £335.00!
PRICE (INC. VAT)..... £393.63



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Massive Stocks

We always have at least 15,000 items in stock!

We have won more awards over the past 2 years than any other software supplier!



WORD PROCESSING

Lotus AmiPro V.3.1

The Best Windows Word Processor!

If you are looking for a word processor that's not only easy to use but packed with useful features, then look no further than Ami Pro. Using all the latest word processing features, AmiPro is the obvious choice for individuals and workgroups.

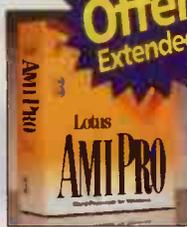
It also has the new Document Sharing Application that helps you to share and manage your files, and features 55 professionally designed style sheets for memos, fax sheets, reports.

Version Upgrade **£39**

STOCK CODE... L07039
CD RRP..... £299
OUR PRICE £89.00!
PRICE (INC. VAT)..... £104.58



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PERFECT OFFICE VERSION 3.0

New! Perfect Office-The

Only £149 for PerfectOffice Standard Edition if you own WordPerfect, NetWare or Quattro Pro. Or if you own any other manufacturer's application, it's only £179.

NEW PRODUCT



PerfectOffice 3.0 offers OLE 2.0 functionality in more programs than any other suite. So now you can simply drag and drop data between suite applications, ie. you can drag a chart from Quattro Pro into a WordPerfect document, or even edit a Presentations image while in a WordPerfect document.

New tools to make life easier

The Desktop Application Director (DAD) is a customisable toolbar that makes navigation through the Perfect Office suite a snap. With DAD you can switch among applications, manage, locate and view files, and automate common tasks with a mouse click. For convenience, DAD can be located anywhere on the desktop as a floating palette.

Simple task automation

QuickTasks™ is accessible from your Desktop Application Director (DAD) toolbar and allows you to automatically perform tasks from your desktop, without opening particular applications. You can use QuickTasks to automatically create



Launch applications directly from DAD (Desktop Application Director)

The Perfect Place to Work

Perfect Office Version 3.0 for Windows offers you a completely integrated suite of powerful business applications - Trade up now with Software Warehouse and save yourself £££££!

It comes in two separate editions: Standard and Professional. The Standard edition comes with the applications numbered 1-6 below (WordPerfect 6.1, Quattro Pro 6.0, Presentations 3.0, InfoCentral 1.1, Envoy 1.0a, GroupWise 4.1) while the professional edition includes 7 & 8 (Paradox 5.0, Visual App Builder) as well.

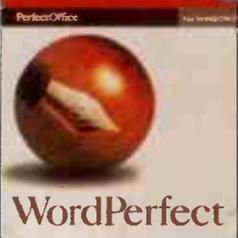
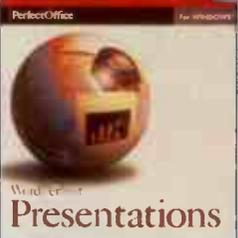
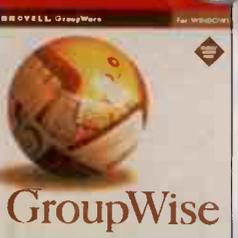
True Integration

PerfectOffice 3.0 integrates software like no other suite available today. A new PerfectFit™ technology takes you beyond common look-and-feel integration to a suite that offers complete inter-connection between programs. With a common user interface, all your programs share consistent toolbars, pull-down menus and key dialogue boxes. Each program looks and feels alike - making it easy for you to master each application quickly and with the minimum of fuss.

Looking for a software suite that offers unbeatable value for money for the home or office?

Perfect Office is the ideal choice. Offering more power and flexibility than an integrated package, with greater integration than stand-alone applications Perfect Office can meet all your business needs. It is easy to learn too! All the applications share a common look and feel so you will be up and running in no time.

GET ALL THESE POWERFUL APPLICATIONS IN PERFECT OFFICE!

<p>1 <small>Start Work in no time!</small></p> <p>NEW VERSION</p>  <p>WordPerfect 6.1</p> <p>The world's best-selling word processor in history - the Perfect way to create better documents.</p>	<p>2 <small>Start Work in No time! Numbers Count</small></p> <p>NEW VERSION</p>  <p>Quattro Pro 6.0</p> <p>The award-winning spreadsheet that is the perfect way to make your numbers count.</p>	<p>3 <small>Start Work in no time!</small></p> <p>NEW VERSION</p>  <p>Presentations 3.0</p> <p>The perfect way to sell your ideas with graphics-based information.</p>	<p>4 <small>Start Work in no time!</small></p> <p>NEW PRODUCT</p>  <p>GroupWise 4.1</p> <p>The perfect way to share information, a powerful integrated E-mail/work-group productivity package.</p>
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Tel. 0675 466 467

Leeds

28 Eastgate,
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SOFTWARE WAREHOUSE

PERFECT OFFICE VERSION 3.0

Perfect Place to Work.

letters, send and receive faxes, update spreadsheets from databases, open E-mail, generate mail merges and any number of other common tasks. In fact if you can do it in Perfect Office, QuickTasks can automate it.

What You Mean Is What You Get

Perfect Office features new PerfectSense™; a number of intelligent word and grammar correction features far superior to anything currently available in other suites. For the first time What You Mean Is What You Get!

better English by automatically rewriting entire sentences for your consideration, correcting both spelling and grammatical errors. Complete sentences can be corrected in just one click of a button - proof reading your business letters just got a whole lot easier!

More custom possibilities

Automation tools such as QuickCorrect™, Coaches and Experts are all shared among all Perfect Office applications. PerfectOffice 3.0 has more common tools and common code across its applications than any other suite, making better use of

system resources and increasing efficiency.

Plus, there's PerfectScript™ technology which is the first cross-application scripting language that allows you to record automated processes and play them back. There are a variety of tools available for both novice users and professional third-party developers giving unparalleled control over PerfectOffice's powerful routines.

Need a software suite that meets the growing needs of your business?

Perfect Office not only fulfills your present business needs with powerful, innovative applications but also anticipates the future with true workgroup networking features. You can also customise PerfectOffice to build your own specific applications and interfaces. Call today and make your business fly!

Superior network integration

Because Perfect Office is a WordPerfect/Novell product it supports superior integration with network services. Perfect Office is the only suite to include a workgroup publishing tool for collaborative computing. Envoy™ enables users to electronically view, annotate and distribute documents across the network, while keeping full document formatting intact, including the use of colour and graphics. Envoy will often reduce file size too, conserving network resources as documents are distributed.

In short, The Perfect Office is a group of remarkably powerful and intuitive applications designed to work together perfectly as a standalone environment or across your network. Perfect.



A common user interface across application makes PerfectOffice easy to use and learn.

The intelligent find and replace feature actually understands the meaning of words and their different forms. For example you can search for all forms of 'go' (go, goes, went, gone, going) and replace them with corresponding forms of 'fly' (fly, flies, flew, flown, flying) automatically!

PerfectSense will also help you write

<p>5 NEW PRODUCT</p> <p>Order files to view documents and collaborate electronically.</p> <p>Envoy 1.0a</p> <p>The versatile tool that provides the perfect way to view any document and collaborate electronically.</p>	<p>6 NEW VERSION</p> <p>Get files to see people, places & things.</p> <p>InfoCentral 1.1</p> <p>The innovative personal information manager. The perfect way to organize people, places and things.</p>	<p>7 NEW VERSION</p> <p>Only included in Professional Suite</p> <p>Order files to see your data.</p> <p>Paradox 5.0</p> <p>The powerful database that is easy to use. Includes its own programming language.</p>	<p>8 NEW PRODUCT</p> <p>Only included in Professional Suite</p> <p>Order files to see shared!</p> <p>Visual App Builder 1</p> <p>A fifth generation visual programming tool and application developer.</p>
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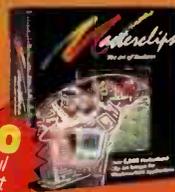


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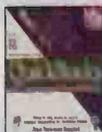


As authorised resellers for all the products we sell, there were representatives from the major software publishers present at our recent Birmingham store opening party. In the picture (left), joining in the fun with Steve and Cliff Bennett of Software Warehouse were Microsoft, Borland, SoftKey, WordPerfect, IMSI, Logitech, Stac, Intuit, DataStorm, Delrina, Andromeda, and Symantec. We'd like to thank all our suppliers for their support and look forward to continued growth through 1995.

ACCOUNTS

QuickBooks 2.0 for Windows

Easy to use and quick to learn, it's a breakthrough approach to accounting!



Designed specifically for business people rather than accountants, QuickBooks is the easy way to speed through book-keeping chores, arriving at the critical information your company needs to make better business decisions fast. Let QuickBooks manage all aspects of invoicing, credit control, expense tracking and bill-paying, along with painless VAT tracking.

STOCK CODE QUI016
RRP £99
OUR PRICE £87.90!
PRICE (INC. VAT) £103.28



SAG021	WIN Sage Accountant +2	£194
STE006	DOS Sage Accountant v6	£161
SAG022	WIN Sage Accountant Plus +2	£275
STE005	DOS Sage Accountant Plus v6	£243
SAG020	WIN Sage Bookkeeper +2	£79
STE008	DOS Sage Bookkeeper v6	£52
SAG019	WIN Sage Financial Controller +2	£357
SAG010	DOS Sage Financial Controller v6	£320
SAG013	DOS Sage Fin. Controller Multi User	£508
SAG012	DOS Sage Job Costing	£107
QUI016	WIN QuickBooks	£88
TAS001	DOS Tas Books	£85
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Fully integrated accounting software, ideally suited to the small business.

Pegasus Solo is ideally suited for every small business, incorporating Sales, Purchase and Nominal ledgers along with invoicing and stock control, allowing you to keep track of customer's and supplier's transactions. Produce statements and debtors' reports, as well as handling all of your VAT requirements.



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ACCOUNTS - PERSONAL & SMALL OFFICE

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QUI020	WIN Quicken Home Inventory	£19
QUI004	DOS Quicken	£29
SAG023	WIN Sage Moneywise	£24
SAG015	WIN Sage Invoicing	£24

CAD

TurboCAD Version 2 for Windows

TurboCAD, the top-selling low-cost Windows CAD software, now features new 'drag and drop' capabilities and is easier to use and more powerful than ever.

TurboCAD for Windows Version 2 combines easy to use 'drag and drop' features with the precision of conventional CAD methods. It's so advanced it's actually simple!



TurboCAD will increase your productivity from the moment you open the box. The new interface and user configurable preferences mean configuring TurboCAD to work the way you do is simple.

Making TurboCAD easier to use hasn't made it any less powerful. In fact, new features like context-sensitive toolbars, Fillet and Chamfertools and OLE 1.0 support make TurboCAD the choice of professionals too.

FEATURES INCLUDE:

- 'Drag and drop' handle-based editing allows you to quickly move, rotate, stretch and align any number of entities
- Movable control points let you reshape curves and polylines easily
- Double-line drawing with automatic 'fill' option for walls and piping
- Automatic fill and hatching for closed shapes
- TurboTools™ local, context-sensitive floating toolbars appear with a right button mouse click
- Globally change line styles, colours and more
- Adjustable ortho-angle
- Smart Dimensioning™ with fully automatic and associative features, both decimal and fractional
- Define and recall 'styles' for often used patterns, fills, layers, colours etc.

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PRICE (INC. VAT) £66.90



CAD (CONTINUED)

Over 70 symbol libraries are available for TurboCad, they include....

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TCW005	WIN TCL Basic Electronics	£18
TCL001	DOS TCL Basic Home Design	£18
TCL022	WIN TCL Basic Home Design	£18
TCL039	WIN TCL Bathrooms	£18
TCL031	WIN TCL Business Flowcharting	£18
TCL033	WIN TCL CMOS Library	£18
TCL023	WIN TCL Construction Details	£18
TCW062	WIN TCL Drafting Aids	£18
TCL025	WIN TCL Electrical Power	£18
TCL008	DOS TCL Electrical Wiring	£18
TCL024	WIN TCL Electrical Wiring	£18
TCL072	WIN TCL Electric Motors	£18
TCL064	WIN TCL Fasteners	£18
TCL003	DOS TCL Furnishings	£18
TCW007	WIN TCL Furnishings 2	£18
TCL026	WIN TCL HVAC	£18
TCL040	WIN TCL Kitchens	£18
TCL041	WIN TCL Landscaping	£18
TCL061	WIN TCL Local Area Networks	£18
TCL032	WIN TCL Networking Diagrams	£18
TCL009	DOS TCL Plumbing	£18
TCW006	WIN TCL Plumbing	£18

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LEEDS, Eastgate0532 448 540
READING.....OPENING SOON
NOTTINGHAM.....OPENING SOON



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Index and Key to our Listings

For this issue we have increased the number of new titles and lowered many of our prices. In addition, we have re-designed the way we list them. We hope categories and individual products will be easier to find.

Remember, prices change constantly so if you do find it cheaper, call us. We will try to beat any advertised price!

SUBJECTS ARE ARRANGED ALPHABETICALLY

Accounts	Languages - Tutoring
Accounts - Personal	Leisure & Games
CAD	Leisure Bargains
CD Utilities	Management - PIMS
Communications	Mapping
Communications - Fax	Music & Literature
Databases	OCR
DTP	Operating Systems
Education/Reference	Screensavers
Graphics - Presentations	Spreadsheets
Graphics - Charts	Utilities
Graphics - Clip Art	Videos - Training
Graphics - Design	Word Processing
Graphics, Labels & Forms	
Graphics - Image Editing	
Integrated	
Languages - Programming	

KEY
CD Requires CD Drive
SL Site License available

CAD (CONTINUED)

Floorplan Plus 3D

Now you can design and plan your home, office or garden quickly and easily.



Everything you need is here: large libraries of furniture, fixtures, fittings, landscaping and so on, definable wall types that break when windows and doors are inserted, floor coverings, wiring, plumbing - the lot. You can even produce a bill of materials list which can be exported in 'Estimator Plus' for a detailed costing.

With this 3D version, you can now see your design in 3D, walking around in 'virtual reality' style!

FastCAD

STOCK CODE ...THR002
RRP .....£99
OUR PRICE £63.90!
PRICE (INC. VAT) .....£75.08

THR005 WIN 3D Estimator Plus	£44
THR002 WIN 3D FloorPlan Plus	£64
THR006 WIN 3D FloorPlan Plus + Estimator	£79
THR004 WIN 3D FloorPlan Plus + 3D Design	£109
THR003 WIN 3D Design Plus	£89
AUT025 WIN AutoCAD LT	£369
AUT027 WIN AutoSketch v2	£149
AUT019 DOS AutoSketch v3	£61
AUT013 WIN AutoSketch Electrical Lib	£65
AUT014 WIN AutoSketch Architectural Lib	£65
HOM004 DOS Bathroom Design by Autodesk	£39
DRA004 WIN Drafix CAD	SPECIAL OFFER £49
EAS004 DOS EasyCAD	£99
EXP002 WIN Expert Home Design	£19
FAS003 DOS FastCAD	£335
GEN001 DOS Generic CAD	£359

KeyCAD Complete for Windows

High performance CAD at your fingertips.



Produce drawings, plans and layouts to perfect scale and accuracy. But that's only the beginning, the only limit is your imagination. Whether you're an inventor, hobbyist, craftsman, electrician, architect or contractor, KeyCAD Complete for Windows takes you step by step from concept to realisation. Plus, there are over 375 symbols included for Home, Mechanical, Electrical, Landscape and Architectural design use.

STOCK CODE ...KEY002
RRP .....£39
OUR PRICE £29.49!
PRICE (INC. VAT) .....£34.85

Softkey

CAD (CONTINUED)

AutoCAD LT for Windows

Ideal for architects, engineers, designers and contractors.

AutoCAD LT is ideal for those who don't need the power and sophistication of AutoCAD. Extensive 2D drawings and editing features and the familiar Windows interface offer a great value alternative. You can extrude 2D drawings into 3D, perform shade and hide operations, and edit 3D drawing from AutoCAD. All drawings can then be used in AutoCAD.



AutoSketch 2 for Windows

AutoSketch for Windows combines CAD precision, drawing flexibility and Windows simplicity in one value-packed program.



Produce concept sketches, technical diagrams, architectural layouts, electrical drawings, patterns, illustrations, presentations, and information graphics. Freehand curve tools and line options give you the versatility to meet any need. Easy view features let you choose drawings, symbols and fonts with simple icons, allowing you to create professional illustrations quickly. Other features include: over 600 symbols, TrueType fonts support, DWG Write 4 upward compatibility with AutoCAD and DXF import/export.

AutoCAD LT	AutoSketch 2
STOCK CODE ...AUT025	STOCK CODE ...AUT027
RRP .....£499	RRP .....£199
OUR PRICE £369!	OUR PRICE £147!
PRICE (INC. VAT) .....£433.58	PRICE (INC. VAT) .....£172.73

GEN002 DOS Generic CAD Trial Pack	£9
HOM002 DOS Home Design by AutoDesk	£39
HOM003 DOS Kitchen Design by AutoDesk	£39
PLA001 WIN Planix - Space Planning	£99
TUR018 WIN TurboCAD v2	£57
TUR012 WIN TurboCAD Professional	£159
TUR019 DOS TurboCAD v3.2	£57
TUR017 WIN TurboCAD 10-user license	£169

CD UTILITIES

Corel PowerPack

Add functionality and fun to your CD-ROM drive!



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Plus you get a bonus of two more CD-ROMs - Corel Professional Photos Sampler and a sound clips CD - and a pair of KOSS headphones.



STOCK CODE ...COR016
RRP .....£49
OUR PRICE £25.98!
PRICE (INC. VAT) .....£30.53

CD5001 CD Speedway	£29
COR016 Corel CD PowerPack	£26
ACE002 MediaBlitz by Asymetrix	£59
PRO030 Professor Multimedia	£29
SOU005 SoundWorks	£15
SOU025 Sounds of Multimedia	£19
NOR017 Symantec SpeedDrive	£29
WIRO01 Wired For Sound Pro	£39

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Magic Media

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Includes: Animation Works brings animation to PC users. Halo Desktop Manager is a complete imaging utility. AudioDirector lets you edit sounds on your system. AddImpact allows you to incorporate animation and sound in OLE programs. ScreenCraze lets you brighten up your Windows with animations and video. ClipMedia contains clip-art and sound files.



STOCK CODE ...GOL001
RRP .....£59
OUR PRICE £39.98!
PRICE (INC. VAT) .....£46.98

COMMUNICATIONS

CAR003 WIN Carbon Copy v2.5	£76
CAR001 DOS Carbon Copy Plus v6.1	£76
CRO001 WIN Cross Talk v2.1	£67
LOT055 WIN Lotus CC-Mail Mobile Release 2	£119
LOT051 WIN Lotus CC-Mail 10-User License	£259
MIC206 WIN MS Mail Server	£299
MIC199 WIN MS Post Office Workgroups U/G	£235
NOR016 WIN Norton PC Anywhere v2	£94
NOR004 DOS Norton PC Anywhere v4.5	£94
NOR023 WIN Norton PC Anywhere Host	£58
NOR024 WIN Norton PC Anywhere Remote	£58
PRO003 WIN Procomm Plus EC v1.02	£57
PRO004 DOS Procomm Plus EC v2.10	£54
PRO015 DOS Procomm Plus S-User LAN	£269
REF001 WIN Reflections v4	£219
SMA001 WIN Smart Term 340 Emulator	£169
TER001 WIN Termite v3 Async	£159
TER004 WIN Termite v3 + Net for Windows	£235
TER003 DOS Termite v3 + Net for DOS	£235
DEL017 WIN WinComm Pro by Delrina	£54

COMMUNICATIONS - FAX

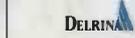
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WinFax Pro is the fastest, easiest and most convenient way to handle all of your faxing. It's the only one that combines the advanced faxing features you need with a new standard in ease of use and usability.



Send faxes from within any Windows application as easily as you would print. Organize sent and receiving in convenient folders, and convert faxes into word processing documents with OCR.



STOCK CODE ...WIN039
RRP .....£99
OUR PRICE £53.45!
PRICE (INC. VAT) .....£62.80

WIN036 WIN WinFax Comms Suite	£95
TRIO02 WIN Trio Data Fax	£44
ASC003 WIN UltraFax Comp. Upgrade	£29
ULT001 WIN UltraFax	£39
WIN039 WIN WinFax Pro v4	£54
WIN040 WIN WinFax v4 Upgrade	£33
WIN022 WIN WinFax Server v4	NEW! £99
WIN049 WIN WinFax LAN Starter Kit	£189
WIN052 WIN WinFax LAN Starter Kit Upgrade	£299
DEL005 WIN WinFax Pro 10-user license	£409
DEL004 WIN WinFax Pro 25-user license	£899
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DATABASES

Paradox 5.0

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With OLE 2.0 client and server support, Paradox 5.0 is the natural database to use with any suite or other applications. In fact, it even integrates better with leading suites than the ones included! Paradox for Windows is the database choice for end users, power users and developers, no other database offers so many powerful features, combined with ease of use.

STOCK CODE...PAR021	
RRP	£149
OUR PRICE	£129!
PRICE (INC. VAT)	£151.58

Borland

CL1006	DOS CA-Clipper Tools III	£279
CL1005	DOS CA-Clipper V5.2	£289
DBA002	DOS DBase IV v2 + Compiler Upgrade	£149
FOX011	WIN FoxPro 2.6 Standard Edition	£75
FOX012	WIN FoxPro 2.6 MLP	£69
FOX013	WIN FoxPro 2.6 Professional Edition	£281
FOX014	DOS FoxPro 2.6 Standard Edition	£73
FOX015	DOS FoxPro 2.6 MLP	£69
FOX016	DOS FoxPro 2.6 Professional Ed.	£281
LOT039	WIN Lotus Approach	£84
MIC148	WIN MS Access v2	£222
MIC144	WIN MS Access v2 MLP	£199
MIC174	WIN MS Access v2 CCP Upgrade	£85

AskSAM

The freeform database that's as easy to use as a word processor.

Like a word processor, AskSAM lets you enter unstructured text. You can format your text using AskSAM's WYSIWYG word processor. AskSAM lets you find any word or phrase in your database - there is no need to concern yourself with fields, indexes, or field lengths. AskSAM is a convenient warehouse for information from a variety of sources. Specific tools allow you to take data direct from CompuServe or the Internet.

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RRP	£199
OUR PRICE	£99.00!
PRICE (INC. VAT)	£116.33

PAR010	DOS Paradox 4.5	£333
PAR021	WIN Paradox 5.0 Competitive Upgrade	£129
PAR014	DOS Paradox Runtime	£139
Q8A002	WIN Q & A by Symantec	£129
Q8A001	DOS Q & A by Symantec	£168
SUP005	WIN SuperBase v2	£219
SUP007	WIN SuperBase v2 Developers Edition	£614
TEL001	WIN TeleMagic	£189

Alpha 5

Alpha 5 is a fully-featured Windows database.

Alpha 5 goes much further than other Windows databases because it comes with common database functions already pre-built! With Alpha 5 you can create powerful database applications without the need for any programming or take advantage of XBasic™. Alpha 5's proprietary database language. Create forms, reports, mail labels and even stunning WYSIWYG letters with the ease of Drag & Drop.

STOCK CODE...ALP004	
RRP	£99
FROM ONLY	£69.85!
PRICE (INC. VAT)	£82.07

ALPHA
SOFTWARE CORPORATION

DTP

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Right out of the box you'll be designing and producing professional, graphics-packed newsletters, ads, catalogues, brochures, greeting cards and a thousand other designer publications. Print in colour or black and white to ANY Windows printer or get hi-res colour separations, ready for commercial printing.

The Publishing Suite includes:
TablePlus - create tables, mini spreadsheets and mathematical equations
TypePlus - create special text effects
PhotoPlus - is Serif's award-winning imaging software and DrawPlus allows you to create vector drawings



WITH PAGEPLUS 3.0 YOU CAN:

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- Layout publications quickly and easily
- Add graphics, clip-art, photo images from scanners or any Windows graphics package

PAG027	WIN PagePlus Suite CD	£79
PAG020	WIN PagePlus 3.0 Upgrade	£19
PAG021	WIN PagePlus 3.0 Suite	£79
PAG022	WIN PagePlus 3.0 Suite Upgrade	£49

SERIF

STOCK CODE...PAG019	
RRP	£99.95
FROM ONLY	£52.90!
PRICE (INC. VAT)	£62.16

DTP (CONTINUED)

Corel Ventura V5

Power publishing for Windows.

Corel Ventura 5 extends the boundaries of DTP with an intuitive new interface and powerful architecture that supports both structured and free-form documents. Included are over 650 fonts, 17,000 clip-art images, 100 photos and 75 style sheets and templates.

3.5" STOCK CODE...COR045	CD STOCK CODE...COR044
RRP	£199
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RRP	£169
OUR PRICE	£129!
PRICE (INC. VAT)	£151.58

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SYM001	DOS 1st Press	£26
AL0002	WIN Aldus Persuasion	£199
PAG003	WIN Aldus Pagemaker v5	£429
PAG017	WIN Aldus Pagemaker v5 5-user	£1399
PAG018	WIN Aldus Pagemaker Classic	£58
COR009	WIN Corel Ventura v4.2	£115
DES006	WIN GST DeskPress	£149
PRES001	WIN GST Pressworks	£65
GST001	WIN GST Publishing Partners	£79
MIC073	WIN MS Publisher v2	£62
MIC159	WIN MS Publisher MLP	£57
MIC147	WIN MS Publisher 20-MLP	£699
MIC165	WIN MS Publisher Design Pack	£29
PAG024	WIN PagePlus Type Plus v3	£29
PAG026	WIN PagePlus Art Pack v2	£29
PAG023	WIN PagePlus Photo Plus	£29
PAG013	WIN PagePlus 10-User Pack	£199
PFS005	WIN PFS Publisher v2	£29
QUA014	WIN Quark Xpress v3.3	£565
TIM005	DOS Timeworks Lite	£29

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EDUCATION/REFERENCE

Memphis Maths

Maths education software on CD for ages 8 - 14 years.

The program quizzes children on fraction, decimal and percent problems while taking them on adventures through the Great Pyramid at Giza, The Mortuary Temple of Hatshepsut and the Great Sphinx.

Players are given opportunities to answer a variety of 1800 maths problems while collecting artifacts. Memphis Maths is a great way to introduce children to mathematical problem solving, whilst proving that learning can be fun!

STOCK CODE...WOR115	
CD RRP	£59
OUR PRICE	£34.50!
PRICE (INC. VAT)	£40.54

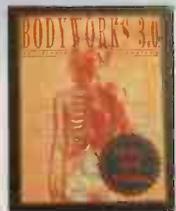
THR001	3D Body Adventure	£29
OIA001	3D Dinosaur Adventure	£29
CDT001	Animals	£16
BOD001	BodyWorks	£32
BOD003	Bodyworks Voyager	£35
CHE007	Chemistry Works	£34
COM007	Comptons Grammy Awards	£26
COM009	Comptons Interactive CD	£69
COM006	Computer Works	£29
DIS002	Discoverers	£29
DOC001	Doctors Book Of Home Remedies	£24
DOR005	Eyewitness Encycl. of Science	£59

EDUCATION/REFERENCE

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STOCK CODE...BOD002	
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PRICE (INC. VAT)	£37.54

EXP007	Exploring Architecture	£29
RT001	Fitness Partner	£39
FOR005	Forever Growing Gardens	£29
FUN001	DOS Fun School 4 for under 5's	£15

The Interactive Space Encyclopedia

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FUN003	DOS Fun School 4 Ages 7-11	£15
GRO002	Groliers Encyclopedia	£89
HEN001	DOS Henrietta's Book Of Spelling	£24
JUS002	Just Grandma & Me	£26
KID003	Kids Zoo	£29
KID001	DOS Kid Works	£29
MAY002	WIN Mavis Beacon v2	£12
MID001	Midnight Movie Madness	£29
MIC176	MS Ancient Lands	£32
MIC123	MS Art Gallery	£32
MIC175	MS Bookshelf	£59
MIC215	MS Cinemania '95 MPC	£32
MIC177	MS Dangerous Creatures	£32

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EDUCATION/REFERENCE

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MIC124	WIN MS Fine Artist	£27
OXF001	Oxford English Dictionary	£435
SC001	Science Adventure	£29
AND003	Space Encyclopedia	£34
TAL001	Tales Of Peter Rabbit	£19
DOR004	The Way Things Work	£44
UND001	Undersea Adventure	£29
UFO002	U.F.O For Windows	£35
DOR003	Ultimate Human Body	£44
WOR072	World Atlas v4	£39



GRAPHICS - PRESENTATIONS

ALP003	WIN Alpha Bravo Presentations	£45
ASY001	WIN Asymedia	£93
HAR013	WIN Harvard Graphics v3 CU	£129
HAR013	WIN Harvard Graphics v3 U/G	£129
HAR000	WIN Harvard Presenters' Pack	£189
LOT005	WIN Lotus Freelance v2.01	£258
LOT050	WIN Lotus Freelance LLP	£229
LOT033	WIN Lotus Freelance CU	£135
LOT034	WIN Lotus Freelance V/U	£95
POW002	WIN MS Powerpoint v4	£225
MIC155	WIN MS Powerpoint MLP	£199
MIC156	WIN MS Powerpoint u/g CCP	£90
WOR021	DOS Wordperfect Presentations	£99
WOR031	DOS Wordperfect Presentations U/G	£69

GRAPHICS - CHARTS

CorelFLOW

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STOCK CODE...COR034
RRP.....£79
OUR PRICE **£49.65!**
PRICE (INC. VAT).....£58.34

ORG001	WIN OrgPlus	£95
ORG002	DOS OrgPlus	£95

Family Tree Maker

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Family Tree Maker is quick and easy to use. Just enter information about parents, children and marriages to create a great looking Family Tree in minutes. Record birth dates, occupation, medical history, and any other information you wish to print. You can even record favourite family stories and can save up to 15 pages per person. You can automatically create ancestor, descendant and photo trees, or view your tree in one of the many different styles available.

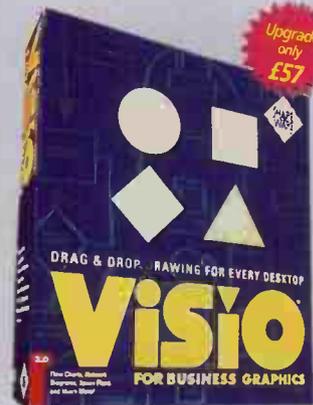


STOCK CODE...FAM001
RRP.....£49
OUR PRICE **£42.95!**
PRICE (INC. VAT).....£50.47

GRAPHICS - CHARTS (CONTINUED)

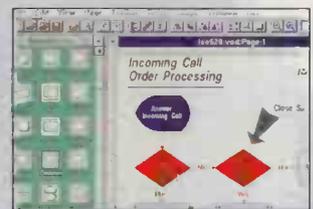
Visio Version 3

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Visio is the drag and drop drawing tool for people who can't draw. The 22 job-specific stencils and 750 SmartShapes™ that come with Visio allow you to create a multitude of diagram types, from flowcharts and organisation charts to electrical diagrams, maps and office floor plans.

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Extra Visio Shapes & Ideas

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More than 260 shapes for flowcharting	
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Design and model detailed data networks	
Electrical Engineering	£39
Create electrical and electronic diagrams	
Marketing	£39
Illustrate business, sales and marketing concepts	
Software Diagrams	£39
Produce data flows, processes & logic structures	
Space Planning	£39
240 shapes for planning office layouts	
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Chemical Engineering	£39
Accurately display plant equipment & facilities	
Biotechnology/Medicine	£39
Illustrate experimental & physiological processes	
Mechanical Engineering	£39
For creating detailed design documents	
Petroleum Engineering	£39
Covers all phases of petroleum based activities	
Insurance/Law	£39
Graphics for insurance claims & legal briefs	
Home Planning	£39
Plan your dream home or your next remodel	
Kids	£39
A wealth of fun illustrations & shapes for kids	
Landscape Planning	£39
Landscape your garden & create planting charts	



STOCK CODE...VIS033
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GRAPHICS - CLIP ART

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Click Art is the instant image Resource for high quality, ready-to-use artwork that adds a new level of professionalism to anything you produce on your computer. All images in Click Art are vector format which means you can shape, resize and reformat without loss of quality or resolution no matter what size you output them. Supports all popular graphics formats.



STOCK CODE...CLJ010
RRP.....£19
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PRICE (INC. VAT).....£16.44

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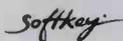
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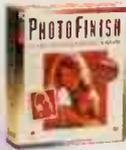
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MIC139 WIN MS Office 4.2 CCP U/G.....	£159
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PRICE (INC. VAT) £33.96

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NEW PRODUCT

STOCK CODE ... ECC001
RRP £69
OUR PRICE £48.90!
PRICE (INC. VAT) £57.46

ACT004	WIN ACT1 v2	£149
ECC002	WIN ECCO Professional	£149
ECC003	WIN ECCO Professional 3-User	£399
ACT005	WIN First ACT1	£49
WDR084	WIN InfoCentral by WordPerfect	£67
LOT043	WIN Lotus Organizer 1.1 WSL	£49
PAC001	WIN Pack Rat v5	£199
SID001	DOS SideKick	£29

Sidekick

The fast, friendly and functional personal organiser.

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AUT022	WIN AutoRoute Express UK	£64
AUT002	WIN AutoRoute Express Europe	£72
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AUT007	DOS AutoRoute Express Europe	£59
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MAP012	DOS Mapbase - Europe	£299
MAP010	MapVision	£175
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EXP005	DOS Explorer	£59

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OMN001	WIN Omnipage v3.2	£319
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Turn your PC into a true multi-tasking Windows PC. Have all the power, flexibility and features of future versions of Windows today!



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OS/2 Features:

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RRP £69
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Fully animated cartoon screen savers, cool wallpaper, music clips and film clips from the Pink Panther films starring Peter Sellers. The inspector is following our hero across your screen, in and out of doors, and into the very workings of your computer. With over 100MB of materials (you only have to load the ones you want), this is one screen saver that will not bore you.



STOCK CODE... PIN004
CD RRP... £29
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AFT001 WIN AfterDark	£19
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MIC108 WIN MS Scenes Outer Space	£16
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RRP... £199
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PRICE (INC. VAT)... £80.96

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EXC004 WIN MS Excel v5	£222
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UTILITIES

386 MAX V7

The ultimate memory manager for 386, 486 and Pentium systems.

386MAX v7 contains the most advanced suite of integrated memory recovery, optimisation and management tools ever. They work together to safely provide more of the base memory needed to run applications. It's ideally suited to leisure uses, where games take up huge amounts of base memory.



STOCK CODE... MAX004
RRP... £59
OUR PRICE £33.90!
PRICE (INC. VAT)... £39.83

QUALITAS

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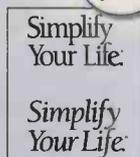


STOCK CODE... CLE009
RRP... £39
OUR PRICE £31.75!
PRICE (INC. VAT)... £37.30

Dashboard

Simplify your Windows set-up!

Dashboard is the convenient push-button utility panel for Windows, designed for fingertip access to the features and information that you need. Launch applications with the touch of a button, switch between different full-screen set-ups instantly. Monitor your computer's resources with a single glance. Dashboard is the fastest way to work in Windows.



STOCK CODE... DAS002
RRP... £49
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The World's No. 1 selling utility!

The most powerful memory manager for Windows, DOS and games! QEMM gets your programs more memory, so you get fewer out-of-memory errors and better performance. The gains are amazing: up to 634k of conventional memory. The new version 7.5 includes special support for Dos, Windows, Stacker and for doubleSpace users. QEMM can add up to 40k of base memory.



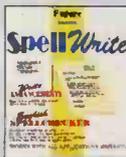
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Once installed, this clever utility works in the background of Windows and is accessed by highlighting a piece of text and then pressing a hot key, the default being F9. If your highlighted text contains a word that doesn't match any in the supplied English 85,000-word dictionary, it pops a dialog box. Here you can perform all the usual activities you'd expect from a good spell-checker. You can customise the dictionary and it then remains constant whether you're in an accounts package, spreadsheet, database etc.



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ADV. 386SX/20; 386SX/25; Pro 386SX/25	54		210		
ADV. 486/25; 486/33; 486/33p; 486SX/20;	57		300		
Bravo 4/33 (Original); 486/25; Premium-486/25; 486/25E; 486/33; 486/33E; 386/33TE; 486/25TE; 486/33TE; Premium-II 386/25; 386/33; 486/33; 486SX/20; Power Premium 3/33; 4/33; 4/33s; 4/50d; 4/66d; Premium Server SE 4/33		105	210	440	880
Advantage Pro 486DX/33; 486SX/25; Bravo 4/25s; 4/33; 4/33s; 4/50d; 4/66d; Bravo LC 4/25s; 4/33; 4/33s; 4/50d; 4/66d; Bravo LP 4/25s; 4/33; 4/33s; 4/50d; Bravo MT 4/33; 4/66d					
ADV. 486DX/33; 486DX2-50; 486DX2-66		110	210		
Bravo 286's; 386sx/16; 386sx/20; 386sx/25	70		210		
Bravo 3/25s; 3/33s	54		210		
Premia 4/33; 4/33s; 4/50d; 4/66d		140	230	440	880
Premium 386; Premium 386C			140		
Premium 386/25; 386/33; 386SX/16; 386/33T; Premium II 386SX/20; 386SX/25; Premium Server SE 4/50; SE 4/66; Cupid Expansion Board					Call
Manhattan SMP					

COMPAQ	2Mb	4Mb	8Mb	16M	32M
Deskpro 286N; 386N; 386X/20; 386X/20N; 3/25i; 3/33i; 4/25is; 4/33i; 4/66i; 386/25M; 386/33M; 486/33M; 486s/16M; 486s/25M; 486DX/50M; 486DX/66M; Deskpro XE-433s; 450; 466; Enhanced Prolinea; Prolinea 4/25s; 4/33; 4/50; 4/66; 4/33s; CDS; Net 1/25e; 1/25s; 1/25tr; Prolinea-MT 4/33s; MT 4/50; MT 4/66; Proseries-400/600/800 Series; Prosignia PC-Server 486/33; 486DX/66; Prosignia VS; Systempro/LT 386/25; 386/33; 486SX/25; 486/33; 486DX/50; ProLiant 1000-486DX/66	70	115	220	440	860
Deskpro 386/33; 486/25; 386/33L; 486/33L; 486/50L; Systempro 386/33; 486/33; 486/33-1020e; 486/33-1e; 486/33-2040e; 486/33-680e					
Deskpro 5/60M; 5/66M; XE 560; ProLiant 1000 5/60; ProLiant 2000-486/50; 5/66; ProLiant 4000 486/50; 5/66; Prosignia PC Server 5/60		280	460	880	
Prolinea 3/25s; 3/25s	54		210		
Systempro JXL 486/50; Pentium				460	880

Deskpro 386/16	1Mb	1-2	4-8	8Mb
	67	160	314	470

DELL	2Mb	4Mb	8Mb	16M	32M
System 3165X; 320SX (Rev. 1); 325SX System 320SX (Rev. 2); 325D; 325P; 333D; 333P; 433P	70				
Power Desktop 486D/16; 486D/20; 486D/25; 486D/33; 486D/50; 486D/66; Low Profile Desktop 486P/16; 486P/20; 486P/25; 486P/33; Low Profile Power-Desktop 486P/50; 486P/66; Precision-486 Series					
Performance 425s/L; 425s/M; 433/L; 433/M; 433/T; 433s/L; 433s/M; 450/L; 450/M; 450/T; 466/L; 466/M; 466/T		115	440		
Performance 425s/ME; 433/ME; 433s/ME; 450/ME; 466/ME; 400XE Series 486/33; 486/50; 486/66					
System 425TE; 433TE; PowerLine-Workstations 420DE; 425DE; 433DE; 450DE; 450DE/2; 466DE; 420SE; 425SE; 433SE; 450SE; 450SE/2; 466SE	80	140	230	440	880

HEWLETT PACKARD	2Mb	4Mb	8Mb	16M	32M
Vectra QS/16SS; OS/20; RS/20; RS/20C; RS/25; RS/25C	70		140		
Vectra 386/25 PC; 486/25VL; 486/33VL; 486/50VL; 486/25M; 486/33M; 486/50M; 486/66M; 486/25M; 486/33M; 486/25N; 486/33M; 486/33M; 486/33N; 486/33M; 486s/33M; 486s/33M; 486 PC; 486s/20; 486/25T; 486/33T PC; 486/25U PC; 486/33U PC; 486/50U PC; 486/66U PC; 486/33ST; 486/66ST; 486/33XM; 486/50XM; 486/66XM; 486s/33XM; NetServer LE Series 486DX/33; 486DX/66; 486SX/33; NetServer LM-Series 4/33 LM; 4/66 LM; 5/60 LM					
Vectra 386/16N PC; 386/20N PC; 386/25N PC; 386/33N; 386/33M	70		280		

IBM	1Mb	2Mb	4Mb	8Mb	16M
PS/1 286 (2011); PS/1 386SX (2121)		75	140		
PS/1 PRO 386SX (2123); (2133-72PIN); (2155-72PIN); (2168-72PIN); PS/ValuePoint (6381); (6382); (6384-72PIN); (6387)	36	62	120	220	440
PS/1 (2133-30PIN); (2155-30PIN); PS/ValuePoint (6384-30PIN)			110		420

PS/2 25/286; 30/286					83
PS/2 35LS; 35SX; 40SX; 50Z; 55LS; 55SX; 56SLC; 56SLC LS; 56SX; 56LS; 57SLC; 57SX; 65SX; 70; 80; 90 XP 486; 95 XP 486 (8595); E (9533); Server 85; Premier PS/2 56; 57; 76; 77; UltraMedia-M57; M77	40	70	120	220	
PS/2 95 XP 486 (9595); Server 95 (9595); Server 95 Array (9596)			140	260	480
PS/2 Series 16/32 Bit MCA Exp. Board (6450609 & 34F3077)			194	240	360

ZENITH	2Mb	4Mb	8Mb	16M	32M
Z-386SX; Z-386SX/20; Z-325/SX	70		210		
Z-386/20; Z-386/25; Z-386/33; Z-386/33E; Z-486/25E		115			
Z-486/33TE		140		440	
Z-420/SX; Z-425/SX; Z-433/DX; Z-433/SX; Z-Station 325SSh; 325Sn; 420Sh; 420Sn; 425Sh; 433Dh; 420SEh; 420SEn; 433DEh; 450EN; Z-400 Series		115	140	440	
Z-Server 425SE; 433DE; 450DE; EX 433DE; EX 450DE; EX P66E; LT 433DE; LT 466XE; LT P6DE		140	230	440	880



WORKSTATION MEMORY

HEWLETT PACKARD	4Mb	8Mb	16M	32M	64M
HP 3000 9x7LX Series 917LX; 927LX; 937LX; 947LX; 957LX; 967LX; 977 Series 937; 947; 957; 967; 977; 987; 9000 Series 807S; 817S; 827S; 837S; 847S; 857S; 867S; 877S; 887S; 897S	140	240	460	880	
HP Apollo 9000 Series 375; 380; 400s; 400s; 400t; 425s; 425t; 433s	140	240	460		
HP Apollo 9000 Series 382; 425e	140	240	460		
HP Apollo 9000 Series 700/RX 16Ca; 16C1; 19Ca; 19M1	120	230			
HP Apollo 9000 Series 705; 710	300	580	1100		
HP Apollo 9000 Series 745i; 747i; 715/33; 715/50; 725/50	300	580	1100	2300	
HP Apollo 9000 Series 720; 730; 735				580	1100
HP Apollo 9000 Series 750; 755				580	1100

IBM	4Mb	8Mb	16M	32M	64M
Xstation 120; 130	115				
RS/6000 POWERstation/POWERserver-220 Series	115	220			
RS/6000 POWERstation/POWERserver-320; 320E; 320H; 340; 340R; 350; 350R; 520; 520H; 530; 530E; 530M; 550; 550E; 550S; 560; 560F; 580; 730; 930; 950; 970; 980			780	1150	2100

SUN MICROSYSTEMS	4Mb	8Mb	16M	32M	64M
Model 3/60; 3/80; 4/110	140		420		
SPARCstation ELC (4/25); IPX (4/50)			480		
SPARCserver/SPARCstation 330; 370; 390		240			
SPARCstation SLC (4/20)	120		420		
SPARCstation IPC (4/40); 1 (4/60); 1+ (4/65); 2 (4/75)			240		900
SPARCstation Classic LC (4/15); LX (4/30)					
SPARCserver/station/engine 10-Model 30; Model 41; Model 52/54			520		1950
SPARCserver 630MP; 670MP; 690MP					1920



CYRIX PROCESSOR UPGRADES

UPGRADE PROCESSORS		
80386SX - 16 & 20 MHz TO 486 - 40 MHz		165
80386SX - 25 MHz TO 486 - 50 MHz		185
80386DX - 16 MHz TO 486 - 33 MHz		180
80386DX - 20 MHz TO 486 - 40 MHz		210
80386DX - 25 MHz TO 486 - 50 MHz		240
80386DX - 33 MHz TO 486 - 66 MHz		240
NUMERIC CO-PROCESSORS		
80387SX - 0-33 MHz		45
80387DX - 0-33 MHz		45

30 & 72 PIN SIMM

30 PIN J.E.D.E.C. MODULES	60MHz	70MHz	80MHz	100MHz
256K x 8 BIT - 2 CHIP				7
256 x 9 BIT - 3 & 9 CHIP			8	7
1MB x 8 BIT - 8 CHIP		30		
1MB x 9 BIT - 3 CHIP	28	27	27	
1MB x 9 BIT - 9 CHIP	32	31	33	30
4MB x 9 BIT - 9 CHIP	108	105	105	
16MB x 9 BIT - 9 CHIP		495		
72 PIN J.E.D.E.C. MODULES				
1MB = 256K x 36 BIT - SINGLE SIDED			70	40
2MB = 512K x 36 BIT - SINGLE/DOUBLE			70	65
4MB = 1MB x 36 BIT - SINGLE SIDED	105	102		
4MB = 1MB x 36 BIT - SINGLE/DOUBLE	120	115		
8MB = 2MB x 36 BIT - DOUBLE SIDED	220	210		
8MB = 2MB x 36 BIT - DOUBLE SIDED	230	220		
16MB = 4MB x 36 BIT - SINGLE/DOUBLE	460	440		
32MB = 8MB x 36 BIT - DOUBLE SIDED		860		

PORTABLE MEMORY

AST	1Mb	2Mb	4Mb	8Mb	16M
Bravo NB: Advantage Explorer					735
Premium Executive 286/12;			142		
386SX/20; 386SX/25; 386SX/25C			147		
Power Executive 3/25SL; 3/25SL-C; 4/25SL (SE); 4/33SL; Colour; Colour 4; EL			97	151	345
Power Executive 4/25SL; Colour;				167	614
Colour Plus					
CANON	2Mb	4Mb	8Mb		
NoteJet 486/25 (BN-22)	85	130	273		
NoteJet 486/33 (BN-22); 486C (BN-100C)		180	320		
NoteJet II 486C (BN-32P)	85	145	280		
COMMODORE	2Mb	4Mb			
C286-LT; C386SX-LT (16 MHz)	84				
C386SX-LT (20 MHz)		161			
COMPAQ	1Mb	2Mb	4Mb	8Mb	16M
CONCERTO 4/25; 4/33; LTE ELITE			148	284	710
CNTURA 3/20; 3/25; 3/25C	43		163	238	
CNTURA 4/25; 4/25C; 4/25SX; 4/25EX			273	347	638
CNTURA AERD			150	310	
LTE 286		40	74	100	
LTE 386s/20		77	176	176	
LTE LITE/20; LITE/25; LITE/25C;		60	176	340	Call
LITE/25E					
LTE LITE 4/25; 4/25C; 4/25E; 4/33C			148	288	694
PORTABLE 486/66; 486C/66	47	74	130	250	
SLT 286		70	222		
SLT 386s/20		60	84	174	
DELL	2Mb	8Mb			
212N; 320N; 320N;			84		
316LT; 320LT; 320LX			70		
320SL; 325SLI			87	314	
325N; 325NC			88		
NL20; NL25			84		
EVEREST		2Mb			
TEMP CARRIER			90		
TEMP LX			88		

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PS/2 CL57 SX; THINKPAD 700; 700C; 720; 720C			176	347		
PS/2 L40 SLX; N33 SX; PS/NOTE 182		87	168	296		
PS/2 N51 SLX; N51 SX		77	157	322		
PS/2 P70 031; 051; 121; P75	40	74	130	250		
PS/Note 2618 C45; E35; M40; Thinkpad 350C			168	322	527	
PS/NOTE N45 SL		Call				
THINKPAD 300		80		287		
THINKPAD 600			170	330		
THINKPAD 710T		87	160	315		
THINKPAD 360; 360C; 360CS; 360P; 750; 750C; 750CS; 750P; 755C; 755CS			176	347	679	
MITAG		4Mb				
3026E		181				
PANASONIC		1Mb	2Mb	4Mb	6Mb	16M
CF-170; 270; 370		50				
CF-380; 480C			110	192	305	
CF-580				156	634	
CF-1000				Call		
CF-V21P (CO-NOTE)				168	595	
PHILIPS		2Mb	4Mb			
PCL 300; 304		87	180			
SANYO		2Mb				
17/NB; 18/NB; NB/6		88				
SHARP		1Mb	2Mb	4Mb	16M	
PC 6200; 6220; 6240		72				
PC 6440			140			
PC 9600; 9621; 9641; 9661			80			
PC 6700; 6741; 6781; 6785; 6800; 6841; 6881; 6891			70	140		
PC 7700; 7750; 8150; 8650				Call	Call	
PC 8501 COLOURSTAR			97			
TANDON		2Mb	4Mb			
NB 386SX; 486SLC		55	210			
TEXAS INSTRUMENTS TRAV. MATE'S		1Mb	2Mb	4Mb	16M	
2000		72				
3000; 3000 WinSX; WinSLC/25			80			
4000 Win Series; 4000E Win Series			153	900		
TOSHIBA		2Mb	3Mb	4Mb	8Mb	16M
DYNAPAD T100X				176		
T1000LE; 1000SE; 1000XE; 1800; 1850; 1850C; 2000; 2000SX; 2000SXx; 2200SX			64	163	320	
T1200XE			54			
T1600			54			
T1900; 1900C; 1950; 1950CS; 1950CT; 4500; 4500C; 4500; 4600C; 4700; 4700CS; 4700CT; T4800; DYNAPAD T200			170	330	659	
T2400; 3400; 3500			167	330	613	
T3100			105			
T3100E			84			
T3100SX			65	170		
T3200			90			
T3200SX; 3200SXC			64	160		
T3300SL			70	161	Call	
T4400C DX; 4400SX; 4400C SX; 4400SX; 64000X; 6400DX; 6400SX; 6400SX; 6500C; 6500C/CD; 6500C/CDV			72	171	304	
T5100			63			
T5200; 5200/100; 5200/200; 5200C; 8500			80		347	
ZENITH		1Mb	2Mb	4Mb	8Mb	
SUMSPORT 286; SUPERSPORT 286; 286E		76	120	154		
SUPERSPORT SX			77			
MASTERSPORT 386SL; 386SLx; II; ZDS-600nl; 620nl; 625nl; Z-STAR 433VL			97			
MASTERSPORT 386SX						
Z-SPORT 325S			101			
Z-SPORT 420S; 425S			Call	Call		
Z-NOTE 320L; 320Lb; 325L; 325Lx; 325Lp			80		287	
Z-NOTE 200; 425Lx; 425Lnc; 425Lnp; 425Lnx; 425Lncx; 425Llpx; 433Lpx			175	475		
Z-LITE 320L			Call	Call		

LASER MEMORY					
APPLE	1Mb	2Mb	4Mb	8Mb	16M
LASERWRITER III & IIg			120		456
LASERWRITER II NTX & NTX-J		Call	127		
LASERWRITER PRO 600 & PRO 630			120		520
LASERWRITER PRO 810			175	350	
LASERWRITER SELECT 300		30	114		
LASERWRITER SELECT 310		40	120		
LASERWRITER SELECT 360					520
PERSONAL LASERWRITER NT					228
PERSONAL LASERWRITER NTR			Call	Call	
BROTHER		1Mb	2Mb	4Mb	8Mb
HL-4; 4PS; 4V; 4Ve		77	107	167	
HL-8D; 8e; 8V		74	104		
HL-6V			103	165	

HL-10DPS; 10DV; 10PS; 10V		107	170			
HL-10h		40	91	120	244	
CANON		1Mb	2Mb	3Mb	4Mb	8Mb
LBP-4; 4 LITE; 4 PLUS		90	120			
LBP-4SX		71	110			
LBP-430		43	135			
LBP-8II; 8IIR; 8IIT		72	110		187	
LBP-8IIR; 8IIR PLUS		104	134	164		
LBP-8IV; 4U		40			130	
LBP-8SX		75	110		250	
LBP-860		44	77		135	
COMPAQ		2Mb	4Mb	8Mb	16M	
PAGEMARQ 15 & 20		80	148	246	488	
EPSON		512	1Mb	2Mb	3Mb	4Mb
ACTIONLASER 1000; 1500; 5000; 5200		24		77		
ACTIONLASER II; EPL-4000; 4100; 4300; 8000; 8100			64	93	Call	
ACTIONLASER PLUS & EPL-6000				115	192	
EPL-7000			24	Call	Call	
EPL-7100 & G0-5000			24		Call	
EPL-7500				Call	Call	
HEWLETT PACKARD		256	1Mb	2Mb	4Mb	8Mb
DESIGNJET 200; 600; 650C; PLOTTER			40	70	130	
DESIGNJET 500; 500C; 510; 520; 550C; 560; PLUS		39			250	
DESIGNJET 1200; 1200C; 1200C/PS			40	74	130	
LASERJET II; IIO			72	110	187	
LASERJET IIP; IIP PLUS; III; IIO; IIP; FAX			52	82	141	
LASERJET III/SI			33		120	
LASERJET 4; 4 PLUS; 4M; 4MP; 4M PLUS; 4P; 4SI; 4SIMX; LASERJET 4L			40	74	130	
PAINTJET XL300			48		306	
IBM/ALEXMARK		1Mb	2Mb	3.5	4Mb	8Mb
LaserPrinter (4019-001); E(4019-E01); Penneant System (4028)		63	93	138		
LaserPrinter 5E (4029-010); 6 (4029-020); 6A (4029-021); 10 (4029-030); 10A (4029-041); 10L (4029-040); (4037-5E)		49	69		150	
LaserPrinter 4039 10R; 10R DUPLEX; 12L; 12R; 16L; Colour JetPrinter PS 4079				130	250	
KYOCERA		1Mb	2Mb	4Mb		
F-800; 800A; 800T		70	100	160		
F-820; 1200S (Post 92); 1500A; 1800 (Post 92); 1800A; 2000A; 3000A; 3300 (Post 92); 5000		63				
F-1200S (Pre. 92); 2000A; 3000A; 3300 (Pre. 92)		76	160	219		
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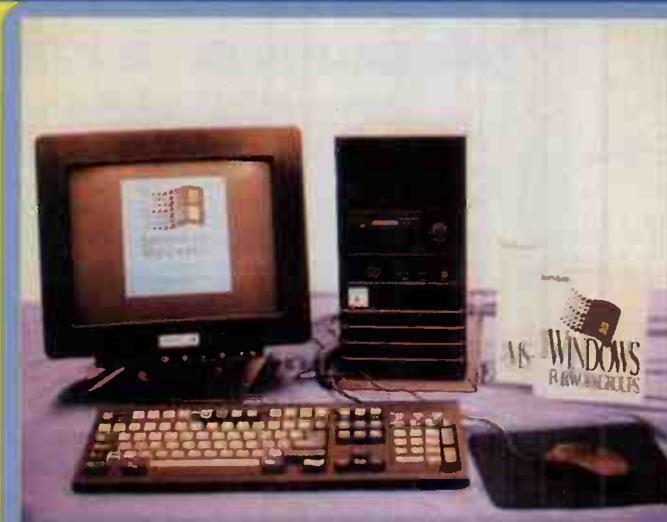
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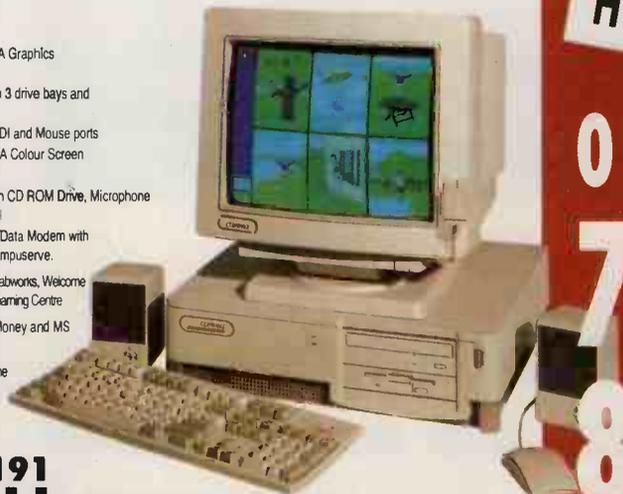
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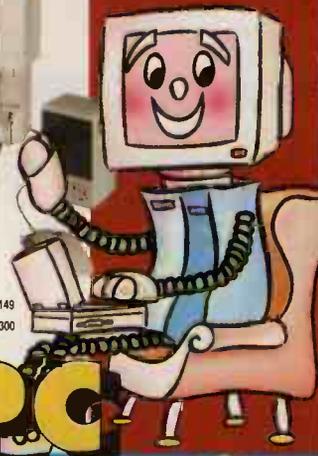
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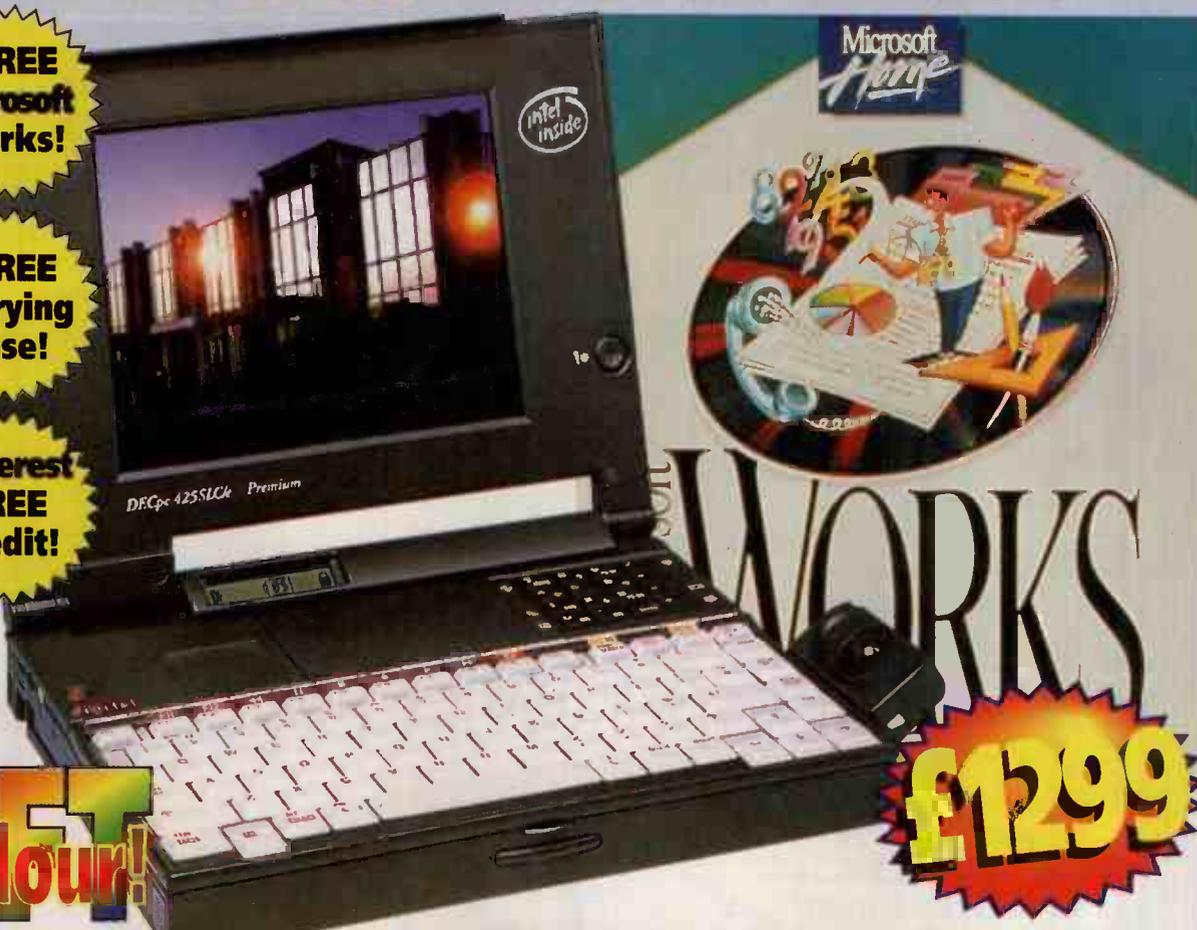
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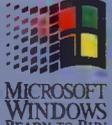
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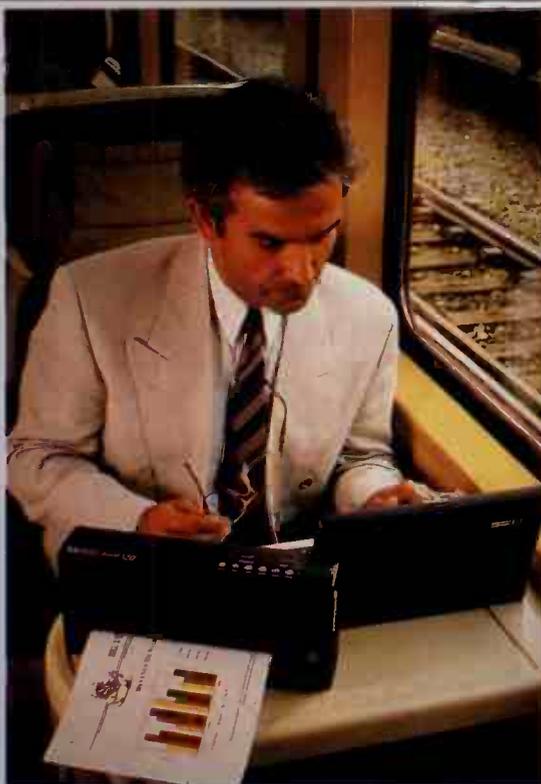
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Presario CDS 520

- 486SX2 66Mhz processor
- Processor upgradable
- 4Mb RAM expandable to 64Mb
- 420Mb Fixed Disk
- Dual speed CD ROM
- 16-bit Stereo sound system
- Integrated speakers
- Integrated microphone
- MIDI Interface
- CD Stereo sound
- Integrated 9600/2400bps fax/data modem
- Integrated telephone answering machine
- Integrated 14inch SVGA colour screen
- 512Kb Video RAM
- MD-DOS 6.2
- Windows 3.1
- MS Works for Windows v 3.0
- MS Money 3.0
- MS Entertainment Pack IV
- MS Encarta '94
- "The Ultimate Human Body" (DK)
- MaxFax and WinCIM
- 3 year warranty

As seen on TV!

STEREO
 MS Works
 Modem
 MIDI
 FAX
 CD ROM

£1276
 +VAT
MULTIMEDIA



Personal and business INTEREST FREE CREDIT terms are available on the Compaq Presario at 0% APR to businesses and persons over the age of 18, subject to status and payment of instalments by direct debit. A deposit of 25% is required and six equal instalments. Example: Purchase price: £1,500 including VAT. £375 deposit is required, plus six monthly instalments of £187.50p. LANTEC are licensed Credit Brokers. Offer is subject to change without notice. Written quotations available upon request. We also draw your attention to the important information on the right.

Prices shown are EXCLUSIVE of VAT and DELIVERY, are correct at the time of going to press, and are subject to change without notice. We draw your attention to the important information shown at the side of the right-hand page.

Lowest 486 Portable price from LANTEC DIRECT - Ever!

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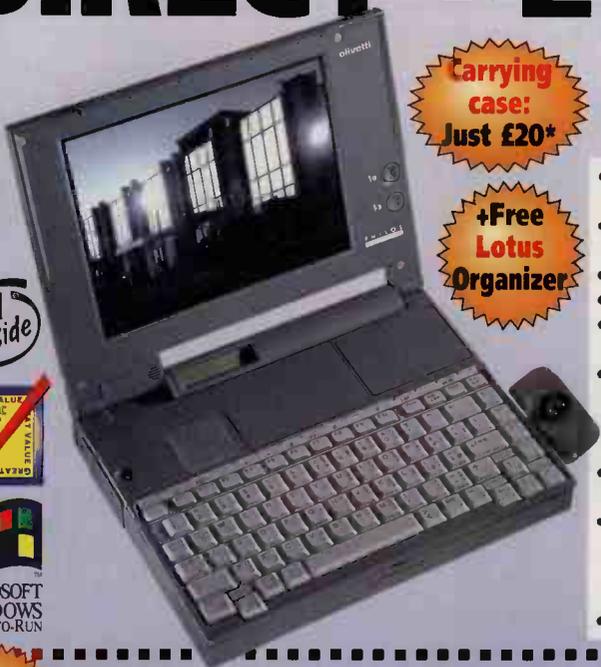
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LANTEC Information Services Ltd. are a B55750 Registered Firm. Our certificate number is FS22661.



Carrying case: Just £20*

+Free Lotus Organizer

The Olivetti Philos 20 '486

£649

- Intel 486SL, 25Mhz, (3.3v) Microprocessor
- 4Mb RAM (expandable to 32Mb)
- 2.5" hard disk drive
- 120 Mb capacity
- 3.5" 1.44Mb floppy drive (removable)
- Backlit, VGA passive Matrix Mono LCD screen with:
 - 64 grey shades
 - 8.4" diagonal size
- 82/83-key, PS/2 compatible keyboard
- Rechargeable 15 Watt NiCad battery. (Battery life is from 3 to 6 hours depending upon peripherals used.)
- FREE carrying case
- Integrated Pop-Up Trackball
- Serial port (RS232-C compatible)
- Parallel printer port
- External VGA video proprietary interface
- External keyboard/mouse port (PS/2 compatible)
- MS DOS 5.0 (or later)
- MS Windows 3.1
- Lotus Organizer for Olivetti
- Online manuals
- Interlink for file transfer
- File transfer cable
- Dimensions - 279 x 216 x 45mm (x49mm in colour version) • Weight - 2.1kg
- "ExtraTime" Power Management System



MICROSOFT WINDOWS READY-TO-RUN

PLUS

*You may ADD Lotus 1-2-3 spreadsheet v4.01 and Lotus AmiPro word processing v3.01 AND the Carrying Case for JUST £50

£50



The Toshiba T1950CT

- Intel 486DX2 microprocessor
- 40Mhz clock speed
- 4Mb RAM expandable to 20Mb
- 200Mb hard disk
- 1.44Mb floppy
- SVGA Graphics adapter
- 8.4" Colour TFT display
- External monitor port
- 640 x 480 pixel resolution
- PCMCIA Release 2.0 Type III slot
- PS/2 keyboard and mouse ports
- Toshiba Ballpoint Mouse
- 84 full-size keys & 12 function keys
- Overlay numeric keypad
- MS DOS 6.2 & Windows version 3.11
- Autosensing Power Supply
- Rechargeable NiH2 4 hour battery
- One Year international warranty

£1879

The Toshiba T1910CS

- Intel SL Enhanced 486SX processor
- 33Mhz clock speed
- 8kb on-chip cache memory
- 4Mb RAM expandable to 20Mb
- 200Mb hard disk and 1.44Mb floppy
- VGA Graphics adapter
- 9.5 inch Passive Matrix Colour display
- external monitor port
- 640 x 480 VGA Graphics resolution
- PCMCIA Release 2.0 Type III slot
- PS/2 keyboard and mouse ports
- Toshiba Ballpoint Mouse
- 84 full-size keys & 12 function keys
- Overlay numeric keypad
- MS DOS 6.2 & Windows version 3.11
- Autosensing Power Supply
- Rechargeable NiH2 battery
- 1 year international warranty

£1369



The Toshiba T1910

- Intel SL Enhanced i486SX processor
- 33Mhz clock speed
- 8kb on-chip cache memory
- 4Mb RAM expandable to 20Mb
- 120Mb hard disk and 1.44Mb floppy
- VGA Graphics adapter
- 9.5 inch Sidelit STN Mono LCD display
- external monitor port
- 640 x 480 pixel resolution
- PCMCIA Release 2.0 Type III slot
- PS/2 keyboard and mouse ports
- Toshiba Ballpoint Mouse
- 84 full-size keys & 12 function keys
- Overlay numeric keypad
- MS DOS 6.2 & Windows version 3.11
- Autosensing Power Supply
- Rechargeable, removable NiH2 battery
- Up to 4 hours usage per charge

120MB Model
£849

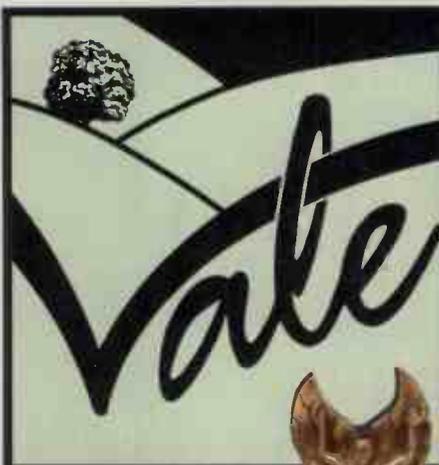
200MB Model
£939

01753 777777

Extended Warranty: Options for 1, 2, or 3 years are available on all systems and printers. Ask our staff to quote you the low LANTEC DIRECT price for this total peace of mind. Delivery Charges: PC System £14 + VAT, Peripherals (printers etc.) £10 + VAT, Software/small items etc £5 + VAT. Please read the information to the right.



CALL US NOW ON (01386) 765500 • Evesham Micros



ESTABLISHED 11 YEARS
 Evesham Micros has been established over 11 years and now has four operating locations with a total annual turnover exceeding £34 million. It has risen to a position of strength in the computer market, with sustained growth and a secure financial status.

NO CHARGE UNTIL SHIPMENT
 If you pay by credit card, payment is not processed until the goods are shipped. Beware of suppliers who charge your credit card weeks before they ship your order!

PCDMA
 We are a founder member of the Personal Computer Direct Marketers Association; a collaboration of manufacturers who adhere to a professional code of practice. This assures you of our pledge to provide a high standard of service. Additionally, the new Payment Protection Plan provides peace of mind if you pay by cheque.



Evesham Micros Evesham Micros

COMPUTER SHOPPER

For the last 2 years Evesham Micros have swept the board when it comes to Service Awards. Our efforts to provide the best possible service have once again been rewarded - the readers of "Computer Shopper" magazine have just voted Evesham Micros "Best Customer Liaison" for 1994.



SERVICE

In the 1993 PC Direct 'HITS AWARDS' we won both "Customer Service Excellence" and "Service and Support Excellence" categories as voted by their readers. In 1994 we did it again winning the prestigious "Service Excellence" award. We are especially proud of all these accolades as they were nominated by readers who have actually dealt with our company.

The PC Direct readers also voted us their favourite supplier of these products:



OPTICAL /CD-ROM DRIVES

SERVICE



MORE TECHNOLOGY PER £
 Vale PCs are packed with the latest technology and high quality components. Our objective is to supply you with a great PC at a great price and to back it up with top notch support.

READY TO RUN

All systems are fully formatted and pre-installed with DOS and Windows. Comprehensive documentation is of course supplied, including all software disks and manuals, as is a mouse. Any peripherals and upgrades you buy with your PC will, wherever possible, be fully configured and tested.



Evesham Micros

READY TO SHIP

We endeavour to build and despatch all orders as quickly as possible. To this end, we try to maintain a buffer stock of popular configurations which can be either shipped immediately or purchased from one of our showrooms. These models are highlighted with a "Ready to ship" logo in the pricing information. Custom and other configurations are built to customer order and take a little longer, but we aim to despatch in days not weeks. If you contact us we will give you a realistic estimate of the current delivery situation.



"Ready to ship"

DYNAMIC BURN-IN

A rigorous burn-in procedure repeatedly tests all key components. Only after passing this and a final QC inspection do we ship the goods.



Evesham Micros



ALL PCI MODELS NOW FEATURE **2Mb VIDEO**



Leave nothing to **CHANCE**

Evesham Micros

30 DAY MONEY BACK GUARANTEE

We are so confident that you will be delighted with your Vale PC that should you, for any reason at all, be unhappy with your purchase, we will COLLECT it and refund your money in full. You will NOT pay any carriage or restocking charges. (UK mainland only).

ON-SITE SERVICE

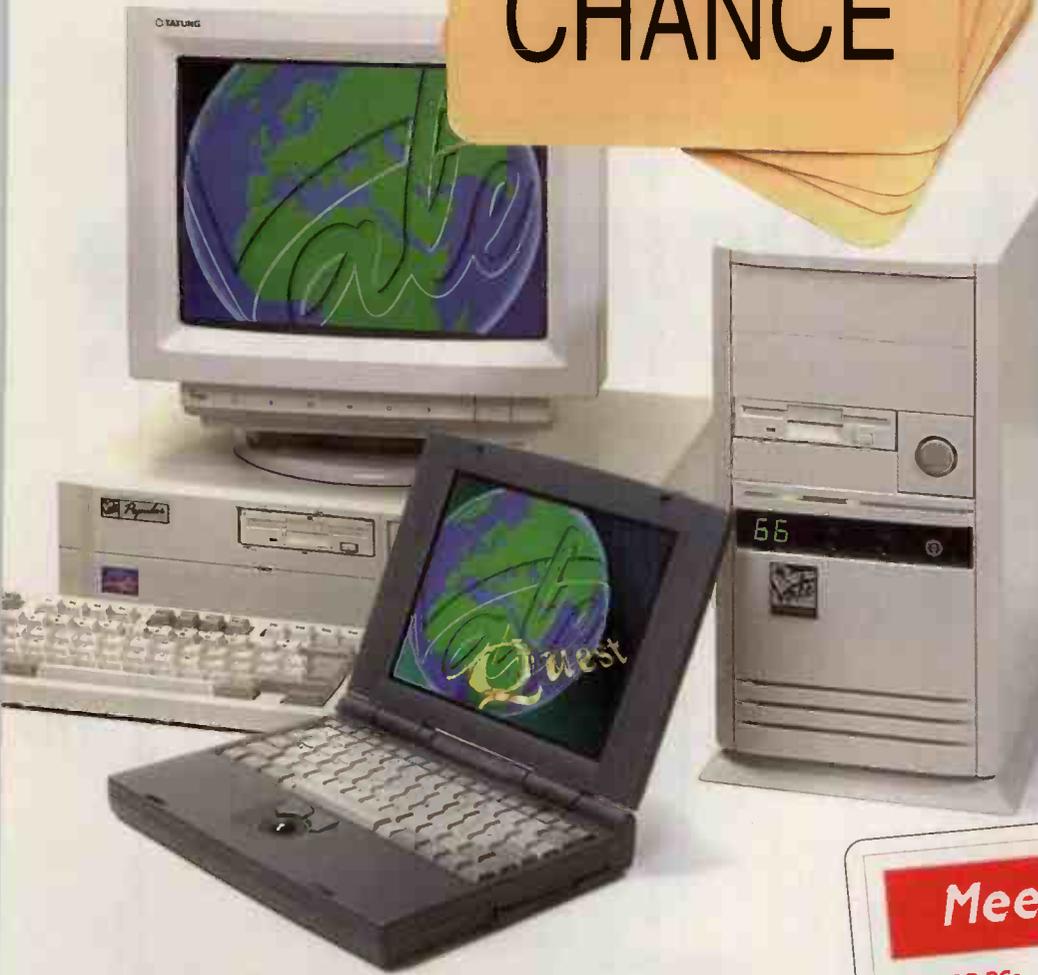
All UK mainland based PCs (except the Quest and Voyager notebooks) have the benefit of on-site maintenance for the first year, covering both parts and labour. The length of cover can be extended to 2 or 3 years if desired (see the "Options" section of each page for price details).

LIFETIME TECHNICAL SUPPORT

As an owner, you will be privileged with access to an exclusive VALE HOTLINE support number, staffed by friendly knowledgeable people with a full record of your system. Lines open 9am until 5-30pm Monday to Friday, and 10am until 4pm Saturday.

LIFETIME WARRANTY

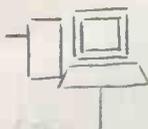
We also offer a lifetime warranty on labour, so if a problem arises at anytime in the future you will only pay for the parts necessary to repair it.



Corporate Sales

Evesham Micros has a proven track record of supplying some of the country's leading organisations - a wide spectrum of businesses, government bodies and

educational establishments. Each of our branches has an established corporate sales team with a wealth of experience and enthusiasm, and the backing of the leading suppliers to the industry. Whether your needs are large or small, they are ready to discuss your requirements and advise on the ideal solution.



Meet the

range

DESKTOP PCs

We offer a range of desktop PCs from the modestly priced Popular models to state-of-the-art performance in the Premier and Platinum models.

PENTIUM MODELS

In the Platinum range we offer a computer optimised specifically for Pentium performance at the most economical cost.

NOTEBOOKS

The Quest notebook is an efficient "no frills" introduction to mobile computing, while the Voyager offers the ultimate in performance and features, in a very modern stylish design.

FILESERVERS AND NETWORK INSTALLATION

In addition to stand-alone PCs we specialise in the installation and support of a wide variety of network installations. Please see the "Network Solutions" section on page 7 of the advert.

Evesham Micros • CALL US NOW ON (01386) 765500 • Evesham Micros



Popular

PRACTICAL PC
May 1994

"I cannot think of anything I would add to it to make it more attractive as a package and I cannot see how they could get the price any lower!"
Vale Popular Multimedia PC

MICRO MART
24 March 1994

"An extremely high value package at an extremely low price. £999 does not buy much these days, but it can buy one hell of a good Multimedia PC!"
Vale Popular Multimedia PC

The **Vale Popular** range offers a level of sophistication not normally associated with computers at this price. The perfect solution for so many applications.

- ◆ Processor Upgradeable Motherboard with 2 free VL-Bus slots
- ◆ EPA Energy Star compliant
- ◆ Upgradeable to Pentium Overdrive processor
- ◆ 4Mb RAM (expandable to 64Mb)
- ◆ 8k internal cache fitted, capacity for up to 1Mb external cache
- ◆ 1Mb Cirrus Logic 5428 VL-Bus video
- ◆ 14" SVGA monitor (non-interlaced up to 800x600)
- ◆ 3.5" 1.44Mb Floppy Disk Drive
- ◆ 2 Serial and 1 Parallel port
- ◆ 2xVL-Bus/16-bit & 2x16-bit expansion slots free
- ◆ TÜV approved Power Supply with low noise fan
- ◆ Slimline desktop case
- ◆ 102-key keyboard
- ◆ MS-DOS 6.22, Windows for Workgroups 3.11 and Mouse
- ◆ 30 day moneyback guarantee
- ◆ 1 year On-Site Maintenance for parts and labour
- ◆ Lifetime technical support hotline
- ◆ Lifetime labour warranty



from **£699^{+VAT}**

PROCESSOR UPGRADEABLE MOTHERBOARD Quite simply most other PCs in this price bracket do not compete with the performance, facilities and features offered here. The board is a bang up to date integrated design that incorporates 1Mb VL-Bus video, a ZIF socket for processor upgrades, facility for up to 1Mb external cache RAM coupled with the latest energy saving technology and excellent memory performance.

1MB ACCELERATED VIDEO The on-board 1Mb Cirrus Logic 5428 video processor (upgradeable to 2Mb) bestows the Vale Popular with astonishingly fast video performance for such a moderately priced computer (see the graph on the *Premier* page). It supports resolutions up to 1280x1024 and provides 24-bit colour at 640x480.

486sx +33		486dx2+66	
250MB	£699 ^{+VAT}	250MB	£799 ^{+VAT}
528MB	£799 ^{+VAT}	528MB	£899 ^{+VAT}

OPTIONS	8Mb RAM option instead of standard 4Mb	£120.00 +VAT
	16Mb RAM option instead of standard 4Mb	£360.00 +VAT
	256k external cache RAM	£50.00 +VAT
	Fully non-interlaced monitor (as <i>Vale Prestige</i>)	£50.00 +VAT
	Fully non-interlaced 15" monitor (as <i>Vale Premier</i>)	£100.00 +VAT
	Internal High Density 5.25" 1.2Mb Drive	£49.00 +VAT
	Second year on-site maintenance	£59.00 +VAT
	Second and third year on-site maintenance	£129.00 +VAT

SEE THE PREMIER PAGE FOR VALE ACCESSORIES

NEW POPULAR MEDIA '95

- ◆ Popular 486DX2+66 with 260Mb hard disk
- ◆ Full multimedia pack featuring:
 - Double speed CD-ROM drive;
 - Zy-Fi2 amplified stereo speaker system;
 - Genuine Creative Labs SoundBlaster 16 sound card;
 - Media '95 software bundle (see below)

Ready to ship



- Microsoft Works** The integrated productivity suite: Word Processor, Spreadsheet, Database, Graphics, Communications.
- Microsoft Encarta '95** The complete multimedia encyclopedia, harnessing the power of your computer to take you on a journey of discovery and learning.
- Microsoft Golf** Experience the true-to-life challenges of the game of golf.
- Microsoft Scenes** Superb screen saver.
- Microsoft Money** Everything you need to take control of your finances.
- Microsoft Dangerous Creatures** See extraordinary creatures come to life in more than 100 exciting narrated videos.

All this for only
£999^{+VAT}

This pack is available on any Vale model at a supplement of £200+VAT.

We offer a full range of multimedia packs and products, any of which can be specified with your Vale PC. Please see page 9 of our advert for full details.



A Vale Popular Media '95 PC

new
ZYFI2



Prestige PCI

"Overall, this is a well-specified, well-constructed computer with good expansion potential, plenty of bells and whistles and sharp performance. A hard combination to beat." Vale Prestige



February 1995

Fantastic value **PCI** Fantastic specification

- ◆ Processor Upgradeable Motherboard with 2x PCI, 1x PCI/16-bit & 4x16-bit expansion slots
- ◆ EPA Energy Star compliant
- ◆ Upgradeable to Pentium Overdrive processor
- ◆ 4Mb RAM (expandable to 64Mb) ◆ 256kb cache
- ◆ High speed local bus hard disk controller
- ◆ Prolink 2Mb Cirrus Logic 5434 64-bit PCI video card
- ◆ Fully non-interlaced 14" MPR II monitor
- ◆ 3.5" 1.44Mb Floppy Disk Drive
- ◆ 2 Serial and 1 Parallel port
- ◆ CPU cooling fan
- ◆ TÜV approved Power Supply with low noise fan
- ◆ Choice of desktop or mini-tower case (see first page)
- ◆ Full-tower case available at extra cost (see first page)
- ◆ 102-key tactile keyboard
- ◆ MS-DOS 6.22, Windows for Workgroups 3.11 and Mouse
- ◆ 30 day moneyback guarantee
- ◆ 1 year On-Site Maintenance for parts and labour
- ◆ Lifetime technical support hotline
- ◆ Lifetime labour warranty

STATE OF THE ART MOTHERBOARD

Prestige & Premier models feature a top quality board designed and built to offer superb performance, compatibility, reliability and upgradeability. Three of the new PCI slots should take care of any expansion requirements, while the processor ZIF socket allows 486 models to be upgraded to Pentium technology with a Pentium Overdrive CPU. The heart of any personal computer is the motherboard – we have learned from experience that selecting the right one may cost more but it is worth it!



2Mb PCI VIDEO CARD

All *Prestige* models feature a Prolink 2Mb PCI video card. Based on the Cirrus Logic 5434 Windows accelerator, it offers superb video performance – see the graph on the next page. 24-bit colour support (16.7 million colours) in 800x600 is provided along with a good range of drivers and an easy to use control panel.

REFRESHING MONITOR

The *Vale ECO Scan 14* is a top quality dark screen, Low Emission 14" SVGA colour monitor which is non-Interlaced in all modes including 1024x768. An important point is its ability to display SVGA mode (800x600) at 72Hz refresh rate which is flicker free, making it comfortable to use and restful on the eyes. It also meets the stringent MPR II safety requirements as well as surpassing the EPA Energy Star power saving standard.



Figures are Mb/sec and were produced using CORE test software on a Vale 486dx2-66 PC. These are actual test figures, not theoretical maximums. Figures vary with processor and hard disk type.

HARD DISK PERFORMANCE

With their 32-bit local bus controller the *Vale Prestige & Premier* offer bristling IDE hard disk performance, and by utilising the block transfer mode of the latest hard disk drives a significant performance improvement is gained. If the optimum in hard disk performance is your goal, then specify the optional Tekram PCI caching controller. The performance advantages are illustrated in the graph. Please note: All 2Gb models (and 1Gb SCSI option) use a Fast SCSI-2 PCI bus controller.

Tekram Caching Hard Disk Controller

- 2Mb cache RAM, expandable to 16Mb
- Less than 0.3ms access time
- Up to 16Mb/sec data transfer rate

486dx2-66
528MB £999^{+VAT}
1GB £1169^{+VAT}

486dx4-100
528MB £1049^{+VAT}
1GB £1219^{+VAT}

OPTIONS	8Mb RAM instead of standard 4Mb	£120.00 +VAT
	16Mb RAM instead of standard 4Mb	£360.00 +VAT
	Tekram PCI caching HD controller with 2Mb installed (for IDE hard disks)	£167.00 +VAT
	1Gb SCSI hard disk instead of 1Gb IDE	£199.00 +VAT
	2Gb SCSI hard disk instead of 1Gb IDE	£450.00 +VAT
	Diamond Stealth 64DRAM PCI video card (2Mb)	£50.00 +VAT
	Diamond Stealth 64VRAM PCI video card (2Mb)	£159.00 +VAT
	Internal high density 5.25" 1.2Mb drive	£49.00 +VAT
	Full-Tower case	£50.00 +VAT
	Second year on-site maintenance	£59.00 +VAT
Second and third year on-site maintenance	£129.00 +VAT	

SEE THE PREMIER PAGE FOR VALE ACCESSORIES

MONITOR UPGRADES

Vale ECO Scan 15 SVGA colour monitor (as <i>Premier</i> range)	£50.00 +VAT
17" Panasonic TX-D1732 SVGA colour monitor, illustrated on <i>Platinum</i> page, (up to 64kHz scan, on-screen control display, EPA Energy Star power saving functions)	£399.00 +VAT
17" Tatung CM-17MCR SVGA colour monitor (up to 65kHz scan, 1280x1024 max. res. non-interlaced) "...leads the field in PC Labs' performance tests" (CM-17MBD) – PC Magazine, June 1993	£299.00 +VAT
17" Tatung CM-17MKR SVGA colour monitor (up to 82kHz scan, 1600x1200 max. resolution non-interlaced)	£479.00 +VAT
20" Tatung SVGA Low Emission colour monitor (1280x1024 non-interlaced)	£699.00 +VAT

KEYBOARD

The *Prestige, Premier & Platinum* ranges use a full 102-key keyboard with proper tactile switches and a sturdy metal base. This unit has consistently impressed reviewers: "...almost traditional in its weight and touch. A deeply desirable device." Computer Buyer, June 1994.



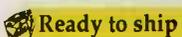
new ZYFI2

PRESTIGE MEDIA '95

- ◆ Prestige 486DX2-66 with 528Mb hard disk
- ◆ Full multimedia pack featuring:
 - Double speed CD-ROM drive;
 - Zy-Fi2 amplified stereo speaker system;
 - Genuine Creative Labs SoundBlaster 16 sound card;
 - Media '95 software bundle (*Microsoft Works, Encarta '95, Golf, Scenes, Money, Dangerous Creatures*)



A Vale Prestige Media '95 PC



All for only **£1199^{+VAT}**

This pack is available on any Vale model at a supplement of £200 +VAT.



We offer a full range of multimedia packs and products, any of which can be specified with your Vale PC. Please see page 9 of our advert for full details.

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Premier PCI

"Without hesitation we recommend the Vale Premier from this group."
Vale Premier Media '95 PC



January 1995

The Premier PCI range features the following enhancements to the Prestige PCI:

- ♦ 8Mb RAM (max. to 64Mb)
- ♦ 2Mb Diamond Stealth 64DRAM 64-bit PCI video card
- ♦ Microprocessor controlled 15" non-interlaced monitor

486DX2-66
528MB £1179^{+VAT}
1GB £1349^{+VAT}

486DX4-100
528MB £1229^{+VAT}
1GB £1399^{+VAT}

PENTIUM P60
528MB £1299^{+VAT}
1GB £1469^{+VAT}

PREMIER MEDIA '95

486DX2-66 with

528Mb hard disk. Ready to ship @ £1379^{+VAT}

(For contents of the Media '95 pack, please see the Popular page).

16Mb RAM instead of standard 8Mb	£240.00 +VAT
Pentium P66 processor instead of P60	£80.00 +VAT
Tekram PCI caching HD controller with 2Mb installed (for IDE hard disks)	£167.00 +VAT
1Gb SCSI hard disk instead of 1Gb IDE	£199.00 +VAT
2Gb SCSI hard disk instead of 1Gb IDE	£450.00 +VAT
Diamond Stealth 64VRAM PCI video card (2Mb)	£109.00 +VAT
Internal high density 5.25" 1.2Mb Drive	£49.00 +VAT
Full-Tower case	£50.00 +VAT
Second year on-site maintenance	£59.00 +VAT
Second and third year on-site maintenance	£129.00 +VAT

DIAMOND VIDEO CARDS

Diamond Computer Systems Inc are the leading supplier of high performance video cards in the USA, regularly winning awards from the American PC magazines for their "designed and manufactured in the USA" products. The graph highlights the performance advantages of their PCI video cards. Diamond Systems are continually striving to optimise the performance and compatibility of their video cards; you therefore have the assurance that driver support is ongoing.



DIAMOND Stealth 64DRAM

The highly acclaimed Stealth range has won many press accolades including PC Magazine "Editors Choice". The new Diamond Stealth 64DRAM is set to further enhance the strong reputation of this range, setting a new standard in affordable 64-bit graphics performance. With 2Mb of RAM and the S3 Vision864 chipset, it excels under both DOS and Windows.

For ultimate performance, the new Stealth 64VRAM can be specified at extra cost - see the Platinum page for description.

- 24-bit True Colour
- 2Mb DRAM
- Max. 16.7 million colours (800x600)
- Non-interlaced up to 1024x768
- Full Windows 3.x support
- AutoCad drivers (including Rel 12)
- 1280x1024 maximum resolution

Source: PC Labs Winmark 3.1. The figures represent megapixels per second over a variety of Windows related tasks. Last two figures produced on a Vale Pentium P90, all others on a Vale 486DX2-66. Figures vary with processor type.

15" MONITOR

The Vale ECO Scan 15 that is supplied with the Premier and Platinum ranges is a superb quality micro-processor controlled 15" monitor. A dark non-glare FST screen with 'Edge-to-Edge' display gives as much as 30% greater picture area than 14" models. Complete control over all display adjustments is obtained via a simple digital push button system, with on-screen representation of the settings. As it complies with the stringent Swedish MPR II safety standards and supports all VESA video modes, it is especially kind to your eyes. It also surpasses the EPA Energy Star power saving standard.



If you prefer the luxury of a larger monitor with your PC we offer a choice of 17" and 20" models. Please see the "Monitor upgrades" section below.

The on-screen display shows the current selected video mode and facilitates easy adjustment of display settings.

- 15" FST tube
- Micro-processor controlled digital adjustments
- Fully non-interlaced
- 72Hz Flicker-Free performance at 1024x768
- Low radiation (MPR II)
- 0.28mm dot pitch
- 1280 x 1024 max. resolution
- Energy Star and NUTEK power saving down to 5W

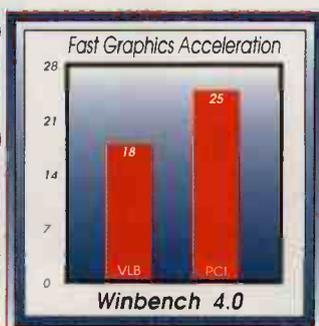
MONITOR UPGRADES

17" Panasonic TX-D1732 SVGA colour monitor, illustrated on Platinum page, (up to 64kHz scan, on-screen control display, EPA Energy Star power saving functions)	£349.00 +VAT
17" Tatung CM-17MCR SVGA colour monitor (up to 65kHz scan, 1280x1024 max. res. non-interlaced)	£249.00 +VAT
"...leads the field in PC Labs' performance tests" (CM-17MBD) - PC Magazine, June 1993	£249.00 +VAT
17" Tatung CM-17MKR SVGA colour monitor (up to 82kHz scan, 1600x1200 max. res. non-interlaced)	£429.00 +VAT
20" Tatung SVGA Low Emission colour monitor (1280x1024 non-interlaced)	£649.00 +VAT



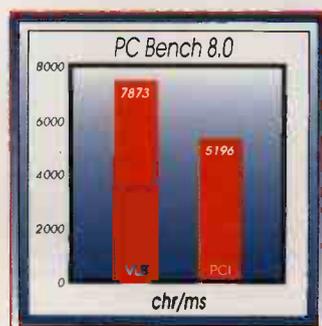
The Vale 15" microprocessor controlled digital Monitor

WINDOWS



These two graphs illustrate the performance benchmarks of the Diamond Stealth 32 card under Windows and DOS.

DOS



Vale PC Accessories

TAPE STREAMER BACKUP

Regular backups are essential to ensure the safety of your data; why not take the advantage of having a tape streamer fitted into your Vale? It is more economical than using multiple floppy disks, as well as being faster and far more convenient. Quoted capacities are with compression software (supplied). All units are supplied with full backup software.



IOMEGA 250Mb UNIT	£99.00 +VAT
DC2120 Tapes for above	£15.00 +VAT
IOMEGA 700Mb UNIT	£249.00 +VAT
Tapes for above.....	£16.00 +VAT
TEAC 1Gb UNIT	£399.00 +VAT
QIC-143 Tapes for above.....	£25.00 +VAT

LOTUS SMARTSUITE 3

- NEW!**
- Ami Pro 3.1
 - 1.2.3. 5.0
 - Organiser 1.1
 - Approach 3.0
 - Freelance 2.1



A complete software suite providing the latest versions of leading Windows applications.

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The performance to cope with the most demanding multimedia applications.

If you opt for either the "Media '95" or "Lotus Platinum '95" multimedia packs with any of the Prestige, Premier or Platinum ranges, you can specify a quad speed CD-ROM drive instead of the double speed unit for just

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Platinum



Vale Platinum... the Editor's choice!

- ◆ Next generation Pentium CPU, upgradeable with P54CT via Intel socket 5
- ◆ Integrated motherboard with 2x PCI, 1xPCI/16-bit & 4x16-bit expansion slots
- ◆ 256kb external CPU write-back cache
- ◆ 8Mb RAM (expandable to 192Mb)
- ◆ PCI IDE hard disk controller (528Mb and 1Gb IDE models)
- ◆ Diamond Stealth 64DRAM 2Mb 64-bit video card
- ◆ Microprocessor controlled 15" non-interlaced monitor (as Premier range, see previous page)
- ◆ EPP and ECP capable printer port
- ◆ Two 16550 compatible UART driven high speed serial ports
- ◆ Full Microsoft Windows 95 'plug and play' support
- ◆ Flash BIOS
- ◆ 3.5" 1.44Mb Floppy Disk Drive
- ◆ TÜV approved Power Supply with low noise fan
- ◆ CPU cooling fan ◆ EPA Energy Star compliant
- ◆ 102-key tactile keyboard (as Prestige range)
- ◆ MS-DOS 6.22, Windows for Workgroups 3.11 and Mouse
- ◆ Choice of desktop or mini-tower case (see first page)
- ◆ Full-tower case available at extra cost (see first page)
- ◆ 30 day moneyback guarantee
- ◆ 1 year On-Site Maintenance for parts and labour
- ◆ Lifetime technical support hotline
- ◆ Lifetime labour warranty



January 1995
Vale Platinum
Media '95 PC



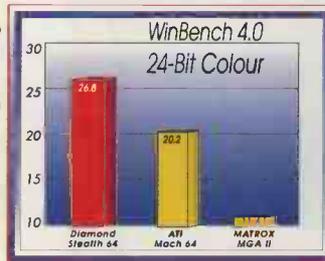
January 1995

- ◆ Vale Platinum P90 with:
- ◆ 16Mb RAM upgrade
- ◆ Diamond Stealth 64vram video upgrade
- ◆ Panasonic TX-D1732 monitor upgrade
- ◆ Media '95 multimedia kit

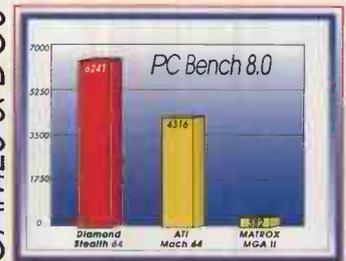
"the Evesham Vale Platinum delivers excellent performance, a good feature set and an affordable price—a combination which is the hallmark of a PC Magazine Editor's Choice. In a market where compromise is all too common, the Evesham Vale Platinum is a winner."

DIAMOND STEALTH 64vram option For the ultimate graphics performance you can specify the Stealth 64vram — the fastest Diamond video card yet. Its 2Mb VRAM can be expanded to 4Mb, allowing the use of 16 million colours at resolutions up to 1152x864, and 65 thousand colours at 1280x1024.

WINDOWS



GAMES & DOS



These two graphs illustrate the performance of the Diamond Stealth 64 vram under Windows and DOS.

PENTIUM P75	
528MB	£1349 ^{+VAT}
1GB	£1519 ^{+VAT}
2GB	£1969 ^{+VAT}

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528MB	£1549 ^{+VAT}
1GB	£1719 ^{+VAT}
2GB	£2169 ^{+VAT}

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 - Tekram PCI caching HD controller with 2Mb installed (for IDE hard disks).....£167.00 +VAT
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- SEE THE PREMIER PAGE FOR VALE ACCESSORIES

MONITOR UPGRADES

PLEASE SEE THE PREMIER SECTION FOR MONITOR UPGRADES



Platinum P90 with 528Mb hard disk. Ready to ship @ £1749^{+VAT}
(For contents of the Media '95 pack, please see the Popular page).

Lotus Platinum '95

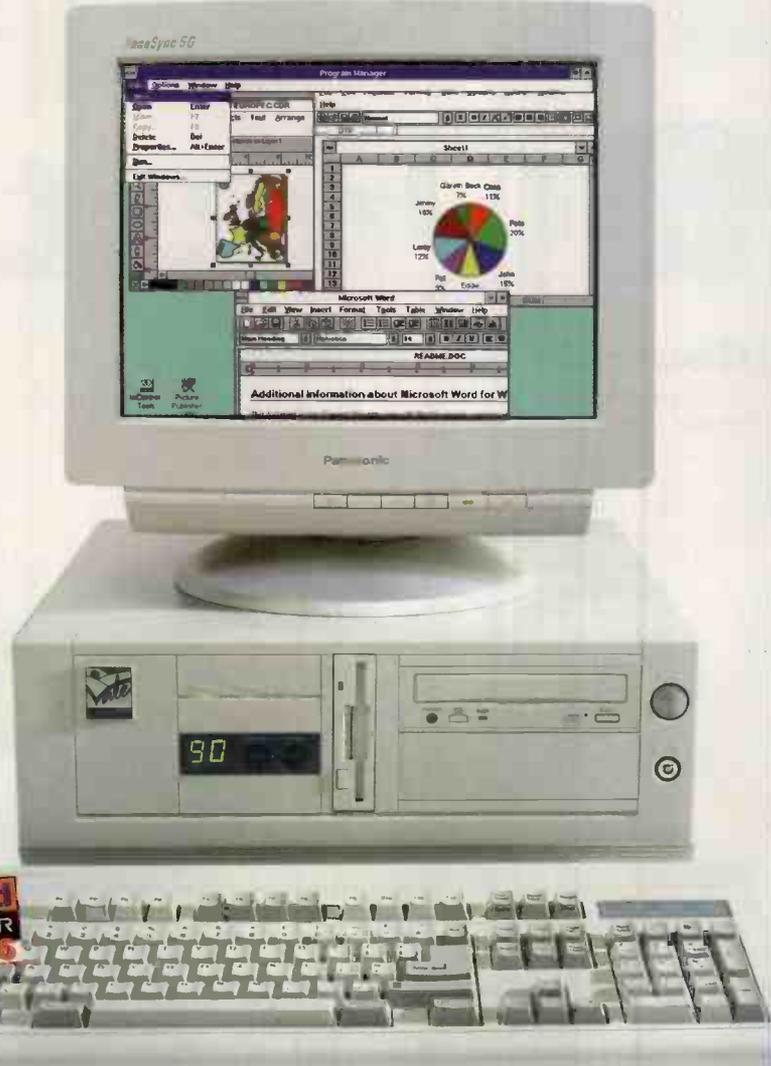
- ◆ Platinum P90 with 528Mb hard disk
- ◆ Double speed CD-ROM drive;
- ◆ Amplified stereo speaker system;
- ◆ Genuine SoundBlaster 16 sound card;
- ◆ Fantastic collection of software (with on-line documentation):
 - Lotus 1-2-3, Lotus AmiPro, Lotus Approach, Lotus Screencam, Lotus Smartpics
 - Software Toolworks Grolier Encyclopaedia for 1994 - version 6
 - Supervoice, Dragon Lore, MegaRace, Theme Park, FIFA International Football
 - Professor Windows, Professor Training Suite, Professor Multimedia, Typing Tutor
 - Pilot Multimedia including 'Interlude' and 'Get Organized'



Ready to ship

Only **£1799^{+VAT}**

This pack is available on any Vale model at a supplement of £250+VAT.

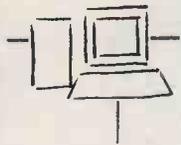


A Vale Platinum P90 PC with the optional Panasonic 17" monitor and Panasonic CD-ROM drive

We offer a full range of multimedia packs and products, any of which can be specified with your Vale PC, see page 9 of our advert for full details. Please note that bundled software does not feature retail packaging.

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Whatever your networking requirement, we can provide the complete solution. From a simple two user peer to peer system to a Wide Area Network, we will install and support the entire installation – from initial concept to user training. All our installations are supervised by a Novell Certified Network Engineer, thus assuring our clients of the very best in networking expertise. Why not contact our Corporate Sales staff at your nearest Evesham Micros branch to discuss your requirements.



The Vale modular Fileserver system

The Vale Fileserver

This is just an example of the type of fileserver we can supply. We will be happy to quote for your individual requirements.



- ◆ 90MHz Pentium CPU
- ◆ 1Gb SCSI hard disk with PCI controller
- ◆ 8Mb RAM ◆ 256kb cache
- ◆ 1Mb PCI video
- ◆ 14" SVGA monitor
- ◆ 32-bit PCI ethernet card
- ◆ Full-tower case

£1999.00+VAT

5 Station Solution



£4999.00+VAT

Not including cabling and installation

1 Fileserver:

- ◆ Vale Pentium P90 Fileserver (as left)

4 Workstations:

- ◆ 4x Vale Popular 486DX2•66
- ◆ 250Mb hard disk
- ◆ Ethernet card suitable for 10Base2 or 10BaseT

We fully appreciate that no two network requirements are exactly the same. While the above is an example of one of our solutions, we will be delighted to quote for your individual needs.



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for Portability
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Quest – the compact notebook.

The Quest offers the all essential features and versatility of a full size notebook in an exceptionally small and neat package.

- ◆ 9.4" LCD VGA display, either monochrome or dual scan colour
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- ◆ Very compact 268mm x 204mm x 45mm (less than an A4 page)
- ◆ Only 4.4lbs mono model or 4.8lbs colour model
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Monochrome

	250MB	340MB	520MB
486sx33	£899 ^{+VAT}	£999 ^{+VAT}	£1099 ^{+VAT}
486dx2•66	£999 ^{+VAT}	£1099 ^{+VAT}	£1199 ^{+VAT}

Dual Scan Colour

	250MB	340MB	520MB
486sx33	£1249 ^{+VAT}	£1349 ^{+VAT}	£1449 ^{+VAT}
486dx2•66	£1349 ^{+VAT}	£1449 ^{+VAT}	£1549 ^{+VAT}

QUEST OPTIONS

- Upgrade from 4Mb to 8Mb RAM£169^{+VAT}
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MULTIMEDIA SOLUTIONS

CD-ROM SOFTWARE

7th Guest.....	£34.00 ^{***}	Microsoft Art Gallery.....	£35.00 ^{***}
Alone in the Dark 2.....	£30.00 ^{***}	Microsoft Bookshelf.....	£69.00 ^{***}
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Special Offer! - The following titles are available with any purchase of a CD-ROM drive, Sound card or our special bundles (see right). Please note that they are not full retail packs.

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Animals of San Diego Zoo.....	£15.00 ^{***}	Secrets of Luftwaffe.....	£15.00 ^{***}
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Software Toolworks Grolier Encyclopaedia for 1994, Version 6.....	£39.00 ^{***}	PhotoStyler LE.....	£29.00 ^{***}
Guinness Book of Records.....	£19.00 ^{***}	Challenge Pack 9 Games.....	£19.00 ^{***}
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PANASONIC CD-ROM DRIVE

CR-562 Double Speed, multi-session drive for only

£89.99+VAT



April 1994



Includes cables and driver software

- Double speed 300kb/sec data transfer rate
- Multi-session mechanism - compatible with Kodak Photo CD Standard
- Motorised loading tray - no need for a caddy
- High speed 320ms access
- MPC compatible
- Mounts in 5.25" drive bay
- Output from audio CDs via headphone socket
- Requires SoundBlaster or compatible card with Panasonic CD interface

1B £149.99+VAT
CR-562 bundled with SoundBlaster 16 card

1C £169.99+VAT
CR-562 with SoundBlaster 16 ASP card

1E £103.99+VAT
CR-562 with AT-bus driver card

SPECIAL OFFER! - "Aldus PhotoStyler" PhotoCD compatible image manipulation software and "Software Toolworks Grolier Encyclopaedia for 1994 - Version 6" with any of the above packs for only **£20+VAT**.

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Based around the superb Panasonic CR-562 CD-ROM drive and a choice of carefully selected software bundles, these packs offer everything you need to discover the wonderful world of multimedia.

When ordering please quote pack number. We recommend a minimum 486sx33 system for the software in the multimedia packs. Please note that bundled versions of software and sound cards are not full retail packs, and the software features on-line documentation.

- * Panasonic CR-562 double speed CD-ROM drive
- * Choice of SoundBlaster sound cards
- * Zy-Fi 2 active speakers - The choice for the discerning listener. Please note that you can upgrade to Zy-Fi 2 PROs for a supplement of £20+VAT.
- * Outstanding collection of software:
 - SOFTWARE TOOLWORKS GROLIER ENCYCLOPAEDIA FOR 1994 - VERSION 6 with 33000 researched articles, plus dazzling array of graphics, sound, video sequences and animation.
 - PHOTO-CD software.
 - 'WORLD ATLAS 4' (latest version);
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2B £214.99+VAT
Multimedia kit featuring SoundBlaster 16 card

2C £234.99+VAT
Multimedia kit featuring SoundBlaster 16 ASP

2E £369.99+VAT
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All these multimedia packs use genuine Creative Labs SoundBlaster cards - the only choice for top performance and 100% compatibility.

Lotus MULTIMEDIA Office



- ◆ Panasonic CR-562 double speed CD-ROM drive;
- ◆ Choice of SoundBlaster sound cards;
- ◆ Zy-Fi 2 active speakers (you can upgrade to Zy-Fi 2 PROs for a supplement of £20+VAT);
- ◆ Fantastic collection of software:
 - Lotus 1-2-3, Lotus AmiPro, Lotus Approach, Lotus ScreenCam, Lotus Smartpics
 - Software Toolworks Grolier Encyclopaedia for 1994 - version 6
 - Professor Windows, Professor Training Suite, Professor Multimedia, Typing Tutor
 - Superoice, Dragon Lore, MegaRace, Theme Park, FIFA International Football
 - Pilot Multimedia including 'Interlude' and 'Get Organized'

9A £249.99+VAT
Multimedia kit featuring SoundBlaster 16 card

9B £269.99+VAT
Multimedia kit featuring SoundBlaster 16 ASP

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Multimedia kit featuring SoundBlaster AWE32

NEW MEDIA '95

- * Panasonic CR-562 double speed CD-ROM drive
- * Choice of SoundBlaster sound cards
- * Zy-Fi 2 active speakers - The choice for the discerning listener. Please note that you can upgrade to Zy-Fi 2 PROs for a supplement of £20+VAT.
- * Unrivaled software collection:
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 - Microsoft Encarta '95 The complete multimedia encyclopaedia, harnessing the power of your computer to take you on a journey of discovery and learning.
 - Microsoft Golf The true-to-life challenges of the game of golf.
 - Microsoft Scenes Superb screen saver.
 - Microsoft Money All you need to take control of your finances.
 - Microsoft Dangerous Creatures See extraordinary creatures come to life in more than 100 exciting narrated videos.
 - PhotoCD software
 - 'Challenge Pack' 9 top game titles • The Chessmaster 2100 • F-29 Retaliator • Paperboy 2 • ROBOCOR 3D • D/Generation • Contraption Zack • Epic • Might & Magic II • Push-Over



7A £224.99+VAT
Multimedia kit featuring SoundBlaster 16 card

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TEAC CD-55A Super Quad CD-ROM drive

With 4x speed this drive has the performance to cope with the most demanding multimedia applications.

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- Super fast 195ms access time
- Multi-session mechanism - compatible with Kodak Photo CD
- Output from audio CDs via headphone socket
- MPC compatible
- Requires sound card with Panasonic CD-ROM interface or AT-bus driver card



Only **£199.99+VAT**

Including cables and driver software

8A £213.99+VAT
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CD-55A with genuine SoundBlaster 16 card

8C £279.99+VAT
CD-55A with genuine SoundBlaster 16 ASP card

This drive can be specified with our multimedia packs 2x, 7x and 9x (see left) instead of the Panasonic CR-562 for a supplement of £110+VAT.



FX2000 Joystick £18.00+VAT

This recent addition to the highly acclaimed range of Suncom joysticks brings further advances in comfort and control. The pistol grip can be easily rotated to give perfect orientation for left or right handed use, while the unique "V" designed top fire button allows lightning fast response. Switchable autofire, throttle control and suction feet complete the package. Requires game port.



FlightMAX £25.00+VAT

Suncom's analogue joysticks always set new standards in quality and performance. The new FlightMAX Advanced Flight Control Console features Suncom's unique "SATURN-RING" Direct Drive Technology. This feature equalises control stick tension in all directions, for constant "G" tracking. FlightMAX also has dual fire buttons, throttle and rudder controls - right at your fingertips. Requires game port.

COMMAND CONTROL £17.00+VAT

TWO-HANDED HIGH DEFINITION CURSOR CONTROL - IDEAL FOR ALL GAMES!



New from Suncom Technologies is this exclusive Command Control. Giving full two handed cursor control it adds a new dimension to playing action games. Two fire buttons and autofire buttons at your fingertips maximize your scoring. Requires game port.



FLIGHTSTICK £30.00+VAT

THE FLIGHTSTICK IS CONSISTENTLY REVIEWED AS THE BEST QUALITY JOYSTICK IN ITS CLASS

Test fly a Flightstick with your favourite simulator and you will know the meaning of control. Whether you're a novice or experienced combat pilot, flying skills will be improved and enemy kill rate will increase. Excellent construction - looks and feels like the real thing! Includes throttle control and 7ft long connection cable. Requires game port.



FLIGHTSTICK PRO £55.00+VAT

THE ULTIMATE COMBAT STICK FOR COMPUTER PILOTS!

The new Flightstick PRO from CH Products offers the ultimate in fingertip control. It has four fire buttons, and a four-way switch which allows you to control weapons, radar and viewing functions on more advanced software - all without taking your hand from the stick! With its top quality sturdy construction it is designed to last for years. Includes driver software and long connection cable. Requires game port.



FLIGHT YOKE £39.00+VAT

Introducing G-FORCE from Suncom, designed for realistic control of all simulation software.

The G-FORCE functions as a full size aviation yoke with pitch and roll control, and twin fire buttons at your thumb-tips. For driving games, simply engage the column lock and G-FORCE functions as a stable steering wheel. The base plate has large suction feet and table edge clamps. Requires game port.

VIRTUAL PILOT £68.00+VAT

THE MOST REALISTIC FLIGHT YOKE AVAILABLE FOR THE PC



Enjoy the ultimate realism in all flight simulation games with the Virtual Pilot, made in the USA by CH Products. Looking just like a real airplane yoke, it is designed for the ultimate precision, giving you superb control. Also ideal for driving games. Clamps to table top. Requires game port.

VIRTUAL PILOT PRO £79.00+VAT



The VIRTUAL PILOT PRO has all the best features of the award winning VIRTUAL PILOT. It adds four extra fire buttons and two four-way switches for unrivaled control in all combat and simulation games. Requires game port.

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Featuring dual operating modes for forward and back rudder motion, as well as pivot movement for driving games, the CH Products PRO PEDALS provide gamers with the most realistic flying and driving experience. They also include aircraft style toe-brakes, and independent accelerator and brake control. They are designed to work with all CH Products joysticks and yokes, and are built with rugged components to withstand the toughest competitor. Require game port.

GAME PORT 2000 £12.50+VAT

Game port card for any of these joysticks and yokes. Works with any clock speed. Particularly recommended for 486sx2-66 and Pentium systems.

CREATIVE LABS, INC.

- SoundBlaster 2 Deluxe card.....£37.50+VAT
includes "Lemmings" and "Indianapolis 500" games
- SoundBlaster PRO Value pack.....£62.00+VAT
- SoundBlaster 16 Value pack.....£67.00+VAT
with Panasonic only CD-ROM interface
- SoundBlaster 16 MCD card.....£99.00+VAT
- SoundBlaster 16 ASP MCD card.....£119.00+VAT
- MCD (Multi-CD) cards have a triple CD-ROM interface for Panasonic/Sony/Mitsumi drives



- SoundBlaster AWE32 card
- integrated design combines SB16 ASP MCD with WaveBlaster.....£179.00+VAT
- WaveBlaster.....£115.00+VAT
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- TV Coder VGA to Video encoder.
Transfer your PC creations and manipulations back to video.....£119.00+VAT



PC SOUND SOLUTIONS

SOUNDPLUS 16 CARD

A 16-bit stereo sound card, compatible with the SoundBlaster and SoundBlaster Pro, as well as the Windows Sound Sytem, MPU-401 and AdLib standards. It provides CD-ROM interfaces for Panasonic, Sony, Mitsumi and IDE CD-ROM drives, has a MIDI interface/joystick port, and also interfaces for microphone, speakers, audio In/out, and wave table synthesizer. The high specification includes 48kHz stereo sampling rate, a 20 voice FM music synthesizer, and a 4 Watt per channel stereo power amplifier.

Incredible value... **£49.99+VAT**

3G £64.99+VAT
Soundplus 16 sound card with QS-123 joystick and Soundplus speakers

3H £74.99+VAT
Soundplus 16 sound card with QS-123 joystick, Zy-Fi2 active speakers and Monkey Island 2

3D £89.00+VAT
Pack 3H with genuine SoundBlaster 16 card

3F £109.00+VAT
Pack 3H with genuine SoundBlaster 16 ASP card

QS-123 Joystick

Ergonomic design with auto-centring, 2 fire buttons and autofire.

Soundplus Speakers

Full range shielded speakers.

Monkey Island 2

Renowned adventure game with fantastic sound and graphics.

Zy-Fi 2 PRO Speakers

The choice for the discerning listener. Packs which feature the Zy-Fi 2 speaker system can be upgraded to Zy-Fi 2 PROs for a supplement of £20+VAT.



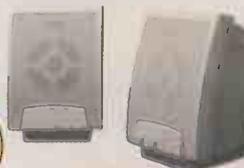
"Monkey Island 2 LeChuck's Revenge" is a registered trademark of Lucasfilm Games



ZY-FI 2 SPEAKERS

THE NEW ZY-FI 2 ACTIVE POWER AMPLIFIED STEREO SPEAKERS OFFER THE VERY BEST IN SOUND REPRODUCTION - IDEAL FOR ALL SOUND CARDS AND MULTIMEDIA SYSTEMS!

Feature built-in power amplifier with separate L/R volume controls and tone control. Magnetically shielded.



6 Watts RMS per channel

Only **£29.00+VAT**

ZY-FI 2 PRO SPEAKERS

The latest addition to the serious multimedia system must be our ZY-FI 2 PRO Active speaker system.

With a PMPO of 60 Watts per channel and an amplifier with a true 18 Watts RMS per channel rating, the PROs deliver a rich dynamic sound. They feature separate volume, bass and treble controls, and are magnetically shielded. Speaker size 14x23x15cm.



18 Watts RMS per channel

Only **£49.00+VAT**

SOUNDWAVE 32

ONLY **£149.00+VAT**

Personal Computer World CHOICE January 1994 February 1994



- SoundWave card with CD-ROM drive.....£299.00+VAT
- GameWave card.....£103.00+VAT
- CDS-3110 CD-ROM drive.....£155.00+VAT

VIDIOLA DIGITAL VIDEO SOLUTION

- Capture real-time video to disk from VCR, Video camera or TV tuner at 30fps **£285.00+VAT**
- Includes Adobe Premier professional video editing package and Asymedia PE for integrating text and graphic screens into presentations

UPGRADES & ACCESSORIES

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486 fan & heatsink.....£10.00 ^{+VAT}	486dx33£99.00 ^{+VAT}
Pentium fan & h/sink.....£12.50 ^{+VAT}	486dx2-66 heatsink and fan recommended£109.00 ^{+VAT}
	486dx4-100 heatsink and fan recommended£179.00 ^{+VAT}
	Pentium P60 heatsink and fan recommended£229.00 ^{+VAT}
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Our bulk purchase of motherboards allows us to offer you these special prices.



486 UP TO DX2+66 (TYPE 2).....£69.00^{+VAT}
 ● 3xVESA local bus/ISA slots ● 4xISA slots ● 256kb Cache
 ● ZIF socket ● P24T upgradeable ● Will accept most 486 CPUs up to DX2-66 ● Accepts 30/72-pin SIMMs.

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 Type 2 board bundled with 486dx2+66 processor£173.00^{+VAT}

486 UP TO DX2+66 (TYPE 4).....£85.00^{+VAT}
 ● 3xPCI local bus slots ● 4xISA slots ● ZIF socket ● P24T upgradeable ● 256kb Cache ● Will accept most 486 CPUs up to DX2-66 ● Accepts 72-pin SIMMs.

SPECIAL OFFER!
 Type 4 board bundled with 486dx2+66 processor£189.00^{+VAT}

486 UP TO DX4+100 (TYPE 7)£99.00^{+VAT}
 ● 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 ● Will accept most 486 CPUs up to DX4-100 ● Accepts 72-pin SIMMs.

SPECIAL OFFERS!
 Type 7 board bundled with 486dx2+66 processor£203.00^{+VAT}
 Type 7 board bundled with 486dx4+100 processor£273.00^{+VAT}

PENTIUM P60 (TYPE 5).....£145.00^{+VAT}
 DESIGNED FOR PENTIUM P60 PROCESSOR ● 2xPCI local bus slots ● 1xPCI/ISA bus slot ● 4xISA slots ● ZIF socket ● 256kb Cache ● Accepts 72-pin SIMMs.

SPECIAL OFFER!
 Type 5 board bundled with Pentium P60 processor£369.00^{+VAT}

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 DESIGNED FOR PENTIUM P75 OR P90 PROCESSOR ● 2xPCI local bus slots ● 1xPCI/ISA bus slot ● 4xISA 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.

SPECIAL OFFERS!
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1Mb 30-pin SIMM (3 chip) 70ns£34.00 ^{+VAT}
4Mb 30-pin SIMM (3 chip) 70ns£120.00 ^{+VAT}
4Mb 72-pin SIMM 70ns 32-bit£120.00 ^{+VAT}
8Mb 72-pin SIMM 70ns 32-bit .....£240.00 ^{+VAT}



VIDEO CARDS

DIAMOND

MULTIMEDIA

Diamond Stealth 24 VL Bus (1Mb) .....£99.00 ^{+VAT}
Diamond Stealth 64DRAM VL Bus (2Mb) .....£129.00 ^{+VAT}
Diamond Stealth 64DRAM PCI Bus (2Mb) .....£130.00 ^{+VAT}
Diamond Stealth 64VRAM VL Bus (2Mb) .....£229.00 ^{+VAT}
Diamond Stealth 64VRAM PCI Bus (2Mb) .....£230.00 ^{+VAT}
Diamond Stealth Trio32 PCI Bus (1Mb) .....£78.00 ^{+VAT}
Diamond Stealth Trio32 VL Bus (1Mb) .....£79.00 ^{+VAT}



ProLink Cirrus Logic 5434 (PCI Bus) 1Mb .....£69.00 ^{+VAT}
ProLink Cirrus Logic 5434 (PCI Bus) 2Mb .....£99.00 ^{+VAT}

HD CONTROLLER CARDS

VL bus IDE controller with 2x hard disk/floppy disk ports, 2x serial ports, 1x parallel port .....£19.00 ^{+VAT}
Tekram (PCI bus) c/w 0Mb RAM (upgr. to 16Mb) .....£99.00 ^{+VAT}
Tekram (PCI bus) c/w 2Mb RAM (upgr. to 16Mb) .....£167.00 ^{+VAT}



PROMISE CACHING HARD DISK CONTROLLERS

DC4030 (VL bus) c/w 0kb RAM (upgradeable to 16Mb) .....£89.00 ^{+VAT}
DC4030 (VL bus) c/w 2Mb RAM (upgradeable to 16Mb) .....£149.00 ^{+VAT}

HARD DISKS

COST EFFECTIVE MASS STORAGE



Drive mechanism only:

Optional installation kit (5.25" mounting bracket kit plus cables) .....£10.00 ^{+VAT}
Seagate ST3243A/3250A (IDE) 210Mb .....£99.00 ^{+VAT}
Seagate ST3290A (IDE) 250Mb .....£112.00 ^{+VAT}
Seagate ST3391A (IDE) 340Mb .....£139.00 ^{+VAT}
Seagate ST3660A (IDE) 528Mb .....£159.00 ^{+VAT}
Seagate ST31200A (IDE) 1Gb .....£325.00 ^{+VAT}
Seagate ST31200N (SCSI) 1Gb .....£445.00 ^{+VAT}



Upgrading the storage capacity of your system has never been easier.

Why worry about cables, fixing brackets, installation and technical backup?

This compact, externally mounted storage subsystem is designed for desktop use. It includes everything you need to install an extra drive quickly, with easy to follow instructions.

All units are covered by the manufacture's unique 48 hour **FREE** exchange warranty for the first year. Simply return the unit and within 48 hrs you will receive a replacement free of charge.

500Mb SCSI Unit£369.00 ^{+VAT}
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1Gb SCSI/Parallel Port Unit£619.00 ^{+VAT}

MONITORS

Due to our bulk purchasing power for our own Vale PCs, we are able to offer the following high spec. monitors at very competitive prices.



Vale EcoScan15

- On screen micro-processor controlled digital adjustments
 - Fully non-interlaced
 - 72Hz Flicker-Free at 1024x768
 - Low radiation (MPR II)
 - 1280 x 1024 max. res.
 - Energy Star power saving
- ONLY £249.00^{+VAT}**

Tatung 14" SVGA Monochrome£99.00^{+VAT}

Vale Eco14 SVGA Colour, 0.39mm dot pitch (as Vale Popular, see page 3)£149.00^{+VAT}

Vale Eco Scan14 SVGA Colour, 0.28mm dot pitch (as Vale Prestige, see page 4)£199.00^{+VAT}

Panasonic TX-D1732 17" SVGA Colour£599.00^{+VAT}
 On-screen control display • EPA power saving functions • Up to 64KHz horiz. scan

Tatung CM-17MCR 17" SVGA Colour£479.00^{+VAT}
 1280x1024 max. res. (non-interlaced) • 0.28mm dot pitch • Up to 65KHz horiz. scan

Tatung CM-17MKR 17" SVGA Colour£649.00^{+VAT}
 1600x1200 max. res. (non-interlaced) • 0.28mm dot pitch • Up to 82KHz horiz. scan
 "...leads the field in PC Labs' performance tests" (CM-17MBD) - PC Magazine, June 1993

Tatung 20" SVGA Colour£899.00^{+VAT}
 1280x1024 max. res (non-interlaced) • 0.31mm dot pitch
 • Auto 29-65KHz horiz. scan

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We are **NOVELL** authorised suppliers - Please contact us regarding your specific networking requirements.



Novell compatible 16-bit network card.
 Fully Novell authorised and tested.

NEW COMBO VERSION

£45.00 +VAT

- Faster than and compatible with NE2000 cards
- 10Mbps 10BaseT and 10Base2 I/O ports
- NETBIOS compatible

Kingston card with Novell Network Lite£65.00^{+VAT}

Longshine Ethernet Card (10Base2)£35.00^{+VAT}

PCMCIA Combo card (type II)£139.00^{+VAT}

Parallel port 10Base2 unit£179.00^{+VAT}

Ethernet Cable 5m length .....£8.50 ^{+VAT}	BNC connectors
10m length .....£14.00 ^{+VAT}	T Connector .....£3.20 ^{+VAT}
20m length .....£20.00 ^{+VAT}	Through Connector .....£1.80 ^{+VAT}

Asstmap PC Accs

3.5" 720kb Internal floppy drive for PC1512/1640. Suits any single drive machine. Complete kit with full instructions£51.06^{+VAT}
 PC1512 RAM upgrade to 640k with full instructions£25.49^{+VAT}

UPSONIC UNINTERRUPTIBLE POWER SUPPLIES

Protect your installation from mains power faults with an Upsonic uninterruptible power supply.

UPSONIC Station 28	280VA rating	.....£95 ^{+VAT}
UPSONIC Station 40	400VA rating	.....£155 ^{+VAT}
UPSONIC Station 60	600VA rating	.....£209 ^{+VAT}
UPSONIC Station 90	900VA rating	.....£309 ^{+VAT}
UPSONIC Station 140	1400VA rating	.....£419 ^{+VAT}
UPSONIC Station 200	2000VA rating	.....£649 ^{+VAT}

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

UPSONIC System 60	600VA rating	.....£499 ^{+VAT}
UPSONIC System 100	1000VA rating	.....£599 ^{+VAT}
UPSONIC System 300	3000VA rating	.....£1699 ^{+VAT}

KEYBOARD AND MICE



£25.00^{+VAT}

A full 102-key keyboard as used in our Vale range of PCs. It features proper tactile keys and a sturdy metal base. This unit has consistently impressed reviewers: "...almost traditional in its weight and touch. A deeply desirable device." Computer Buyer, June 1994

HANDY MOUSE £30.00^{+VAT}

TOTAL ONE-HANDED CURSOR CONTROL - PERFECT FOR ALL YOUR PORTABLE PC APPLICATIONS!



Slim, comfortable and easy to use, this specially designed controller is suitable for both left and right handed users! Features a clever 'Ball Button' which gives one-finger cursor control, clicking and click'n'drag, all in one control. Variable resolution 80-500dpi. Microsoft serial compatible - driver software supplied.

TRACKBALL £30.00^{+VAT}

Super smooth, accurate and versatile, perfect for the Windows environment, as well as games! With its featured locking drag button and line hold facilities, accurate total one-handed control is a doddle. Top quality construction and opto-mechanical design, delivering high speed and accuracy every time. Full Microsoft compatible driver software supplied.



Mouse 2.0 £39.00^{+VAT}

Intellipoint version

Ergonomics at it's best! Microsoft have their finger on the button when it comes to mouse design.

As well as an extremely high standard of quality and reliability the Mouse 2.0 offers increased comfort and efficiency when using Windows. New improved Intellipoint Software, provides a wide range of features designed to customise the mouse to the way the user wants to work. Features include: On screen toolbar, Autoscroll, Button Assignment, Smart Speed, Pointer character options and many more.



Home Mouse £29.00^{+VAT}

This unique design provides maximum comfort and optimum usability for all home PC users.

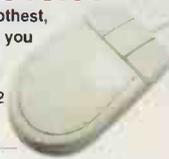
Built to the same high standards of reliability and performance as the Mouse 2.0. The Home Mouse also includes new Intellipoint Software - Home Edition enabling users to tailor the mouse exactly to their personal working methods, increasing efficiency and fun.



TRUEMOUSE £19.00^{+VAT}

WE GUARANTEE that this is the smoothest, most responsive and accurate mouse you can buy for the PC.

Excellent performance, amazing low price! 3-Button Serial (9-way & 25-way) and PS/2 versions available - please state which version is required when ordering.



PACE FAX/MODEMS



PACE
Authorised Dealer

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.

MICROLIN fax modems

V22bis units (2400 bps Modem, 9600bps FAX)

MICROLIN fx portable external unit£97 ^{+VAT}
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MICROLIN NB 24 PCMCIA type II unit£135 ^{+VAT}

BEST BUY

V32bis units (14400 bps Modem and FAX)

MICROLIN fx 32Plus portable external unit	.....£172 ^{+VAT}
MICROLIN fx 32Plus internal unit	.....£154 ^{+VAT}
MICROLIN NB 32Plus PCMCIA type II unit	.....£222 ^{+VAT}

PERSONAL COMPUTER REVIEWERS CHOICE FEBRUARY 1991

MobiFax

The MobiFax personal fax modem is the affordable way to enhance your PC with communications ability. Send and receive faxes, and access online information services and the Internet. All you need is MobiFax, your PC, and a phone socket.



- Includes free registration and Online time for the CompuServe information service and the AImac bulletin board system

MobiFax 24 package£79^{+VAT}

V22bis (2400 bps) Modem, 9600bps FAX

MobiFax 144 package£119^{+VAT}

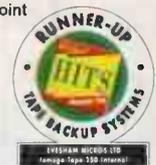
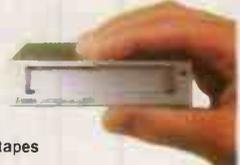
V32bis (14400 bps) Modem, 14400bps FAX

OMEGA STORAGE SOLUTIONS

Both the tape streamer and the floptical drive are available as either an internal or a stand alone unit. The stand alone versions simply connect to the PC's parallel port, with the tape streamer having a through port for printer operation.

Tape Backup

- ◆ Internal unit external 'parallel port' version available
- ◆ Industry standard QIC-80 recording format
- ◆ The only drive to read QIC tapes and Irwin tapes
- ◆ Internal unit includes DOS backup software
- ◆ Parallel port unit includes Central Point backup software (for DOS)
- ◆ 2 year warranty



PC today "A superb combination of tape drive and software." PC Today, December 1993
Omega Tape250 Parallel Port Unit

250Mb Version

INTERNAL UNIT	PARALLEL PORT UNIT
£99.00^{+VAT}	£199.00^{+VAT}
DC2120 tape for 250Mb Unit	.....£15.00 ^{+VAT}

700Mb Version

INTERNAL UNIT	PARALLEL PORT UNIT
£249.00^{+VAT}	£329.00^{+VAT}
Tape for 700Mb Unit	.....£16.00 ^{+VAT}

21 Mb Floptical Drive

A Standard floppy drive and a 21Mb floptical drive in one unit.
Floptical Disks: £16.00^{+VAT}

INTERNAL UNIT	PARALLEL PORT UNIT
£249.00^{+VAT}	£329.00^{+VAT}



ROMBO VIDEO DIGITISERS

MEDIA-PRO Plus

View, Freeze, Capture and Edit real-time running video on your PC in full 21-bit colour!

- Perfect for multimedia and image capture applications
- Full motion TV/Video & Sound on your Windows screen!
- PAL/NTSC Composite/S-Video inputs and R.G.B. output
- Free 'PHOTOFINISH' powerful image editing software supplied on registration
- Free 2 Speakers & Headphones

Clearance offer - MEDIA-PRO Plus .£149.00^{+VAT}
MEDIA-PRO HiRes includes Frame Buffer accessory£229.00^{+VAT}

N.B. Requires a 286 PC or higher with at least 1Mb RAM, Windows 3.1 & DOS installed, and one unoccupied expansion slot available. Media-PRO Plus requires 'Frame Buffer' hardware accessory when used with accelerated video cards.

SOFTWARE BARGAINS

NEW Test drive these top applications today! With a 60 day money back guarantee you have nothing to lose.

Lotus SMARTSUITE-3
Competitive upgrade
£229.00^{+VAT}

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Redefining spreadsheet productivity
- Lotus Freelance Graphics v2.1
The fastest, easiest way to a great presentation
- Lotus Ami Pro v3.1
The best word processor for Windows

- Lotus Organizer v1.1
The easiest way to manage your time and work
- Lotus Approach v3.0
It's never been easier to use a database

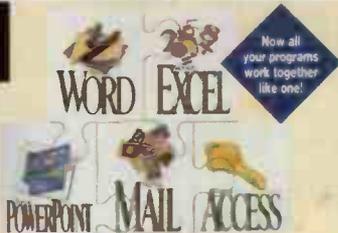
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Via voucher redemption

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Don't worry, we will supply a qualifying product free of charge.

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Competitive Upgrades are via voucher redemption.



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- ◆ MS Excel
- ◆ MS Powerpoint
- ◆ MS Mail (workstation license)
- ◆ MS Access (Office professional only)

Office Standard 4.2
Version upgrade£169^{+VAT}
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Version upgrade£259^{+VAT}
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WORDSTAR v1.5

Top Windows Word Processing package with superb text and page layout controls. Also ideal trade-in product for MS Office! **£19^{+VAT}**



SuperStor £15^{+VAT}

Double your hard disk capacity.

Evesham Micros ● (01386) 765500 ● Evesham Micros

SCAN THESE PRICES

ALL SCANNERS ARE TWAIN COMPLIANT

True 256 GREYSCALE HANDY SCANNER with all the right features, including O.C.R. and extensive graphics editing facilities.

True 24-bit Colour Version

Providing powerful colour scanning tools, this package enables high quality colour images to be generated for use in professional graphics presentations.

COLOUR SCANNER FEATURES:

- Colour mode gives genuine 16 million colour, 400dpi hardware scanning (not software interpolated)
- Greyscale mode with true 256 greyscales at up to 400dpi
- Halftone and Line-art modes at up to 400dpi

PACKAGE INCLUDES:

- HAND-HELD COLOUR SCANNER & INTERFACE CARD
- 'iPhoto Plus' top professional Windows based Image Scanning and Photograph re-touching software
- 'PERCEIVE PERSONAL' powerful OCR Windows software, giving simple, efficient operation with highly effective results

Requires '386 or higher, Windows 3.1 or higher, at least 4Mb RAM, Mouse, Hard Drive and SVGA graphics or higher,

Personal Computer World

"...I have found the quality of photographic and line-art scans to be good, and with Picture Publisher thrown in, this is extremely good value for money."

Personal Computer World, September 1994

- Genuine 256 greyscale performance (not interpolated from 32 greyscales) giving photo-realistic quality monochrome scans, with actual shades and shadows, at up to 400dpi
- Halftone and Line-art scanning at genuine 800dpi resolution
- Full 105mm wide scanning head with illuminated scan window
- Eight selectable scanning resolutions between 100 and 800dpi
- Variable brightness control
- Built-in scan speed indicator
- Includes "iPhoto Plus" top professional Windows based image scanning and photograph re-touching software, and "Perceive Personal" OCR software



WHAT PC? BEST BUY

Requires '386 CPU or above with Colour Monitor, at least 4Mb RAM, Windows 3.1 or higher, Hard Drive and Mouse.

"Superb quality results time after time. The ease of use is commendable and the bundled software offers brilliant value for money... We therefore recommend the Mustek without hesitation." What PC?, August 1993

Scanners from **Mustek**

with internal interface card **£59.00+VAT**

or with 'parallel port' interface (see bottom left) **£125.00+VAT**



Produced by the 24-bit hand scanner at 300dpi.

£129.00+VAT
Clearly excellent value!

TRY BEFORE YOU BUY



To help with your choice of scanner we have prepared a sample disk pack for each of the three units featured on this page.

Each sample pack contains several images (including the Car and Child) scanned in various modes to provide an exact representation of each unit's capabilities - before you buy.

A fact sheet is also included containing loading instructions, scanning info., and printed originals produced by the scanner of your choice for comparison.

Please state which scanner you are interested in (greyscale, colour or flatbed). Supplied on 3 1/2" disks.



Cost Per Pack **£5.00+VAT**

including delivery - refundable on purchase of a scanner.

External SCANNER INTERFACE

Connect your scanner to your printer port!

This compact in-line interface box does away with the need to install an expansion card for your scanner by simply plugging into the Parallel port. It is ideal for anyone who wants to transfer their scanner quickly between computers, as well as notebook owners and those who have simply run out of expansion ports.

Compatible with the Mustek Black & White, Greyscale, & 24-bit Colour hand-held scanners.



only **£69.00+VAT**

FLATBED A4 COLOUR SCANNERS

- Two models available: 600dpi unit, giving 1200dpi via interpolation; and 1200dpi unit, giving 2400dpi via interpolation
- Line art, 8-bit grey and 24-bit colour modes
- 12 built-in halftoning patterns
- 216mm x 356mm scan area
- SCSI expansion card interface supplied
- Both units include powerful OCR software and 'iPhoto Plus' Image Scanning and Photograph re-touching software

up to **2400 dpi**



"Excellent value for money. The works for only £700." PERSONAL COMPUTER December 1993

Personal Computer World April 1993 "The MFS6000C is a quality piece of hardware... Superb results."

"The Mustek MFS-1200CX provides a good set of features at the lowest price in the test group... if you need an inexpensive high-resolution scanner, then the Mustek MFS-1200CX should be on your shortlist." PC MAGAZINE October 1994

600/1200dpi **£329.00+VAT**
1200/2400dpi **£469.00+VAT**
Transparency adaptor £299+VAT
Sheet feeder £299+VAT

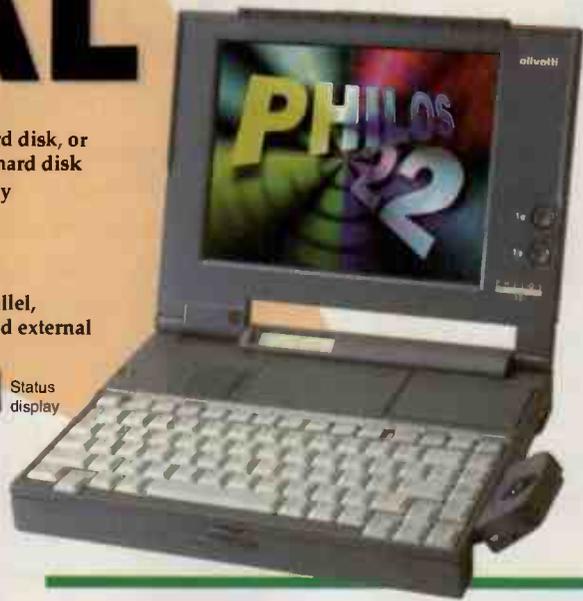
Requirements: '386 or higher, Windows 3.1 or higher, Mouse, Hard Drive and SVGA graphics or higher. 600dpi unit needs at least 4Mb RAM. 1200dpi unit needs at least 8Mb RAM.

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AN **OLIVETTI '486**
FOR **£649 ?**

- Intel 25MHz 486SL processor
- Monochrome model with 80Mb hard disk, or Passive Colour model with 120Mb hard disk
- 10" mono or 9.4" colour VGA display
- 4Mb RAM, expandable to 32Mb
- PopUp™ trackball
- 3.5" 1.44Mb floppy disk drive
- Expansion ports include serial, parallel, external PS2 keyboard or mouse, and external VGA monitor (via adaptor cable)
- Comprehensive Status display
- Weight: Mono 4.4lbs / Colour 5.5lbs
- Dimensions: 279 x 216 x 44mm (mono) or 49mm (colour)
- Preloaded MS-DOS, Windows, Lotus Organiser, online manuals



Status display

Side view

PHILOS OPTIONS

- Upgrade from 4Mb to 8Mb RAM£180⁰⁰+VAT
- Full size keyboard with 14" colour monitor and monitor cable£239⁰⁰+VAT
- Carrying case£30⁰⁰+VAT
- Cable for external VGA monitor£15⁰⁰+VAT



Go on **Twist our arm!**
mono **£649.00 +VAT**
colour **£999.00 +VAT**

DeskJet and LaserJet

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- HP DeskJet 320 with sheet feeder£199.00⁰⁰+VAT
- HP DeskJet 520£219.00⁰⁰+VAT
- HP DeskJet 500C£218.00⁰⁰+VAT
- HP DeskJet 560C£364.00⁰⁰+VAT
- HP DeskJet 1200C£999.00⁰⁰+VAT
- HP DeskJet 1200C/PS£1399.00⁰⁰+VAT



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- HP LaserJet 4 L£429.00⁰⁰+VAT
- HP LaserJet 4 ML£799.00⁰⁰+VAT
- HP LaserJet 4 P£659.00⁰⁰+VAT
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- HP LaserJet 4 Plus£1049.00⁰⁰+VAT
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- HP DeskJet 310/320 colour upgrade kit£35.00⁰⁰+VAT
- HP DeskJet long life black ink cartridge£25.00⁰⁰+VAT
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- 56kb RAM cartridge for DeskJet Plus / 500£59.00⁰⁰+VAT



- PostScript Level 2 upgrade for LaserJet 4£229.00⁰⁰+VAT
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- 4Mb RAM upgrade for LaserJet 4£169.00⁰⁰+VAT

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- Star XB24-200£346.00⁰⁰+VAT
- Star XB24-250£425.00⁰⁰+VAT
- Star SJ-144 Colour£362.00⁰⁰+VAT
- Star WinType 4000 laser (requires Windows 3.1 or later)£319.00⁰⁰+VAT

CANON

- Canon BJ-10SX Portable£147.00⁰⁰+VAT
- Canon BJ-200 (Epson compatible)£199.00⁰⁰+VAT
- Canon BJ-230£275.00⁰⁰+VAT
- Canon BJ-C600£389.00⁰⁰+VAT
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EPSON

- Epson LX300£100.00⁰⁰+VAT
- Epson LQ570+£215.00⁰⁰+VAT

TEXAS INSTRUMENTS

- Ti microWriter£449.00⁰⁰+VAT
- Ti microWriter PS23£599.00⁰⁰+VAT
- Ti microWriter PS65£699.00⁰⁰+VAT
- Ti microLaser Pro600 PS23£999.00⁰⁰+VAT
- Ti microLaser Pro600 PS65£1199.00⁰⁰+VAT

PANASONIC

- Panasonic KX-P2135£139.00⁰⁰+VAT
- Panasonic KX-P2624£339.57⁰⁰+VAT

Cut Sheet feeders are available for most printers. Please call for price / availability

This product can seriously **SAVE you money...**

INK REFILLS
For HP DeskJet/500/Plus/DeskWriter printers

The best and easiest to use inkjet refills we have found. Comprehensive and simple to follow instructions are supplied. Each pack will refill a standard cartridge four times, or a long life cartridge twice.

ONLY £11.99⁰⁰+VAT
- that's as little as £3 per cartridge fill!

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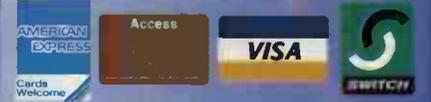
Send Cheque, Postal Order or Access/Visa/Switch/AmEx card details to:

Evesham Micros Ltd., Dept PECW,
Unit 9, St Richards Road,
Evesham, Worcs. WR11 6TD

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Same day despatch whenever possible.
Delivery on orders up to £150.00 ex VAT value is charged at £3.50 +VAT. All items above this value are shipped by insured Express Courier service at £6.50 +VAT per order - normally next working day after despatch (UK mainland only, others please call).
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Always a good sign.

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BIRMINGHAM	MILTON KEYNES
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TECHNICAL SUPPORT Monday to Friday, 10.00 - 5.00
01386-769403

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 1/2/95
SOME PRICES AND SPECIFICATIONS MAY CHANGE AFTER 28/2/95

CLEARANCE BARGAINS

MONITORS

Fantastic ex-Vale range monitor bargains, similar specification to the current range but without Energy Star features.

- Categories: 1. As new
2. Minor imperfections
3. Discoloured and/or slightly damaged cases

14" SVGA 0.28mm dot pitch
1. - £179⁰⁰+VAT 2. - £159⁰⁰+VAT 3. - £145⁰⁰+VAT

Vale VESA Scan15 0.28mm dot pitch
1. - £229⁰⁰+VAT 2. - £199⁰⁰+VAT 3. - £179⁰⁰+VAT

Tatung 17" SVGA
2. - £399⁰⁰+VAT 3. - £349⁰⁰+VAT

PRINTERS

- DOT MATRIX**
- Panasonic KX-P2123 24-pin colour£119.00⁰⁰+VAT
- NEC P20 24-pin£149.00⁰⁰+VAT
- NEC P6+ 24-pin£169.00⁰⁰+VAT
- Citizen Projot 24-pin£169.00⁰⁰+VAT

- Epson LQ860, Pro quality 24-pin£299.00⁰⁰+VAT
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INKJET

- Citizen Projot£149.00⁰⁰+VAT
- HP DeskJet 520£189.00⁰⁰+VAT
- HP DeskJet 560 Colour£339.00⁰⁰+VAT
- Olivetti UP150£129.00⁰⁰+VAT
- Olivetti JP350S£169.00⁰⁰+VAT
- Epson Stylus 800£199.00⁰⁰+VAT

LASER

- Ti microWriter£229.00⁰⁰+VAT
- Ti microWriter (new)£249.00⁰⁰+VAT
- Ti microWriter PS23 (PostScript)£399.00⁰⁰+VAT
- Ti microWriter PS65 (PostScript) -NEW£599.00⁰⁰+VAT

OTHERS

- Triumph Adler notebook, 486sx25, 125Mb HD, mono screen£699.00⁰⁰+VAT
- Triumph Adler notebook, 486sx25, 120Mb HD, mono screen£649.00⁰⁰+VAT
- Triumph Adler notebook, 486sx25, 120Mb HD, colour screen£949.00⁰⁰+VAT

- Amstrad Penpad£149.00⁰⁰+VAT
- 250Mb tape streamer (Internal)£89.00⁰⁰+VAT
- 250Mb tape streamer (external)£199.00⁰⁰+VAT
- 800dpi hands scanner£59.00⁰⁰+VAT
- Handscanner, 400dpi mono£45.00⁰⁰+VAT
- Handscanner, 400dpi mono (new - limited stocks)£53.00⁰⁰+VAT
- Colour handscanner£99.00⁰⁰+VAT
- A4 colour scanner£329.00⁰⁰+VAT
- Sony/Panasonic CD-ROM drives, internal units£49.00⁰⁰+VAT
- Pace Innet 32 (Internal) (new) high specification V32 modem (9600bps)£149.00⁰⁰+VAT
- Pace Innet 32 (external) (new)£169.00⁰⁰+VAT
- Pace Innet 32plus (ext.) (new) high spec. V32bis modem (14400bps)£299.00⁰⁰+VAT
- Dowty UPS - 400VA£79.00⁰⁰+VAT
- Dowty UPS - 1200VA£249.00⁰⁰+VAT
- 200Mb IDE hard disk£99.00⁰⁰+VAT
- 420Mb IDE hard disk£139.00⁰⁰+VAT
- 620Mb IDE hard disk£279.00⁰⁰+VAT

Please contact our Evesham branch for these products. All are clearance lines, shop soiled or second hand stock and carry 12 months warranty. More clearance bargains are held at our other branches - please call them if you do not see what you require.

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Time Direct are one of very few direct resellers who are fully accredited by the British Standards Institute for the ISO 9000 quality standard (BS 5750). We are certified to BS5750

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PRESARIO



Entry level excellent value for money systems with pre-loaded software and fitted soundcard & modem on 720 and 920 models

- 486SX2-66 Processor
 - 4Mb RAM or 8Mb RAM (920) expandable to 64Mb
 - 200Mb or 420Mb Hard Disk
 - 3.5" 1.44Mb floppy Drive
 - Enhanced Local Bus SVGA Graphics with 1Mb RAM
 - Desktop case (660 & 720) with 3 drive bays and 3 expansion slots
 - Mini Tower Case (920) with 5 bays and 5 slots
 - Serial parallel, joystick, MIDI and mouse ports
 - 14" Low Radiation NI SVGA colour screen
 - Model 660 486SX-33 200Mb£Call
 - Model 720 486SX2-66 420Mb£Call
 - Model 920MT 486SX2-66 420Mb 8Mb£Call
- Please call for details of availability & pricing

- Options
- 4Mb Upgrade£160
 - 486DX2-66 Upgrade£149
 - CDS models£Call

£CALL

PROLINEA



The new enhanced Compaq ProLinea provides excellent performance at truly remarkable prices.

- Intel 486SX-33, 486DX2-66 or 486DX4-100 processor
- Pentium technology upgradeable
- 128K external cache on DX4
- 4Mb RAM (8Mb on DX4) Upgradeable to 100Mb
- 200Mb, 340Mb or 525Mb hard disk
- 3.5" 1.44Mb floppy drive
- Enhanced Local Bus Graphics with 1Mb VRAM/Monitor
- options see below
- 3 drive bays and 3 free ISA slots
- Parallel port, mouse port & 2 serial ports
- Compaq keyboard & mouse
- Security & energy saving features
- DOS 6, Windows 3.1 Tabworks software
- 3 year Compaq warranty

- 4/33S 486SX-33 200Mb£659
- 4/33S 486SX-33 340Mb£749
- 4/66 486DX2-66 525Mb£1009
- 4/100 486DX4-100 525Mb 8Mb£1349

- Options
- Colossus 14" 0.28 SVGA NI LR ... £149
 - Compaq 14" SVGA Screen£239
 - Compaq 14" SVGA 1024LR£289
 - 4Mb SIMM Upgrade£160
 - SX-33 to DX2-66 Upgrade£149

£659

CONTURA AERO



The ideal subnotebook with Mono or Colour screens and PCMCIA. 40% smaller and 33% lighter!

- Intel 486SX-25 or 486SX-33 (SL versions)
- 4Mb RAM expandable to 12Mb
- 84, 170 or 250Mb hard disk
- Includes FREE external 1.44Mb floppy drive
- 8" mono or 7.8" VGA colour screen
- PCMCIA 2.0 type II slot
- Serial, parallel & Compaq base ports
- MS DOS 6 & Windows 3.1
- Lotus Organizer & Winlink with cable
- Rechargeable NiMH battery, AC adaptor/charger & slipcase
- 3 year Compaq warranty

- 4/25 mono 84Mb£765
- 4/25 mono 170Mb£849
- 4/33 colour 170Mb£1189
- 4/33 colour 250Mb£1359

- Options
- 4Mb RAM module£139
 - Intel PCMCIA modem£99
 - Aero battery (DR19)£62
 - Car adaptor£45

£765

CONTURA 400



New 486DX2-40 model with mono, STN colour or TFT colour screens

- Intel 486DX2-40 processor
- 4Mb RAM upgradeable to 20Mb
- 3.5" 1.44Mb floppy drive
- 170Mb or 250Mb IDE hard disk
- SVGA Graphics with 1Mb Local Bus video
- VGA 9.5" TFT mono, 9.5" STN colour or 8.4" TFT colour screen
- 2 PCMCIA type II or one type III slot
- Parallel, serial & docking base ports (docking base includes other ports)
- Powered by NiMH battery with upto 5 hour life, advanced power management or AC/power adaptor
- Status panel with 'dashboard' display
- Dimensions: 22.6cm x 5.1cm x 30.4cm. Weight 2.7Kg
- DOS 6, Microsoft Windows 3.1, Lotus Organizer & Tabworks
- Integral Compaq trackball mouse
- 3 year Compaq warranty

- 400 TFT mono 170Mb£1271
- 400 STN colour 250Mb£1698
- 400 TFT colour 250Mb£2206

- Options
- 4Mb RAM module£178
 - Docking base£108
 - Docking base with E/Net£183
 - NiMH Battery£85
 - Intel PCMCIA modem£99

£1271

CONTURA TFT



The amazing high quality Compaq Contura TFT colour notebook with Intel 486DX processor and excellent TFT screen. Simply the best buy!

- Intel 486DX-25 processor
- 4Mb RAM upgradeable to 20Mb
- 3.5" 1.44Mb floppy drive
- 120Mb or 209Mb IDE hard disk
- Superb 8.4" VGA TFT active matrix colour screen with 256 colours
- Parallel, mouse, serial, ext. keyboard and ext. SVGA ports
- Integral Compaq trackball mouse
- Powered by battery with advanced power management or AC/power Adaptor
- Dimensions: 22.6cm x 4.8cm x 29.7cm. Weight 3Kg
- DOS 6 & Microsoft Windows 3.1 pre-loaded
- Compaq Tabworks Software
- 3 year Compaq warranty

- 4/25cx 120Mb TFT£1549
- 4/25cx 209Mb TFT£1749

- Options
- 4Mb RAM module£146
 - Contura car adaptor£65
 - NiCAD battery£52
 - Wordport serial modem£199

£1549

LTE ELITE



The high performance colour notebook with built-in AC adaptor, PCMCIA and advanced docking facilities

- Intel 486DX2-40, DX2-50 or DX4-75 processor
- 4Mb RAM (8Mb on DX2-50 & DX4)
- 3.5" 1.44Mb floppy drive
- 170Mb, 340Mb or 510Mb IDE hard disk
- SVGA Graphics with 1Mb Local Bus video
- 9.5" STN Dual Scan colour or 8.4"/9.5" TFT colour screen
- 2 PCMCIA type II or one type III slot
- Parallel, serial, keyboard/ mouse & docking base ports (docking base includes other ports)
- Powered by battery with upto 5 hour life with advanced power management or integral AC/power adaptor
- Dimensions: DOS 6 & Microsoft Windows 3.1
- Integral Compaq trackball mouse
- 3 year Compaq warranty

- 486DX2-40 Dual Scan 170Mb£2291
- 486DX2-40 TFT 8.4" 170Mb£2716
- 486DX2-40 TFT 8.4" 340Mb£2971
- 486DX2-50 TFT 9.5" 340Mb 8Mb£3566
- 486DX4-74 TFT 9.5" 340Mb 8Mb£3906
- 486DX4-75 TFT 9.5" 510Mb 8Mb£4246

- Options
- 4Mb RAM module£207
 - Battery£118
 - Ministation Base Ethernet£209
 - Smartstation Base£421
 - Intel PCMCIA modem£99

£2291

All prices exclude delivery and VAT (17.5%). Delivery: Systems £19, Lasers and large items £15, software and small items £10. Visa /Access/ American Express /Switch and Government orders welcome. Prices, specifications and offers are subject to change and subject to our conditions of sale copies of which are available on request. Mail order only. No collections please. Goods are normally despatched within 7 days. All orders will be fulfilled within 28 days unless otherwise specified. E&OE.



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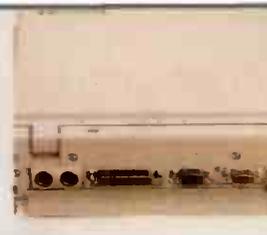
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The new Microsoft Ballpoint V2.0 with Quickport is standard on most models (no cables)



The easy to use integral Mousepoint on T4900, T2400, T3400 & T3600 models



All systems include standard ports (PS/2 mouse, external PS/2 keyboard, parallel printer, serial and external SVGA ports.)



Port replicator (mini docking station) option is available for the T3400/T3600/T2400

COMMON TOSHIBA FEATURES

Toshiba notebooks are unbeatable in terms of quality, advanced features, performance and ease of use. Do not consider a low quality clone-buy the best. The following common features are standard with all models:-

SCREENS

Mono notebooks include a high quality sldelit Super Twist Nematic (STN) mono LCD capable of 64 grey scales and VGA resolution. STN colour portables utilise the latest advanced STN (Dual Scan) screens for enhanced contrast and faster response. Thin Film Transistor (TFT) or active matrix screens provide the best displays with 256 bright colours, ultra fast response and the ability to use motion video.

KEYBOARD

Ergonomically designed 84 key full-size keys with 12 function keys and overlay numeric keypad. Dedicated cursor control keys.

INTERFACES

Standard ports include centronics parallel, RS-232C serial, PS/2 ext. keyboard, PS/2 mouse and VGA/SVGA for ext. monitor. Either Quickport port with bundled Ballpoint mouse or Integral MousePoint device included. Other ports and PCMCIA details see individual notebook.

POWER

Autosensing AC adaptor (100 to 240V) suitable for world wide usage provides power for notebook and recharges batteries. Removable rechargeable batteries are standard (type of battery and life varies as shown).

SOFTWARE

Microsoft MS DOS 6.2 with Toshiba notebook enhancements, Windows 3.1 (Rel 3.11) or WFWG 3.11 are pre-loaded. CardWare PCMCIA support provides transparent use of PCMCIA cards with out Incompatibility problems and supports 'insertion'.

SPECIAL FEATURES

Intel 3.3v SL technology with low power consumption. Reset button for warm reboot. AutoResume puts your systems in standby mode for upto 7 days. AutoSave automatically saves your data if your battery power is running out. LIM EMS/XMS/Hard RAM support. MaxTime Power Management can be set to switch off your disk drive, screen, keyboard and CPU after a certain time. Advanced Power Management is also supported. Flash BIOS allows easy upgradeability in the future. Kensington Cable Lock Provision for physical security. Password/Multi-Safe security with various levels of protection.

MONO 486SX-33



T1910

The ideal entry level mono 486 notebook with fast 33MHz processor, a choice of 120Mb or 200Mb hard disks and PCMCIA

- Intel 486SX-33 processor
- 4Mb RAM expandable to 20Mb
- 120Mb or 200Mb IDE hard disk
- 3.5" 1.44Mb floppy drive
- VGA (640 x 480) Graphics
- 9.5" STN LCD VGA mono screen with 64 grey scales
- 84 key keyboard and standard ports
- PCMCIA Rel 2.0 Type III or type II slot
- 11.8" x 8.4" x 2" with 2.9Kg (6.4lb) weight
- NiH2 battery (4 hours use)
- 12mth warranty extendable to 3 years
- Microsoft Ballpoint quickport mouse
- MSDOS 6.2 and Windows 3.1

T1910 200Mb£931

Options

- 4Mb RAM (PA2012U).....£170
- 8Mb RAM (PA2013U).....£298
- 16Mb RAM (PA2014U)£1339
- NiH2 Battery (PA2429UR)£94

£846

STN DS COLOUR 486SX-33



T1910CS

STN Dual Scan colour notebook with fast 33MHz processor, 200Mb hard disk and PCMCIA slot.

- Intel 486SX-33 processor
- 4Mb RAM expandable to 20Mb
- 200Mb IDE hard disk
- 3.5" 1.44Mb floppy drive
- VGA (640 x 480) Graphics
- 9.5" STN Dual Scan
- VGA colour screen
- 84 key keyboard and standard ports
- PCMCIA Rel 2.0 Type III or type II slot
- 11.8" x 8.4" x 2.1" with 3.2Kg (6.9lb) weight
- NiH2 battery (3.5 hours use)
- 12m warranty extendable to 3 years
- Microsoft Ballpoint quick port mouse
- MS DOS 6.2 and Windows 3.1

Options

- 4Mb RAM (PA2012U).....£170
- 8Mb RAM (PA2013U).....£298
- 16Mb RAM (PA2014U)£1339
- NiH2 Battery (PA2429UR)£94

£1356

TFT COLOUR 486DX2-50



T2400CT

High performance TFT colour notebook with fast 486DX2-50 processor, 8Mb RAM, 320Mb hard disk and multimedia options.

- Intel 486DX2-50 processor
- 8Mb RAM expandable to 24Mb
- 320Mb IDE hard disk
- 3.5" 1.44Mb floppy drive
- VESA Local Bus
- VGA/SVGA Graphics
- 1Mb video RAM and Graphics Accelerator
- 8.4" TFT VGA colour screen
- 84 Key keyboard and Integral MousePoint device
- Standard ports. SCSI-2 ports
- and 120 pin replicator port (for mini-docking station)
- Sound card port for portable soundcard
- PCMCIA Rel 2.0 slots (one type III and one type II)
- 11.8" x 8.4" x 2.1" with 3.2Kg (6.9lb) weight
- NiH2 battery (3.5 hours use)
- 3 year warranty
- MS DOS 6.2 and Windows 3.11 for Workgroups

T2450 CT 320Mb£2848
T2450 CT 500Mb£3056

Options

- 4Mb RAM (PA2019U).....£192
- 8Mb RAM (PA2020U).....£340
- 16Mb RAM (PA2023U).....£1148
- NiH2 Battery (PA2429UR).....£94
- Soundcard (PA28070).....£102

£2564

TFT COLOUR 486DX-33



T4600C

TFT colour 486 notebook with 486DX-33 processor, 200Mb or 320Mb hard disk, large TFT screen and Deskstation IV option.

- Intel 486DX-33 processor
- 4Mb RAM expandable to 20Mb
- 200Mb or 320Mb IDE hard disks
- Internal 3.5" 1.44MB floppy drive
- VGA/SVGA Graphics
- 9.5" TFT VGA colour screen
- 84 key keyboard and standard ports
- Toshiba memory slot
- Deskstation IV docking station compatible (shown)
- PCMCIA Rel 2.0 slots (one type III and one type II)
- 11.7" x 8.3" x 2.0" with 3.3Kg (7.3lb) weight
- NiH2 battery (4.5 hours use)
- Quick read LCD panel display
- 3 year Toshiba warranty
- Microsoft Ballpoint quick port mouse
- MS DOS 6.2 and Windows 3.11 for Workgroups

T4600/320 320Mb£2678

Options

- 4Mb RAM (PA2012U).....£170
- 8Mb RAM (PA2013U).....£298
- 16Mb RAM (PA2014U).....£1339
- NiH2 Battery (PA2413R).....£119
- DeskStation IV.....£374

£2508

TFT COLOUR 486DX-50



T4700CT

486DX2-50 TFT colour notebook with 200Mb or 320Mb hard disks, 8Mb RAM, integrated multimedia and Deskstation IV option.

- Intel 486DX2-50 processor
- 8Mb RAM expandable to 24Mb
- 200Mb or 320Mb IDE hard disks
- 3.5" 1.44Mb floppy drive
- VESA Local Bus VGA/SVGA Graphics
- 1Mb video RAM and Graphics Accelerator
- 9.5" TFT VGA colour screen
- 84 key keyboard and Standard ports
- Toshiba memory slot ports
- Microsoft Sound system with software and built-in microphone and speaker
- Deskstation IV docking station compatible
- PCMCIA Rel 2.0 slots (one type III and one type II)
- 11.7" x 8.3" x 2.2" with 3.1Kg (6.8lb) weight
- NiH2 battery (3.5 hours use)
- Quick read LCD panel display
- 3 year Toshiba warranty
- Microsoft Ballpoint quickport mouse
- MS DOS 6.2 and Windows 3.11 for Workgroups

T4700 CT/3200 320Mb£3141

Options

- 4Mb RAM (PA2012U).....£170
- 8Mb RAM (PA2013U).....£298
- 16Mb RAM (PA2014U).....£1339
- NiH2 Battery (PA2420U).....£81
- DeskStation IV.....£374

£2971

TOSHIBA



Two PCMCIA slots on many models provide ultimate expansion. Intel fax/data modem at an incredible £99



Built-in Microsoft Sound System on T4700, T4800 T4850, T4900 and T6600 lets you record live



QuickRead 'Dashboard' LCD icons display on many models shows the status of your PC



Deskstation IV turns your T4600, T4700, T4800, T4850 and T4900 notebooks into expandable desktop systems

STN DS COLOUR 486DX2-50



T2400CS

High performance STN Dual Scan colour notebook with fast 486DX2-50 processor, 200Mb or 320Mb hard disks, and multimedia options

- Intel 486DX2-50 processor
- 4Mb RAM expandable to 20Mb
- 250Mb or 320Mb IDE hard disks
- 3.5" 1.44Mb floppy drive
- VESA Local Bus VGA/SVGA Graphics
- 1Mb video RAM and Graphics Accelerator
- 9.5" STN Dual Scan VGA colour screen
- 84 Key keyboard and Integral MousePoint device
- Standard ports, SCSI-2 ports and 120 pin replicator port (for mini-docking station)
- Sound card port for portable soundcard
- PCMCIA Rel 2.0 slots (one type III and one type II)
- 11.8" x 8.4" x 2.1" with 3.2Kg (6.9lb) weight
- NIH2 battery (3.5 hours use)
- 3 years warranty
- MS DOS 6.2, Windows 3.11 for Workgroups

Options

- 4Mb RAM (PA2019U)£192
- 8Mb RAM (PA2020U)£340
- 16Mb RAM (PA2021U)£1148
- Li ion Battery (PA2841U)£175
- External 3.5" FDD (PA2606R)£128

£1866

TFT COLOUR SUBNOTE



T3600CT

Superb TFT colour ultra notebook with fast 486DX2-50 processor, 8Mb RAM, 250Mb hard disk, and just 2Kg Weight

- Intel DX2-50 processor
- 8Mb RAM expandable to 20Mb
- 250Mb IDE hard disks
- VGA/SVGA VESA Local Bus Graphics
- 1Mb video RAM and Graphics Accelerator
- 8.4" TFT VGA colour screen
- 84 Key keyboard and Integral MousePoint device
- Parallel, serial, 72 pin replicator and single SIMM memory ports
- Port replicator (Mini-Docking Station) option with standard Ports
- PCMCIA Rel 2.0 Type II slot 9.8" x 7.9" x 1.8" with 2.0Kg (4.4lb) weight
- Lithium Ion battery (4 hours use)
- 3 year Toshiba Warranty
- MS DOS 6.2 and Windows 3.11 for Workgroups

Options

- 4Mb RAM (PA2019U)£192
- 8Mb RAM (PA2020U)£340
- 16Mb RAM (PA2021U)£1148
- Li ion Battery (PA2841U)£175
- External 3.5" FDD (PA2606R)£128

£2631

TFT COLOUR 486DX2-40



T1950CT

High performance TFT Colour 486 Notebook with 486DX2-40 processor, 200Mb or 320Mb hard disks and VESA Local Bus graphics

- Intel 486DX2-40 processor
- 4Mb RAM expandable to 20Mb
- 200Mb or 320Mb IDE hard disk
- 3.5" 1.44Mb floppy drive
- VGA/SVGA VESA Local Bus Graphics
- 1Mb video RAM and Graphics Accelerator
- 8.4" TFT VGA colour screen
- 84 key keyboard and standard ports
- PCMCIA Rel 2.0 Type III or type II Slot
- 11.8" x 8.4" x 2.1" with 3.2Kg (6.9lb) weight
- NIH2 battery (4 hours use)
- 12mth warranty extendable to 3 years
- Microsoft Ballpoint Quickport mouse
- MS DOS 6.2 and Windows 3.1

T1950 CT/320 320Mb£1998

Options

- 4Mb RAM (PA2012U) .. £170
- 8Mb RAM (PA2013U) .. £298
- 16Mb RAM (PA2014U) £1339
- NIH2 Battery (PA2420U) £61

£1866

TFT COLOUR 486DX4-75 & PENTIUM



T4800/T4850/T4900 CT 486DX4-75 or Pentium 75 (T4900) TFT colour notebook with 500Mb or 810Mb hard disks, 8Mb RAM, integrated multimedia and Deskstation IV option

- Intel 486DX4-75 (T4800/T4850) or Pentium 75 (T4900) processor
- 8Mb RAM expandable to 40Mb
- 500Mb (T4800/T4850) or 810Mb (T4900) IDE hard disk
- 3.5" 1.44Mb floppy drive
- VESA Local Bus VGA/SVGA Graphics
- 1Mb Video RAM and Graphics Accelerator
- 9.5" TFT VGA colour screen on T4800
- 10.4" TFT (65K Colour) screen on T4850/T4900
- 84 key keyboard and standard ports
- Toshiba memory slot ports
- Microsoft Sound system with software and built-in microphone and speaker
- Deskstation IV docking station compatible
- PCMCIA Rel 2.0 slots (one type III and one type II)
- 11.7" x 8.3" x 2.2" with 3.1Kg (6.8lb) weight
- NIH2 battery (3.5 hours use)
- Quick read LCD panel display
- 3 year Toshiba warranty
- Microsoft Ballpoint mouse or Mousepoint (T4900)
- Toshiba memory slot ports
- MSDOS 6.2 and Window 3.11 for Workgroups

T4850CT 10.4" TFT£3821
T4900CT Pentium 75 10.4" TFT£4586

Options (T4800/T4850)

- 4Mb RAM (PA2012U)£170
- 8Mb RAM (PA2013U)£298
- 16Mb RAM (PA2014U)£1339
- NIH2 Battery (PA2429UR) £94
- DeskStation IV£374

£3666

TFT COLOUR PORTABLE



T6600C

486DX2-66 TFT Colour Power Portable with 5.25" bay, 2 expansion slots, 510Mb hard disks, 8Mb RAM, Large 10.5" TFT Screen and integrated multimedia

- Intel 486DX2-66 processor
- 8Mb RAM expandable to 40Mb
- 510Mb IDE hard disk
- 3.5" 1.44Mb floppy drive
- VGA/SVGA Graphics
- 10.5" TFT VGA colour screen
- 102 key detachable keyboard with full size keypad and 12 function keys
- Standard Ports, SCSI and SCSI II ports
- Toshiba memory slot ports
- Microsoft Sound system with software with two integral speakers and bundled Microphone
- Free 5.25" drive bay and 2 16-bit full-size expansion slots
- PCMCIA Rel 2.0 slots type III slot
- 15.4" x 12.6" x 4.7" with 7.8Kg (17.1lb) Weight
- Auto sensing AC adaptor (100 to 240v). Mains powered only
- 3 year Toshiba warranty
- MSDOS 6.2, Windows 3.11 for Workgroups, Ez SCSI and Logitech Mouse

Options

- 4Mb RAM (PA2004U)£149
- 8Mb RAM (PA2005U)£277
- 16Mb RAM (PA2010U)£1148

£5015

TOSHIBA OPTIONS

External Battery Charger:
• T3400/T3600 (2482U) ..£166
• Others (PA2422U-E) ..£107

ExtraUniversal AC Adaptor:
• T1910, T1950, T4700, T4800 (PA2478U)£56
• T2400 (PA2430U)£48
• T4600 (PA2411U)£48
• T3400, T3600 (PA2426U-E)£48

Toshiba PCMCIA cards:
• PCMCIA 14.4 modem (TPCV32BFUK)£255
• PCMCIA ethernet adaptor (PCE-10BC)£192

Other Options:
• Carry case T6600C (T239L)£39
• Carry case others (T202L)£34
• Ballpoint Quickport mouse (PA2805U)£73
• Portable SCSI CD ROM (HR-CD400)£306
• CD-ROM requires PCMCIA SCSI adaptor on most notebooks (just SCSI to SCSI D cable on T2400)

• Deskstation IV£374 (Docking station for T4600, T4700 and T4800 models. It includes all standard ports, two full-size 16-bit slots, 5.25" drive bay, power supply and monitor stand).

THIRD PARTY OPTIONS

PCMCIA Options
• Intel 2496 Fax/data Modem£99
• New media Bus Toaster SCSI Adapter£173
• New Media Visual SCSI adaptor£149
• New Media 16-bit Soundcard£196
• New Media Combo Ethernet Card£125
• MiniStore 130Mb hard drive£399

Parallel Port Devices
• Backpack DS CD-ROM Drive£299
• Backpack 5.25" floppy drive£149
• Logitech Scanman Easytouch Scanner£142
• Trakker 250Mb Tape backup£208

Keyboards & Mice
• External COL 130 key keyboard (needs PS/2 adaptor)£29
• PS/2 to DIN keyboard adaptor£9
• Microsoft Natural keyboard£69
• IMSI PC Stylus PS/2£29
• IMSI Mini Thumbball£24
• Logitech Trackman Portable£32

Portable Printers
• HP DeskJet 320£175
• Canon BJ10x£141

Other Options:
• Universal third party car adaptor£99
• Laplink XL & serial cable£39
• Laplink Pro v6 for Win£74
• Time external speakers £18

All prices exclude delivery and VAT (17.5%). Delivery:- Systems £19, Lasers and large items £15, software and small items £10. Visa /Access/ American Express /Switch and Government orders welcome. Prices, specifications and offers are subject to change and subject to our conditions of sale copies of which are available on request. Mail order only. No collections please. Goods are normally despatched within 7 days. All orders will be fulfilled within 28 days unless otherwise specified. E&OE.



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Networking/Volume enquires Telephone 01282 77 00 99

TDR8A



The keyboard flips up with easy access to memory slot, batteries, floppy drive and hard disks, all of which are removable on 360 & 755 models



Port Replicators I & II (mini-docking stations) provide standard ports and cable convenience (Replicator I also has additional PCMCIA III or two type II slots.)



The unique easy to use TrackPoint II or III pointing device provides better cursor control than any mouse! Equally good for right & left handers.



Portable Dock I has standard ports, SCSI, Speakers, one ISA slot, one 5.25" drive bay (suitable for CD-ROM) and a handle. Shown with ThinkPad attached

COMMON THINKPAD FEATURES

The IBM ThinkPad range of notebooks are the most advanced notebooks money can buy. In terms of quality, innovation, useability and technology, these systems are way ahead of the competition.

CASE

Elegant yet robust case made from special carbon fibre re-inforced plastic for extra durability, yet incredibly light weight. The ThinkPad 340 is only 2.2Kg!

TRACKPOINT

IBM's innovative red device situated in the middle of the keyboard has no moving parts and responds naturally to your finger's pressure. Easier to use than any mouse or trackball!

SCREENS

High quality screen opens to 180 degrees and features edge to edge display with contrast and brightness control.

-Mono screen available on the 340, 360 and provides a high quality Mono STN LCD capable of 64 grey scales and VGA resolution.

-STN colour screens on some 360 & 755 models provide 9.5" diagonal, 256 colours and utilise the latest advanced sidelit STN (Dual Scan) technology for enhanced contrast and faster response.

-TFT or active matrix screens (8.4" on 360; 10.4" on 755) provide the best displays with 256 bright colours, ultra fast response and the ability to use motion video.

-New Black Matrix on array 10.4" TFT colour screens on 755CE & 755CD reduce glare, give the brightest and clearest display and 65 thousand colours.

GRAPHICS

All 360 & 755 models include VESA Local Bus graphics with 1Mb RAM and Windows accelerator. Simultaneous display to external SVGA screen.

MODULAR DESIGN

All models except 340 allow removable hard disk (170Mb to 810Mb), floppy drive and battery. The keyboard easily flips up for access.

KEYBOARD

Ergonomically designed, quiet, 85 key full-size keys with 12 function keys and overlay numeric keypad.

INTERFACES

Standard ports include enhanced centronics parallel, RS-232C serial, PS/2 ext. keyboard/mouse and SVGA for external monitor. One type III PCMCIA slot (also functions as two type II on 360/755 or one type II on 340).

POWER & MANAGEMENT

Powerful rechargeable batteries coupled with Advanced Power Management and non-disruptive battery exchange allow you to work a whole day without being near a powerpoint. Fuel gauge provides an indicator of battery life. AC adaptor provides power for notebook and recharges batteries with quick charge facility

(1.5 hours). Minimum battery life figure shown is for full use whilst higher figure is for typical use with power management.

SECURITY

Hard disk is removable (except 340) and lockable in the computer and can be protected by a password. Kensington Cable Lock Provision and security loop for physical security. Just send in the registration card to IBM for engraved nameplate personalised for you or your company.

SOFTWARE

IBM PC DOS 6.3, Windows 3.1 plus additional software as shown. Various utilities including PC Card Director with Auto Configuration, Hot PCMCIA Insertion (Easy Playing) and Automatic Memory Device Driver.

DOCKING OPTIONS

360 & 755 models have ability to use 4 docking stations; port replicator 1 for economical expansion and cable management, replicator 2 also has additional PCMCIA slots. Portable DOCK 1 and larger DOCK 2 full size docking stations provide extra drive bays and expansion slots and room for multimedia options in addition to port replication. Intelligent software allows docking when your system is on!

IBM SERVICE & SUPPORT

12mth IBM HelpWare hotline support. 12mth warranty with 3 year warranty on 755 models.

THINKPAD 340



Mono 486-50

The ideal entry level mono 486 notebook with fast 50MHz processor, 125Mb hard disk, PCMCIA and IBM ThinkPad quality

- Fast IBM 486SLC2-50 processor
- 16K internal CPU Cache
- 4Mb RAM expandable to 12Mb
- 125Mb IDE fixed hard disk
- 3.5" 1.44Mb floppy drive
- VGA (640 x 480) Graphics
- 9.5" STN LCD VGA mono screen with 64 greyscale
- 85 key keyboard and Standard Ports
- PCMCIA Rel 2.0 Type III Slot (or one type II)
- 48mm x 297mm x 210mm with 2.2Kg Weight
- NIH2 battery (2.2 to 4 hours use)
- 12mth warranty extendable to 3 years
- Integral Trackpoint II pointing device
- PC DOS 6.3, Windows 3.1 & Utilities

TP 340 Model M01£899

Options

4Mb RAM (TONPM04)£186
8Mb RAM (TONPM08)£369
NICad battery.....£41
AC adaptor£36

£899

WHICH THINKPAD IS FOR YOU?

ThinkPad 340

The low cost budget ThinkPad with mono screen only and fixed 125Mb hard disk. ThinkPad quality and fast processor but limited expansion and modularity. Ideal for home and small business use.

ThinkPad 360

All the modularity, expansion capability, security and versatility of the ThinkPad range with a wide choice of screens, hard drives, processors and docking facilities. Ideal for the corporate sales team, fleet use and other general business requirements.

ThinkPad 755

All the features of the ThinkPad 360 plus multimedia sound, larger screens and faster processors. Ideal for presentations and business users where performance is important.

ThinkPad 755CE & 755CD

The ultimate mobile computers with innovative technology, the world's best BMA TFT screen, 100MHz processor, full-feature multimedia and modem facilities, and InfraRed communications. Ideal for the top executive. Treat yourself to the best money can buy!

THINKPAD 755

Common Features

ThinkPad 755 range is available with a range of processors, large 9.5" Dual Scan or 10.4" TFT colour screens, various hard disks and software pre-loads. All systems have a modular design with multimedia capability included as standard.

All the features of the 360 are included such as Trackpoint II, lightweight design and built-in modularity.

- 4Mb or 8Mb base RAM expandable to 20Mb using one 4, 8 or 16Mb IC DRAM card or 36Mb/40Mb (using DIMM adaptor which provides two slots, which can be fitted with two 16Mb DIMM modules)
- Removable 3.5" 1.44Mb floppy drive (to reduce weight)
- VESA Local Bus Graphics with 1Mb RAM, Windows Accelerator and Dual VGA support for external SVGA display (256 colours at 1024 x 768)
- 85 key keyboard which flips open to provide access to battery, removable hard disk and floppy bays
- Standard ports include enhanced parallel, serial, PS/2 for mouse or keyboard
- PCMCIA type III slot (can be used as two type II slots)
- Soundcard is included as standard
- Expansion bus port for dock 1, dock 2, port replicator 1 and port replicator 2
- Sizes, weights, battery (NiMH) life vary as shown

755CE and 755CD include 486DX4-100 processor, 8Mb base RAM, extra multimedia/modem features, Trackpoint III, Black Matrix on array TFT screens, motion video support, infra-red comms, and 5.25" CD on 755CD model

Popular 755 Options

2Mb DRAM (35G2314)£117
4Mb DRAM (35G2315)£203
8Mb DRAM (35G2316)£405
16Mb DRAM (66G6574)£1031
DIMM Adaptor (provides 2 slots)£72
4Mb DIMM (TOMMD04)£203
8Mb DIMM (TOMMD08)£599
16Mb DIMM (TOMMD16)£1031
360 NiMH Battery.....£95
750 NiMH Battery.....£135
750 Battery Safety Cover.....£12
NiMH Battery Pack II (755CE/CD).....£117
Other options: See General Options

486DX2-50/DX4-75 DS COLOUR



ThinkPad 755CS

Powerful Dual Scan colour ThinkPad 755 models with 486DX2-50 or 486DX4-75 processor and a range of hard disks. (shown with portable Dock 1 & CD ROM options)

General specification as shown under common features

- 4Mb RAM upgradeable to 36Mb
- 9.5" STN Dual Scan colour display with 256 colours and 20:1 contrast ratio
- 170Mb, 340Mb or 540Mb removable hard disks
- 51h x 297w x 210d in mm
- 2.8Kg weight with battery & drives
- IBM PC DOS 6.3, Windows 3.1, Lotus Organizer & PC Card Director
- Battery life 4 to 8 hours
- Built-in soundcard with audio jacks, microphone and speaker
- IBM 3 year warranty

755CS DS1 486DX2-50 170Mb ..£2768
755CS DS2 486DX2-50 340Mb ..£2916
755CS DS5 486DX4-75 340Mb ..£3209
755CS DS6 486DX4-75 340Mb ..£3501

£2768

486DX2-50/DX4-75 TFT COLOUR



ThinkPad 755C

Powerful TFT colour ThinkPad 755 models with 486DX2-50 or 486DX4-75 Processor and a range of hard disks. (shown with Dock 2 & matching keyboard options)

General specification as shown under common features

- 4Mb RAM upgradeable to 36Mb
- 10.4" TFT colour display with 256 colours and 100:1 contrast ratio
- 170Mb, 340Mb, 540Mb or 810Mb removable hard disks
- 51h x 297w x 210d in mm
- 2.9Kg weight with battery & drives
- IBM PC DOS 6.3, Windows 3.1, Lotus Organizer & PC Card Director
- Battery life 3.1 to 8 hours
- Built-in soundcard with audio jacks, microphone and speaker
- IBM 3 year warranty

755C TF1 486DX2-50 170Mb.....£3416
755C TF2 486DX2-50 340Mb.....£3564
755C TF4 486DX4-75 170Mb.....£3708
755C TF5 486DX4-75 340Mb.....£3857
755C TF6 486DX4-75 540Mb.....£4149
755C TF6 486DX4-75 810Mb.....£4590

£3416

IBM ThinkPad



Matching black monitor and black keyboard are available to complement your IBM ThinkPad. Shown with monitor stand and Dock 2 (2 ISA slots, 2 bays & PCMCIA slots).



Various nylon and leather cases are available for ThinkPad and Portable Dock 1.



A plethora of high quality multimedia, comms & productivity software for the mobile professional comes pre-loaded on many models.



The Communicate Connexion 1440C PCMCIA type II fax/data modem attaches to the Motorola Micro TAC II mobile phone (and others e.g. BT Pearl, Vodac: VP130, Ford Compact).

THINKPAD 360

Common Features

ThinkPad 360 Range is available with a range of Processors, Screens, Hard Disks and Software Pre-loads. All systems have a modular design and full docking capabilities

- Standard Thinkpad features such as Trackpoint II, lightweight design and built-in modularity
- 4Mb base RAM expandable to 20Mb using one 4, 8 or 16Mb IC DRAM card (fits into memory slot)
- Removable 3.5" 1.44Mb floppy drive (to reduce weight)
- VESA Local Bus graphics with 1Mb RAM, Windows Accelerator and Dual VGA support for external SVGA display (256 colours at 1024 x 768)
- 85 key keyboard which flips open to provide access to battery, removable hard disk and floppy bays.
- Standard ports include enhanced parallel, serial, PS/2 for mouse or keyboard (adaptor allows use of both)
- PCMCIA type III slot (can be used as two type II slots)
- Soundcard port for optional soundcard (only to special order - factory fitted)
- Expansion bus port for dock 1, dock 2, port replicator 1 and port replicator 2
- Sizes, weights, battery (NiMH) life vary as shown
- Pen model is also available

Popular 360 Options

4Mb RAM (TONPM04).....	£186
8Mb RAM (TONPM08).....	£369
16Mb RAM (TOMP16).....	£923
360 NiMH battery.....	£95
750 NiMH battery.....	£135
750 battery safety cover.....	£12
Other options: See General Options	

MONO/DUAL SCAN COLOUR



CALL FOR NEW LOWER PRICES

ThinkPad 360/360CS/CE
Popular mono or Dual Scan colour ThinkPad 360 models with 486SX-33 or 486DX2-50 processor and a range of hard disks. Shown with optional modem & mobile phone

- General specification as shown under common features
- 4Mb RAM upgradeable to 20Mb
- 9.5" STN Dual Scan colour display with 256 colours and 20:1 contrast ratio
- Mono model has 9.6" STN LCD monochrome display with 64 grey scales and 18:1 contrast ratio
- 170Mb or 340Mb removable hard disks
- 51h x 297w x 210d In mm
- 2.8Kg weight with battery & drives
- IBM PC DOS 6.3, Windows 3.1 & PC Card Director
- Lotus Organizer, Lotus ScreenCam, Lotus cc:Mail Mobile, OAG FlightDisk, Triton CoSession Host (Organizer only with 486SX-33 Models)
- Battery life 3 to 10 hours

Mono	
360 M01 486SX-33 170Mb.....	£1395
360 M02 486SX-33 340Mb.....	£1544

Dual Scan Colour	
360CS DS1 486SX-33 170Mb.....	£1773
360CS DS2 486SX-33 340Mb.....	£1922
360CSE DS3 486DX2-50 170Mb.....	£1949
360CSE DS4 486DX2-50 340Mb.....	£2097

£1395

TFT COLOUR



ThinkPad 360C/CE
Superb TFT Colour ThinkPad 360 models with 486SX-33 or 486DX2-50 Processor and a range of hard disks

- General specification as shown under common features
- 4Mb RAM upgradeable to 20Mb
- 8.4" TFT active matrix colour display with 256 colours and 100:1 contrast ratio
- 170Mb or 340Mb removable hard disks
- 47h x 297w x 210d In mm
- 2.8Kg weight with battery & drives
- IBM PC DOS 6.3, Windows 3.1 & PC Card Director
- Lotus Organizer, Lotus ScreenCam, Lotus cc:Mail Mobile, OAG FlightDisk, Triton CoSession Host (Organizer only with 486SX-33 Models)
- Battery life 3.2 to 7 hours

360C TF1 486SX-33 170Mb.....	£1949
360C TF2 486SX-33 340Mb.....	£2097
360CSE TF3 486DX-50 170Mb.....	£2390
360CSE TF4 486DX-50 340Mb.....	£2530

£1949

486DX4-100 BMA TFT COLOUR



ThinkPad 755CE

Powerful TFT colour notebook with 486DX4-100 processor, large TFT BMA screen, Advanced Multimedia/Modem and Infra-red Comms

- General specification as shown under common features
- 8Mb RAM upgradeable to 40Mb
- 10.4" TFT Black Matrix on array colour display with 65,000 colours, reduced glare and excellent visibility even in daylight. 100:1 contrast ratio
- Trackpoint III pointing device with improved rubber grip and drag & drop features
- 340Mb, 540Mb or 810Mb removable hard disks
- 50h x 297w x 210d In mm; 2.9Kg weight with battery & drives
- IBM PC DOS 6.3, Windows 3.1, & PC Card Director
- Software Suite including Lotus Organizer 1.1, ScreenCam, cc:Mail Mobile, Audiofile TalkWorks, Asymetrix Presentation PE, Puma TranXit, OAG FlightDisk, Video for Windows runtime.
- Built-in 16-bit soundcard with audio jacks, headphone jack, microphone and speaker
- Battery life 3.5 to 7 hours
- Built-in IRDA compatible Infra-red ports
- Integrated Mwave DSP unit which can function as stereo soundcard with WAV & MIDI support, audio compression or integrated 14.4 data/fax modem with Telephony support (Speaker phone or Telephone answering)

755CE CE2 486DX4-100 340Mb.....	£4491
755CE CE3 486DX4-100 540Mb.....	£4743
755CE CE4 486DX4-100 810Mb.....	£5211

£4451

486DX4-100 BMA TFT COLOUR & MPC2



ThinkPad 755CD

Ultimate TFT colour fully MPC2 compliant multimedia notebook with 486DX4-100 processor, Large TFT BMA screen, advanced stereo multimedia/modem, built-in CD ROM, and Infra-red Comms

- General specification as shown under common features
- 8Mb RAM upgradeable to 40Mb
- 10.4" TFT Black Matrix on array colour display with 65,000 colours, reduced glare and excellent visibility even in day light. 100:1 contrast ratio.
- Trackpoint III pointing device with improved rubber grip and drag & drop features
- 540Mb or 810Mb removable hard disks
- 57h x 297w x 210d In mm; 2.9Kg weight with battery & drives
- IBM PC DOS 6.3, Windows 3.1, & PC Card Director
- Software Suite including Lotus Organizer 1.1, ScreenCam, cc:Mail Mobile, Audiofile TalkWorks, Asymetrix Presentation PE & Digital Video Producer, Puma TranXit, OAG flightDisk, Video for Windows runtime
- Built-in soundcard with audio jacks, headphone jack, MIDI/Joystick port, microphone and stereospeakers
- Video capture/overlay features and Composite (video) in; video out to TV ports
- Battery life 3.5 to 7 hours
- Built-in IRDA compatible InfraRed ports
- Integrated Mwave DSP unit which can function as stereo soundcard with WAV & MIDI support, audio compression or integrated 14.4 data/fax modem with Telephony support (speaker phone or telephone answering)
- Built-in 5.25" double speed multi-session CD-ROM Drive

755CD CD3 486DX4-100 540Mb.....	£5333
755CD CD4 486DX4-100 810Mb.....	£5774

£5333

GENERAL OPTIONS

Additional Removable Hard Drives	Dock II.....	£500
170Mb.....	Dock II display stand.....	£50
340Mb.....	Dock II 555Mb tape backup.....	£473
540Mb.....		
810Mb.....		

PCMCIA type II Cards

Intel fax/data modem.....	£99
Communicate Connexion 1440C.....	£Call
IBM PCMCIA options	
-3270 Card.....	£269
-14.4 fax/data modem.....	£324
-Modem UK DAA for above.....	£63
-16/4 Token Ring card.....	£360
-10Base2 Ethernet card.....	£180
-10BaseT Ethernet card.....	£180

Carry Cases

Deluxe leather overnight.....	£176
Deluxe leather.....	£104
Deluxe nylon.....	£72
Nylon.....	£38

Black Matching Extras

Black 15X FST SVGA screen.....	£432
Black external keyboard.....	£140
Black Keypad for keyboard.....	£45
Black mouse.....	£30

Other Options

Keyboard mouse connector cable.....	£23
KeyGuard.....	£63
Numeric keypad.....	£22
AC adaptor 40W.....	£48
AC adaptor 50W.....	£108
Car battery adaptor.....	£48
Quick charger (can take 2 batteries).....	£176
Microphone kit.....	£36
Laplink XL & serial cable.....	£39
755CE/CD only options	
Headset.....	£95
DAA/telemetry kit.....	£104
FDD bay PCMCIA cartridge.....	£41

Docking Options (360 & 755)	
Port Replicator 1.....	£198
Port Replicator 2.....	£72
Portable Dock 1.....	£536
-Includes 5.25" bay, one ISA slot, one special slot for A to D adapter for motion video, two integral speakers, SCSI port, and standard ports.	
Dock I carry case.....	£77
Dock I display stand.....	£77
Ext. floppy enclosure.....	£32
Dock I CD-ROM kit.....	£414
Dock I Anal. to Digit. video card.....	£563
Dock I audio cable.....	£18
Dock I SCSI install kit.....	£41
Dock I IDE install kit.....	£45

All prices exclude delivery and VAT (17.5%). Delivery: Systems £19, Lasers and large items £15, software and small items £10. Visa /Access/ American Express /Switch and Government orders welcome. Prices, specifications and offers are subject to change and subject to our conditions of sale copies of which are available on request. Mail order only. No collections please. Goods are normally despatched within 7 days. All orders will be fulfilled within 28 days unless otherwise specified. E&OE.

THE DIRECT

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COLOSSUS 486DX2-66 SERVER



An entry level PC server suitable for small networks from 2 to 20 users

- 486DX2-66 processor
- Mini-Tower case with 6 drive bays and 8 slots
- 2 VESA/ISA and 5 ISA slots are free
- 8Mb RAM (Max 64Mb)
- 340Mb IDE hard disk
- 3.5" floppy drive
- VESA Local Bus SVGA with 1Mb
- 2 serial, mouse and printer ports
- 102 keyboard and mouse
- 14" 0.28dp NI SVGA colour screen
- Novell compatible 16-bit ethernet combo card with AUI, BNC and RJ45 ports
- Manufactured by IBM
- 12 month warranty extendable to three years

Options

- Upgrade to 540Mb hard drive.....£150
 - 8Mb to 16Mb RAM upgrade.....£320
 - VESA Local Bus SCSI II Controller.....£199
 - 1Gb SCSI II hard drive.....£699
 - 2Gb SCSI II hard drive.....£1299
- Also see common options

£1149

COMPAQ PROSIGNIA VS SERVER



Compaq's high quality dedicated server suitable for 5 to 50+ user networks and complete with 3 year on-site warranty from Compaq

- Intel 486SX-33 processor upgradeable to 486DX2-66, 486DX4-100 and Pentium technology
- 8Mb RAM upgradeable to 128Mb
- Local Bus Fast SCSI-2 controller with choice of hard drives
- SCSI disk storage capability in excess of 8Gb
- 3.5" 1.44Mb floppy drive
- 32-bit Integrated Local Bus ethernet network controller
- Comprehensive security features including password protection, server mode and device disable mode
- 5-slot EISA bus for high speed industry standard devices
- Excellent built-in manageability features including Automatic Server Recovery and System Health Logs
- 3 year Compaq on-site warranty

Select CPU, hard drive and monitor options from below

Options

- Compaq 2/8Gb DAT drive (requires software).....£833
- Compaq Dual Speed SCSI CD drive.....£171
- Compaq SmartStart Option pack.....£45
- Compaq serial parallel interface.....£63
- Compaq 14" SVGA colour screen.....£239
- Colossus 14" SVGA colour screen.....£149
- 486DX2-66 upgrade.....£149
- 486DX4-100 upgrade.....£299
- RAM upgrade to 16Mb.....£320
- 1Gb SCSI II hard drive.....£699
- 2Gb SCSI II hard drive.....£1299
- Compaq 256K Cache.....£140

£1049

IBM PC SERVER



The new IBM PC server suitable for 5 to 100+ users with industry standard EISA/PCI architecture, 486 or Pentium processors and 3 year IBM warranty

- Intel 486DX2-66 processor Upgradeable to 486DX4-100 (Pentium 60 model also available)
- 256K write back cache
- 8Mb RAM expandable to 128Mb
- Industry standard architecture and Flash BIOS
- 8 expansion slots (5 EISA and 3 PCI); 4 EISA slot and 2 PCI slots are free)
- 1 standard IDE and 1 enhanced IDE port
- 14Gb capacity using 2Gb drives
- 1.44Mb 3.5" floppy drive
- Full-Tower case with 300W heavy duty power supply and 7 drive bays
- 2 serial ports, 1 high speed parallel port, mouse and keyboard
- Dual fan to keep cool, SVGA graphics card
- Security features including power on password and lockable hinged door
- 3 year IBM warranty and 24 Hour IBM Helpware support

Select ethernet adaptor, hard drive and screen

Options

- IBM cache upgrade to 512K on P60 model.....£90
- IBM EISA ethernet adaptor.....£225
- IBM Fast SCSI-II PCI controller.....£126
- IBM PC Server cable kit.....£15
- IBM enhanced SCSI internal CD-ROM.....£333
- IBM 14" SVGA screen.....£176
- Colossus 14" SVGA colour screen.....£149
- Intel 486DX4-100 upgrade.....£299
- RAM upgrade 8Mb to 16Mb.....£320
- 540Mb IDE hard drive.....£299
- 720Mb IDE hard drive.....£399
- 1Gb IDE hard drive.....£599
- 1Gb SCSI II hard drive.....£699
- 2Gb SCSI II hard drive.....£1299

£1485

Pentium 60 with 16Mb.....£2376

COLOSSUS 486D2-50 WORKSTATION



The ideal network workstation with 486-50 or 486DX2-66 processor, 340Mb drive and superb screen

- 50MHz 486 processor (IBM Blue Lightning) with 16K internal Cache
- 4Mb RAM expandable to 64Mb
- 340Mb IDE hard drive
- 3.5" 1.44Mb floppy drive
- VESA Local Bus with 1 VESA slot free
- VESA graphics card with 1Mb
- 14" 0.28dp MPRII NI SVGA colour screen
- 3 drive bays and 3 slots (1 VESA and one ISA slot free)
- 2 serial, parallel and mouse ports
- Novell compatible 16-bit ethernet combo card with AUI, BNC and RJ45 ports
- PC DOS 6.3 and Windows 3.1
- Manufactured by IBM UK

Options

- 540Mb hard drive upgrade.....£150
- 486DX2-66 upgrade.....£130
- RAM upgrade to 8Mb.....£160

£799

COMPAQ PROLINEA WORKSTATION



Compaq ProLinea workstation provides excellent performance and industry standard design at truly remarkable prices

- Intel 486SX-33 processor
- Upgradeable to 486DX2-66 and 486DX4-100
- Pentium technology upgradeable
- 4Mb RAM upgradeable to 100Mb
- 200Mb or 340Mb IDE hard disk
- 3.5" 1.44Mb floppy drive
- Enhanced Local Bus graphics with 1Mb VRAM
- 3 drive bays and 3 free ISA slots
- Parallel port, mouse port and 2 serial ports
- Compaq keyboard & mouse
- Security & energy saving features
- DOS 6, Windows 3.1, Tabworks
- Novell compatible 16-bit ethernet combo card with AUI, BNC and RJ45 ports
- 3 year Compaq warranty

Select screen option from below

Options

- Compaq 14" SVGA screen.....£239
- Compaq 14" SVGA 1024LR.....£269
- Colossus 14" 0.28 SVGA 1024LR...£149
- Upgrade to 8Mb.....£160
- SX-33 to DX2-66 upgrade.....£149
- SX-33 to DX4-100 upgrade.....£299
- Compaq 340Mb model.....£90 extra

£709

IBM PC 300 WORKSTATION



New IBM PC 300 Workstation with SelectaBus design, excellent performance and upgradeability at truly remarkable prices

- Intel 486SX-33 processor
- Upgradeable to 486DX2-66 or 486DX4-100
- Pentium technology upgradeable
- 4Mb RAM upgradeable to 128Mb
- 270Mb IDE hard disk
- 3.5" 1.44Mb floppy drive
- Support for up to 4 IDE devices
- Unique SelectaBus technology with VESA bus as standard and PCI option
- 3 drive bays and 3 expansion slots. Unit can be placed horizontally or vertically
- Lockable doors with sliding cover
- 2 serial ports, parallel port and mouse port
- IBM keyboard and mouse
- VESA local bus graphics with 1Mb
- Advanced power management
- Plug and play design; Energy Star compliant
- EasyTools pre-loaded software
- PC DOS 6.3 and Windows 3.1
- Novell compatible 16-bit ethernet combo card with AUI, BNC and twisted pair connections
- 3 year IBM warranty & IBM Helpware 24 hour support

Select screen option from below

Options

- IBM 14L6 SVGA screen.....£176
- IBM 14L10 SVGA MultiFreq screen.....£267
- Colossus 14" 0.28 MPRII NI SVGA screen.....£149
- 486SX-33 to 486DX2-66 upgrade.....£149
- 486SX-33 to 486DX4-100 upgrade.....£299
- 540Mb IDE hard disk upgrade...£150
- 128K Cache.....£41
- 256K Cache.....£82
- RAM upgrade to 8Mb.....£160

£734

NETWORKING

NETWORKING - THE TOTAL SOLUTION

Popular networks can be divided into simple peer-to-peer (WorkGroup) networks or more complex client-server (Server based) networks. Frequently a combination of both is used.

PEER-TO-PEER

Peer-to-peer networks simply connect the PC systems together in your office/department and increase productivity by allowing you to:-
 -Share files, directories, hard disks and access information from your colleagues
 -Share peripherals such as laser printers, scanners, CD ROM drives and fax modems
 -Use electronic mail for faster communication

Usually all systems will include network interface cards linked via ethernet cables. Network software (Windows for Workgroups 3.11 or Novell Personal Netware) will be required for each user. Peripherals (printers, scanners, plotters), storage devices and modems can be connected to any PC and can be shared by all or selected users.

CLIENT SERVER NETWORKS

Server based networks are essential for sharing data eg accounts/order processing systems as well as other resources and provide better security. Peripherals, modems and storage devices are normally attached to the server or workstations dedicated for this purpose. Many solutions are available. For most uses we recommend industry standard Novell Netware based ethernet solutions, these account for over 70% of networks and are tried and tested and provide the best value.

SERVER

Usually a tower system with fast hard disk controller, 32 bit network card, large fast hard disks, plenty of RAM and large power supply. Server performance is more related to the hard disk system, RAM and network card and not the processor speed. A Pentium 90 system with network card can be slower than an optimised 486 purpose-built server.

WORKSTATIONS

These need to be powerful 486 (or Pentium) systems with network card, and good performance. We recommend at least 8Mb RAM, Local Bus graphics and 0.28dp screen if using Windows applications. Nowadays we strongly recommend a local hard disk in each workstation.

SERVER BACK-UP

An uninterruptible power supply with software monitoring

is essential for the server to allow it to shut down safely should there be a power failure.

TAPE BACK-UP

There are two options:-
 -Network wide back-ups of server and local PC drives with tape streamer (usually SCSI DAT drive) installed in server together with Cheyenne ARCServe server software
 -Fileserver back-up only via tape unit installed in a workstation.

COMMUNICATIONS

There are two options:-
 -A fax/data modem installed in the fileserver together with network fax software eg Cheyenne FAXServe software
 -Fax/Data modem installed in a workstation which functions as a dedicated fax server. This could also be used for remote support of the network using PC Anywhere software.

PERIPHERALS

These may be attached to the server, workstations which function as print servers or dedicated small network devices called print servers. Some network printers eg HP LaserJet with HP JetDirect card can also connect directly to the network without the use of a workstation/print server.

CABLING

Thin co-axial ethernet for small networks. 10Base-T cabling provides better cable management and is recommended for larger networks.

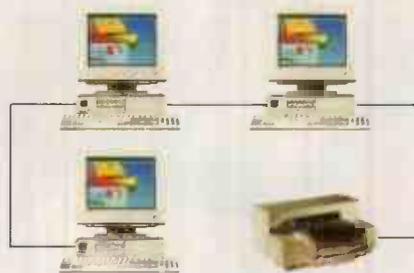
APPLICATIONS

Popular network applications include wordprocessing, spreadsheets, databases, accounts and electronic mail. We can provide solutions from Lotus, Microsoft or Novell tailored to your requirements.

SERVICES

Purchasing the network components alone will not allow you to be functional with a network system. Our experienced network services team will provide you with the complete solution tailored to your individual requirements. We can provide you with an initial quotation. Once you are happy with this, we can provide a more detailed plan taking account of your service requirements with final quotation and installation plan. This may involve a site survey. The simple example network prices shown here do not include service elements such as installation, cabling and training.

3 USER WORKGROUP NETWORK



WORKSTATIONS

3 Colossus 486-50 4Mb Workstations

APPLICATION SOFTWARE

Lotus Software bundle comprising of:-
 • Lotus 123 v5
 • Lotus Ami Pro v3.1
 • Lotus Organizer
 • Lotus Approach
 • Lotus SmartPics
 • Lotus individual training for Ami Pro, 1-2-3 and Approach
 • Pacioli 2000 Accounts
 • GST Pressworks DTP
 • GST Designworks

NETWORK SOFTWARE

• Peer-to-peer software either Windows for WorkGroups
 Add-on or Novell Personal Netware

PRINTER

• HP DeskJet 520 Printer with autosheet feeder

CABLES

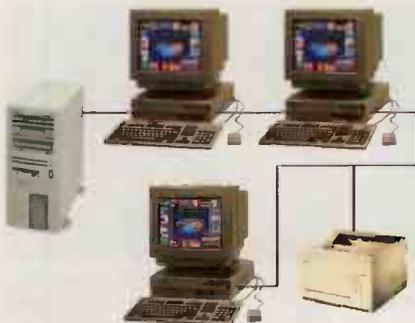
• Sets of 5m cables, connectors and two terminators

Power Network: As above but with 486DX2-66 8Mb Workstations: 3 user£3749
 with additional users for£1179

Additional Users
£899

£2899

COMPAQ SERVER NETWORK



SERVER

• Compaq Prosignia VS Fileserver with 1Gb SCSI II hard drive and 486DX2-66 processor
 • 32-bit ethernet card, 8Mb RAM and SVGA colour screen

NETWORK SOFTWARE

• Novell Netware 3.12 5 User

WORKSTATIONS

• 3 Compaq Prolinea Workstations (486SX-33, 4Mb, 200Mb) with Compaq 14" SVGA screens

APPLICATION SOFTWARE

• Lotus software on each workstation including 1-2-3, Ami Pro, Approach, SmartPics, Organizer, Lotus training, Pacioli Accounts, Pressworks & Designworks

PRINTER

• HP LaserJet 4 Plus 12ppm 600dpi laser printer with HP JetDirect card

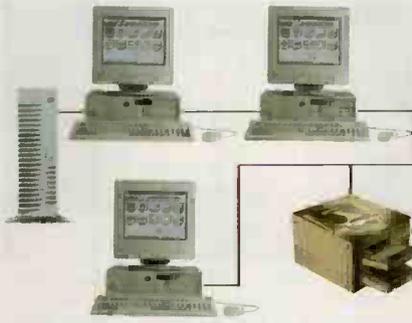
CABLES

• 5m cables, connectors and terminators

Additional Users
£998

£6799

IBM SERVER NETWORK



SERVER

• IBM PC Server Fileserver with 486DX2-66 processor, 1Gb SCSI II hard drive
 • 32-bit ethernet card, 16Mb RAM and SVGA colour screen
Server option pack£1999 Extra
 • 14.4 Fax/Data modem with 5 user Cheyenne FAXServe software
 • 2Gb DAT tape back-up with 5 user ARCServe 5 software
 • APC 600VA UPS with PowerChute monitoring software and interface cable

NETWORK SOFTWARE

• Novell Netware 3.12 5 User

WORKSTATIONS

• 3 IBM PC 300 workstations (486DX2-66, 8Mb, 270Mb) with IBM 14" SVGA screens

APPLICATION SOFTWARE

• Microsoft Office Professional Software on each workstation including Works, Excel 5, Word 6, PowerPoint 4 and Access 2

PRINTER

• HP LaserJet 4Si 16ppm 600dpi network laser printer with HP JetDirect card

CABLES

• 5m cables, connectors and terminators

Additional Users
£1469

£9999

GENERAL OPTIONS

SERVER OPTIONS

Novell Netware 3.12
 - 5 user£479
 - 10 user£949
 - 25 user£1749
 Cheyenne ARCServe 5 Tape backup software
 - 5 user£249
 - 10 user£499
 - 25 user£899
 - 2Gb SCSI DAT tape drive only£689
 Cheyenne FAXServe Software
 - 5 user£299
 - 20 user£499
 - 14.4 fax data modem (server modem)£199
 Uninterruptible Power Supplies
 - APC Smart-Ups 600£349
 - APC Smart-Ups 900£499
 - APC Smart-Ups 1250£699
 - PowerChute Plus for Novell£50
 - DCB interface cable£19
 - Mouse port interface cable£19

WORKSTATION OPTIONS

14.4 fax data modem£119
 PC Anywhere host/remote for DOS£99
 250Mb tape back-up unit£149
 500Mb tape back-up unit£399
 2Gb DAT back-up unit (drive only)£689

CABLING & ACCESSORIES

Lan Research Combi network card£50
 5m thin ethernet cable with connectors£15
 Terminators£5
 10BASE-T Ethernet Hubs
 - 8 port hub£299
 - 16 port hub£499

SERVICES

Prices will vary on individual requirements

Workshop Build

-Novell fileserver build and workstation build with Netware installation on server
 -Network configuration with creation of logins and user access
 -Application installation

On-site Build

-Site survey (if not conducted earlier)
 -Site cabling
 -On-site hardware installation
 -On-site network implementation with possible links to mini/mainframe and ISDN
 -On-site application implementation
 -On-site training
 -Support: modem, hotline and onsite support

All prices exclude delivery and VAT (17.5%). Delivery:- systems £19, lasers and large items £15, software and small items £10. Visa /Access/ American Express /Switch and Government orders welcome. Prices, specifications and offers are subject to change and subject to our conditions of sale copies of which are available on request. Mail order only. No collections please. Goods are normally despatched within 7 days. All orders will be fulfilled within 28 days unless otherwise specified. E&OE.



THE DIRECT

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HP DeskJet 320



The portable DeskJet printer for the mobile user. Full featured 600 x 300 dpi printing offers high quality text and graphics as fast as most desktop printers - up to 3 ppm

- 600 x 300 dpi resolution yields clear, sharp, professional documents
- Optional colour kit uses HP's ColorSmart technology to produce the finest colour output (16.7m colours). Colour resolution 300 x 300 and speed 4-7 minutes per page. 256 levels of greyscale for dramatic black graphics
- Optional cut-sheet feeder holds up to 60 sheets or 20 transparencies and folds-down for compact storage and portability
- Fast print speeds of up to 3 ppm is as fast as most office printers
- Built-in portrait and landscape typefaces (many faces with 84 size and style combinations) plus 14 TrueType scalable fonts for Windows
- 48K print buffer, Centronics interface, HP PCL 3 language
- Built-in auto-sheet feeder with capacity of 100 sheets
- Automatic envelope sensor: no need to make a manual adjustment. Up to 50 transparencies at a time, and stacks of up to 20 envelopes
- Media flexibility: plain paper, glossy paper, transparencies and a wide range of paper sizes (A4, letter, legal paper and envelopes)
- Small size (310x65x147mm) and light weight (1.96Kg)
- Windows compatibility
- 3 year return to HP warranty

Options

- Sheet feeder (C3005A)£59
- Colour kit (C3569A)£38
- European battery (C3059A)£34
- Carry case (C3050A)£63
- Rapid recharger (C3062A)£71
- Black ink cartridge (51633A)£17.50
- 3 year on-site support (H5463A)£40
- Paper prices as per DeskJet 520

£169

With Sheet feeder bundle£207

HP DeskJet 520



The HP DeskJet 520 offers sharp, clear 600 x 300 dpi black printing utilising Hewlett-Packard's exclusive Resolution Enhancement technology

- 600 x 300 dpi resolution yields clear, sharp, professional documents
- Fast print speeds of up to 3 ppm for fast, time-saving output
- Built-in portrait and landscape typefaces (6 faces with many size and style combinations) plus 14 TrueType scalable fonts for Windows
- 16K print buffer, Centronics interface, HP PCL 3 language and built-in Proprietary emulation
- Built-in auto-sheet feeder with capacity of 100 sheets
- Automatic envelope sensor: no need to make a manual adjustment. Up to 50 transparencies at a time, and stacks of up to 20 envelopes
- Media flexibility permits you to print on plain paper, glossy paper, a wide range of paper sizes (A4, letter, legal paper and envelopes & Transparencies)
- 256 levels of greyscale for dramatic black graphics for Windows. Water-resistant ink for smudge proof printing
- Windows Print Manager compatibility increases personal productivity with fast return to computer while printer is printing
- 3 year return to HP warranty

Options

- CX A4 cutsheet paper 200 (51630Z)£16.50
- CX Lett. cutsheet paper 200 (51630Y)£15.70
- LX A4 glossy paper 50 (51636J)£43.50
- LX Lett. glossy paper 50 (51636H)£45
- LX A4 transparency film 50 (51636G)£40.50
- LX Lett. transparency film 50 (51636F)£42
- Black double ink cartridge (51626A)£23
- 256Kb RAM memory (22707B)£133
- 3 year on-site support (H5463A)£40

£199

HP DeskJet 560C



The HP DeskJet 560C offers quality colour printing using ColorSmart technology for clear and vivid colour output automatically

- All the features of DeskJet 520 plus HP's ColorSmart technology produces clear vivid colour output
- Resident colour and black cartridges for convenient black and colour printing without switching cartridges
- 600 x 300 dpi resolution (mono) 300 x 300 (colour) yields clear, sharp, professional documents
- Fast print speeds of up to 3 ppm for mono and an average of 4 minutes per page for colour
- Built-in portrait and landscape typefaces (6 faces with many size and style combinations) plus 14 TrueType scalable fonts for Windows
- 80K print buffer, Centronics parallel interface, HP PCL 3 language
- Built-in auto-sheet feeder with capacity of 100 sheets
- Automatic envelope sensor: no need to make a manual adjustment. Up to 50 transparencies at a time, and stacks of up to 20 envelopes
- Media flexibility permits you to print on plain paper, glossy paper, a wide range of paper sizes (A4, letter, legal paper and envelopes & transparencies)
- 256 levels of greyscale for dramatic black graphics for Windows
- 3 year return to HP warranty

Options

- Black double ink cartridge (51626A)£23
- Colour print cartridge (51625A)£25.50
- 256Kb RAM memory (22707B)£133
- 3 year on-site support (H5466A)£65
- Paper prices as per DeskJet 520

£329

DeskJet 500C (check availability)£219

HP LaserJet 4 Plus



This 12 ppm, 600 dpi resolution printer gives your office the advantage of superior looking documents and a wide assortment of built-in scalable fonts

- 600 dpi plus HP Resolution Enhancement and Microfine Toner
- 12 ppm print speed (RISC CPU with cache) and 20,000 pages per month usage
- Enhanced PCL5 language with 10 TrueType and 35 IntelliFont internal scalable fonts with additional download facility
- Two input trays (1 x 100 sheets and 1 x 250 sheets)
- with 500 sheet options
- 10 envelope handling capacity with 75 envelope power feeder option
- 250 sheet output tray with 1000 sheet tray output stacker option
- A4, letter, legal, exec and envelope paper sizes
- Media flexibility with copier, bond, recycled, envelopes, transparencies and labels
- 2Mb RAM with memory enhancement to effectively double RAM
- RAM expandable to 66Mb via 4 SIMM memory slots
- Optional duplex printing facility
- Bi-tonics parallel and serial interfaces. Modular I/O slot
- Auto print switching. HP JetDirect card option
- 421 x 297 x 403mm dimensions and 1 year HP warranty

Options

- HP toner (92298A)£109
- Multisize tray 250 (C2085D)£88
- Letter tray 250 (C2085E)£88
- A4 tray 250 (C2085F)£88
- 500 sheet multi-tray-base (C2083D)£265
- 500 sheet repl tray (C2084C)£114
- Power envelope feeder (C2082B)£257
- Duplex assembly (C3157A)£530
- 1000 sheet output stacker (C2806A)£273
- 1Mb, 2Mb, 4Mb, 8Mb SIMMS as LaserJet 4P
- 16Mb SIMM (C3146A)£991
- Postscript Level 2 (C3129A)£312
- HP JetDirect ethernet (J2552A)£350
- 3 year on-site support (H5479A)£170

£939

Postscript Model 4M Plus

With Adobe Postscript (takes up 1 SIMM slot) with autoswitching, 80 scalable fonts (10 TrueType, 35 IntelliFont & 35 Adobe PS), 6Mb RAM (2Mb base RAM plus 4Mb SIMM 2 slots free) and network ready with integrated ethernet and Mac LocalTalk interface (in addition to the others with autoswitching)

£1259

HP LaserJet 4V



The new 16 ppm, 600 dpi resolution printer that sets a new standard for workgroup printers, offering A4/A3 paper size printing and the most advanced printer management capabilities

- 600 dpi plus HP Resolution Enhancement and Microfine Toner
- 16 ppm print speed (33MHz RISC CPU) and 35,000 pages per month usage
- Enhanced PCL5 language & HP GL/2 with 10 TrueType and 35 IntelliFont internal scalable fonts with additional download facility
- Two input trays (1 x 100 sheets and 1 x 250 sheets) with 500 sheet options
- 1 envelope handling capacity
- 250 sheet output tray
- A3, A4, letter, legal, exec, envelope and custom paper sizes
- Media flexibility with copier, bond, recycled, envelopes, transparencies and labels
- 4Mb RAM expandable to 68Mb via 4 SIMM memory slots
- Bi-tonics parallel interface modular I/O slot. Auto print switching. HP JetDirect card option
- 459 x 317 x 522mm dimensions and 1 year HP warranty

Options

- 500 sheet multi-tray-base (C3760A)£345
- HP toner (C3900A)£151
- A4/lett multisize tray (C3160A)£114
- A3/lett multisize tray (C3161A)£114
- Legal (C3162A)£114
- 500 sheet repl. tray (C3761A)£114
- 1Mb, 2Mb, 4Mb, 8Mb SIMMS as LaserJet 4P
- Postscript Level 2 (C3159A)£383
- HP JetDirect ethernet (J2552A)£350
- 3 year on-site support (H5492A)£499

£1379

Postscript Model 4MV

With Adobe Postscript (takes up 1 SIMM slot) with autoswitching, 80 scalable fonts (10 TrueType, 35 IntelliFont & 35 Adobe PS), 12Mb RAM (4Mb base RAM plus 8Mb SIMM- 2 slots free) and network ready with integrated ethernet and Mac LocalTalk interface (in addition to the others with autoswitching)

£1979

HP LaserJet 4Si



The 16 ppm, 600 dpi resolution, high speed, high volume LaserJet printer for small businesses with large workloads, or networks supporting thousands of nodes in multiple environments

- 600 dpi plus HP Resolution Enhancement and Microfine Toner
- 16ppm print speed (Intel RISC CPU) and 75,000 pages per month usage
- Enhanced PCL5 language with 10 TrueType and 35 IntelliFont internal scalable fonts with additional download facility
- Two input trays (2 x 500 sheets)
- with 1500 sheet options
- 1 envelope handling capacity with 100 envelope power feeder option
- 500 sheet output tray with 2000 sheet output stacker option
- A4, letter, legal, exec and envelope paper sizes
- Media flexibility with copier, bond, recycled, envelopes, transparencies and labels
- 2Mb RAM expandable to 34Mb via 4 SIMM memory slots
- Bi-tonics parallel interface modular I/O slot. Auto print switching. HP JetDirect card option
- Duplex printing option available
- Network ready with integrated Ethernet and Mac LocalTalk interface (in addition to the others with autoswitching)
- Also includes 2 JetDirect slots
- 545 x 418 x 763mm dimensions and 1 year on-site HP warranty

Options

- HP toner (92291A)£125
- Letter tray (92291B)£115
- Legal tray (92291C)£115
- A4 tray (92291D)£86
- Executive tray (92291E)£115
- 1500 sheet Input tray (C2920A)£479
- 100 power envelope feeder (C2060A)£369
- Duplex printing assembly (C2061A)£515
- 2000 sheet output stacker & cabinet (C2801A)£1150
- Printer cabinet (C2917A)£295
- A5 Paper feeder 450 sheet (L2NT-80795)£78
- 1Mb, 2Mb, 4Mb, 8Mb SIMMS as DeskJet 1200
- Postscript Level 2 SIMM (C2013A)£614
- HP JetDirect Ethernet (J2552A)£350
- 3 year on-site support (H5492A)£499

£2089

Postscript Model 4Si MX

With Adobe Postscript (takes up 1 SIMM slot) with autoswitching, 80 scalable fonts (10 TrueType, 35 IntelliFont & 35 Adobe PS) and 10Mb RAM (2Mb base RAM plus 8Mb SIMM 2 slots free)

£2969

HEWLETT-PACKARD

HP DeskJet 1200C



The combination of high quality black text, using HP's Resolution Enhancement technology, plus full featured colour in a single, affordable printer satisfies the full range of printing needs in the office

- All the features of DeskJet 560C with 600x300 dpi black text and 300 dpi full colour printing using ColorSmart technology. Fast 7 ppm black and 1 ppm colour speed
- Operation with four print cartridges (cyan, magenta, yellow, and black) gives millions of colour with full Pantone support. Integrated Ink-level indicators with out-of-ink auto-sensing and very low cost per page
- Fully HP LaserJet compatible with Colour PCL5 language, slot for HP LaserJet cartridges
- and 3 memory slots (one may be used for Postscript SIMM)
- 45 internal scalable typefaces (35 Intellifont and 10 TrueType) and line printer font. Optional Postscript SIMM provides 35 scalable Adobe Postscript fonts (standard on Postscript model)
- 2Mb RAM expandable to 26Mb using 8Mb SIMMS (4Mb expandable to 20Mb with 1200/PS model)
- Fast Centronics interface and RISC processor. Automatic I/O and language switching. Network compatible with slot for HP JetDirect card. Novell certified
- Automatic 180 sheet feeder with 100 sheet output tray
- HP DeskJet 1200/PS. Postscript model includes postscript level 2 SIMM and HP JetDirect LocalTalk card

Options

Black cartridge (51640A).....	£21.50
Cyan cartridge (51640C).....	£25
Yellow cartridge (51640Y).....	£25
Magenta cartridge (51640M).....	£25
Postscript SIMM (C2865A).....	£651
1Mb SIMM (C2063A).....	£31
2Mb SIMM (C2064A).....	£159
4Mb SIMM (C2065A).....	£259
8Mb SIMM (C2066A).....	£480
Ethernet JetDirect card (J2552A).....	£350
3 year on-site support (H5473A).....	£100

Paper prices as per DeskJet 520

HP toner (92274A).....	£68
1Mb SIMM (C2024A).....	£76
Ext. HP JetDirect ethernet (J2382B).....	£275
3 year on-site support (H5473A).....	£100

£899

HP DeskJet 1200/PS..... **£1269**

HP LaserJet 4L



This 4 ppm, 300 dpi resolution printer combines great print quality and a very small footprint to offer the ideal printing solution for the desktop or small office

- 300 dpi plus HP Resolution Enhancement and Microfine Toner
- 4 ppm print speed and 8,000 pages per month usage
- Enhanced PCL5 language with 26 Intellifont Internal scalable fonts with additional download facility
- One 100 sheet input tray and 50 sheet output tray
- 1 envelope handling capacity. A4, letter, legal, exec and envelope paper sizes
- Media flexibility with copier, bond, recycled, envelopes, transparencies and labels
- 1Mb RAM with memory enhancement to effectively double RAM
- RAM expandable to 2Mb via one memory slot.
- Bi-tonics parallel interface
- HP Explorer software. One button control panel and Econmode feature to use less toner
- 362 x 164 x 358mm dimensions and 1 year HP warranty

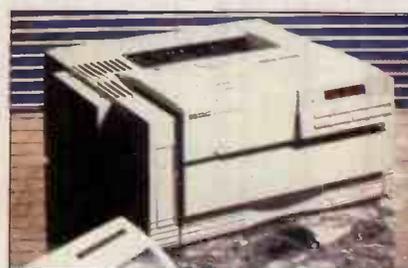
Options

HP toner (92274A).....	£68
1Mb SIMM (C2024A).....	£76
Ext. HP JetDirect ethernet (J2382B).....	£275
3 year on-site support (H5473A).....	£100

£389

Postscript Model 4ML
With Adobe Postscript as well as HP PCL5 with autoswitching, 80 scalable fonts, 4Mb RAM and Mac LocalTalk interface (in addition to Centronics with autoswitching) **£739**

HP LaserJet 4P



This 4 ppm printer offers superb 600 dpi resolution print quality at a price and size that are perfect for the desktop, small office and workgroup

- 600 dpi plus HP Resolution Enhancement and Microfine Toner
- 4 ppm print speed and 8,000 pages per month usage
- Enhanced PCL5 language with 10 TrueType and 35 Intellifont internal scalable fonts with additional download facility
- 1 internal bitmapped font and one cartridge slot
- One 250 sheet input tray
- 1 envelope handling capacity
- 100 sheet output tray
- A4, letter, legal, exec, envelope and custom paper sizes
- Media flexibility with copier, bond, recycled, envelopes, transparencies and labels
- 2Mb RAM with memory enhancement to effectively double RAM
- RAM expandable to 26Mb via 3 SIMM memory slots (one can be used for Postscript SIMM option)
- Bi-tonics parallel and serial interfaces
- HP Explorer software, DOS & Windows drivers, eight button control panel and Econmode feature to use less toner
- PowerSave energy save feature
- 374x175x380mm dimensions and 1 year HP warranty

Options

HP toner (92274A).....	£68
1Mb SIMM (C3150A).....	£91
2Mb SIMM (C3151A).....	£159
4Mb SIMM (C3152A).....	£236
8Mb SIMM (C3153A).....	£442
Postscript level 2 (C2049A).....	£234
Ext. HP JetDirect ethernet (J2382B).....	£275
3 year on-site support (H5476A).....	£135

£599

Postscript Model 4MP
With Adobe Postscript (takes up 1 SIMM slot) as well as HP PCL5 with autoswitching, 80 scalable fonts (10 TrueType, 35 Intellifont & 35 Adobe PS), 6Mb RAM and Mac LocalTalk Interface (in addition to the others with autoswitching) **£859**

HP Color LaserJet



The new HP LaserJet that does colour. A 10 ppm black and white, 2 ppm colour printer that meets the demands of today's shared office environments by offering both fast black and white, and colour printing, paper handling flexibility and connectivity options for network use

- 300 dpi plus HP Resolution Enhancement and 4 toner cartridges (Black, Yellow, Magenta and Cyan)
- HP ColorSmart produces crisp, clean and sharp colour images in 16.7m colours
- Separate colour toner supplies and imaging units are replaced only as needed
- 10 ppm print speed (mono) with 2 ppm Colour and 15,000 pages per month usage
- Enhanced PCS language with colour, 10 TrueType and 35 Intellifont internal scalable fonts with additional download facility
- Two internal bitmapped fonts
- One Input trays (1 x 250 sheets)
- with additional 250 sheet tray options
- 1 envelope handling capacity option
- 100 sheet output tray
- A3 (mono only) A4, letter, legal, exec and envelope paper sizes
- Media flexibility with copier, bond, recycled, envelopes and transparencies
- 8Mb RAM expandable to 72Mb via 4 SIMM memory slots
- Bi-tonics parallel interface modular I/O slot. Auto print switching. HP JetDirect card option
- HP Explorer software, eight button control panel and Econmode feature to use less toner
- PowerSave energy save feature
- 620 x 375 x 490mm dimensions and 1 year on-site HP warranty

Postscript Printing: We recommend Postscript SIMM, additional 4Mb RAM (at least), HP JetDirect card for network and rear feed tray options.

Options
Separate colour toner and consumables please call for prices

£Call
For latest price

HP Scanners



HP ScanJet II CX

HP's affordable colour/greyscale flat-bed scanner with impressive features and software bundle

- 400 dpi optical resolution (1600 dpi enhanced resolution)
- Scan text, drawings and illustrations and photographic images
- Recognises over 16m colours and 256 levels of greyscale
- HP ColorSmart technology optimises output for HP colour printers
- HP AccuPage technology via Calera Wordscan OCR software recognises text down to 4 point
- TWAIN support. OCR aware, automatic brightness and contrast settings. Fast preview and final scan, powerful image editing tools, user selectable resolutions from 4% to 400% in 1% increments, on-line learning, and easy setup and installation
- Scans transparencies from 35mm to other media up to A4. Up to 50 pages at a time with optional document feeder
- PC bundle includes SCSI adaptor, cable, power cord, scanner, HP DeskScan II for Windows scanning utility, Calera Wordscan OCR package and Aldus Photostyler SE image editing software
- 1 year HP warranty

HP ScanJet 3P
Entry level flat-bed mono scanner with 256 greyscales and up to 1200 dpi enhanced resolution. Similar specification to the colour model but with 300 dpi optical (1200 dpi enhanced) resolution and 256 greyscale levels. Includes HP Picture place image editing and Calera WordScan 3. **£339**

Options

50 page autosheet feeder IIX (C1751A).....	£399
Transparency adaptor IIX (C2501A).....	£569
20 page autosheet feeder 3P (C1791A).....	£169
Scanner stand for 3P (C2576A).....	£54
3 year on-site support 3P (H5468A).....	£85
3 year on-site support IIX (H5475A).....	£135

£679

HP Plotters



Leading inkjet technology coupled with 600 dpi resolution, excellent colour, fast speeds and ability to vary line thickness means that InkJet plotters will quickly replace traditional pen plotters. HP's DesignJet range offers the best value

All models are available with A0 or A1 size, 600 dpi resolution in mono on plain paper. AutoCAD and Windows drivers included. RS232C and Centronics interfaces with autoswitching. One year on-site warranty

DesignJet 220: Desktop mono InkJet plotting with ability to take sheets only (Legs optional). 600 dpi and 2Mb RAM as standard.

DesignJet 600: Mono InkJet plotters with sheet or roll feed and legs as standard. 600 dpi and 4Mb RAM as standard

DesignJet 650: Colour and mono inkjet plotters with sheet or roll feed, legs as standard. 600 dpi (mono mode) and 300 dpi (colour). 4Mb RAM buffer expandable to 20Mb. Four ink cartridges with ink level indicators

DesignJet 220 A1	£1799	DesignJet 600 A0	£3729
DesignJet 220 A0	£2339	DesignJet 650C A1	£4549
DesignJet 600 A1	£3359	DesignJet 650C A0	£5499

Options

DesignJet 220 legs & bin (A1) (C3185A).....	£310	Mono double ink cart. 220/600 (51626A).....	£23.50
DesignJet 220 legs & bin (A0) (C3186A).....	£360	Black cartridge 650C (51640A).....	£21.50
4Mb SIMM (C2065A).....	£259	Cyan cartridge 650C (51640C).....	£30
8Mb SIMM (C2066A).....	£480	Magenta cartridge (51650M).....	£30
16Mb SIMM (D2297A).....	£874	Yellow cartridge (51650Y).....	£30
32Mb SIMM (D2298A).....	£1735	JetDirect ethernet card (J2552A).....	£350
Manual cutter (17291C).....	£6	3 year on-site support (H5486A).....	£300
		HP special colour plotting paper.....	£Call

All prices exclude delivery and VAT (17.5%). Delivery: Systems £19, Lasers and large items £15, software and small items £10. Visa /Access/ American Express /Switch and Government orders welcome. Prices, specifications and offers are subject to change and subject to our conditions of sale copies of which are available on request. Mail order only. No collections please. Goods are normally despatched within 7 days. All orders will be fulfilled within 28 days unless otherwise specified. E&OE.



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Monday-Friday 9.00am-7.00pm Saturday 9.00am-5.00pm
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TEXAS INSTRUMENTS



TravelMate 4000M

Multimedia ready notebook computers with built-in 16-bit soundcard. (Shown with optional CD-ROM dock)

- Intel 486DX2-50, 486DX4-75, or DX4-100
- 4Mb expandable to 20Mb
- 1.44Mb floppy drive
- 340Mb, 455Mb or 520Mb hard disks
- 9.5" Advanced STN Dual Scan (DS) or TFT colour 8.47/9.5" screens with simultaneous external SVGA output, 1Mb video and windows acceleration
- 16-bit soundcard with internal speakers & microphone
- Ports: audio in, audio out, Fast SCSI II, microphone, 16-bit MIDI with joystick port, PCMCIA type III (two type II), serial, parallel, SVGA, PS/2 mouse, PS/2 external keyboard ports
- 21.6 x 27.9 x 4.6 cm. Weight 2.7 to 2.9Kg
- MS DOS 6.2 & Windows for Workgroups 3.11 & utilities
- The point internal pointing device
- Battery charger/AC adaptor
- NiMH Battery life 3-5 hours

486DX2-50 340Mb Dual Scan 9.5"	£1899
486DX4-75 455Mb Dual Scan 9.5"	£2469
486DX2-50 455Mb 8.4" TFT	£2469
486DX4-75 340Mb 8.4" TFT	£3039
486DX4-100 520Mb 9.5" TFT	£3499

- Options
- 4Mb RAM.....£170
 - 16Mb RAM.....£1039
 - NiMH battery.....£99
 - CD-ROM docking.....£595
 - Deluxe carry case.....£49

£1899

PANASONIC



Panasonic "JET" Notebooks

The Panasonic JET notebooks provide the ultimate modularity, large 10.4" TFT colour screen and PCMCIA from an incredible £1599!

- Intel 486 processors
- 4Mb expandable to 20Mb
- MP pocket for removable 3.5" floppy drive or extra battery pack or video pack or 3.5" CD-ROM drive
- 200Mb, 250Mb or 450Mb hard disks
- Large 10.4" detachable TFT VGA 256 colour screen with 1Mb video graphics
- PCMCIA type III slot (or two type II), serial, parallel, SVGA, PS/2 mouse, PS/2 external keyboard & bus expansion ports
- Password security, power management & 8 LED lights
- Mini-Trackball pointing device; 2.7Kg weight
- Autosensing battery charger/AC adaptor. Can use upto 3 battery packs with battery life upto 9 hours
- MS DOS 6 & Windows 3.1

486sx-33 200Mb TFT Colour	£1599
486DX2-50 200Mb TFT Colour.....	£2639
486DX2-50 450Mb TFT Colour	£2759
486DX4-75 450Mb TFT Colour	£2999

- Options
- 3.5" CD-ROM drive.....£299
 - PCMCIA soundcard.....£199
 - 4Mb RAM.....£199
 - Battery pack.....£92

£1599

HEWLETT-PACKARD



HP Omnibook 600

The new small, light colourful notebook PC from Hewlett Packard with incredible power

- Intel 486DX2-50 or 486DX4-75 processor
- 4Mb RAM or 8Mb upgradeable to 12/16Mb
- 3.5" 1.44Mb slim external floppy drive
- 170Mb or 260Mb 1.8" rugged removable PCMCIA IDE hard disk (upto 520Mb capacity)
- Vacant PCMCIA type III (two type II) slot
- Unique built-in pop-up mouse
- VESA Local Bus graphics with 1Mb RAM
- Full-size 85 key keyboard with 12 function keys
- Superb 8.5" Crisp Dual Scan VGA colour screen
- Parallel, serial, ext. SVGA, Infra-red, floppy drive and port replicator ports
- Powered by NiMH battery (4 hours) or AC/power adaptor. Suspend when closed & instant on feature when lid lifted
- Dimensions:7.3x11.1x1.6 in. Weight 1.7Kg
- MS DOS 6.2 & Windows for Workgroups 3.11, Flash BIOS, Laplink remote access, appointments book & calculator
- 3 year HP warranty

600C 4/50 170Mb 4Mb.....	£1628
600C 4/50 260Mb 4Mb.....	£Call
600C 4/75 170Mb 8Mb.....	£1984
600C 4/75 260Mb 8Mb.....	£Call

- Popular Options
- 4Mb module.....£239
 - 8Mb module.....£327
 - NiMH battery.....£58
 - Car adaptor.....£58
 - Port replicator.....£Call
 - Double battery charger.....£30

£1628

HEWLETT-PACKARD



HP Omnibook 4000

Superb new notebooks with built-in multimedia, modularity and docking options

- Intel 486DX2-50 or 486DX4-100
- 8Mb RAM expandable to 32Mb (250Mb 4/50 model has 4Mb)
- Removable 3.5" 1.44Mb floppy drive (can be replaced by second battery)
- 260, 340 or 520Mb removable hard disks
- 1Mb VESA Local Bus graphics
- 10.3" Dual Scan colour or 10.4" TFT colour screens
- 85 Key keyboard & large trackball with wrist rest.
- Parallel, serial, Infra-red IRDA, PS/2 mouse/keyboard, PCMCIA type III (or two type II) and expansion bus for port replicator and docking station
- Multimedia: 16-bit soundcard with two built-in stereo speakers and microphone. Ports for audio in, audio out & microphone jack
- NiMH battery with advanced power management, standby and switcheable battery charger/AC adaptor
- LCD status icons, Flash BIOS, Weight 3.2Kg
- MS DOS 6.2 and Windows for Workgroups 3.11, Laplink remote access, & information manager
- Automatic PCMCIA recognition with hot Insertion
- 3 year HP warranty

Dual Scan Colour Models

4000C 4/50 260Mb.....	£1972
4000C 4/50 340Mb.....	£2160
4000C 4/50 520Mb.....	£2656
4000C 4/100 340Mb.....	£2676
4000C 4/100 520Mb.....	£3304

TFT Colour Models

4000CT 4/50 340Mb.....	£2676
4000CT 4/50 520Mb.....	£2799
4000CT 4/100 340Mb.....	£3324
4000CT 4/100 520Mb.....	£3412

- Options
- Port Replicator.....£177
 - NiMH battery.....£77
 - 4Mb RAM.....£206
 - 8Mb RAM.....£413
 - 16Mb RAM.....£1124
 - Removable hard disks.....£Call

£1972

TWINHEAD



Slimnote

High quality notebooks from one of the world's leading notebook manufacturers

- Intel processors
- 4Mb expandable to 20Mb
- 1.44Mb floppy drive
- 80Mb, 120Mb, 200Mb or 260Mb hard drive
- Various screens
- Serial, parallel, SVGA, mouse, external keyboard ports & expansion bus
- MS DOS 6 & Windows 3.1 & utilities
- Serial mouse (trackball optional)
- Battery charger/AC adaptor
- PCMCIA type II slot and Internal trackball as standard on slimnote II mono
- Slimnote 3 and Slimnote 5 series: Similar specification & same case as HP Omnibook 4000. Please call for details.

Slimnote

486sx-25 80Mb mono.....	£699
486sx-25 120Mb mono.....	£749
486sx-33 120Mb mono.....	£799
486sx-33 200Mb mono.....	£899
486DX2-50 200Mb mono.....	£1099
486DX-33 200Mb TFT colour.....	£1499
486DX2-66 200Mb TFT colour.....	£1699

Slimnote II
With PCMCIA & Internal trackball

486sx-33 260Mb mono.....	£999
486sx-33 200Mb Dual Scan colour.....	£1499
486DX-33 200Mb Dual Scan colour.....	£1699

Slimnote 3 & 5
Please call for pricing

- Options
- 4Mb RAM module.....£229
 - Battery pack.....£69

£699

TWINHEAD



Ultra Notebook 486DX

Small lightweight notebook with Intel 486DX processor, PCMCIA, 120Mb removable hard drive and free external 1.44Mb floppy drive

- Intel 486DX-25 processor
- Low power consumption SL technology
- 4Mb RAM upgradeable to 12Mb
- 3.5" 1.44Mb external floppy drive
- 120Mb removable IDE hard disk
- PCMCIA type II slot
- Built-In Trackball
- Superb 7.2" Crisp VGA mono screen
- Parallel, mouse, serial, ext. keyboard and ext. SVGA ports
- Powered by battery or AC/power adaptor
- Carry case
- Dimensions:10x7x1.6 inches, Weight 3.9lb.
- MS DOS 6 & Microsoft Windows 3.1 pre-loaded
- 12mth warranty extendable to 3 years

- Options
- 4Mb RAM module.....£259
 - Intel PCMCIA modem.....£99
 - Laplink XL & cable.....£39

£699

Intel PCMCIA Modem

High quality Intel PCMCIA type II fax and data modem complete with line adaptor module, 2m line cord, RJ-11 connector excellent software and Intel 3 year warranty

- Modem: 2400 bps, CCITT v.22 bis, v.21; upto 9600 bps with V.42/V.42 bis, MNP 1-5.
- Fax: Upto 9600 bps send/receive, CCITT Group (V.29, V.27ter, V.21); Class 1. Hayes AT Compatible
- Intel card manager software lets you insert and remove your card without leaving your application
- Winfax Lite for Windows lets you send and receive faxes easily
- Hyperaccess comms software for Windows will handle all your communication needs

£99

US ROBOTICS

SPORTSTER RANGE

Sportster 14,400 Fax

Operating at the 14,400 bps standard for business communications, the Sportster 14,400 is 50% faster than the 9600 bps modems and with error control and data compression through-put can easily reach 57,600 bps.



£106
£Call

SPORTSTER 14.4 EXTERNAL

SPORTSTER 14.4 INTERNAL

Sportster 28,800 Fax

The new Sportster 28,800 v.34 fax/data modem operates at the 28,800 bps standard for business communications, this modem is 100% faster than 14,400 bps modems. With error and data compression, throughput can easily reach 115,200bps. External only. Complete with fax and data software.



£239

THE NEW LATEST VERSION

WORLDPORT RANGE

Complete data and fax transmission capabilities for the mobile user. Available as either PCMCIA or portable.

WorldPort Pocket

The WorldPort Dual Standard Cellular Fax is ideal for high volume data transmissions for anyone who regularly needs to transfer data from their portable. Features include fax and data at 14,400 bps. HST Cellular is also included and allows connections over cellular lines at up to 12,000 bps.



£159
£169

WORLDPORT POCKET 2496

WORLDPORT POCKET DUAL STD 14.4

WorldPort PCMCIA

...allows you to send and receive faxes at speeds of upto 14400 bps. Data transmission is supported at 2400 bps giving you the option to access on-line services such as CompuServe. This is available as 2496 (v22 bis) or Dual STD (14.4 v32 bis)



£129
£199

WORLDPORT PCMCIA 2496

WORLDPORT PCMCIA DUAL STD 14.4

COURIER RANGE

The Courier range offers advanced performance for the professional at an affordable price. The Courier Dual Standard is available in both internal and external versions.

Features include data connection speeds of up to 28,800 bps, dial security with passwords provides optimum security for access to sensitive data and HST Cellular allows you to reliably transmit data across cellular lines at up to 12,000 bps.

Also supplied with a 5 year warranty from US Robotics.



£329
£329

COURIER TERBO V34 EXT

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US Robotics

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OPERATING SYSTEMS

Windows 3.1	£Call
Windows 3.1 Upg	£42
Win for Workgroups 3.11	£91
Win for Workgroups 3.11 Upg	£43
WFWG Add-on MLP1	£34
WFWG Add-on MLP20	£690
Windows NT	£265
Windows NT Upg from 3.1	£225
Windows Printing System	£86
Video for Windows	£93
Windows Sound System 2	£48
Win Sound System 2 +Card	£132
MS DOS 6.22	£37
MS DOS 6.2 MLP1	£38
MS DOS 6.2 MLP20	£620

LANGUAGES

MS Basic compiler v7.1 DOS	£203
MS Cobol v5 DOS	£399
MS Delta Ver Cont system	£235
MS Fortran v5.1 DOS/WIN	£123
MS Fortran v5.1 DOS/Win Educ	£56
MS Fortran Powerstation	£234
MS Macro Assembler v6.11	£99
MS Quick Basic DOS	£83
MS Test	£399
MS Visual C++ for Win	£58
MS Visual C++ Pro for Win	£205
MS Visual C++ Pro CD v2	£282
MS Visual Control Pack Win	£79
MS Visual Tools Suite Win	£188
MS Visual Basic Std DOS	£80
MS Visual Basic Pro DOS	£195
MS Visual Basic Std for Win	£80
MS Visual Basic Prof Kit for Win	£195

APPLICATIONS

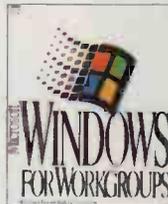
MS Money v3 for Win	£25
MS Publisher for Win	£63
MS Works v3 DOS	£85
MS Works v3 for Win	£84
MS Works v3 for Win Upg	£52
MS Works v3 for Win MLP1	£74
MS Works v3 Win MLP20	£1329
MS Office Assistant	£93
MS Schedule Plus for Win	£89
MS Access v2 Upg	£89
MS Access v2 Comp Upg	£129
MS Access v2 for Win	£221
MS Access v2 MLP1	£199
MS Access v2 MLP20	£3779
MS Excel v5 version Upg	£89
MS Excel v5 Comp Upg	£129
MS Excel v5	£224
MS Excel v5 MLP1	£199
MS Excel v5 MLP20	£3779
MS Foxpro v2.6 for DOS STD	£72
MS Foxpro for DOS Pro	£276
MS Foxpro for WIN STD	£72
MS Foxpro for Win comp Upg	£129
MS Foxpro for Win Pro	£276
MS PowerPoint version Upg	£89
MS PowerPoint comp Upg	£129
MS PowerPoint 4 for Win	£224
MS Project comp Upg	£129
MS Project	£285
MS Word v6 for DOS	£179
MS Word v6 for Win version Upg	£89
MS Word v6 for Win comp Upg	£129
MS Word v6 for Win	£221
MS Office 4.2 Upg	£169
MS Office 4.2 Comp Upg	£269
MS Office 4.2	£337
MS Office 4.2 CD	£337
MS Office 4.2 MLP1	£289
MS Office 4.2 MLP20	£5489
MS Office Pro 4.3 Upg	£269
MS Office Pro 4.3 Upg CD	£269
MS Office Pro 4.3 Comp Upg	£299
MS Office Pro 4.3	£442
MS Office Pro 4.3 CD	£442
MS Office Pro 4.3 MLP1	£359
MS Office Pro 4.3 MLP20	£7139
MS Open Licence Packs	£Call



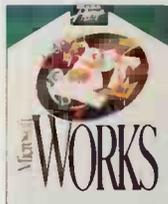
Windows 3.1 - The essential windows operating system £Call



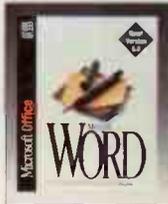
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Windows 3.11 for Workgroups - Upgrade to this faster version for £43



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MS Fine Artist for Win	£27.30
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MS Excel v5 for Win	£129
MS Fortran for Win	£52
MS Foxpro v2.6 for Win	£69
MS Foxpro v2.6 for DOS	£69
MS Mail PC 3.2 Server	£173
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MS Office v4.2 for Win	£173
MS Office v4.2 for Win MLP1	£129
MS Office v4.2 for Win MLP20	£2127
MS Office v4.2 Upg	£98
MS Office Pro v4.3	£218
MS Office Pro v4.3 MLP1	£173
MS Office Pro v4.3 MLP20	£2658
MS Powerpoint v4 for Win	£129
MS Project v4 for Win	£129
MS Publisher v2 for Win	£66
MS Visual Basic v3 for Win	£52
MS Visual Basic v1 for DOS 10PK	£132
MS Visual C++ STD	£52
MS WFWG Add-on	£37
MS Word v6 for Win	£129
MS Word v6 for Win MLP1	£75
MS Word v6 for Win MLP20	£1152
MS Word v6 for DOS	£66
MS Works v3 for Win	£66
MS Works v3 for Win MLP1	£44
MS Works v3 for Win MLP20	£709
MS Works v3 for DOS	£61



Microsoft Office Pro - price for users of Works or included applications £275 Others £325



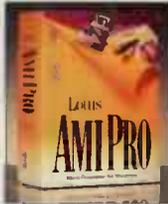
Microsoft Office - price for users of Works or included applications £169 Others £269



Lotus 1-2-3 Spreadsheet. Upgrade for just £89 or buy SmartSuite for just £179!

LOTUS

Lotus 1-2-3 v2.4 for DOS	£235
Lotus 1-2-3 v4 for DOS	£288
Lotus 1-2-3 Rel v5 Upg	£89
Lotus 1-2-3 Win Rel 4.01 cu	£139
Lotus 1-2-3 Rel 5	£236
Ami Pro v2 for Windows	£19
Ami Pro v3.1	£85
Approach v3 for Windows	£83
Freelance v4 for DOS	£270
Freelance v2-Version Upg	£89
Freelance v2-cu Upg	£139
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Lotus Market Power	£295
Organizer v1.1	£84
Organizer v1.0	£39
Lotus Write v2	£49
SmartPics Clipart	£84
SmartSuite Upgrade	£169
SmartSuite Comp upg	£249
SmartSuite bundles from	£179
Lotus Notes	£Call
Lotus cc:Mail Platform Pack	£Call



Lotus Ami Pro v3.1. £85 or buy SmartSuite for just £179!



SmartSuite £169 for Lotus users, £249 for others! Includes 1-2-3, Ami Pro, Approach 3, Freelance & Organizer!

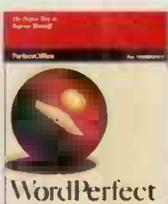
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OFFICE APPLICATIONS

Quattro Pro for Windows v5	£37
Quattro Pro for Windows v6	£Call
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Borland OWin	£75
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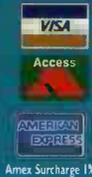
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All prices exclude delivery and VAT (17.5%). Delivery:- Systems £19, Lasers and large items £15, software and small items £10. Visa /Access/ American Express /Switch and Government orders welcome. Prices, specifications and offers are subject to change and subject to our conditions of sale copies of which are available on request. Mail order only. No collections please. Goods are normally despatched within 7 days. All orders will be fulfilled within 28 days unless otherwise specified. E&OE.

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TECHNOMATIC

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THE CHOICE IS SIMPLE : HIGH SPECIFICATION & LOW COST



TRUST PC STANDARD FEATURES

Compare the following before you decide:

- ✓ 420MB ATA-2 Hard Disk Drive
- ✓ 4MB Main RAM (expandable to 64MB)
- ✓ Processor Upgradable Motherboard
- ✓ 128Kb Fast Secondary Cache SRAM
- ✓ 3 x 32bit VLB slots (1 free)
- ✓ Local Bus Multi I/O adapter (32 bit)
 - ◆ Fast IDE (4 device support inc CD-ROM)
 - ◆ 2 Serial, 1 Parallel & 1 Game Ports
- ✓ Local Bus SVGA (32 bit)
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 - ◆ Max Res. 1280x1024
 - ◆ 16.8M colours @ 640x480
- ✓ Mini Tower Case
 - ◆ 2 x 3.5" drive bays
 - ◆ 2 x 5.25" drive bays (free)
- ✓ 200 Watt Power supply (essential for CD-ROM)
- ✓ Trust 14" Colour SVGA Low Rad. Monitor
 - ◆ see below for full spec.
- ✓ 1.44MB Floppy Drive
- ✓ 102 Key Keyboard
- ✓ Trust Mouse
- ✓ MS-DOS 6.2 & MS-Windows for Workgroups
- ✓ 1 year On-site Maintenance (UK mainland)

*Carriage £12 per system

486DX2-66

£799*

486DX2-50

£755*

486SX-25

£689*

Trust
 COMPUTER PRODUCTS

**A POWER
 YOU CAN
 COUNT ON**

TRUST SCANNERS



Common features

- ◆ A4 & US legal scanning size (216mm x 356mm)
- ◆ PC SCSI interface and cable included
- ◆ TWAIN compatible drivers for DOS/Windows
- ◆ 24 bit (16.8M) colour
- ◆ 3.6ms per line speed
- ◆ 8 bit (256) grey scales
- ◆ Wordlinx OCR software

Imagery 2400

- ◆ 2400 dpi output resolution
- ◆ Adobe Photoshop LE software
- ◆ Optional Transparency kit

Transparency Kit for Imagery 2400

£459 (a)

£275 (a)

Imagery 1200

- ◆ 1200 dpi output resolution
- ◆ iPhoto Plus software

£309 (a)

TRUST MONITORS

Trust 14" Colour SVGA Monitor



- ◆ 1024 x 768 non-interlaced res.
- ◆ 31-38/48 kHz Hor. freq.
- ◆ Low Radiation
- ◆ TUV & UL approved
- ◆ 0.28mm dot pitch
- ◆ 50-90 Hz Vert. freq.
- ◆ Power Management

Trust 12" Mono SVGA Monitor

- ◆ 1024 x 768 interlaced res.
- ◆ 50-90 Hz Vert. freq.
- ◆ 31/35.5 kHz Hor. freq.

£79 (a)

TRUST PRINTER AUTOSWITCHES



- ◆ No external power needed
- ◆ 25 way 'D' connectors
- ◆ Manual switching possible

Trust 2 port Autoswitch
 Trust 4 port Autoswitch

£19(c)
£29(c)

Trust
 COMPUTER PRODUCTS

Trust

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Hewlett-Packard

HP SCANJET



3yr OSM
£85

HP SCANJET 3P

- ☆ Monochrome
- ☆ 300 dpi enhanced to 1200dpi
- ☆ Up to 12ppm Scan rate
- ☆ SCSI i/f for speed
- Free software bundle:**
- HP PicturePlace** - image editing s/w
- Calera Wordscan 3.0** - an outstanding OCR package

HP SCANJET 3P £350(a)
A4 Scanner (PC/AT)

Auto Document Feeder £149(a)



£100 INCREDIBLE CASHBACK if bought before 28.2.95

3yr OSM
£135

HP SCANJET IICX

- ☆ Full colour
- ☆ 400 dpi enhanced to 1600dpi
- ☆ HP ColorSmart Support
- ☆ SCSI i/f for speed (PC/AT)
- Free software bundle:**
- HP DeskScan II** - an easy to use customised scanning utility
- Aldus PhotoStyler SE** - a lite version of the leading image editing s/w
- Calera Wordscan 3.0** - an outstanding OCR package

HP SCANJET IICX £689(a)
A4 Scanner (PC/AT)

Auto Document Feeder £349(a)
Transparency Unit £449(a)

HP PLOTTERS



3yr OSM
£300

- No Fuss
- No Mess
- No Pens

**Sharper
Faster
Every time!**

THE BEST IN PROFESSIONAL CAD

HP DESIGNJET 220

- ☆ 600x600dpi Mono
- ☆ Approx 6 mins for A0 plot
- ☆ Tabletop standard, legs option
- ☆ AutoCAD & Windows drivers
- ☆ 2MB RAM Buffer
- ☆ RS232C & Centronics i/f
- ☆ 1yr OSM warranty

HP DESIGNJET 220 A0 £1995
HP DESIGNJET 220 A1 £1530
HP DESIGNJET 650C A0 £4599
HP DESIGNJET 650C A1 £3930

HP DESIGNJET 650C

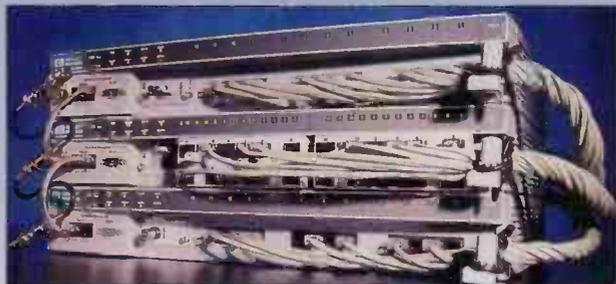
- ☆ 600x600dpi Mono
- ☆ 300x300dpi Colour
- ☆ Autoswitching HRGL/2 & HP-RT
- ☆ AutoCAD & Windows drivers
- ☆ 4MB RAM buffer
- ☆ RS232C & Centronics i/f
- ☆ 1yr OSM warranty

HP DESIGNJET 220 Legs £289(a)
HP DESIGNJET 220 A0 £229(a)
HP DESIGNJET 220 A1 £229(a)

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STACK TO THE FUTURE: ADVANCE STACK

100Mb/s - IEEE 802.12 - 100 VG ANY LAN
IT'S HERE NOW!



HP AdvanceStack 100VG Hub-15 is the first 100VG-AnyLAN multi-port concentrator to be compatible with the proposed IEEE 802.12 standard for 100-Mbit/s networking over fourpair unshielded twisted pair cables, category 3, 4 or 5. The hub incorporates a rich set of features which are normally found only in a modular hub, while retaining the flexibility and economy of a stackable hub.

Call for further information.

HP AdvanceStack 100VG HUB 15 TP,1 AUI £2499(a)
HP AdvanceStack 100VG HUB SNMP-Bridge module £999(a)
HP 10/100VG Selectable ISA Adaptor £249(a)
HP 10/100VG Selectable EISA Adaptor £373(a)

OTHER HP Networking Products

HP LAN Adaptor NC/16 (ISA J2406A) £89(b)
HP Ethertwist Hub/8 (Non Managed) £389(a)
HP Ethertwist Hub Plus/12 (Managed) £899(a)

DATA BACKUP

HP JETSTORE TAPE PRODUCTS

WORLD LEADER IN DAT BACKUP



Conservative estimates state that: "After 1 year of use the data on your hard disk is worth 10 times the computer"

PROTECT YOUR INFORMATION

BACK IT UP

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- ☆ 510Kb/s sustained transfer rate*
- ☆ 8Gb in approx. 2 hours*
- ☆ Find any file in 40 seconds
- ☆ PC kits includes:-

Drive Unit
SCSI Cable

Host Bus Adapter
Cheyenne Arcserve/Arcsolo

HP JetStore 6000* Drive only from £855(a)
HP JetStore 5000 Drive only from £735(a)
HP JetStore 2000 Drive only from £645(a)



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Hewlett-Packard

HP DESKJET 320



3yr
OSM
£39

- ☆ Fully featured 600x300 dpi black text with built-in & Truetype fonts
- ☆ 300x300 dpi colour with optional colour kit
- ☆ Highly portable form with battery option
- ☆ 1 year return to HP warranty

HP DESKJET 320+CSF £189(a)

HP DESKJET 520



3yr
OSM
£39

- ☆ Mono Inkjet printer
- ☆ Whisper quiet, up to 3 pages per minute
- ☆ 600x300dpi text using built-in & TrueType fonts
- ☆ 3 yr RT-HP warranty
- ☆ Apple Mac version available

HP DESKWRITER 520 £208(a)

**HP DESKJET 500C
Colour printer
only £205(a)**

HP DESKJET 560C



3yr
OSM
£64

- ☆ Fully featured 600x300 dpi black text with built-in & Truetype fonts
- ☆ 300x300dpi stunning colour printing
- ☆ 3 yr RT-HP warranty
- ☆ Apple Mac version available

HP DESKWRITER 560C £479a)

HP DESKJET 1200C

This is 7ppm B&W at 600x300dpi or high quality colour at 300x300dpi with HP ColorSmart technology.



3yr
OSM
£98

- ☆ Top of the range colour printer
- ☆ Excellent black text standard
- ☆ Highly expandable with extra memory, PostScript option and networking JetDirect cards
- ☆ 1yr RT-HP warranty

HP DeskJet 1200C £699 £900(a)
HP DeskJet 1200C/PS £1019(a)

HP LASERJET 4L



3yr
OSM
£98

- ☆ 300dpi with HP R.E.t
- ☆ 4ppm, 1Mb RAM
- ☆ PCL5e, Postscript option (M)
- ☆ 1 year return to HP warranty

IDEAL PERSONAL PRINTER

HP LASERJET 4ML £735(a)

HP LASERJET 4P



3yr
OSM
£124

- ☆ 600dpi with HP R.E.t
- ☆ 4ppm, 2Mb RAM
- ☆ PCL5e, Postscript option
- ☆ 1 yr RT-HP warranty
- ☆ Apple Mac version available

HP LASERJET 4MP £880(a)

HP LASERJET 4Plus



3yr
OSM
£155

- ☆ 12ppm @ 600dpi, 2Mb RAM exp to 34Mb
- ☆ HP R.E.t & Microfine toner
- ☆ Economode printing
- ☆ HP MIO slot for simple network connectivity
- ☆ Duplex option 94Q3
- ☆ Award winning printer

HP LASERJET 4MPlus £1260(a)

HP LASERJET 4Si

This is the office standard bearer. Superb 600x600dpi with HP R.E.t. high capacity, very expandable and outstanding reliability.



3yr
OSM
£459

- ☆ Fast 16ppm @ 600dpi & HP RET
- ☆ Host of media handling options
- ☆ Available as a PostScript & network-ready model (MX)
- ☆ 1yr OSM warranty

HP LaserJet 4Si £2055(2a)
HP LaserJet 4SiMX £2929(2a)

HP LASERJET 4V

This is the ultimate A3 printer with HP R.E.t, 600x600dpi resolution to artwork quality output.



3yr
OSM
£219

- ☆ A3, A4, A5, A6 & envelopes
- ☆ Fast 16ppm A4 & 8ppm A3
- ☆ 120 levels of grey at 106 lines per inch
- ☆ PostScript & Apple Mac versions available
- ☆ 1yr RT-HP warranty

HP LaserJet 4V (PC) £1370(2a)
HP LaserJet 4MV (PC/Mac) £1989(2a)

HP SUPPORTPACK



3

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MAINTENANCE
(OSM)
BY
HP

- ☆ Engineer will come to you for greater convenience and faster response
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- ☆ Direct support from HP Engineers
- ☆ Available for HP Peripherals, PCs, Fileservers and for some IBM & Compaq

From as little as £39 for HP DeskJet 520

NETWORKING PRINTING



- ☆ Multi-protocol network interface for parallel-based printers
- ☆ Support for up to 8 Novell Network file servers & 32 print queues
- ☆ Software configuration & monitoring
- ☆ Easy installation, fast performance

HP JETDIRECT EX £249(a)

HP JET Direct EX Cards
Connects to any parallel port device

Ethernet	£249(b)
Token Ring	£459(b)

HP Multi Protocol Cards LJ IIIiS, 4Si/4SiMX, 4, 4M, 4+, 4M+, PJXL300, DJI200C/I200PS, DesignJet 600(I), DesignJet 650C

Ethernet/Local Talk	£289(b)
Token Ring	£429(b)

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COLOUR LASERJET
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HP ACCESSORIES

THE ORIGINAL PARTS

HP LaserJet 4/4Plus Toner	£67(a)
HP LaserJet 4L/4P Toner	£44(a)
HP DeskJet Black Cartridge	£16(a)
HP DeskJet Colour Cartridge	£19(a)
HP Adobe PostScript Level 2 from	£179(a)
HP Duplex Unit (for HP LaserJet 4Plus)	£345(a)

This requires extra memory. See main listings for memory



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Hewlett-Packard

HP VECTRA VL2

This is the best-selling range of desktop PCs from Hewlett-Packard. It is the most affordable premium brand offering unrivalled value without cutting corners. Every machine carries a 3 year warranty with the first year having on-site maintenance by HP engineers. This warranty will also cover 14" or 15" HP monitors (optional) purchased with the computer.

The Economy range offers entry-level computing whilst the Standard range offers higher specification computing and greater upgradability.

Both ranges come pre-loaded with MS Windows for WorkGroups 3.11 giving easier and cheaper networking options for the small office or department. A range of high quality, flicker-free monitors are available to provide the ideal match for your requirements. All computers are EPA Energy Star compliant.



MONITORS

HP 14" VGA mono	£149(a)
HP 14" SVGA colour	£195(a)
HP 14" Ergo SVGA colour	£235(a)
HP 14" SVGA ES colour	£220(a)
HP 15" Ergo Ultra SVGA col	£355(a)
HP 17" Ergo UVGA col	£710(a)

ECONOMY RANGE

VL2 4/25e	4/170/DWWW	£569(a)
VL2 4/25e	4/210/DWWW	£625(a)
VL2 4/33se	4/210/DWWW	£645(a)
VL2 4/50se	4/210/DWWW	£693(a)
VL2 4/50se	4/340/DWWW	£735(a)
VL2 4/50e	4/210/DWWW	£739(a)
VL2 4/50e	4/340/DWWW	£789(a)
VL2 4/66e	4/210/DWWW	£789(a)
VL2 4/66e	4/340/DWWW	£839(a)

STANDARD RANGE

VL2 4/33s	8/270/DWWW	£799(a)
VL2 4/33s	8/540/DWWW	£885(a)
VL2 4/50	8/270/DWWW	£899(a)
VL2 4/50	8/540/DWWW	£970(a)
VL2 4/66	8/270/DWWW	£969(a)
VL2 4/66	8/540/DWWW	£1030(a)
VL2 4/100	8/270/DWWW	£1099(a)
VL2 4/100	8/540/DWWW	£1169(a)
VL2 P60	8/340/DWWW	£1389(a)
VL2 P60	8/540/DWWW	£1439(a)

MULTIMEDIA



A truly integrated multimedia PC designed with attention to detail such as in-built speaker, front panel volume control, microphone and headphone sockets. A choice of computing bases allow a range of price points but all incorporate MPC-2 compatible, industry standard 16 bit sound capability. The CD-ROM drive is a high quality NEC drive featuring double speed data transfer and access to Kodak Photo-CD high quality images. Kodak Photo-CD Access s/w opt. Monitor is optional

- ☆ Intel 486 CPUs
- ☆ Integrated Design
- ☆ Dual speed CD-ROM
- ☆ 16 bit DSP standard
- ☆ Microsoft s/w ☆ Voyetra s/w

VL2 4/50Se	4/210Mb/DWMM - CD/AUDIO	£965(a)
VL2 4/66	8/340Mb/DWMM - CD/AUDIO	£1260(a)
VL2 4/100	8/540Mb/DWMM - CD/AUDIO	£1449(a)
M2: 4/66e	8/540Mb/DWMM/NW - 10BASE-T	£1375(a)

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NETWORKING PCS

- ☆ Slimline case (N2i)
- ☆ Intel 486 32 bit CPUs
- ☆ Fast Local Bus IDE
- ☆ 10Base-T (TP) interface
- ☆ Local Bus UVGA
- ☆ MS-DOS & Windows
- ☆ Monitor is optional and for WorkGroups may be chosen from above

BENEFITS OF THE HP NETWORK-READY PCs

- ☆ No card installation & configuration = major time & cost saving
- ☆ Integrated n/w iff can be viewed & configured via BIOS = Time saving
- ☆ Covered by system warranty = Maintenance saving



HP Vectra N2i	4/25s	4/170/DWWW/NW	£870(a)
HP Vectra N2i	4/33s	8/210/DWWW/NW	£939(a)
HP Vectra N2i	4/50	8/210/DWWW/NW	£945(a)
HP Vectra M2i	4/50	8/210/DWWW/NW	£980(a)
HP Vectra M2i	4/66	8/540/DWWW/NW	£1120(a)

HP NOTEBOOKS

NEW

HP Omnibook 600

The industry's lightest colour notebook at only 3.8 pounds! DX2/50, DSTN display, 170MB HDD, 4MB RAM **from £1795**

HP Omnibook 4000

Advanced colour notebook. DX2/50, DSTN display, 260MB HDD, 4MB RAM **from £2175**

NETSERVERS

HP Servers feature built-in Automatic Server Restart capability, without administrator intervention, in the event of a hang. Further availability features include a temperature monitor which can warn of potential system overheat.

Control is available via the HP Netserver Assistant 2.1 software which provides a proactive system alerting and resolution. To aid in problem resolution every server is supplied with HP Support Assistant - a mine of technical information.



HP NETSERVER LC

- ☆ File/Print Applications
- ☆ Intel 486DX2 & Pentium® CPUs
- ☆ Fast SCSI-2, PCI, EISA
- ☆ 4 bay deskside case
- ☆ 3 year OSM by HP

HP NETSERVER LF

- ☆ Client/Server Applications
- ☆ Intel 486DX2 & Pentium® CPUs
- ☆ PCI, EISA & SCSI-2
- ☆ Drive array options
- ☆ 3 year OSM by HP

HP NETSERVER LM

- ☆ Scaleable Client/Server
 - ☆ Intel 486DX2 & Pentium® CPUs
 - ☆ EISA, Fast SCSI-2, & IDE
 - ☆ ECC Ram, Hot-Swap array options
 - ☆ 3 year OSM by HP
- Pentium is a trademark of Intel Corp

STANDARD SERVERS

HP Netserver	4/66LC-540	8/540/-	£1675
HP Netserver	4/100LC-1050	8/1Gb/-	£2215
HP Netserver	4/100LF-1050	8/1Gb/CD	£2780
HP Netserver	5/66LF-1050	16/1Gb/CD	£3155
HP Netserver	5/66LM-1050	16/1Gb/CD	£4215
HP Netserver	5/100LM-1	16/None/-	£4899

ARRAY SERVERS

HP Netserver	4/66LF-1 Array	8/Chassis/CD	£2990
HP Netserver	4/100LF-1 Array	8/Chassis/CD	£3320
HP Netserver	4/66LM-2000	16/2*1'Gb/CD	£6199
HP Netserver	5/60LM-2000	16/2*1'Gb/CD	£6099
HP Netserver	5/66LM-1 Array	16/Chassis/CD	£4999
HP Netserver	5/66LM2-1	16/None/-	£5799

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Simply purchase any one of:-
 a) HP Printer (excluding HP Deskjets), Plotter or Scanner and its HP SupportPack
 b) A complete Compaq, IBM or HP Computer System
 c) Over £500 (excl. carriage & VAT) of Software or Network Products or Multimedia Products or Storage Products or Modems

You must request your complimentary award with your order. Offer subject to availability. Its usage is governed by conditions as stated on the award. Conditions include paying for breakfast and dinner at the hotel, and some hotels list periods when reservations are not accepted. Only one award per order available whilst stocks last.



Access



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CORPORATE PCs

The new IBM Personal Computers ally the best technology with great attention to usability and keen pricing. The result is one of the best PC launches ever.

IBM PC 300 FAMILY

- The entry level corporate desktop PC.
- ☆ Desktop cases with lockable sliding cover
 - ☆ Selectabus ISA/VEESA or ISA/PCI
 - ☆ Intel 486 or Pentium CPUs
 - ☆ 4MB/8MB RAM (max 128MB)
 - ☆ Plug & Play capable
 - ☆ Local Bus Graphics
 - ☆ LogicLock Security
 - ☆ PCMCIA capability
 - ☆ Easytools software

IBM PC 700 FAMILY

- The performance corporate desktop PC.
- ☆ Desktop cases with lockable sliding cover
 - ☆ Selectabus ISA/PCI or ISA/MCA
 - ☆ Intel Pentium CPUs
 - ☆ 8MB RAM (max 192MB)
 - ☆ Plug & Play capable
 - ☆ Local Bus 64 bit Graphics
 - ☆ Security C2
 - ☆ PCMCIA capability
 - ☆ Easytools software

PC330	4/33SX	4/270W	£694(a)
PC330	4/50DX2	8/270W	£999(a)
PC330	4/66DX2	8/270W	£1085(a)
PC350	4/66DX2	8/364W	£1205(a)
PC350	4/100DX4	8/364W	£1440(a)

Monitors are not included



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PC SERVER

- ☆ 9 drive bays
- ☆ 5 EISA/ISA & 3 PCI slots
- ☆ Intel 486DX2-66 or Pentium-60 CPU
- ☆ 8/16MB RAM exp. 128/192 MB
- ☆ Choice of hard disks
- ☆ Choice of IDE-2 or SCSI-2
- ☆ 300 watt PSU
- ☆ 3 year warranty

4/66-1	8MB, None	£1599(a)
4/66-728	8MB, 728MB HD	£2045(a)
4/66-1000	16MB, 1GB HD	£2645(a)

FILESERVERS

PROSIGNIA VS

The all new Compaq server - again defining a new price point. The entry level server at a workstation price. Ideal for file or print applications and for small workgroups. EISA, SCSI, integrated network interface and other server class features.

4/33-535Mb HD, 8Mb RAM	£1695(a)
4/33-1Gb HD, 16Mb RAM	£2235(a)
4/66-535Mb HD, 16Mb RAM	£2165(a)
4/66-1Gb HD, 16Mb RAM	£2375(a)

PROLIANT

The top end server. Outstanding performance, reliability and upgrade options. Ideal for heavy duty workloads or business critical applications. MP options, RAID support, CD-ROM with NOS supplied on CD. Hot pluggable drive bays, high performance Netflex 2 network card and 16Mb RAM standard.

4/66-1Gb, 16Mb RAM, Single CPU	£3739(a)
5/60-1Gb, 16Mb RAM, Single CPU	£4239(a)

COMPAQ WARRANTY

Please note that the on-site maintenance warranty service for Compaq products is through Compaq appointed Service Providers. This on-site maintenance service is also intended to address 'DOA' situations. Compaq notebooks do not carry an on-site warranty. Technomatic provide a 12 month RTB warranty as standard and can supply a 3yr on-site maintenance enhancement on certain products. Please call for details.

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As seen on TV

The Aptiva - a modern, state-of-the-art range of computers designed for you, designed to perform, designed to be the best value package from IBM. Each Aptiva has class leading software - from PC

DOS v6.3, MS Windows v3.1 and MS Works to IBM's Learning Library, Personal Desktop, Custom Tools & First Steps. Every Aptiva comes with free membership of Helpware with access to the best 24 hour, 365 day telephone helpline.

- ☆ Includes 14" SVGA display
- ☆ 32 bit 486 Intel CPUs
- ☆ Local Bus Video
- ☆ Local Bus Hard Disk
- ☆ DOS, Windows & Works
- ☆ 4MB or 8MB RAM
- ☆ 170MB/270MB/420MB HD
- ☆ Rapid Resume & Scheduler s/w
- ☆ Multimedia models

Aptiva 2144/754 Starter/Level B	486sx/33mhz, 4mb Ram	270mb HD Desktop	£770(2a)
Aptiva 2144/853 Starter/Multimedia A	486sx/33mhz, 4mb Ram	270mb HD Desktop	£999(2a)
Aptiva 2144/766 Standard/Level B	496sx/250mhz, 4mb Ram	270mb HD Desktop	£915(2a)
Aptiva 2144/887 Standard/Multimedia B	486dx/266mhz, 4mb Ram	420mb HD Desktop	£1299(2a)
Aptiva 2144/789 Advanced/Level A	486dx/266mhz, 8mb Ram	420mb HD Tower	£1199(2a)

DESKTOPS

ENHANCED PROLINEA

The new entry level standard. 8Mb. Faster CPUs, faster graphics, & faster memory access, faster parallel port.

4/50-200/w	£1029(a)
4/50-340/w	£1109(a)
4/66-340/w	£1160(a)
4/100-340/w	£1339(a)



DESKPRO XE

High performance office desktop computer with enhanced business audio, Qvision graphics on LB. All systems with MS Dos v6.0, MS Windows v3.1 & mouse. 8Mb Ram std except 4/33s with 4Mb.

4/33s-170/w	£815(a)	4/66-270/w	£1229(a)
4/50-170/w	£1130(a)	5/60-270/w	£1459(a)
4/50-340/w	£1229(a)	5/60-525/w	£1575(a)



DESKPRO XL

The most powerful Compaq desktop, optimised for the pressured office environment. Enhanced business audio support, very fast graphics and highly expandable.

4/50-M270/w	8Mb RAM, QVision 1280/P + 1Mb VRAM	£1449(a)
4/66-M270/w	8Mb RAM, QVision 1280/P + 1Mb VRAM	£1579(a)
5/60-M270/w	8Mb RAM, QVision 2000/P + 2Mb VRAM	£1899(a)
5/66-M535cds	16Mb RAM, QVision 2000/P, CD-ROM	£2669(a)

*Monitors are optional with all computers

THINKPADS



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ThinkPad 340

• Lightweight <5lbs • Large 9.5" mono screen • IBM 486SLC2-50 CPU • 4Mb RAM, 125Mb HD • PCMCIA II slot • Trackpoint II cursor control, 1.44Mb 3.5" FDD • DOS & Windows • Very strong carbon fibre case.

ThinkPad 360

Intel 486SX-33 (SL) • 170Mb or 340Mb HD • LB Video & external port • 9.5" Mono STN Screen or • 9.5" Dual-Scan Colour or • 8.4" TFT Colour Screen • PCMCIA II • 4 1/2 hr battery life • 5 1/2 lb weight • Very strong carbon fibre case • OS/2 2.1 preload available

ThinkPad 755

Intel 486DX4-75 • 170, 340, 540 or 810Mb HD • LB Video & external port • 9.5" Dual-Scan Colour or • 10.4" TFT Screen • PCMCIA II • 3hr battery life • 16 bit sound system with speaker and microphone • Very strong carbon fibre case

	CPU	Screen	RAM	HD	
ThinkPad 340	486SLC2-50	Mono	4	125	£919(a)
ThinkPad 360	4/33s	Mono	4	340	£1555(a)
ThinkPad 360	4/33s	Col(STN)	4	340	£1935(a)
ThinkPad 360	4/33s	Col(TFT)	4	170	£1959(a)
ThinkPad 755	4/75	STN	4	340	£3235(2a)
ThinkPad 755	4/75	STN	4	540	£3530(2a)
ThinkPad 755	4/75	TFT	4	170	£3739(2a)
ThinkPad 755	4/75	TFT	4	540	£4160(2a)
ThinkPad 755CD	4/100 NEW	TFT	8	810	£5799(2a)

COMPAQ

NOTEBOOKS



CONTURA AERO

Outstanding new portable in a subnotebook form. Weighs only 3.5lbs, built in trackball, 4Mb RAM, MSDOS 6 & MS Windows v3.1 and a 4 hour Duracell

battery. The Aero is shipped with MS-DOS, MS Windows, Tabworks & Compaq Learning Centre. External FDD included.

4/25-170 + FDD	£879(a)
4/33c-170 + FDD	£1209(a)
4/33c-250 + FDD	£1399(a)



CONTURA 400

The new Contura 400 replaces the original Contura. It adds a host of new features such as larger hard disks, PCMCIA, integrated trackball, faster CPUs (486DX2-40) in a lighter package

at a lower price.	
Contura 400	4/40-170 £1315(a)
Contura 400C	4/40-250 £1749(a)
Contura 400CX	4/40-250 £2299(a)



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4/40c-170/w Dual Scan Col	£2375(a)*
4/40cx-170/w TFT Col	£2815(a)*
4/50c-250/w TFT Mono	£2285(a)
4/50cx-340/w TFT Col	£3689(a)
4/75cx-340/w TFT Col	£3999(a)
4/75cx-510/w TFT Col	£4399(a)

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 - ◆ 0.28mm Dot Pitch
- £291**

ERGOVISION



- ◆ 17" FST Multiscanning Colour Monitor
 - ◆ Up to 1280 x 1024 Non-interlaced Resolution
 - ◆ 0.28mm Dot Pitch
- £532**

ERGOVISION



- ◆ 17" FST Multiscanning Colour Monitor
 - ◆ Up to 1600 x 1200 Non-interlaced Resolution
 - ◆ 0.26mm Dot Pitch
- £634**

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- ◆ Super Fast 64 Bit Windows Accelerator
 - ◆ Powered by ATi Mach 64 Processor
 - ◆ VESA DPMS Compatible
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- ◆ Flicker Free Operation
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- ◆ VESA DPMS Compatible

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- ◆ Allows printing and networking together

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- ◆ Power from mains or PS/2 mouse port
- ◆ Supports switchless hardware configuration
- ◆ Drivers for: ODI for Netware, NDIS 2.0 & 3.0 for Lan Manager & WFVG, Packet for TCP/IP
- ◆ Diagnostic using s/w & LED
- ◆ Power cable & mains PSU included

ETHERNET COMBO ADAPTER

GE2000D

£32 (b)



20-pack **£589(a)**

- ◆ Fully Novell NE2000 compatible
- ◆ Drivers for: IPX & ODI for Netware Windows for Workgroups NDIS for Lan Manager Packet for TCP/IP
- ◆ BNC & RJ45 connectors
- ◆ Jumper & Jumperless
- ◆ Auto-Setup hardware using software
- ◆ Auto-Detect media type
- ◆ Auto-Detect 8 bit or 16 bit Bus
- ◆ Includes diagnostic software
- ◆ Up to 35% performance improvement

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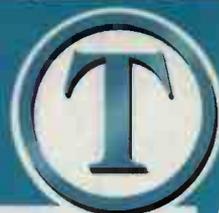
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US Robotics

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US Robotics
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- ☆ 2400bps, 1200bps, 300bps, 1200/75bps
- ☆ MNP 5 Data Compression
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- ☆ Telemate Shareware Comms s/w
- ☆ Auto Speed Detect & Select
- ☆ 5 Year Manufacturers Warranty
- ☆ Fully BABT Approved
- ☆ Ideal for low volume comms user

ONLY £35 (a)
PC/AT modem cable with WS3000 £8
LIMITED STOCKS HURRY HURRY HURRY!

NEW Sportster®

28.8 + FAX EXTERNAL

£193



**USR SPORTSTER
THE BEST SELLING MODEM
IN THE WORLD**

- SPORTSTER 14.4 + Fax Ext £126(a)
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- SPORTSTER 2400 + Fax Ext £79(a)
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- PC/AT Modem Cable 9/25 £9(c)

**NEW WORLDPORT
WITH CELLULAR
£167 (a)**

NEW

WORLDPORT

**NOW PCMCIA
DUAL STANDARD
CELLULAR**

Courier V.34

**SPECIAL
COMMS
BUNDLE**

**FROM
£249**

- WORLDPORT RANGE**
- HST Dual Standard
 - Cellular Pocket £167(a)
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 - 2496 + Fax PCMCIA £130(a)

MODEL	SPEED							ERROR CORR.	DATA COMP.	FAX	ASYNCHRONOUS	DIAL UP	LEASE LINE	DESKTOP (EXT)	PC CARD (INT)	POCKET	PCMCIA
	UPGRADABLE TO V34	28800 (V34)	19200 (V32 terpo)	14400 (V32bis)	9600 (V32)	2400 (V22bis)	1200 (V22)											1200/75 (V23)	300 (V21)	V42	MNP 2-4	V42bis	MNP 5	9600	14400 (V17)
SPORTSTER 28.8 + FAX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SPORTSTER 14.4 + FAX			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SPORTSTER 2400 + FAX					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COURIER V34	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WORLDPORT HST DUAL STD CELLULAR			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WORLDPORT PCMCIA 2496 + FAX					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

- COURIER V34 + Fax External Comms Bundle £279(a)
- with FREE High speed Serial Port
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- FREE Quicklink Gold upgrade
- COURIER V34 + Fax External Modem only £249(a)
- COURIER V34 Ready + Fax Internal £265(a)

USR HIGH SPEED DUAL SERIAL PORT
Essential for all windows users **£59 (a)**
faster than 9,600. 2 yr warranty

APPROVED for Connection to telecommunication systems specified in the instruction for use subject to the Conditions set out in them.

5 YEAR WARRANTY
FREE DIRECT TECHNICAL SUPPORT

US Robotics®
The Intelligent Choice in Data Communications



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At Last... A Multi-Tech Modem For The Home Office And Small Business.

NEW 28,800bps (V34)



DX

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**INCLUDES
MULTIEXPRESS
FAX SOFTWARE
FOR WINDOWS**



Announcing the amazing value packed Multimodem 2834ZDX from Multi-Tech Systems.

Superior Performance. With blazing V34 data rates up to 28,800bps and fax speeds of 14,400bps, and with V42bis data compression data transfer rates of up to 115,200bps are achievable. Multi-Tech also gives you full backward compatibility to all ITU standards including V32bis (14,400bps) and the V32 turbo (19,200bps) standard.

Fully Featured. 10 LED indicators to monitor every aspect of your connection. Plus help screens, non-volatile memory and windows communications and fax software you need.

Unmatched Warranty. A 10-year warranty direct from Multi-Tech eliminates worry and makes the MultiModemZDX ideal for the home or small business.

BABT Approved - And it's a Multi-Tech!



TECHNO VALUE

ZDX 2834 NEW £219(a)
ZDX 1932 NEW £119(a)

MULTI-TECH HIGH SPEED

SERIAL PORT £75(b)

PC/AT MODEM CABLE 9/25 £9

FOR THE PROFESSIONAL COMMS USERS

MT2834 BLK DESKTOP NEW £395(a)

MT1432 BLK DESKTOP £325(a)

MT1432 MK POCKET £345(a)

MT1432 LTI PCMCIA £209(a)



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Systems

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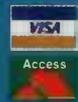
COMPUSERVE CVI27/C13
INFORMATION
MANAGER
WINDOWS S/W £19 (b)



8

Postage & Packing for UK mainland: (a) £8 (b) £6 (c) £3 (+VAT) All prices exclude carriage & VAT. All prices & specifications subject to change without notice. Our standard terms and conditions of sale apply to all sales (available on request). Returned goods may be liable to a restocking charge.

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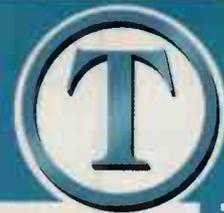
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NEC



NEC



**FREE
ENCARTA 95
WITH 3xi**

**INCREDIBLE NEC
SUPERSCRIPT PRINTERS**

**AMAZING NEC MULTISPIN
4X CD-ROM**

- GDI Technology
- High (660) Medium (610+) Resolutions
- Amazing Prices for Laser Printers
- Ideal for Windows users

- Quad Speed 600 KB/s
- 220ms Average Access
- Full Function Control Panel with LCD

NEC SuperScript 610 plus	£299(a)
NEC SuperScript 660	£429(a)
NEC SuperScript Colour 3000	£649(a)

NEC 4Xi Int CD-ROM Drive	£262
NEC 4Xe Ext CD-ROM Drive	£373
NEC 3Xi with FREE Microsoft Encarta 95 CD-ROM	£220
NEC 3Xe External CD-ROM Drive	£306

EPSON
training

FREE



SCANNER TRAINING

FREE scanner training from Epson UK with every PC-based Epson scanner bundle purchased from January - March 1995

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PRICES ON
EPSON
RANGE

Claims for free training should be made before 7 April 1995

EPSON

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NEW LOW PRICES

**FREE
MODEM CABLE**



Accura 288 + Fax	£199(a)
- up to 28,800 bps (V.FC) upgradable to V34	
Accura 144 + Fax	£149(a)
- up to 14,400 bps (V32 bis)	

Common Features

- Full error correction & data compression
- Up to 14,400 (V17) fax incl. Group 3 fax
- FREE Hayes Smartcom data & fax Windows S/W
- AutoFaxDetect between fax & data calls

**ALSO NEW LOW PRICES ON
OPTIMA MODELS - CALL NOW!**

EPSON / Hayes



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Printers

LASER PRINTERS (a)

HEWLETT-PACKARD	SPEED/RES	RAM/FONTS	LANG.	I/F	1 Year RMP	3 Year OSM	Size	Speed	Res (Dpi)	RAM	Lang	I/F	Price
HP LaserJet 4L	4ppm/300dpi	1Mb/265	PCL5e	BiPar	£390	£488							
HP LaserJet 4ML	4ppm/300dpi	4Mb/805	PCL5e	BiPar/Mac	£735	£833							
HP LaserJet 4P	4ppm/600dpi	2Mb/455	PCL5e	Par/Ser	£597	£721							
HP LaserJet 4MP	4ppm/600dpi	6Mb/805	PCL5e	Par/Ser	£880	£1004							
HP LaserJet 4 Plus	12ppm/600dpi	2Mb/455	PCL5e	BiPar/Ser	£945	£1100							
HP LaserJet 4M Plus	12ppm/600dpi	6Mb/805	PCL5e	BiPar/Mac/Ethernet	£1260	£1415							
HP LaserJet 4V A3	16ppm/600dpi	4Mb/455	PCL5e	BiPar/Ser	£1370	£1589							
HP LaserJet 4MV A3	16ppm/600dpi	12Mb/805	PCL5e	BiPar/Mac/Ethernet	£1989	£2208							
HP LaserJet 4Si	1yr OSM 16ppm/600dpi	2Mb/455	PCL5e	BiPar	£2055(2xa)	£2514(2xa)							
HP LaserJet 4Si MX	1yr OSM 16ppm/600dpi	10Mb/805	PCL5e	BiPar/Mac/Ethernet	£2929(2xa)	£3388(2xa)							
NEC 1 year OSM SuperScript 610+ New	A4 6ppm	300x300					A4	6ppm	300x300	256kb	G	B	£299
SuperScript 660 New	A4 6ppm	1200x600					A4	6ppm	1200x600	256kb	G	B	£429
SuperScript Color 3000	A4 1ppm	300x300					A4	1ppm	300x300		G	B	£649
EPSON 1 year OSM EPL3000 New	A4 4ppm	300					A4	4ppm	300	1Mb	5e	B	£390
EPL5200	A4 6ppm	300					A4	6ppm	300	1Mb	P5	PS	£465
EPL5600	A4 6ppm	600					A4	6ppm	600	2Mb	5e	B,S	£609
EPL9000 New	A3 8ppm	600					A3	8ppm	600	2Mb	5e	B,S	£1729
EPL9000PS New	A3 8ppm	600					A3	8ppm	600	6Mb	5e,PS	B,S,A	£2179
PANASONIC KXP4400 1yr OSM	A4 4ppm	300					A4	4ppm	300	512Kb	P4	P	£289
KXP4401 1yr OSM	A4 4ppm	300					A4	4ppm	300	512Kb	P5	P	£359
KXP4430 2yr OSM	A4 5ppm	300					A4	5ppm	300	1Mb	P5	PS	£485
KXP4440 2yr OSM	A4 10ppm	300					A4	10ppm	300	1Mb	P4	PS	£739
KXP5400 1yr OSM	A4 4ppm	300					A4	4ppm	300	2Mb	P4,2S	PA	£545

I/F: P=Parallel, B=Bi-directional Parallel, S=Serial, A=Appletalk
Lang: G=GDI (Windows), P4=HP PCL4, P5=HP PCL5e, PS=PostScript, S2=PostScript Level 2

COMPATIBLE LASER RAM UPGRADES (b) Please phone for latest prices

FOR HEWLETT-PACKARD					FOR EPSON				FOR PANASONIC				
4(+M,M+,P,V,5i)	II	III,III,III	4L	XL300	4000,4100	5000,5200	EPL8000	ActionLaser+	4410,4430	4420,4450i	4440	4400	4500
1Mb	£45	£65	£59	£65	£62	£55	£62	£60	£89	£69	£72	£65	-
2Mb	£85	£95	£89	£185	£109	£89	£109	£89	£129	£109	£109	£95	£95
3Mb	-	-	-	-	£159	-	£159	-	-	-	-	-	-
4Mb	£129	£159	£155	£225	£199	£185	£199	£159	£199	£179	£193	£175	-
8Mb	£255	-	-	£355	-	-	-	-	-	-	-	-	-

All prices include expansion card where needed (Please see our memory page for more memories)

TONER CARTRIDGES (b)

HEWLETT-PACKARD LaserJet III/III+/III	£46	4410/4430 Developer	£90
LaserJet III/III+/III	£47	4420 Drum	£26
LaserJet III/III+/III	£67	4420 Developer	£57
LaserJet 4V/4VM	£115	4400/5400 Drum	£55
LaserJet III/III+/III	£77	NEC	
LaserJet 4L/4L4P/4MP	£44	560/60P/62P/102/102P	£109
EPSON		610	£79
EPL 7100/7500/8100	£119	LEXMARK	
EPL 4000/4100/4300	£64	4039 Toner	£165
EPL 5000/5200	£85	4029 Toner	£162
EPL 5600	£110	CANON	
PANASONIC		LBP 4	£49
4410/4430	£28	LBP B MKI/III	£54
4410/4430 Drum	£95		

INKJET PRINTERS (a)

Colour Inkjet printers	Price	Cartridges
Canon BJC4000 (A4)	£295	Blk/Colour
Canon BJC600* (A4)	£329	£6 £7
Canon BJC800 (A3)	£1070	£14 £18
Epson Stylus Colour (A4)	£332	£14 £29
HP Deskjet 320** NEW (A4 Port)	£170	£13 -
HP DJ320 + CSF NEW (A4 Port)	£189	£13 -
HP DESKJET 500C (A4)	£205	£16 £19
HP Deskjet 560C (A4)	£332	£16 £19
HP Deskjet 1200C (A4)	£699	£19 £22
HP Deskjet 1200C/PS (A4)	£1019	£19 £22
HP Paintjet XL300 (A3)	£1599	£15 £17
Black Inkjet printers		
Canon BJ10SX (A4 Port)	£140	£14.50 -
Canon BJ200 (A4)	£185	£16 -
Canon BJ230 (A3)	£245	£16 -
Canon BJ300 (A4)	£325	£11 -
Canon BJ330 TF (A3 Port)	£385	£11 -
Epson Stylus 400 (A4)	£135	£8.50 -
Epson Stylus 800+ (A4)	£174	£8.50 -
Epson Stylus 1000 (A3)	£315	-
HP Deskjet 520 (A4)	£199	£16 -

**Requires optional colour kit

CANON SHEET FEEDERS

BJ10	£43	
BJ300 1st	£87	2nd £65
BJ330 1st	£90	2nd £65

BJC600
FREE CARTRIDGES!
While stocks last

NEW HEWLETT-PACKARD COLOUR LASERJET

CALL FOR DETAILS & AVAILABILITY

DOT MATRIX PRINTERS

EPSON

Model	PIN	Col	Price	Blk Rib	Model	PIN	Col	Price	Blk Rib
FX870	9	80	£229	£4.50	LQ570+	24	80	£192	£5
FX1170	9	136	£289	£6	LQ870	24	80	£355	£5
LX300	9	80	£95	£4.50	LQ1070+	24	136	£285	£7
LX1050	9	136	£179	£9	LQ1170	24	136	£405	£7
LQ100	24	80	£105	£5	DFX5000+	9	136	£1119	£22.50
LQ150 Col	24	80	£165	£5.50	SQ870 Inkjet	80		£425	
					SQ1170 Inkjet	136		£569	

PRINTER MEDIA (c)

HP LX JET Series Trans A4 50 shts	£33	CANON BJ800C A4 Paper	£21
LX JET Series Glossy A4 50 shts	£36	BJ800C A3 Paper	£36
CX JET Series Coated A4 200 shts	£15	BJ800C Transparency CF101	£35
CX JET Series Coated A3 200 shts	£31	BJ600C Transparency CF102	£35
LJ Transparencies A4 50 shts	£14	FARGO PRIMERA Thermal Paper	
HP Labels various sizes	POA	Std A4 500 sheets	£18
EPSON STYLUS COLOUR COATED PAPER		Premium A4 500 sheets	£19
360 dpi A4 200 shts	£18	Special Long A4	£19
720 dpi A4 200 shts	£20	Transparency A4 50 sheets	£34
Transparencies A4	£49	A4 T-Shirt Transfer	£18

COLOUR THERMAL

FARGO Primera PRO £1259(a)

♦ High resolution thermal transfer & dye sublimation printing

FARGO Primera £569(a) Carts: Blk £33, Col £35

STAR SJ144 £189(a) Carts: Blk £17, Col £18

♦ Up to 360 and 1.4ppm in colour

NEC SuperScript Color 3000 New! £689(a)

Suitable for all multimedia applications with up to 16.7 million colours. High quality and high performance, with ability to use plain paper.

NEW QMS THERMAL PRINTERS MAGIC COLOUR CALL FOR DETAILS

PRINTER CABLES (c)

Length	25M/36M	36M/36M	25M/25M
1.8m	£4	£6	£4
3m	£6	£8	£6
5m	£7	£10	£7
10m	£15	£17	£18

25M/36M is standard PC parallel cable 25/25 & 36/36 are for use with printer switches

PAPER HANDLING

EIT LASER TOWER for LJ/4+

The Laser Tower System positions the printer on top of a stack of paper feeding cassettes. Each cassette will take a whole ream of paper - 500 sheets and the user can opt for selective feeding of different paper types.

3 paper cassettes laser tower £1999

6 paper cassettes laser tower £3349

PLOTTERS AND DIGITISING TABLETS

HP PLOTTERS



Size	A1	A0
Designjet 220 Black	C3187A £1530*	C3188A £1995*
Designjet 600 Black	C2847A £2875*	C2848A £3425*
Designjet 650C Col	C2858B £3930*	C2859B £4599*
DraftPro Plus	C3170A £2339*	C3171A £3129*

Draft Pro & Master comes with three years On Site Warranty.

Designjet price includes one year OSM.

3 Year OSM Support Pack for Designjet £300

*Carriage on request.

PLOTTER MEDIA (a)

HP Paper A0 150 sheets	£64
HP Paper A1 200 sheets	£42
HP Paper 36" Roll	£29
HP Dj650C Paper 24"x150ft	£23
HP Dj650C Paper 36"x150ft	£29
HP Dj650C Paper A1 100 sheets	£43
HP Dj650C Paper A0 100 sheets	£83

HP PLOTTER PENS (c)

17825P, 17826P, 17725T, 17726T	£6.30
Ink Cartridges (c)BK/CMY	
Designjet 200/220	£16
Designjet 600	£16
Designjet 650	£20.40/£20.40

Summagraphics

INKJETS

Summajet A1 Mono	£1869
Summajet A0 Mono	£2449
Summajet A1 Colour	£2349
Summajet A0 Colour	£2685

PEN PLOTTERS

HiPlot Plotter A1	£1499
HiPlot Plotter A0	£1869

DIGITISERS & TABLETS

SummaSketch III A4	£235
SummaSketch III A3	£455
SummaSketch FX A4	£305
SummaSketch FX A3	£499
SummaSketch 1824 A2	£959
SummaSketch 2436 A1	£1279



GENIUS TABLETS



HiSketch SP Model

1212 SP (12"x12")	£120(a)
1812 SP (18"x12")	£185(a)
1812D SP (18"x12") LCD coord disp	£210(a)

Features:-

- Windows 3.1 & ADI drivers • Up to 19,200 bps data rate
- 5 to 90 pairs/sec sampling rate
- 1000 lines per inch resolution
- ± 0.01 inch accuracy • Proximity sensing
- AutoCAD R10/11/12 compatible templates
- Multi-directional puck • 3 button stylus



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Memories

STANDARD MEMORIES (b)

SIMMS

30 PIN SIMMS

1Mb x 9-60/70/80N (9 chip)	£34
1Mb x 9-70 (3 chip)	£31
4Mb x 9-70/80NS	£115
4Mb x 9-60NS	£119
256K x 9-80NS	£13

72 PIN SIMMS

1Mb 36 bit 70 NS	£42
4Mb 36 bit 70 NS	£125
8Mb 36 bit 70 NS	£259
16Mb 36 bit 70 NS	£419
4Mb 32 bit 70 NS	£119
8Mb 32 bit 70 NS	£249
16Mb 32 bit 70 NS	£389

DRAMS

44256-70NS (256K x 4)	£4.50
1Mb x 1-80/70NS	£4.90
1Mb x 4-80/70NS	£20

CACHE RAM

(SRAMS)

8K x 8 20NS cache	£4.50
32K x 8 20NS cache	£9
32K x 8 15NS cache	£10

Recommended for most Elonex, Ambra, ICL, Olivetti, Opus, Tandon, Vale, Vigen, Gateway and most other clones. Please refer to your manual or manufacturer.



CO-PROCESSORS (b)

Performance accelerator for CAD, spreadsheets, graphics & DTP

80287-8 to 20MHz	£59
80387SX-16/20/25MHz	£58
80387SL-16/20/25MHz	£58
80387SX-33MHz	£65
80387-DX-16 to 33MHz	£58

IIT FASTER CO-PROCESSORS (b)

2C87-12, 20	£46
3C87-20, 25, 33	£55
3C87SX-20, 25	£55
3C87SX-33	£55
3C87-40	£55

intel OVERDRIVE PROCESSORS (b)

Improve performance up to 70%	
486SX16 to DX2-32	£99
486SX20 to DX2-40	£99
486DX20 to DX2-40	£99
486DX25 to DX2-50	£99
486SX25 to DX2-50	£99
486DX33 to DX2-66	£149

PRINTER MEMORY UPGRADES (b)

BROTHER	1Mb	2Mb	4Mb	KYOCERA	1Mb	2Mb	4Mb
HL4VPS/VE	£79	£125	£185	F-800/AT	£75	£109	£179
HL-8V/D/BE	£79	£115	-	F1200S/3000A/3300	£79	£115	£199
HL-10-H	£49	£89	£145	F51500/820/5000	£65	£138	£260
HL-10V/DV/PS/DPS	-	£102	£179	F1500/A (Ecosys)	£79	£144	£274
STAR				SHARP			
LP4/Starscript	£79	£119	£175	JX-9500 PS	£59	-	-
LP8Plus	£79	£119	£199	JX-9500/E/H/9700	1.5Mb	£119	-
LS-5/SEX/STT	£76	£131	£228	9400/9600/PS/9460,			
CANON				OKI			
LBP-4/4+II Lite	£89	£125	-	9660/9700E	£65	£99	£179
LBP-8 II Series	£65	£95	£159	OL830/840/850	-	£129	-
LBP-8 III	£99	£129	£169	OL800/820	£69	£109	£179
LBP-8IV, LBP-4U, LBP-4i	£49	-	£129	OL400E/EX	£69	£109	£179
ALSO SEE PRINTER PAGE				OL410E/EX	£69	£109	£179

RAM CARDS (b)

0-16Mb Half Length 16-bit Card		Type I Version I.0 SRAM	
0Mb card	£99	1Mb/2Mb	£125/£195
Card with 2Mb installed	£160	HP FLASH DISC CARD 12V	
Card with 4Mb installed	£220	5Mb F1012A	£299
(Suitable for most 286/386 AT/XT computer please check your manual or manufacturer)		10Mb F1013A	£475
		20Mb F1014A	£779

All memories supplied are compatible parts from reputable manufacturers. IBM, Compaq & HP original memories are also available. Please call for latest prices.

Memories for AST, Olivetti, Canon and NEC are available, please call if the upgrade you require is not listed.

MEMORY UPGRADES FOR PCs (b)

COMPUTER	2MB	4MB	8MB	COMPUTER	2MB	4MB	8MB
IBM				COMPAQ			
THINKPAD 700-720-750-755-360 (IBM original)		£245	£485	CONTURA 3/20, 3/25, 3/25C	£75	£155	£259
THINKPAD 700, C-720, C-750, C-755, C-360-330 EQUIV		£169	£299	CONTURA 4/25, CX, EX (COMPAQ ORIGINAL)		£155	£265
THINKPAD 350, C-PS/2 L40SX PS/NOTE	£89	£159	£335	LTE 386 520		£189	
PS/NP 6381		£135		LTE LITE 4/25, 4/25C, 4/25E, 4/33C		£179	£329
PS/NP 6382		£135	£269	LTE 386 LITE/20, 25, 25C, 25E	£89	£185	
PS/NP 6384 F/M/W SERIES		£135	£269	SLT 386S/20	£110	£190	
PS/NP C00-C2A-C20-C4A-C40	£85	£149	£289	PROLINEA 3/25S, 3/25ZS	£80		£239
PS/I 2135-G11-G13-W11-W13-S11-S13, 2155-G14-W14-S14	£85	£135	£269	PROLINEA 4/25S, 4/33, 4/50, 4/66, CDS	£79	£135	£269
PS/I PRO 386SX 2123	£85	£135	£269	PROLINEA MT SERIES, NET 1/25	£79	£135	£269
PS/I 386SX 2121	£89	£149		PROLINEA Enhanced Family	£79	£135	£269
PS/I 286 2011	£89			PROSIGNIA PC SERIES SP/LTM & 1 SERIES	£85	£135	£269
PORTABLE PS/2 P75	£85	£155		PROSIGNIA PC SERVER 486/33-DX2/66	£135	£269	
PS/2 L40SX, PS/NOTE 182	£89	£149	£289	PRESARIO CDS 633-CDS 860-660	£135	£269	
PS/2 N51 SLC, SX	£89	£159	£299	DESKPRO 386-33L, 486-25-33L-50L	£119		£409
PS/2 N33 SX	£89	£149		DESKPRO M & SP/LT SERIES (NOT LT486-33)	£185	£275	£435
PS/2 56-57-76-77 SERIES, PS/2 90-95 SERIES	£85	£135	£269	DESKPRO XE 433S, 450, 466	£79	£135	£269
PS/2 SERVER 85, PS/2 E SERIES				PROLIANT 1000 486DX2/66		£135	£269
PS/2 95XP, 486 OMF, OHT (ECC)		£209	£399	SYSTEMPRO 486/E SERIES	£119		£409
PS/2 EXP-BOARD FOR PS/2 70 & 80 SERIES	£189	£275	£429				
ADD ON	£85	£149					
PS/2 65SX, 50 021, 60 041-071, 55LS-SX041, 081, 55SX 061-031 EXP. BOARD	£85	£149					
PS/2 50 021, PS/2 60 041-071 EXP. BOARD	£249	£369					
PS/2 50Z 031-061	£85	£149					
EXP. BOARD	£249	£369					
PS/2 57SX, M57SLC, 56SLC/LS, 56SX, LS	£85	£135	£269				
PS/2 35LS/SX, PS/2 40SX	£85	£149	£289				
PS/2 30/286 E21-E31-341, 25-286 006, 036-G06-G36	£80						

DELL

NOTEBOOK 325N/NC	£99		
NOTEBOOK NL25, NL20	£110		
LAPTOP 320N/N+, 212N	£135		
SYSTEM 316SX, 325SX	£80		
SYSTEM 320SX, 325P, 325D, 333D/P		£135	
SYSTEM 320SL, 325SLI	£115		£439
SYSTEM 433-333-325P-333-325D		£135	
POWER D/TOP 486P-66-50-33-25-20-16		£135	
POWER D/TOP 486D-66-50-33-25-20D		£135	
PERFORMANCE ME SERIES		£135	£269
PERFORMANCE T-L-M- SERIES		£129	
POWERLINE 466-450-433-425-	£95	£158	£268
POWERLINE DE, SE SERIES	£95	£158	£268
DESKTOP 200-210-300 SERIES	£76	£144	£239

SHARP

PC-6881, 6781, 6891, 6785, 6700, 6741, 6800, 6841	£85	£169
PC-7700, 7750		£209
PC-8501	£129	
PC-3000/3100	£195	

HEWLETT-PACKARD

VECTRA 486-33ST-66ST-25U PC-	£85	£269
VECTRA 486 33U PC-50U PC-66U PC	£85	£269
VECTRA 486S-20 PC-25T-33T-486VL	£85	£135
VECTRA VL2		£129
VECTRA 486-25N-33N-50N-66N	£85	£135
VECTRA 386-25N PC-16N PC-20N PC	£80	£160
VECTRA 386-25 PC	£95	£299
VECTRA Multimedia PC's		
VL 4/33SE - 4/50SE		
VL 4/66 - 4/100 - M2 4/50-M2 4/66i	£129	£265
VECTRA 486N2-N21	£129	£265
VECTRA 486M2-M21-XM2 XP/60 - XU	£129	£265
NETSERVER LE, LM, LF	£135	£269
HP95LX	£199	

PANASONIC

CF170, CF270, CF370 NOTEBOOK	£90	£180
CF380, CF480, CF580 NOTEBOOK	£109	£189
CF480C	£109	



intel Overdrive DX4 (b) "Speed Tripling"

25 MHZ with U/G Socket to 75 MHZ	£325.00(b)
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33 MHZ with U/G Socket to 100 MHZ	£375.00(b)
33 MHZ without U/G Socket to 100 MHZ	£375.00(b)

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Networking

NETWORKING

NOVELL NETWORK	5 User	10	25	50	100	250
Netware 4.1 CD ROM (a)	482	1145	1178	2350	3359	5950
Netware 3.12 (a)	385	905	1333	1825	2540	4575

Call for quote on Novell Connectivity products

NOVELL
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& EDUCATIONAL PRICES**
NETWORK OR LAN MANAGER SERVER SUPPORT FOR 1 YEAR
Full telephone and dial-up on-line support by CNE team. Price of support contract includes modem. £1500

Novell
Authorised
Reseller

PEER TO PEER NETWORKS

All Techno starter kits contain 5M BNC cable & terminators. All Techno add-on kits contain 3M BNC cable. All starter kits contain everything necessary to connect stated no of PCs.

Item Description	Windows for Workgroups	
	Full	MLP
Windows for WG 3.11	£89	£80
Add-on for Win 3.1/W4WG 3.1	£42	£39
Add-on for MS-DOS	£45	£40
Techno W4WG Add-on Kits		
For those users with MS Windows 3.1 installed		
Techno W4WG 2 Stn Starter Kit	£149(a)	
Techno W4WG 1 Stn Add-on Kit	£69(a)	
Techno Hardware only Kits		
For those users with MS W4WG 3.11 installed		
Techno 5 Stn Starter Kit H/W only	£175(a)	
Techno 2 Stn Starter Kit H/W only	£66(a)	
Techno 1 Stn Add-on Kit H/W only	£35(a)	

NOVELL Personal Netware

- Share files, directories, printers & CD-ROMs in Dos & Windows
 - Universal network client
 - Single Login to all resources
- | | |
|-------------------------------------|---------|
| Personal Netware (PNW) | £44(b) |
| Personal Netware 5 Pack | £195(a) |
| Novell Dos 7 inc PNW | £58(b) |
| Techno Personal Netware Kits | |
| Techno PNW 5 Stn Starter Kits | £215(a) |
| Techno PNW 2 Stn Starter Kits | £105(a) |
| Techno PNW 1 Stn Add-on Kit | £59(a) |

LANTASTIC v6.0



Lantastic v6 provides a cost effective, easy to use, install and manage peer-to-peer network workgroup solution for IBM compatible computers. Version 6 includes Artisoft Exchange for e-mail, scheduling and fax capability. It also allows you to integrate your workgroup with the office LAN such as Netware, Windows NY or LanManager. A new modular

design means that Lantastic 6 can transfer data 15% faster than version 5. Configure your servers to be dedicated or non-dedicated. Each machine in the workgroup requires Lantastic A1 software and a compatible network card. A 2 node starter kit includes everything needed to connect two machines including Noderunner network cards. The 1 node starter kits include a card and software for one machine. Upgrades to v6 from any previous version must be purchased per node.

- Lantastic NodeRunner 2000Si 2 node kit £195
- Lantastic NodeRunner 2000Si 1 node kit £110
- Lantastic A1 software Win + Dos only £65
- Lantastic A1 software 5 pack £315
- Lantastic NodeRunner 2000Si card only £85
- Lantastic NodeRunner 2000Si 5 pack £365
- Lantastic v6 A1 upgrade 1 user £29
- Lantastic v6 A1 upgrade 5 user £95
- Lantastic v6 A1 upgrade 10 user £165
- Lantastic Central Station II £Call

SPECIAL OFFER
Buy a starter kit Get 1 licence free

PRINTER SERVER(a)

Please verify exact version of protocol supported with manufacturer

	CONNECTION		PROTOCOL								PRICE
	PARALLEL	SERIAL	NOVELL (IPX)	NETBIOS	WANG	WINDOWNT	TOPIC (UNIX)	APPLE TALK	DEC LAT		
Intel Netport Express XL BNC/TP											£325
Intel Netport Express XL Token Ring											£449
Intel Netport Express EL BNC/TP											£259
Intel Netport Express EL Token Ring											£389
HP JetDirect Ex											£249
HP JetDirect J2552A MIO LJ4 Series											£289
EMULEX NetQue BNC/TP											£399
EMULEX NetJet MIO LJ4 Series											£369

COMMUNICATION SERVER(a)

- US Robotics Fax Servers**
- Direct Lan Connection (BNC/TP) • Novell Netware support
 - Dos & Windows s/w sit licence - Call for full details
 - Fax server 1 port £929 2 port £1149
- US Robotics Comms Servers**
- Direct Lan Connection (BNC/TP) • Novell Netware support
 - Host & Remote functionality - Call for full specifications
- Software Comms Servers**
- Winport (Comms + Fax) 1 modem £225
 - Novell Connect 2 Port £279

UPS

- TRIPP-LITE UPS** - Made in USA. 2yr swap-out.
- | Smart Series NEW | BC Series |
|-----------------------|------------------------|
| SM 250 VA £185(a) | BC250 VA £89(a) |
| SM 400 VA £215(a) | BC400 VA £129(a) |
| *SM 600 VA £229(a) | BC600 VA £179(a) |
| SM 750 VA £289(a) | BC900 VA £289(a) |
| *SM 900 VA £399(a) | Special Ltd Offer OMNI |
| *SM 1250 VA £499(2xa) | 600VA £189 900VA £299 |
- PowerAlert For: Netware £55 Unix £89 Dos/Win £55
*FREE PowerAlert for Netware. While stocks last.
- American Power Conversion (APC)** 2yr swap-out
- | Smart-UPS (Line-interactive) | Back-UPS (off-line) |
|------------------------------|---------------------|
| SU250 £189(a) | BK250 £89(a) |
| SU400 £239(a) | BK400 £139(a) |
| *SU600 £239(a) | BK600 £179(a) |
| *SU900 £499(a) | BK900 £319(2xa) |
| *SU1250 £549(2xa) | BK1250 £395(2xa) |
- Powerchute for Netware £55 For Unix £95 For Win £59
*FREE PowerChute for Netware. While stocks last.

HUBS & REPEATERS

Model carr (a)	Ports	SMNP		Stackable	Price
		TP	BNC			AUI	Option
3COM					
L.Build TP/12	12	-	1	No	No £299
L.Build FMS II	12	OPT	1	Yes	Yes £499
L.Build FMS II	24	OPT	1	Yes	Yes £839
SMC					
Tiger TP6	6	OPT	1	No	No £159
Tiger TP6B	6	1	-	No	No £179
Tiger TP12	12	-	1	No	No £319
Tiger CX3	-	3	1	No	No £219
Elite 3812TP	12	OPT	2	Yes	Yes £399
Genius 1000/D					
	12	1	2	Yes	No £199
Techno					
8TP Port	8	-	1	No	No £129
4 Port Repeater	-	4	2	No	No £339
2 Port Repeater	-	2	2	No	No £185

**NETWORK BACKUP
SEE STORAGE PAGE**

ETHERNET PRODUCTS(a)

GENIUS COMBO CARD
GE2000D Lifetime warranty, BNC & TP, NE2000 compatible, s/w & h/w configure, T Piece. See Taxan/Genius page for more info.
£32(b)
20 pack £599(a)



B = BNC, A = AUI, T = TP, I = ISA, M = MCA, E = EISA, V = VLB, P = PCI

	NETWORK	BUS	1PK	5PK	20PK
3COM					
3C509B	B A	I-16	£67	£319	£1199
3C509BTP	- A T	I-16	£70	£319	£1149
3C509B-Combo	B A T	I-16	£76	£359	£1299
3C529B	B A	M-32	£155	£709	-
3C529B-TP	- A T	M-32	£156	£709	-
3C579	B A	E-32	£149	£699	-
3C579-TP	- A T	E-32	£149	£699	-
3C503-16	B A	I-16	£115	£535	-

		1PK	6PK	24PK
SMC Ethercard Plus				
Elite Ultra 16	B - -	I-8/16	£59	£339
Elite Ultra 16T	- - T	I-8/16	£60	£329
Elite Ultra 16C	B - T	I-8/16	£65	£379
Elite/A	B A -	M-16	£129	-
Elite 10T/A	- A T	M-16	£129	-
Ultra 32C EISA	B - T	E-32	£159	£849
Ultra 32C PCI	B - T	P-32	£149	£829
Ultra Boot Rom Multi-Protocol				£29

		1PK	5PK	20PK
Novell - Genuine Cards				
NE1000	B A -	I-8	£65	-
NE2000 +	B - -	I-16	£49	£235
NE2000T +	- - T	I-16	£48	£235
NE2000+3	B - T	I-16	£59	£279
NE2XC	B A -	M-16	£149	-
NE2-32C	B A -	M-32	£370	-
NE3200	B A -	E-32	£299	-

		1PK	6PK
D-Link Ethernet			
DE220	B A -	I-8/16	£59
DE220C	B - -	I-8/16	£54
DE220T	- - T	I-8/16	£55
DE220CT	B - T	I-8/16	£66
DE500CAT	B A T	V-32	£199
DE320CT	B - T	M-32	£119
DE400	B - T	E-32	£159
DE530 PCI	B - T	P-32	£99
DEDE220X Novell Boot Rom			£19

		1PK	5PK	20PK
Intel EtherExpress (E.XP)				
E.XP PRO 16C	B - T	I-8/16	£57	£279
E.XP PRO Flash 16CB	- T	I-8/16	£65	£315

		BNC	TP	DUAL
Ethernet for Portables				
Parallel Port				
Genius E3000D-II with printer		-	-	£76
Multi-plexer built-in & EPP support				
Xircom Pocket III		£185	£186	£209
SMC Elite Note		-	-	£169
D-Link DE600		-	-	£69*
D-Link DE620 EPP Support		£114	£115	£129

PCMCIA BNC & TP PCMCIA GOLD CARD £175

3COM 3C589B		-	£139	£159
Xircom PCMCIA - Performance range		£165	£155	£189
SMC Elite Card		-	£140	£159
Genius ME3000H		-	-	£139
D-Link DE650		£135	£139	-

*While stocks last

Boot ROM for NE2000 & clones TEC/NK/R09R £10(c)

	Length (m)	3	5	10	15	20	25	30	50
Thin		£6	£8	£12	£16	£20	-	£27	£35
TP		£9	£12	£17	£22	-	£30	-	-
100M Reel				Thin	£45(2xa)		300M TP	£169(2a)	

BNC T-Piece 5 Pack £15(c) BNC F-F Barrel 5 Pack £15(c)
BNC 50ohm Earthed Terminator 2 Pack £4(c) BNC M-M Barrel 5 Pack £17(c)



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MONITORS (MULTISYNC COLOUR) Carr £8 for 14"15" £12 for 17"-21"

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The Art of Vision

(1 year RTB warranty)

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400LR NEW	14"	800x600	@ 60Hz* EPA	£193
410LR NEW	14"	1024x768	@ 60Hz EPA	£203
420LR NEW	14"	1280x1024	@ 60Hz	£240
580LR	15"	1280x1024	@ 60Hz EPA	£291
880LR NEW	17"	1280x1024	@ 62Hz EPA	£532
885LR NEW	17"	1600x1200	@ 65Hz EPA	£634
895LR NEW	17"	1600x1200	@ 67Hz Trinitron	£875
1080LR NEW	20"	1600x1200	@ 65Hz EPA	£948
1095LR	20"	1600x1200	@ 62Hz Trinitron	£1459
2100LR NEW	21"	1600x1200	@ 72Hz Diatron	£1532



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- 15" flat, square tube
- Built-in stereo speakers
- Low radiation & static (MPR-II)
- 0.28mm dot pitch



£265

All Philips monitors are low radiation (MPR-II compliant)

14C	14"	800x600	@ 56Hz*	£170
14A	14"	1024x768	@ 70Hz	£207
15B	15"	1024x768	@ 72Hz Stereo	£260
17A	17"	1280x1024	@ 76Hz	£659
17C	17"	1024x768	@ 72Hz Stereo	£430
20T	20"	1280x1024	@ 76Hz Trinitron	£1349
21B	21"	1600x1280	@ 60Hz	£1375

All resolutions shown are maximum non-interlaced. Models marked with a * can achieve higher resolutions by interlacing.



NEC PLUG & PLAY MONITORS

XV - Value Range - Soho Market
XE - Efficiency Range - Corporate Market
XP - Professional Range - DTP/CAD Market

XV15	15"	1024x768	@ 80Hz	£291
XV17	17"	1024x768	@ 80Hz	£589
2V	14"	(Not Plug & Play)	@ 80Hz	£291
XE15	15"	1024x768	@ 80Hz	£409
XE17	17"	1024x768	@ 80Hz	£721
XE21	21"	1152x870	@ 75Hz	£1399
XP17	17"	1280x1024	@ 76Hz	£949
XP21	21"	1600x1200	@ 70Hz	£1859

Panasonic

2 years on-site

TX-T1537	15"	£325
TX-D1751	17"	£645
TX-D1732	17"	£545
TX-D2032	20"	£1135
TX-D2131	21"	£1369

SONY

CPD 15 SFI	15"	£295
CPD 17 SFI	17"	£589
GDM 17 SEIT	17"	£845
GDM 20 SEIT	20"	£1499
GDM 20 SEV	20"	£1325

GRAPHICS CARDS

MODEL	RAM	ISA	VLB	PCI
TAXAN				
WIN TURBO+	V4MB	£398	£399	£400
WIN TURBO	V2MB	£248	£249	£250
WIN BOOST (Upgradeable)	D1MB	£114	£115	£116
GTS 795 (MACH 32)	D1MB	£88	£89	£90
ULTRA PRO	V2MB	MCA £228	EISA £229	
DIAMOND				
VIPER SE	V4MB	-	£358	£359
STEALTH V64-4	V4MB	-	£349	£365
STEALTH V64-2	V2MB	-	£245	£235
STEALTH D64-2	D2MB	-	£140	£139
STEALTH D64-1	D1MB	-	£106	£105
SPEEDSTAR 64	D1MB	£109	-	£110

TECHWORKS

NEW

MODEL	RAM	ISA	VLB	PCI
THUNDERBOLT-2	D2MB	-	£139	£116
THUNDERBOLT-1	D1MB	£59	£96	£75

VLB - ET4000, PCI - TRIDENT DG1, ISA - CIRRUS 5422

MATROX - NEW 3D ABILITY

IMPRESSION PLUS	V2MB	£289	-	£259
IMPRESSION PLUS LITE	V2MB	-	£249	£269
MGA 2MB VRAM UPGRADE MODULE				£199

ORCHID

KELVIN 64-2	D2MB	£136	£135	£150
KELVIN 64-1	D1MB	£100	£99	£112
FAHRENHEIT VA	D1MB	£99	-	-
STANDARD SVGA	512KB	£29	TRIDENT CHIP	
STANDARD SVGA	1MB	£45	TRIDENT CHIP	

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Designed to fit impact panels.

Red Spot Laser Pointer
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• Built in LCD calculator	
• Diagonal cursor keys	
• Key-lock function* XT/AT compatible	
• Angled template holder with 5 templates	
FREE WRIST REST	
CHERRY 102 Key AT Keyboard	£45
German made using high quality key switches	
Mitsumi XT/AT Keyboard	£29
Keyboard Extension. Cable XT/AT	£7(c)
Keyboard Extension. Cable PS/2	£9(c)
AT Keyboard to PS/2 system Conv. cable	£9(c)
Ergo Wrist Rest	£4(c)

VDU FILTERS

Glass - TUV & SSI App (b)	
Mirus ECO 14"-15"	£39
Mirus CAD 16"-17"	£59
Carbon Fibre (c)	12" 14"
Colour Monitor	£8 £9
Mono Monitor	£7 £8

MICE & TRACKER

Microsoft(b)	
MS Mouse V2 Serial & PS/2	£38
MS Mouse V2 5pk Serial & PS/2	£185(a)
MS Mouse V2 Bus	£49
MS Home Mouse Serial	£27
MS Ball Point Mouse PS/2	£59
Logitech(b)	
Pilot II Mouse PC Serial	£18
Pilot II Mouse PS/2	£18
Pilot Trackman PC Serial New!	£28
Mouseman Serial (or PS/2)	£35
Mouseman Cordless Small	£54
Trackman II PC Combo	£45
Trackman Portable Ser + PS/2	£33
Trackman Voyager	£49
Hard Mouse Mat	£4(c)
Genius(b)	
Hi Mouse range includes mouse mat, 9-25 adaptor and Paintbrush IV	
Hi Mouse Serial Only	£19
Hi Mouse Serial & PS/2	£21
Mouse One Serial	£9
Hi Point Serial	£20
Clips on to keyboard, includes carry case and 9-25 adaptor, ideal for notebook user	
Mini tablet & pen mouse	
Genius Easy Painter: A budget price digitiser for those who want to exercise their free hand creativity. Includes PC Paintbrush for Windows, 3 button stylus, 25, 9 pin adaptor DOS/Windows/ADI Driver.	£69(b)

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NEW

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Fast & Secure Backup
Jetstore 2000 Workstation-based kit
 2Gb drive, Arcserve s/w & SCSI card
Jetstore 5000 Network Server-based kit
 2Gb to 8Gb drive, 250-user Arcserve v4/v5 & SCSI card
Jetstore 6000 Network Server-based kit
 4Gb to 16Gb drive, 250-user Arcserve v5 & SCSI card

(Drive Only:)	Int	Ext	ISA Kit	MCA Kit
JS 2000	£645	£775	£895	£1070
JS 5000-v4	£735	£865	£1605	£1785
JS 5000-v5	£735	£865	£1839	£2015
JS 6000-v5	£885	£985	£2039	£2215

HP Support Pack for Jetstore £140(b)
 (Provides 3 years OSM direct from HP)
TECHNO DAT Drives Kits (a) 1 yr RTB warranty

Leading DAT Drives (HP/Sony)	INT	EXT
TEC 2Gb DAT	£659	£739
TEC 2-8Gb DAT	£719	£819
TEC 4-16Gb DAT	£859	£939
TEC 24-48Gb DAT Autoloader	£1959	£2049

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NEW LARGER CAPACITIES
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 Run from PC's floppy controller, or use an optional fast controller card for speed and compression

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FC-20 Fast Controller card (250)	£56
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Full range of accessories & mounting kit - Call
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Trakker 250 80/250MB (QIC-80)	£189
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Trakker 700 340/680MB (QIC-3010)	£309
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Colorado Backup Software
 Colorado Backup for Windows V2 NEW £49

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- Supports Netware, WFWG, Lantastic
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PCMCIA DEVICES (a)

HARD DISKS - TYPE III

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---------------------	------	--------------	------

Calluna
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MiniStor with Stacker Anywhere on board
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PCMCIA FOR DESKTOPS

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 A standard Type III slot in a 3.5" drive bay. Inc. 5.25" adaptor & 16-bit interface with rear Type II slot.

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 Provides 1 Type III front slot £99(a)

TAPE CARTRIDGES

Colorado Formatted - 3 Pack(c)
 DT-120 (QIC-40) £49 DT-250 (QIC-80) £45
 DT-350 (QIC-80XL) £54 DT-740 (QIC-3010) £69

3M QUALITY TAPE CARTRIDGES

Unformatted

	1(c)	5pk (b)
DC2120 (QIC-80)	£9.75	£45
MC3000 (QIC-80XL)	POA	POA
MC3010 (QIC-3010)	POA	POA
DC2750 - Exabyte 2501	£16	£75
DC6150	£12	£55
DC6250	£15	£70
DC6525	£17	£80

4mm DDS DAT tapes - 5 tapes per pack

	3M(1pk)	SONY	HP
1.3Gb 60m	-	-	£49
2Gb 90m	£10	£55	£65
4Gb 120m DDS-2	-	-	£85

HP DDS DAT Cleaning Kit - 2 tapes £24

HARD DISKS (a)

MODEL **SIZE (Mb)** **PRICE**
 For improved IDE performance upgrade to our enhanced -IDE VLB controller (IDE-5)

CONNER

IDE	SIZE (Mb)	PRICE
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CFS420A	420	£135
CFA540A	540	£165
CFA810A	810	£309
CFA1080A	1000	£439

SCSI

CFN250S (2.5")	250	£299
CFA540S	540	£235
CFP1060S	1060	£425

SEAGATE

IDE

ST9385AG (2.5")	341	£359
ST3250A2	214	£107
ST3391A	340	£130
ST3491A	428	£145
ST3660A	545	£170
ST3780A	780	£270
ST31220A	1050	£389

FAST SCSI-2

ST3655N	528	£219
ST31200N	1050	£389
ST12400N	2100	£769
ST12550N Fast	2100	£869
ST43400N	3000	£1499
ST15150N	4000	£1699
ST410800N	9090	£3299

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BackPack CD-ROM Double speed £255

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BackPack 900 Up to 900Mb (QIC 3010) £399

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Teac 2.88Mb 3 1/2" FD + 5 1/4" Kit £69
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SCSI DEVICE CASES WITH PSU(a)
 Includes: 50-way Centronics input & output, PSU, mains cable, fan, activity LED, SCSI ID switch, mounting screws.

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5.25" HH	£85	£109	£139

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I/O-2 XT/AT Dual Serial Port	£14

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M2512A 230Mb Drive only (ext)	£589(a)
M2512A 230Mb PC SCSI Kit (ext)	£659(a)
M2512A 230Mb PC Parallel Port Kit	£749(a)

Panasonic 5.25" Optical Drives

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LF7300B 1.5Gb SCSI ext drv	£1615(a)

SCSI CONTROLLERS(b)

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1515	ISA	-	£69
1542C	ISA	£129	£175
1640	MCA	-	£235
2742T	EISA	£239	£279
2842	VLB	-	£169
2940	PCI	-	£209

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DPT EISA 32 High Performance kit 0MB	£329
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- for PC to PC transfer Program in MS Dos 6	
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- Auto configure & drive select

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TIC 30E	EISA	0Mb	£POA
TIC 40P	PCI	0Mb	£149

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- Hardware disk mirroring • S/W configuration
- 4 x 30 pin Simm sockets (16MB max)

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TSC 30E	EISA	0Mb	£POA
TSC 40P	PCI	0Mb	£POA

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M2684T	528	£155

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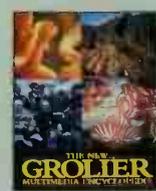


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NEC 3xe	195ms	450kb (3X)	£43 (16b)	Multi		£306		£349		
NEC 3xp+	250ms	450kb (3X)	£43 (16b)	Multi		£248		£291		
NEC 4xi/e	220ms	600kb (4X)	Yes	£43 (16b)	Multi	£262	£373	£305	£416	
NEC 4xp	220ms	600kb (4X)		£43 (16b)	Multi		£499 NEW		£542 NEW	
Pioneer DRU104X	250ms	614kb (4X)	Yes	Multi	£199		£254			
Pioneer DRM604X	300ms	600kb (4X)	Yes	Multi		£870		£939	SCSI	
Pioneer DRM602X	300ms	300kb (2X)		Multi		£389		£449		
Toshiba KT3501	170ms	614kb (4X)	Yes	Multi	£253	£306	£314	£370		
Toshiba XM15201B	190ms	510kb (3.4X)	Yes	Multi	£152		£214			
Toshiba KT3504S	170ms	614kb (4X)	Yes	Multi		£1299		£1375		
Creative CR563	320ms	300kb (2X)		Multi	£95(+Photostyler +Grolier CD-ROM'S)					
Orchid CDS3110	350ms	300kb (2X)		Multi	£109				GENERIC	
Panasonic CR562	320ms	300kb (2X)		Multi	£86	(+cables+s/w)	£96			
Aztech CDA268-03i	320ms	300kb (2X)	Yes	Multi	£87				IDE	
Aztech CDA468-01	235ms	600kb (4X)	Yes	Multi	£139	NEW				
Mitsumi FX300	250ms	450kb (3X)		Multi	£119					
Mitsumi FX400	230ms	600kb (4X)	Yes	Multi	£159	NEW				
NEC Qua 4X	220ms	600kb (4X)	Yes	Multi	£195	NEW			RECORDER	
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Philips CDD522	N/A	330kb (2X)				£1950 (2a)				
Yamaha Quad 4X	N/A	600kb (4X)			£2550 (2a)	£2950 (2a)				
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COREL Record S/W				Multi	£165 (b)					
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- Stories Of Murder Mystery & Magic (101 tales) £19
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- Wines Of The World (MPC,BS) £29

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- Prince Interactive (PI) £29
- Soundbits (MPC, cartoon,film,world,each) £21
- Schubert (MPC,MS) "Trout Quartet" £31
- Stravinsky (MPC,MS) "Rite Of Spring" £31
- Strauss (MPC,MS) "Three Tone Poems" £31
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- Soundbits are floppy based.

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- Source Code (WC) £25

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- Old Testament (OT) £38
- World Religions (MPC,QP) £39

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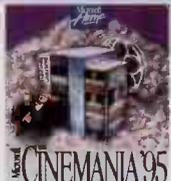
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A Typical OS/2 Screen



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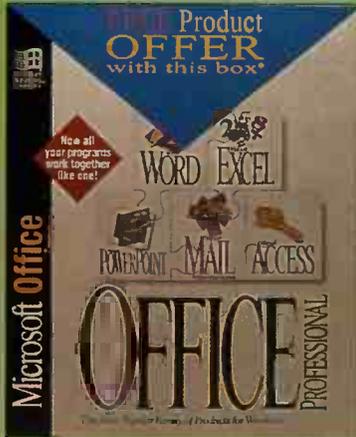


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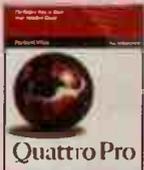
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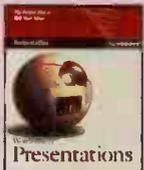
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- Notebook for easier organisation - each holding up to 256 pages
- Works seamlessly with other applications within PerfectOffice sharing common icons, menu structures
- Analytical and graphical features include integrated data-base technology, integrated E-mail & groupware technology
- Power users benefit with formula composer, Plug-n-Play OLE 2 compatibility



Presentation 3.0

NEW!

- Helps you create slides, printed handouts and on screen shows with ease
- Upgrade expert, coaches and online documentation demonstration program guides you through tasks
- Master gallery includes over 60 slide backgrounds and templates
- Outliner makes it easier to create professional slides
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Envoy 1.0

NEW!

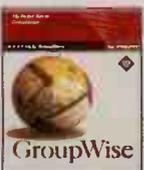
- Sharing documents with others has never been easier than with Envoy 1.0
- Create an Envoy document from any Windows or Macintosh application
- View, manipulate, annotate or print a WP Envoy file
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- No licensing required to send a run time file to other users



InfoCentral 1.1

NEW!

- The Personal Information Manager (PIM) that intelligently links events, people, places and things to give you easy-to-follow information
- Access and view information from multiple perspective
- Free information base includes ComputerCentral, ConsumerCentral, TravelCentre and WineCentral
- Enter information once and then make the relevant connection with other data



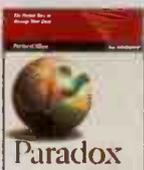
GroupWise 4.1

NEW!

- The messaging system that integrates E-mail, personal calendaring, group scheduling and task management
- Support for 12 client desktops, 10 server environments, and 25 gateways
- Includes both local and remote client because it can be run with or without a network (from a phone socket)
- Fully compatible with WP Office 4.0a products

PerfectOffice Professional Edition (Call for prices)

Includes all products in the Standard version plus Paradox 5.0 for Windows and Visual Appbuilder



Paradox 5.0 for Windows

NEW!

- Relational database power made easy
- Store data, analyse and format your data more easily than before
- Built in computer based training makes learning easy
- OLE 2.0 provides integration with other Windows applications and suites
- New additional type fields for greater flexibility and data handling
- Increased SQL connectivity

Visual Appbuilder

NEW!

- Provides a visual development environment for customer application
- No need of intensive power programming

**VISUAL
APPBUILDER**



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SG10 513 Sage Bookkeeper Dos V7	55
SG10 572 Sage +2 Financial Cont. Win	357
SG60 586 Sage +2 Financial Cont. Lan Win	579
SG10 568 Sage +2 Accountant Plus Win	274
SG60 583 Sage +2 Accountant Plus Lan Win	465
SG10 564 Sage +2 Accountant Win	193
SG10 562 Sage +2 Bookkeeper Win	84
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SG10 N80 Sage Invoicing (Add-On)	24
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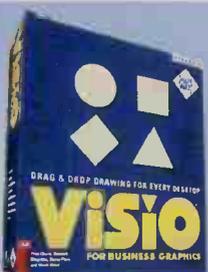
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SY27 P43	Norton PC Anywhere V2 Win Host + Remote	£92
SY27 P46	Norton PC Anywhere V2 Win Host	£65
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TERMINAL EMULATION

WK27 R48	Reflection 4 Plus Dos	£219
WK27 R44	Reflection 4 Win	£249
PE27 S13	Smarterm 320	£95
PE27 S23	Smarterm 340	£159
PE27 S26	Smarterm 320 Win	£159
PE27 S43	Smarterm 420 Win	£125
PE27 S43	Smarterm 420 Win	£125
PI27 T23	Termitte Async Dos	£169
PI27 T33	Termitte Async Win v6 New	£169
PI60 T53	Termitte Network Dos	£249
PI60 T63	Termitte Network Win v6 New	£249
PI77 T73	Termitte Net Win Comp. Upg	£99

Call for more information

COMMS FAX

DL27 C12	Delrina Commsuite	£95
DL27 W34	Winfax Pro V4 Win	£53
DL77 W52	Winfax Pro V4 Upgrade	£33
DL60 W23	Winfax Pro V4 Server + 2 Users	£185
DL60 W19	Winfax Pro V4 Lan Server only	£125
DL60 W30	Winfax Pro V4 5 Pack	£265
DL60 W32	Winfax Pro V4 10 Pack	£409
WP45 E59	WP Express Fax Plus Win	£36
DL27 C22	Dosfax Pro Dos	£45
RM27 T46	Trlo Datafax	£89
RM27 T43	Trlo Datafax Lite Win	£20
LS27 E13	Eclipse Fax Server + 2 User	£199
LS27 E43	Eclipse Fax 2 User	£140
LS27 W23	Winport 1 Modem Sharing	£225
LS27 W26	Winport 2 Modem Sharing	£225
LS27 W33	Winport 5 Modem Sharing	£425
LS27 W46	Winport For Windows for Workgroups	£99
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ZS27 U19	Ultrafax Win	£38

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SY27 P46	Norton pcAnywhere v2 Host only	£65
SY27 P49	Norton pcAnywhere v2 Win Remote only	£79
SY27 P23	Norton pcAnywhere v5 Dos Host + Remote	£82
SY27 P76	Norton pcAnywhere v5 Dos Host only	£58
SY27 P83	Norton pcAnywhere v5 Dos Remote only	£69



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- Dual Speed CD-ROM
- SoundBlaster 16-bit Stereo Soundcard
- Stereo Speakers
- Microsoft Family CD Pack
- 12 months on-site warranty

£889

Graduate Multimedia

- 486DX 40MHz processor
- 128K Cache
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- 4Mb RAM exp. to 128Mb
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- Dual Speed CD-ROM
- SoundBlaster 16-bit Stereo Soundcard
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- Microsoft Family CD Pack
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Professor Multimedia

- 486DX2 66MHz processor
- 128K Cache
- 420Mb Hard Disk
- 4Mb RAM exp. to 128Mb
- 14" SVGA Low Radiation Non-Interlaced Colour Monitor (0.28)
- Creative CR563 Dual Speed Internal CD-ROM
- SoundBlaster 16-bit Stereo Soundcard
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- Intel Pentium 60MHz processor
- PCI 1MB Graphics Card
- 256K Cache
- 420Mb Hard Disk
- 8Mb RAM exp. to 128Mb
- 14" SVGA Low Radiation Non-Interlaced Colour Monitor (0.28)
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- SoundBlaster 16-bit Stereo Soundcard
- Deluxe Stereo Speakers
- Microsoft Family CD Pack
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- All Systems include:**
- 1Mb VESA Local Bus Windows Graphics Accel. (except Pentium)
 - 3.5" 1.44Mb Floppy Disk
 - 2 VESA Local Bus Slots
 - 2 Serial, 1 Parallel, 1 Games Port
 - 1 x 8-bit, 6 x 16-bit (2VL) slots
 - 200 Watt PSU
 - Windows for Workgroups 3.11, MS-DOS 6.2 and Mouse

Worth over £400 (RRP)

Microsoft Family CD Pack FREE with these Brother MultiMedia Systems

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 - MS Dangerous Creatures CD Wildlife
 - MS Money CD Home Finances
 - MS MultiMedia Golf CD Entertainment
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Upgrade Case to 5000 Series Mini Tower Case	£30
Upgrade Case to 8000 Series Full Tower Case	£70

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The Lotus Graduate Bundle Offer



Model shown Lotus Graduate. Manuals and disks available for additional charge. Software license for single user. Software box shots for illustration only.

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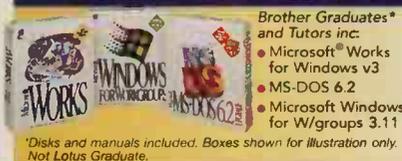
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Windows and
mouse pre-
installed with
original
documentation

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No ordinary entry-level PC, the Graduate offers truly amazing value and performance. For a start there's the fast 40MHz 486DX processor, a large 210Mb hard disk and a 14" SVGA Low Radiation non-interlaced Colour Monitor. Then to give you even higher performance, the Graduate incorporates the industry standard VESA Local Bus with a 1Mb Windows™ graphics Accelerator card. Choose either the standard Graduate which includes Microsoft Works for Windows™ v3, or the Lotus Graduate which comes with a complete suite of Lotus Windows™ software pre-installed and ready-to-run (*packages as shown*). Either way you'll be productive from the moment you power up.

Software worth over £200



*Disks and manuals included. Boxes shown for illustration only. Not Lotus Graduate.

The Brother Graduate

- 486DX 40MHz processor
- 210Mb hard disk
- 128K Cache
- 4Mb RAM exp. to 128Mb
- 14" SVGA Low Radiation MPRII non-interlaced Colour Monitor (0.28 dot pitch)
- 1Mb VESA Local Bus Graphics Accel.
- 3.5" 1.44Mb Floppy Disk
- 2 VESA Local Bus slots
- 2 serial, 1 Parallel Ports
- 1 x 8-bit, 6 x 16-bit (2 VL) expansion slots
- Microsoft compatible mouse
- Microsoft Works for Windows v3, Windows for Workgroups 3.11 and MS-DOS 6.2
- 12 months on-site warranty

£799

Special
LOW
PRICE

The Lotus Graduate

- 486DX 40MHz processor
- 210Mb hard disk
- 128K Cache
- 4Mb RAM exp. to 128Mb
- 14" SVGA Low Radiation MPRII non-interlaced Colour Monitor (0.28 dot pitch)
- 1Mb VESA Local Bus Graphics Accel.
- 3.5" 1.44Mb Floppy Disk
- 2 VESA Local Bus slots
- 2 serial, 1 Parallel Ports
- 1 x 8-bit, 6 x 16-bit (2VL) slots
- Microsoft compatible mouse
- Lotus Software Bundle* including: Lotus Ami Pro 3.1, Lotus Approach 3.0, Lotus Improv 2.1, Lotus SmartPics Lotus Organizer 1.0, Right Hand Desk
- Windows for Workgroups 3.11 and MS-DOS 6.2
- 12 months on-site warranty

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The Brother Tutors - Low cost entry to Windows



If you're looking for a low cost entry to the world of Windows based computing, the Brother Tutor 386 and 486 PC's have been designed for you. With a choice of fast 40MHz 386SX or 33MHz 486SX processors, 14" SVGA Colour Monitor and pre-installed software including Microsoft Works for Windows™ v3 integrated package, the Brother Tutors offer truly excellent value even by Brother's standards.

The Brother Tutor

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- 512K Video Memory
- 3.5" 1.44Mb Floppy disk
- 200 Watt PSU
- 2 serial, 1 parallel Ports
- 6 x 16 bit Expansion Slots
- Microsoft compatible mouse
- MS Works for Windows v3, MS-DOS 6.2, Windows for Workgroups 3.11
- 12 months on-site warranty

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£549 with
170Mb Hard Disk

The Brother Tutor 486

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- 14" SVGA colour monitor
- 512K Video Memory
- 3.5" 1.44Mb Floppy disk
- 200 Watt PSU
- 2 serial, 1 parallel Ports
- 6 x 16 bit Expansion Slots
- Microsoft compatible mouse
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cheque clearance. Carriage will be
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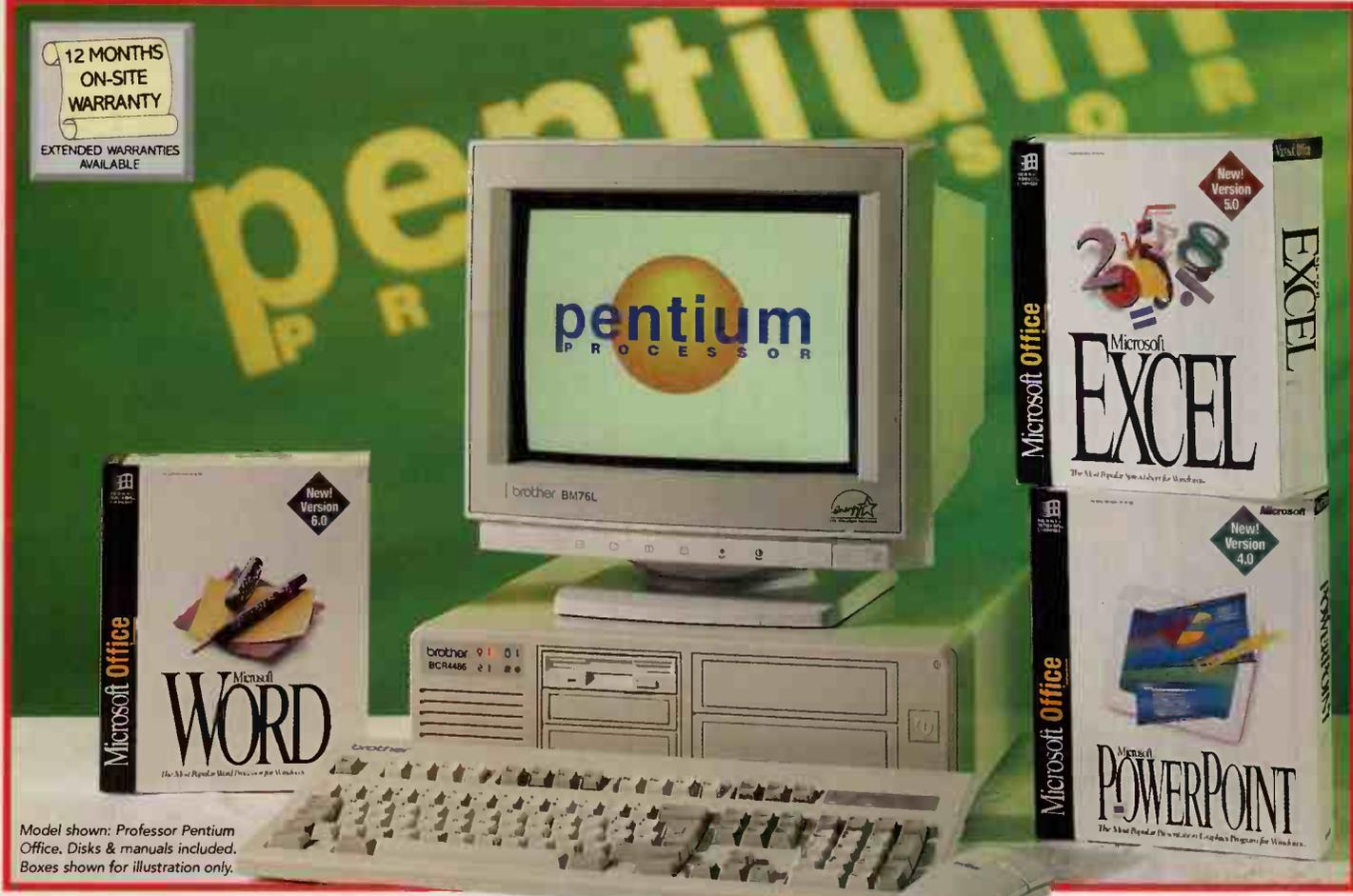
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New Professor Series

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12 MONTHS ON-SITE WARRANTY
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Model shown: Professor Pentium Office. Disks & manuals included. Boxes shown for illustration only.

If you're looking for the fastest PC's around, the New Brother Professor Series has been designed for you. They're powerful, fast, highly specified and ready to run all your toughest applications at record-breaking speeds.

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Brother 60MHz Pentium Systems
featuring 8Mb, PCI Graphics and Hard Disk Controller
from **£1199**

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- 420Mb Hard Disk
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- 1Mb VESA Local Bus Graphics Accelerator
- 3.5" 1.44Mb Floppy Disk
- 2 VESA Local Bus slots
- 2 serial, 1 Parallel Ports
- 1 x 8-bit, 6 x 16-bit (2VL) slots
- Microsoft Works for Windows v.3 integrated software package (WordProcessor, Spreadsheet, Database, Communications)
- Windows for Workgroups 3.11 and MS-DOS 6.2
- Microsoft compatible mouse
- Desktop Case
- 12 months on-site warranty

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Lotus Professor

Lotus Smartsuite v.3 inc:
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Lotus Ami Pro 3.1,
Lotus Approach 3.0,
Lotus Freelance Graphics
Lotus Organiser 1.1,
Right Hand Desk
(disks & manuals available at extra cost. Box shown for illustration)



- 486DX2 66MHz Processor
- 420Mb Hard Disk
- 128K Cache
- 8Mb RAM exp. to 128Mb
- 14" SVGA Low Radiation MPRII, Non-interlaced Colour Monitor (0.28 dp), EPA EnergyStar
- 1Mb VESA Local Bus Graphics Accelerator
- 3.5" 1.44Mb Floppy Disk
- 2 VESA Local Bus slots
- 2 serial, 1 Parallel Ports
- 1 x 8-bit, 6 x 16-bit (2VL) slots
- Lotus Smartsuite v3.0
- Windows for Workgroups 3.11 and MS-DOS 6.2
- Microsoft compatible mouse
- Desktop Case
- 12 months on-site warranty

£1079

Office Professor

Microsoft Office v.4.2 inc:
MS Office Manager,
MS Word for Windows v.6,
MS Excel for Windows v.5,
MS PowerPoint for Win. v.4,
MS Mail License,
(disks & manuals included. Box shown for illustration only)



- 486DX2 66MHz Processor
- 420Mb Hard Disk
- 128K Cache
- 8Mb RAM exp. to 128Mb
- 14" SVGA Low Radiation MPRII, Non-interlaced Colour Monitor (0.28 dp), EPA EnergyStar
- 1Mb VESA Local Bus Graphics Accelerator
- 3.5" 1.44Mb Floppy Disk
- 2 VESA Local Bus slots
- 2 serial, 1 Parallel Ports
- 1 x 8-bit, 6 x 16-bit (2VL) slots
- Microsoft Office v4.2
- Windows for Workgroups 3.11 and MS-DOS 6.2
- Microsoft compatible mouse
- Desktop Case
- 12 months on-site warranty

£1179

The Professor Pentium Office

Microsoft Office v.4.2 inc:
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MS Word for Windows v.6,
MS Excel for Windows v.5,
MS PowerPoint for Win. v.4,
MS Mail License,
(disks & manuals included. Box shown for illustration only)



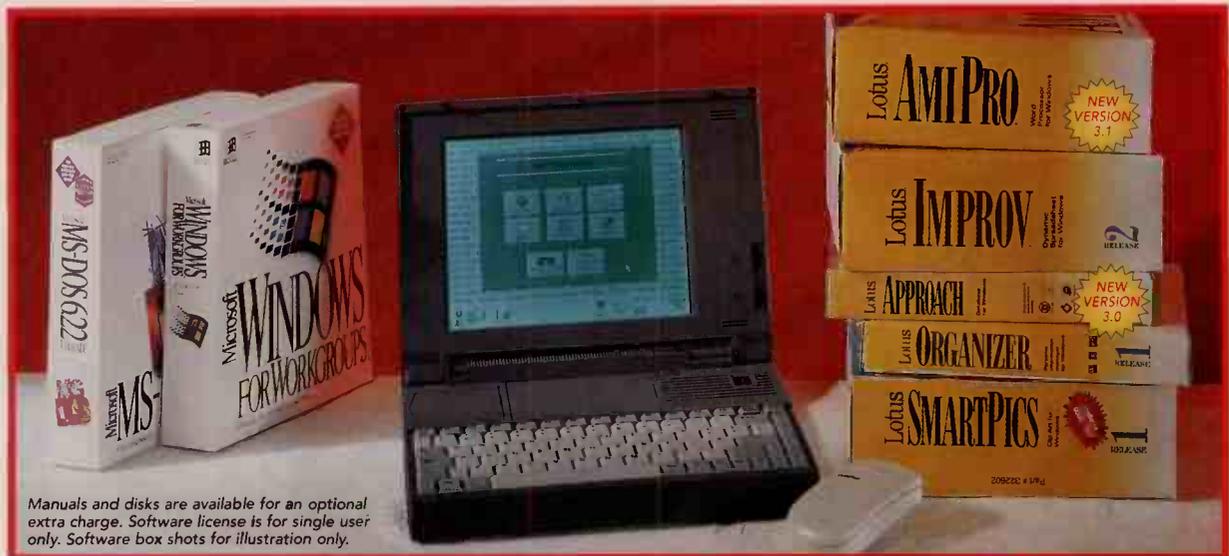
- Pentium 60MHz Processor for lightning fast 64-bit power
- PCI bus optimises data throughput
- 420Mb Hard Disk
- 256K Cache
- 8Mb RAM exp. to 128Mb
- 14" SVGA Low Radiation MPRII, Non-interlaced Colour Monitor (0.28 dp), EPA EnergyStar
- PCI 1Mb Graphic Accelerator
- 3.5" 1.44Mb Floppy Disk
- 2 serial, 1 Parallel Ports
- 4 PCI bus and 4 ISA 16-bit slots
- Microsoft Office v4.2
- Windows for Workgroups 3.11 and MS-DOS 6.2
- Microsoft compatible mouse
- Desktop Case
- 12 months on-site warranty

£1399

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The Brother & Lotus Notebook



Manuals and disks are available for an optional extra charge. Software license is for single user only. Software box shots for illustration only.

Brother brings you an exclusive notebook solution that represents truly amazing value. The powerful Brother BCP431V notebook with its fast 486DX 33MHz processor and large 250Mb hard disk, together with a complete suite of Lotus Windows software pre-installed and ready to run for your convenience. This solution provides the answer to all your needs - word processing, spreadsheet, database, personal organising plus clipart graphics. All Lotus documentation is pre-loaded to provide on-line help as you need it, and the package includes the Right Hand Desk utility program to manage your Lotus system.

LOTUS SOFTWARE

All this software is Pre-installed and ready to run

- Lotus Ami Pro 3.1
- Lotus Improv 2.1
- Lotus Smart Pics
- Lotus Organizer 1.0
- Lotus Approach 3.0
- Right Hand Desk

* Disks and manuals extra. Does not include Microsoft Works



Brother BCP431V

- 486DX 33MHz Processor
- Maths Co-processor
- Internal cache memory
- 250Mb Hard Disk
- 4Mb RAM expandable to 8Mb
- Power saving conservation feature on Hard Disk and LCD
- Easy to read back-lit 10" VGA Mono LCD with 64 greyscales
- 3.5" 1.44Mb floppy disk drive
- 2 x Serial, 1 x Parallel, SVGA monitor and keyboard ports
- 2-4 hours average charge time
- Password protection
- Microsoft compatible Mouse
- Lotus Software Bundle
- Windows for Workgroups 3.11, MS-DOS 6.2
- 292(w) x 217(d) x 46(h) mm
- Weighs only 3Kg
- 12 Month on-site warranty
- Wide range of options: carry case, car adaptor, trackerball, extra battery, LAN Ethernet D link, keyboard adaptor.

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No other Notebook is this lightweight, this powerful, this flexible or this affordable **£699**

For ultimate portability without sacrificing usability or performance, the Brother LiteBook sub-notebook is what you've been waiting for. Never has so much computing power been packed into such a compact unit. PCMCIA slots give you access to optional plug-in cards that can provide fax/modem, extra memory and much more. The Sleep and Suspend feature extends usage time and the Nickel Metal Hydride battery provides up to 4 hours of power. To complete the package Microsoft Works v3.0 is pre-loaded to provide a complete suite of applications the moment you power up.

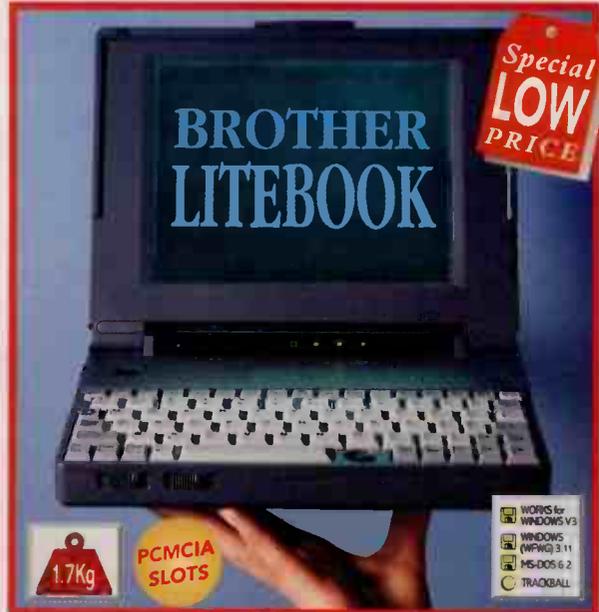
The Brother Traveller



The Brother Litebook with GemFax PCMCIA Fax/Modem and Communications Software

- PCMCIA card slots straight into Litebook
- Gain access to the InterNet and Information Superhighway with FREE subscription + £25 on-line time
- Free Communication Software (Windows & DOS)
- Group III Send and Receive Fax
- 2400 bits per second Modem
- Dataflex 5 Year Guarantee

£799



- 486SLC 25MHz processor
- Built-in co-processor
- 4Mb RAM exp. to 20Mb
- 80Mb Hard Disk
- PCMCIA slots: 2 x type II, 1 x type III
- External 3.5" 1.44Mb FDD
- 8.5" VGA LCD 64 Greyscales
- External colour (1024 x 768) port
- Ports: 1 serial, 1 parallel, 1 SVGA + External keyboard, 1 External Floppy Disk Drive
- Built-in Micro Trackball with left/right buttons
- Microsoft Works 3.0 package includes Word Processing, Spreadsheet, Database and Communications
- Microsoft Windows 3.11, MS-DOS 6.2
- Removable Long-Life NiHi battery
- 252mm x 192mm x 39mm
- Weight 1.7kg with battery
- 12 months on-site warranty

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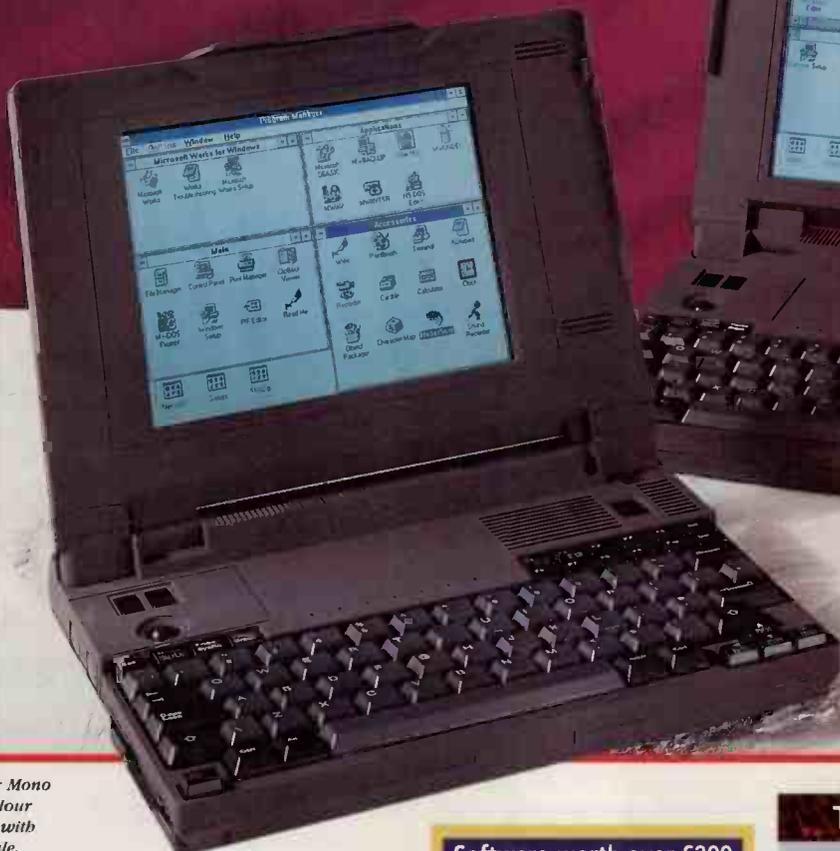
New Brother Trekker Notebooks

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50MHz
PROCESSOR

Trekker 486 Mono

£ **749**



Trekker 486 Colour

£ **969**

Brother Trekker Mono and Trekker Colour come standard with Trackball Module.

The Brother Trekker is the perfect business travelling partner.

It is one of the world's smallest and most lightweight portable computers yet packs the power of the Superfast 486SLC2 50MHz processor and is equipped with a formidable array of features you would expect to find on your desktop PC. Giving you the power to run your applications while visiting customers on-site, while on the move or to bring work home.

Designed for flexibility, the Brother Trekker features Personality Modules - exchangeable cartridges enabling you to tailor the Trekker for your own use. The Trekker comes with a Trackball device as standard, optional modules include a Pocket Fax/Modem, Lan Ethernet Adaptor and a second RS232 port.

Weighing a mere 2.3Kg and approximately the size of an A4 sheet, the Brother Trekker combines the most advanced technology with superb portability enabling it to readily perform as your primary computer, as well as being your perfect portable companion.

Software worth over £200



- Microsoft® Works for Windows V3
- MS-DOS 6.2
- Microsoft Windows for Workgroups 3.11

Documentation and disks included. Software boxes shown for illustration only.

TREKKER SPECIFICATIONS

- 486SLC2 50MHz CPU
- 4Mb RAM
- 120Mb Hard Disk
- Built-in 3.5" 1.44Mb floppy disk drive
- Mono: 10" VGA LCD 64 greyscales
- Colour: 8.2" passive matrix colour LCD
- External colour (1024 x 768) SVGA port
- Micro Trackball module with left/right buttons
- 80-key keyboard with embedded numeric keypad
- Suspend/Resume feature
- Ports: 1 serial, 1 parallel, 1 SVGA + External keyboard
- 2-4 hour fast charge NiCd battery
- Microsoft Works v3.0 integrated package includes Word Processing, Spreadsheet, Database, Communications
- Microsoft Windows for Workgroups 3.11, MS-DOS 6.2
- 279mm x 210mm x 40mm
- Weight 2.3kg
- 12 Months on-site warranty

The Brother Trekker Traveller



The Brother Trekker Colour with Pocket GemFax Fax/Modem and Communications Software

- Gain access to the InterNet and Information Superhighway with FREE subscription + £25 on-line time
- Free Communication Software (Windows & DOS)
- Group III Send and Receive Fax
- 2400 bits per second Modem
- Dataflex 5 Year Guarantee

£ **999**

TREKKER OPTIONS

Upgrade to 250Mb HD	£79	Car Adaptor	£49
Additional 4Mb RAM	£150	Executive Carry Case	£49
RS232 Module	£13		

Brother Trekker with 250Mb Hard Disk and Lotus Bundle 1* (Lotus Ami Pro 3.1, Lotus Improv 2.1, Lotus Approach 3.0, Lotus Organiser 1.0, Lotus Smart Pics, Right Hand Desk)

Mono: **£848** Colour: **£1068**



Brother Trekker with 250Mb Hard Disk and Lotus Smartsuite 3.0*

Mono: **£899** Colour: **£1119**

* Disks and manuals extra. Does not include Microsoft Works

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30 day no-quibble
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MS-DOS,
Windows and
mouse pre-
installed with
original
documentation

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Model	Processor	10" Mono	10" Dual Scan	10" TFT Colour
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Brother Pro'Book 486DX33 Mono with 250Mb Hard Disk and Lotus Bundle 1 (inc: Lotus Ami Pro 3.1, Lotus Improv 2.1, Lotus Approach 3.0, Lotus Organiser 1.0, Lotus Smart Pics, Right Hand Desk)	£1148	
Brother Pro'Book 486DX33 Mono with 250Mb Hard Disk and Lotus Smartsuite 3.0*	£1208	

*Disks and manuals extra. Does not include Microsoft Works.

Pro'Book Specifications

- **Choice of Display:**
Mono 10" VGA LCD 64 greyscales
Dual Scan Colour 10"
Colour Active Matrix TFT 10"
- **Choice of Processor:**
486DX 33MHz, 486DX2 50MHz,
486DX4 75MHz, 486DX4 100MHz
- 4Mb RAM exp. to 8Mb, 16Mb or 32Mb
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(250Mb/340Mb/520Mb options)
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The new HL-630 Superfast All-Rounder. Ordinary Windows-only printers don't look so clever now.

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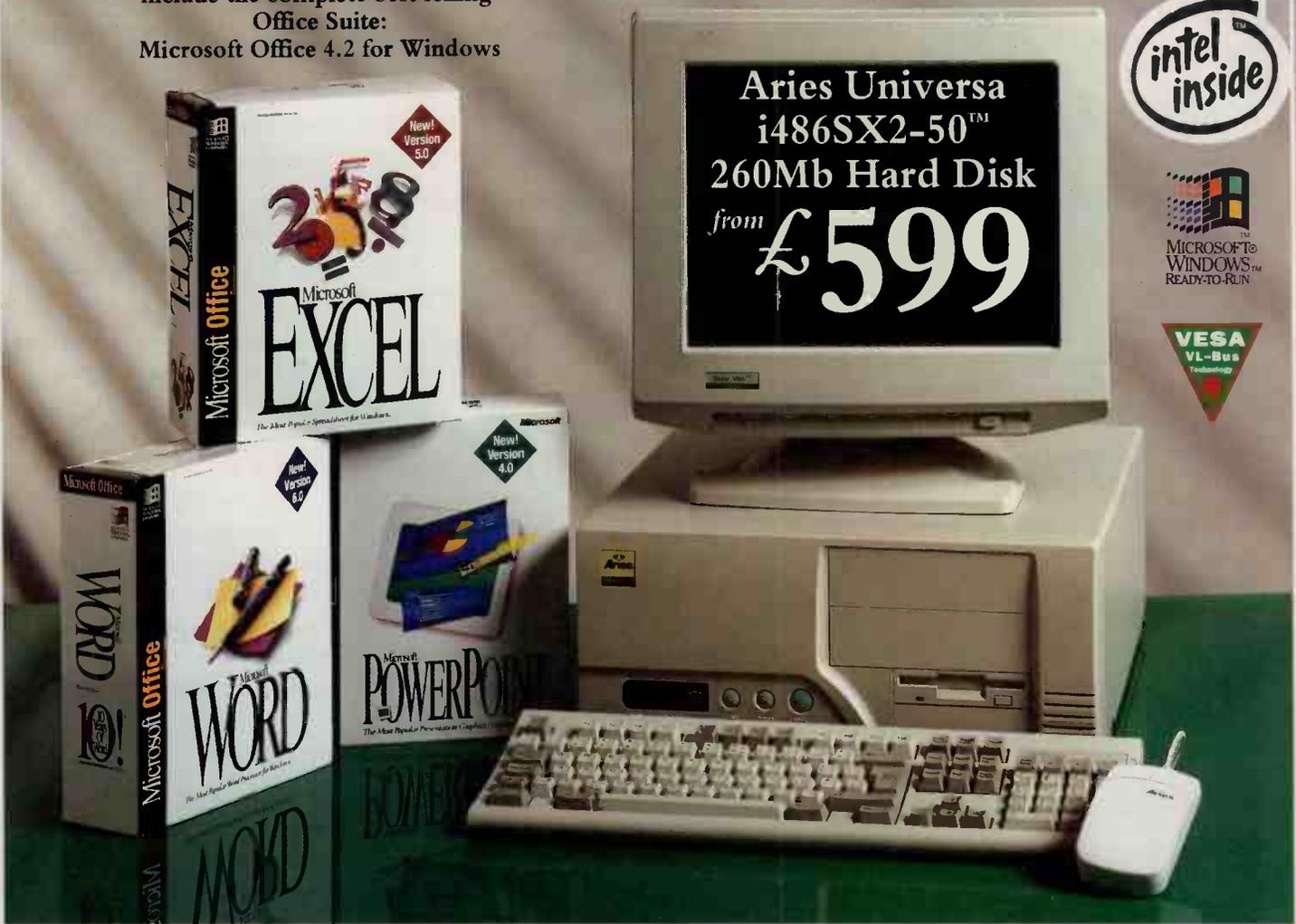
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i486SX2-50™
260Mb Hard Disk
from **£599**

* Monitor/Case may be cosmetically different to that shown. Software boxes shown for illustrative purposes only. All Office Software supplied pre-loaded for your convenience with built-in tutorial. Disks and manuals available as an optional extra

ARIES *Universa* PC SYSTEMS

System Specification:

- ◆ Intel i486 Processor
- ◆ Processor Upgradable VL-Bus Motherboard to Pentium® Overdrive
- ◆ 4Mb RAM expandable to 64Mb
- ◆ 260Mb Hard Disk (12ms)
- ◆ 16 bit Super VGA Graphics Card
- ◆ Super VGA 1024 x 768 Colour Monitor*
- ◆ 3.5" 1.44Mb Floppy Drive
- ◆ 102 key enhanced keyboard
- ◆ Dual Serial, Parallel and Games Port
- ◆ MS compatible mouse
- ◆ MS DOS v6.2
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- ◆ Lifetime Technical Support Hotline

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System Specification:

- ◆ Intel i486 Processor
- ◆ Processor Upgradable VL-Bus Mother board to Pentium® Overdrive
- ◆ 4Mb RAM expandable to 64Mb
- ◆ 420Mb Hard Disk (12ms)
- ◆ 16 bit Super VGA Graphics Card
- ◆ Super VGA 1024 x 768 Colour Monitor*
- ◆ 3.5" 1.44Mb Floppy Drive
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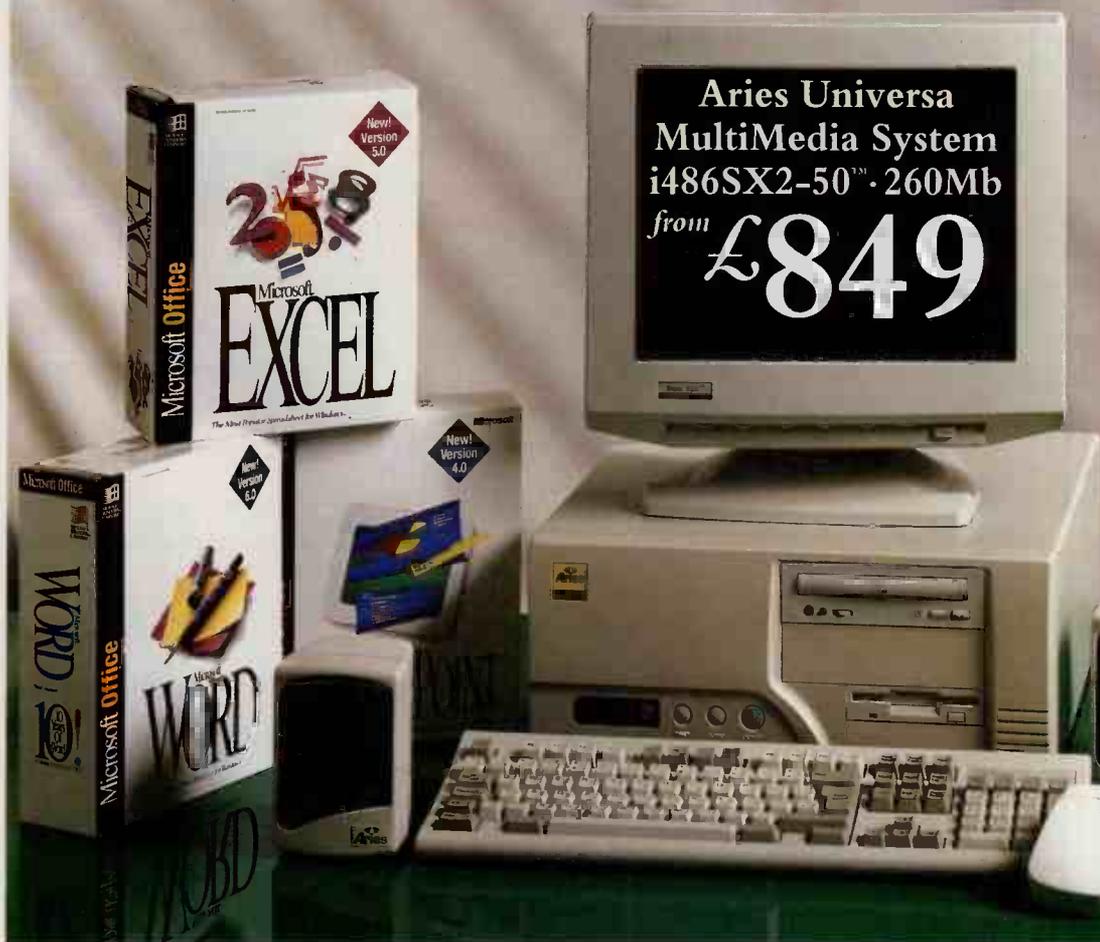
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Universa MultiMedia



Bundled CD software with Aries Universa Multimedia systems

- ◆ MS Works for Windows
- ◆ MS Encarta 1995
- ◆ MS Money
- ◆ MS Dangerous Creatures
- ◆ MS Golf
- ◆ MS Scenes (3.5" Disks)
- ◆ MS Multimedia Jumpstart
- ◆ Paramount Movie Select
- ◆ Home Medical Advisor
- ◆ Arts & Letters Warbirds
- ◆ TIME Man of the Year
- ◆ PC Animation festival
- ◆ World Vista Atlas
- ◆ World Fact Book
- ◆ Best of Media Clips
- ◆ Fantasia's 2000 Fonts
- ◆ Rock, Rap'N Roll
- ◆ PC Karaoke - Classic Oldies
- ◆ PC Karaoke - Family Fun
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- ◆ Sherlock Holmes - Detective
- ◆ Space Quest 4
- ◆ Battle Chess Enhanced
- ◆ Star Trek 7
- ◆ Sierra's Kings Quest V
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- ◆ 10 out of 10 - Junior Essntls.

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ARIES *Universa* MULTIMEDIA SYSTEMS

System Specification:

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- ◆ Bundled 30 Software titles on 25 CDs worth over £500
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- ◆ Processor Upgradable VL-Bus Motherboard to Pentium® Overdrive
- ◆ 4Mb RAM expandable to 64Mb
- ◆ 260Mb Hard Disk (12ms)
- ◆ 16 bit Super VGA Graphics Card
- ◆ Super VGA 1024 x 768 Colour Monitor*
- ◆ 3.5" 1.44Mb Floppy Drive
- ◆ 102 key enhanced keyboard
- ◆ Dual Serial, Parallel, Games Port
- ◆ MS compatible mouse
- ◆ MS DOS v6.2
- ◆ MS Windows v3.11
- ◆ Lifetime Technical Support Hotline

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System Specification:

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- ◆ Intel i486 Processor

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- ◆ 420Mb Hard Disk (12ms)
- ◆ 16 bit Super VGA Graphics Card
- ◆ Super VGA 1024 x 768 Colour Monitor*
- ◆ 3.5" 1.44Mb Floppy Drive
- ◆ 102 key enhanced keyboard
- ◆ Dual Serial, Parallel, Games Port
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Multimedia Bundle: 30 Titles on 25 CDs



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 - ◆ 256K Cache
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*Case styling may be different from that shown

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Code	Description	Additional Cost
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UGA 1610/A	Upgrade to 17" Aries EnergyPro 7560i 0.26mm dp Non-Int. Microprocessor Controlled Monito	£258
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UGA 0310/A	Upgrade to VL-Bus 2Mb IDE HD Cache Controller	£149
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- ◆ Flash ROM System BIOS ◆ CPU Cooling Fan
- ◆ 2Mb PCI Graphics Accelerator Card with DPMS Support
- ◆ 15" Aries EnergyPro 6000i, EnergyStar, Low Radiation (Swedish MPR II standard), Non-Interlaced 0.28mm dot Pitch Colour Monitor
- ◆ 3 PCI Slots with Four 16-bit ISA slots (1 ISA/PCI slot)
- ◆ 200W Low noise, TÜV approved Power supply
- ◆ Mini Tower Case ◆ 102 key tactile keyboard
- ◆ MS compatible mouse ◆ MS DOS v6.2 + Enhanced Tools
- ◆ MS Windows for Workgroups v3.11
- ◆ 12 months On-Site Maintenance
- ◆ Lifetime Technical Hotline

UNBEATABLE VALUE £1699



Optional Upgrades Perfecta Pentium Systems

- Memory**
- UGA1340/A 8Mb to 16Mb RAM Upgrade **£240**
 - UGA1350/A 8Mb to 32Mb RAM Upgrade **£495**
 - UGA1360/A 8Mb to 64Mb RAM Upgrade **£989**
- Hard Disk**
- UGA1710A Upgrade 365Mb to 528Mb **£89**
 - UGA1720/A Upgrade 365Mb to 1Gb **£289**
 - UGA1730/A Upgrade 365Mb to 2Gb SCSI* **£849**
- Monitors**
- UGA 1740/A Upgrade 15" to 17" Aries EnergyPro 7560i **£199**
- Graphics Card**
- UGA1370/A Upgrade 1Mb PCI to Diamond Viper PCI 2Mb **£189**
 - UGA0090/A Upgrade 2Mb PCI to Diamond Viper PCI 2Mb **£149**
 - UGA1750/A Upgrade 2Mb PCI to Diamond Viper Pro 4Mb **£299**

*Requires SCSI Controller Card

Offers and all items are subject to availability. Prices may have to change for reasons beyond our control. Specifications of all products are correct at time of going to press and given in good faith, but may change without notice. All trademarks acknowledged. Goods are sold subject to our standard Terms & Conditions of Sale available on request. E&OE. Phone for the very latest prices and the quickest delivery options. Software supplied will be cosmetically different from that shown.

Networking Made Easy

Watford Electronics can now offer you a solution to your networking requirements, no matter how large or small. You can be confident that we will give the best advice and support that you have come to expect from Watford. We stock a wide range of Ethernet products from manufacturers such as SMC, 3Com, Intel, Genius and others, and we also have our own Aries branded products.

WATFORD
the Award Winners
PRICE PROMISE
If you can find a better price call us, we'll try and beat it.

ETHERNET ADAPTERS

16-bit ISA Bus Adapters	Connection	Single Card Pack Part No.	Price	5 Card Pack Part No.	Price
3 Com Etherlink III	BNC/AUI	CNA0610	£69	CNA1900	£321
3 Com Etherlink III	UTP/AUI	CNA0620	£69	CNA1910	£321
3 Com Etherlink III	BNC/UTP/AUI	CNA0630	£79	CNA1920	£365
Aries NE2000 II	BNC/UTP	CNA0040	£32	CNA1710	£148
D-Link DE-220	BNC	CNA1550	£59	CNA1720	£345
D-Link DE-220CT	BNC/UTP	CNA1570	£69	CNA1730	£349
Genius GE2000 II	BNC/UTP	CNA1130	£32	CNA0940	£148
Intel EtherExpress 16 Flash	BNC/AUI	CNA1460	£69	CNA2020	£325
Intel EtherExpress 16T Flash	UNC/AUI	CNA1470	£69	CNA2030	£325
Intel EtherExpress 16C Flash	BNC/UTP/AUI	CNA1480	£79	CNA2040	£369
Novell NE2000 Plus	BNC	CNA1510	£49	CNA2070	£249
Novell NE2000T	UTP	CNA1250	£55	CNA2080	£285
SMC Elite 16 Ultra	BNC	CNA0910	£61	CNA1200	£349 (6pk)
SMC Elite 16T Ultra	UTP	CNA0880	£61	CNA0900	£349 (6pk)
SMC Elite 16C Ultra	BNC/UTP/AUI	CNA0890	£67	CNA1210	£395 (6pk)
SMC Elite EZ	BNC	CNA2600	£66	CNA2640	£309
SMC Elite Z	UTP	CNA2610	£66	CNA2650	£309
SMC Elite ZA	BNC/UTP	CNA2620	£73	CNA2660	£339
32-bit EISA Bus Adapters	Connection	Single Card Pack Part No.	Price	5 Card Pack Part No.	Price
3 Com Etherlink III	BNC/AUI	CNA0710	£143	CNA1950	£699
3 Com Etherlink III	UTP/AUI	CNA0720	£143	CNA1960	£699
3 Com Etherlink III	BNC/UTP	CNA1370	£169	CNA0960	£849
Intel EtherExpress 32 Flash	BNC/UTP/AUI	CNA1420	£189	CNA2670	£799
SMC Elite 32C Ultra	BNC/UTP/AUI	CNA1780	£159	CNA1740	£899
MCA Bus (PS/2) Adapters	Connection	Single Card Pack Part No.	Price	5 Card Pack Part No.	Price
3 Com Etherlink III	BNC/AUI	CNA0730	£146	CNA1930	£709
3 Com Etherlink III	UTP/AUI	CNA0740	£146	CNA1940	£709
D-Link DE-320	BNC/UTP	CNA1580	£139		
D-Link DE-320M	BNC/UTP	CNA1360	£159	CNA0960	£779
Genius E162M	BNC/AUI	CNA1530	£159		
Novell NE/2	BNC	CNA0350	£119		
SMC Elite/A	UTP	CNA0790	£119		
VESA Local Bus Adapters	Connection	Single Card Pack Part No.	Price	5 Card Pack Part No.	Price
Aries CE3200-VI	BNC/UTP/AUI	CNA1880	£159	CNA2670	£779
D-Link DE-500CT	BNC/UTP	CNA1750	£225		
PCI Bus Adapters	Connection	Single Card Pack Part No.	Price	5 Card Pack Part No.	Price
SMC EtherPower	BNC/UTP	CNA1240	£135	CNA2700	£749
Parallel Port Adapters	Connection	Single Card Pack Part No.	Price	5 Card Pack Part No.	Price
Genius E3000 II	BNC/UTP	CNA1145	£76	CNA1230	£372
D-Link DE-620CT	BNC/UTP	CNA1660	£129		
SMC EliteNote	BNC/UTP	CNA1630	£199		
PCMCIA Adapters	Connection	Single Card Pack Part No.	Price	5 Card Pack Part No.	Price
3 Com Etherlink III	BNC/UTP	CNA1490	£149		
D-Link DE-650CT	BNC/UTP	CNA7210	£135		
Genius ME3000	BNC/UTP	CNA1620	£149	CNA1770	£729
SMC EliteCard	BNC/UTP	CNA2630	£149		

Personal Network Networking Kits



Link up to 30 PCs with Novell's new Peer to Peer networking software, and have shared access to files, printers and CD ROM drives, all at the push of a button. With support for DOS and Windows, Personal Network is the ideal low cost solution for small scale installations.

- ◆ 2 User Pack £89
- ◆ 5 User Pack £249
- ◆ 10 User Pack £439
- ◆ Extra User Pack £59
- ◆ Notebook Pack £119
- ◆ PCMCIA Pack £179

NOVELL

All kits contain Ethernet card, 5m cables, software and connectors



Microsoft Windows for Workgroups Networking Kits

Now, Windows 3.1 users can have easy access to shared resources - such as printers, fax modems, CD-ROM drives and data files, all at the click of a mouse button. Send messages to other users or even have 'live' conversations over the network.

- | For users with Windows 3.1 | | For users without Windows 3.1 | |
|----------------------------|------|-------------------------------|------|
| ◆ 2 User Starter Kit | £235 | ◆ 2 User Add-On Kit | £149 |
| ◆ 5 User Starter Kit | £595 | ◆ 5 User Add-On Kit | £375 |
| ◆ Extra User Starter Kit | £115 | ◆ Extra User Add-On Kit | £69 |
| ◆ Notebook Starter Kit | £155 | ◆ Notebook Add-On Kit | £119 |

All packs contain Ethernet card, 5m cables, software and connectors.

ETHERNET CABLING

Length	1m	3m	5m	10m	15m	20m	30m	50m	100m	300m
Thinnet UTP	£3	£5	£6	£9	£12	£17	£25	£35	£39	£115
UTP	£2	£3	£5	£8	£10	£14	£22	£30		£149

Genius Ethernet Products



GE2000 II
Ethernet Card

£32



E3000 II
Parallel Port Adapter

£76

The GE2000 is a 16-bit Ethernet card which is 100% NE2000 compatible. Installation is simple - just plug in and run the software.

- ◆ BNC and UTP connections as standard
- ◆ 35% faster than Novell NE2000 cards
- ◆ Support for Netware, FWWG & TCP/IP

Single: £32 3 Pack: £89 5 Pack: £148

The E3000 II Ethernet adapter offers higher performance than any other similarly priced model available.

- ◆ BNC and UTP connections as standard
- ◆ Through connector for local printer
- ◆ Support for bi-directional and enhanced parallel port
- ◆ PS/2 mouse port power cable included

Single: £76 3 Pack: £219 5 Pack: £369



Personal Network Card Pack
-Genius GE2000 II Ethernet card
-Novell Personal Network
Special Offer Price £49

NOVELL NETWORK

No of Users	5	10	25	50	100	250	Manuals
Netware 3.12	£375	£905	£1335	£1825	£2549	£4580	£155
Netware 4.02 (CD)	£485	£1159	£1790	£2389	£3369	£5999	£135

Call for prices on Netware Upgrades and also for Educational Discounts

ETHERNET HUBS

3 Com	UTP	BNC	AUI	SMNP	Price
LinkBuilder TP/12	12	-	1	no	£259
LinkBuilder FMS II	12	opt	1	opt	£399
Aries	UTP	BNC	AUI	SMNP	Price
EH-8	8	1	1	no	£159
EH-12	12	1	1	no	£259
EH-16	16	1	1	no	£299
Genius	UTP	BNC	AUI	SMNP	Price
GH1000	12	1	2	opt	£329
SMC	UTP	BNC	AUI	SMNP	Price
Elite 3812TP	12	opt	2	opt	£399
Tiger TP6	6	-	1	no	£159
Tiger TP12	12	-	1	no	£299

REPEATERS

- ◆ Allied Telesis 2 port Repeater £399
- ◆ Allied Telesis 4 port Repeater £659
- ◆ D-Link DE808 8 port Repeater £529
- ◆ D-Link DE1608 8 port Repeater £679
- ◆ Genius E5020 2 port Repeater £299
- ◆ Genius E5021 4 port Repeater £499

TRANSCEIVERS

- ◆ Allied Telesis Micro Transceiver £35
- ◆ Allied Telesis 2 port Transceiver £299
- ◆ Allied Telesis 4 port Transceiver £399
- ◆ Media adaptor for above £21

PRINTER SERVERS

HP JetDirect		
JetDirect Card - LaserJet 4/4Si	£299	
JetDirect Card - LaserJet III/IIID	£279	
JetDirect - External	£299	
Intel NetPort		
NetPort II - 2 printers	£255	
NetPort Express EL - 2 printers	£269	
NetPort Express XL - 3 printers	£339	

UPS SYSTEMS

Protect your computer systems from power cuts and unstable mains supplies with an uninterruptible power supply. Optional interface kits are available to provide automatic shutdown of filesaver when power failure occurs.

- Upsonic PC Might Standby UPS**
- ◆ PC Might 25 - 250VA Backup UPS £84
 - ◆ PC Might 35 - 350VA Backup UPS £129
 - ◆ PC Might 50 - 500VA Backup UPS £168
 - ◆ PC Might 80 - 800VA Backup UPS £279
 - ◆ PC Might 140 - 1400VA Backup UPS £448
 - ◆ PowerMon Interface/Software (State OS) £99
- American Power Conversion UPS**
- ◆ BK250I-250VA Backup UPS £89
 - ◆ BK600I-600VA Backup UPS £179
 - ◆ AP250I-250VA Smart UPS £189
 - ◆ AP600I-600VA Smart UPS £219
 - ◆ AP900I-900VA Smart UPS £469
 - ◆ AP1250I-1250VA Smart UPS £529
 - ◆ PowerChute Interface/Software (state OS) £59

We stock a wide range of connectors and network accessories for permanent installations - call 01582 745555 for best prices.

TOOLS & CONNECTORS

- ◆ Thin Ethernet Crimp Tool £17.00
- ◆ RJ45 Crimp Tool £19.00
- ◆ Thin Ethernet Cable Stripper £9.00
- ◆ Round Cable Stripper £12.00
- ◆ BNC Crimp Plug £0.90
- ◆ BNC T Connector £2.00
- ◆ BNC In-line coupler £1.75
- ◆ BNC 50ohm Terminator £1.25
- ◆ BNC 50ohm Terminator & Earth £1.55
- ◆ RJ45 Crimp Plug £0.45
- ◆ EAD Thinwire Tap Socket System £25.00
- ◆ EAD Thinwire Drop Leads - from £26.00
- ◆ AMP Thinner Tap Socket System £17.00
- ◆ AMP Thinner Drop Leads - from £26.00
- ◆ Safenet Cabling System £15.00
- ◆ Safenet Drop Leads - from £15.00
- ◆ RJ45 24 Way Patch Panel - 19" rack mount £0.45



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The Aries *Perfecta*® 7000 Series

The Most Advanced Yet!

**NOW WITH
340Mb
Hard Disk
as Standard**



Notebook shown here with 19mm Trackerball with 2 buttons supplied as standard

Introducing a new range of beautifully designed notebooks that genuinely give you the power and facilities you expect from your desktop PC. The Aries Perfecta 7000 is packed with intelligent energy-saving features that ensure you get longer life and safer data. PCMCIA flexibility gives fax/modem communications on the move and Ethernet in the office (with optional cards). With a choice of processors up to DX4 100MHz and RAM expandable to a mammoth 32Mb, the 7000 packs the power to run your Windows applications, and an ergonomic design to make them easier to use. While the standard trackerball or the new optional trackpoint control stick allows you to control the cursor smoothly and effortlessly.

We've taken the portable computer a long way, think where you can take it.



Notebook shown here with Optional TrackPoint Control Stick



Ergonomical designed sloping palm rests

i486sx™-33 Mono

£1129

i486sx™-33 Dual Scan Colour

£1468

Aries *Perfecta* 7000 Series

- ◆ Intel SL-Enhanced CPU
- ◆ 4Mb RAM expandable to 32Mb
- ◆ 340Mb Hard Disk Drive
- ◆ L2 Write-Back Cache
- ◆ Advanced Power Management
- ◆ LCD Status Indicator
- ◆ Fully Modularised Design - Upgradable CPU, LCD, Removable Hard Disk & Keyboard
- ◆ VESA Bus Video with GUI accelerator
- ◆ Advance PMU Function
- ◆ Mono/Stereo 16 bit Sound System (Optional)
- ◆ Audio Line (In/Out) with volume control
- ◆ Built-in Speaker/Microphone (requires sound system)
- ◆ 1.44Mb 3.5" Floppy Drive
- ◆ 82 key QWERTY Keyboard
- ◆ 19mm Trackerball (Optional Track-point device)
- ◆ PCMCIA slots (2 x Type II/1 x Type III)
- ◆ Hi-Speed 16C550 Serial Port
- ◆ Enhanced Parallel Port (EPP/ECP support)
- ◆ External Super VGA Monitor Port
- ◆ External Keyboard/PS/2 Mouse connector
- ◆ Optional Internal 14.4K Fax/Modem
- ◆ Rechargeable Ni-MH Battery Pack
- ◆ Weight: 3Kg
- ◆ Carrying Case

Fully Charged Battery Life:
Mono: Up to 6 hrs* Colour Dual Scan: Up to 5hrs
* PC Magazine Battery Run-Down test: The mono machine lasted for over 9 hours

LOW POWER 3.3V

All the components in the notebook run at 3.3V, giving up to three times longer life.

SOUND PLUG-IN

Mono/Stereo sound system with built-in speaker/microphone by adding a soundcard.

SUSPEND TO DISK

Suspend to memory or suspend to disk ensures data is never lost when you leave the notebook.

EXTERNAL STATUS INDICATOR

"At a glance" multi colour indicator on the top cover shows if machine is charging, charged, suspended with battery charging or charged.

INTERNAL STATUS INDICATOR PANEL

12 distinct icons will display, flash or change appearance to give you a complete report on the state of the machine including a 5 step graduated remaining charge gauge.

ADVANCED POWER MANAGEMENT

Complete with a comprehensive set of 16 features that will allow you to customise the operation of the machine to your benefit.

FLEXIBLE PCMCIA

Compartment for two type I/II or one type III PCMCIA slot with removable cover.

UP TO 32Mb RAM

If your applications demand it, then we can supply it.

REPLACEABLE HARD DISK DRIVE

Running out of space? Replace the Hard Disk Drive easily. The system BIOS will automatically detect the new HDD

SUPERB PERFORMANCE

CPU Upgrade up to Intel DX4-100 and 512KB of level 2 Cache! External connectivity enhanced by use of 16C550 Serial Port and Parallel Port with support for EPP/ECP

FREE Software with every Perfecta Notebook



Worth over £300

WORDPERFECT MAIN STREET RANGE
◆ WORKS ◆ INFOCENTRAL
◆ CLIPART for HOME ◆ GRAMMATIK



Software actually supplied will be cosmetically different to that shown.

1 YEAR SUPPORT

All Perfecta Notebooks are covered by a FREE 12 Months Warranty in mainland UK.

2 YEAR GOLD CARE

For 12% of the cost, we will collect, repair and return your notebook within mainland UK for the first 24 months.

VAT: UK customers, please add 17.5% to value of order and carriage.

Display	10" Mono 64 Grey Scale	10" Colour Dual Scan	10" Colour TFT Active Matrix
7000 Series	7100	7300	7400
SL i486SX™-33	£1129	£1468	£2239
SL i486DX2™-50	£1259	£1598	£2369
SL i486DX4™-75	£1435	£1774	£2545
SL i486DX4™-100	£1495	£1834	£2605

All prices above are for standard 340Mb Hard Disk. Supplied with FREE Carrying Case
BUSINESS LEASING Low Cost Leasing - Call for details

ADDITIONAL OPTIONS

- 4 to 8Mb RAM Upgrade* £159
- 4 to 16Mb RAM Upgrade* £679
- 4 to 32Mb RAM Upgrade* £POA
- Track-point device £25
- 8 bit Internal Sound Card £39
- 16 bit Internal Sound Card £69
- Aries HiFi Speakers £29
- Internal V32b1s 14.4K Fax/Modem (Non Approved) with Software £139
- Spare NiMH Battery Pack £69
- Spare AC Mains Adaptor £49
- PCMCIA Fax/Modem £135
- PCMCIA V32b1s Fax/Mod. £145
- PCMCIA Ethernet Card £149
- External Keyboard £25

*Requires module exchange

7000 Notebook Upgrades

- (Prices valid when purchasing Notebooks only)
- UGA0530/A £125
- 340Mb to 540Mb HDD £125
- UGA0540/A £249
- 340Mb to 730Mb HDD

HOTLINE SUPPORT

All Perfecta Notebooks are covered by Unlimited Lifetime Support. We want you to get the best from your machine, so we offer a comprehensive support package over the phone.



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Aries Award-Winning Scanners



Optional Automatic Sheet Feeder available with all Aries Relysis Scanners

Colour Transparency ready



The Relysis Scanner has been voted the 'BEST SCANNER OF THE YEAR' by the readers of PC Direct



"better all round, and therefore a Best Buy, is Watford's Relysis...which combines value for money and good software support with quality output"



"...It is a considerable feat to produce a unit of this quality but Watford have stolen a march on everyone in so doing. Add the bundled software and it is undoubtedly the best buy." PC Today



Winner of the Best Peripheral Award

STOP PRESS £35 OFF Advertised Prices of RELI Scanners (2412/4816/9624)

ISO-9001
Manufactured to BSI Quality Standard Certificate

All Aries Relysis models will scan full A4 legal size

With the Aries Relysis you'll open up a whole new world of possibilities. Imagine being able to scan pictures, diagrams, photographs in perfectly matched colour. To use unlimited zoom to create precisely the size you need. And then to combine them with other files to produce truly professional documents.

Aries Relysis Scanners are the perfect answer for Desk Top Publishing (DTP) and Optical Character Recognition (OCR) applications in both the PC and MAC environments. With Firmware Interpolated, they

have outstanding Scanning Resolution in addition to stunning colours (16.7 million) and mono (256 greyscales) definition. Now industry standard TWAIN compliant, Aries Relysis Scanners can be used directly with Windows software.

With the new Hi-speed scanners you can scan an A4 image in colour in just minutes. And in a breathtaking 15 seconds deliver an A4 mono. It's simplicity itself to set up and use, and the new comprehensive range offers a model for every need.

FREE Software Worth over £500

The Relysis comes bundled with three FREE packages (requires Windows 3.1)



- Micrografx Picture Publisher v4 LE- Graphics Image Scanning/Editing
- Caere Omnipage Direct or Calera Wordscan* OCR (optical character recognition)

* Depending on availability

Software Options for Aries Relysis Scanners

Special upgrade pricing valid at the time of purchase

UGA 1800	Upg Picture Publisher LE to v4	£75
UGA 1810	Upg OmniPage Direct v2 to Omnipage Professional v5	£185
UGA 1820	Upg PageKeeper Portfolio to PageKeeper Personal	£85
UGA 1830	Upg PageKeeper Portfolio to PageKeeper Network	£279

Aries Relysis Scanners

VM3420 SCSI II 256 Grey Scale

£339

VM3520 SCSI II 16.7 million Colours 24 bit

£379

- ◆ Up to 1200dpi resolution
- ◆ TWAIN standard
- ◆ Opt. Document Feeder
- ◆ Bundled Software
- ◆ Optional Transparency Adapter (Mono only)

Auto Document Feeders

Specification

- ◆ Capacity: 50 pages
- ◆ Paper size - Max: 8.5"x14" - Min: 5.0" x 7.2"
- ◆ Paper Thickness .05 to .15mm sheet

ADF-30 **£259**

ADF-40 **£295**

ADF-60 **£345**

Hi-Speed SCSI II Colour Flatbed Scanners

Aries	RELI 2412 2400dpi	RELI 4816 4800dpi	RELI 9624 9600dpi
Flat Bed Scanner type	Colour	Colour	Colour
Scanning Process	Single Pass	Single Pass	Single Pass
Image Data Colour - 24 bit	16.7 million Colours	16.7 million Colours	16.7 million Colours
Image Data mono - 8 bit	256 Greyscale	256 Greyscale	256 Greyscale
Effective Scanning Area	216 x 356mm	216 x 356mm	216 x 356mm
Zoom Out Feature	Unlimited	Unlimited	Unlimited
Scanning Resolution - Max*	2400 x 2400	4800 x 4800	9600 x 9600
Brightness/Contrast Settings	256/256	256/256	256/256
Interface	SCSI II	SCSI II	SCSI II
Auto Document Option	ADF-30	ADF-40	ADF-60
Transparency Adaptor	VMT-68S optional £295	VMT-68S optional £295	Included - Worth £500
Price	£575 PC/£595 Mac	£785 PC/£795 Mac	£1425 PC/£1495 Mac

* Resolution quoted is the maximum achievable using interpolation



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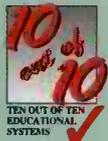


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Aries
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WordPerfect

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It's a day out for the whole family – 'hands-on' opportunities for you to try out all the latest products in the PC market: Seminars, Presentations and Demonstrations throughout the day for both the home and business user (SOHO). There are exciting new games products and leisure software for the young-at-heart and, for the first time, a special new Early Learning area for the children. Our technical and sales support team will be there to assist and advise you on the best products for all your computing needs and representatives from a host of leading computer companies will be on hand to answer your questions. Try it and then buy it – for the young and old (and those in between) – it's fun, it's educational and it's FREE.

For business users, demonstrations will take place throughout the day for: Word-processing, Spreadsheet, Accounts & Payroll softwares, and Aries Office Computer Systems will be available for hands-on evaluation.

Do not miss the unique opportunity to see the Aries PC based document processing system in action.

Some of the products on show and available for purchase ♦ Printers ♦ Plotters ♦ Aries Notebooks ♦ Aries PC's
♦ Scanners ♦ Software ♦ Monitors ♦ MultiMedia ♦ Mice ♦ Books ♦ Education Products ♦ Psion ♦ Networks

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Jessa House, Finway (off Dallow Road), Luton. LU1 1TR. Tel: (0582) 487777

Direction to Jessa House, Luton, from the M1 Motorway:

Exit off junction 11 of the M1. If coming from the South, turn right at the roundabout (under the motorway) or from the North, turn immediate left. At the first roundabout turn right. Pass "DO-IT-ALL" on your left. Over a bridge, across another roundabout. You are now in Dallow Road. After half a mile, you pass BESTWAYS on your left. Finway is the first turning on the left.

E & OE Subject to change.

Credit Card/Sales: 0582 74 55 55 Technical Support: 0582 74 55 00 Watford Shop: 0923 23 77 74

**NEW
from
GENIUS**

Handy Scanners from the UK's No.1 Genius Supplier

Up to true 800dpi resolution and supplied complete with OCR software, a powerful presentation graphics package and an advanced image scanning, enhancement and editing application.

ScanMate 32 & 256

800 dpi



- ◆ **Powerful image software** - PhotoFinish 3.0 software has image auto enhancement functions and 87 tools to satisfy your creativity.
- ◆ **Hi resolution** - up to 800 dpi gives you the best image quality available.
- ◆ **Powerful OCR** - included SmartPage Direct means you'll never have to re-key data again.
- ◆ **TWAIN Compliant** - Lets you use the scanner with all TWAIN compatible programs
- ◆ **Includes:** Interface card, PhotoFinish 3.0, Media Mate presentation software, Smart Page Direct OCR software, TWAIN compliant software, User's manuals.

ScanMate/32
Black and White scanner with 32 Halftones **£49**
ScanMate/256
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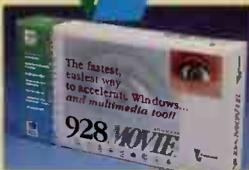
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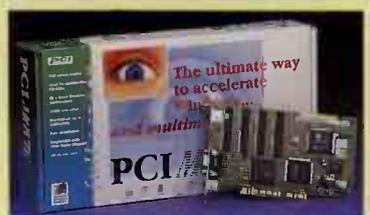
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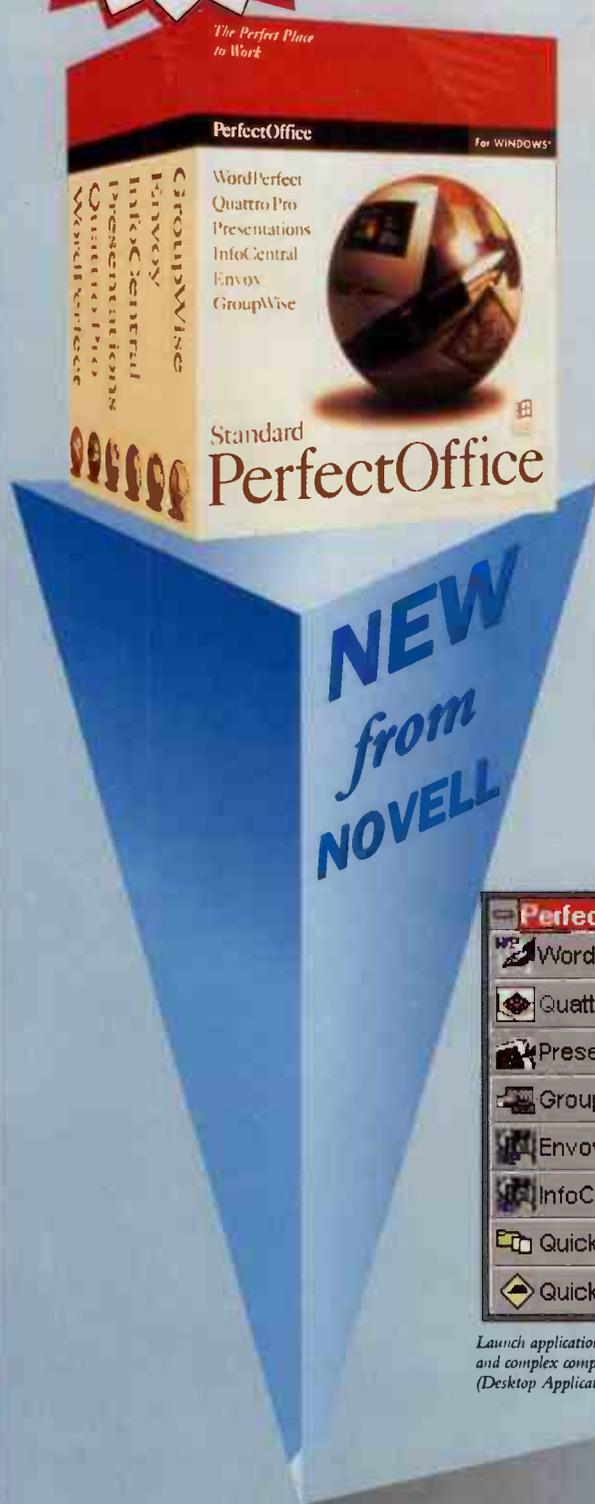
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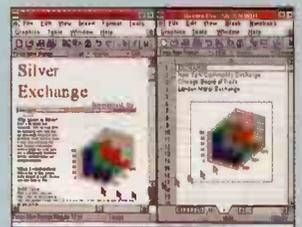
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Quattro Pro

Quattro Pro 6.0

The Perfect Way to Make Numbers Count

You can forget about "learning curves" with Quattro Pro. This powerful spreadsheet has Interactive tutors, Experts, Spreadsheet Notebooks for data organisation, and an online manual to make learning and using the program a breeze.

Get organised and stay organised. Quattro Pro lets you file multiple sheets into distinct pages in a Notebook - each holding up to 256 pages. Notebook Tabs let you flip through quickly and easily. No other spreadsheet filing system keeps your data in better order.

The Perfect Way to Sell Your Ideas

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Presentations 3.0

The Perfect Way to Sell Your Ideas

Presentations takes what you've done in WordPerfect and Quattro Pro and turns it into a slide show complete with graphics, Video & sound.

Sounds difficult?, it's not. Just import your information. Or organise your thoughts into an outline. Presentations take care of the rest. Our Show Expert suggests different professionally designed styles for the content and structure.

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PerfectOffice Standard

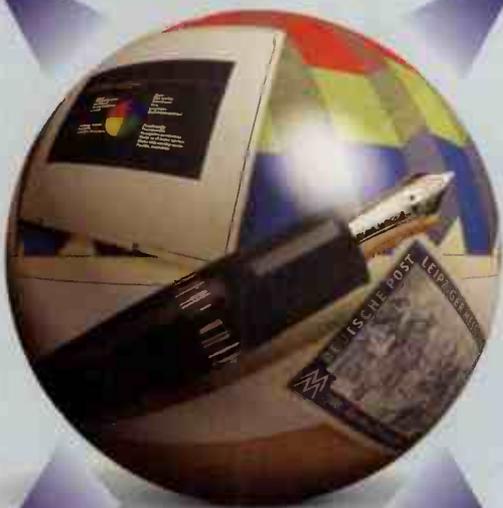
Consists of:

- WordPerfect** word processor
- Quattro Pro** spreadsheet
- Presentations** presentation graphics
- Info Central** personal information manager
- GroupWise** e-mail, calendaring and scheduling client
- Envoy** electronic publisher and viewer

PerfectOffice Professional

Consists of:

- WordPerfect** word processor
- Quattro Pro** spreadsheet
- Paradox** database
- Presentations** presentation graphics
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- GroupWise** e-mail, calendaring and scheduling client
- Envoy** electronic publisher and viewer
- Visual AppBuilder** visual application development program



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PerfectOffice For WINDOWS



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Envoy 1.0a

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The Perfect Way to Communicate

NOVELL GroupWise For WINDOWS



GroupWise

GroupWise 4.1

The Perfect Way to Share Information

GroupWise (formerly WordPerfect Office) makes it easy for your entire company to stay in touch. You can send E-mail and schedule group meetings. Even co-ordinate and reserve resources like meeting rooms and shared computers. Plus you can assign and follow up on tasks.

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The Perfect Way to Organise People, Places and Things

PerfectOffice For WINDOWS



InfoCentral

InfoCentral 1.1

The Perfect Way to Organise People, Places and Things

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ET ON IT'S HEAD!



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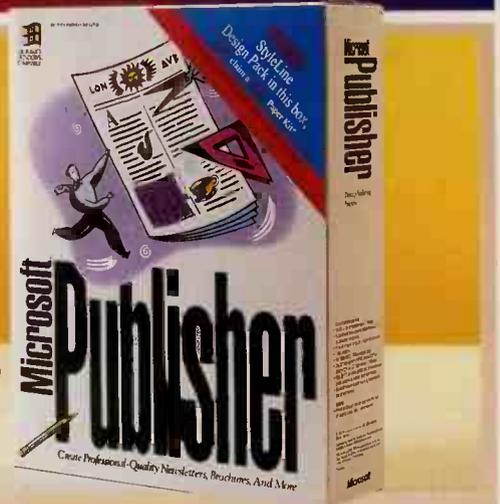
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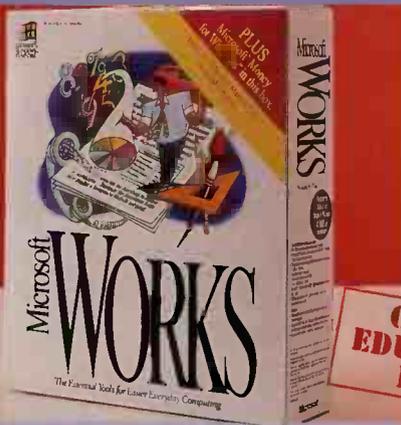
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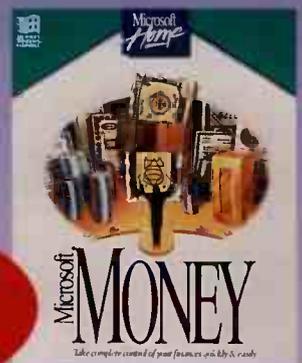
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NotesSuite is the only suite of groupware applications designed to improve the productivity and responsiveness for teams. NotesSuite combines Lotus Notes release 3.2, the industry standard client-server platform for developing and deploying groupware applications, and SmartSuite 3.0 for Windows, the complete suite of five integrated desktop applications. Central to NotesSuite is the NotesSuite Application Collection, a set of production-quality Notes applications that take advantage of Lotus Notes and SmartSuite connectivity to deliver workgroup solutions.

The NotesSuite Application Collection demonstrates the potential of Notes to leverage the powerful graphics document layout and analytic capabilities of SmartSuite as tools, or "editors", within Notes applications. The NotesSuite Application Collection takes advantage of Notes/FX technology, the Lotus facility for exchanging data bi-directionally between desktop applications and Lotus Notes. Notes/FX seamlessly integrates SmartSuite productivity tools with Lotus Notes for developing and deploying applications that automate business processes.

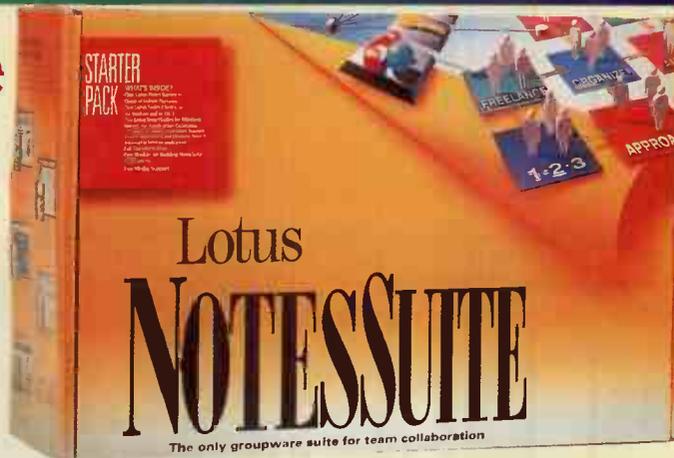
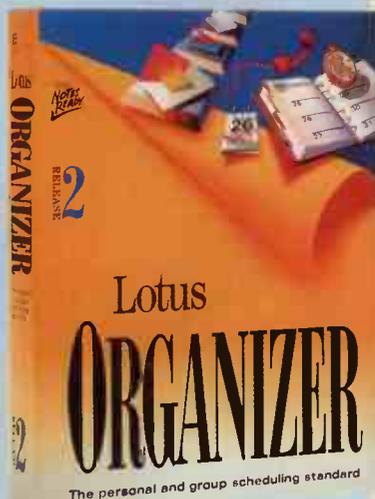
By combining the unique collaborative power of Notes with the familiar desktop tools of SmartSuite, NotesSuite provides corporate teams with instant groupware solutions, with NotesSuite, companies can build effective office and business support systems.

Standard Product	£995	Trade-Up	£POA
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Upgrade	£495		

NEW VERSION Lotus Organizer 2.0

Organizer 2 is a major upgrade of the industry's most popular networked personal information manager. Organizer 2 features enhancements to its award-winning user interface and more than 100 new features to set a new standard for personal productivity as a PIM and enhanced in workgroups. In addition, Organiser 2 now provides group scheduling and shared calendaring for users of Lotus Notes and cc:Mail.

Standard Product	£99
Single License	£84
20 License pack	£1,580
Upgrade	£49



NotesSuite Application Categories

The NotesSuite databases fall into four application categories: Introductory, Library, Business Process, and Information Services.

Introductory Application

This database provides descriptions of Notes, Notes/FX, and specific Notes/FX applications to new users.

Business Process Applications

These databases leverage SmartSuite and notes to automate business processes that manage the workflow for tasks such as Expense Reports and Contact Management.

Information Services Applications

These databases provide up to the minute news, financial, and industry information that can be included in user reports, competitive analyses, and sales alerts.

Library Applications

These databases serve as corporate information repositories that store and catalogue everything from customised document templates, in the form of SmartMasters, to past and present sales presentations. Library applications also house pre-defined templates for specific tasks such as producing expense reports with 1-2-3 and form letters with Ami Pro.

The collaboration and information sharing abilities of Notes may also be used to circulate presentations and workgroup documents for review and comment.

Lotus SmartSuite 3.0

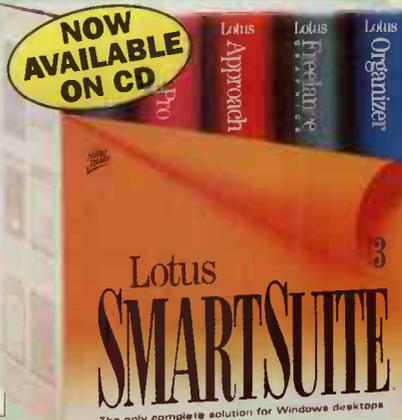
The only complete solution for Windows desktops.

Lotus SmartSuite 3.0 includes

- ◆ Lotus 1-2-3 Release 5
- ◆ Lotus Ami Pro Release 3.1
- ◆ Lotus Approach Release
- ◆ Lotus Freelance Graphics Release 2.1
- ◆ Lotus Organizer Release 1.1

By bringing these five desktop tools together you can get your job done fast. With the SmartCenter, you can easily launch and switch between applications and this customisable icon palette also provides you with SuiteAnswers, the cross-application help service. Lotus SmartSuite 3.0 is workgroup enabled and the best suite to use with Lotus Notes.

Standard Product	£545
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CD	£545
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LLP = Lotus Licence Pack
MLP = Microsoft Licence Pack
U/G = Upgrade
Comp = Competitive (or sidegrade) upgrade
DOS = Program designed to work in DOS environment
WIN = Program designed for MS Windows 3.1 or later



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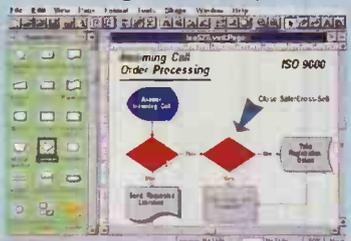
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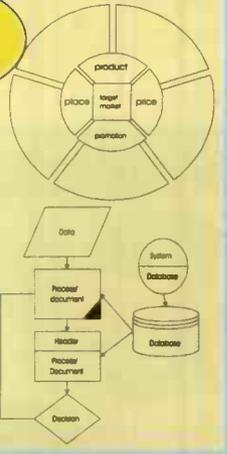
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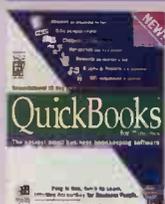
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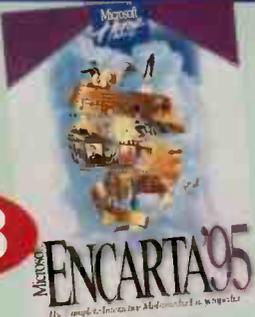
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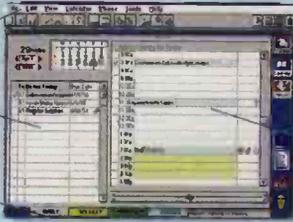
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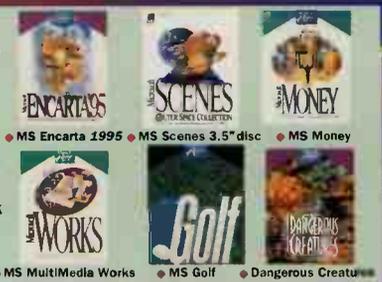
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Compatibility	High Sierra and ISO 9660 Apple Macintosh HFS Audio: CD-DA Multimedia /video: CD-I, VideoCD, CD-ROM XA, MPC2 Photo:PhotoCD and PortfolioCD
Dimensions (WxHxD) Weight	149x43x214mm 1.4Kg
Special Features	CD caddy, LCD panel, audio function buttons, double door dust protect, auto lens clean, emergency eject.

MULTISPIN 4Xe



Only
£372

The first choice in high performance multimedia, the external MultiSpin 4Xe turns a PC into a multimedia action station. With the same features as the MultiSpin 4Xi, this external version is superbly designed for the desktop, and provides unmatched sound quality when used as a CD player.

Specification	4Xe
Data transfer rate	600KB/s
Access time	220ms
Cache memory	256Kb
Interfaces	SCSI-2, headphone jack with volume control, line out, digital output
Compatibility	High Sierra and ISO 9660 Apple Macintosh HFS Audio: CD-DA Multimedia /video: CD-I, VideoCD, CD-ROM XA, MPC2 Photo:PhotoCD and PortfolioCD
Dimensions (WxHxD) Weight	175x77x331mm 2.9Kg
Special Features	CD caddy, LCD panel, audio function buttons, double door dust protect, auto lens clean, emergency eject.



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AMAZING MULTIMEDIA OFFERS



Choose one of these special offer CD-ROM drives which comes complete with the Solution Kit

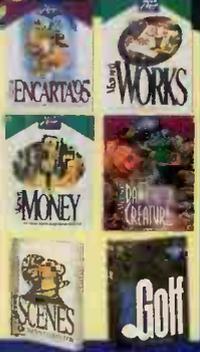
- Aries ATAPI IDE Dual Speed Solution Kit** £208
- Panasonic Dual Speed CR-562 Solution Kit** £224
- NEC Quad Speed 4X-IDE Solution Kit** £279
- TEAC Quad Speed CD-55A Solution Kit** £339

Microsoft Solution Kit includes:

- ◆ 16 bit Stereo Sound Card
- ◆ Soundblaster Pro, MPC & MPC 2 Compatible
- ◆ Sound/Recording Software
- ◆ Aries Stereo Speakers (Opt. Upgrade to Aries HiFi Pro Speakers Only £18 + VAT)
- ◆ Complete Solution Bundle Software Pack
- MS Encarta 95 Encyclopaedia
- MS MultiMedia Works
- MS Dangerous Creatures
- MS Money
- MS Golf
- MS Scenes (3.5" disks)

Plus Legend Pack CD Bundle

- Robocop 3D
- F29
- Mega Race
- Pushover
- Epic
- Might and Magic II
- D/Generation
- Contraption Zack
- ChessMaster 2100
- Life & Death II - The Brain
- Kids can Read - Cinderella
- Mud Puddle
- Thomas Snowsuit
- Paper Bag Princess
- Spiders - National Geographic



CD-ROM DRIVE OFFERS

Aries ATAPI IDE Dual Speed CD-ROM

Lowest Cost ATAPI IDE Drive



- ◆ ATAPI IDE Drive
- ◆ Supports Kodak Multisession Photo CD, Audio CD-DA, CD-XA, CD-I & High Sierra (White Book Compatible)
- ◆ High Speed with 300Kb/sec Data Transfer Rate
- ◆ MPC Level 2 Compliant with 250ms Seek Time
- ◆ Supports Audio Scan, Skip Back and Random Play
- ◆ Video CD Compliant/MPEG 1 Full Motion Video Playback
- ◆ Supplied with Audio Lead

- ◆ CD-ROM with Audio Lead £79
- ◆ CD-ROM Kit 2 with Aries 16 bit Stereo Soundcard (as below) £129

Aries 16 bit Stereo Sound Card

- ◆ 16 bit Stereo SoundCard, compatible with SoundBlaster Pro, CD-ROM interface support, 44.1KHz play/record, 4-operator FM synthesizer
- ◆ Adlib, Sound Blaster & Pro, MS Win System Compatible
- ◆ True 16 bit Sound Sampling
- ◆ Built-in Midi Interface and Joystick Port
- ◆ Bundled Utility Software

Watford - Panasonic CR-562 Offer

- ◆ MPC Compliant
- ◆ Multisession
- ◆ Kodak Photo CD Compatible
- ◆ Access Time: 320ms
- ◆ Transfer Rate: 300Kb/s

DUAL SPEED

- WEPn Kit 1: CR562 with Audio/Data Leads £87
- WEPn Kit 2: CR562 with I'Face & Leads £97
- WEPn Kit 3: CR562 with Aries 16 bit Stereo Sound Card £136

Watford - Mitsumi FX300M Offer

- ◆ ATAPI IDE Drive
- ◆ MPC Compliant
- ◆ Multisession
- ◆ Kodak Photo CD Compatible
- ◆ Access Time: 250ms
- ◆ Transfer Rate: 450Kb/s

TRIPLE SPEED

- WEMt Kit 1: FX300M IDE Drive £129
- WEMt Kit 3: FX300M with Aries 16 bit Stereo Sound Card £179

Watford - Teac CD-55A Offer

- ◆ MPC Compliant
- ◆ Multisession Quad Speed
- ◆ Kodak Photo CD Compatible
- ◆ Access Time: 195ms
- ◆ Transfer Rate: 600Kb/s
- ◆ 256K Data Buffer

QUAD SPEED

- WETc Kit 2: CD-55A with I'Face & Leads £198
- WETc Kit 3: CD-55A with Aries 16 bit Stereo Sound Card £248

Watford - Creative CR-563 Offer

- ◆ MPC Compliant
- ◆ Multisession
- ◆ Kodak Photo CD Compatible
- ◆ Access Time: 320ms
- ◆ Transfer Rate: 300Kb/s

DUAL SPEED

- WECr Kit 1: CR563 with Audio/Data Leads £87
- WECr Kit 2: CR563 with Sound Blaster 16 Value Kit £159
- WECr Kit 3: CR563 with 16 bit Sound Blaster 16 MCD ADSP £209

FREE SOFTWARE
Aldus Photostyler SE CD
New Grolier's Encyclopedia

CREATIVE MULTIMEDIA KITS

CREATIVE BUNDLE KIT OFFER

- ◆ Creative CR-563 Dual Speed CD-ROM Drive
- ◆ Creative SoundBlaster 16 Sound Card
- ◆ Aries Stereo Speakers (Upp. to HiFi Pro Speakers for only £18 + VAT)
- ◆ Bundle CD Software collection -Worth over £300
- MS Encarta 1995
- MS MultiMedia Works
- MS Dangerous Creatures
- MS Money, MS Golf
- MS Scenes (3.5" disks) **£228**

Plus Legend Pack CD Bundle

- Robocop 3D
- F29
- Mega Race
- Pushover
- Epic
- Might and Magic II
- D/Generation
- Contraption Zack
- ChessMaster 2100
- Life & Death II - The Brain
- Kids can Read - Cinderella
- Mud Puddle
- Thomas Snowsuit
- Paper Bag Princess
- Spiders - National Geographic

MULTIMEDIA OFFICE

- ◆ CR563 Dual Speed CD ROM Drive
- ◆ Microsoft Office Professional v4.3
- ◆ Sound Blaster 16 ADSP
- ◆ Stereo Headphones and Microphone
- ◆ Microsoft Encarta CD
- ◆ Microsoft Sound System Software
- ◆ Creative Text & Voice Assist and Wavestudio **£399**

DUAL SPEED

DISCOVERY CD16

- ◆ CR563 Dual Speed CD ROM Drive
- ◆ Sound Blaster 16 Card
- ◆ Stereo Speakers & Microphone
- ◆ Aldus Photostyler SE CD
- ◆ Grolier's Encyclopedia
- ◆ 3D Dinosaurs Adventure
- ◆ Conspiracy & Magic Castle
- ◆ Kid Pix & Syndicate **£226**

DUAL SPEED

GAMEBLASTER CD16

- ◆ CR563 Dual Speed CD ROM Drive
- ◆ Sound Blaster 16 Card
- ◆ Stereo Speakers & a Joystick
- ◆ Rebel Assault, Sim City, Iron Helix, Lemmings, Indianapolis, Conspiracy & Syndicate **£222**

DUAL SPEED

DIGITAL EDGE 3X

- ◆ NEC Triple Speed CD Rom Drive
- ◆ Sound Blaster 16 ADSP
- ◆ Stereo Speakers and Microphone
- ◆ Aldus Photostyler SE CD
- ◆ New Grolier's Encyclopedia
- ◆ Altmira Composer SE
- ◆ Kai's Power Tools, HSC Digital Morph
- ◆ Rebel Assault, Speed, Conspiracy & Syndicate **£369**

TRIPLE SPEED

Aries Quality Speakers

◆ Ideal for PC Multimedia System ◆ Magnetically Shielded



Aries Digital Plus Speakers (inc. stand)

- | | | | |
|-----------------------------|-----|------|-----|
| Aries Stereo Speakers | 10W | £6* | £9 |
| Aries Hi-Fi Speakers | 10W | £19* | £29 |
| Aries Hi-Fi Pro Speakers | 25W | £28* | £35 |
| Aries Digital Speakers | 25W | £39* | £49 |
| Aries Digital Plus Speakers | 70W | £48* | £59 |
- HIFI and Digital series speakers have built-in Poer Amplifier, Base, Treble and Volume controls
- * Price applicable when purchasing any of the above CD ROM drives
- Aries Screen Microphone £4.50
 - Aries Headphone Set £4.50

Optional Software Bundle Packs

- | | | |
|---|--|--|
| Media Wonder Pack <ul style="list-style-type: none"> ◆ Farm Animals (National Geographic) ◆ Butterflies (National Geographic) ◆ Kids Can Read ◆ World Atlas ◆ US Atlas ◆ Mavis Beacon Teaches Typing ◆ Chess Master 3000 ◆ Chess Master 2100 | <ul style="list-style-type: none"> ◆ Beyond The Black Hole ◆ Life & Death ◆ Disan Lau ◆ The Puzzle Gallery ◆ Loopz ◆ Cribbage King ◆ Checkers ◆ Backgammon ◆ Robot Tank | Educational Pack <ul style="list-style-type: none"> ◆ Maths (Numbers) ◆ Maths (Algebra) ◆ French ◆ Junior Essentials ◆ English |
|---|--|--|
- £24**



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Ultra Slimline, Ultra-Compact, Page Printers from Panasonic

only
£279

Ideal for 'SOHO', office workstations and home use, the latest 4ppm LED page printers from Panasonic pack 300dpi laser quality output into what is currently the smallest and lightest package available. The new printers weigh just 6.3Kg (14lbs) and have a very small footprint.

Panasonic KX-P4400 Ultra Compact LED Page Printer

Announcing the Panasonic KX-P4400 ultra-compact LED page printer. The upright design and small footprint (only 12.7cm x 38.1cm excluding trays) enables the KX-P4400 to fit virtually anywhere. In addition to being ultra-compact it's also extremely lightweight (under 6.5kg!) allowing you to take it with you. The KX-P4400 produces 4 pages per minute of crisp 300dpi laser quality output as well as offering the power and flexibility to produce virtually any document. This 4ppm printer also provides versatile paper handling with a 100 sheet multi-purpose (A4, letter, legal & executive) paper tray, 1Mb of standard RAM expandable to 5Mb - all backed by Panasonic's commitment to quality and reliability.



only
£330



- ◆ Completely silent in the stand-by-mode
- ◆ Energy Efficient Power Save
- ◆ 4ppm printing speed
- ◆ 100 sheet multi-purpose paper tray (A4, letter, legal & executive)
- ◆ 50 sheets face down output tray for collated output
- ◆ 28 Internal bitmap fonts (14 portrait & 14 landscape)
- ◆ HP LaserJet Series IIP compatible
- ◆ 1Mb RAM Standard, exp. to 5Mb
- ◆ Easy-Set front panel with 16 character LCD
- ◆ Cartridge style consumables for quick, clean installation
- ◆ Windows 3.1 printer driver included
- ◆ 1 year on site warranty

Panasonic KX-P4401 Ultra Compact LED Page Printer

Presenting the Panasonic KX-P4401, the Ultra-Compact LED page printer that puts power printing at your side or on your desk. Producing crisp, clear laser quality output on plain paper at a rapid 4 pages per minute would normally require a much heavier, bulkier printer, but the compact, upright design and tiny footprint of the KX-P4401 leaves you with both working space and elbow room. With 1Mb RAM, Windows Driver and HP PCL5 compatibility included as standard you can produce sharp text and graphics immediately and easily.

Near Ozone-free operation, energy efficient "sleep mode", completely silent when not printing means that your Panasonic compact printer is comfortable to live with at home or in your office.

- ◆ Completely silent in stand-by-mode
- ◆ Energy Efficient Power Save.
- ◆ 4ppm print speed
- ◆ 100 sheet multi-purpose paper tray (A4, letter, legal & executive.)
- ◆ Compatible with HP LaserJet Series III (HP PCL5.)
- ◆ 8 Internal scalable outline fonts & 28 bitmap fonts (14 portrait & landscape.)
- ◆ 50 sheets face down output tray for collated output.
- ◆ 1Mb RAM exp to 5Mb
- ◆ Cartridge style consumable for quick, clean installation.
- ◆ Easy-set front panel with 16 character LCD.
- ◆ Windows 3.1 printer driver included
- ◆ 1 year on site warranty

The Quiet, Colour, 24-pin Dot Matrix

Panasonic KX-P2135 24-Pin Quiet Dot Matrix Printer with Colour Standard



only
£135

Announcing the Panasonic KX-P2135, a low-cost 24 pin quiet printer with colour standard, designed for the home office or small business that needs professional quality output. The KX-P2135 features a flat-belt push tractor to facilitate easy form loading, a 20 page built-in sheet feeder and a noise level of only 46.5dBA (43.5dBA in super-quiet mode). The KX-P2135 also features the Easy-Set up operator panel and set up disk (IBM PC compatibles) that lets you control all of the printer's features, including font, pitch, form length, enhancement and emulation mode.

The KX-P2135 also offers you low-cost colour printing, so you can give all your documents and presentations eye-catching colour. And of course the KX-P2135 comes packaged in a rugged design.

- ◆ 7 Colour Printing Standard
- ◆ Super Quiet Printing
- ◆ Built-in Auto Sheet Feeder
- ◆ Top and rear paper feed
- ◆ Paper parking - Loads single sheets and envelopes without removing or wasting continuous paper
- ◆ 11.7" carriage allows single sheets to be loaded in landscape or portrait orientation with an 8" printline
- ◆ Tear off for short tear capability
- ◆ Fonts include 3 draft (pica, elite & micron) and 7 letter quality (Courier, Prestige, Bold PS, Script, Sans Serif, Roman and OCR-B)
- ◆ 360x360 dots per inch resolution offers clear, crisp graphics
- ◆ Ergonomic Design for convenience and Ease of Use
- ◆ Set-up Disk includes Windows 3.1 driver



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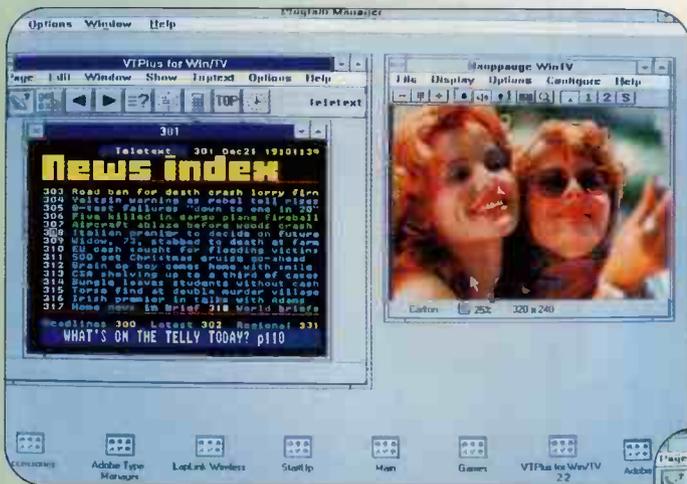
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With Every WIN/TV Celebrity Card Comes a Big Thank you from IBM



A Typical Windows Screen

WHAT'S SLUGGISH IN WINDOWS IS RACEY UNDER OS/2

Our on-board PAL tuner brings high quality broadcast - cable TV to your SVGA monitor which means you can watch your favourite TV programme, track the stock market and share prices via Teletext - whilst you're writing a letter in your favourite Windows word processing package. What Windows users won't be used to are the benefits of OS/2's multi-tasking technology. You'll be able (via Win/TV) to watch the News, see Teletext updating and even play your DOS games. Each in its own separate window. And all bang up to speed. No time delays and no lagging behind

A BONUS PACK INCLUDING THE INTERNET SOFTWARE COMPLIMENTS OF IBM

In addition to OS/2 WARP, IBM are also sending you their Bonus pack which contains the IBM Internet software which will allow you to EMail from Jersey to Japan, London to Las Vegas. In fact almost anywhere to anywhere.

LINK SHARE PRICES TO YOUR PC

Win/TV supports DDE linking. For example, if you have a spreadsheet where UK prices are dependant upon the \$ exchange rate - if the exchange rate changes once a minute, so will your sterling prices

A BRILLIANT DEAL FOR JUST £280

Never before have we been able to offer so much for so little. Let's face it, you're getting all the television channels, Teletext, a video frame grabber and a brand new operating system for less than the price of most software packages. And if you miss it now, you'll only have yourself to blame.

Hauppauge!

A ONCE IN A LIFETIME OFFER OS/2 WARP AT NO EXTRA COST

What better commendation than to be the only manufacturer selected by IBM for this amazing special offer. Buy the Win/TV Celebrity card to watch TV, TELETEXT & VIDEO in any Windows application and you'll receive the highly acclaimed OS/2 Warp - 32 bit operating system just by completing and returning the registration card to IBM completely free of charge.



A Typical OS/2 Screen

Win/TV is a 16 bit multimedia frame grabber which allows the user to watch and capture full motion TV/VIDEO and TELETEXT under resizable windows.

Features

- ◆ An on-board 122 Channel Tuner offers one board solution
- ◆ 128 page Teletext with SAVE, COPY, PASTE and DDE facilities
- ◆ 1280x1024 non-interlaced resolution. No feature connection required
- ◆ Full screen video playback.
- ◆ Connects to VCR & Camcorder for 24 bit frame grabbing
- ◆ Compatible with Teletext 2000 Service on Channel 4
- ◆ Preview facility. Allowing all channels to be viewed simultaneously.



only
£278



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Aries 14" VGA Monitors

Mono: 14" Flat Screen Paper White Monitor. Supplied complete with Swivel Base. **£85**

Colour Super VGA LR: State of Art Colour Monitor, Swedish Low Radiation MPRII, supporting resolution of upto 1024 x 768 with an 0.28mm dot pitch tube. (EPA: EnergyStar Compliant)

- EnergyPro 14" SVGA Colour MPRII **£165**
- Above with 512K SVGA Card **£185**

Aries Multiscan Monitors



The NEW Aries Multiscan monitors, with Horizontal Frequency ranging from 29KHz to 75KHz providing rock solid images at resolutions of upto 1280 x 1024 Non-Interlaced, coupled with the 0.28mm dot pitch Picture Tube provides the Ultra High Image that is expected from the Aries range of Low Radiation Swedish MPRII Standard Monitors. Supplied complete with tilt and swivel base.

- **Aries Alphascan Pro LR**
1024 x 768/72Hz (NI) H-Sync 70KHz, Front Mounted user controls **£199**
- **Aries EnergyPro 6000i LR**
15" Colour Display, 0.28mm dot pitch, 1280 x 1024/60Hz NI, Microprocessor Control with digital display. Incos Pincushion, Trapezoid, Rotation settings. EPA EnergyStar Compliant **£259**
- **Aries EnergyPro 7560i LR**
17" Flat Screen 0.26mm, 1280 x 1024/70Hz (NI) H-Sync 80KHz, Microprocessor Controls incl. Pincushion, Trapezoid, Rotation & Individual RGB Colours. EPA EnergyStar Compliant **£499**

Multiscan Monitors

Hitachi 17MVX	£579	Taxan Ergo 580LR	£292
NEC 2V	£225	Taxan Ergo 885LR	£624
NEC XV15	£281	Taxan Ergo 880LR	£520
NEC XE15	£394	Taxan Ergo 895LR	£835
NEC XV17	£563	Taxan Ergo1080LR	£909
NEC XE17	£696	Taxan Ergo 2100LR	£1565
NEC XP17	£914	Taxan Ultra 1095LR	£1499
NEC XE21	£1337	Phi 14C 14"	£168
NEC XP21	£1759	Phi 15B 15"	£254
Panasync TX-T1537	£319	Phi 17C 17"	£427
Panasync TX1751	£599	Phi 20C 20"	£840
Panasync TX-D1732	£535	Phi 20T 20"	£1315
Panasync TX-D2032	£1125	Sony CPD-15SF1	£289
Panasync Pro 7		Sony CPD-1730 17"	£598
TX-D2131	£1359	Sony GDM-17SE1 17"	£819
Taxan EV400LR	£186	Sony GDM-20SE1VT	£1315
Taxan EV410LR	£195	Sony GDM-20SE1 20"	£1409
Taxan EV420LR	£245		

Panasonic monitors carry 2 years on-site maintenance warranty

Controller Cards

ISA			
W-2FH	IDE 2FD/HD		£9
W-M/O	IDE FD/HD, 2S, 1P, 1G		£11
W-M/O+	IDE+ 4FD/2HD, 2S, 1P, 1G		£28
W-S/O	Enhanced Dual Serial (16550 & 14550), 1P, 1G		£32
W-FSS	Serial Card with 16550 Fast UART		£29
W-I/O	Multi I/O with 2S, 1P, 1G		£9
XT/AT	Joystick/Games Card		£11
	Dual Serial (RS232) Card		£8
	Parallel Printer Port Card		£8
	ISA Caching Controllers		
	Promise DC-100	OK	£69
	Promise DC-100	1Mb	£95
	Promise DC-200	OK	£75
	VL-Bus/Cache		
	IDE 2FD/HD, 2S, 1P, 1G		£16
	Promise DC-4030VL Cache	OK	£89
	SCSI Controllers		
	Adaptec 1542 Controller Kit	ISA	£174
	Adaptec 1542 Controller Bare	ISA	£132
	Adaptec 2842 Controller Kit	VLB	£198
	Adaptec 2940 Controller Kit	PCI	£239
	Adaptec 2742 Controller Kit	EISA	£289
	Promise DC2040	ISA	£149

MS Input Devices

● MS Mouse v2 (Serial)	£35
● MS Mouse v2 (PS/2)	£35
● MS Bus Mouse	£48
● MS HomeMouse	£27
● MS Natural Keyboard	£69

Graphics Card

● 256K VGA Card	ISA	£21
● 512K SVGA Card	ISA	£27
● 1Mb Super VGA	ISA	£44
● 1Mb S3 805 Graphics Card	VLB	£69
● 1Mb VI-711A CirrusLogic 5428	VLB	£62
● 1Mb VI-720 CirrusLogic 5434	PCI	£72
● 2Mb VI-720 CirrusLogic 5434	PCI	£109
DIAMOND		
● 1Mb SpeedStar Pro	ISA	£89
● 1Mb SpeedStar 64	ISA	£94
● 2Mb SpeedStar 64	ISA	£139
● 1Mb SpeedStar Pro	VLB	£88
● 1Mb Stealth 64 DRAM	VLB	£96
● 2Mb Stealth 64 DRAM	VLB	£136
● 2Mb Viper SE VRAM	VLB	£245
● 4Mb Viper SE VRAM	VLB	£348
● 1Mb Stealth 64 DRAM	PCI	£104
● 2Mb Stealth 64 DRAM	PCI	£135
● 2Mb Viper SE VRAM	PCI	£248
● 4Mb Viper SE VRAM	PCI	£355
MATROX		
● 2Mb Matrox MGA Ultima	VLB	£305
● 2Mb Matrox MGA Ultima+	VLB	£328
ORCHID		
● 1Mb Kelvin EZ	VLB	£87
● 1Mb Kelvin EZ	PCI	£98
● 1Mb Kelvin 64	ISA	£98
● 2Mb Kelvin 64	ISA	£134
● 1Mb Kelvin 64	PCI	£98
● 2Mb Kelvin 64	PCI	£138
● 1Mb Kelvin 64	VLB	£97
● 2Mb Kelvin 64	VLB	£128
● 1Mb Fahrenheit 64	PCI	£123
● 2Mb Fahrenheit 64	PCI	£156
● 1Mb Fahrenheit 64	VLB	£118
● 2Mb Fahrenheit 64	VLB	£154
● 2Mb Fahrenheit Pro 64	PCI	£244
● 4Mb Fahrenheit Pro 64	PCI	£345
● 2Mb Fahrenheit Pro 64	VLB	£242
● 4Mb Fahrenheit Pro 64	VLB	£346
● 1Mb Celsius	VLB	£145
● 2Mb Celsius	VLB	£219
● 1Mb Fahrenheit VA	ISA	£98

SPEA			
● 1Mb V7 Mirage	ISA	£86	
● 1Mb V7 Mirage P64	VLB	£122	
● 2Mb V7 Mercury P64	VLB	£246	
● 2Mb V7 Mercury P64	PCI	£179	
● 2Mb V7 Mercury P64	PCI	£247	



TAXAN			
● 1Mb GTS 795	ISA	£88	
● 1Mb GTS 795	VLB	£89	
● 1Mb GTS 795	PCI	£90	
● WinBoost	ISA	£114	
● WinBoost	VLB	£115	
● WinBoost	PCI	£116	
● 2Mb GTS WinTurbo	ISA	£248	
● 2Mb GTS WinTurbo	VLB	£249	
● 2Mb GTS WinTurbo	PCI	£250	
● 4Mb GTS WinTurbo Plus	ISA	£398	
● 4Mb GTS WinTurbo Plus	VLB	£399	
● 4Mb GTS WinTurbo Plus	PCI	£400	



● 1Mb ThunderBolt	ISA	£59
● 1Mb ThunderBolt ET4000	VLB	£96
● 2Mb ThunderBolt ET4000	VLB	£135
● 1Mb ThunderBolt-T 9420DGi	PCI	£75
● 2Mb ThunderBolt-T 9420DGi	PCI	£116



AT IDE Hard Drives

IBM				
DSA-3360	365Mb	11ms	£116	
DSA-3540	546Mb	11ms	£149	
DSA-3720	730Mb	10ms	£189	
0662-A10	1Gb		£359	
MAXTOR				
7420AV	420Mb	12ms	£129	
7540AV	540Mb	12ms	£157	
SEAGATE				
ST3290A	260Mb	16ms	£105	
ST3491A	428Mb	12ms	£136	
ST3660A	540Mb	12ms	£179	
WESTERN DIGITAL				
AC1270	270MB	12MS	£120	
AC2340	340Mb	12ms	£129	
AC2420	420Mb	12ms	£135	
AC2540	540MB	12ms	£163	
AC2700	730Mb	10ms	£189	
AC31000	1.1Gb	10ms	£319	

SCSI Hard Drives

FUJITSU				
M2681S	264Mb	12ms	£115	
M2682S	355Mb	12ms	£135	
M2684S	532Mb	12ms	£178	
M2694E	1.0Gb	10ms	£389	
M2903SA	2.0Gb	12ms	£828	
IBM (5 year warranty)				
DS-3540	546Mb	10ms	£159	
DS-3720	730Mb	10ms	£199	
0662-S12	1.0Gb	9ms	£389	
0664-M1H	2.0Gb	10ms	£699	
HITACHI				
DK326C-10	1Gb	10ms	£369	
SEAGATE				
ST3655N	545Mb	12ms	£229	
ST31200N	1.05Gb	9ms	£409	
ST12400N	2.1Gb	9ms	£739	
ST44400N	4.2Gb		£1889	

SCSI Cables & Accessories

Single Drive Cable (Internal IDC)	£8
Dual Drive Cable (Internal IDC)	£9
Cent. to Cent. 50 way	£16
25 way D'Connector to 50 way Cent.	£16
25 way Mini D'Conn. to 50 way Cent.	£25
25 way Mini D'Conn. to 25 way Mini D'	£26
Removable SCSI Drive Rack	£29
External Case with PSU	£POA

Software

● WINProbe	£20
● DataSafe	£20
● Uninstall-it	£20

This offer is available only when hardware greater than £50 is purchased

Hard Disk/Tape Drive

KIT 2		
● 365Mb 12ms Hard Disk Drive		
● 350Mb Internal Tape Streamer		
● Backup Software		
● Fitting Instructions		

Offer Price: £239

Removable Drives

Syquest			
SQ3105A	105Mb	IDE Internal	£215
SQ3105S	105Mb	SCSI Internal	£235
SQ3270S	270Mb	IDE Internal	£289
SQ3270S	270Mb	SCSI Internal	£349
SQ400	44Mb Cartridge		£55
SQ310	105Mb Cartridge		£55
SQ327	270Mb Cartridge		£65

Teac		
250Mb Single Drive Kit		£285
250Mb Dual Drive Kit		£315
250Mb Additional Bare Drive		£248

Parallel Port Drives

BackPack Hard Disk Drives		
210Mb	£275	340Mb £326
BackPack Floppy Disk Drives		
3.5" 1.44Mb	£115	5.25" 1.2Mb £131
BackPack CD ROM Drives		
Dual Speed		£314
BackPack Tape Drives		
BP 1080 250Mb (QIC-80)		£218

PC Mouse

● 2 Button Aries Mouse (Serial)	£12
● 2 button Mouse (Serial)	£8
● 2 button PS/2 Mouse	£8

Logitech Products

SCANNERS		
ScanMan - Colour 24 bit with OmniPage Direct		£195
ScanMan EasyTouch		£121
ScanMan PowerPage		£309
ScanMan 256 PC Win		£96
ScanMan 32 PC Win with OmniPage Direct		£63
MOUSE		
Chroma Mouse		£24
Mouseman Sensa Mouse		£38
Mouseman Bus		£38
My Mouse		£18
MouseMan Cordless (Small)		£49
MouseMan 10 pack Bulk		£249
Pilot II Mouse - Serial		£17
Pilot II Mouse - PS/2		£17
TRACKERBALL		
Pilot TrackMan		£27
TrackMan Voyager		£48
TrackMan II Combo (Serial/PS2)		£42
TrackMan Portable (Serial/PS2)		£32
JOYSTICK		
CyberMan		£59
WingMan		£25
WingMan Extreme		£32
MULTIMEDIA		
AudioMan		£76
SoundMan Wave Sound Card		£139
FotoMan Plus		£376

Genius Products

Mouse 3+	
Includes powerful imaging software: PC Paintbrush for Windows, Media Mate Presentation Software, MouseMate Driver and Pad	£20
Mouse 3 with Driver only	£12
HiMouse The Advanced Mouse	
HiMouse - Serial	£19
HiMouse - Serial & PS/2	£21
HiMouse - Cordless	£20
Mouse One & Mouse Too	
MouseOne PS/2	£8
MouseOne - Serial 2B	£8
MouseToo - 350-1050dpi	£11
HiMouse Lite	
High performance Optical Mouse	£35
HiPoint	
The Smart Mini-TrakerBall	£19
HiTrak - (Serial & PS/2)	£22



New Sketch	
New Sketch 1812	£185
New Sketch 1812D	£209
ScanMate 32 & 256	
Black and White scanner with 32 Halftones	800 dpi £49
256 true grey scale & B/W scanner	£65



ScanMate Colour	
ScanMate Colour, 24 bit 800 dpi Scanner	£155
Easy Painter	
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	£67

Printers & Accessories

Laser Printers

All Laser printers (excluding Hewlett Packard & Panasonic 4400/4401/5400) include 12 Months On-Site maintenance

• Brother HL630	6ppm	£326
• Brother HL660		£499
• Brother HL1260		£910
• Canon LBP 4i	4ppm	£427
• Canon LBP-8 IV	8ppm	£920
• Canon LBP-8 III	8ppm	£1559
• Epson EPL-3000	4ppm	£389
• Epson EPL-5200	6ppm	£462
• Epson EPL-5600	6ppm	£594
• Epson EPL-7500 PS	6ppm	£1135
• Fujitsu VM600	6ppm	£499
• HP LaserJet 4L	4ppm	£386
• HP LaserJet 4 ML	4ppm	£734
• HP LaserJet 4P	4ppm	£593
• HP LaserJet 4MP	4ppm	£849
• HP LaserJet 4MV	4ppm	£1989
• HP LaserJet 4V	4ppm	£1372
• HP LaserJet 4+	12ppm	£938
• HP LaserJet 4M+	12ppm	£1258
• HP LaserJet 4Si	16ppm	£2095
• HP LaserJet 4Si MX	16ppm	£2967
• NEC SuperScript 610	6ppm	£268
• NEC SuperScript 610+	6ppm	£283
• NEC SuperScript 660	6ppm	£416
• NEC SuperScript 660i	6ppm	£569
• NEC SuperScript Colour 3000	6ppm	£677
• OKI OL-400ex	4ppm	£319
• OKI OL-410ex	4ppm	£442
• OKI OL-850 PS	8ppm	£1199
• Panasonic KX-P4400P	4ppm	£279
• Panasonic KX-P4401P	4ppm	£330
• Panasonic KX-P4410*	5ppm	£318
• Panasonic KX-P4430*	5ppm	£479
• Panasonic KX-P4440*	10ppm	£679
• Panasonic KX-P5400	4ppm	£595
• Star WinType 4000	4ppm	£296

*2 years on-site warranty

Laser RAM Upgrades

Type	1M	2M	4M	8M
• Canon LBP-4+	£139	-	-	-
• Canon LBP-4i	£109	-	£279	-
• Canon LBP-8 IV	£119	-	£299	-
• EPL-4100/4300	£70	£110	£205	-
• EPL-5200/5800	£58	£115	£215	-
• Fujitsu VM600/VM4	£57	£85	£149	£299
• Fujitsu VM800	£115	-	-	-
• HP III/III/IIID	£75	£115	£135	-
• HP II/II	£75	£115	£135	-
• HP IIISI	£57	£85	£158	£299
• HP 4/4M/4P/4MP	£85	£85	£149	£299
• HP 4L/4ML	£75	-	-	-
• KX-P4410/4430	£129	£199	-	-
• KX-P4420/4450i	£75	£115	£135	-
• KX-P4400/5400	£89	£139	£229	-
• OKI OL400e	£99	£118	-	-
• Star LP-8	£138	£225	-	-
• Star LS-5	£75	-	-	-

Laser Consumables

Type	Toner	Drum	Dev
• Brother HL630	£20	£99	-
• Canon/Star 4s	£46	-	-
• Canon LBP-8 IV	£70	-	-
• Canon LBP-8 III	£52	-	-
• EPL-4100/4300	£75	£89	-
• EPL-5200	£85	-	-
• EPL-7100/7500/8100	£117	-	-
• Fujitsu VM600	£85	-	-
• Fujitsu VM800	£115	-	-
• Fujitsu VM4	£29	£149	£89
• HP III/III/IIID	£47	-	-
• HP II/II	£46	-	-
• HP IIISI/4Si	£85	-	-
• HP 4/4M/4P/4MP	£72	-	-
• HP 4L/4ML	£49	-	-
• NEC 610	£85	-	-
• NEC S80/S62P	£105	-	-
• OKI OL-400/800	£19	£189	-
• OKI OL-400e	£17	£129	-
• KX-P4410/30	£29	£90	£90
• KX-P4440	£32	£108	£115
• KX-P4420	£24	£60	£55
• KX-P4450/50i/51/55	£18	£75	£60
• KX-P4400/5400	£11.50	£69	-
• Qume Crystalprint	£99	£189	-
• Star LS-5	£83	-	-

Laser Accessories

• JetPage Postscript Cartridge - IIP/IIIP	£225
• Postscript Upgrade for LaserJet 4	£270
• LaserJet 4 Lower Paper Cassette	£205
• LaserJet 4 JetDirect Ethernet Card	£339
• LaserJet IIIIP Lower Paper Cassette	£115
• Ozone filter for KX-P4420	£9
• Ozone filter for KX-P4450/4455	£20
• LaserJet 4SI Duplex Unit	£475
• Envelope Feeder for LaserJet 4	£199
• LaserJet Font Cartridges	from £45
• LaserJet III FX/IBM Emulation Cart.	£79
• Lower Paper Tray for Canon LBP-4	£98
• A5 Paper Feeder for LaserJet 4P	£85
• Postscript Upgrade for LaserJet 4P	£225

9pin Matrix Printers

• Citizen Swift 90	80col	£114
• Citizen Swift 90C	80col	£121
• Citizen 1200+ Parallel	80col	£90
• Citizen 1200+ Serial	80col	£105
• Epson LX100	80col	£109
• Epson LX300	80col	£89
• Epson LX400	80col	£89
• Epson LX1050	132col	£172
• Epson FX870	80col	£222
• Epson FX1170	132col	£280
• Epson DFX5000+	132col	£1095
• Panasonic KX-P1150	80col	£89
• Panasonic KX-P1695	132col	£267
• Star LC15	132col	£177
• Star LC100C	80col	£89
• Star LC90	80col	£89
• Star ZA200	80col	£255
• Star ZA250	132col	£315

24pin Matrix Printers

• Citizen ABC Mono	80col	£106
• Citizen ABC Colour	80col	£125
• Citizen Swift 200 Mono	80col	£138
• Citizen Swift 200 Colour	80col	£146
• Citizen Swift 240 Mono	80col	£160
• Citizen Swift 240 Colour	80col	£178
• Citizen Swift 24X	132col	£235
• Epson LQ100	80col	£97
• Epson LQ150 Mono	80col	£114
• Epson LQ150 Colour	80col	£158
• Epson LQ300		£140
• Epson LQ570+	80col	£185
• Epson LQ870	80col	£350
• Epson LQ1070	132col	£282
• Epson LQ1170+	132col	£400
• Epson DLQ3000		£672
• Epson LQ3000	132col	£680
• NEC P2Q	80col	£98
• NEC P3Q	132col	£236
• NEC P62Q	80col	£315
• NEC P72	132col	£375
• NEC P90	132col	£549
• Panasonic KX-P2023	80col	£108
• Panasonic KX-P2124	80col	£198
• Panasonic KX-P1624	132col	£210
• Panasonic KX-P2135	80col	£124
• Panasonic KX-P3626	132col	£259
• Star LC24-20 II	80col	£113
• Star LC24-15 II	132col	£232
• Star LC24-300C	80col	£188
• Star LC90	80col	£79
• Star LC240 Mono	80col	£92
• Star LC240 Colour	80col	£103
• Star XB24-200C	80col	£315
• Star XB24-250C	132col	£385

Ribbons/Ink Cartridges

(Manufacturers Original Ribbons Only)

Type	Black	Colour
• Canon BJ10ex/BJ10sx	£14	-
• Canon BJ200/BJ230	£16	-
• Canon BJ300/BJ330	£11	-
• Canon BJ600	£6	£7
• Canon BJ800	£16	£22
• Canon BJC4000	£7	£13
• Citizen 1200+	£4	-
• Citizen Swift 200/240	£4	£13
• Citizen Swift 24X	£8	£18
• Epson LX400/LX850/FX870	£4	-
• Epson LX100	£4	-
• Epson LX1050/FX1170	£5	-
• Epson LQ100	£4	-
• Epson LQ150	£4	£12
• Epson LQ570/870	£5	-
• Epson LQ1070/1170	£8	-
• Epson LQ2550	£8	£16
• Epson SQ870/SQ1170	£21	-
• Epson Stylus Colour	£-	£29
• Epson Stylus 300	£12	-
• Epson Stylus 800/1000	£10	-
• Fujitsu DL1150/DL1250	£5	£7
• Fujitsu DL3600	£6	£12
• Fujitsu B100/B200	£18	-
• HP DeskJet Std Capacity	£-	£21
• HP DeskJet High Capacity	£20	-
• HP DeskJet 310	£15	£21
• HP DeskJet 1200	£20	£21
• HP PaintJet	£16	£18
• HP PaintJet XL300	£16	£18
• Kaga/Taxan KP810/815	£5	-
• NEC P88Q/P32Q	£8	-
• NEC P82/72/90	£8	£14
• Panasonic 1150/1170/1180	£7	-
• Panasonic 2180/23/24/35	£7	£14
• Panasonic 1824/2824	£8	-
• Panasonic KXP3626	£11	-
• Star LC10/LC20/LC100	£5	£9
• Star LC100/200	£5	£11
• Star LC24-20/24-100/24-200	£5	£12
• Star LC24-30	£8	£12
• Star XB24/ZA200/ZA250	£5	£12
• Star SJ48	£15	-
• Star SJ144 Thermal	£18	£18

Inkjet Printers

• Canon BJ10sx	80col	£145
• Canon BJ200	80col	£186
• Canon BJ230	132col	£247
• Canon BJ300	80col	£333
• Canon BJ330	132col	£404
• Canon BJ600	80col	£344
• Canon BJ800	132col	£1065
• Canon BJ820 (Mac)	132col	£1228
• Canon BJC4000 Colour		£270
• Citizen ProJet IIC		£204
• Epson Stylus 300	80col	£138
• Epson Stylus 400	80col	£130
• Epson Stylus 800+	80col	£168
• Epson Stylus 1000	132col	£311
• Epson Stylus Colour	80col	£327
• Epson SQ870	80col	£415
• Epson SQ1170	132col	£580
• Fujitsu B100	80col	£145
• HP DeskJet 320		£165
• HP DeskJet 320 & CSF		£180
• HP DeskJet 520	80col	£193
• HP DeskJet 500C	80col	£199
• HP DeskJet 560C	80col	£326
• HP DeskJet 1200C	80col	£630
• HP DeskJet 1200C PS	80col	£992
• HP PaintJet XL300+ A4	132col	£1589
• HP PaintJet XL300+ A3		£1769
• HP PaintJet XL300 PS A4	132col	£2517
• HP PaintJet XL300 PS A3		£2759
• HP DeskWriter 520 (Mac)	80col	£199
• HP DeskWriter 500C (Mac)	80col	£260
• HP DeskWriter 560C (Mac)	80col	£375
• Star SJ48	80col	£182
• Star SJ144	80col	£285
• Star WinType 800C Thermal Colour		£592

Sheet Feeders

• Canon BJ10ex/BJ10sx	£40
• Canon BJ300	£88
• Canon BJ330	£92
• Canon BJ600	£75
• Citizen Swift 24/200/240	£75
• Epson LX400	£69
• Epson LQ570/LQ870	£47
• Epson LQ1070/LQ1170	£89
• HP DeskJet 310	£48
• NEC P20/P220	£59
• NEC P3Q/P32Q	£85
• Panasonic 1170/1180/1123	£59
• Panasonic 1124/1124i/2124	£79
• Panasonic 1824/2824	£128
• Panasonic KX-P2135	£30
• Star LC100	£69
• Star LC24-20	£69
• Star LC200/LC24-200	£69

INKJET REFILL PACKS

• Canon BJ10ex/BJ10sx - 2 pack	£12
• Canon BJ10ex/BJ10sx - 5 pack	£24
• Canon BJ10ex - Cart/3 Refills	£29
• Canon BJ200 - Cart/3 Refills	£34
• HP DeskJet Std Capacity - 2 pack	£8
• HP DeskJet Hi-Capacity - 2 pack	£24
• HP DeskJet Std Capacity - 5 pack	£14
• HP DeskJet Hi-Capacity - 5 pack	£35
• HP DeskJet Colour - Cart/4 Refills	£49

Accessories

• Citizen Swift 200/240/ABC Colour Kit	£32
• Citizen ProJet II Cartridge	£3
• Canon BJ10sx Battery Pack	£32
• Epson 0K Serial Interface	£29
• Epson 8K Serial Interface	£75
• Epson 32K Serial Interface	£95
• Epson LQ100 Tractor Unit	£29
• HP DeskJet FX Emulation Cartridge	£49
• HP DeskJet IBM Emulation Cartridge	£57
• HP DeskJet 256K RAM Cartridge	£45
• HP DeskJet 310 Black Cartridge	£14
• HP DeskJet 310 Battery Pack	£33
• HP DeskJet Carry Case	£49
• HP DeskJet 310 Colour Kit	£28
• HP DeskJet 1200 Postscript Upgrade	£499
• HP DeskJet Prestige Elite Fonts	£55
• HP DeskJet Letter Gothic Fonts	£56
• HP DeskJet 310 Parallel Cable	£12
• Panasonic Serial Interface	£49
• Panasonic 32K Buffer	£16
• Panasonic 2180/2123 Colour Kit	£30
• Star 8K Serial Interface - LC range	£52
• Star 8K Serial Interface - XB range	£39
• Star 32K Buffer - LC24/XB24	£52
• Dustcovers for 80col printers	£6
• Dustcovers for 132col printers	£9
• 51636G - 50 x DJ500 Transparencies	£35
• 51838J - 50 x DJ500 Glossy A4 Paper	£35
• 51630Z - 50 x DJ500 A4 Paper	£15
• Appletalk Printer Cable - 2m	£12

Memories, Modems, Data-Storage, Facsimile, Spares, Accessories

NEW 386 to 486 Upgrade

Cyrix The NEW Cyrix affordable 386 to 486 CPU Upgrade **PRICE CUT**

At last it's here! In minutes, turn an old 386 PC into a 486 class performer. Simply 'Plug and Play' one small chip that is easy to install and fully compatible with existing hardware and software. Experience the remarkable improvements in both video and disk performance with an increase of up to 100% using the latest clock doubling technology.

Upgrade:

386SX-16/20MHz to 486SX-40MHz	£139
386SX-25MHz to 486SX-50MHz	£159
386DX-16/20MHz to 486DX-40MHz	£139
386DX-25MHz to 486DX-50MHz	£159
386DX-33MHz to 486DX-66MHz	£189

Motherboards

CEA1800 - (VLB) 486 Upgradeable MB, 256 Cache, ZIF (3 x VLB, 4 x ISA slots). Memory: 2 x 72 Pin, 4 x 30 Pin)	£62
CEA5000 - (PCI) EnergyStar 486 Upgradeable MB (to Pentium Overdrive), (EPP, ECP), 256K Cache, IDE, Enhanced Parallel Port, Dual Serial Ports, (16550) 3 PCI Ports, White ZIF	£119
CEA5010 - (PCI) Pentium P60/66MHz MB, 256K Cache, On-Bd PCI Enh. IDE, Upg. to 192Mb White ZIF	£199
CEA5050 - (PCI) Pentium P90MHz MB, 256K Cache, On-Bd PCI IDE, Enhanced Parallel, Fast 16550 Dual Serial Ports, MS 'Plug & Play' Support, 3 PCI Ports, White ZIF	£295

Processors

INTEL		
CIA0020	i486SX-33MHz	£62
CIA0030	i486DX-33MHz	£95
CIA0050	i486DX2-50MHz	£115
CIA0060	i486DX2-66MHz	£139
CIA0100	Pentium P60MHz	£289
CIA0110	Pentium P66MHz	£369
CIA0120	Pentium P90MHz	£485
AMD		
CIA0720	AMD486DX2-66MHz	£119
	AMD486DX2-80MHz	£165

PC AT Keyboards

All keyboards are with 102 keys

● EntryLevel (ELV) Keyboard	£14
● Aries Click-Action (Alps Keys with Dustcover)	£32
● KeyPro Programmable Keyboard with LCD Calculator, Diagonal Cursor Keys, keylock	£49
● KeyTrack Keyboard with built-in Trackerball	£39
Cherry new low cost keyboard Call for pricing	
● Cherry G83-3210 Membrane	£23
● Cherry G80-3000 Click-Action	£33
● Cherry G81-3000 Soft-Action	£31
● MS Natural Keyboard	£67

PC Spares

● CPU Cooling Fan with Heatsink (486)	£12
● CPU Cooling Fan with Heatsink (Pentium - P60/P66)	£29
● Coiled Keyboard Extension Lead	£6
● PS/2 - AT Keyboard Adapter	£4
● 200W PSU Unit (Desktop/Mini Tower)	£32
● 230W PSU Unit (Full Tower)	£42

Roland Plotters

● DXY1150	£575	● DXY1250	£725
● DXY1350	£939	● DPX2800	£90A
● Skelchmate A4	£335	● S/Mate A3	£499

Floppy Disk Drives

● UC600 5.25" 1.2M 96tpi Double Sided High Density, Disk Drive	£35
● UC35/6 3.5" 1.44M Drive	£22
● 5.25" Fixing kit for 3.5" Drives	£4
● UC35/55 - Combined 3.5" 1.44Mb & 5.25" 1.2Mb FDD	£85
● US35/9 3.5" 4Mb (2.88Mb when formatted) Drive (Capable of reading/writing 720K & 1.44MB)	£62
● 5 Head Floppy Cable	£5

Watford Fax/Modems

XL-144E External 14400bps V.Fast, V32bis, V42bis, MNP5	£89
XL-144I Internal 14400bps V.Fast, V32bis, V42bis, MNP5	£87
XL-V34I Internal 28800bps V34, V32bis, V42bis, MNP5	£179
XL-V34E External 28800bps V34, V32bis, V42bis, MNP5	£185

All Watford modems are BAPT approved, have a 3 year warranty & come with Winfax Lite

PACE Fax/Modems

Manufacturer's 5 Year No-Quibble Warranty

DESKTOP MODEM	
Pace - Mobifax	£75
Pace - Mobifax 14.4	£119
Linnet Quad + Fx - V22bis, V22, V23, V21, V42, V42bis, MNP4, MNP5 & MNP10.	£80
Linnet 32+ VFX - V22bis, V22, V23, V21, V42, V42bis, MNP4, MNP5 & MNP10.	£155
Linnet 34 VFC	£269
Ultralink 32+ - Dial up to 2/4 wire leased line operation with PSTN dial back-up and auto restoral.	£330
POCKET & PC CARD	
Microlin Fx - Internal Card	£79
Microlin Fx - Pocket Unit	£94
Microlin Fx 32+ - Internal Card	£135
Microlin Fx 32+ - Pocket Unit	£149
PCMCIA Fax Modem	
Microlin Fx NB24	£124
Microlin Fx NB32+	£190

Except for Linnet, all PACE Fax/Modems are supplied with Cables, Win/DosFax & COMit softwares

US Robotics Modems

	Int	Ext
Sportster 14.4 Fax/Modem	£126	£129
Worldport Dual Cellular	£175	
Courier v34 Fx/Md	£260	£260
Worldport PCMCIA 2496 Fx/Md	-	£129
Worldport Dual standard cellular PCMCIA	-	£196
Connecting Cable 9/25	-	£8

Price includes software.

Dataflex Fax/Modems

GEM Fax Pocket	V22bis	£45
GEM Fax PCMCIA	V22bis	£129
HyperGEM PC/Int	V34bis	£219
HyperGEM Portable	V34bis	£219
HyperGEM Desktop	V34bis	£229
SuperGEM PC Card	V32bis 14.4K	£137
SuperGEM Portable	V32bis 14.4K	£115
SuperGEM Comms Office		£159
Rapier Plus PC Card		£319
Rapier Plus Desktop		£338
Rapier V.Fast Class Desktop		£358
Rapier Plus PCMCIA	V32bis 14.4K	£145

Price include PSU, Cable & Software.

Suncom PC Joysticks

● Analogue Xtra	£19
● FX2000 - the Ultimate Stick	£20
● Flight Yoke	£49
● Command Control	£16
● Quick Shot Aviator 5	£29
● 2-into-1 Joystick Adapter	£5
● Flight Max	£24
● Axyx	£18

Scanners

AT - HP-Scanjet IIP	£497	IICX	£686
PS/2 - HP-Scanjet IIP	£497	IICX	£686
HP Auto Doc Feeder IIP	£229	IIC	£265

EPSON

Epson A4, 24 bit colour Flatbed Scanner: Supplied complete with Pic. Publisher LE, Omni Direct OCR, Interface Card & Cables

● GTX6500 Parallel I/F	£508
● GTX6500 SCSI I/F	£567
● GTX8000 Parallel	£660
● GTX8000 SCSI	£720
● GTX9000 SCSI	£905

Psion Computers



● Series 3 128K	£108	● Series 3 256K	£159
● Ser3A 256K	£229	● Ser 3A 512K	£269
RAM Solid State Discs (SSD)			
● 128K	£48;	● 512K	£97
Flash Solid State Discs (SSD)			
● 128K	£30;	● 256K	£48
● 512K	£79	● 1Mb	£139;
● 2Mb	£199	● Parallel Interface Link	£24
● RS 232 Serial Link for PC	£58;	Mac	£59
● Mains Adaptor 9V AC	£12	● Professional Finance	£47
● Spelling Checker/Thesaurus	£39	● Spreadsheet	£50
● WinLink	£25	● Leather Case	£21
● Desk Stand	£15		

Memory (RAM) Simms

256K 3 Chip	£18	4Mb - 1Mb x 32	£125
1Mb x 9 3 Chip	£28	4Mb - 1Mb x 36	£134
1Mb x 9 9 Chip	£42	8Mb - 2Mb x 36	£259
256K x 36 (1Mb)	£52	16Mb - 4Mb x 32	£379
4Mb x 9 9 Chip	£115	16Mb - 4Mb x 36	£395
2Mb - 512K x 36	£95		

Maths Co-Processors

8087-8MHz	£87	80387DX-	
8087-10MHz	£115	20/25/33MHz	£44
80287-8/10/12MHz	£35	80387DX-40MHz	£45
80287-20MHz	£45	80487SX-	
80387SX-16/20MHz	£38	16/20/25MHz	£275
80387SX-25MHz	£38	Overdrive 486SX-	
80387SX-33MHz	£42	20MHz-32/40M	£188
80387SX-40MHz	£44	25MHz-50M	£188

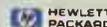
Computer Cases - Chic

● Mini Tower Case with PSU	£38
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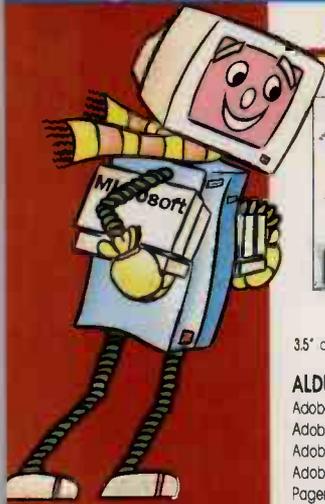
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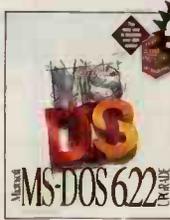
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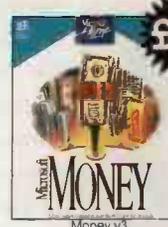
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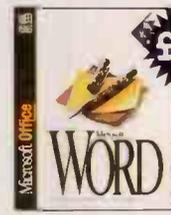
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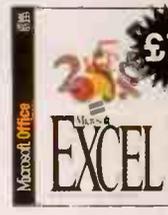
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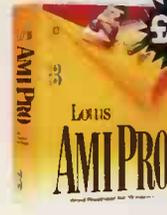
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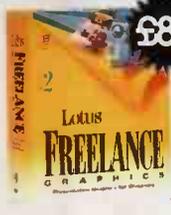
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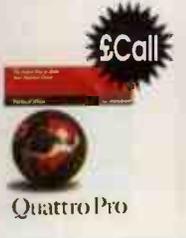
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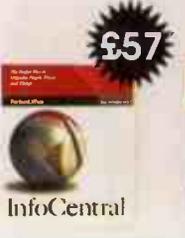
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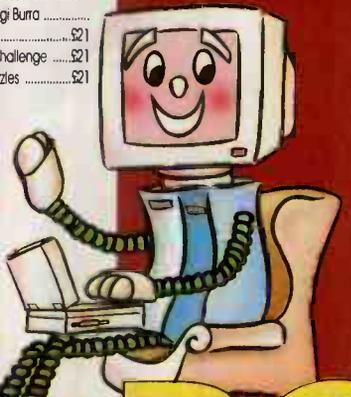
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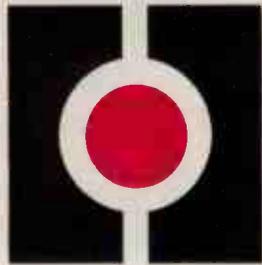


Mr PC

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MrPC6B

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Mark Simon

Mark Simon
Chairman

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OUR TOP TEN SOFTWARE PACKAGES AND THEIR MEMORY REQUIREMENTS

	Minimum	Recommended
Word Perfect V.6	4MB	8MB+
MS Excel V.5	4MB	8MB+
Lotus 1.2.3 V.5	4MB	8MB+
MS Word V.6	4MB	8MB+
MS Office V.4.3	4MB	8MB+
MS Access V.4	6MB	8MB+
MS Powerpoint	4MB	8MB+
Norton Utilities V.8	4MB	8MB+
Corel Draw 5	4MB	8MB+/16MB
Aldus PageMaker 5	4MB	8MB+

Source: Manufacturers' figures

DELIVERY CHARGES

UK Mainland:
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MEMORY LANE

Do you remember all those great exhibits at the Science Museum's Children's Gallery?

- ... the automatic door
- ... the speedometer
- ... the levers and pulleys
- ... the static ball



THE LARGEST DIRECT MEMORY SUPPLIER

Every month Powermark plc supply thousands of memory upgrades to thousands of satisfied customers, making us the largest direct supplier of memory in the UK.

"Adding memory to your computer is undoubtedly the easiest, most cost effective way of increasing the performance of your system"

More and more applications demand large amounts of memory to work effectively. By increasing the standard memory in your PC you can:

- Radically increase the performance of your system
- Run multimedia applications at optimum speed
- Keep fonts and desktop accessories in RAM for instant access
- Run more than one application at a time, enabling true multi-tasking

DON'T JUST TAKE OUR WORD FOR IT...

"There's no question that you need more memory to run Windows or OS/2 than you ever did to run DOS.

The amount of memory made an even greater difference when we tried features like dragging and dropping between applications. The system was very slow with 4MB, significantly faster with 8MB, and faster still with 12MB.

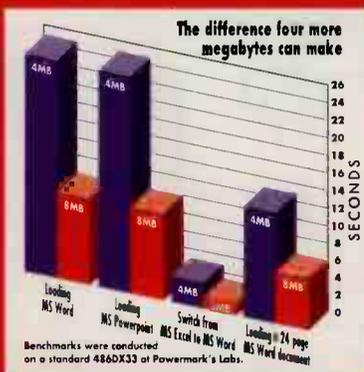
On the basis of our tests, 8MB - not 4MB - is the minimum amount of memory you'll need to run Windows 3.1 satisfactorily. With 12MB, you'll get optimal performance in many cases."

PC Magazine, February 1995

"Possibly the greatest upgrade you can offer a flagging PC is an increase in memory.

The difference in speed between 4MB and 8MB is enormous, as is the jump from 8MB to 16MB. Anyone attempting to run Windows 3.1 in less than 4MB should upgrade now."

Personal Computer World, January 1995



Benchmarks were conducted on a standard 486DX33 at Powermark's Labs.

MATCHED MEMORY SIMM KITS

If you're unsure about upgrading then our Matched Memory SIMM Kits are for you. They're guaranteed to be totally memory matched. That means speed, voltage, refresh, parity and physical characteristics are all matched to give optimum performance to your system.

From our listings on the following pages, just select the upgrade kit for your PC. They cost a little more but you get:

- full installation instructions
- anti-static wrist strap
- dedicated support hotline
- our famous double guarantee - full lifetime warranty and the Powermark Promise - our 14 day 'no-quibble' money back guarantee

If your PC is not listed then call us. Our Memory Database has the upgrade path for almost every PC supplied in the UK over the last five years.

UPGRADING IS EASY

With most memory upgrades it's just a case of:

- switching off PC
- removing lid
- locating SIMM sockets
- installing SIMMs
- closing lid
- switching back on

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LIFETIME WARRANTY ON ALL MATCHED MEMORY

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30 PIN SIMMS

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1M x 8	1MB	80ns	£33
1M x 9	1MB	80ns	£33
1M x 9	1MB	70ns	£29
1M x 9 (9cs)	1MB	70ns	£31
1M x 9	1MB	60ns	£36
4M x 8	4MB	80ns	£125
4M x 9	4MB	80ns	£128
4M x 9	4MB	70ns	£115
4M x 9	4MB	60ns	£125
16M x 9	16MB	70ns	£579
16M x 9	16MB	60ns	£599

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- Specified by many PC manufacturers
- Longer MTBF

1M x 9	1MB	70ns	£41
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72 PIN SIMMS

- 10 year warranty on all SIMMs listed here

Type	Capacity	Speed	Price
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256K x 36	1MB	70ns	£59
512K x 32	2MB	70ns	£75
512K x 36	2MB	70ns	£75
1MB x 32	4MB	80ns	£122
1MB x 32	4MB	70ns	£125
1MB x 36	4MB	80ns	£135
1MB x 36	4MB	70ns	£135
1MB x 36	4MB	60ns	£145
2MB x 32	8MB	80ns	£265
2MB x 32	8MB	70ns	£255
2MB x 36	8MB	80ns	£265
2MB x 36	8MB	70ns	£255
2MB x 36	8MB	60ns	£279
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4MB x 36	16MB	70ns	£499
4MB x 36	16MB	60ns	£539
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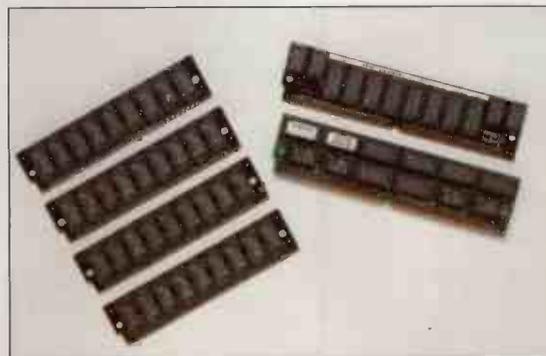
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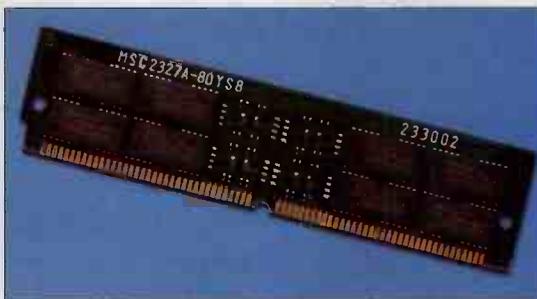
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• Complete range of anti-static products available

ANTI-STATIC WRIST STRAP
 • Essential when handling electrostatic devices £8

IC EXTRACTOR TOOL £9
SIMM TESTER £779
WRIST STRAP TESTER £99

WE ALSO SUPPLY UPGRADES FOR...

Acorn, ALR, AST, Austin, Canon, Commodore, Dan, Goldstar, Hyundai, Loeland, MJN, Multiplex, NEC, NeXT, Opus, Philips, QMS, Sharp, Tandy, TI, Unisys, Wyse and many more.

SIPS

• Call for configurations not shown here

• 5 year warranty

256 x 9 - 80ns £15
 1M x 9 - 80ns £48
 1M x 9 - 70ns £41
 1M x 9 - 60ns £58

DRAMS

• Call for devices not shown.
 • Full range of PROMs, SRAMs & ZIPs available

• 5 year warranty

64K x 1 - 120ns £1.79
 256K x 1 - 100ns £2.62
 256K x 1 - 80ns £2.80
 256K x 4 - 80ns £5.77
 1M x 1 - 80ns £4.99
 1M x 1 - 70ns £5.20
 1M x 4 - 80ns £17.80



Public Sector customers can purchase through HMSO by calling 01603 694153.

BEWARE
 Beware of third party, low grade memory. Powermark plc only supply premium upgrades from market leaders with manufacturer's approvals.



HUGE STOCKS
 Guaranteed same day despatch on virtually all orders placed even up to 5.00pm.

TECHNICAL SALES PEOPLE
 Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

FINANCIAL STABILITY
 Powermark plc has been supplying upgrades for over 4 years and has an annual turnover exceeding £15 million with a healthy balance sheet.

LOW PRICES
 We only supply products from leading manufacturers and at low, low prices too. Powermark plc is a BS5750 upgrade reseller.

TECHNICAL SUPPORT
 Dedicated after sales technical support teams on line to help with installation.

CORPORATE & PUBLIC SECTOR
 We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

1 DAY MONEY BACK GUARANTEE
 Items must be returned (with a returns number from Powermark Customer Service) in "as new" condition for a full refund (excluding carriage). Not valid for software.

TURN THE PAGE FOR MORE

UPGRADE DRIVE THRU
 While-you-wait installation service available. See page of this advertisement for full details.

PERSONAL CALLERS
 Save on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday and on Saturdays from 9.30am to 4.00pm.

Powermark plc
 Premier House,
 112 Station Road, Edgware,
 Middlesex HA8 7AQ
Tel: 0181-951 3355
 (50 lines)
Fax: 0181 905 6233



Cards are not debited until despatch.

CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE



Mark®

**Technical Sales
Order Lines
0181-
951 3355
(50 lines)**



Unsure about upgrading?
Upgrading is easy but if you would like us to upgrade your computer then our new **UPGRADE DRIVE THRU** is for you. It's fast, it's simple, and it's convenient. Just drive into our loading bay at the rear of Premier House and your computer will go directly to our on-site labs for instant upgrading by our fully qualified engineers.

For upgrades that take a little while we'll even hand you a Pager enabling you to visit the shopping centre next door. You'll be paged the minute your computer is ready. In most cases you need only bring your base unit along but do call first to discuss your requirements and to confirm our stock position on the upgrades you require.

DESKTOP MENU

- (Call for notebook menu)
- Memory £27
 - Hard Disk £39
 - Processor £28
 - Tape Backup £31
 - Sound or Modem Card £25
 - Graphics or Video Card £26
 - Multimedia Kit £39

Save £££s with combo orders!

**TURN THE PAGE
FOR MORE**

MEMORABLE ADS

That'll do nicely
American Express

Follow the bear
Hofmeister

For the man that doesn't have to try too hard



MATCHED MEMORY

MATCHED MEMORY FOR AMSTRAD

• Includes full instructions
• While you wait installation service at our north London Distribution Centre

PC1286/PC1386/PC3286/PC3386/PC5286

1MB → 4MB **POWERCUT!** £132
ALT286/386SX
1MB → 4MB £149
1MB → 4MB (Zero-wait state) £199

NC100
256K Card £58
512K Card £89
1MB Card £129

PC7286, 7386
2MB **POWERCUT!** £62
4MB **POWERCUT!** £124

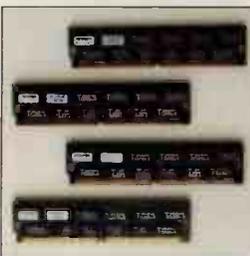
PC7486 SLC
8MB Kit £229
16MB Kit £539

PC9486
4MB Module **POWERCUT!** £139
16MB Module £529

ANB386SX
4MB Module **POWERCUT!** £185

386SX25
MEGA PC
4MB Kit **POWERCUT!** £129
16MB Kit £469

All our Matched Memory Kits come with our famous double guarantee - full lifetime warranty and our 14 day money back guarantee



MATCHED MEMORY FOR TANDON

PC 386/20
8MB Kit £336
PC386SX/20
4MB Kit **POWERCUT!** £129
6MB Kit £219

386SX NOTEBOOK
2MB → 4MB £72
2MB → 10MB £289

POSITIVE 386SX25, 386DX40, 486SX25, 486DX33

4MB Kit **POWERCUT!** £129
16MB Kit £439

MATCHED MEMORY FOR PACKARD BELL

• Includes full fitting instructions

LEGEND 200/316SX
2MB Kit **POWERCUT!** £72
4MB Kit **POWERCUT!** £144

LEGEND 600, 900
4MB Kit **POWERCUT!** £129
8MB Kit **POWERCUT!** £289

486 LOCAL BUS
2MB Module £85
4MB Module **POWERCUT!** £129

FORCE RANGE
XL410
16MB Kit £539

MATCHED MEMORY FOR HP

• Authorised HP dealer

VECTRA 386/25 PC, 486 PC, 486s/20
4MB Kit £169
8MB Kit £336

HP VALUELINE 486, NETSERVER SERIES
8MB £299
16MB Module £599

HP95
512K Card £89
1MB Card £149

HP OMNIBOOK RANGE £Call

MATCHED MEMORY FOR OLIVETTI

• Includes full instructions

PCS386SX
1MB → 2MB **POWERCUT!** £64
1MB → 4MB **POWERCUT!** £129
1MB → 6MB **POWERCUT!** £209
1MB → 8MB £272

PCS40
8MB Kit £336

M290
2MB Kit **POWERCUT!** £74
4MB Kit **POWERCUT!** £149

M486/CP386
2MB Kit £99
4MB Kit £168

PCS33
2MB Kit **POWERCUT!** £66

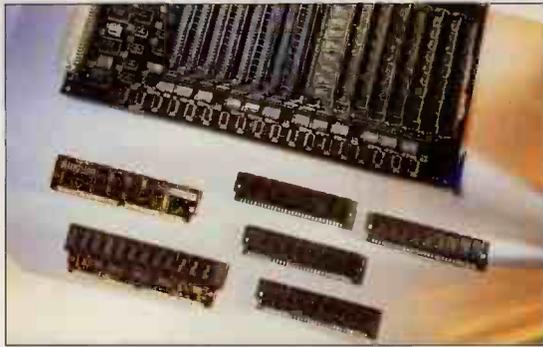
M300-30
4MB Kit £168
8MB Kit £299

M400-10/40/60, M480-10/20
4MB Kit £156
16MB Kit £539

QUADERNO
512K £89
1MB Kit £149

MODULO & SUPREMA RANGE
8MB Module £289
16MB Module £529
32MB Module £1199

BEWARE
Beware of low grade 5 volt notebook memory that reduces battery life by up to 40%. Powermark plc only supplies 3.3 volt devices from market leaders with manufacturers' approvals.



MATCHED MEMORY FOR TOSHIBA

T1000/E/XE/LE, T1800, T1850C, T2000SX, T2000SXE, T2200SXE

2MB Card £89
4MB Module £162
8MB Card £299

T3300SL
2MB £66

T1200XE
2MB Card £93

T1600/T5100
2MB Card £75

T3100SX
2MB Card £89
4MB Card £162

T3200SX/C
2MB Module £89
4MB Module £162
8MB Kit £299

T3200
3MB Card £169

T4400, T6400 SX/C, DX/C
2MB Card £89
4MB Card £169
8MB Card £299

T1950CT, T3400CT, T4500, T4600, T4700CT, T4800CT
8MB Module £349
16MB Module £679

T5200/C & T8500
2MB Module £94
8MB Module £349
12MB Kit £464

DYNAPAD T100X
6MB Card £269

MATCHED MEMORY FOR ZENITH

• Includes full fitting instructions

SUPERSPORT SX
2MB Module £127

TURBOSPORT 386E
1MB Kit £135
2MB Kit £424

MASTERSPORT SL/SLc, 620NL
2MB Module £109
4MB Module £194

Z-NOTE L SERIES, 320, 325
1MB £114
2MB £408

Z-SERVER/STATION
Z-SPORT
4MB £179

MATCHED MEMORY FOR GATEWAY

PC 4SX-33
4MB Module £129
16MB Module £499

PC 4DX-33V, PC 4DX-66V
4MB Module £129
16MB Module £499
32MB Module £1199

PC 4DX2-66P/V
16MB Module £499
32MB Module £1199

PC P5-60, P5-66
64MB Kit £2622

PC 4D-66, PC 4D-100
8MB Kit £299
32MB Kit £1199

MATCHED MEMORY FOR ELONEX

• Includes full fitting instructions

PC386SXM, SXB, 386/16, B/33
2MB Kit £64
4MB Kit £119
8MB Kit £249

PC386 V/E, 486 V/E
4MB Kit £139
8MB Kit £279
16MB Kit £469

WS RANGE
4MB Kit **POWERCUT!** £139
8MB Kit **POWERCUT!** £289
16MB Kit **POWERCUT!** £529

PC433M, 450M, 466M
4MB Kit £122
8MB Kit £279
16MB Kit £469

LT386SX/P
2MB Kit £64
4MB Kit £139

PC500 SERIES
8MB Module **POWERCUT!** £289
16MB Module £499

ELONEX 560F EISA
8MB Kit £269
16MB Kit **POWERCUT!** £499



Public Sector customers can purchase through HMSO by calling 01603 694153.

3 CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE

VAT at 17.5% will be added to all prices

The Memory Bank

at Powermark



MATCHED MEMORY AND FLIGHT DECK

MATCHED MEMORY FOR IBM



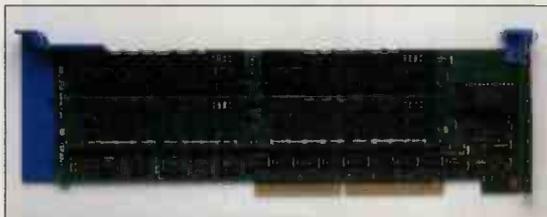
- Planar memory plugs directly onto system board
- Includes fitting instructions
- Price instability - check latest offers on IBM memory before ordering

PS/2 35LS, 35SX, 40SX	
4MB	£159
8MB	£299
PS/2 50Z	
1MB → 2MB	£85
PS/2 55SX, 60, 65SX	
4MB	£168
PS/2 57SX, M57 SLC	
4MB	£168
PS/2 70, Portable 70/75	
4MB	£168
8MB	£289
PS/2 80	
4MB	£239
PS/2 140SX, N335SX, NSL	
4MB Card	POWERCUT! £149
8MB Card	£349
PS/2 90, 95, 95A	
4MB Module	£168
PS/2 195 & 295	
32MB Module	£Call
VALUEPOINT 6381, 6382, 6384	
4MB	POWERCUT! £129
8MB	£282
PENTIUM VALUEPOINT SERIES	
8MB Kit	£299
16MB Kit	£599
THINKPAD 300, 350, 500, 700, 710, 720, 750, 755c	
2MB	£179
8MB	£349
PC466DX2, 100DX4	
8MB Module	£299
CL57SX	
4MB	£189
8MB	£383
TREKKA	
2MB	£89
HURDLA, SPRINTA	
4MB Kit	£159
16MB Kit	£509
PS/1	
2MB	£85
PS/1 - 386	
4MB	£159
PS/1 - PRO 486	
4MB	£159
8MB	£289
CONSULTANT, ESSENTIAL, EXPERT	
4MB	£149
8MB	£279
NEW! APTIVA	
4MB	£139

MATHS CO-PROCESSORS

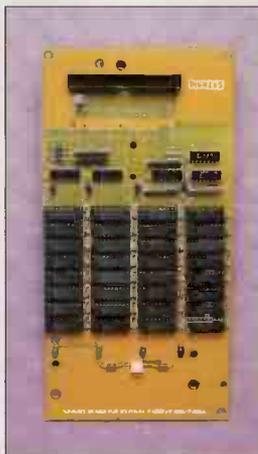
Installation of a Co-Processor results in a significant speed increase in maths intensive applications eg: spreadsheets, databases, CAD and graphics packages.

	INTEL	ULSI	IIT/ CYRIX
80287 XL (12MHz)	£49	-	£36
80387 SX (16 MHz → 33MHz)	£58	£49	POWERCUT! £42
80387 SX (40 MHz)	£58	-	£48
80387 SL (25 MHz)	£58	-	-
80387 DX (16 MHz → 33MHz)	£59	£32	POWERCUT! £49
80387 DX (40 MHz)	-	-	£51
80487 SX (25 MHz)	£277	-	-
80386 RapidCAD	£189	-	-



MATCHED ADAPTER BOARDS FOR IBM PS/2

- Completely user expandable
- | | |
|----------------------------------|------|
| PS/2 50, 50Z, 60 & 65 | |
| 16MB Board with 4MB | £295 |
| 16MB Board with 8MB | £425 |
| PS/2 70, 80, 90 & 95 | |
| 64MB Board with 4MB | £295 |
| 64MB Board with 8MB | £465 |



MATCHED MEMORY FOR VIGLEN

- Complete range for Executive, Professional and Tower
- | | |
|--|-------|
| GENIE 386SX | |
| 2MB Kit | £64 |
| 4MB Kit | £128 |
| VIG II ELITE | |
| 2MB Kit | £98 |
| 4MB Kit | £196 |
| VIG III LS (Type 1) | |
| 4MB Kit | £169 |
| 8MB Kit | £399 |
| VIG III/25, III/33 | |
| 4MB Kit | £129 |
| 8MB Kit | £279 |
| 16MB Kit | £469 |
| VIGLEN EX PENTIUM SERIES | |
| 8MB Kit | £269 |
| VIGLEN EX 4DX33/50 | |
| 4MB | £129 |
| 8MB | £269 |
| VIG 4SX25, 4DX33, 4DX50, 4DX2-50, 4DX2-66 | |
| 4MB Kit | £129 |
| 8MB Kit | £279 |
| 16MB Kit | £499 |
| CONTENDER RANGE | |
| 4MB | £129 |
| 8MB | £269 |
| GENIE 486VLB RANGE | |
| 16MB Module | £499 |
| 64MB Kit | £2396 |
| GENIE PCI RANGE | |
| 16MB Module | £499 |
| 32MB Module | £1199 |

MATCHED MEMORY FOR APPLE

- Complete range stocked



Authorised Reseller

Certificate no. FS 26535
BS5750 registered for the supply of computer, printer and workstation memory, processor and other upgrades.

Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.

Technical Sales Order Lines
0181-951 3355
(50 lines)

MATCHED MEMORY FOR ICL

DRS 40, 45	
2MB Kit	£69
4MB Kit	£155
ERGOPRO C4, D4	
8MB Kit	£155
16MB Kit	£539
DRS M95	
4MB Kit	POWERCUT! £179
32MB Kit	£1199
VALUEPLUS DL RANGE	
4MB	£168
ZENO SERIES	
4MB Kit	£168
16MB Kit	£539

MATCHED MEMORY FOR APRICOT

XEN 486SX-25, 486DX2-50, 486 DX2-66, PCM	
4MB Module	£168
16MB Module	£599

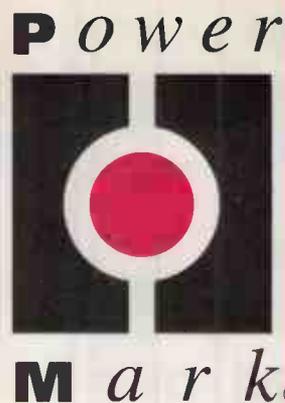
FLIGHT DECK

Broaden your flight simulator horizons from the widest range of advanced interface controls, utilities, scenery disks & books. Commercial pilot available for specialist advice.

- THE YOKE** £24
- THE YOKE PRO** £36
- New G Force model
- Realistic aircraft style two-handed joystick
- VIRTUAL PILOT** POWERCUT! £69
- VIRTUAL PILOT PRO** £Call
- FLIGHT CONSOLE** £149
- Incorporating yoke and pedals
- RUDDER PEDALS** £Call
- GRAVIS ANALOGUE STICK PRO** £23
- 8 tension adjustments
- 3 adjustable fire buttons
- FLIGHT SIMULATION COMPENDIUM** £15



- FLIGHT ASSIGNMENT: AT** £Call
- FLYING BLIND** (Book & Disk) £14
- MS FLIGHT SIMULATOR V.5** £25
- SPACE SHUTTLE SIM CD ROM** £29
- MICROSOFT SPACE SIMULATOR** £32
- FLIGHT UNLIMITED SCENERY DISKS FOR MS FLIGHT SIMULATOR 5:**
- JAPAN** £19
- CARIBBEAN ISLANDS** £19
- NEW YORK** £16
- PARIS** £16
- Pilot's Choice**



- HUGE STOCKS**
Guaranteed same day despatch on virtually all orders placed even up to 5.00pm.
- TECHNICAL SALES PEOPLE**
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.
- FINANCIAL STABILITY**
Powermark plc has been supplying upgrades for over 4 years and has an annual turnover exceeding £15 million with a healthy balance sheet.

- LOW PRICES**
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Dedicated after sales technical support teams on line to help with installation.

- CORPORATE & PUBLIC SECTOR**
We welcome orders from corporate, education and public sector organisations. Use fax or phone your order number.

- 14 DAY MONEY BACK GUARANTEE**
Items must be returned (with a returns number from Powermark Customer Service) in "as new" condition for a full refund (excluding carriage). Not valid for software.

TURN THE PAGE FOR MORE

- UPGRADE DRIVE THRU**
While you wait installation service available. See page 9 of this advertisement for full details.

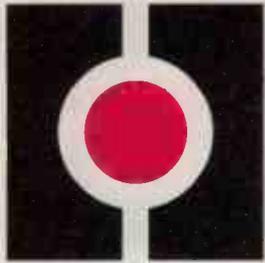
- PERSONAL CALLERS**
Save delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday and on Saturdays from 9.30am to 4.00pm.

Powermark plc
Premier House,
112 Station Road, Edgware,
Middlesex HA8 7AQ
Tel: 0181-951 3355
(50 lines)
Fax: 0181 905 6233



Cards are not debited until despatch.

CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE



MATCHED MEMORY

MATCHED LASERPRINTER MEMORY

• Price instability - check latest offers on laser printer memory before ordering

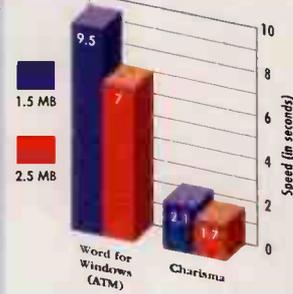
Expansion guidelines
1MB - 2MB
 High resolution graphics
 Multi-font downloading
 Macro downloading
3MB - 4MB
 Networking and CAD

BROTHER HL4	
1MB	£79
4MB	£199
BROTHER HL8/E/V, HL10, DPS	
1MB	£79
2MB	£129
CANON	
NOTEJET 486, BN22	
4MB Module	£149
CANON LBP4, 4+, LITE, SX	
1MB	£85
2MB	£159
CANON LBP8II	
2MB	£109
4MB	£189
CANON LBP8IV	
4MB	£144
COMPAQ PAGEMARQ 15/20	
2MB	£96
8MB	£299
16MB	£599
EPSON EPL4000/4100/4300	
1MB	£62
2MB	£109
EPSON EPL8100	
1MB	£62
2MB	£109
KYOCERA F800	
1MB	£82
2MB	£129
KYOCERA F1800	
1MB	£94
KYOCERA F1200S/3000/3300	
1MB	£94
4MB	£199
KYOCERA ECOSYS	
KYOCERA F3500A, 5500A	
1MB	£59
MANNESMAN TALLY	
MT904/908	
1MB	£69
MANNESMAN TALLY MT905	
2MB	£129
4MB	£189
OKI LASER 400	
1MB	£72
2MB	£109
OKI LASER 400e, 400ex, 410ex	
1MB	£119
OKI LASER 830/840/850	
2MB	£129
PANASONIC 4420	
1MB	£72
2MB	£109
PANASONIC 4430	
1MB	£89
PANASONIC 5410, 4440	
2MB	£117
PANASONIC 4450I	
2MB	£99
4MB	POWERCUT! £165
SHARP JX-9500PS	
1MB	£68
STAR LP4/LP8	
1MB	£89
2MB	£129
TEXAS MICROLASER PS	
2MB	£109
TOSHIBA PAGELASER 6	
1MB	£119

LASER PRINTER MEMORY - AN EXPLANATION

Increasing memory in your laser printer will enable it to print large, graphics intensive documents. Additional benefits include faster print spooling, faster printing speed and multiple font downloading.

This chart shows the improvement a single megabyte of printer memory can make. "Speed" represents the amount of time required to spool the document into the printer and get the full use of your PC back.



How much memory do you need?

Full page graphics	1MB - 2MB	PostScript with duplexing	4MB
Soft fonts	1MB	4 - 5 PostScript fonts	2MB
PostScript cartridge	1.5MB	8 - 10 PostScript fonts	4MB
		Network printer sharing	4MB

MATCHED MEMORY FOR HP PRINTERS



HEWLETT
PACKARD

Authorised reseller

LASERJET II, IID	
2MB	£96
4MB	£165
LASERJET IIP, III, IIID, IIIP	
2MB	£88
4MB	£159
LASERJET IIIsi, 4, 4M,	
4si, 4MV	
4MB	£149
LASERJET 4L	
1MB	£79
DESKJET 500, 500c	
256K	POWERCUT! £49
JET DIRECT	
EX PRINT SERVER	
	&Call
NETSERVER SERIES	
32MB Module	£1399
DESIGNJET 600/650	
4MB	£155

MATCHED MEMORY FOR HP APOLLO Workstations

• Call for models not listed here

• All HP Apollo memory is individually tested

APOLLO 9000 807S - 897S	
32MB Board with 16MB	£1509
32MB Board	£2304
APOLLO 3000	
917LX - 967LX	16MB Kit
£997	
32MB Kit	£1811
128MB Kit	£6265
APOLLO 9000 70S, 710	
8MB Kit	POWERCUT! £532
16MB Kit	£968
32MB Kit	£2384
ENVIZEX RANGE	
16MB Module	£699

MATCHED MEMORY FOR DEC Workstations

• Call for models not listed here

• All DEC workstation memory is individually tested

MICROVAX 3100 MODEL 80	
8MB Kit	£489
32MB Kit	£1296
MICROVAX 3100 MODEL 30 & 40	
8MB Kit	£430
DECSYSTEM 5100	
8MB Kit	£386
48MB Kit	£1986

MEMORY FOR SILICON GRAPHICS Workstations

POWER SERIES IRIS	
32MB Kit	£2030
PROFESSIONAL IRIS	
4MB	£265
INDIGO, 4D/30, 4D/35533	
64MB Kit	POWERCUT! £1999
88MB Kit	£4700

MATCHED MEMORY FOR SUN Workstations

• SPARC tested and approved

• All Sun memory is individually tested

• Workstation experts available

SPARC 1, 3/60, 3/80, 4/40, 4/60, 4/65, 4/75	
4MB Kit	POWERCUT! £162
16MB Kit	£499
SPARC ELC	
16MB Kit	POWERCUT! £489
SPARC LX	
32MB Kit	£1199
SPARC 330, 370 & 390	
16MB Kit	£1294
32MB Kit	£1802
SPARC SERVER 630, 670, 690	
64MB Kit	£2812
SPARC 630MP, 670 & 690	
64MB	£2812
128MB	£5402
SPARCSTATION 10/20	
16MB	£599

Technical Sales Order Lines
0181-951 3355
 (50 lines)

MATCHED MEMORY FOR IBM PRINTERS



Authorised Dealer
 IBM Personal Computers

IBM 4019 & 4019E	
1MB	£49
2MB	£119
IBM 4029	
2MB	£114
IBM 4039 & 4079	
4MB	£221
8MB	£418
LEXMARK RANGE	
	&Call

DOG OF THE MONTH
PARALLEL PRINTER CABLE
 £2.50

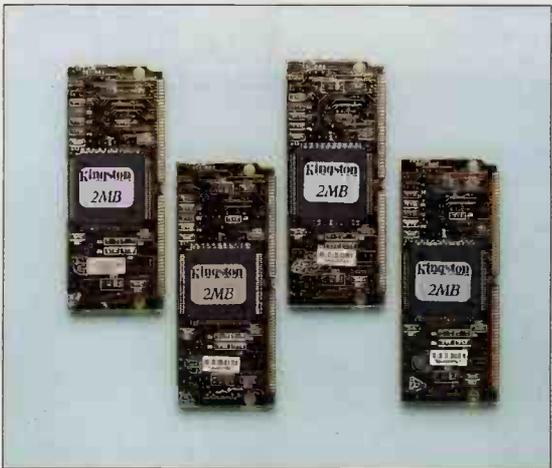
TURN THE PAGE FOR MORE

MEMORY QUIZ

??????
 "Your starter for 10MB"

1. What does POTS stand for?
2. What does PANS stand for?
3. What was the difference between the BBC Model B and the Proton?

Answers on fax form page



MATCHED MEMORY FOR IBM RISC Workstations

• Call for models not listed here

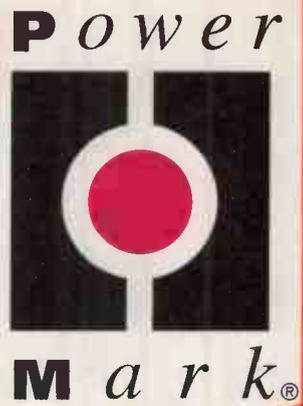
• All workstation memory is individually tested

RISC SYSTEM 6000	
32MB Kit	£1383
64MB Kit	£2787
448MB Kit	£17,384
POWERSTATION/ POWERSERVER 200	
8MB Kit	£298
X STATION	
6MB Kit	£228

All our Matched Memory Kits come with our famous double guarantee - full lifetime warranty and our 14 day money back guarantee

BEWARE
 Beware of third party, low grade memory. Powermark plc only supply premium upgrades from market leaders with manufacturer's approvals.

The Memory Bank *at Powermark*



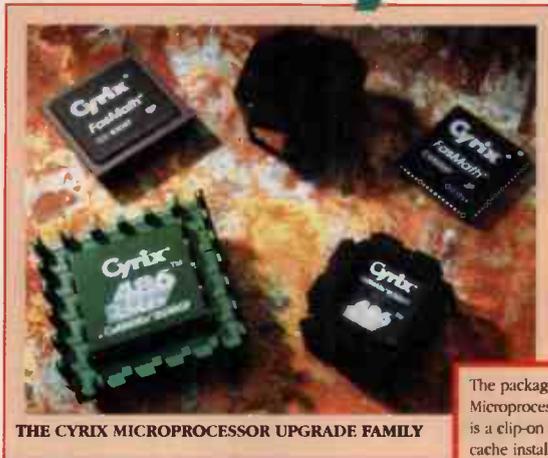
CYRIX FEATURE

THE NEW CYRIX 386 TO 486 PROCESSOR UPGRADE



Plug in the new Cyrix 386 to 486 Processor Upgrade. It's the fastest, most cost effective way to a 486 computer and its totally compatible with the world's leading software: DOS, Windows and OS/2 operating systems.

It's easy to install. Just clip on the Cyrix processor and load the cache installation software. It's as simple as that. You're ready to run in minutes.



THE CYRIX MICROPROCESSOR UPGRADE FAMILY

Certificate no. FS 26535
BS5750 registered for the supply of computer, printer and workstation memory, processor and other upgrades.

Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.

The package consists of one Cx486DRx2 Microprocessor, a 386DX removal tool. (SX version is a clip-on chip), installation manual, upgrade cache installation software (on both 3.5" and 5.25" media) and a pin 1 locator arrow (for correctly aligning the upgrade processor in the socket). A Cyrix-green heatsink is also included with 20/40, 25/50 and 33/66 versions.

386DX

EVEN LOWER PRICES!

DX 16MHz → 486 32MHz	£149	£195
DX 20MHz → 486 40MHz	£149	£235
DX 25MHz → 486 50MHz	£169	£265
DX 33MHz → 486 66MHz	£189	£199

386SX

SX 16MHz → 486 32MHz	£159	£169
SX 20MHz → 486 40MHz	£159	£169
SX 25MHz → 486 50MHz	£169	£185

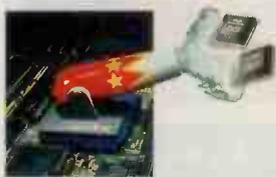
CYRIX

DRx2/SRx2

- Single chip upgrade solution for 386 DX and SX personal computers
- Clock doubling technology for increased performance
- 1K on-chip cache
- Very easy to install
- Compatible with DOS, Windows and OS/2
- Free technical support
- Limited lifetime warranty

Technical Sales Order Lines
0181-951 3355
(50 lines)

INTEL OVERDRIVE FEATURE



OVERDRIVE

Intel OverDrive processors enable you to take advantage of advanced technology on your existing upgradable Intel 486 CPU-based system. OverDrive processors accelerate all applications running under MS-DOS, Windows, OS/2 and UNIX. Simply install the Intel OverDrive processor into your existing system and watch your applications run at blazing speeds. Intel OverDrive processors are available for all Intel 486 CPU-based systems with or without an OverDrive socket.

LIFETIME WARRANTY ON ALL INTEL OVERDRIVE PROCESSORS

INTEL DX4 OVERDRIVE

- For most 16, 20, 25, 33MHz Intel 486 SX or DX CPU-based systems
- Features Intel's "speed tripling" technology
- 16K on-chip cache memory
- On-chip maths co-processor
- The most powerful PC upgrade available

INTEL DX4	POWERCUT!	
16MHz → 48MHz		£299
INTEL DX4	POWERCUT!	
20MHz → 60MHz		£299
INTEL DX4		
25MHz → 75MHz		£329
INTEL DX4	POWERCUT!	
33MHz → 100MHz		£359



INTEL DX2 OVERDRIVE

Give your Intel 486 SX or DX PC 66MHz performance with the Intel DX2 OverDrive processor

- For any 16, 20, 25 or 33MHz Intel 486 SX or DX CPU-based systems
- Features Intel's "speed doubling" technology
- 8K on-chip cache memory
- On-chip maths co-processor
- Opens and runs all your software applications faster on your system

INTEL DX2		
25MHz → 50MHz		
	POWERCUT!	£129
INTEL DX2		
33MHz → 66MHz		
	POWERCUT!	£169

NEW!

INTEL PENTIUM OVERDRIVE

- Supports Intel 486 verified systems
- Internal 32K cache
- 90MHz Pentium core
- Heat sink included
- Suitable for Socket type 1 or 2 systems

PENTIUM OVERDRIVE £Call

CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE



Public Sector customers can purchase through HMSO by calling 01603 694153.

DELIVERY CHARGES

UK Mainland:
Next working day courier delivery to your door: only £7 per order (£5 per CD ROM software order)
Outside UK Mainland: Call for prices

CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE

HUGE STOCKS
Guaranteed same day despatch on virtually all orders placed even up to 5.00pm.

TECHNICAL SALES PEOPLE
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

FINANCIAL STABILITY
Powermark plc has been supplying upgrades for 4 years and has an annual turnover exceeding £15 million with a healthy balance sheet.

LOW PRICES
We only supply products from leading manufacturers and at low prices too. Powermark plc is a BS5750 upgrade reseller.

TECHNICAL SUPPORT
Dedicated after sales technical support teams on line to help with installation.

CORPORATE & PUBLIC SECTOR
We welcome orders from companies, education and public sector organisations. Just fax or phone your order number.

14 DAY MONEY BACK GUARANTEE
Items must be returned (with a returns number from Powermark Customer Service) in "as new" condition for a full refund (excluding carriage). Not valid for software.

TURN THE PAGE FOR MORE

UPGRADE DRIVE THRU
While you wait installation service available. See page 9 of this advertisement for full details.

PERSONAL CALLERS
Save on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday and on Saturdays from 9.30am to 4.00pm.

Powermark plc
Premier House,
112 Station Road, Edgware,
Middlesex HA8 7AQ
Tel: 0181-951 3355
(50 lines)
Fax: 0181 905 6233

VISA ACCORD SWITCH DELTA
Cards are not debited until despatch.



**Technical Sales
Order Lines
0181-
951 3355
(50 lines)**

DATA CARTRIDGES

3M DATA CARTRIDGES			
	each	10 pack	
DC2120	£10	£89	
DC6150	£11	£99	
DC6250	£16	£135	
DC6525	£17	£144	
DAT CARTRIDGES			
	each	5 pack	
1.3GB 60m	£10	£49	
2GB 90m	£11	£55	
4GB 120m	£16	£85	
DAT head cleaner kit		£26	

HMSO

Public Sector customers can purchase through HMSO by calling 01603 694153.

DELIVERY CHARGES

UK Mainland:
Next working day courier delivery to your door: only £7 per order (£5 per CD ROM software order)
Outside UK Mainland: Call for prices

**TURN THE PAGE
FOR MORE**

REAL HARD DRIVES

Famous hard drives...
...Micro Scalextric
...Duel
...Driving when the clutch has gone.



The Memory Bank

at Powermark

MASS STORAGE

HARD DISKS

CONNER

IDE			
CFS210A	270MB	14ms	£111
CFS420A	420MB	14ms	POWERCUT! £132
CFA540A	545MB	12ms	£185
CP1060A	1.06GB	10ms	£425
SCSI			
CFA540S	540MB	12ms	£232
CFP1060	1.06GB	10ms	£425
CP31370	1.3GB	10ms	£699

FUJITSU

IDE			
M2681	264MB	12ms	£108
M2682	353MB	12ms	£132
M2684	532MB	12ms	£166
SCSI			
M2684S	540MB	12ms	£180
M2694ES	1.08GB	10ms	£385

IBM

SCSI			
55F5211	868MB	9ms	£499
86F0102	2GB	9ms	£899
90F0780	4GB	9ms	£1995

STARFIRE 3.5", 1"
NEW! 2.1GB 8ms &Call
STARFIRE 3.5", 1.6"
NEW! 4.3GB 8ms &Call

PEGASUS II AND ALLICAT

- New generation very fast hard disks
- Fast SCSI II

PEGASUS II	1.05GB	9ms	POWERCUT! £585
ALLICAT 0664	2.01GB	9ms	POWERCUT! £995

MAXTOR

IDE			
7273A	245MB	15ms	£122
7345A	340MB	15ms	£158
7545A	545MB	12ms	£190
SCSI			
7345S	340MB	14ms	£183
7545S	545MB	9ms	£245
1240S	1.4GB	9ms	£699

QUANTUM

IDE			
LPS270AT	270MB	12ms	POWERCUT! £114
LPS340AT	340MB	12ms	£133
LPS425AT	425MB	12ms	£149
LPS525AT	525MB	10ms	£161
SCSI			
LPS240S	245MB	10ms	£149
LPS525S	525MB	12ms	£180
LPS1225S	1.2GB	10ms	POWERCUT! £599

WESTERN DIGITAL

IDE			
AC1210	212MB	13ms	£106
AC1270	270MB	13ms	POWERCUT! £111
AC2340	340MB	13ms	POWERCUT! £132
AC2420	420MB	13ms	POWERCUT! £139
AC2540	540MB	13ms	POWERCUT! £176
AC2700	730MB	10ms	POWERCUT! £229
AC31000	1.0GB	10ms	£399

MICROPOLIS

IDE			
2217A	1.7GB	10ms	£699
SCSI			
4110	1.0GB	8.5ms	£585
2217	1.75GB	10ms	£795
4221	2.1GB	8.5ms	£865
1936	3.0GB	12ms	£1410
3243	4.3GB	8.5ms	£1976
1991	9.1GB	12ms	£3160
AUDIO VISUAL DRIVES			
4110AV	1.0GB	8.5ms	£590
2217AV	1.75GB	10ms	£840
4221AV	2.1GB	8.5ms	£1338
1936AV	3.0GB	12ms	£1640
3243AV	4.3GB	12ms	£2100
1991AV	9.1GB	8.5ms	£3220

HARD DISK UPGRADES- AN EXPLANATION

As the latest software requires more and more storage the following upgrade options are available:

IDE TYPE HARD DISKS

- Up to two drives supported
- The ideal solution for stand alone PC's
- Capacities up to 1GB (BIOS limitations can be overcome by Powermark's Disk Manager software)

SCSI TYPE HARD DISKS

- Up to 7 devices supported. Ideal for file servers, power users and where other SCSI devices are being used
- Up to 9GB currently available
- No BIOS limitations
- Internal & external drives available

HARD DISK EXPERTS AVAILABLE FOR SPECIALIST ADVICE



TOSHIBA

IDE - 2.5" NOTEBOOK DRIVES			
MK2124FC	130MB	17ms	£169
MK1724FC	262MB	12ms	£210
MK2326FC	340MB	12ms	£249
MK2428FC	520MB	12ms	£369
SCSI - 2.5" NOTEBOOK DRIVES			
MK2224FB	213MB	12ms	£279
MK2428FB	520MB	12ms	£499

ALL HARD DISKS INCLUDE A MINIMUM 12 MONTH WARRANTY WITH 2, 3 OR 5 YEARS ON MOST MODELS

SEAGATE HARD DISK FEATURE



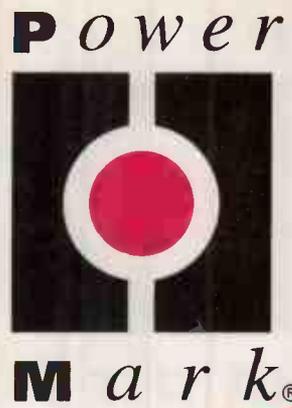
IDE		SCSI	
ST3243A	214MB 16ms £99	ST3390N	344MB 12ms £229
ST3291A	273MB 13ms £115	ST3655N	528MB 12ms £233
ST3391A	341MB 13ms £135	ST4766N	665MB 15ms £399
ST3491A	428MB 14ms £136	ST31200N	1.05GB 9ms £565
ST3655A	528MB 12ms £166	ST42400N	2.1GB 10ms £980
ST9150AG	128MB 16ms, 2.5" £160	ST43400N	2.8GB 10ms £1545
ST9235AG	209MB 16ms, 2.5" £242	ST41800N	9GB 11ms £3517
ST9935AG	340MB 16ms, 2.5" £290	BARRACUDA FAMILY	
ST9530AG	455MB 16ms, 2.5" £390	ST11950N	1.69GB Fast SCSI II £1045
		ST12550N	2.14GB Fast SCSI II £1090

7 CALL 0181-951 3355 IF THE STORAGE DEVICE YOU REQUIRE IS NOT LISTED HERE

VAT at 17.5% will be added to all prices

The Memory Bank

at Powermark



SCSI AND OPTICAL DRIVES

SCSI CONTROLLER CARDS

ADAPTEC

• Industry standard

	Bare Card	Kit With Software
AHA1522 ISA	-	£119
AHA1542 ISA	£155	£185
AHA1640 MCA	£184	£228
AHA2742 EISA	£275	£335
AHA2940 PCI	£243	-
AHA2742T EISA	-	£345
AHA2842VL/K VLB	-	£299

PCMCIA SCSI ADAPTERS

• Connect your SCSI device through any PCMCIA II slot

VISUAL MEDIA	PCMCIA II	ADAPTEC APA460	PCMCIA
	£219		
		£219	

RAID

RAID - Redundant Array of Inexpensive Disks. It allows data distribution or striping across all drives ensuring that even in the event of a failed drive, data and access to data is not lost.

RAID is cost effective and is aimed at failsafe computing. Powermark has RAID experts able to offer you free and unbiased advice.

IDE CONTROLLER CARDS

IDE KIT £25

• Includes cable and software

IDE CACHING CONTROLLERS From £75

OPTICAL DRIVES

PANASONIC

LF7300 £1699

- 1.5GB storage
- 45ms seek time
- 5 Mbits/sec data transfer rate
- External version available

FUJITSU M2512A £599

- 1.09MB/sec data transfer rate
- 128MB capacity
- 30ms access time
- External version available

Technical Sales Order Lines
0181-951 3355
(50 lines)

FLOPPY DRIVES

INTERNAL FLOPPY DRIVES

- Check compatibility with your system before ordering
- 5.25" 1.2MB DISK DRIVE £43
- 3.5" 1.44MB DISK DRIVE IN 5.25" SHELL £34

PARALLEL FLOPPY DRIVES

- From MicroSolutions, Parallel Drives are extremely portable
- 3.5" 1.44MB DRIVE £155
- 5.25" 1.2MB DRIVE £155

DISK DRIVE SOFTWARE

ONTRACK DRIVE

ROCKET £19

- Accelerates data transfer rate of most IDE hard drives

DISK MANAGER

- £35 when purchased with a hard disk

IOMEGA TAPE BACKUP FEATURE



• Complete family offers a solution for every need:

Tape250 for hard disks up to 250MB and Tape700 for hard disks up to 680MB

- 3.5" patented beltless design ensures problem free operation
- Latest generation software support for DOS and

Windows included so no need for upgrades

- Tape250 has full QIC-80 compatibility also reading QIC-40 and Irwin formats
- Tape700 has full QIC-3010 compatibility and also reads QIC-80, QIC-40 and Irwin formats
- Complete kits include everything you'll need
- Internal units fit in any free drive bay without adding extra cards
- Parallel Port units are plug-and-play external



TAPE700 PARALLEL PORT

TAPE250 INTERNAL £89

TAPE250 PARALLEL PORT £166

TAPE700 INTERNAL £199

TAPE700 PARALLEL PORT £283

TAPE ACCELERATOR CARD AVAILABLE, ENABLES HIGH SPEED 1MBIT DATA TRANSFER - CALL FOR DETAILS



TAPE250 PARALLEL PORT

HP - COLORADO FEATURE

COLORADO MEMORY SYSTEMS

A division of
HEWLETT PACKARD



COLORADO TRAKKER 700

COLORADO JUMBO

- Value for money
- Connects to your floppy controller
- Internal device fits either 3.5" or 5.25" drive bays
- Includes software and cables

JUMBO 250 £95

JUMBO 350 £115

JUMBO 700 £199

FAST CONTROLLER CARD £55

EXTERNAL MOUNTING KIT £67

HP JETSTORE SERIES

- Very fast DAT drive system
- 2GB, 4GB or 8GB capacity
- PC Magazine Editors's Choice
- 3 year HP on-site warranty for only £140

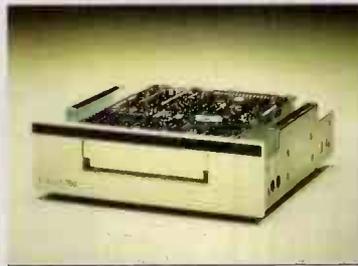
Int Ext ISA Kit*

HP JetStore 2000 £649 £779 £899

HP JetStore 5000 £735 £865 £1599

HP JetStore 6000 £885 £985 £2039

*ISA Kit includes SCSI controller & full software



COLORADO JUMBO 700

COLORADO TRAKKER

- Plug and play - no hardware installation
- A total backup solution - fully assembled systems available in up to 250MB and up to 680MB capacities
- QIC-80 and QIC-3010-MC industry standard recording format
- Can be moved among laptops, notebooks, desktops, and towers alike

PARALLEL PORT TRAKKER 250 £189

PARALLEL PORT TRAKKER 350 £219

PARALLEL PORT TRAKKER 700 £309

TRAKKER CARRY CASE £37

HUGE STOCKS
Guaranteed same day despatch on virtually all orders placed even up to 5.00pm.

TECHNICAL SALES PEOPLE
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

FINANCIAL STABILITY
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LOW PRICES
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TECHNICAL SUPPORT
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Use the red border to find these pages easily

TURN THE PAGE FOR MORE

UPGRADE DRIVE THRU
While-you-wait installation service available. See page 9 of this advertisement for full details.

PERSONAL CALLERS
Save on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday and on Saturdays from 9.30am to 4.00pm.

Powermark plc
Premier House,
112 Station Road, Edgware,
Middlesex HA8 7AQ
Tel: 0181-951 3355
(50 lines)
Fax: 0181 905 6233

CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE



Cards are not debited until despatch.



Mark

**Technical Sales
Order Lines
0181-
951 3355
(50 lines)**



**UPGRADE
DRIVE THRU**

Unsure about upgrading?
Upgrading is easy but if you would like us to upgrade your computer then our new **UPGRADE DRIVE THRU** is for you. It's fast, it's simple, and it's convenient. Just drive into our loading bay at the rear of Premier House and your computer will go directly to our on-site labs for instant upgrading by our fully qualified engineers. For upgrades that take a little while we'll even hand you a Pager enabling you to visit the shopping centre next door. You'll be paged the minute your computer is ready. In most cases you need only bring your base unit along but do call first to discuss your requirements and to confirm our stock position on the upgrades you require.

DESKTOP MENU

(Call for notebook menu)

Memory	£27
Hard Disk	£39
Processor	£28
Tape Backup	£31
Sound or Modem Card	£25
Graphics or Video Card	£26
Multimedia Kit	£39

Save £££s with combo orders!

**TURN THE PAGE
FOR MORE**

**JUKEBOX
HITS**

- General Magic Moments*
Perry Como
- Y-MCA*
Village People
- Twisted Pair and Shout*
Beatles



Mountain

THE PRICE - PERFORMANCE LEADER IN BACKUP

**MOUNTAIN
8GB DAT
BACKUP**

- Massive 8GB capacity
- Powerful, yet easy to use 4mm DAT SCSI tape backup solution
- Extremely fast 40MB/min backup speed
- A complete, economical solution to reliable network backup, data management and recovery
- Fully compatible with all of today's leading network environments
- Records in industry standard DDS2 format
- Comes complete with Mountain FileSafe for Windows, SCSI host adapter, SCSI cable, 4MM DAT cartridge and cleaning cassette

8GB DAT BACKUP INT £1449
8GB DAT BACKUP EXT £1599

**7 disk CD ROM
minichanger only £495**



MOUNTAIN 8GB DAT BACKUP



SIDECAR II PARALLEL PORT BACKUP

**SIDECAR II
PARALLEL
PORT BACKUP**

- 305MB capacity
- 20% faster than competitive parallel port backup solutions
- No additional interface card required
- Shares port with printer
- Designed for notebook use
- Includes FileSafe SideCar II, fully compatible with Mountain's backup and disaster recovery software, FileSafe for Windows
- Format on-the-fly capability enables the tape to format as it is used

MOUNTAIN SIDECAR I £255
MOUNTAIN SIDECAR II £209

**FILESAFE
TD-700 TAPE
BACKUP**

- 680MB capacity
- QIC-3010 cost effective tape drive solution
- Ideal for workstations and small networks
- Very fast 10MB/min backup speed when used with a 1MB floppy controller
- 700MB capacity
- Also reads old QIC-80 format
- High resolution servo head positioning system
- Includes FileSafe First for Windows
- Automatic backup facility

**FILESAFE TD-700 TAPE
BACKUP** £249

**FILESAFE FIRST
FOR WINDOWS
SOFTWARE** £39

• Software based on Mountain's FileSafe for Windows

**FILESAFE FOR WINDOWS
RESCUE NLM
SOFTWARE** £239

FILESAFE DATABANK £Call

- 4mm DAT cartridge autoloader system

FILESAFE TD250 £106

- 250MB backup system

TRANS-SEND COMMS FEATURE



**TRANS-SEND
COMMSCENTRE**

TRANS-SEND COMMSCentre is a comprehensive and fully-featured communications package for both Microsoft Windows and MS-DOS.

- Send and receive faxes via your fax modems
- Communicate with online PC hosts such as CompuServe and CIX, or national videotex systems such as new Prestel, BTX, Minitel, etc
- Transfer files via modem between PCs
- Direct PC to PC file transfer
- Network support/modem sharing
- Fax polling



- Extensive list of fax modem drivers
- Send and receive faxes
- View and zoom received faxes
- Address book with import and export

**TRANS-SEND
COMMSCENTRE** £129

**COMPETITIVE
UPGRADE** £75

From any other comms package

**TRANS-SEND
UPGRADE** £49

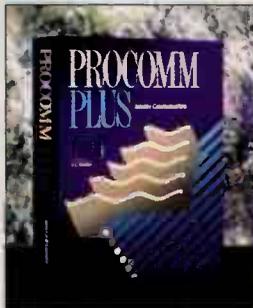
From Trans-Send Lite

DATASTORM COMMS FEATURE

DATA TORM

**PROCOMM PLUS
DOS**

- PROCOMM PLUS DOS £57
- Fully automated dialling directory
 - Script language with over 450 commands
 - Record mode to automate log on sequences and frequently used functions
 - 33 terminal emulations
 - 15 file transfer protocols



**PROCOMM PLUS
WINDOWS**

- PROCOMM PLUS for WINDOWS 2.1 £60
- Fax Capabilities including:-
- Standard fine resolution choices
 - Host mode for "Fax on Demand"
 - Fax scheduler for unattended transmission/reception
 - Fax viewer
 - Customised fax header
 - Zoom/rotate fax images
 - Fax to multiple recipient
 - Videotex emulations - Prestel, Intel and BTX (CEPT)



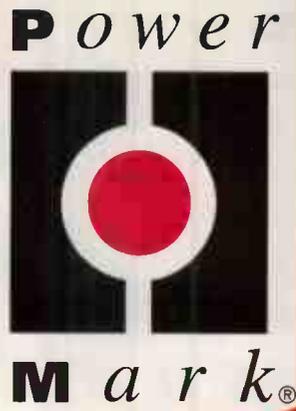
**PROCOMM PLUS
NETWORK V.2** £Call

9 CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE

VAT at 17.5% will be added to all prices

The Memory Bank

at Powermark



SYQUEST STORAGE FEATURE



SyQuest®



SYQUEST SQ3270

SYQUEST REMOVABLE CARTRIDGE HARD DISK DRIVES

- Work like fixed drives yet provide unlimited capacity
- Superior performance to optical drives and higher reliability than floppy drives
- Perform backup faster than tape



SYQUEST 105MB AND 270MB EXTERNAL REMOVABLE CARTRIDGE DISK DRIVES

- Organise data easily and allow easy data transportability
- Provide data security
- Unsurpassed warranties - 2 years on drives and 5 years on data cartridges
- SyQuest technology is the world standard in removability with more than 6,000,000 cartridges shipped.
- Removable storage advantages include unlimited capacity and nearline storage, data transportability, data security and fast backup
- System sharing is ideal for several users sharing a single PC, for example education establishments
- The only secondary storage drive that is fast enough to be your primary drive

SYQUEST 5.25" RANGE

The SyQuest 5.25" range is ideal for users who want to save and transport data-intensive applications.

The 5.25" range gives you 200MB of storage and hard drive performance, as well as full read/write compatibility with all SyQuest 44MB and 88MB cartridges. Plus all the advantages of removability, like unlimited capacity, off-line storage, system sharing and fast backup, as well as unbeatable data security and transportability.

- 18ms seek time
- Sustained data transfer rate of up to 2MB per second
- Burst data transfer rate of up to 5MB per second
- 64K intelligent read "Look Ahead" buffer to optimize performance
- 100,000 hours MTBF
- Automatic Error correction and self-test diagnostics
- Fully embedded SCSI II controller

PORTABLE VERSIONS IDEAL FOR NOTEBOOKS AND PORTABLES

SYQUEST REMOVABLE CARTRIDGE HARD DISK DRIVES

	Type	Capacity	Internal	External
SyQuest 3.5"	IDE	105MB	£149	£239
SyQuest 3.5"	SCSI	105MB	£185	£275
SyQuest 3.5"	PARALLEL	105MB	-	£389
SyQuest 3.5"	IDE	270MB	£319	£409
SyQuest 3.5"	SCSI	270MB	£315	£405
SyQuest 3.5"	PARALLEL	270MB	-	£471
SyQuest 5.25"	SCSI	88MB	£202	£294
SyQuest 5.25"	SCSI	200MB	£319	£409

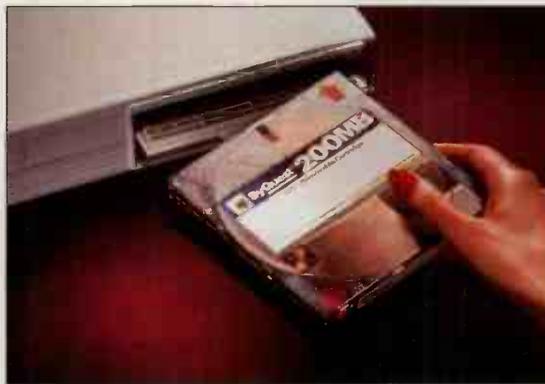
SYQUEST 3.5" RANGE

The 3.5" drives are designed to give you superior performance in desktop/laptop computers requiring a removable, expandable storage subsystem.

With your choice of 105MB or 270MB formatted capacities on each cartridge, these drives let you add as much removable storage as you'll ever need.

The 3.5" drives also provide universal interchangeability through the use of an embedded servo system and adaptive read channel, while including comprehensive self-diagnostic capabilities and programmable power-saving modes.

- ANSI ATA/SCSI interface provides as low as 13.5ms seek time
- Air circulation system provides a Winchester-class environment for the head-disk interface
- 64K and 128K intelligent read "Look Ahead" caching buffer
- Data transfer rate at the host interface up to 4MB per second
- Data transfer rate from the head/media interface up to 2.3MB per second
- Programmable power modes - sleep, standby, idle and active
- Ergonomic engineering for reliable and easy cartridge loading and unloading
- 100,000 hours MTBF



SYQUEST SQ5200

Certificate no. FS 26535
BS5750 registered for the supply of computer, printer and workstation memory, processor and other upgrades.

Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.

Technical Sales Order Lines
0181-951 3355
(50 lines)

UNSURPASSED WARRANTIES -
2 YEARS ON DRIVES
AND 5 YEARS ON DATA CARTRIDGES

SYQUEST CARTRIDGES

Capacity	Form	Each	5 pack
105MB	3.5"	£43	£209
270MB	3.5"	£51	£240
44MB	5.25"	£49	£237
88MB	5.25"	£67	£330
200MB	5.25"	£73	£360



Public Sector customers can purchase through HMSO by calling 01603 694153.

DELIVERY CHARGES

UK Mainland:
Next working day courier delivery to your door: only £7 per order (£5 per CD ROM software order)

Outside UK Mainland: Call for prices

- HUGE STOCKS**
Get the same day despatch on virtually all orders placed even up to 5.00pm.
- TECHNICAL SALES PEOPLE**
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.
- FINANCIAL STABILITY**
Powermark plc has been supplying upgrades for over 4 years and has an annual turnover exceeding £15 million with a healthy balance sheet.
- LOW PRICES**
We only supply products from leading manufacturers and at low prices too. Powermark plc is a BS5750 upgrade reseller.
- TECHNICAL SUPPORT**
Dedicated after sales technical support teams on line to help with installation.
- CORPORATE & PUBLIC SECTOR**
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.
- 14 DAY MONEY BACK GUARANTEE**
Items must be returned (with a returns number from Powermark Customer Service) in "as new" condition for a full refund (excluding carriage). Not valid for software.

TURN THE PAGE FOR MORE

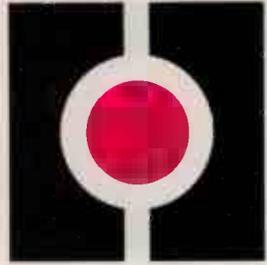
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While-you-wait installation service available. See page 9 of this advertisement for full details.
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Powermark plc
Premier House,
112 Station Road, Edgware,
Middlesex HA8 7AQ
Tel: 0181-951 3355
(50 lines)
Fax: 0181 905 6233

CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE



Power



Mark®

Technical Sales
Order Lines
0181-951 3355
(50 lines)



Certificate no. FS 26535

SPORTSWEAR & GIFTS

- Quality clothing and gifts printed with the unique Powermark logo
- Pink Polo Shirt (XL)** £9.95
- Pink & White Golf Umbrella** £13.45
- Yellow Baseball Cap** £4.95
- Powerpen** (per 10) £1.65
- Top Quality Mousemat** £2.00

ALL OUR PRODUCTS ARE 100% COMPATIBLE AND COME WITH A MINIMUM 12 MONTH GUARANTEE

TURN THE PAGE FOR MORE

MOVIE MEMORIES

Play It Again Samsung
A Bridge and Router Too Far
Disk-Caddy Shack



The **Memory Bank** at Powermark

MULTITECH MODEM FEATURE



MULTITECH MODEMS

Model	V21	V22	V22bis	V32	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	Fax	External
NEW! MT2834BLK	●	●	●	●	●	●	●	●	●	●	●	●	£449
MT1932ZDX	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT! £120
MT1432LTI PCMCIA	●	●	●	●	●	●	●	●	●	●	●	●	POWERCUT! £239
MT1432MK Pocket	●	●	●	●	●	●	●	●	●	●	●	●	£330
MT1432BLK	●	●	●	●	●	●	●	●	●	●	●	●	£330
NEW! MT2832ZDX	●	●	●	●	●	●	●	●	●	●	●	●	£Call



MULTIMODEM II MT1932 ZDX

MULTIMODEM II MT2834BLK

- 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
- V54 loop back tests
- Unix UUCP support
- IBM AS/400 support
- Async/sync operation
- AT command set (Hayes compatible)
- 10 number telephone directory
- Free Multiexpress fax and comms software
- 5 year warranty

MULTIMODEM II MT1932 ZDXK

- Desktop unit
- Group 3/Class 2 (TR29) fax
- V.17 fax compatible
- PSTN only
- V42 (lap-M) error correction
- V42bis data compression
- MNP to Level 5
- Asynchronous operation
- AT command set (Hayes compatible)
- Free Multiexpress fax and comms software for windows
- 10 year warranty
- Now available in 28.8bps (V34)

MULTIMODEM II MT1432BLK

- 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
- V54 loop back tests
- Unix UUCP support
- IBM AS/400 support
- AT command set (Hayes compatible)
- Free Multiexpress fax and comms software
- 5 year warranty



All modems supplied by Powermark plc are BABT APPROVED



FREE Internet offer on all MultiTech modems - Call for details

MULTIMODEM MICRO MT1432 MK

MULTIMODEM MT1432LTI

- PCMCIA Type II
- Group 3/v.17 Class 2 (TR29) fax
- PSTN only
- Remote configuration
- V42 (lap-M) error correction
- V42bis data compression
- MNP to Level 5
- Incorporates flash technology
- V54 loop back tests
- Unix UUCP support
- Asynchronous only
- AT command set (Hayes compatible)
- 10 number telephone directory
- Free Multiexpress fax and comms software
- 5 year warranty

MULTIMODEM MICRO MT1432MK

- 'PC MAGAZINE' Editor's Choice
- Pocket modem
- Group 3/Class 2 (TR29) fax
- PSTN only
- Remote configuration
- V42 (lap-M) error correction
- V42bis data compression
- MNP to Level 5
- Incorporates flash technology
- 10 number telephone directory
- Battery or mains operated with external mains adapter included
- Built-in RS232 cable with DB-9 connector
- Free Multiexpress fax and comms software



MULTIMODEM MT1432 LTI



Public Sector customers can purchase through HMSO by calling 01603 694153.

DELIVERY CHARGES

UK Mainland:
Next working day courier delivery to your door: only £7 per order (£5 per CD-ROM software order)
Outside UK Mainland: Call for prices

11 CALL 0181-951 3355 IF THE MODEM YOU REQUIRE IS NOT LISTED HERE

VAT at 17.5% will be added to all prices

DFI MODEM FEATURE



BSI REGISTERED FIRM
NATIONAL ACCREDITATION OF CERTIFICATION BODIES

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Technical Sales Order Lines
0181-951 3355
 (50 lines)

All modems supplied by Powermark plc are **BABT APPROVED**

DFI MODEMS

Model	V21	V22	V22bis	V32	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	BSI Cellular	Internal	External
F1114V	●	●	●	●	●	●	●	●	●	●	●	●	£89	£89
F1128V+	●	●	●	●	●	●	●	●	●	●	●	●	£189	£189

F1128V+

- Features**
- Data/Fax speed: 28,800/14,400 BPS
 - V.32, V.32 BIS, V.42, V.42 BIS, V.34
 - MNP Level 2-4, 5
 - Fax class 1, 2 & 3
 - Call back security
 - Full/half duplex and auto fallback
- Accessories included**
- Serial cable
 - Telephone lead
 - User's manual
 - AC adapter
- Software**
- Delrina's 4 in 1 Win/DOS Fax Lite and Comit Lite DOS/Win software for data transmission
- Access**
- Introductory membership to CompuServe
- Warranty**
- 5 years

DFI® F1114V

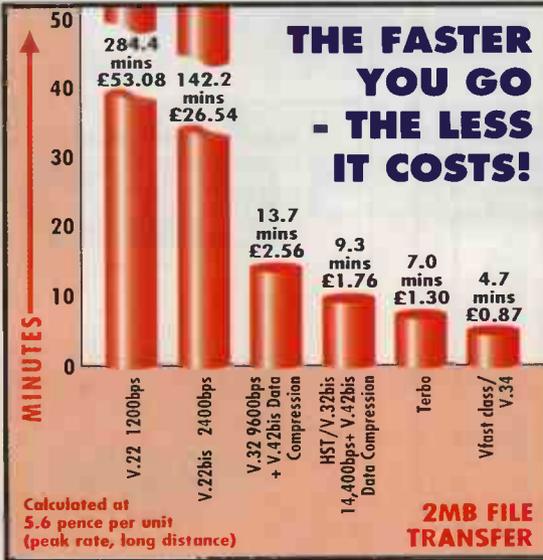
DFI manufactures a comprehensive line of high quality PC components which are the strength behind it's custom-built desktop and notebook PCs. To supplement this product line, DFI have now moved into the data communications arena, launching the passport range of BABT approved fax modems. This complete package offers you state of the art technology and incorporates everything you need to gain access to the information superhighway at a highly competitive price.

- Features**
- Data/fax speed: 14,400 bps
 - V.32, V.32 BIS, V.42, V.42BIS
 - MNP level 2-4, 5
 - Fax class 1, 2 & 3
 - Call back security
 - Full/half duplex and auto fallback
- Accessories included**
- Serial cable
 - Telephone lead
 - User's manual
 - AC adapter
- Software**
- Delrina's 4 in 1 Win/DOS Fax Lite and Comit Lite DOS/Win software for data transmission
- Access**
- Introductory membership to CompuServe
- Warranty**
- 5 years



DFI F1114V

COMMS EXPERTS AVAILABLE FOR SPECIALIST ADVICE



- HUGE STOCKS**
Guaranteed same day despatch on virtually all orders placed even to 5.00pm.
- TECHNICAL SALES PEOPLE**
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.
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Powermark plc has been supplying upgrades for over 4 years and has an annual turnover exceeding £15 million with a healthy balance sheet.
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Dedicated after sales technical support teams on line to help with installation.
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 112 Station Road, Edgware,
 Middlesex HA8 7AQ
Tel: 0181-951 3355
 (50 lines)
Fax: 0181 905 6233

VISA

Cards are not debited until despatch.

CALL 0181-951 3355 IF THE MODEM YOU REQUIRE IS NOT LISTED HERE



**Technical Sales
Order Lines
0181-
951 3355
(50 lines)**



Certificate no. FS 26535

“... and here's what some of our customers have said ...

...thank you for the help which was provided by your technical department.

...I was helped for some considerable time by Alan Cross who eventually put me right.

Dr M W Houghton
West Yorks

... thank you for your superbly professional approach. It has been a pleasure dealing with you.

D. E. Hastings
Cheshire

TURN THE PAGE FOR MORE

FAMOUS COMMUNICATORS

Car Phoneys

Telegraphs

Telegrams

LASAT MODEM FEATURE



LASAT MODEMS

Model	V21	V22	V22bis	V32	V32bis	MNP2-4	MNP5	MNP10	Fax	Internal	External
Unique 144	●	●	●	●	●	●	●	●	●	-	£292
Unique 144 Lite (Mains only)	●	●	●	●	●	●	●	●	●	-	£199
Credit 144 PCMCIA	●	●	●	●	●	●	●	●	●	-	£324
CLM144 Compaq Notebook	●	●	●	●	●	●	●	●	●	-	£399



UNIQUE 144

- 10 year warranty on LASAT modems
- Quality modems manufactured in Denmark
- All LASAT modems feature MNP10 for cellular use
- Winfax Lite software included with all modems
- All modems are BABT approved and come complete with cable



UNIQUE 144 LITE

CREDIT 144

The LASAT Credit 144 is a fully featured PCMCIA V.32 bis fax modem. It has a built in high speed serial port emulator to give your notebook the highest possible data throughput capability.

- MNP 10 for cellular use
- Autosync
- Callback security
- Remote configuration
- Two-wire leased line
- V.25 bis dialling
- V.17 - 14,400 bps fax

UNIQUE 144

The LASAT Unique 144 is a V.32 bis desktop fax modem that is also easy to use as a portable.

- NiCad battery
- MNP 10
- Autosync
- Synchronous
- Callback security
- Remote configuration
- Two-wire leased line
- V.25 bis dialling
- Small 3.5" square footprint
- Bang & Olufsen like design

"We were wrong to expect a good looking modem to perform badly. The Unique 144 displayed perfect data performance... and its throughput was excellent."

Computer Shopper, April 1994

CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE

All modems supplied by Powermark plc are BABT APPROVED

TRUST MODEM FEATURE



- 14,400 bps full duplex data
- Includes telephone plug and cable, software and manual
- Trio Datafax (DOS), Datafax (Windows) and DataComm (DOS) software
- 5 year warranty



TRUST MODEMS

Model	V21	V22	V22bis	V23	V32	V32bis	MNP2-5	V42	V42bis	Fax	Internal	External
AE1414	●	●	●	●	●	●	●	●	●	●	-	£95
AC1414	●	●	●	●	●	●	●	●	●	●	-	£95

COMMS ACCESSORIES AND SOFTWARE

ANDEST MSL MANAGERS

A professional range of automatic voice, fax and data line switches

MSL MANAGER 1100 £99

- Calls switched to fax, phone or answerphone

MSL MANAGER 3300 £109

- Supports up to 4 telephone handsets

MSL MANAGER 3300M £129

- As above but switching to modem instead of fax

MSL MANAGER 7700 £149

- Will additionally support and switch a modem or PC

HAYES ESP ACCELERATOR CARDS

- Helps PCs to keep up with fast modems
- Recommended for all 288 and 144 modems
- Can run at speeds up to 921,600bps

ESP Card - 1 Port £75

ESP Card - 2 Port £139



HAYES ESP ACCELERATOR CARD

CABLES

2 metre 9F to 25M £6

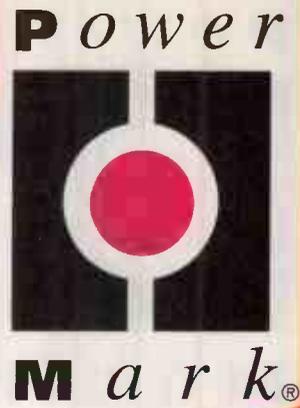
2 metre 25F to 25F £6

Call for modem/serial cables and adaptors not listed here.

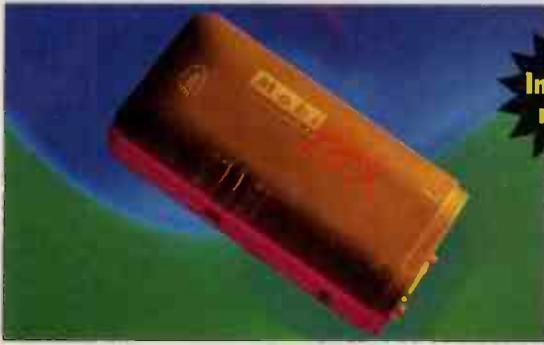
SOFTWARE

Carbon Copy + V.6.1	£75
Carbon Copy Windows	£83
Compuserve Info Manager	£19
DataTalk V.4	£69
Laplink V.5 Win	£89
Norton PC Anywhere	£84
PC Anywhere DOS V.5	£85
PC Anywhere Windows	£87
Reflection 4 DOS	£219
Smartterm 340 Win	£165
Termite Async Win V.6	£159
Ultrafax Win V.1.12	£66
WinComm Pro	£75
Winfax Pro	£54
WordPerfect ExpressFax +	£36

The Memory Bank at Powermark



PACE FAX MODEM FEATURE



MOBIFAX 14.4

Internet ready



MOBIFAX 14.4

The new MobiFax personal fax modem is the affordable way to enhance your PC with communications abilities. With MobiFax you can access a wealth of online information services, all your PC needs is a phone line.

Whether you need fast and efficient fax or smooth data exchange between your machine and others, MobiFax has the capability and performance to make your applications excel. MobiFax has the essential flexibility to extend the use of your PC. It works with desktop, portable and notebook computers and is truly portable.

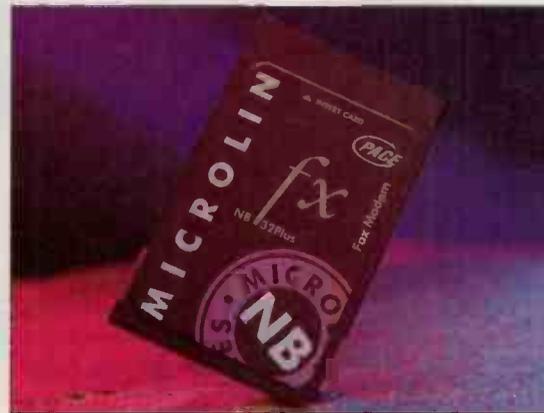
MICROLIN NB32+ PCMCIA

The Microlin 32+ brings high performance fax modem capabilities to notebook users with PCMCIA type II sockets.

- NB 32Plus: 6 data speeds to 14000bps with 1400bps fax
- NB 24: 4 data speeds to 2400bps with 9600bps fax
- V42/V42bis & MNP 5 error correction and data compression

LINNET 32+ FX

The Linnet 32+ FX has 6 data speeds to V32bis 14,400bps, V42/V42bis and MNP 5 error correction and data compression are also supported.



MICROLIN NB32+ PCMCIA

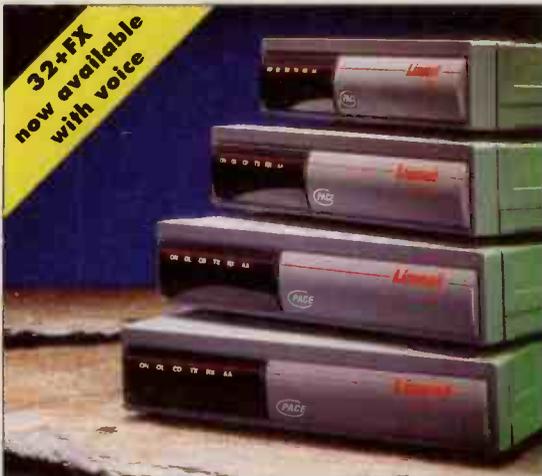
COMMS EXPERTS AVAILABLE FOR SPECIALIST ADVICE

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(50 lines)

PACE MODEMS

Model	V21	V22	V22bis	V32	V32bis	V32terho	V.34	MNP2-4	V42	V42bis	MNP5	Fax	Internal	External
Mobifax	●	●	●	●	●	●	●	●	●	●	●	●	-	£75
NEW Mobifax 14,400	●	●	●	●	●	●	●	●	●	●	●	●	-	£110
Microlin FX	●	●	●	●	●	●	●	●	●	●	●	●	£82	£94
Microlin FX32+	●	●	●	●	●	●	●	●	●	●	●	●	£139	£149
PCMCIA Microlin FX	●	●	●	●	●	●	●	●	●	●	●	●	-	£129
PCMCIA Microlin FX32+	●	●	●	●	●	●	●	●	●	●	●	●	-	£195
Linnet 24	●	●	●	●	●	●	●	●	●	●	●	●	-	£95
Linnet Quad + Fx	●	●	●	●	●	●	●	●	●	●	●	●	-	£95
Linnet 32 + Fx	●	●	●	●	●	●	●	●	●	●	●	●	-	£156
Linnet 32 + Fx + Voice	●	●	●	●	●	●	●	●	●	●	●	●	-	£Call
NEW Linnet 34 + Fx	●	●	●	●	●	●	●	●	●	●	●	●	-	£275
Ultralink 32 Plus	●	●	●	●	●	●	●	●	●	●	●	●	-	£354



THE LINNET RANGE

ZOOM



- High speed 14,400 bps fax and data transmission with V.42bis and MNP 2-5
- Extended status reporting with 15 LED lights (14.4X only)

ZOOM MODEMS

Model	V21	V22	V22bis	V32	V32bis	MNP2-5	V42	V42bis	Fax	Internal	External
14.4X	●	●	●	●	●	●	●	●	●	-	£129
14.4I	●	●	●	●	●	●	●	●	●	£129	-
14.4X MacPak	●	●	●	●	●	●	●	●	●	-	£149

- 5 year warranty
- Buffered 16550 UART to prevent data overruns (14.4I only)

Windows User: Best On Test, February 94

All modems supplied by Powermark plc are BAPT APPROVED

CALL 0181-951 3355 IF THE MODEM YOU REQUIRE IS NOT LISTED HERE

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VISA SWITCH
Cards are not debited until despatch.



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... and here's what some of our customers have said ...

I would like to thank you for your help and rest assured Powermark will have my future custom.

D Dougan, Belfast

A recent purchase of a SIMM produced a few problems here which suggested a faulty item. An explanation produced an immediate response, offer to replace etc.

I am always prepared to be patronised and to cope with impatience of computer literate sales people who cannot understand or tolerate those who cannot translate their 'computer speak'.

Your own staff were helpful in the extreme. Please note that Stuart and Melissa were a delight to deal with. Please note my comments and thank them for me.

J R Killoch, W Midlands

U.S. ROBOTICS MODEM FEATURE



The Intelligent Choice in Data Communications

US ROBOTICS MODEMS

Model	V21	V22	V22bis	V32	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	HST Cellular Fax	Internal	External
Sportster 14.4 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	£126	£Call
Sportster 28.8 V.34 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	£199	£199
Sportster Mac + Fax	●	●	●	●	●	●	●	●	●	●	●	●	-	£239
Courier Dual V.34 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	£299	-
Courier Dual V.34 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	-	£299
<i>Includes FREE PowerPort High Speed Dual Async Serial Card, cable and upgrade to Quicklink Gold (OCR software)</i>														
WorldPort 14.4 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	-	£168
PCMCIA 14.4 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	-	£195
PowerPort High Speed Dual Async Serial Card. Recommended for turbo and V.fast modems to prevent bottleneck of data														
													£59	-



WORLDPORT 14.4

WORLDPORT 14.4

Small enough to fit in your pocket, whilst providing you with all your data communications needs both in and out of the office, the WorldPort Dual Standard Cellular fax is the perfect choice for the mobile user.

SPORTSTER 28.8 + FAX

The world's best selling modem just got better. With speeds of up to 28,800bps, the Sportster 28.8 + fax offers proven high performance technology, at an unbeatable price.



SPORTSTER 28.8 + FAX

All modems supplied by Powermark plc are **BABT APPROVED**

HAYES MODEM FEATURE



ACCURA 288

HAYES ACCURA MODEMS

Hayes ACCURA modems are built to meet the same high standards as the legendary Hayes Smartmodems.



ACCURA 144



HAYES MODEMS

The industry standard

Model	V21	V22	V22bis	V32	V32bis	V32terbo	V34	MNP2-4	V42	V42bis	MNP5	Fax	Internal	External
Accura 144 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	-	£145
Accura 288 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	-	£195
Optima 24	●	●	●	●	●	●	●	●	●	●	●	●	-	£214
Optima 96	●	●	●	●	●	●	●	●	●	●	●	●	-	£295
Optima 144 + Fax	●	●	●	●	●	●	●	●	●	●	●	●	-	£310
Optima 144 PCMCIA	●	●	●	●	●	●	●	●	●	●	●	●	-	£310
Optima 288	●	●	●	●	●	●	●	●	●	●	●	●	-	£455
Optima 288 bundle 2 pack with free accelerator cards and upgrade to V.34	●	●	●	●	●	●	●	●	●	●	●	●	-	£699
Ultra 24	●	●	●	●	●	●	●	●	●	●	●	●	-	£269
Ultra 96	●	●	●	●	●	●	●	●	●	●	●	●	-	£429
Ultra 144	●	●	●	●	●	●	●	●	●	●	●	●	-	£479
Ultra ISDN 64K System Adapter														£795

TURN THE PAGE FOR MORE

MEMORABLE GAGS

Punchlines to old, old, old favourites

... 2.30

...£1-a-mile

... the big h-ends gone

If you can't remember the stories to these then contact Quentin Quizzzy and he'll be happy to oblige.

INTEL PERSONAL CONFERRING FEATURE



INTEL PROSHARE VIDEO SYSTEM 200

- Full-featured personal conferencing. See and hear each other while working together using the shared notebook or shared application
- Easy to use. Simple on-screen keypad lets you dial, access built-in address book and share an on-screen notebook



- Interoperable family. Conference with anyone who has another ProShare product. If they don't have video you can still share documents over a modem or LAN
- Complete with camera and earphone. Sleek, miniature camera mounts atop monitor, comfortable ear piece with built-in microphone for hands-free operation

FOR MORE INFORMATION AND DETAILS OF OUR VIDEO CONFERRING SEMINARS, CALL AND ASK FOR OUR VIDEO CONFERRING EXPERTS



- Compatible with your existing PC standards. Capable of recording high quality Indeo video to your hard disk in standard Windows format for later playback (software kit available from Intel)
- New advanced PC video technology. With Intel Indeo video, the ProShare Video System 200 supports a range of video window sizes from icon size to one-quarter screen (320 x 240 pixels)

VIDEOLOGIC FEATURE



928MOVIE

- Up to 6x performance over ordinary SVGAs
- Up to 1280 x 1024 resolution. Up to 16.7 million colours
- Postage stamp-sized video clips become high quality full screen movies

ISA 1MB
928MOVIE POWERCUT! £195
928MOVIE with sound £259

VLB 1MB
928MOVIE £195
928MOVIE with sound £249

NEW! **928MOVIE with MPEG** £Call
"VideoLogic 928Movie is an indispensable asset to any truly usable multimedia system."

PC Magazine, June 1994

MPEG PLAYER

The quality solution for Video CD playback

- Exceptional quality video/audio playback of Video CD, CD-i and interactive CD ROM titles
- Video playback at up to 30 frames per second
- Full support for application developers via MCI
- Connects to the 928Movie/PCIMovie card via the VESA media channel connector
- Requires 928Movie or PCIMovie

MPEG PLAYER £329

CAPTIVATOR PRO TV

Sensational quality video and TV

- Exceptional quality live TV in a window
- Captures stills and video to your PC from any source such as a camcorder or VCR
- High quality stills and video capture with full picture control
- Connects to the 928Movie/PCIMovie card via the VESA media channel connector
- Requires 928Movie or PCIMovie

CAPTIVATOR PRO TV £219

CAPTIVATOR PRO £189

CAPTIVATOR

Low cost Video for Windows capture card

- Single slot solution for PC's with spare ISA slot
- Quality stills and video capture from your camcorder or VCR
- Includes full version MS Video for Windows
- No feature connector required

CAPTIVATOR £179

"The 928Movie is a very impressive card indeed. It proved miraculously easy to set up...and gave remarkable video acceleration."

PC Direct, October 1994

"928Movie is very fast, has the latest VM-Channel connection and is good value. This is a card to consider seriously."

Personal Computer World July 1994

PCIMOVIE

Super fast graphics for PCI machines

- All the benefits of 928Movie but with even faster windows acceleration

- Weitek P9100 graphics processor - 16 times faster than SVGA
- 2MB high speed VRAM

PCIMOVIE £329



PHILIPS AND TELEVIDEO FEATURE

TELEVIDEO SOUND CARDS

TELEWAVE AUDIO 32 £139

- DSP wavetable and FM synthesis
- 32 polyphony for multiple instrument sounds
- Stereo sampling rates from 4KHz to 44.1KHz
- Supports 16 MIDI channels
- 4 operator FM synthesis with 20 voice channel
- "True-to-Life" reproduction of real instrument sounds
- 16-bit, CD-quality stereo sound
- 128 General MIDI instruments with 51 drum kits
- 100% compatible with all major audio standards
- Multiple CD-ROM drive interface built-in: IDE, Sony, Mitsumi and Panasonic

FEATURED BONUS SOFTWARE

- EASYSTART
- AUDIOSTATION
- MIDI ORCHESTRATOR PLUS
- WINDAT
- MONOLOGUE
- TALK-TO-PLUS

PHILIPS

PHILIPS CM207 CD ROM DRIVE

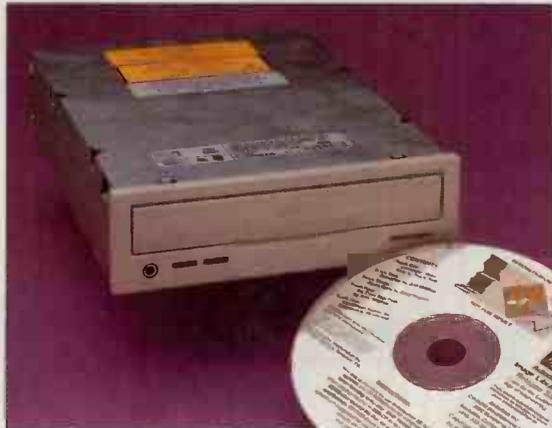
THE POWER INSIDE

Inside the CM207 Philips have incorporated the most accurate laser optics available along with amazing, Advanced Error Correction technology. These cutting edge components and algorithms optimize the drive for years of reliable performance regardless of disc contaminations such as dust or fingerprints. Through an oversize memory buffer, the CM207 intelligently manages the data stream to the computer and maximizes the uninterrupted transfer of information at a minimum use of the computer's CPU power.



Public Sector customers can purchase through HMSO by calling 01603 694153.

FREE CD when you buy a CD ROM drive
 Titles may vary from time to time.



- Dual speed
 - IDE ATAPI Interface
 - Can be used as slave device on IDE
 - Power assisted tray
 - Multisession
 - 12 month warranty
- PHILIPS CM207 INTERNAL** £94

DELIVERY CHARGES

UK Mainland:
 Next working day courier delivery to your door: only £7 per order (£5 per CD ROM software order)
 Outside UK Mainland: Call for prices

Save £8
BUY TELEWAVE AUDIO 32 & PHILIPS CM207 INTERNAL for £225

FREE!
 Don't forget to ask for your free Microsoft CD ROM Sampler - See page 23 of this advertisement

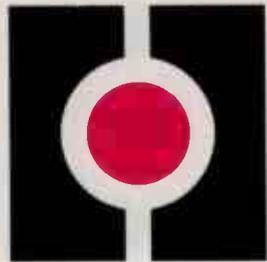
- HUGE STOCKS**
 Guaranteed same day despatch on virtually all orders placed even up to 5.00pm.
- TECHNICAL SALES PEOPLE**
 Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.
- FINANCIAL STABILITY**
 Powermark plc has been supplying upgrades for over 4 years and has an annual turnover exceeding £15 million with a healthy balance sheet.
- LOW PRICES**
 We only supply products from leading manufacturers and at low low prices too. Powermark plc is a BS5750 upgrade reseller.
- TECHNICAL SUPPORT**
 Dedicated after sales technical support teams on line to help with installation.
- CORPORATE & PUBLIC SECTOR**
 We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.
- 14 DAY MONEY BACK GUARANTEE**
 Items must be returned (with a returns number from Powermark Customer Service) in "as new" condition for a full refund (excluding carriage). Not valid for software.

TURN THE PAGE FOR MORE

UPGRADE DRIVE THRU
 While you wait installation service available. See page 9 of this advertisement for full details.

PERSONAL CALLERS
 No on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday and on Saturdays from 9.30am to 4.00pm.

Powermark plc
 Premier House,
 112 Station Road, Edgware,
 Middlesex HA8 7AQ
Tel: 0181-951 3355
 (50 lines)
Fax: 0181 905 6233



Mark

**Technical Sales
Order Lines
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951 3355
(50 lines)**

... and here's what some of our customers have said ...

I am pleased to write to you to communicate my pleasure with three members of your staff who recently helped me through the purchase and installation of some computer hardware. The individuals concerned are:-

*Mr Stuart Bailey
Mr Paul Stafford
Ms Melissa Curran*

While the circumstances surrounding the need for this hardware were not ideal, these people gave me a level of service that I could not dream of receiving. Their manner was always professional and patient, even when I had to repeatedly contact them to clarify seemingly minor points. If their general conduct and manner are representative of the Company as a whole, then I congratulate you sir, on fostering this ethos within your Company.

I can say with assurance, that for the component needs of both myself and my clients in the future, Powermark plc will be the recommended choice.

*R Jonathan Stewart BSc (Bioch.)
MSc (Comp. St.) PGCE
Go Fermanagh*

**TURN THE PAGE
FOR MORE**

**MEDIA
MOMENTS**
Famous media moments...

One small step...

Lindbergh after crossing the Atlantic

Anything that Houdini did



SOUNDBLASTER CARDS

- SOUNDBLASTER V.2 DELUXE VALUE EDITION** £33
- Includes Indy 500 and Lemmings
- SOUNDBLASTER PACK** **POWERCUT!** £65
- Includes SoundBlaster V.2 Deluxe, amplified speakers, joystick and software bundle
- SOUNDBLASTER PRO VALUE EDITION** £53
- SOUNDBLASTER AWE 32** **POWERCUT!** £171
- Next generation SoundBlaster card offering unbelievable sound quality
 - E-mu Advanced Waveeffects Synthesis
 - Full 16 channels, 128 instruments, 6 drum kits, 32 voice polyphony
 - 16 bit stereo sampling and playback
 - Real time hardware compression / decompression
 - Microphone included
 - Comprehensive software bundle including Creative VoiceAssist, Creative TextAssist, WaveStudio, Creative Sound Panel, Creative Mosaic, Creative Ensemble and more

CREATIVE LABS FEATURE



MULTIMEDIA OFFICE KIT

FREE!

Don't forget to ask for your free Microsoft CD ROM Sampler - See page 23 of this advertisement

- SOUNDBLASTER PRO DELUXE PACK** £119
- Includes SoundBlaster Pro card, dynamic microphone, amplified speakers, joystick, 1 in/1 out MIDI interface, MIDIsoft Recording Session & bundled CD ROM software.



SOUNDBLASTER AWE32

- SOUNDBLASTER 16 MULTICD VALUE EDITION** £92
- SOUNDBLASTER 16 ASP MULTICD VALUE EDITION** £115
- SOUNDBLASTER 16 VALUE EDITION** £69
- 16-bit stereo sampling and playback
 - 20-voice enhanced 4-operator stereo FM-synthesiser
 - Power amplifier (4 watts per channel) and volume, bass and treble control
 - Full software control of fade-in, fade-out, pan, volume, left/right steering and microphone mixing
 - Bundled software



SOUNDBLASTER 16 VALUE EDITION

ALL CREATIVE LABS PRODUCTS ARE 100% COMPATIBLE AND COME WITH A 2 YEAR GUARANTEE

- MIDIBLASTER** £109
- For amateur and professional music composition and presentation
 - 16 channels, 128 preset sounds, 33 preset effects, 55 preset drums
 - Bundled software included
- SOUNDBLASTER 16 ASP SCSI VALUE EDITION** £134
- 16-bit real time compression/ decompression in hardware
 - 20 voice enhanced 4 operator stereo synthesiser
 - Bundled software included
 - Includes EZ-SCSI software

- WAVEBLASTER II** £119
- Programmable Advanced WaveEffects generator with 16 channels, 32 voice polyphony, 128 preset melodic instruments and 6 drum kits
 - General midi compliant
 - 2MB built-in ROM
 - Includes Cakewalk Apprentice for Windows

SOUNDBLASTER SOFTWARE

- SOUNDBLASTER DEVELOPERS KIT FOR DOS** £48
- Plays and records digitised voice from or to conventional memory and disk with start/stop, synchronisation, voice I/O looping control
 - Plays synthesised music in the background and control start, stop, tempo and real-time transposition
 - Converts English text strings to digitised speech

- SOUNDBLASTER DEVELOPERS KIT FOR WINDOWS** £48

MULTIMEDIA KITS

- NEW! SOUNDBLASTER 16 MULTIMEDIA OFFICE KIT** **POWERCUT!** £399
- Includes multisession internal CD ROM drive, SoundBlaster 16 ASP
 - MS Office Professional 4.3 on CD ROM comprising of Word 6.0, Excel 5.0, Powerpoint 4.0, Access 2.0
 - MS Encarta, MS Sound System 2.0, Creative Voice Assist, Creative Text Assist, microphone and headphones
- NEW! CREATIVE LABS CRACKER PACK 3** £199
- Panasonic 563 drive
 - SoundBlaster 16
 - Speakers
 - Groliers Encyclopaedia, Aldus Photostyler
 - Limited stocks
- EASY CD16 PRO** **POWERCUT!** £349
- Includes, Panasonic 563 External, SoundBlaster Pro 16, speakers, microphone and comprehensive software bundle

- SOUNDBLASTER CD 16** **POWERCUT!** £239
- Includes SoundBlaster Pro 16, double speed multisession internal CD ROM drive, amplified speakers and top selling CD titles

- DIGITAL EDGE 3X** **POWERCUT!** £389
- Includes NEC triple speed SCSI CD ROM drive, SoundBlaster 16 ASP SCSI, quality stereo speakers, microphone & extensive CD ROM bundle

- GAMEBLASTER CD 16** **POWERCUT!** £239
- Includes Creative 563 internal double speed CD ROM drive, SoundBlaster 16, stereo speakers, joystick and comprehensive games bundle

- OMNI CD INTERNAL KIT** £139
- CD ROM INTERNAL UPGRADE KIT** £119

CREATIVE LABS FEATURE

VIDEO BOARDS

NEW! VIDEOBLASTER MP400 £399

- Displays full motion MPEG video in a scalable window up to full screen
- Overlays colour graphics and text on full-motion video
- Complies with MPEG1 levels and 1 and 2, video CD and white book video
- DOS and Windows drivers included

NEW! VIDEOBLASTER RT300 £299

- Intel i750PE chip inside
- Real time video capture and compression card

VIDEOBLASTER FS200 £249

- Full screen playback
- Text and graphics overlay
- 30 frames per second
- Capture, freeze, store and manipulate images from VCRs, Videodiscs, cameras and broadcast video
- Includes Aldus Photostyler, Aldus Gallery Effects Vol. 1

EXTERNAL SCSI CONNECTOR £39

- Add-on for SoundBlaster 16 SCSI card



3DO BLASTER £299

3DO Blaster is an ISA expansion card that transforms your PC into a 3DO Multiplayer. Hardware and software are easy to install and your 3DO titles can be accessed just like any Windows applications. An on-board 32-bit RISC CPU provides lightning fast processing power.

- Full motion video
- Photo realistic graphics, images and video
- 64 million pixels per second animation
- Control 3DO game play with voice, joystick or keyboard
- Requires CR-563 CD ROM drive and SoundBlaster with CD audio connector

VIDEOSPIGOT POWERCUT! £89

- Video capture card giving full motion video in real time at up to 30 frames per second
- Includes Microsoft Video for Windows

TV CODER POWERCUT! £99

VIDEOBLASTER DEVELOPERS KIT £48

VIDEOBLASTER SE £169

- Displays full-motion, digital video in a moveable, sizeable window
- Captures, freezes, stores, manipulates and exports images from VCRs, Videodisc, cameras and broadcast video
- Overlays computer text and graphics on video



Certificate no. FS 26535
BS5750 registered for the supply of computer, printer and workstation memory, processor and other upgrades.

Powermark plc is regularly assessed by the British Standards Institution to ensure compliance with the quality standard.

Technical Sales Order Lines
0181-951 3355
(50 lines)

ALL CREATIVE LABS PRODUCTS ARE 100% COMPATIBLE AND COME WITH A 2 YEAR GUARANTEE

HAUPPAUGE FEATURE

WIN/TV CELEBRITY £275

THE NEW GENERATION...the best choice for Multimedia Video! Perfect colour digitising from Hauppauge.

Works with all VGA and SVGA cards up to 1280 x 1024 with up to 16.7 million colours, requiring no feature connector. No memory size limitations making the Win/TV celebrity the easiest overlay/capture card to install.

- MAET technology support: on board motion artifacts elimination
- Fast 320 x 240 lossless AVI clip capture

- Integrated TV tuner/teletext
- Perfect colour: 4:2:2 YUV colour separations and S-Video support for high quality multimedia presentations
- Win/TV HighQ ideal in industrial applications; with square Pixel (CCIR 601) support
- Teletext feature is Reuters 1000 ready, supporting dynamic data exchange (DDE) see page 876 on CNNtext, for updated news
- Optional recordable video output, for recording to external video sources in composite and S-Video quality



FREE! Buy WIN/TV CELEBRITY from Powermark and get OS/2 WARP FREE!

TOSHIBA CD ROM DRIVE FEATURE

TOSHIBA 5201B CD ROM DRIVE

AMAZING VALUE!

TOSHIBA 5201B £149

- New 3.4 speed
- 510Kb/S transfer rate
- 190ms access time
- SCSI II interface
- 64K buffer

4101 INTERNAL £149

4101 EXTERNAL £199

4100A PORTABLE £249

TOSHIBA XM3501B CD ROM DRIVE

TOSHIBA XM3501B

- Quad speed, multisession internal drive
- 155ms access time
- 256Kb continuous flow cache memory
- 614Kb/sec data transfer rate
- SCSI II interface
- Low power consumption

TOSHIBA XM3501B £XXX



TOSHIBA XM3501B

FREE!

Don't forget to ask for your free Microsoft CD ROM Sampler - See page 23 of this advertisement

DELIVERY CHARGES

UK Mainland:
Next working day courier delivery to your door: only £7 per order (£5 per CD ROM software order)
Outside UK Mainland: Call for prices

HUGE STOCKS
Guaranteed same day despatch on virtually all orders placed even up to 5.00pm.

TECHNICAL SALES PEOPLE
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.

FINANCIAL STABILITY
Powermark plc has been supplying upgrades for over 4 years and has an annual turnover exceeding £15 million with a healthy balance sheet.

LOW PRICES
We offer supply products from leading manufacturers and at low, low prices too. Powermark plc is a BS5750 upgrade reseller.

TECHNICAL SUPPORT
Dedicated after sales technical support teams on line to help with installation.

CORPORATE & PUBLIC SECTOR
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.

14 DAY MONEY BACK GUARANTEE
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TURN THE PAGE FOR MORE

UPGRADE DRIVE THRU
While-you-wait installation service available. See page 9 of this advertisement for full details.

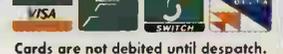
PERSONAL CALLERS
Save on delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday and on Saturdays from 9.30am to 4.00pm.

Powermark plc
Premier House,
112 Station Road, Edgware,
Middlesex HA8 7AQ

Tel: 0181-951 3355

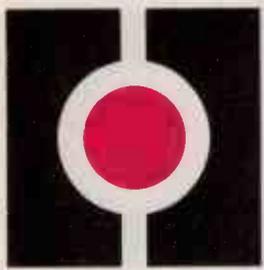
(50 lines)

Fax: 0181 905 6233



Cards are not debited until despatch.

CALL 0181-951 3355 IF THE MULTIMEDIA PACKAGE YOU REQUIRE IS NOT LISTED HERE



Mark

**Technical Sales
Order Lines
0181-
951 3355
(50 lines)**

**FEBRUARY
OFFER**

Mitsumi Mouse

400 dpi, 2 button,
ergonomic design

Only £4.50
with any purchase

(Offer ends
28th February 1995)



Public Sector customers can
purchase through HMSO
by calling 01603 694153.

DELIVERY CHARGES

UK Mainland:
Next working day courier
delivery to your door: only £7 per
order (£5 per CD ROM software order)
Outside UK Mainland: Call for prices

**TURN THE PAGE
FOR MORE**

**MEMORY
TUNES**

I Remember You

Frank Ifield

*Looking Through
The Windows*

Jackson Five

*These Boots Are
Made For Walking*

Nancy Sinatra



NEC

NEW!

**NEC CDR 271
CD ROM DRIVE**

- New low cost quad speed drive
- Enhanced, fast IDE interface
- 250ms average access time
- 600Kb/sec transfer rate
- Internal device
- Digital audio output

ONLY £159



NEC CD ROM DRIVES

		Speed	Bare	ISA Kit	Advanced ISA Kit
MULTISPIN 2Xc	EXT	DOUBLE	£379	-	-
MULTISPIN 3Xi	INT	TRIPLE	£222	£279	£329
MULTISPIN 3Xe	EXT	TRIPLE	£311	-	-
MULTISPIN 3Xp	PORTABLE	TRIPLE	£249	£309	£359
CDR 271	INT	QUAD	£159	-	-
MULTISPIN 4Xi	INT	QUAD	£289	£339	£389
MULTISPIN 4Xe	EXT	QUAD	£412	£469	£529

GRAPHICS CARD UPGRADES

	VRAM 1MB 2MB 4MB	DRAM 1MB 2MB	MCA	VLB	PCI	ISA
TAXAN						
GTS ULTRA PLUS	- - -	-	•	-	£216	£199
GTS ULTRA PRO	- • -	-	-	•	£457	£318 £347 £299
ORCHID						
FARENHEIT VA	- - -	•	-	-	£137	£137
CELCIUS	• - -	-	-	-	£145	-
CELCIUS 2MB	- • -	-	-	-	£225	-
KELVIN 64	- - -	•	-	-	£109	£169
KELVIN 64 2MB	- - -	•	-	-	£185	-
DIAMOND						
SPEEDPRO	- - -	•	-	-	-	£99
STEALTH 32	- - -	-	•	-	£195	-
STEALTH 64	- • -	-	-	-	£239	-
VIPER	- • -	-	-	-	£295	£249
NO.9						
GXe 64	- - -	•	-	-	£185	-
GXe L11	- • -	-	-	-	£396	£299
GXe L16	- - •	-	-	-	£749	£749
GXi LITE L21	• - -	•	-	-	-	£642
GXi-TC+ L39	- - •	•	-	-	-	£966

All cards are 1280 x 1024 and 16.7 million colours except Orchid Fahrenheit VA and No.9 GXe 64. Maximum colours are not necessarily at the highest resolution.

NEC MULTISPIN 2Xc

- New external 7 stack system

NEC MULTISPIN 3Xi

- MPC I & II formats
- 256K cache
- 195ms average access time

**INCLUDES MICROSOFT
ENCARTA 95**

NEC MULTISPIN 3XP

- 450Kb/sec sustained data transfer rate
- 250ms average access time
- Full function control panel
- Also available with Parallel to SCSI kit

NEC MULTISPIN 4Xi & 4Xe

- New quad speed SCSI drive
- 600Kb/sec sustained transfer rate
- 220ms average access time
- 256K continuous flow cache
- White book compliant



**2 year warranty on all
NEC CD ROM drives**

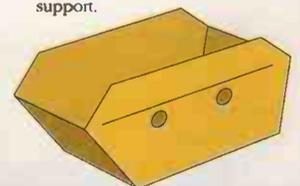
VIDEO BOARDS

REELMAGIC	£299	MOVIE MACHINE	£249
• Watch VideoCD's on your PC		• 3 modules in 1:	
• Built-in 16-bit sound card		• Live overlay	
• Includes bundled software		• TV-Tuner	
REELMAGIC LITE	£239	• Frame Grabber	
MEDIA PRO PLUS	£225	PC TELE VISION	£349
• Full motion sound and video with real time colour capture		WIN/TV	£289
		ORCHID VIDIOLA	£259
		• 30 frames per second	
		• 3:1 on board compression	
		• 800 x 600 non interlaced	

THE SKIP

All items are new, boxed and with full warranty unless stated.

Bus Logic BT-747		2GB DAT DRIVE	£499	QUICKSHOT SOUNDMATE		IBM AT*	£49
SCSI Card	£49	DEC 16 BIT		4 SPEAKERS	£12	COMPEX PCI COMBO	
OS/2 CD ROM	£49	ETHERWORKS AUI	£149	XIRCOM 16/4		NW CARDS	£49
HP Postscript Upgrade	£99	INTEL SMART VIDEO	£199	RING NODE	£199	* Sold as seen, without warranty or technical support.	
4MB Apple MacIIFX	£99	127MB HDB PS/2 MCA	£99	80387 DX25MHZ WEITEK			
4MB Compaq SLT 286	£59	8MB NEC POWERMATE 386/255	£199	CO PROCESOR	£20		
1MB Kit Kyocera F1500	£20	£199		486/NOW! 33MHZ			
Pentium 66MHz VLB		8MB HP APOLLO		PS/2	£59		
Motherboard	£599	9000/425E	£149	4MB BOARD			
64MB IBM RISC		INTEL 486DX50 CPU	£139	COMPAQ 386	£149		
SYS 6000 £1599		SYQUEST PUMA 105		PACIFIC PAGE 25 IN 1	£49		
4MB - 8MB Board		PARALLEL PORT	£199	8MB NEC POWERMATE			
NEC P/Mate	£89	2MB NCR 386SX/MC20	£39	386/255	£99		
HP JETSTORE 2000		1MB COMPAQ 386S	£29	SX NOW! 25MHZ 386SX			



AZTECH MULTIMEDIA FEATURE

AZTECH

SOUND GALAXY STELLAR MULTIMEDIA KIT £179

- 16 bit sound card
- CD ROM drive
- Speakers and cables
- Two CD ROM titles



EXPLORER PERSONAL SYSTEM £249

- Includes WaveTable Sound Card, external, top loading, dual speed CD ROM drive and speakers
- Bundled CD ROMs include: Software Toolworks Multimedia Encyclopaedia, Professor Multimedia, MidiSoft Recording Session and Learn To Use Windows

EXPLORER PERSONAL SYSTEM DELUXE £299

- As Explorer Personal System but with extra CD ROMs including Outpost, Kings Quest VI, Macromedia Action, Wired For Sound Pro, World Atlas, Arthur's Teaching Troubles and Ultimate Domain

AZTECH CD ROM DRIVES

- CDA268-031** £87
 - Internal double speed IDE drive
 - 350ms average access time
 - Includes cables and software

AZTECH SOUND CARDS

- AZTECH SOUND GALAXY PRO16** £65
 - 16-bit stereo CD quality playback
 - Supports multiple AT bus CD ROM drives
 - Includes 4 software packs
- AZTECH SOUND GALAXY NOVA 16 EXTRA** £79
 - 16-bit stereo CD quality
 - Includes complete suite of software
- AZTECH SOUND GALAXY WAVERIDER 32+** £105
 - Upgrade option for 3D sound effects
 - 48KHz sampling rate
 - Includes microphone and headphones
 - Wave table synthesis for reproduction of crystal clear, realistic instrument sounds

DIAMOND MULTIMEDIA FEATURE

DIAMOND

MULTIMEDIA

DIAMOND 4000

- Quad speed CD ROM drive
- 16-bit, CD quality sound card, wave table upgradable
- Includes over 30 best selling CD ROMs
- Premium stereo speakers, headphones and microphone
- Quick start video for easy installation
- Works with all SoundBlaster compatible games

DIAMOND 4X MULTIMEDIA KIT £449

DIAMOND 2000

- Double speed CD ROM drive
- 16-bit, CD quality sound card, wave table upgradable
- Includes over 30 best selling CD ROMs
- Premium stereo speakers, headphones and microphone
- Quick start video for easy installation
- Works with all SoundBlaster compatible games

DIAMOND 2X MULTIMEDIA KIT £299



FREE! Free Microsoft CD ROM Sampler - See page 23 of this advertisement

GOLD DISK MULTIMEDIA FEATURE

VIDEODIRECTOR



VideoDirector V.2 is a complete videotape editing system: everything you need is included. The SmartCable connects your 8mm camcorder,

QUICK & EASY EDITING! With VCR-like on-screen controls, simple drag and drop editing and automatic tape assembly.

VCR and computer. Editing is easy: just point and click to pick the shots you want, press "Make Tape" and VideoDirector makes a new tape of just your favourite moments.

EVERYTHING INCLUDED! The exclusive SmartCable controls your home camcorder and VCR. No additional hardware required.

ADD SOUND, TITLES, SPECIAL EFFECTS! Now, supports a variety of video and sound cards so you can add sound, music, titles, graphics and animations.

IMPROVED VIDEO LIBRARY! Stores video clips for fast, easy retrieval. Organize clips into sections, add comments, create multiple libraries.

3-STEP EDITING! Operates in 3 modes to guide you through the process: Log, Edit and Make Tape. Nothing could be simpler!

VIDEODIRECTOR £85

MULTIMEDIA MAGIC CD

- Create your own multimedia productions
 - Drop in photos and line art, retouch, resize and more
 - Add multimedia effects to other programs
 - Play animated screensavers and wallpaper
 - Add the power of sounds and music
 - Choose from over 1000 animated actors, photos, clipart, digital video, backgrounds, and sound effects
- MULTIMEDIA MAGIC** £37

MULTIMEDIA EXPERTS AVAILABLE FOR SPECIALIST ADVICE

- HUGE STOCKS**
Guaranteed same day despatch on virtually all orders placed even up to 5.00pm.
- TECHNICAL SALES PEOPLE**
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.
- FINANCIAL STABILITY**
Powermark plc has been supplying upgrades for over 4 years and has an annual turnover exceeding £15 million with a healthy balance sheet.
- LOW PRICES**
We only supply products from leading manufacturers and at low, low prices too. Powermark plc is a BS5750 upgrade reseller.
- TECHNICAL SUPPORT**
Dedicated after sales technical support teams on line to help with installation.
- CORPORATE & PUBLIC SECTOR**
We welcome orders from corporate, education and public sector organisations. Just fax or phone your order number.
- 14 DAY MONEY BACK GUARANTEE**
Items must be returned (with a returns number from Powermark Customer Service) in "as new" condition for a full refund (excluding carriage). Not valid for software.

TURN THE PAGE FOR MORE

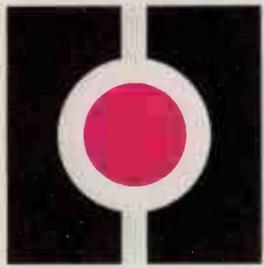
UPGRADE DRIVE THRU
While-you-wait installation service available. See page 9 of this advertisement for full details.

PERSONAL CALLERS
Save delivery charges - there's plenty of parking. Telephone first to check our stock position on the items you want. We're open from 9.00am to 6.00pm Monday to Friday and on Saturdays from 9.30am to 4.00pm.

Powermark plc
Premier House,
112 Station Road, Edgware,
Middlesex HA8 7AQ
Tel: 0181-951 3355
(50 lines)
Fax: 0181 905 6233

VISA, Access, SWITCH, EuroCard
Cards are not debited until despatch.

CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE



Mark®

**Technical Sales
Order Lines
0181-
951 3355
(50 lines)**

NEW!

NAKAMICHI CD ROM DRIVES

- NAKAMICHI MBR-7 £299
- 7 stack external device
 - Dual speed
 - 300Kb/sec data transfer rate
 - 380ms access time
 - Can be used in conjunction with another SCSI CD ROM drive



HITACHI CD ROM DRIVES

- CDR6550 INTERNAL £149
- CDR6550S EXTERNAL £235
- CDR1850S EXTERNAL £209
- CDR6700 INTERNAL £229
- CDR6750 INTERNAL £219
- CDR1950S EXTERNAL £369

**TURN THE PAGE
FOR MORE**



MASTER QUIZZY

Famous
quiz
show
sayings...

*I've started so I'll finish
Mastermind*

*Let's check that with
Bully's dictionary*

Bullseye

*Our contestants have not
rehearsed this - THIS is the
rehearsal*

Generation Game

*Write to Mr Quizzy with your
favourite quiz show sayings.*

CD ROM DRIVES, SOUND CARDS AND SPEAKERS

SONY CD ROM DRIVES

- SONY CDU55E £109
- IDE interface
 - Dual speed

PANASONIC CD ROM DRIVES

- 562B £87
- Multisession internal drive

'95 MULTIMEDIA KITS

- '95 PANASONIC BUNDLE £249
- SoundBlaster 16 Value
 - Panasonic 563 CD ROM drive
 - Encarta '95, MS Publisher, Dangerous Creatures, MS Money and MS Golf
- '95 NEC BUNDLE £499
- SoundBlaster 16 SCSI
 - NEC 3Xi CD ROM drive

PIONEER CD ROM DRIVES

- PIONEER DR-U104X £279
- Quad speed, SCSI II
 - 614Kb/sec, 190ms access time
 - Works horizontally and vertically
- PIONEER DRM 602X £459
- 6 disk magazine system
 - Double speed drive
 - Small footprint
 - Includes cables & supporting software
- PIONEER DRM 604X £939
- 6 disk magazine system
 - Quad speed drive
 - 614K/sec transfer rate
 - 300ms access time
 - Small footprint
- PIONEER DRM 1804X £1699
- 18 disk CD ROM drive

FREE!

Don't forget to ask for your free Microsoft CD ROM Sampler - See page 23 of this advertisement

MITSUMI CD ROM DRIVES

- MITSUMI LU000 £59
- INTERNAL
 - With Photo CD software £79
- MITSUMI DUAL SPEED IDE £94
- 350Kb/sec data transfer rate
 - Includes secondary IDE interface card and cable
- NEW! MITSUMI FX300 TRIPLE SPEED INTERNAL £129
- 450Kb/sec data transfer rate
 - 250ms access time

CD RECORDABLE SYSTEMS IN STOCK

CD ROM ACCESSORIES

- CD SPEEDWAY £39
- Increase the speed of your CD ROM drive by up to 1000%
- QUALITY DISK CADDY 10 PACK £45
- CD ROM DRIVE LASER CLEANER £24
- CD ROM DISK CLEANER KIT REFILLS FOR ABOVE £19
- CD TOWER STORAGE UNIT £19

FREE CD when you buy a CD ROM drive

Titles may vary from time to time.

SOUND BOARD SOFTWARE

- SOUNDBLASTER DEVELOPERS KIT
- MS DOS version £48
 - MS Windows V.3 version £48
- CREATIVE VOICE EDITOR £37
- MIDISOFT STUDIO FOR WINDOWS £133
- MIDISOFT RECORDING SESSION £55
- VOICE ASSIST £59
- MICROSOFT WINDOWS SOUND SYSTEM SOFTWARE £47
- MIDISOFT SOUND IMPRESSION FOR WINDOWS £45
- Play, record, edit and mix multiple sound files
- MIDISOFT MENTOR £77
- MIDISOFT MULTIMEDIA MUSIC LIBRARY V.2 £39

**ALL OUR
MULTIMEDIA
PRODUCTS ARE
100% COMPATIBLE
AND COME WITH A
MINIMUM 12
MONTH GUARANTEE**

BEWARE

Beware of major incompatibility between CD ROM drives and sound cards. Powermark's specialists will 'multi-match' for you.

SOUND BOARD HARDWARE

- ANALOGUE 'Y' CABLE £8
- MIDI ADAPTER 1 £21
- MIDI ADAPTER 5 DELUXE £75
- Includes MIDIsoft recording session
- DESK MICROPHONE £9
- HEADPHONES £7
- 'PROFESSIONAL' HEADPHONES £19
- ORCHID SCSI CHIP KIT £22

SPEAKERS



Quality speakers supplied as matched pairs

- SB SBS300 £85
- 10 watts
 - Magnetically shielded
- SB SBS37 £24
- Magnetically shielded
- SCREENBEAT £9
- Amplified with bass control
- POWERSOUND MAX SP30 £19
- With power adaptor
 - 2 watts per channel
 - Shielded, with volume control
- ALTEC ACS50 £69
- QUICKSHOT SOUNDMATE 3 £15
- QUICKSHOT SOUNDMATE 4 £12
- ADD UP SS50 SPEAKERS £32
- 8 watts
 - Built-in amplifier
- LABTEC CS-1000 £59
- 'Under Monitor' unit



- YAMAHA YST-M10 £59
- 10 watts per channel
 - 80Hz - 20KHz frequency response
 - Full magnetic shielding
 - Built-in power amplifier

DELIVERY CHARGES

- UK Mainland:
Next working day courier delivery to your door: only £7 per order (£5 per CD ROM software order)
- Outside UK Mainland: Call for prices

SOUND BOARDS

- The widest range of Sound Boards
- Add a new dimension to business, education, training, MIDI, special needs and many more applications.
- Multimedia experts available for specialist advice

NEW! AUDIOTRIX PRO £229

- Wavetable synthesiser
 - 16-bit stereo record and playback
 - On-board CD ROM instruments
 - ADPCM compression software
- SOUNDWAVE 32 £148
- Includes Zool and speakers
 - True 16-bit stereo using Roland chip set
- GAMEWAVE 32 POWERCUT! £102
- GRAVIS ULTRASOUND £99



- GRAVIS ULTRASOUND MAX £149
- 16-bit record and playback, 48KHz
 - Multi CD ROM interfaces
 - Dedicated digital sound processor

CREATIVE LABS PRO-DIGITAL SPEAKERS

- £34
- 4.5 watts per channel
 - Includes power adapter

- PORTABLE SOUND PLUS POWERCUT! £109
- Plugs into parallel port
 - 16-bit stereo playback
 - Includes speaker unit
 - Suitable for MCA machines
- WAVJAMMER POWERCUT! £249
- 16-bit PCMCIA sound card
 - Includes MS Sound System
 - Sample rates up to 44.1MHz

RADIO FX

- £Call
- FM stereo card
 - Up to 100 radio stations can be preset
 - FM coverage of USA, Japan and Europe

The Memory Bank at Powermark

TRUST MULTIMEDIA FEATURE



SOUND CARDS

SOUND EXPERT DE LUXE WAVE 32 £129

- ICS WaveFront Wavetable synthesizer for natural sound
- 2MB instrument ROM
- 32 simultaneously voice output, controlled by MIDI
- Backward compatible with OPL2 and OPL3
- 128 wave table instruments
- Supports Sony, Panasonic, Mitsumi and IDE CD ROM interface
- MPU 401 compatible MIDI-interface
- Aclib, SoundBlaster Pro and Windows Sound System compatible
- Comp Rack for Windows and Recording Session Midi sequencer software included



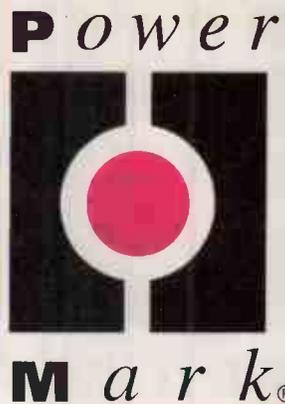
SPEAKERS

- | | |
|----------------------------------|----------------------------------|
| DYNAMIC SOUNDWAVE 40 £30 | DYNAMIC SOUNDWAVE 20 £44 |
| • 15 watt (peak) power amplifier | • 25 watt (peak) power amplifier |
| • Volume control | • Treble and bass control |
| DYNAMIC SOUNDWAVE 30 £39 | DYNAMIC SOUNDWAVE 10 £52 |
| • 25 watt (peak) power amplifier | • 80 watt (peak) power amplifier |
| • Treble control | • Treble and bass control |



Certificate no. FS 26535

Technical Sales Order Lines
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(50 lines)



TAXAN FEATURE

MONITORS

- Taxan, market leader in display technology were the first manufacturer to introduce an energy efficient monitor compatible with the new EPA Energy Star programme - the adopted 'green' standard for the PC industry.
- The Ergovision range not only help save the environment, they save you money too.

3 YEAR ON-SITE WARRANTY ONLY £49



TAXAN ERGOVISION 1080LR

TAXAN ERGOVISION 1080LR

A 20" analogue auto-scanning ultra high resolution colour monitor, compatible with Compaq, IBM, Apple and most other personal computers. It is an excellent solution for high resolution Windows applications

	Size	Dot pitch	Resolution at up to:	Frequency	Tube	
400LR	14"	0.28mm	800 x 600	60Hz	Energy Star	£199
410LR	14"	0.28mm	1024 x 768	60Hz	Energy Star	£209
420LR	14"	0.28mm	1280 x 1024	60Hz	Standard	£249
580LR	15"	0.28mm	1280 x 1024	60Hz	FST	£319
880LR	17"	0.28mm	1280 x 1024	60Hz	Energy Star, FST	£569
885LR	17"	0.26mm	1600 x 1200	65Hz	Energy Star, FST	£669
895LR	17"	0.25mm	1600 x 1200	67Hz	Trinitron	£899
1080LR	20"	0.28mm	1600 x 1200	65Hz	Energy Star	£979
1095LR	20"	0.28mm	1600 x 1200	62Hz	Trinitron	£1499
2100LR	21"	0.30mm	1600 x 1200	72Hz	Diatron	£1579



TAXAN ERGOVISION 880LR



TAXAN ERGOVISION 580LR



TAXAN ERGOVISION 410LR

WINTURBO ACCELERATORS

- True 64-bit graphics and multimedia accelerator
- Powered by ATI 88800 mach64 graphics engine
- 2MB (upgradable) or 4MB VRAM for higher resolution, more colours and greater performance
- ISA, VLB and PCI versions available
- Up to 16.7 million colours at all resolutions from 640 x 480 to 1280 x 1024 with full graphics acceleration
- Up to 75Hz refresh rate in 1280 x 1024 mode
- Up to 100Hz refresh rate in VGA
- Installation via menu driven software for fast and simple setup

GTS WINTURBO

ISA	2MB VRAM	£249
ISA	4MB VRAM	£399
VLB	2MB VRAM	£249
VLB	4MB VRAM	£399
PCI	2MB VRAM	£249
PCI	4MB VRAM	£399

WINBOOST ACCELERATORS

GTS WINBOOST

IISA	1MB DRAM	£115
ISA	2MB DRAM	£149
VLB	1MB DRAM	£115
VLB	2MB DRAM	£149
PCI	1MB DRAM	£115
PCI	2MB DRAM	£149

- HUGE STOCKS**
Guaranteed same day despatch on virtually all orders placed even up to 5.00pm.
- TECHNICAL SALES PEOPLE**
Our sales people are the best. They are trained specialists in their chosen field - multimedia, memory of all types, mass storage, networking and communications.
- FINANCIAL STABILITY**
Powermark plc has been supplying upgrades for over 4 years and has an annual turnover exceeding £15 million with a healthy balance sheet.
- LOW PRICES**
We only supply products from leading manufacturers and at low, low prices too. Powermark plc is a BS5750 upgrade reseller.
- TECHNICAL SUPPORT**
Dedicated after sales technical support teams on line to help with installation.
- CORPORATE & PUBLIC SECTOR**
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CALL 0181-951 3355 IF THE UPGRADE YOU REQUIRE IS NOT LISTED HERE



Mark®

Technical Sales
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(50 lines)

FREE!

**MICROSOFT
SAMPLER CD ROM
WITH EVERY SOUND
CARD, CD ROM DRIVE
OR MULTIMEDIA KIT**

Feature packed with samples from Encarta, Space Simulator, Cinemania, Art Gallery, Strauss, Bookshelf, Dinosaurs and 35 more.

When ordering just ask for your **FREE** Microsoft Sampler CD ROM as it is not shipped automatically

**HURRY!
STOCKS ARE NOW
VERY LIMITED**



Certificate no. FS 26535

**TURN THE PAGE
FOR MORE**

**MOVIE
MEMORIES II**

Another chance to read...
**Gone with the
Window**
Love at First Byte
Rambo



Microsoft



ENCARTA '95
The Complete Interactive Multimedia Encyclopedia

ENCARTA 1995

Microsoft Encarta '95 has been extensively updated with new and up to date content. Encarta '95 contains a wealth of new features that make it easier to quickly find the information that you need.

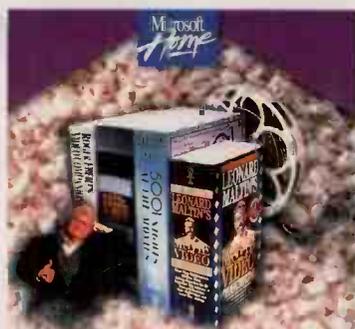
- New 40 country fact boxes, covering climate, religion, economy, geography, musical styles and more
- Over 9 million works, 8,000 photographs, 300,000 links, 26,000 articles and over 15,000 multimedia elements with 100 minutes of video and animation
- Stunning animations, videos, maps, charts, sounds and pictures bring information to life
- Special £30 cash back offer for owners of previous versions

**GAHAN WILSON'S
ULTIMATE HAUNTED
HOUSE**

- A scary, fun game full of scary sounds, animation's and video for children to play. They can meet Frankenstein, good and bad ghosts, a two-headed monster and more!

CINEMANIA 1995

- New Cinemania 1995
- Easy to use
- Nearly 20,000 film reviews, 1,000 movie stills, 168 dialogue excerpts, and 139 tracks of film music
- Now includes 1994 films



CINEMANIA '95
The Entertainment Guide to Movies and the Movies Industry

MICROSOFT FEATURE

**SCHOLASTIC MAGIC
SCHOOL BUS SERIES**

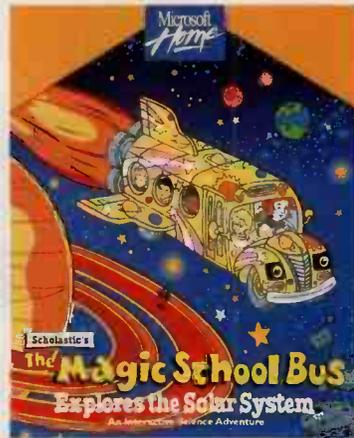
In our opinion, these new CD ROMs are just about the best educational titles available. A fully animated, interactive multimedia science adventure series for children ages 6-10. Inspired by Scholastic Inc's award-winning book series, these CD ROMs are designed to entertain and encourage a sense of adventure and exploration. They both feature the irrepressible science teacher, Ms Frizzle.

MAGIC SCHOOL BUS - SOLAR SYSTEM

- Children can drive the Magic School Bus through the solar system to any planet, land and explore the surface
- Explore science concepts such as gravity and 'planetary' information

MAGIC SCHOOL BUS - HUMAN BODY

- Children can tour 12 different body parts from the brain to the mouth to the large intestines



**HOME AND
BUSINESS
MANAGEMENT**

	MEDIA	PRICE
Works	floppy	£89
Works multimedia version	CD ROM	£86
Works competitive upgrade	floppy	£41
Publisher Money	floppy	£64
	floppy	£26

**CHILDRENS
SOFTWARE**

Creative Writer	floppy	£31
Creative Writer	CD ROM	£31
Fine Artist	floppy	£31
Fine Artist	CD ROM	£31
How the Leopard Got his Spots	CD ROM	£32
Gahan Wilson's Ultimate Haunted House	CD ROM	£31
Magic School Bus - Inside the Human Body	CD ROM	£31
Magic School Bus - Solar System	CD ROM	£31

**REFERENCE AND
EXPLORATION**

Encarta '95	CD ROM	£59
The Ultimate Frank Lloyd Wright	CD ROM	£32
Dangerous Creatures	CD ROM	£32
Ancient Lands	CD ROM	£37
Cinemania '95	CD ROM	£31
Bookshelf	CD ROM	£64
Dinosaurs	CD ROM	£31
Art Gallery	CD ROM	£33
Musical Instruments	CD ROM	£32
Schubert	CD ROM	£32
Stravinsky	CD ROM	£32
Strauss	CD ROM	£32
Mozart	CD ROM	£32
Beethoven	CD ROM	£32
Composer Collection	CD ROM	£59

• 3 CD ROM set includes Mozart, Beethoven and Schubert

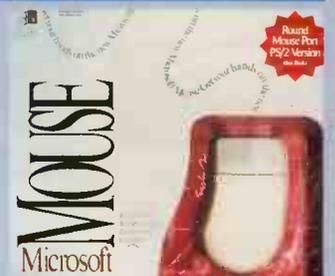
MICROSOFT MICE AND KEYBOARDS

MOUSE 2.0 £39
• New version with Intellipoint - allows you to personalise the way your mouse works
• Suitable for left or right hand

HOME MOUSE £27
• Features Intellipoint
• Change the pointer into exciting and interesting shapes
• Double speed click acceleration



**NATURAL
KEYBOARD** £68
• Discover a more natural hand position for comfortable computing
• Includes safety labels and full ergonomic guide
• Includes 2 Windows keys to pull up system menus



Public Sector customers can purchase through HMSO by calling 01603 694153.

DELIVERY CHARGES

UK Mainland: Next working day courier delivery to your door: only £7 per order (£5 per CD ROM software order)
Outside UK Mainland: Call for prices

ENTERTAINMENT

	MEDIA	PRICE
Space Simulator	floppy	£29
Arcade	floppy	£15
Golf	floppy	£29
Golf	CD ROM	£31
Golf course - Mauna Kea	floppy	£16
Golf course - Pinehurst	floppy	£16
Golf course - Banff Springs	floppy	£16
Best of Entertainment Packs	floppy	£16

CD ROMS

FAB NEW BUNDLE 10 CD ROMs for £29!

The Blues Brothers
The Blues Brothers Juke
Box Adventure
Titus Fox
Crazy Cars 3
Fire Forget II
Battlestorm
Super Cauldron
Titan
Prehistorix
Prehistorix II
All for only £29!

HOT NEW RELEASES



MUSIQUIZ £20

BIOSPHERE
ENCYCLOPAEDIA OF
THE ENVIRONMENT £Call
ZARGON ZOO £30

- Interactive comic book based on Heinemann International's Graded Reader Scheme for English Language teaching
- 32 screens of wild and wacky interactive fun
- On screen colouring book (it's printable too!)

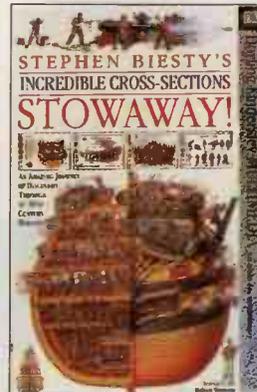
PSION SHAREWARE £29

- The only shareware CD ROM for the Psion Organisers 3 and 3a

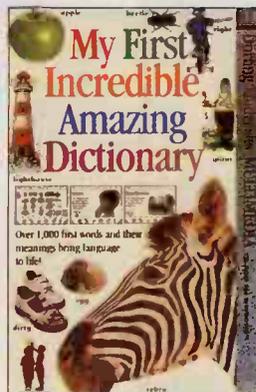
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DORLING KINDERSLEY

INCREDIBLE CROSS SECTIONS: STOWAWAY! £39



MY FIRST INCREDIBLE, AMAZING DICTIONARY £39
EYEWITNESS ENCYCLOPAEDIA OF SCIENCE £75
ULTIMATE HUMAN BODY £59
THE WAY THINGS WORK £59



LATEST CD ROM TITLES

A selection of the season's releases. Check availability before ordering.

Delta V £32
Virtuoso £31
Iron Assault £31
Legend of Kyrandia 3: Malcolm's Revenge £27
Novastorm £31
Retribution £28
Ecstatica £31
Alone in the Dark 3 £Call

NEW BUNDLE 16 TITLES ON 10 CDS for £35

Animals	James Pond 2
World Atlas	Outrun
Interactive Space	Print/Paint Power
Encyclopaedia	Comedy Central
World Cup USA	Madonna
Winter Olympics	Michael Jackson
Links Golf	Phil Collins
Thunderhawk	Abba
Curse of Enchantia	



DISCS CD ROMS

The Tale of Peter Rabbit £19
The Tale of Benjamin Bunny £19
Cinderella £19
Scary Poems for Rotten Kids £19
Mud Puddle £19
The Paper Bag Princess £19
Thomas' Snowsuit £19
Moving Gives Me a Stomach Ache £19
A Long Hard Day on the Ranch £19
Heather Hits Her First Home Run £19
Aesop's Fables £19
The Tell-Tale Heart £39

POWERMARK'S TOP SELLERS

Myst £34
MS Art Gallery £33
MS Cinemania '95 £31
MS Encarta '95 £59
MS Musical Instruments £32
Redshift £53
Under A Killing Moon £35
10 CD Bundle £29
Sam & Max Hit The Road £25



GROLIER FEATURE

THE NEW GROLIER MULTIMEDIA ENCYCLOPEDIA £89
THE ULTIMATE PRODUCT - This completely new edition includes fully updated text, new movies, new narrated animations, and the brand new Multimedia Maps and Knowledge Explorer Audio-Visual Essays.



WYATT EARP'S OLD WEST

NEW!

£35

Through full motion video, music and animations, discover all kinds of information about this fascinating periods in history. Take part in a wild west shoot-out, explore nearly 40 locations, click on hundreds of "hot spots", try your hand at trivia questions, and more.

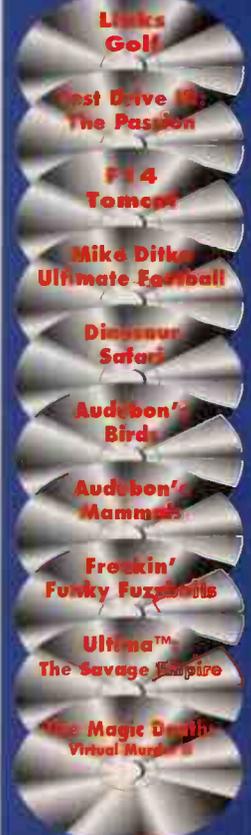


CD ROM TITLES

The Journeyman Project £25
Frontier: Elite II £25
Outpost £29
Little Big Adventure £33
Nascar Racing £29
Arcade Pool £12
Pinball Dreams Delux £25
Magic Carpet £32
Counting On Frank £32
Kid Pix Studio £32
Monty Python's Complete Waste Of Time £45
7th Guest & Dune £29
Vid Grid £28
Dog Fight £15
Doom II £37
Comptons Interactive Encyclopaedia '95 £49
Rise of the Robots £32
Wing Commander Armada £32
Robocop 3 & Dune £14
Bloodnet £25
Shadow of the Comet £49
Alone in the Dark + Jack in the Dark £39
Castles II £34
Magic Theatre £39
Micro Cookbook £14
Harry and the Haunted House £39
The Lost Files of Sherlock Holmes £32
Lemmings 2: The Tribes £19
Space Hulk £32
How Computers Work £32
CD Body Adventure £31
Bugs and Insects £31
Inferno £32
The Tortoise and the Hare £34

Exclusive to Powermark!
UK Distributor

10 CDs for £29 MEGAPAK



Absolutely no shareware or clip-art!

TURN THE PAGE FOR MORE

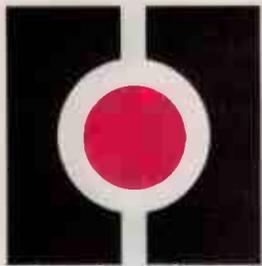
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Premier House,
112 Station Road, Edgware,
Middlesex HA8 7AQ
Tel: 081-951 3355
(50 lines)
Fax: 081 905 6233



Cards are not debited until despatch.

287

PERSONAL COMPUTER WORLD



Mark SECURITY PRODUCTS

**Technical Sales
Order Lines**
**0181-
951 3355**
(50 lines)

A complete range of security devices to safeguard your notebooks, PC's and data. Designed and manufactured in the United States the products are easy to install and use the highest quality materials for maximum security. Lifetime warranty for all PC Guardian products.

We can supply Master Keying and Keyed Alike options for easy management of multiple units.

DOG OF THE MONTH
PARALLEL PRINTER CABLE
£2.50

PUP OF THE MONTH
ECONOMY ANTI-STATIC WRISTSTRAP £3.00



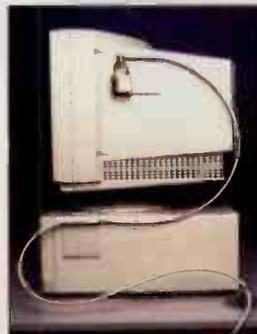
NOTEBOOK PROTECTION

PC GUARDIAN FEATURE

PC Guardian™

ALL PURPOSE ANTI-THEFT KIT

Secures all PC's, monitors, keyboards and external drives. Each kit contains 3 - 3"x3" Perma Plates (2,000 PSD), 6' security cable, case-hardened padlock and two keys.



MODEL UT36 - ALL PURPOSE ANTI-THEFT KIT £25.95
10 PACK £239.50

IT SECURITY EXPERTS AVAILABLE FOR SPECIALIST ADVICE

ENCRYPTION PLUS

Automatically encrypts/decrypts data and prevents unauthorised access with password. Data transported by diskette or modem protected. Disk compression and Windows compatible.

ENCRYPTION PLUS (SOFTWARE) £45

FLOPPY DRIVE LOCK

Installed in any 3.5" drive in seconds. Prevents unauthorised copying of data and programs, loading of unapproved programs. Complete with 2 keys.

MODEL 7350 FLOPPY DRIVE LOCK £14.95
10 PACK £139.50

DEALER ENQUIRIES VERY WELCOME



Public Sector customers can purchase through HMSO by calling 01603 694153.

Dr. SOLOMON'S FEATURE



Dr. SOLOMON'S ANTI-VIRUS TOOLKIT

There are in excess of 4,500 PC viruses - is your PC protected against an attack?

Includes SET UP ADVISOR FREE!

Dr Solomon's award winning range of Anti-Virus Toolkits provides the protection your PC requires. Anti-virus software which is tailored to provide the protection you need: anti-virus software that can be relied upon to detect, accurately identify, and remove viruses, and prevent any re-infection occurring.

Dr Solomon's Anti-Virus Toolkit is available for DOS, Windows, OS/2 and Netware. Each Toolkit comes with quarterly updates so you will remain fully armed to protect your computer in the fight against viruses, whichever operating system you use.

ANTI-VIRUS TOOLKIT DOS £59
ANTI-VIRUS TOOLKIT WINDOWS £69
ANTI-VIRUS TOOLKIT NETWARE £285

Dr. SOLOMON'S



Dr. SOLOMON'S PC ARMOUR

PC Protection for IT Professionals
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- ... Betamax



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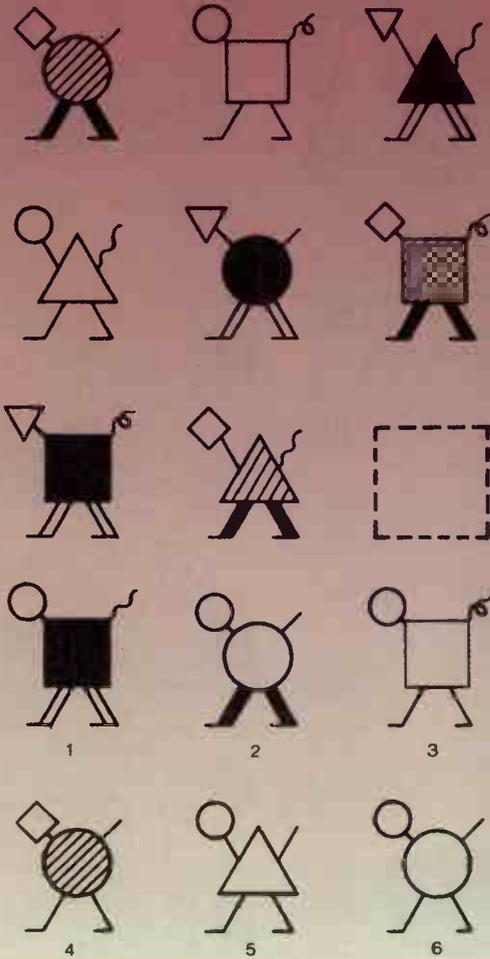
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PROBLEMS?...

A Which of the six numbered figures completes the series (write the number in the Box)



B Add the missing number

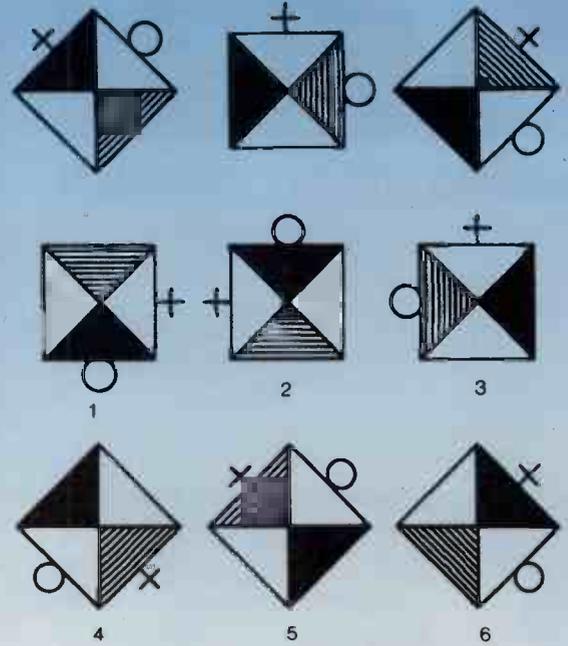
7	14	12
4	12	9
6	24	

A) 6 (in each row and each column, there are three body types-Round, square and triangular-three head types-Round, square and triangular-three tail types-Straight, wavy or curly-and three leg types-a single black or white. Also the bodies are black white or striped. The missing animal must therefore be number 6.)

B) (the letters in the second column are formed by working backward alphabetically working from the letters in the first column, skipping two, three and four places respectively; those in the third column are formed by working backward from the letters in the second column and skipping three, four and five places respectively. The letter preceding 'P' by six places is 'I' (The large square turns 45 degrees anti-clockwise each time. The cross and the circle also turn 45 degrees but clockwise.)

Answers to this month's problems

C Which of the six numbered figures completes the series (underline the correct figure.)



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- Job title
- Company name
- How many staff are employed at your location?

10 <input type="checkbox"/> 1-9	11 <input type="checkbox"/> 10-24	12 <input type="checkbox"/> 25-49	13 <input type="checkbox"/> 50-99
14 <input type="checkbox"/> 100-249	15 <input type="checkbox"/> 250-499	16 <input type="checkbox"/> 500-999	17 <input type="checkbox"/> 1000+
- What is the annual budget of your DP department, excluding staff costs?

18 <input type="checkbox"/> £0-£24k	19 <input type="checkbox"/> £25-£49k	20 <input type="checkbox"/> £50-£149k	21 <input type="checkbox"/> £150-£499k
22 <input type="checkbox"/> £500-£999k	23 <input type="checkbox"/> £1-5 million	24 <input type="checkbox"/> £5 million+	
- What is the annual turnover of your company?

25 <input type="checkbox"/> Up to £5m	26 <input type="checkbox"/> £5m-£10m	27 <input type="checkbox"/> £10m-£25m	28 <input type="checkbox"/> £25m-£50m
29 <input type="checkbox"/> £50m-£100m	30 <input type="checkbox"/> £100m+		

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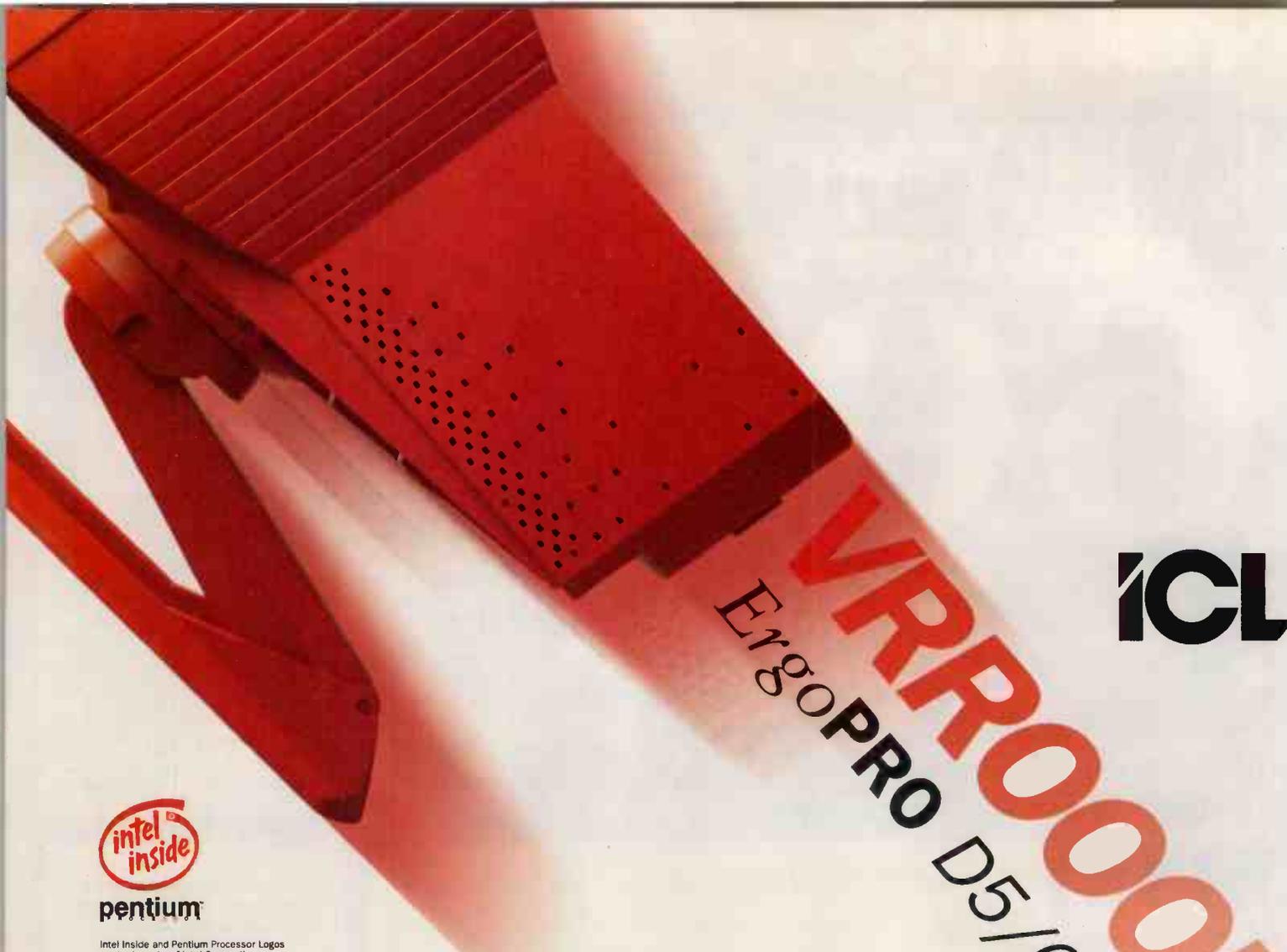
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6. What is the principal activity of your organisation? (Please select the category most appropriate to your business. You must tick one box)

- 31 Agriculture, forestry & fishing
- 32 Energy & water supply
- 33 Mining, chemicals, metals & minerals
- 34 Metal goods, engineering, electronics & vehicles
- 35 Computer manufacturer
- 36 Systems OEM
- 37 Other manufacturing industries
- 38 Construction
- 39 Retail, distribution, hotels, catering & repairs
- 40 Computer dealer/reseller
- 41 Transport & communication
- 42 Banking, financial, business services & insurance
- 43 Computer services bureau
- 44 Software house
- 45 Education, health, government & local authorities

7. Which type of drive do you own?

- 46 CD
- 47 3.5"
- 48 5.25"



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Newsprint

At last it's the Pentium upgrade - for some PCs

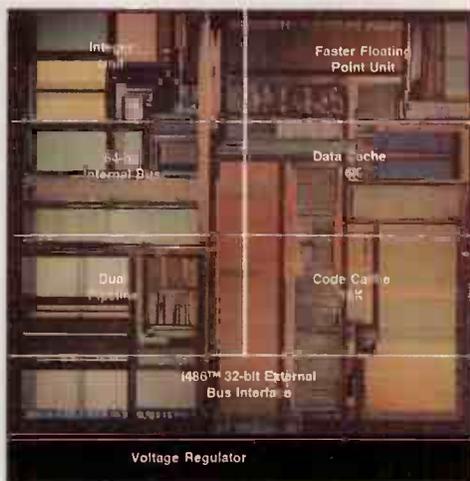
Intel has announced the long-awaited P24T Overdrive chip which will allow 486 systems to be upgraded to Pentium level, boosting speed by up to a claimed 70 percent. It has also slashed the price of the Intel DX4 Overdrive — just a month after we castigated Intel, in a review of the upgrade chip, for charging too much.

The Pentium Overdrive, originally slated for a 1993 launch, cannot be used in all 486 machines, not even all those purporting to be "Pentium". Intel denies promising that all 486 systems would be upgradable and supplies a list of 500 systems worldwide



(and 140 in Europe) which have been found to work with the new chip.

The Pentium Overdrive is Intel's biggest chip to date, with 4.6 million transistors and a complex bus interface to allow its 64-bit architecture to interface to 32-bit 486 systems; but there will not be an SX version of the Pentium to allow manufacturers to use 32-bit motherboards. Unusually, Intel has not announced power consumption figures for the chip although it has fan cooling. The upgrade is initially



Thank you fans ... the Pentium Overdrive (above) has a cooling fan (above) on top of it

only available for 25MHz motherboards and runs at 63MHz — two and a half times the bus speed. It is on sale now at £299. No price has been announced for the 83MHz chips expected later this year.

The DX4 and DX2 Overdrive chips have been cut in price, with the DX4/100 dropping from £449 to £249, the DX4/75 from £379 to £185, and the DX2/66 from £199 to £149. Intel 01793 696000

Simon Rockman

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Warp sales boom as Windows 95 is delayed

Apple and Microsoft have both postponed the release of long-awaited major revamps of their mainstream operating systems — as IBM boasts of booming sales of its rival OS/2 Warp. The delays are not connected directly with the furore over the Pentium bug (see page 295) although this may have concentrated minds on the consequences of flaws.

Windows 95, initially promised for the first half of this year, will not appear in the shops until August to ensure it is completely free of teething troubles, Microsoft says. The product was first scheduled for launch last year.

IBM claims to have sold 800,000 copies of OS/2 Warp in Europe in just three months

after its release last October. Warp offers fast 32-bit operation and efficient multitasking, two of the biggest advances offered by Windows 95. Warp Lan Client, due for beta release this month, includes drivers for multiple networking transports and protocols, including its own TCP/IP stack — also vaunted features of Windows 95.

OS/2 sales have long been healthier on the Continent than in England. IBM says leading manufacturers Vobis, Escom, Peacock and Comtech have signed deals to preload Warp on new machines, accounting for 40 percent of the German preload market. But Warp is unlikely to make a deep impact into global sales of Windows 95.

Meanwhile, Apple says its next-generation Copland OS, scheduled for late this year, will not appear until mid-1996. AppleSoft vice-president, Ike Nassi, was quoted as saying the microkernel and other code need more work. One reason for the delay is to adapt the code to enable it to run on Mac clones, following Apple's decision to license its hardware architecture to manufacturers.

Copland is set to replace Apple's System 7 operating system and it is likely to be called System 8 when launched.

● Microsoft is to integrate Opcode's Open Music System (OMS) into Windows 95 to extend plug-and-play features to MIDI devices such as keyboards and synthesisers.

Short Stories

All credit to Xircom

● A combined 19.2kbps fax-modem and Ethernet network adaptor from Xircom is among the first of many dual-purpose PCMCIA products expected to appear over the next few months.

The CreditCard

Ethernet+Modem 11 has been designed for international use, and comes with software that allows you to select from a menu of fax-modem configurations optimised for different countries. It comes with Delrina's Winfax Lite and WinComm Lite comms and fax software.

The device comes in 10BaseT and 10Base2 versions or a 10BaseT/1-Base2 combination model.

Suggested prices start at £480.

Combined PCMCIA modems and memory cards are expected on the market soon. They are unlikely to be cheaper than the combined price of separate devices, but can save mobile users the bother of swapping (and possibly losing) cards.

● Xircom has signed a deal with NEC for the licensing and manufacture of chipsets for wireless local networks. The chipset will be a 2.4ghz frequency hopped with a 1Mb/sec data rate.

Xircom Europe 323 360 3855

Computer Users Year Book

● The 1995 edition of the Computer Users Year Book, published by VNU, is now on sale priced £130 (pre-paid, £150 invoiced plus £6.50 p&p). It gives details of hardware and software products, specialist services, and more than 9500 computing and network sites.

The Software Users Year Book on CD-ROM is also available, price £285, or £350 plus £49.88 VAT complete with the printed version.

The Computer Equipment and Suppliers CD-ROM is also shipping, priced £335 plus VAT.

VNU 0171 439 4242

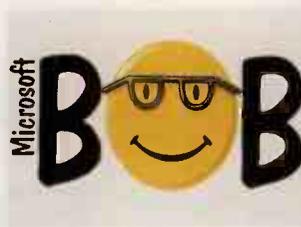
Bob's your uncle — Bill gives us the new social interface

A new term has entered computer language — the social interface. It was coined by Bill Gates during a presentation of a new software product called Bob at the Consumer Electronics Show in Las Vegas last month. Sitting in the packed hall was Steven Spielberg.

Bob is designed to help home computer users operate their machines. Explained Gates: "The PC is not easy to use. The social interface is the next generation of computer interface. It's a personal guide that helps you."

Bob sits on top of Windows and DOS and comes with eight home applications, including a letter writer, calendar, address book and email. It uses a series of cartoon characters and sound effects to guide users through an application.

Each character has a "personality" of its own and is designed for different levels of



computing experience. Future social interface programs will include 3D animated characters and voice recognition.

The demonstrations were slick and impressive, but some doubts remained. The first is that Bob requires a fairly powerful home PC, a minimum of 486

processor with 8Mb RAM, 30Mb hard disk space, Windows 3.1 or Windows 95 and a modem (all demonstrations were on a Pentium). The hard disk requirement will increase as Bob's files grow.

Some wondered whether users would find Bob's zany approach irritating, but PC manufacturers planning to ship Bob with their machines include Gateway 2000, NEC and Micron Computer.

Bob ships in the US next month, priced \$99 (£66 approx). There are no plans to license it to other companies.

George Cole

...but he's got competition

Two new front-ends could be serious rivals for Bob. Simply Village, from Computer Associates, depicts the PC as a village with a post office, general store, news-stand etc. Each building launches you into another layer of images that reflect a task or application.

BIOS specialist Phoenix has come up with Phoenix Office, which uses the image of a desk, file cabinet, phone and bookshelves. Each icon, or item, represents a task or application. Both products are priced low and will be bundled with many PCs. **Tim Bajarin**

Poached egg on new Xerox

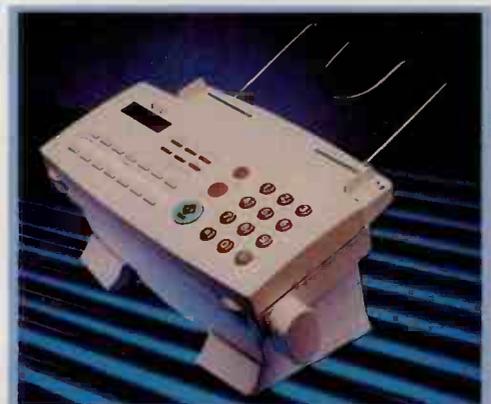
Rank Xerox, famous for the "British disease" of allowing others to profit from its inventions, has announced that it is reinventing itself — and it has poached marketers from three rivals to help.

The basics of the graphical user interface were developed at Xerox's Palo Alto research centre but never patented, allowing Apple to pick up the ideas and develop them into the Mac interface (Apple lawyers were smarter, severely restricting what Microsoft could do with Windows).

Rank Xerox is now billing itself as The Document Company, complete with a flashy new logo. It has hired Simon Hill from Canon, Stephen Flint from Epson and Jason Court from Tektronix, to market its range of office equipment.

The latest addition is the first of what the company says is a new generation of multi-functional office machines. The Xerox 3006 is a combined scanner, copier and fax machine and should be available this month for less than £1,000. Xerox also plans to introduce some inkjets, including one it claims is twice as fast as rival models.

Rank Xerox 01895 251133



Xerox is not the only company combining machines. Plustek's ScanFX (above) is a combined 24-bit colour scanner, fax and copier, for £399. It is designed to work with a printer. Dealer is Aptec on 0171 490 2973. Nebula Communications has the £139 Copyscan Lite, which converts a fax machine into a scanner. Copyscan Lite Plus, at £159, includes a 2400/9600 faxmodem. "Professional" versions of both, with optical character recognition (OCR) software, cost £179 and £199 respectively. Details on 01223 233471.

HP sends in the scrubbers as a million printers lose their grip

Hewlett Packard is the latest company to be hit by an expensive bug. It is sending a strange looking gizmo, looking like three scrubber pads on a spring-loaded rotating arm, to as many as 1.5 million owners of printers with a dodgy paper feed.

The models affected are the DeskWriter 510 and 520, and DeskJet 550C and 560C — but only those manufactured in the nine months up to last March. This was after the specification for the rubber in the paper-feed rollers was changed.

Customers found the grip of the rubber weakened with time so that the paper feed became unreliable or failed altogether. HP says it reverted to the original specification as soon as the problem was discovered. The printers are all covered by

Hewlett Packard's three-year warranty, under which an engineer might be called out to replace a part.

So the free gizmo could prove a cheaper option. It fits under the feed rollers where the paper tray normally goes, and a supplied piece of software keeps the rollers turning for 20 minutes until the abrasive pads tone up the dodgy rollers to give them a better grip.

HP says that typically this may have to be done once or twice in the life of the machine. The gizmo will be sent out to registered users this month. Users having paper feed problems in the meantime can contact the European support centre on 0891 391000.

Short Stories

Don't forget to change numbers

● Time is running out for updating phone numbers in your files to the new codes that come into force on 16th April. You may wish to wait until next month for the changeover, though, because our next edition will carry an overview of many utilities available to do the job.

The main change is an extra 1 in BT area codes, and here hangs a cautionary tale. In our past two editions we have been so assiduous in adding the new 1 to numbers that we have twice misprinted the one for Software Scientific, publisher of the Concept Suite. The number, on the Orange network, should be 0973 226247 — without the extra 1. So be warned: non-BT numbers do *not* change.

Email your views and news

● You can email your news and views to Newsprint Editor Clive Akass at cakassa on CIX, or at the Internet address clive_akass@pcw.ccmil.compuserve.com. Any letters will be considered for publication unless you ask otherwise. We also like to receive interesting screenshots.

Kids learn how to build safe roads

Road safety for kids used to be about learning the Green Cross Code. But in today's hi-tech world children not only learn how to cross the road safely, they get programs telling them how to build safe roads. StreetWise, from education specialist SiR, was launched last week by road safety minister Steven Norris. It costs just £29.99, with a schools resource pack, thanks to sponsorship by 3M. IT in the classroom — page 310



Rush to replace buggy Pentiums

Thousands of UK users have taken up Intel's offer to replace Pentium chips following the floating-point bug debacle — but many more have decided to stick with their original chips.

Intel first offered to replace chips only for users of vulnerable high-precision applications, and sparked off a series of legal actions from disgruntled users.

Chairman Andy Grove made the no-strings offer in a statement apologising for Intel's handling of the bug. He said: "Although Intel stands firmly behind the quality of the current version of the Pentium processor, we recognise that many users have concerns."

He pledged that Intel would replace the Pentium free of charge "any time during the lifetime of a computer". Supply problems

mean replacements could be a long time coming, but the company wants the original chip back. Users can either take their PC to an authorised agent or replace the chip themselves — which isn't difficult, with modern Zero Insertion Force (ZIF) sockets.

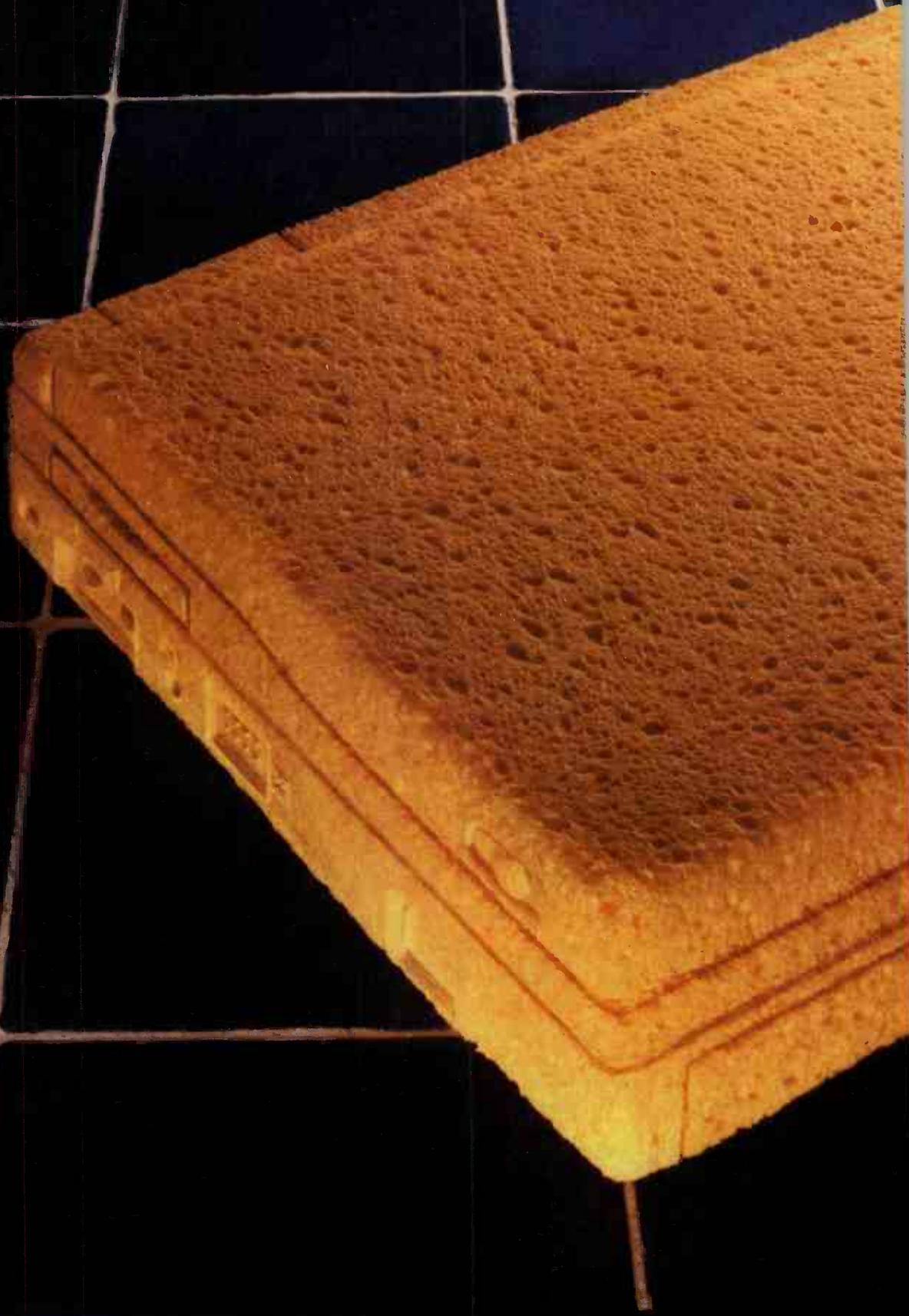
Intel seemed to have ridden out the worst of the storm by the start of the new year, although some vendors reported a drop in Pentium sales. Viglen said demand had held up. IBM was on its own in suspending sales of the chip, claiming the bug could cause an error as often as once in every three weeks. No other PC maker went so far, though; not even Compaq, which has had a long-running public row with Intel and uses rival AMD chips in its 486 machines.

Stanford professor Vaughan Pratt

concluded that the chance of error varies wildly with the task but could be as high as one in a few thousand operations (<ftp://pub/FDIV/README> at boole.stanford.edu for details).

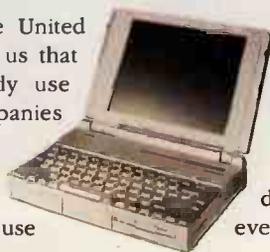
Intel says most users would never be affected, but it seems the company miscalculated badly in not reporting the bug to users with high-precision applications; it also failed to realise that the Internet would instantly turn the bug into a global issue. But the Pentium had been in general use for a year before anyone outside Intel noticed the problem, which at worst affects the fourth decimal place (see Newsprint, January).

Intel has set up a hotline on 01793 423400. The cost of the replacements could run to many millions of dollars.



Already one out of five computers sold in the United Kingdom is a portable. In fact, recent research* tells us that nearly 90% of medium to large companies already use portable computers and moreover 65% of these companies have chosen Toshiba portables.

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Short Stories

CAD payout

● CAD specialist Autodesk has been ordered to pay \$25.5 million to a 10-person Vermont firm called VMI for alleged use of trade secrets obtained from a former VMI worker. Autodesk said it would appeal.

Shuttle support

● Shuttle Technology has upgraded its Dosarch backup software to support SCSI devices and QIC tape formats. Dosarch software costs from £59.

Shuttle 01734 770441

Translation kit

● Globalink has launched Power Translator Professional for Windows in German, Spanish and French versions, offering translation to and from English. £499.

Globalink 0800 752752

Crush hour

● Atlantic Coast is selling Crush, which boosts by a claimed 12 percent the compression gained by its famous PKZip utility.

Atlantic 01297 552 648

CD drives gather speed as quads become norm

Quad-speed CD drives which transfer data four times faster than first-generation units are rapidly becoming the norm. At least one manufacturer, NEC, has stopped making dual-speed drives and is phasing out its triple-speeds. And PCW's Gordon Laing, collecting candidates for a group test of CD drives to be published next month, was offered almost exclusively quad-speeds.

Early CD drives, offering data transfers at only 150kb per second, cannot keep up with the demands of many multimedia CD-ROMs. NEC's Terry Morris, who deals with sales of CD drives to PC makers, said: "We will be selling triple-speed drives for a short while but we see quad speed as becoming a *de facto* standard."

Another big change is that the latest entry-level CD drives use an IDE interface, which means they can be run off the same controller card as an IDE hard disk — a cost-cutter for vendors of cheap multimedia machines.

Quad-speeds are not expensive by CD standards. Upgrade specialist Datrontech is selling NEC's new Quad-X IDE drive, boasting a 250ms access time and 600kbps data transfer, for less than £200. There are internal and external models, and a £269 version that runs off the parallel port.

Datrontech 01252 313155; NEC 0181 993 8111

Britain's first IBM PowerPC model is being put together and sold by Centrex, which launched it in the unlikely setting of the BETT education computing show. It is available running either AIX (IBM's version of Unix) or Windows NT.

The £3,200 Centrex PowerPC is driven by a 66MHz 32-bit 601 processor, but a 604 version will be available shortly. A multi-session double-speed CD-ROM drive is included as standard.

Centrex also plans to preload OS/2 when the PowerPC version of the operating system, currently beta-testing, becomes available. IBM is believed to have held off launching a PowerPC model to wait for OS/2. Apple brought out its own PowerPC-based machines last March but the Centrex is the first conforming to the joint PowerPC Reference Platform (PReP) standard.

Centrex is expecting big sales among companies using IBM RS6000 machines. The Centrex can run RS6000 code straight out of the box.

The company is part of the Hugh Symons Group, which also launched a system based on IBM's VoiceType voice recognition software. A complete entry-level system, based on a 66MHz 486 and capable of taking dictation at 70 words a minute, costs £1,990.

Hugh Symons Group 0202 740853

Mainframes alive and well and on the desk

The mainframe is not dead, according to a narrow majority at a recent Oxford Union debate attended by representatives of major corporations.

Microsoft consultant Adam Warby, proposing the motion "This house believes that the mainframe is dead", declared that a post-mortem was long overdue. He said rival client-server technology lets people at all levels in an organisation to take decisions, not only those with access to a mainframe.

It is also cheaper, he claimed. "When NetWest downsized its cardholder system to PCs, it reduced the cost of that system from £1.7 million a year to £200,000 and cut response times from minutes to seconds." The motion was opposed, aptly enough, by a representative from IBM, which lost billions as mainframes lost ground to growing PC power. Enterprise systems director Arthur Parker said the dinosaur



Not quite the stuff of mainframes ... but this kids' keyboard has clicked with young Americans and is being sold here by AKO (0181 446 0666) complete with tutorial software

image of the mainframe was itself out of date. He told the audience: "The enterprise system we sell today is a small box that sits on the desk, not a huge machine occupying a whole room to itself."

Anyone who pays by credit card, pays an electricity bill, travels on aircraft or even takes a bath, is reaping the benefits of mainframe systems, Parker said.

Lindsay Cox, European marketing director of comms specialist DCA, which co-sponsored the debate, said proprietary protocols were dying but not the mainframes they once ran on. "What we are seeing is the underlying protocol structure change and become more open."

Vauxhall's IT director Paul Butler said his company had cut costs by up to 15 percent by switching to client-server technology.

And IBM's Peter Eldridge asked: "If a train station is where a train stops, what is a workstation?"

Sage hitches lift to the Office with an arch rival

Business software specialist Sage has entered the booming office suite market by hitching a ride with Microsoft — prospective owner of Intuit, its arch rival in the accounts software market.

Sage's Sterling Accountant Plus for Windows, designed for small to medium-sized firms, will be offered in a bundle with Microsoft Office to create what the two companies call a "total business solution". The two packages will be glued together by means of new Open Database Connectivity (ODBC) drivers which will allow Office programs to access Sterling's files.

This will allow details of customer and accounts to be brought easily into Word or Excel for word processed reports or advanced charting and spreadsheeting. Buyers will also get PowerPoint



and Mail, Office's business graphics and email modules.

The price will be about £500, 20 percent less than the cost of the packages purchased separately. The ODBC drivers will be available free or at nominal cost to existing Sterling users.

Sage claims to be Britain's leading seller of accounts software but has been facing increasing competition from Intuit's Quicken range, particularly at the home and small business end of the market. Marketing manager

David Pinches admitted the company had been concerned at the news late last year of the proposed \$1.5 billion "merger" of Intuit and Microsoft:

"We did talk to Microsoft about it. But we are satisfied that the Intuit deal was mainly about Microsoft moving into online banking. Microsoft wants to get hold of Intuit's huge home banking customer list."

The Intuit deal is still under investigation by US officials but Pinches said he expected it to go ahead. Figures that emerged from the deal revealed only a small proportion of Intuit's income came from the kind of businesses that form the bulk of Sage's customers.

"We still think there is a lot of mileage for us working with Microsoft," he said.

Sage 0191 201 3000; Microsoft 01734 270000

Short Stories

Anger over GIF charges

● The Graphics Interchange Format, better known as GIF, is at the centre of a row after CompuServe announced developers will be charged a licence fee for using it. Netters reacted with anger at the news, which overshadowed cuts in CompuServe charges in the face of competition from Internet direct-dial providers.

CompuServe owns the GIF format and has supplied it free for seven years. But it uses the LZW algorithm owned by Unisys, to whom CompuServe has agreed to pay 11 cents for every product using the GIF. CompuServe will charge an extra 4 cents for "administrative costs".

CompuServe 0734 391064

Floppy gizmo

● We printed a wrong number last month for Cipherkey, which sells a £75 gizmo that plugs into your internal floppy connector and offers flexible access to the drive to prevent unauthorised use. The right number is 0181 731 9949.

Screens 'no risk to pregnant women'

Working with VDUs poses no risk to pregnant women, according to the Health and Safety Executive (HSE).

Studies have linked birth defects and miscarriage with electromagnetic radiation from computer screens, but the HSE claims

there is substantial evidence that these fears are unfounded. It concludes, from information provided by the National Radiological Protection Board, that the levels of ionising and non-ionising radiation are well below those likely to cause a health risk. The HSE

recommends no special measures to protect pregnant women and does not recommend that they stop working with VDUs.

The conclusion comes in new regulations requiring employers to assess the risks to women who are pregnant, breastfeeding, or have recently given birth. Employers are told to give mothers-to-be the chance to discuss their fears with someone "adequately informed about the current scientific information" — a doctor, an in-house health service, or the HSE's Employment Medical Advisory Service.

The new regulations, published as "New and expectant mothers at work: a guide for employers", are available for £6.25 from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 6FS.

Adele Dyer



... but don't let that stop you taking some stylish precautions

If you're the kind of person whose likes your socks to match your hat (or whatever), you might like this one. The screensaver and matching mouse are available "free" to purchasers of Office Data's Universal Glass Filter, which fits over computer screens. To buy that, presumably, you have to be the kind of person who believes VDU radiation is dangerous. Which is not the kind of person who writes regulations for the Health and Safety Executive (see above). Office Data is on 0925 820997. Also targeted at VDU paranoiacs are the shades (right). Gepro (01689 851206) is offering them for £24.99, a reduction of £8. Clip-on versions, similarly discounted, cost £21.99. At least they'll allow you to look cool and mysterious as you sweat over your spreadsheet.



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Short Stories

Flagship council burned over "cheap" software

● Tory flagship council Wandsworth has done a deal with Novell after being supplied with £30,000 of allegedly pirated software.

The Vogue Computer Company, said to have supplied the software, has gone bankrupt and former managing director Curtis Maclean faces criminal charges.

The company was awarded the deal, to supply NetWare and DOS to 46 primary schools, after bidding "substantially below" rivals.

Legally, Wandsworth stood to lose £30,000. But Novell agreed to settle for the council buying an early upgrade. Martin Smith, head of Novell's anti-piracy unit, said that ironically the council was one of the most security-conscious in the country. The company reckons it loses \$1 billion a year to software pirates.

Cheap thrill

● Adamson Computers is selling a multimedia upgrade kit including a 16-bit sound card and dual-speed CD drive, for £199 plus VAT.

Adamson 01707 391392

DEC sells plant

● DEC is selling its chip plant at South Queensferry, Scotland, to Motorola for an undisclosed sum. The plant will continue to make AM486 and DEC's Alpha chips.

Drive time

● Driving test panic will no doubt earn a few sales for a £25.99 package called Driving Test from 10/10 Educational Software (01625 780370). It quizzes you on 2,500 facts about driving skills and the Highway Code.

Acrobat talks

● Merlin Open Systems is running a conference called Acrobat In Practise in London on 20th February. It costs £120, including lunch and report.

Merlin 0115 9514230

New fast modems "still won't talk to each other"

Modem buyers were warned last month that models from different makers still cannot be guaranteed to work together using the new V.34 standard, originally called VFast.

The good news is that the standard, heralded as the fastest possible on traditional phone lines, could get a speed-up this year.

But Andrew Hurdle, business development director of comms specialist Sonix, warns there is still confusion over the standard and that people buying V.34 models which are not software upgradable are "making a bed of nails for themselves".

"There are bugs in most people's implementations, including ours at the moment. Ours might not work with, say, US Robotics, or xyx model, and we don't know whether that is our problem or the other manufacturer's. I am not convinced that all these problems have surfaced," he said.

Modems holding their configurations and software in Flash EPROM can be upgraded simply by running a program. The V.34 standard allows for an official maximum line speed of 28.8kbps, allowing data transfers at up to 115kbps with compression. But ways were found during the long run-up to V.34 ratification to cram even more data down a line.

These options, says Hurdle, are not implemented on all modems but they are likely to become important. Some involve tweaking optional parameters in the standard, another involves allowing different rates for incoming and outgoing data to capitalise on the fact that one direction may be noisier than another (most impairment occurs in



Kerridge Network Systems is selling this V.34 slot-in card modem for £499. Toshiba is offering a similar device for the same price.

Kerridge Network Systems 01635 524155; Toshiba 01734 845995

the local link to the exchange). The standards body ITU-T is considering boosting the V.34 maximum to 33.6kbps, giving up to 134kbps with compression. These rates are achieved only on very good lines: the standard allows for a stepping down of speeds on poor lines.

Even 134kbps is not the absolute maximum transfer rate. Hayes claims rates of up to 230kbps on its Optima range using a proprietary protocol. Hurdle said scathingly: "If you send 'a quick brown fox' between two modems you will get that speed, but I have yet to find normal user data that will compress at that rate."

Sonix has already offered a free software upgrade to its Volante Fast modems, permitting line speeds of 33.6kbps.

Sonix 0285 64165; Hayes 01252 775500

Harking back to the acoustic coupler

The once familiar acoustic coupler, which allows you to pump data down an ordinary phone handset, is making a comeback.

The coupler, basically a padded speaker that fits over a handset and beeps, was a familiar sight in the days of 300-baud modems, phone monopoly, and regulations so all-embracing that you could get shot at dawn for fitting your own line extension.

But as line speeds got faster, regulations got looser, and phone sockets went on sale at Woolworths, the coupler looked to be on the way

out. Now, with the boom in mobile computing, travellers face the problem of plugging into phone lines the world over — and, Murphy's Law being what it is, the plug they need is most likely to be the one they haven't got.

TeleAdapt, which makes phone adaptors for travellers, says many are carrying an acoustic coupler as a fallback device. Data rates are surprisingly high: the company's new £159 TeleFast coupler can keep its stuff as fast as the fastest modems: 28.8kb/sec.

Marketing director Colin

Corby says: "You will only get through at that speed under ideal conditions."

"A lot depends on the quality of the handset and whether there is any background noise... if you were calling from Tibet, say, you might have to drop right down to 2400bps."

TeleAdapt 0181 421 4444

IBM tops

IBM is top seller in the Small Office Home Office (SoHo) market, accounting for one in seven PCs sold, says a new survey from Keith Wharton.

Wharton Information Systems 0181 891 6197

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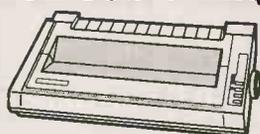
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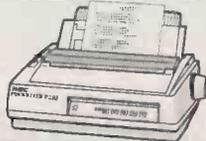
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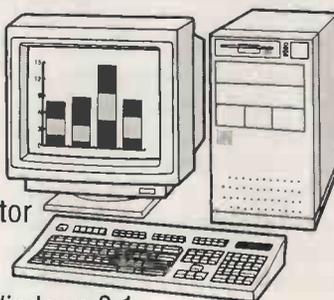


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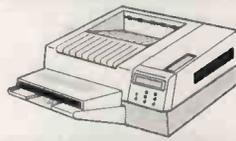
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Short Stories

Multi-channel SCSI boards

● Adaptec has brought out a range of multi-channel SCSI host adapters for use on servers which address more than seven devices — the limit on a single channel.

It is also offering a software package which provides network administrators with remote monitoring and management facilities that parallel those in its highly-successful EZ-SCSI single-user software.

The software, called CIO, is compliant with Hewlett Packard's OpenView management platform and will be bundled with all the new server devices. It will be available, with special drivers, for Adaptec's existing range of SCSI adaptors.

The new devices, all using the PCI bus, include the AHA-3985 RAID adaptor, which boasts three SCSI channels capable of addressing 23 devices, and at £550 is claimed to be a third of the price of rivals. The price cut is achieved by offloading some processing to the host PC.

The 8-bit AHA-30940 has two SCSI channels, capable of addressing 15 devices, and costs £340 — just £75 more than its single-channel sibling, the 2940. A 16-bit version, the £399 30940W, will be available next month.

Adaptec 01252 811200

MediaVision out of Chapter 11

● Multimedia specialist MediaVision has emerged from bankruptcy after a US court approved its reorganisation plan. The company filed for Chapter 11 protection, designed to help companies stay in business, last July. Paul Weber, turnaround specialist with Price Waterhouse, said: "With the bankruptcy behind them, the major issues resolved, and a \$15 million secured line of credit, this company is well positioned to go forward."

MediaVision has a UK arm at High Wycombe.

King Kahn is toppled as Borland chalks up new loss

Philippe Kahn, one of the great characters of the PC industry, was forced last month to resign as president and chief executive of Borland, the company he founded and led.

He will stay on as chairman, but day-to-day management is handed over to chief finance officer Gary Wetsel.

Kahn's resignation followed pressure from shareholders concerned about a \$1.2 million loss for the third quarter of 1994. Another head to roll was that of Keith Maib, brought in last year with the aim of turning the company round.

Borland flourished under Kahn as a leading supplier of Pascal C, and C++ development software; it was also famous for Sidekick, a pop-up



Kahn: big spender

personal organiser that managed a kind of multitasking on pre-Windows PCs.

Much of the company's success was attributed to Kahn's marketing flair but he was a notoriously big spender of Borland money. The company's troubles are generally believed to stem from its purchase of another ailing PC pioneer, dBase developer Ashton Tate. Borland was slow to bring out a

Windows version of dBase, leaving the market open for rivals.

Sales of dBase for Windows, launched finally last year, have been disappointing.

[See editorial — page 9]

British manufacturers seem to be doing well in niche markets for portables. Tadpole's Pentium notebook got a very good response in the US, and this novel new 486-based design from Coventry-based Husky could do even better.

Husky specialises in rugged designs, for the likes of surveyors, meter readers, and the military.

The one in the picture is the company's first notebook-style PC, though it is like no notebook you have ever seen. The case is rigid manganese and the machine can be dropped from six feet without harm. The screen does not fold over and is protected by transparent polycarbonate, and has a replaceable scratch cover. It can be driven by a magnetic coupled pen. Battery life is a claimed ten hours — operating software is run from ROM. Internal and external PCMCIA slots



provide great scope for customisation — including radio communications. And prices start at less than £2,000. Husky 0123 604040

NEC snaps up new 3D technology

Groundbreaking 3D virtual-reality technology developed by UK-based VideoLogic has been snapped up by Japanese electronics giant NEC.

The two companies have reached a "framework agreement" for the development of the technology, which is said to give PCs the kind of graphics quality seen in mega-productions like Jurassic Park.

VideoLogic has been developing the PowerVR technology

for three years. NEC will hard-wire it into a special chipset for use in games machines, PC motherboards and add-on cards. The technology will also have commercial applications such as engineering simulations.

VideoLogic chairman Derek Maclaren claimed: "Our developments with NEC will move games and other PC virtual-reality applications into new realms of quality. Our goal is to remove the 'virtual' from virtual

reality so that users can feel like they are actually in Jurassic Park rather than watching the movie."

The two companies have put together a demonstration system for potential vendors and the first products are expected by the end of this year. VideoLogic says a big advantage of the system is that it is scalable, enabling the creation of a range of systems with different price/performance levels.

NEC 0181 993 8111; VideoLogic 01923

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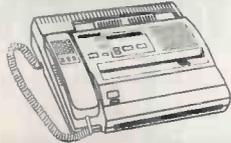
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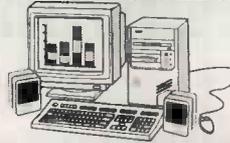
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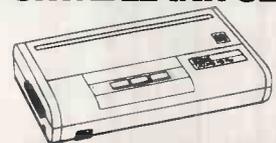
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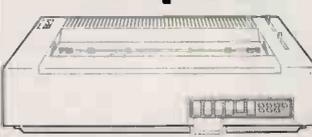
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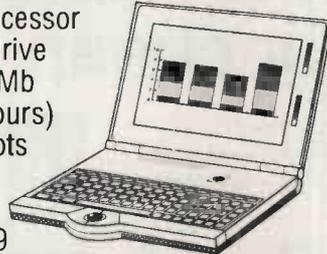
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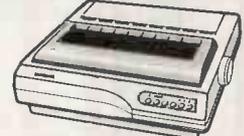
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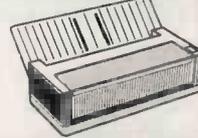
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Short Stories

Coy Lotus and AT&T deny marriage talks

● The latest rumour about Lotus, which is being taken very seriously, is that it is about to jump into bed with US telecoms giant AT&T. Early last year it was Microsoft and AT&T who were heading for a close strategic relationship.

Like Lotus, which teamed up with AT&T in a bid to expand the market for Lotus Notes, Microsoft thought AT&T might help it extend its reach.

However, at the last minute, AT&T backed out of a deal to include Microsoft Mail and a Notes-like product on its new business network system. AT&T feared Microsoft's products would be offered to AT&T rivals, and began to perceive Microsoft as a competitor rather than a partner in network services.

So AT&T has become closer to Lotus and made Notes a critical part of its new business network. The marriage rumours have credence because of the convergence of the communications and business applications market. Also, if anyone can take Microsoft on head-to-head, it could be AT&T. So, although Lotus and AT&T deny that they are more than just good friends with "a strategic relationship", the two companies are being watched very closely. Together, they represent a serious force in corporate computing.

Tim Bjarin

Low-cost colour

● Graphico is shipping a 600 dots per inch thermal-wax colour printer for £3,495 — a claimed £1,000 less than rival products.

Graphico 0135 522810

Hayes multiport

● Hayes is shipping a fast serial board with eight ports, allowing data transfers at rates of up to 921,600 bits per second.

Hayes 0252 775500

Novell's triple whammy may silence the critics

The simultaneous launch last month of NetWare 4.1, PerfectOffice 3.0 and UnixWare 2.0 should make critics of Novell's recent buying binge eat their words.

Novell's purchase of both Unix Systems Labs and WordPerfect was seen as defensive,



as Microsoft encroached upon NetWare territory with its NT range. Doubts were raised about Novell's ability to integrate three companies and create a coherent strategy.

Novell management is confident that NetWare 4.1 can answer the needs of organisations of any size. The company

expects sales of the new product, which is priced at the same level as 3.12, to dominate by the year's end.

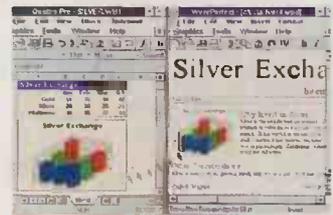
A new pricing structure allows you to buy additional licences in groups of five, so that the jump from, say, 500 to 530 users does not mean buying an extra 500-seat pack. The upshot is a price cut of at least 25 percent and possibly much more.

Integrating older 3.x servers has been greatly eased and setting up 4.1 servers made much more automatic. Flexibility has been greatly enhanced.

PerfectOffice 3.0 brings together a number of separately produced packages and gives them a common look and core program code. WordPerfect 6.1, Quattro Pro 6.0, Presentations 3.0, InfoCentral 1.1 (a PIM), Envoy (an Acrobat-style document distributor) and a Group-Wise client licence are included.

The Professional version includes Paradox 5.0 and AppWare (a Visual Basic Windows developer). In summer, a CD will be released allowing you to pick-and-mix any of the above plus other WordPerfect and third-party applications.

In all, the new PerfectOffice



goes beyond Microsoft Office and has clearly been redesigned as a network product from the outset.

UnixWare 2.0's most significant feature is the standardisation it brings to a historically fragmented marketplace.

Novell 01344 724000

Karl Dunkerley

Plasmon joins the scramble for cheap read-write storage

A novel £750 650Mb read-write from Plasmon has added to the recent proliferation of (relatively) low-cost high-capacity storage devices.

The Plasmon PD2000e, the result of a seven-year co-development with Japanese giant Matsushita, will read all CD-ROM formats and read and write to the company's new 650Mb phase-change optical disks.

The £45 optical disks cannot be read by standard CD drives but the system works out 50 percent cheaper than existing optical archiving system, Plasmon claims.

The cheapest CD-ROM read-write drives are about



twice the price, though they are expected to get cheaper.

Access rates for PC2000e are less than 200 milliseconds — about the same as a good CD-ROM drive but much slower than a hard disk. It incorporates a SCSI-2 interface and is available in both standalone and half-height internal versions.

• Sony is due to ship its delayed MiniDisk drive this

month. This will cost about £400, and takes 140Mb disks that will cost about £10.

Also due to ship soon is Iomega's Zipper drive, which will cost about £140 and takes 100Mb or 25Mb Bernoulli disks costing £14 or £7 respectively.

Sony 01932 816000; Iomega 0800 898563;

Plasmon 01763 262963

Command post

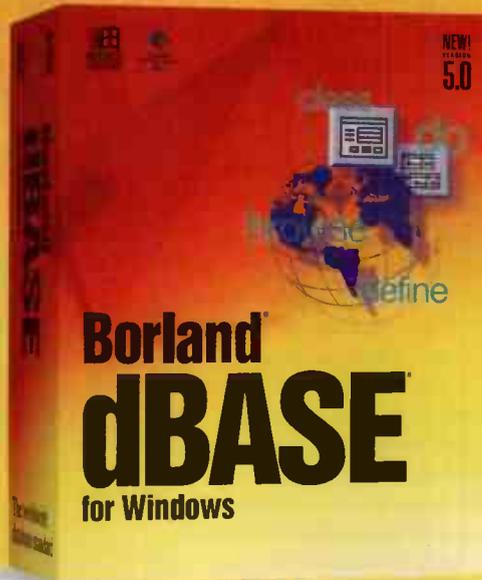
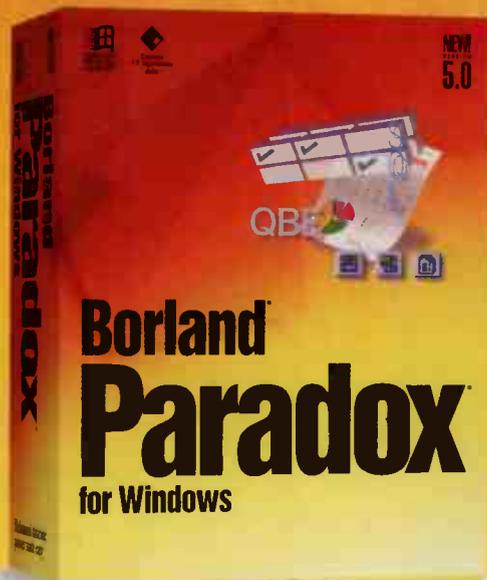
DOS addicts can get the best of both worlds with a £39 utility offered by Atlantic Coast.

Take Command offers command-line operation and a batch-file language for Windows. Most DOS commands are enhanced and there are about 50 extra ones.

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Short Stories

S&S has the common touch

● S&S, publisher of Dr Solomon's antivirus kit, has released a new pack of utility and trouble-shooting tools for common Windows problems. WINCheckIt, at £49.95, also includes an uninstaller, a clean-up facility, a tune-up feature to convert fragmented memory blocks into a contiguous whole, and a system file editor.

Also from the same publisher, Setup Advisor (£24.95) uses CheckIt PRO to collect configuration data and make hardware setup recommendations for users planning to or actually installing new add-ons. Finally, RoadTECH (£69.95) is a portable, single disk application aimed at professional support users.

Glimpse of the smart P6

● The Pentium's successor, currently called the P6, will analyse incoming code and data to decide the most efficient way of processing it. To help cope with the extra calculation, it will have four arithmetic logic units, compared with the Pentium's two. The first version will be clocked at 133MHz, with a 32kb first-level cache, and will not be pin-compatible with a Pentium, according to US reports.

Remote storage

● Remote off-site storage of critical data is offered by a startup company, DataSave, which has set up 260Gb of optical storage near Bracknell, Berks. The idea is that firms with up to 30 PCs dump their data each day. But a file can be backed up at any time by clicking a Datasave icon. Prices start at £13.50 a week.

DataSave 01344 482999

Net gain

● Microsoft has licensed Mosaic technology from Spyglass and NCSA for an Internet service to be bundled with Windows 95.

Developers slow to steal a march on car thieves

Manufacturers are being slow to exploit tracking technology that can radio the position of stolen vehicles and immobilise them, according to Autoroute publisher NextBase.

The technology can also allow firms to keep track of their vehicles, and remotely monitor factors such as oil pressure and temperature.

The basic ideas have already been demonstrated in NextBase, which was bought out late last year by Microsoft, and it offers a software kit for "serious developers". But Nick Berry, one of the firm's five founders, says: "A lot of people are very interested but not many are taking it up."

Tracking systems based on Global Positioning Satellite (GPS) technology can be made cheaply, but for high-interference built-up areas they are best augmented by electronic versions of traditional dead-reckoning navigational methods.

Vehicles would transmit their position to base stations — perhaps an existing commercial cellular network — says a briefing

paper by Berry.

The only company to be near marketing a system so far is cellular-messaging specialist Cognito.

NextBase has also been experimenting with transmitting traffic information base from Traffic Master, a country-wide network of vehicle sensors. Experiments have also been made with capturing Teletext from TV broadcasts to provide in-vehicle information on

weather and road works.

But doesn't Berry expect opposition from lorry drivers and mobile sales people, legendarily fond of off-road dalliance on the firm's time? He says: "No company is going to bother about someone going a couple of miles out of their way to visit grandmother. But anyone who travels an extra 200 miles to drop off a bootleg load deserves to get caught."

NextBase 01784 421422

This is the first range of office lasers to hit the market with a resolution of 1200 x 1200 dots per inch. The five-model Optra, from Lexmark, is positioned firmly to compete with HP's LaserJet 4M and 4Si range, offering four times the print resolution at a comparable price. They offer enhanced PCL5 and PostScript print speeds of 12 and 16ppm. Prices start from under £1,300 for the Optra R, rising to £3,059 for the 16ppm Lxi with 8Mb RAM, a 1,000-sheet feeder and a 10BaseT Ethernet port. Lexmark is on 01628 481500



Multifunction multimedia cards

German company Miro has launched two boards that integrate multimedia facilities for which you would normally need to install more than one device.

The miroVideo 20TD combines a graphics accelerator with video overlay, video capture, and a TV and cable tuner. The Tseng ET-4000 W32p chip with 2Mb DRAM gives 16.7 million colours at 800 x 600 and a 60Hz refresh rate.

The TV tuner can pick up all terrestrial channels plus cable. The Tseng Labs Viper video processor gives large-format smooth AVI playback. A Phillips 7110 video decoder and a superior Video for Windows CoDec supports high-quality video cap-

ture from composite and S-video sources. Small AVI's can be zoomed to almost full PAL format. Coming in both PCI and VESA versions, and bundled with tuner and VideoStudio 2.0 editing software, the 1Mb version costs £325 and the 2Mb board is £375.

The more expensive miro-CRYSTAL 40PV board combines Windows accelerator, video capture and full-screen, full-motion (FSFM) digital video playback. New miro UK managing director Sid Spading says this is aimed at anyone using electronic media and print production techniques.

The power comes from two Weight chips. The 9100

provides tricolour at 1280 x 1024 at very high refresh rates and with high-speed redraw speeds. Its sister 9130 video co-processor provides hardware enhancement for overlay, capture and playback. FSFM video overlay, capture and playback is now possible from one chip. Standard composite input is available for ordinary TV, VHF and 8mm video sources and S-Video for SuperVHS, Hi-8 and other high-quality sources.

Bundled with VideoStudio 2.0 and a utilities package (miroWINTOOLS), the PCI boards will be available at around £1099.

Karl Dunkerley

Miro 01494 510250

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Taxan's new Ergovision 580 LR is a 15" monitor with the kind of picture quality other manufacturers would be happy to achieve on their 17" models. No wonder Computer Shopper recently made it their 15" Colour Monitor Best Buy. Call 0344 484646.



TAXAN
MONITORS

309
PERSONAL COMPUTER WORLD

Short Stories

Brother can you spare me a multimedia PC?

● Kyodai, Brother's sales company, has launched a new range of multimedia PCs. Prices range from £899 plus VAT for the 486SX33 Brother Tutor Multimedia, up to £1,499 plus VAT for the Professor Pentium Multimedia which has a P60 processor and an Intel Premiere motherboard.

All the machines have dual speed CD-ROMs, 16-bit sound cards, stereo speakers and a 14in SVGA monitor.

Included with all the machines is a pack of Microsoft CDs including Encarta 95 and Works for Windows. All systems come with MS-DOS 6.22 and Windows for Workgroups 3.1.

Kyodai 0279 416888

IPE "gives away" £20,000 net kit

● IPE, British agents of the McAfee antivirus software, is giving a CD-ROM what it claims is £20,000 worth of software (based on a 10-user licence fee) to 15,000 key companies.

The CD contains a suite of network management programs, designed to answer all the needs of a central administrator with a particular stress on security — including virus protection. The suite includes tools for software monitoring and distribution, device installation, and access control.

The fully-functioning evaluation copy is supplied on a shareware basis. IPE's Bryan MeLearney says the suite is designed to provide a one-stop answer to problems not fully addressed by network operating-system suppliers such as Microsoft and Novell.

IPE 0171 436 2244

Check it out

● An update is available for WINCheckIt, CheckIt PRO and Road TECH which claims to check Pentium floating point calculations.

S&S 0296 318800

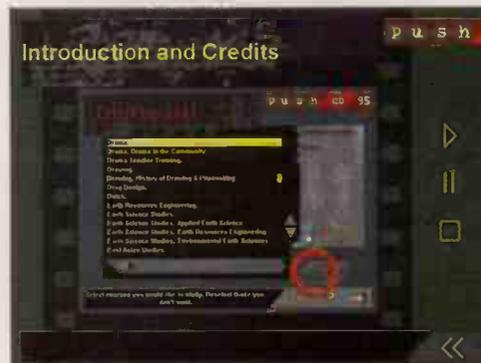
Cradle-to-adulthood learning system goes online at show

A controversial computer-based learning system that could revolutionise teaching in Britain was demonstrated at the BETT 1995 education technology exhibition last month.

Pilot Integrated Learning System (ILS) schemes are currently being evaluated by the National Council for Education in Technology, a government quango. The idea is to create a set of software that can see a child from primary school to university, monitoring progress and allowing pupils to explore the curriculum at their own pace. It aims to complement rather than replace the teacher, though some claim the system helps the teaching of large classes.

The US company CCC is a leader in the field, and its software is distributed here by Research Machines, one of Britain's two major schools IT suppliers. Critics say CCC's core system is not open for developers of third-party modules to write to. British educational software developers, notably RM's arch rival Acorn, have come up with an open ILS (OILS) specification that they hope to establish as a standard. This allows software developers and schools to write teaching modules.

An OILS system from the British company Systems Integrated Research (SIR), running on Acorn machines, was shown in use by pupils from Selly Park Girls' School, Birmingham, one of the pilot NCET sites. Deputy head Mel Tennent said the system had had a dramatic effect on children's performance: "It is important to understand that the system is



School-leavers can virtually design their own university, and then choose the real-life one that comes closest to their dreams, with the aid of the £99 PushCD university guide published by McGraw-Hill. It links multimedia techniques to a database of nearly 70,000 courses at Britain's 128 universities. Details include flunk rates, employment records, living costs, size, sex ratios... and even the cost of a pint. Also included are 7,500 photographs and nearly seven hours of audio. It's witty and fun to use.

integrated with the curriculum. It is not just a bolt-on."

New Acorn products included OmniClient, which was used to network Acorn, Apple and IBM machines at the show. Acorn has also launched Intertalk, a Web browser. It says a version due out soon will have features in advance of current Mac and IBM browsers.

Acorn 01223 254254; Research Machines 01865 791234

Intel and AMD friends again

After years of battling it out in the courts, Intel and AMD finally called off their long-standing feud and decided to find a way to work together. They have come to following the agreement:

- AMD will have a perpetual licence to the micro code in the Intel386 and Intel486 microprocessors.
- AMD agrees it has no right to copy other Intel Microcode including the Pentium Processor, P6 and 486 ICE (in circuit emulation) microcode.
- The companies will negotiate a new patent cross-licence agreement.
- Intel and AMD will drop all

cases including appeals currently in the courts.

- AMD will drop its anti-trust suit against Intel.

- AMD will have the right to use the foundries for AM486 products containing Intel micro code for up to 20 percent of its 486 production.

- AMD and its customers will get a license on Intel's "Crawford 338" patent, covering memory management.

Sources say that Intel finally concluded that AMD, along with Cyrix and NexGen, were going to create legal versions of the Pentium, as well as other 486 products, and decided that it

would be better to have a cross-licensing agreement with at least one of them.

Intel also realised how vulnerable it is after the Pentium flaw, and that an approved second source would help against increased competition from the PowerPC and other RISC chips.

This brings their relationship full circle. In the early eighties, Intel licensed the original 8088 code to AMD to provide a second source. When the 8088 family began to sell big, Intel wanted to keep all of the profits itself. AMD believed it had a licence to the entire 8088 family.

Tim Bajarin

Apple unleashes new improved PowerMacs

Apple launched a range of improved PowerMacs on day one of this year's first MacWorld Expo. The entry-level 6100/60 has been replaced with a 66MHz model, while the 7100 and 8100 now run at 80MHz and 100MHz respectively.

These join the recently launched 8100/110, which sits at the top of the product line and is reviewed in this month's First Impressions on page 336.

In addition to faster clockspeeds the new Macs come with a 256Kb second-level cache as standard. The cache significantly increases performance by reducing the average access time required to retrieve data or instructions from ROM or system RAM.

The improvement is particularly noticeable when you are using non native applications under 68Kb emulation, and Apple claims that the new models give an overall performance increase of 30 percent, 40 percent and 20 percent respectively.

Pricing starts at £1299 for an 8/350 6100/66, £1950 for a 8/350 7100/66 and £2775 for 8/700 8100/100. The first two are the same price as the old PowerMacs, while the 8100 is £400 less.

Apple also announced that Radius Inc and Power Computing Corporation are the first compa-

nies to license the Mac OS, with a view to delivering Mac OS-compatible computers later this year. Both companies showed pre-production products at the show, but neither could offer any specific pricing or shipping information.

Power Computing's "clones" will comprise a mid-range 80MHz desktop unit, aimed at

the 7100 level, and a 100MHz tower model which is aimed at power users. These were shown to the press in typical PC-compatible cases, but the company stressed that this was not how the finished units would look.

Both were demonstrated using standard Mac software and the pre-production non-Apple made system boards were shown. At another conference Radius showed their first clones — a Quadra 950 lookalike with a few aesthetic changes.

Chris Cain

Apple 0181 569 1199; Radius 0635 38531



Mac OS

Short Stories

Newton lives on in niche markets

● Apple is still plugging the handheld Newton, which flopped in the mass market after it failed to live up to prelaunch hype. This month the company has released a new version, called the MessagePad 120. It looks identical to the MessagePad 110, but has 2Mb of RAM and a much crisper screen, with less glare.

Apple sold only 120,000 Newtons in the 18 months after its launch in August 1993, but the product has made serious in-roads in specialist markets. More than 300 niche applications have been written for the Newton, compared with only 80 mainstream apps.

Notion, a list manager from Apple's Star Core, is the most popular application on Newton today. And a new product from Gaia Software of Portland Oregon, called Personal Media, is fast becoming a must.

Personal Media streamlines how you work, take notes, send faxes and transmit email on a Newton. It lets you drag and drop information from one app to another.

It is the best software I have found for the Newton for taking notes, and sells for \$149.

Tim Bajarin

Gaia Software 0101 503 221 4242

German system is teacher's pet

● A new teaching network has been launched in the UK by German-based company TLS. DidacNet allows a tutor teaching computing skills to a large group to have complete control over up to 64 students' activities, including blanking screens and blocking keyboards and mice if no-one is listening.

The systems also allows embarrassed learners to call for help in private and the tutor can explain problems to several users at once, dispensing the need for OHPs or running round the room to each user.

TLS 01732 873990

Top 10 Windows and DOS

Position	Product	Manufacturer	Last Month
1	MS Encarta	Microsoft	6
2	OS/2 Warp v3	IBM	-
3	Corel Gallery	Corel	1
4	BodyWorks	Guildsoft	7
5	Family Tree Maker	RMG	5
6	QEMM 386	QuarterDeck	3
7	Quicken v3	Intuit	2
8	5FT 10 Pack CD	Cirrus	-
9	Photo Library	Softkey	19
10	MS DOS 6.22	Microsoft	15

Top 10 DOS

1	QEMM	QuarterDeck	1
2	OS/2 Warp v3	IBM	-
3	DOS 6.22	Microsoft	3
4	MS Flight Simulator	Microsoft	10
5	Stacker	Stac	5
6	MS Space Simulator	Microsoft	6
7	PC Anywhere	Symantec	4
8	Turbo C++ V3	Borland	-
9	Fun School 4 Ages 5-7	Europress	-
10	Xtree Gold v3	Symantec	7

Top 20 Windows

Position	Product	Manufacturer	Last Month
1	MS Encarta	Microsoft	5
2	Corel Gallery	Corel	1
3	BodyWorks	Guildsoft	6
4	Family Tree Maker	RMG	10
5	Quicken v3	Intuit	2
6	5FT 10 Pack CD	Cirrus	-
7	Photo Library	Softkey	16
8	MS Fineartist on CD	Microsoft	-
9	MS Works	Microsoft	17
10	Cinemania 1995	Microsoft	-
11	MS Office 4.2 U/G	Microsoft	9
12	Wordstar v2	Softkey	3
13	Lotus Smartsuite	Lotus	10
14	Quickbooks	Intuit	-
15	The Way Things Work DK	-	-
16	The Ultimate Human Body DK	-	-
17	Theme Park	Bullfrog	-
18	Quicken Inventory	Intuit	18
19	Far Side Screen Saver	Delrina	-
20	Space Interactive	Andromeda	-

Figures, taken from December sales, supplied by Software Warehouse (01875 464488)

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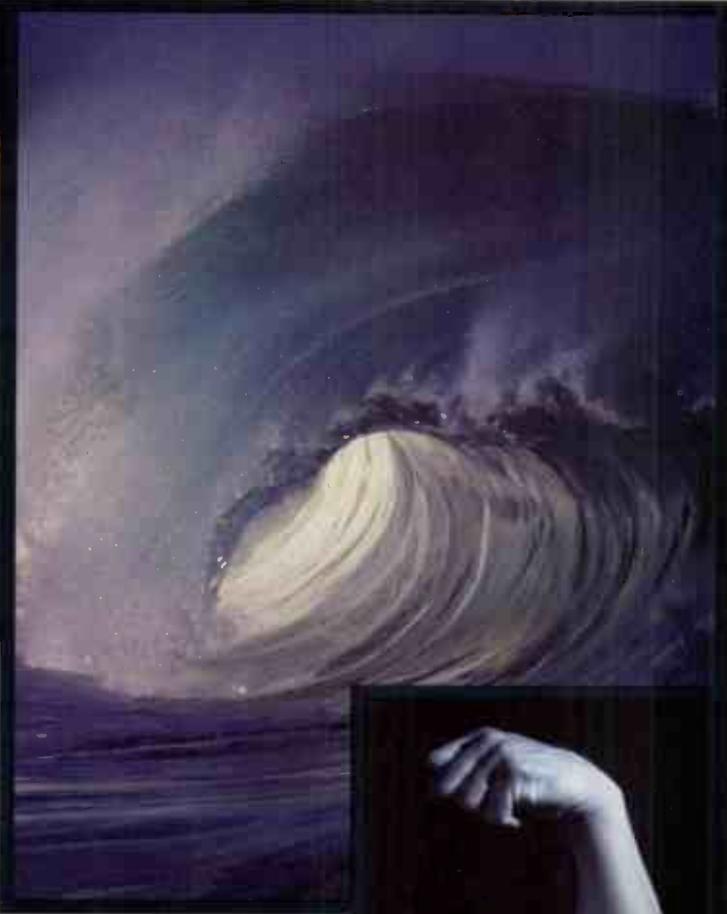
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PCW 2/95



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With friends like that...

An anonymous group of Microsoft's competitors have hired a team of attorneys to oppose the company's deal with the Justice Department. And all because Bill is beating them at their own game.

When Microsoft signed a deal with the US Justice Department last year it must have thought its problems were over. Maybe not. Wilson, Sonsini, Goodrich & Rosati, attorneys at law in Palo Alto, California, have lodged a 30,000-word Memorandum of Amici Curiae in Opposition to the Proposed Final Judgment. This, they claim, "is not in the public interest and should not be entered by this Court". They want the deal overturned in favour of (1) addressing the increase in installed base that Microsoft has procured through illegal practices, and (2) restraining Microsoft's use of that installed base to dominate the markets for applications and other software.

These lawyers must present themselves as "friends of the court" — that's what allows them to become involved in the case — but they are no friends of

Microsoft. Their case, funded anonymously by some of Microsoft's competitors, is entirely one-sided and much of it is based on

journalistic reporting. As a journalist myself (and one who is briefly cited) I have a fairly low opinion of the value of this approach.

Mind you, lawyers are worse. A good journalist would at least wonder why some Microsoft products have been successful while others have flopped. Why did MS-Net and OS/2 1.x fail to take over their markets while Microsoft Word and Visual Basic were so successful? Why did DOS 5.0 and Windows 3.0 succeed when DOS 4.0 and Windows 2.0 had failed? Equating

Microsoft's success with monopolistic practices is too simple-minded to be taken seriously.

Our amici in Palo Alto avoid bringing IBM into the picture. The briefing paper complains that Microsoft "has engaged in classic predatory behaviour by using its monopoly in one market to achieve monopolies in other markets". The authors presumably know this is how IBM operated, though they claim that "how IBM got this monopoly was the subject of much conjecture and years of litigation, but is irrelevant for our purposes". Really? Microsoft is competing against IBM, which is selling OS/2 at a loss: where is it getting the money? It should be easy to show that IBM is engaging in as predatory pricing as Microsoft, but this is not what the paper wants.

Selective blindness also affects some of the tables. Microsoft is found guilty of "vertical integration of markets", for having operating systems, a graphical user interface, development tools and applications. Well, so does Novell, although its GUI is for Unix. So does IBM, and what is more, IBM also makes Intel x86-compatible chips (which Microsoft doesn't), PCs (which Microsoft doesn't) and all sorts of minis and mainframes (ditto). Microsoft is accused of attempting to extend its monopoly into the home via the Microsoft Network, but the authors neglect to mention IBM's similar attempt with Prodigy (a joint venture with Sears, Roebuck) or its use of the OS/2 Web Explorer to encourage the use of IBM's own Internet network.

Even though Microsoft has a monopoly share of desktop PC software, this is not illegal, and in the computer market it is a niche player. There are dozens of niche players including Novell (which has a

monopoly of the LAN market), Sun (workstations), Tandem (fault-tolerant servers), Intuit (home finance software) and even Intel (processors).

IBM is, of course, the test case. For about 20 years it has managed to convince US courts that it did not have a monopoly because customers had alternatives. IBM's founder, Tom Watson Snr, reckoned that (in his son's words) "if you defined the market as the entire world of business calculations, then we had lots of competition, and the huge bulk of the business belonged to the makers of ordinary pencils and paper. By comparison, IBM was very small." If you didn't want to pay for an IBM machine, just go to WH Smith. US courts have bought a slightly less simplistic version of this argument, and if IBM can get away with it, why not Microsoft?

But this may change. Specialist IBM newsletter Infospectives International has recently reported that the Supreme Court has sent back a decision taken in a lower court. IBM had won a case against AMI, which accused it of anti-trust actions in its manipulation of prices for the TCMS (thermal conduction modules) used in mainframes. IBM argued that the market was the whole computer market, which it did not monopolise. The case has been sent back to the lower court with the suggestion that the relevant market is the mainframe market. On this narrower basis, IBM is likely to lose. This would be a huge blow, not only to IBM but to Microsoft, Intel, and other firms that dominate sections of a larger market.

Nobody is arguing that Microsoft is innocent of wrongdoing. My sole argument is that it should not be condemned for doing exactly the same as other firms. Penalising success is not the American Way.

Jack Schofield



IBM's pricing strategy over OS/2 Warp is as predatory as any of Microsoft's, yet the lawyers' paper seems to be glossing over the fact

ANALYSIS

Let the games begin

The gloves are off in the games wars. This year will see a glut of 64-bit systems, but they will face stiff competition from the Mac and PC with new games technology and an established user base.

Last year was not kind to Sega and Nintendo. They had had great growth with 8 and 16-bit systems in the past. But, when 3DO introduced its 32-bit games machine in the autumn of 1993, it pushed Nintendo and Sega to go in the same direction.

Interestingly, Nintendo decided to push past the 32-bit platform altogether and aim for a 64-bit system that would blow 3DO away. Sega chose to add a 32-bit booster cartridge to its 16-bit systems in 1994, but it too is aiming to provide a 64-bit system for delivery this year. But 3DO is not standing still. While it has sold 500,000 machines to date (350,000 in Japan, and 150,000 in the US), it's also getting ready for the 64-bit games wars this autumn. It recently announced that by this summer all machines will have the PowerPC inside, and a special card adaptor for

3DO is in better shape, having created an OS that's extendable. This means its current software titles will work on its 64-bit systems when they come out.

This is a nightmare for games developers, who can't decide which new system to bet on. To make matters worse, they will also have to consider the Sony Playstation, another new 64-bit games system that will hit the US market by mid-1995, and Atari's 64-bit Jaguar, both of which have their own OS and use different chips.

And then, there's the multimedia revolution. In 1994, 7.5 million PCs were sold into American homes. In 1995, analysts predict another 11 million multimedia computers will find their way into the home. Also, as more and more PCs have found their way into the home during the past two years, companies like Creative Labs, S3, Brooktree, and 3D Labs have been working on a new set of chips that render 2D graphics so that they appear to be 3D. Another company, 3D Eye, based in Ithaca, New York, is working on a way to add 3D via a software-only approach. These products will make a PC look something like a high-end graphics workstation, without the cost.

Once all these chips are applied to the PC, and the proper software links to game and edutainment software created, a normal PC should be able to compete head on with the next-generation 64-bit games systems from dedicated games vendors. This looks even more likely when you consider that here are already hundreds of games on the PC, and PC games makers won't have to pay any licence fees to Nintendo, Sega or 3DO in this scenario.

The PC provides a single development environment that makes it easier for a developer to standardise on. It also has a growing

audience of PC users in the home who buy games and edutainment-based products in very large numbers. Perhaps this is why Apple decided to create a games platform of its own based around its popular Mac architecture. Sources say that games vendors have been complaining about the high royalties that they pay Nintendo and Sega, and about having to support multiple games systems.

Since Apple's new system, called the Pippin, connects to a TV, it's versatile and can grow with the user over time. Interestingly, many analysts feel that Apple is the sleeper in the dedicated games wars. While Nintendo and Sega will be trying to get software developers to support their new 64-bit systems, Apple can court these same developers with an installed base of 11 million Macs, the potential for another three to five million Pippins in the market by 1997, and an absence of royalties.

3DO, ironically, is also in a good position to capitalise on this move towards the PC as a games platform. It has created an add-in card with Creative Labs that allows a Windows-based PC with a CD-ROM drive to play all existing 3DO games. And 3DO's own multiplayer has the ability to grow into either a set-top box or a full-blown PC.

All this activity should make this Christmas very confusing for consumers. Not only will they be bombarded with ads for 64-bit games machines, but they will see how a PC, with the addition of these 3D cards, can become a great games system *and* give them productivity tools and access to the information highway.

Who the winner will be, we can only speculate. What's certain is that this year will continue to be very hard for those offering dedicated game machines.

Tim Bajarin



3DO's 32-bit games machine will soon be upgradable to 64-bit, to keep the system competitive

current 32-bit 3DO systems will be available around the same time.

But there's one major hurdle which both Sega and Nintendo have to overcome with their systems. Since they will be introducing brand new 64-bit game devices, their software developers will all have to write programs to a whole new OS and environment. In other words, their 16 and 32-bit software will not work on these 64-bit systems without a total rewrite.

ANALYSIS

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Friday, 9th December. Yet another Internet book rolls off the sausage machine, so, dutifully, off I go to Cyberia, London's premier Internet café, to celebrate its launch. The place buzzes with excitement. The usual throng of international media celebrities shows up and off, hogging the event and its free-flowing booze.

"Darling! Mmmwaaahhh! Mmmwaaahhh! I just *adored* your piece on ftp binary file transfer. There was so much raw emotion. So much drama. It was so ... *intense*."

"Oh my! You're so *outré*, darling, you really are! Mmmwaaahhh! Mmmwaaahhh! Your book on ip> protocols effectively redefines the genre. Reading it is a rebirth experience."

Okay, so it wasn't *exactly* like that. In terms of hacks per square inch, I counted someone in a baggy suit whose name escapes me, a guy with a pigtail and a collection of mobile phones, and myself — in a sensible sports jacket. And there was little, if any, kissing. Which, given the obvious risk of nose rings becoming entangled, was probably just as well. Pony tails were definitely getting a little frisky, however, encouraged by the alcohol and the crush of bodies.

The trouble is that Cyberia offers the cat-swinging potential of a hamster cage, *sans* wheel. Why, then, the management didn't make it a press-only do on this particular night escapes me. Innocent members of the public who'd just come in off the street to keep warm or maybe ftp a girlie gif found themselves mistakenly targeted by the publisher's PRs and plied with sales patter, free magazines, and drink. Little wonder that, by mid-evening, our original stock of 30 bottles of wine had been reduced to an arid zero.

Come 8.00pm, I was almost reduced to asking for a cup of Cyberia coffee. But good sense prevailed, and I decided to "netsurf" instead and try to find some of that hard-core porn everyone's always talking about. The café's seven PCs, all equipped with colourful, graphic web-browsers, are meant to make this sort of thing a dirty old man's dream. Nevertheless, by 8.30 I was still nippleless and rather bored.

"I feel very excited about all this," said a marketing man in an Armani suit, squeezing in beside me. Why? Had he found some of the really hot, Danish stuff? Sadly, no. He meant he was excited about the Internet in general

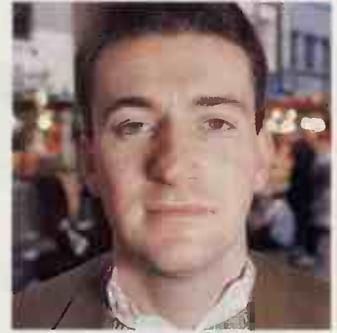
and, in particular, the sales potential for his Internet books and magazines. Yawn. Whenever marketing men in Armani suits tell me they're excited about something, I tend to switch into that mode you always adopt when your Granny's telling you about her bunions. Still, marketing men are paid to get excited on our behalf, so I let him expound. And expound, and expound...

Half an hour later, he was still expounding. "If you thought the Internet was big in 1994, just wait until 1995. By the end of the decade, every home in the country will be online!" And tomorrow, the World. My view (detailed in last month's column) that it's all rather a passing fad, turned out to be a minority one. Still, given the nature of the occasion and the venue, I suppose it's fortunate no-one tried to hit me. Not that I couldn't have taken every one of them, mind...

Well, the majority of the paying customers, anyway. This was Friday night, for God's sake! The fleshpots of Soho and the bars and restaurants of Covent Garden were just a few minutes' walk away. Yet these people preferred to come here and crouch over a PC all evening, without even the solace of a beer can.

According to the staff, Friday night isn't particularly exceptional, either. Cyberia gets packed virtually every evening, not simply with the obvious anorak brigade, but with seemingly normal-looking people, too. Outwardly respectable businessmen drop by, for example. I'll bet they ring their wives beforehand and say: "I'm taking my secretary round to a cheap hotel for a night of unbridled passion, dear, so don't wait up." But then they log on and download pictures from the Hubble Telescope instead. Sick.

And very sad. But relatively profitable, I suppose, if you're feeding this market. The author of the book whose launch we were all toasting, informed me that he's buying a high-performance sports car from his royalties. I debated with him the wisdom of doing this. The bloke has a face full of



Michael Hewitt

off Sounding

metal studs and rings and sports a hairstyle that makes it look as if a Day-Glo squirrel has died on his head. The police will probably pull him over as soon he turns out of his front drive.

Anyhow, by 9.30pm, said author, his fiancée and I, decided that the whole do had become too boring to endure. We therefore congratulated each other on having made it through the evening and went to hail a cab. No more tedious tecchie talk, thank goodness.

"You lot been to a party, then?" asked the cabby, as we sped off towards Victoria Station. The renowned author explained that we'd been at his book signing do, he being one of the UK's leading Cyberspace celebrities and a thoroughly decent chap, to boot. "Oh, the Internet," said our driver. "It's really set to take off next year, innit? I fink before the end of the decade, every home in the country is going to be online..."

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The last twelve months have seen phenomenal goings-on among the software giants. WordPerfect merged with Novell, Aldus and Adobe became as one, and Softkey fielded a "rest of world" team that includes Spinnaker, Zsoft, Software Marketing and WordStar. From being merely confusing as products underwent successive name changes, things became downright bizarre. Microsoft acquired the number one in personal finance software, Quicken, and sold its own second-place contender, Money, to the opposition, Novell. By last December, pundits and public alike were so enthralled by this global, economic soap opera, and so ready to suspend disbelief at the start of each episode, that a spoof news release announcing Microsoft's acquisition of the Catholic Church had to be officially denied.

The domestic market is widely acknowledged as the fastest expanding sector of the software business (though no-one seems to have told Lotus yet). The hearts and minds of the home users figure large in this struggle as the big companies seek new outlets. You can now buy OS/2 in Dixons and the Microsoft "Home" range in Toys R Us, and doubtless it's only a matter of time before you find Softkey at Sainsbury's.

Having got the shelf space, the other half of the struggle is finding the merchandise to fill it. Again we've seen a rash of courtship rituals and partnerships that would have seemed most unlikely a few years ago: Microsoft and Disney, Micrografx and Crayola, Softkey and Faber Castell, and did you hear the one about the record producer, the saxophonist from Pink Floyd, the founder of Micrografx and Monty Python?

Inevitably, many of these "new" products are bought in and many have a familiar ring to them. I haven't seen Softkey's Card Shark Hearts, Castle of the Winds or Dare to Dream games, but I do remember identically named shareware products from two or three years ago. I'm still wrestling with the concept of Sports Illustrated Swimsuit Calendar Goes PC — the title of another Softkey press release. Does this mean we have photographs of men and women of all ages and physiques, posing unprovocatively in modestly cut swimwear? I'm probably thinking of the wrong PC, but the same company is hedging its bets with Religious Clipart Masterpieces, Instant Astrologer, Cross Stitch Designer and Key Home Gourmet. Not to be outdone, Novell Main Street offers games, children's word processing, maths, and other

educational titles developed with the Waterford Institute. Microsoft, with rather more experience, churns out regular releases of reference works, edutainment and games, again often relying on outside talent. Cognitive Applications was the Brighton brain behind the National Gallery CD and Dorling Kindersley (now part-owned by Microsoft and producing its own titles) was instrumental in Musical Instruments.

So we, the customers, are spoiled for choice. Or are we? For a start, the volume of software being released is so huge that magazines such as this one can't hope to review it all. And since you can't browse shrinkwrapped software like books in a shop, there's going to be an awful lot of pigs in pokes on sale, some of which will doubtless turn out to be turkeys.

What's more worrying is how the smaller companies are going to cope. There is some wonderful and original talent around that doesn't have the backing of a large organisation. And there is a demand for all sorts of leisure and educational software, particularly that which is tailored to UK language, syllabus and culture. Last month I mentioned the Chemistry Set, a UK-produced A Level chemistry CD. Readers have been ringing in for the phone number, which I neglected to give. Apologies, it's 0171 916 9999. It would be a great shame if the authors of software such as this, who may lack the clout to advertise nationally or strike a deal with a retail chain, should be squeezed out of the marketplace or see their only chance of success as being "acquired" by a larger organisation.

Marketing software to the home



Tim Nott

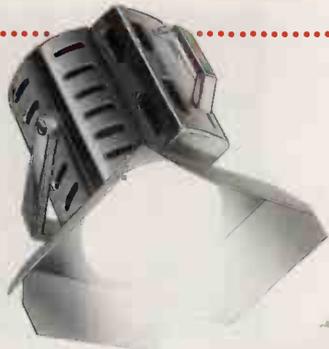
Homefront

user isn't like anything else. Software isn't like toys, it isn't like books, it isn't like recorded music. What's certain is that it will soon become as readily available as any of these. Whether through specialist shops, high street chains or warehouse-style superstores, there's a big shopping spree coming and it's far too important to be left in the hands of the major players. Retailers need to realise that there is a wealth of quality that doesn't have its name writ large in neon. Otherwise we'll be presented with the somewhat depressing scenario:

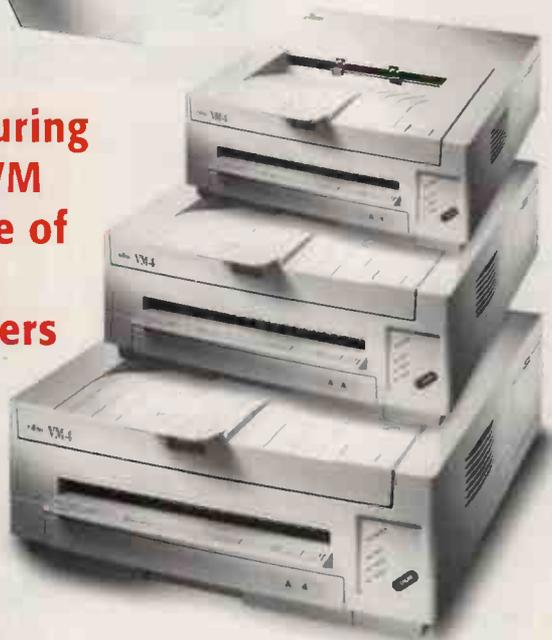
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I earn my living with an early 386, DOS 3.3, 2 meg of RAM, no soundcard and a handful of simple DOS programs which run under DesqView and QEMM memory management. The system works like a warhorse, word-processing my articles, sending them by electronic mail and indexing them in a database.

Alongside it sits a 486 with 16 meg of RAM, running DOS 6.2 with Windows 3.11. Every slot is filled with a card and peripherals hang off the mainframe like a Christmas tree. The doubled hard disk is stuffed with the latest software, and a double speed ROM drive can zip through a library of CD-ROMs, making a stream of pretty pictures and sounds.

For at least two years I have been planning the big switch which will make the Christmas tree my working warhorse. And every time I chicken out. The big system is always almost working reliably, but not quite. Out of the blue it crashes, because fate has got it playing two different tricks at the same time, for the first time ever. So I stick with the DOS warhorse as a real-life working business tool, and leave the Christmas tree as an electronic game that continually comes up with new challenges.

I have been far too busy playing with the 486 game to buy one of the Pentiums which Intel's adverts have been trying to sell me. This is doubly fortuitous. I missed the chance to buy a PC with a dud chip. And I can now wait for what I really wanted all along, a Plug and Play system.

PnP will eventually guarantee that any computer works with any add-on peripheral. Intel calls it "Spin and Grin". The PC user can buy a CD-ROM drive, sound synthesiser and digital video decoder, plug them all in and play multimedia games discs as easily as audio CDs on a hi-fi.

The current mess of partial compatibility between PCs, peripherals and software programs leaves owners with the need to edit config.sys and autoexec.bat software files, allocate i/o addresses and avoid clashing IRQ interrupts. Microsoft and Intel formed the Plug and Play Association to put an end to this misery. But they did so out of necessity, not charity.

Les Magnuson, who co-chairs the PnP committee with Carl Stork of Microsoft, admits that some computer stores in the USA are now getting 25% of what they sell back from dissatisfied customers.

"When you turn on a TV set," says Jeremy Gittins, of Microsoft, "you don't

get error messages coming up on the screen. Hardware configuration problems are stalling growth of the PC industry".

Anyone with half a brain could have told Bill Gates that ten years ago.

Formed in May 1993, the PnP Association now has the co-operation of over a hundred companies. PnP is a three-step solution. The first step is a new PC with new BIOS (Basic Input Output System) that controls loading of the PC's operating system from disk. The second step is a new operating system. A PnP OS will work with a PnP BIOS to create an electronic list of all peripheral hardware already connected to the PC. The third step is a new generation of PnP hardware peripherals. These will work with the BIOS and OS to establish a working connection with the PC that does not clash with any other connections.

With new "Plug and Tell" utility programs, PnP BIOS on its own will be able to give the user some advice on setup. But the full benefits of PnP are only available when all three steps are in place.

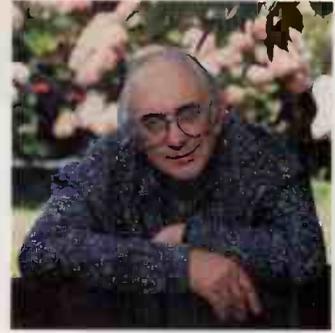
The BIOS chips in a PC cannot usually be changed. But if they are Flash Memory chips, the BIOS can be upgraded from disk. This is why some manufacturers, e.g. Dell, are now using Flash BIOS.

The PnP BIOS standard was agreed in November 1993. The first batches of new PCs with PnP BIOS are just reaching the market. But many PCs and peripherals still in the shops are not PnP compatible and cannot be upgraded.

Microsoft describes Windows 95 as "the Nirvana of PnP". But only when it's ready for sale, and proven safe enough to risk installing.

Those lucky enough to be in the know can now make themselves future-proof by buying a PC with PnP BIOS. But a recent press release from Phoenix on "the smallest PnP kernel...offering support for PCI, ISA, EISA, PCMCIA and motherboard devices" typifies the glibberish information on PnP which the industry is putting out.

The words Plug and Play, and PnP,



Barry Fox

Talking Straight

are not trademarks. "The PnP Association decided not to implement a logo", says Magnuson. "We do not want PCs to look like a racing car."

Nor does the Association have any plans to police misleading use of the Plug and Play generic slogan. Microsoft believes that a logo "Designed for Windows 95" would guide the trade and public, but admits it is not yet used on any equipment.

In May 1994, a year after the PnP committee was formed and six months after the standard was agreed, Intel was mail-shotting members of the public with advertising literature that promised that "today's personal computers are easier to use than ever before". This publicity plug made no mention whatsoever of the imminent launch of PCs with PnP BIOS and all the attendant advantages which Intel is now promoting.

I faxed Les Magnuson of Intel the obvious question. Was this plugging fair play on the consumer? Despite a reminder I've had no reply. Perhaps he's been too busy with dud chippery. **PCW**

MPC

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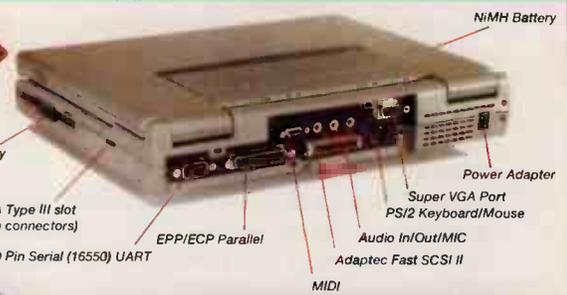
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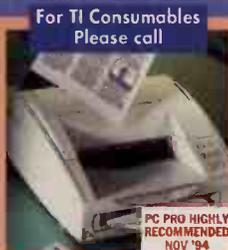
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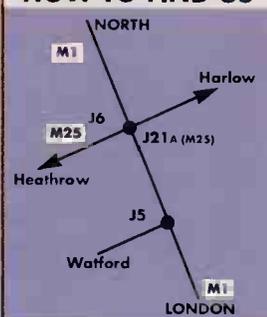
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HCI went into receivership on 9th November last year. As we saw in last month's Business Matters, the primary objective for the receivers is to recover as much money for the creditors as possible. The receivers at HCI have concentrated on finding a buyer for the company trading as a going concern. The sense of "tempered glee" at this situation expressed in some circles has been quite sickening — surely only in the UK could so much cheer be mustered about the business problems of an exciting new project (see, for example, the first of last month's letters) along with much retrospective wisdom along the lines of "I knew it would never work..."

We have been ignoring such stuff, concentrating on keeping the business going, and doing what we do best — treating patients as well as anywhere in the world. The receivers announced on 3rd January that they had awarded "preferred bidder" status to a consortium, led by the Abu Dhabi Investment Company (ADIC). The bidders are planning to continue to develop the site as an international centre of medical excellence. This was an agreement in principle to buy the business. The agreement is still "subject to contract", which means that there is work to be done on a variety of business factors. The whole deal is due for completion within weeks.

I mentioned last month that keeping the information systems going in these circumstances involved some unexpected challenges. These have continued. The first couple of weeks or so were spent explaining the complex web of systems and supplier relationships to a variety of the receivers' staff: lawyers, valuers and other dark-suited types. Not everything in the department was as neatly documented as the lawyers would have liked, a consequence of the speed with which everything had been done in getting the project up and running. A frustrating aspect of this was the need to go over the same ground, over and over again, to various people not particularly experienced in matters IT. However, it was good practice in explaining the background to decisions made in some cases two years ago, to people who were not there at the time. This will be important once HCI#2 (or "NewCo", as it is called for now) gets off the ground and a changed management structure is firmly in place.

Once this was done, a series of interim contracts with suppliers of

IT-related goods and services needed to be set up. Most of the suppliers have been very civilised about what has happened, understanding the situation. One supplier had a slightly different, and distinctly direct approach to the problem: "Well, if you can't pay us, we'll send up a driver and you'll have to give him something of equivalent value." Would that we could: sadly, such matters are, for now, out of the department's hands. Fortunately, the relationships between the department and our suppliers were generally good: we have tried only to do business with suppliers who do consider good service and value simply to be good business practice, and who don't feel they're being made to "jump through hoops" (again, see last month's letters). We have therefore been able to set up interim arrangements with them pending the completion of HCI's purchase. Of course, there's always a bad apple or two, but that's a topic for the future.

The impact of the redundancies has been felt, since the department was tightly staffed in the first place. We all just have to be a bit leaner, and a little meaner, with it. Some of the policies and procedures, however, referred to people or positions who are no longer in the department, and they had not been properly revised by the time they were first called into action.

This caused some embarrassment: there were high-profile failures three days in a row, in the midst of the latest round of budget justification exercises. First, a fault on the main office system's file servers meant that everyone came in one morning to find their entire file space deleted and all records gone. This took the best part of a day to repair, and even then some of the work done the day before — prior to the backups kicking in — was



Nick Beard

Business Matters

lost. Then the FDDI card in the network router died, at 6.30pm, effectively bringing all the systems to a halt. And on the third day, a substantial chunk of the main telecommunications lines into and out of the facility failed. One of the staff suggested trying to contact a "de-hexing service".

I was beginning to think it was Friday 13th: indeed, it was.

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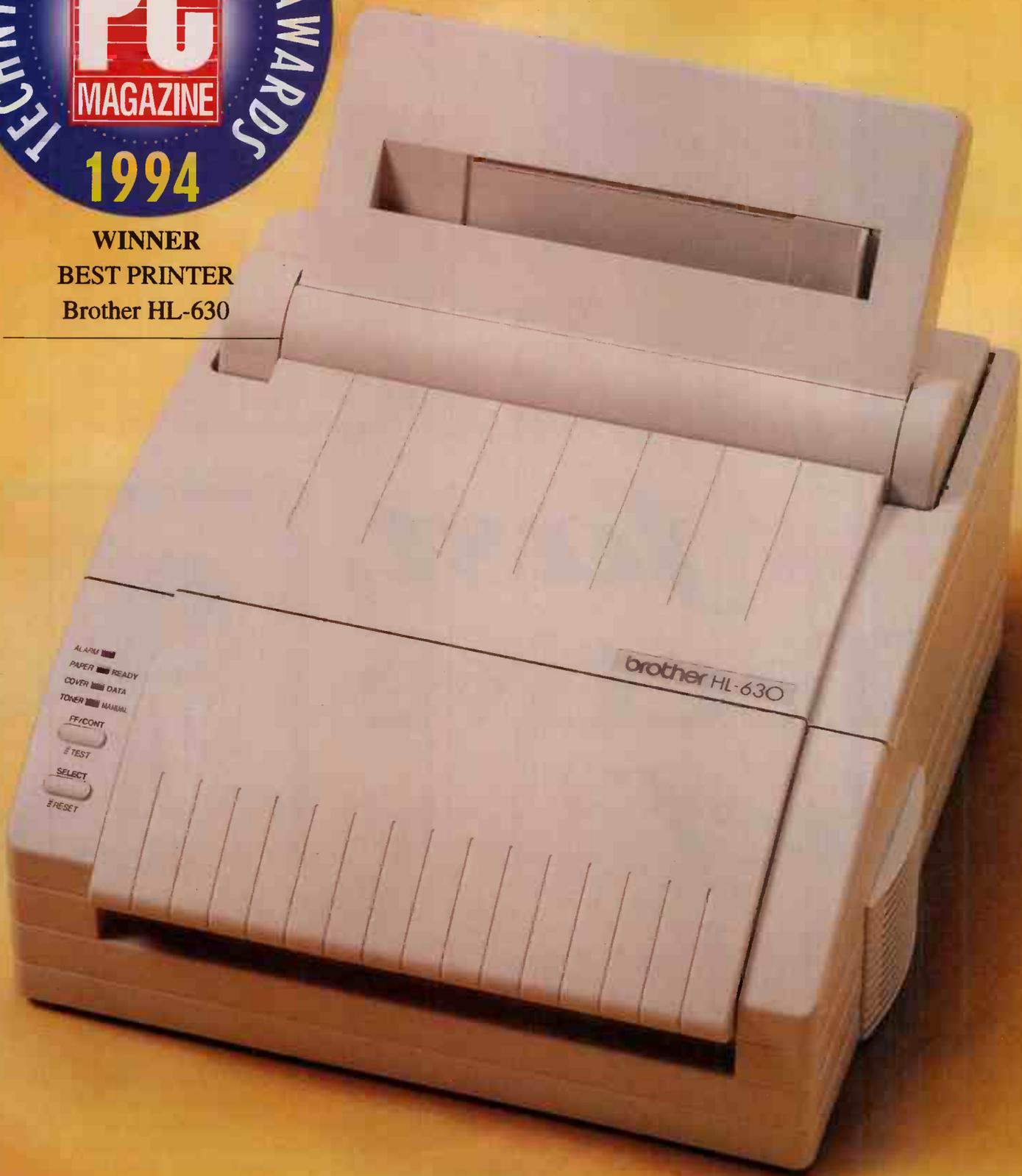
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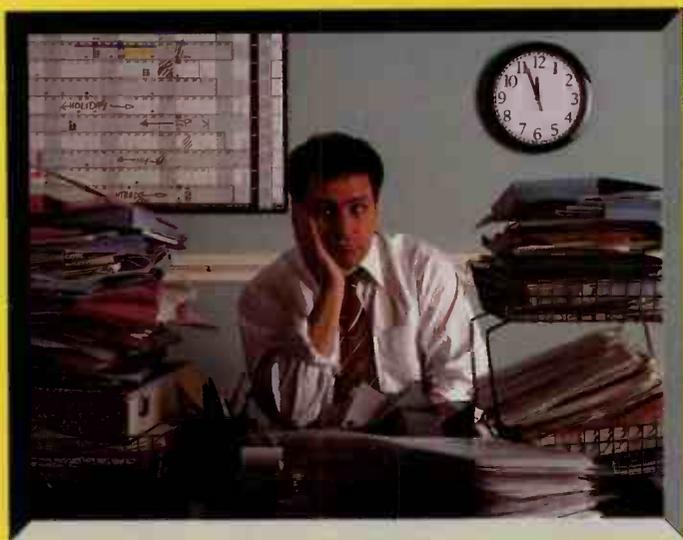
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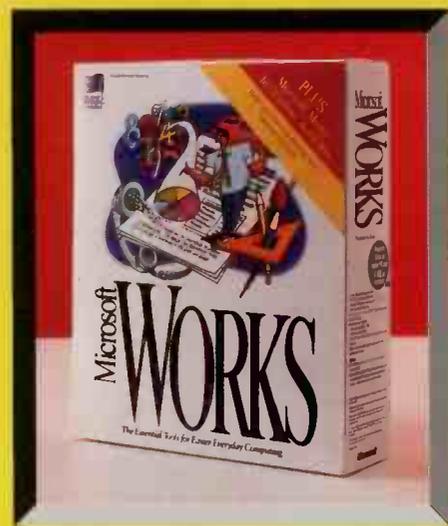
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WHERE DO YOU WANT TO GO TODAY?

HP saucy over printer repairs

I bought a Hewlett Packard 4L laser printer secondhand for £325. It was about 15 months old and outside its one-year manufacturer's guarantee.

After a couple of days I noticed a thin vertical line appearing down every printed page. The User's Manual advises "the internal mirror is contaminated" and must be cleaned by an authorised service representative.

I contacted HP's office in Bristol who said that either they could send out a rep or I could bring the printer to Bristol, some 45 miles away. Either way, assuming it took them one hour to clean the mirror, the cost would be over £200 plus VAT.

After tearing myself off the ceiling I wrote to them to complain. I pointed out that the cost just for looking at the printer was half the amount that it can be bought for new. I also made it clear that I had just become self-employed, starting a business with a client list of some 200 people, and was relying on a good quality laser printer from a well known company. The tone of the reply I received from HP made it blatantly clear: if you can't pay our fees we can't help — oh, and thanks for buying a Hewlett Packard printer.

I wonder how HP would feel if its company vehicles developed simple faults and were told the repair costs would be half of what they paid for them new, irrespective of the faults.

I have since hunted around and found a local man working from home who completed the job for £30 including VAT. Maybe I was conned by HP's glossy advertisement in the press, but to put it bluntly, once they have sold the printer they don't care — but have a nice day.

Simon H Janes
Somerset

HP *Martin Hurren, CPO PR Manager, replies: When purchasing a secondhand printer customers buy with a certain degree of risk because there is little or no knowledge of the printer's history and hence its internal condition. The contaminated internal mirror that Mr Janes has encountered is considered a major fault and requires a high degree of skilled labour to repair. I'm afraid the costs are a reflection of labour-intensive repairs outside of HP's warranty and without a support contract.*

With hi-tech manufacturing being so automated today it allows us to achieve the economies of scale that provide low product prices. The more you introduce the human element to the equation, the more costs will increase, hence the difference between a new product's price and the repair cost. Customers can insure themselves against these costs by purchasing support contracts. Second-hand HP LaserJet 4Ls which are outside of their warranty can have next-day on-site support for only £90 plus VAT per year.

Whoop It Up leaves me down in the mouth

I was struck by the description of Whoop It Up as "a piece of shareware... [which] offers many happy hours of displacement activity" ("Hands On, Windows, November 1994) and thought I would see what it was like for myself.

I was impressed with the efficiency of Atlantic Coast, the current distributors of Whoop It Up, who delivered it to me the day after I placed my order. I was a bit surprised that this shareware software cost me £12.70 for two disks, VAT and delivery, but figured that if the registration fee was of the same order this would probably be a reasonable

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price for those allegedly happy hours. I was extremely annoyed to discover that what I got for my money was little more than a demonstration of the program with no instructions or online help, and repeated messages saying that this or that can only be done in the registered version of the program. I was horrified to discover this would cost me a further £33.93, making a total cost of £46.63 for what is a fairly limited application.

I was always under the impression that writers and distributors of shareware were champions of value for money in the front line of the battle against overpricing by the large software companies. I am no longer so sure.

Dr JJ Clarke, Nottingham

Walnut Creek Toolkit is a real peach

My grateful thanks to Chris Bidmead for his Hands On 32-Bit columns, "Windows dressing" (October 1994) and "Less is More" (December 1994). They encouraged me to order the Walnut Creek Toolkit for Linux from PDSL (£24 inc) to play with over the Christmas holiday.

This proved a turning point in my company's computing strategy. The main reason for writing is to thank publicly all the wizards who developed this fast and stable 32-bit multi-tasking, multi-user operating system and the associated mass of imaginative and useful applications, all offered for free or as shareware.

Dr Sami Attar, Cheshire

Letters

Sibelius review hits a bum note

Ian Waugh's article about Sibelius 7 in the January issue of PCW (First Impressions) makes a number of inaccurate and misleading points.

The music for the film *The Piano*, by Michael Nyman, was produced using SCORE Music Publishing software on PC, as has virtually all of Nyman's music published by Chester Music. To my knowledge, none has been typeset using Sibelius and Mr Nyman is certainly not a user of it, or indeed of any other music software.

Contrary to Mr Waugh's assertion that several major music publishers have "bought complete systems", very few have in fact opted for Sibelius because the quality of output is highly questionable to the experienced eye, and

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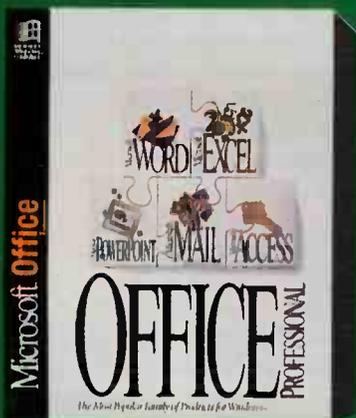
For example, with OfficeLinks you may flit easily between applications.

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because of its virtual unavailability outside the UK (these days music publishing is a truly global industry).

Sibelius still has many limitations which the programmers have been unable to address (presumably due to the difficulty of manipulating machine code) and the much-vaunted MIDI features mentioned in your article as being "available early '95" have been the subject of a string of broken promises for nearly two years. And while mentioning technical details, with the SCORE program the user doesn't "have to wait while the score redraws" as only the items edited redraw, instantly.

It might have been a good idea for Ian Waugh to take a close look at other music processing programs before being overtaken by the hype surrounding Sibelius 7.

Andrew Aird, London

PCW Ian Waugh replies: *You're right, Michael Nyman is not personally a Sibelius user. I erroneously jumped to this conclusion because, contrary to your comments, his music has been set in Sibelius; Masque Arias for Brass Quintet, for example. I never said The Piano was set with Sibelius.*

Music Sales has bought a complete set of the Sibelius system. Chester Music and Open University Press use freelance typesetters, some of whom use Sibelius. I can't believe these companies would do so if the output were questionable, can you?

According to Sibelius Software, the program is available in many parts of the world. The company has distributors in Australia, New Zealand, Denmark, Ireland, France, Germany, The Netherlands, Norway, Sweden, South Africa, Switzerland and Canada.

The only feature I mentioned in my review which Sibelius does not have is the

realtime MIDI input and this is still due in early '95, as I said. Of course, if it doesn't arrive before the summer it can be considered late.

Contrary to the comments in your final paragraph, I have, in fact, reviewed most of the major scorewriters on most computer platforms. Not one can redraw a screen — and reformat a score — as quickly as Sibelius.

There are technical difficulties in manipulating machine code which is one reason why Sibelius is unlikely to be ported to the Mac or PC, at least in the near future — good news for vendors of other scorewriters, I'd say. But apologies again if any of my remarks mislead and thank you for the opportunity to put the record straight.

Foot the bill, Gates!

I'm a single-system user who has put off his hardware upgrade investment until the Windows 95 operating system becomes available. I planned to buy about now but grudgingly put it off until "the second quarter". Now we have a further delay.

I need to get the very best deal from this major purchase and that means getting maximum benefit from the hardware vendor's software bundle. Gateway 2000 bundles Microsoft Office 4.3 as well as Windows with its top-end systems but if I buy now I face considerable upgrade charges in six months' time.

I can't be alone in taking what some will see as a mercenary view on this. Corporate buyers can multiply my dilemma a thousand times. And what about hardware manufacturers who could well see sales faltering as purchasers hold back?

To free up a potentially moribund market, OEMs should join Joe Public in putting pressure on Microsoft to announce now that it will provide free 32-bit upgrades

for all OS and application software supplied in 1996. Such a statement, call it a reward for loyalty and patience, could even have the effect of restoring credibility to the chronological naming strategy which is in danger of looking so embarrassing.

Peter Lawton, Preston

Intertext queries modem test results

Having liaised closely with Geoff Marshall and his team, we were pleased that you were able to complete a thorough test of V.34 modems (January 1995). However, we were very surprised by the results, as we would have expected the Intertext IX34-ED to achieve a top ranking in the throughput tests and quite possibly the "Editor's Choice".

Given PCW's status in the marketplace, you will appreciate our concern. Whether or not there was more to the disparity than a communication breakdown during the testing rush we don't know, but the result was that the Intertext was criticised on a point where we know, by design and by tests, that the performance is considerably better than for the ultimate "winner".

Compared with the "standard" Rockwell-based modems (some of which were in the test) the Intertext IX34-ED actually has 30 percent more power in its CPU. In the case of compression and two-way file transfer performance, the CPU power is a key issue as you pointed out.

With this higher CPU power, considerably higher throughput figures than those indicated by the review test would be expected and is also confirmed by our own tests, both before and afterwards.

**Karl Erik Stahl
Intertext Data AB**

PCW Geoff Marshall replies: *The poor benchmark results we obtained with the Intertext modem were almost certainly due to it defaulting*

to an MNP10 connection in preference to a V.42bis one. This peculiarity is shared with the Dataflex but was discovered too late in the testing schedule to allow a retest of the Intertext with the necessary AT command, AT-KO. Dataflex pointed this out to us rather late, but just in time for its product to benefit from a revised AT initialisation string.

Presumably, the reasoning behind Rockwell's MNP10 default is that it provides better performance on poor telephone lines and cellular connections, but the user's attention should have been drawn more emphatically to the performance penalty that results from using this default with compressible data. Nevertheless, the Rockwell-based Pace modem did not suffer from this unfortunate default choice and Dataflex and Intertext have since changed this default.

PCW was the first magazine to publish a major group test of this new technology and it must be expected that there will be some teething troubles with the implementation of a new chipset such as this V.34 Rockwell one. I have no doubt that if the tests were repeated on the Intertext using V.42bis instead of MNP10, it would match and probably exceed the performance of the other Rockwell-based products. Now that Intertext has changed the default settings, it must be considered excellent value for money.

This is no time for multi-tasking

I am growing to love the Del-Tree command, having just used it to banish OS/2 Warp forever from my hard drive. I run a well specified 486DX2/66 and use it mainly for writing music using Steinburg CuBase driving an external MIDI rig. When running

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CuBase via WFWG 3.11 under Warp, any concept of musical timing goes right out of the window, no matter how the session priorities are set.

The point of this letter is not to gripe about OS/2 but to question the suitability of any pre-emptive multi-tasking system (did someone mention Windows 95?) for any really timing-sensitive applications. I feel all such systems should have an override setting such as WIN/S or Exclusive in foreground to stop them multi-tasking when you need real timing accuracy.

T Lonorgan, Liverpool

Don't be a sitting target

The diagram on page 410 of your February 1995 issue (monitors group test), is wrong. There are British Standards (BS 7179:1990 and BS 3044:1990) which deal with the whole business of computer workplaces and the use of computers.

Part 5 of BS 7179 gives specific guidance on such matters as table and chair height, placement relative to the keyboard and VDU, and location of the VDU on the work surface. The diagram you show does not correspond in any way to the British Standard recommendations, and I think you should try to ensure that you do not give advice that could be harmful to computer users.

The basic principle about keyboard location is that the forearms should be close to horizontal when the keyboard is being used. VDU displays should be lower than eye height and within 60° of the horizontal line of sight. A workplace such as the one you show would be uncomfortable for anyone wearing bi-focal spectacles. Conformity with BS 7179 cannot, of course, guarantee immunity from RSI, but it will help matters.

Achieving good computer workplace layouts is not helped by the prevalent

manufacturing practice of supplying monitors and keyboards with cables so short that the computer *has* to go on the desk, with the monitor on top and the keyboard at desk level in front. That's the way they make them, and that's the way people think they ought to be used. It's wrong!

In passing, I would mention that I get more arm and hand discomfort from using a mouse than I ever had with a keyboard alone.

AL Minter, Kent

Windows shmindows

All this fuss about Windows 95 has me baffled. Writers I considered sensible go weak at the knees when they describe how Windows 95's interface has been changed; how it will be a grown-up 32-bit multi-tasking operating system for anyone with a 486 and four, or preferably eight, megabytes of RAM.

We'd all like an operating system that does all the things it's supposed to do, wouldn't we? Well, I've already got one — OS/2. No, don't laugh. Almost anything Windows 95 will do [insert time lag of your choice here] months from now, OS/2 Warp already does. And it's in version 3.0 whereas Windows 95 will be in version 1.0. You can't really call it Windows 4.0 because a) it's mostly rewritten, b) it's certainly completely different internally, and c) it's not a true Win16 operating system, which means it's likely to be less stable (remember DOS 6.0?).

So why aren't people flocking to OS/2 like lemmings to a cliff? Because OS/2 says "IBM" on the cover and doesn't say "Windows", people don't want to risk it. You may well reply, "No Applications!" but that's just not true. There's a whole host of DOS and Windows applications already out there (which is all Windows 95 is going to have for a few months) and OS/2

boasts a great number of really good small programs and specialist applications. All it lacks are the few big killer apps — and signs seem to suggest they could be on the way after all.

Most of us own 486s with at least 4Mb RAM, so OS/2 is no longer a system for "power-users" only. Plus, it beats Windows hands down in its design purity. It's not a 16/32-bit kludge anymore, it has a genuinely object-oriented user interface (right down to the programmer's level), and the HPFS doesn't waste precious disk space like the FAT system.

If Bill Gates is allowed to get his way with the Windows 95/Windows NT/Win32/Intel PC/Plug'n'Play strategy, Microsoft will effectively own the PC market, the operating system market and the applications market, which can't be a good thing for any of us. The only thing we can do is to resist with our wallets and our PCs. The message is clear: buy OS/2 and read *PCW*, and you won't go far wrong.

Nell Hewitt, Coventry

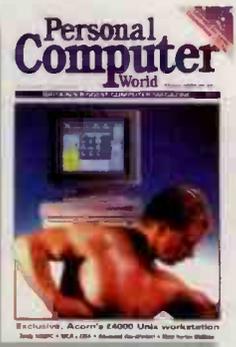
We've got your number

The news item on page 293 of the February 1995 issue of *PCW* seems to have been infected with the "Pentium bug" as it refers to a page number (641) which does not exist. Also, the front cover points the reader to page 494 where one can win a HOT Multimedia kit: I'm not sure if Western Systems, whose advert appears on that page, are offering a competition — there doesn't seem to be an entry form!

I haven't delved any further into the numbering, but I imagine it could be equally interesting! Apart from that, a good and informative magazine: ditch the Pentium which creates the index and keep up the good work!

**John Lemon,
j.s.lemon@aberdeen.
ac.uk**

Hindsight



March 1981

Ian Lloyd, MP, reported that HM Government had appointed a Minister of IT, Kenneth Baker. The "Parliamentary On-Line Information System", or POLIS, had been launched to give members access to parliamentary information. James Prior, later to become a minister, disputed that microelectronics would lead to a "revolution".

Update

The Ministry of IT has all but disappeared. Very little information is truly available to the rest of the nation despite the Internet. Ironically, James Prior became chairman of GEC, a company at the forefront of the industrial electronics revolution.

March 1989

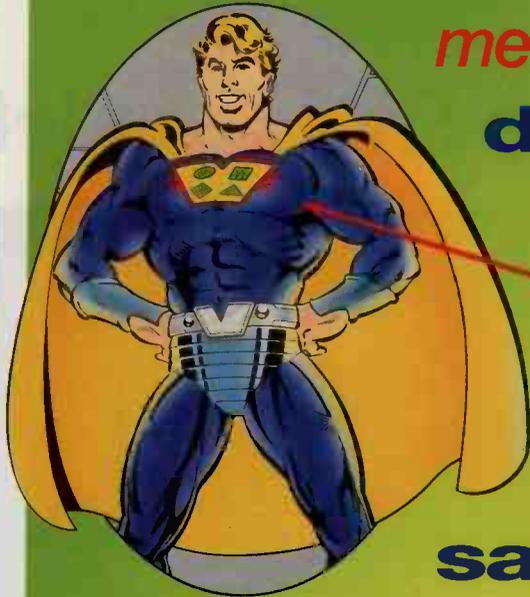
Peter Jackson's article entitled "Bus Wars" looked at the buses most likely to take over from the humble ISA. It recognised the technical lead of the IBM-developed MCA, or Micro Channel Architecture, but decried IBM's failure of IBM to make headway in the market. Its opponent, EISA or Enhanced ISA, still needed development to establish an accepted standard.

Update

The MCA bus remained confined to IBM machines while the EISA bus eventually made it into the world of high-performance servers. Today, even IBM no longer sees MCA as its flagship bus.

PCW

45 minutes ago you were a mere mortal. Now you're drawing flowcharts, organisational charts, even space plans, and someone says, "Gosh, I didn't know *You* could do all that." And *You* just take a sip of your coffee.

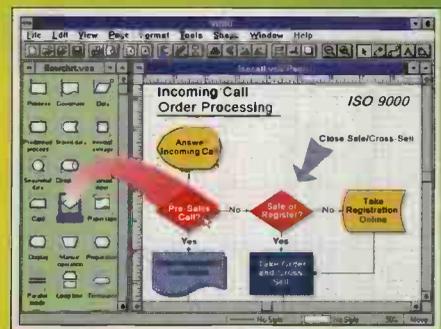


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First Impressions



VNU European Labs

VNU Labs uses NSTL tests, covering every kind of hardware and software including PC hardware, printers, network products, modems and software applications. The industry-standard NSTL tests are licensed from McGraw-Hill. Over fifty people are employed full-time at NSTL's laboratories in the US, which means

there are ample resources to continually develop and enhance tests and testing methodologies.

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

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

- The VNU Labs system-level test suite is called Euromark and came on-stream last month. The tests, which are mainly Windows-based, quickly size up your hard disk, sound card, motherboard, display adaptor and printer, giving individual and overall figures. The Dell Latitude XP reviewed in December '94 has been tested using the Euromark benchtests. We'll be giving away a disk containing the full suite of Euromark benchtests with a forthcoming issue of *PCW*.

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



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PCW takes a first look at some of the latest hardware and software

Apple Power Macintosh 8100/110

Just when you thought Macs couldn't get more desirable, Apple unleashes the fastest, most desirable piece of kit you've ever seen. And it's less prohibitively priced than the heavy power-user alternatives, reports Chris Cain.

Just when you think you've decided which Macintosh to buy, along comes a bunch of new models that make you think twice. Hot on the heels of the multimedia-ready Performa 630 is an improved range of faster, cheaper and

even more desirable PowerMacs. The new models are the 6100/66, 7100/80, 8100/100, and the top of the line 8100/110. With ninja-like stealth *PCW* secured the latter for review.

The 8100/110 comes in the same

shapely mini-tower casing as the Quadra 800 series. After a NeXT cube it's the most stylish industrial design around, with pleasing curves, cute feet and a floppy drive that smiles at you. The unit is equally at home on desktop or floor, and shows that a computer can be just as well designed on the outside as inside.

As well as power sockets for both computer and monitor, the rear features the usual array of switches and connectors. From top to bottom these are: a lockable power switch, external SCSI,

Ethernet, AV video, two serial sockets, an ADB port, and 16-bit audio in and out. An additional non-AV video output is provided by a pre-installed VRAM-based PDS graphics adaptor.

The review machine was supplied with an ergonomic single-button mouse and Apple's Extended Keyboard II, which includes a row of 15 function keys.

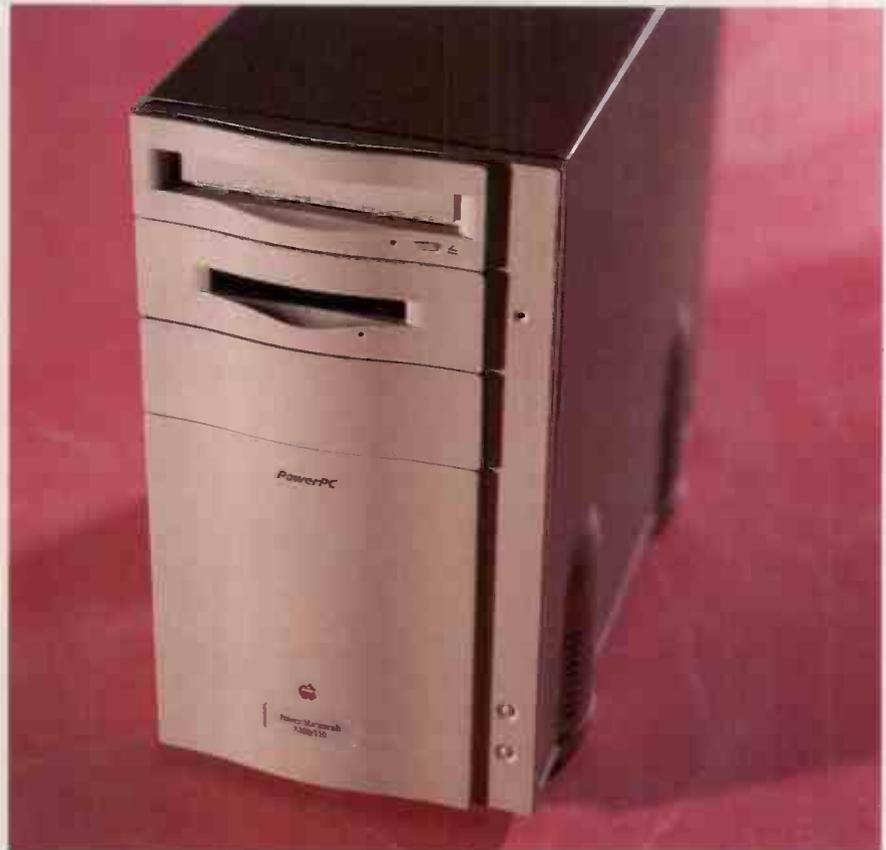
Getting inside is simply a matter of twisting four knobs at the back, but you may need a little help from a screwdriver the first time. Once the case is off there's a clear path to three NuBus expansion slots and four drive bays at the front. The NuBus slots in the 8100/110 can accommodate full-length cards, and although there are only three slots, 16 NuBus devices are supported. Apple has fixed the bug in earlier PowerMacs that stopped users from using NuBus expansion chassis like those produced by Second Wave. The bug wasn't exactly in the Pentium league, but it annoyed musicians, for example, who often need more than three expansion cards.

Of the drive bays, two are free for installing new devices unless you already have an internal CD-ROM. The others contain a 1.44Mb SuperDrive floppy, and either a 500Mb or 2Gb SCSI hard disk.

Apple obviously doesn't consider RAM expansion a user upgrade, as the SIMM sockets sit underneath the drive bays in a most inaccessible fashion. To get to them, and anything else, quite a lot must be removed or unplugged, a daunting task for even the most advanced anoraks. Why can't we go back to the days of the Macintosh IIci, when the extent of your efforts was pulling the lid off? The 8100/110 comes with either 8Mb or 16Mb of RAM as standard, and can be expanded to 246Mb using 72-pin 80ns SIMMs.

At the heart of everything is a PowerPC 601+ RISC processor running at a mighty 110MHz. This is a slightly smaller version of the original 601, at 0.5 micron instead of 0.6, which can be driven faster and is cheaper to build. The chip boasts the same 32kb on-board cache, and an additional 256kb Level 2 cache is fitted to the motherboard, improving speed even more. As with all PowerMacs the machine runs native RISC and 68000 code, the latter being handled by software emulation of a Motorola 68LC040 processor housed in the machine's 4Mb ROM.

Display support from the motherboard DRAM-based AV video output goes up to 832 x 624 pixels in 256 colours. The



faster 2Mb VRAM card gives thousands of colours at 1152 x 870, or the same resolution in millions if you upgrade the VRAM to 4Mb. The VRAM option doesn't support modes lower than 256 colours.

Setting up proved no problem and within five minutes the 8100/110 was up and running System 7.5. A new system enabler extension is required for this Mac, but as the software comes pre-installed there's no need for the user to worry about this.

Tests were carried out for both speed and compatibility, with PowerPC native software such as Photoshop 3.0, and emulated 68kb applications including several metal bashing utilities and games. CPU speed, and the performance of the graphics hardware, disk and floating-point architecture were all taken into account.

At worst, under emulation, the performance was on a par with a 25MHz 68LC040 chip, and at best a 33MHz one. The latter is the same speed as a Quadra 800, the model many people use for publishing and development, but emulation is a stopgap — native RISC code simply flies along. For example, performing an RGB to CMYK mode change on a 640 x 480 24-bit image under Photoshop 3.0 takes just nine seconds, while the crystallise filter does its job in 12 seconds.

Fast worker: the PowerMac 8100/110 is well designed outside and inside, and has a breathtaking price/performance

No compatibility problems cropped up during the test, and as expected, connections to our Ethernet network went smoothly. The only annoying aspect was the need to turn on virtual memory in order to get some native applications to run in 16Mb.

The Power Macintosh 8100/110 is Apple's most powerful computer to date, and the most desirable machine to hit the market for some time. Native code flies, 68kb emulation is as fast as a Quadra, and there's plenty of room inside for add-ons. The price may seem expensive, and it is a lot of money, but then, this isn't the machine for the average user. To those working in time-critical environments who currently use workstations retailing in the £10,000 bracket, the price/performance of the 110 will be a godsend. It's also pretty good for a game of Marathon.

PCW Verdict

A faster processor and slight system changes make this the best Mac you can buy.

Contact Apple 0800 12775.

Price £4,399 (suggested retail)

SOFTWARE

Macromedia Director for Windows 4.0

Surprisingly, perhaps, the most popular CD-ROM development software is still only available on floppy. Ben Tisdall found the pain of installation was matched only by a very steep learning curve. Not one for the luvvies...

Although most multimedia CD-ROMs are released for Windows (where the volume is) before they appear for the Apple Mac, most CD-ROM development still takes place on Macs. And a lot of Mac development is done using Macromedia Director. Director for Windows, reviewed here, completes a family of Windows multimedia tools from Macromedia including Authorware Professional for Windows (widely used for computer-based training applications) and Macromodel for Windows, which is more of a high-end presentation package.

For your thousand quid you get an impressive pile of manuals and an alarming pile of 13 floppy disks. There's a hefty Using Director guide plus two on using Director's scripting language, Lingo (one is a dictionary of the language). There are also 80 pages of Director Tips and Tricks and a short guide to Multimedia Essentials for Windows. This is really aimed at Mac multimedia developers

*Yellow Moon Over Japanese Shrine:
from Ben Tisdall's Director 4.0 period*

trying to make the move to Windows, but people tackling a DOS/Windows machine for the first time will also find it useful. Where the Macintosh version fits on two disks, the Windows release runs to 13 — a good candidate for shipping on CD-ROM.

In case you haven't guessed, this phalanx of manuals is needed to back up a large and complicated program. I began by working through the tutorial in the Learning Director guide. First you're introduced to the main elements of Director, which borrow film and music metaphors: the Cast, Score and Control Panel. The Cast includes every element that can be included in a Director movie: graphics, text, sound effects, colour palettes and even Lingo scripts.

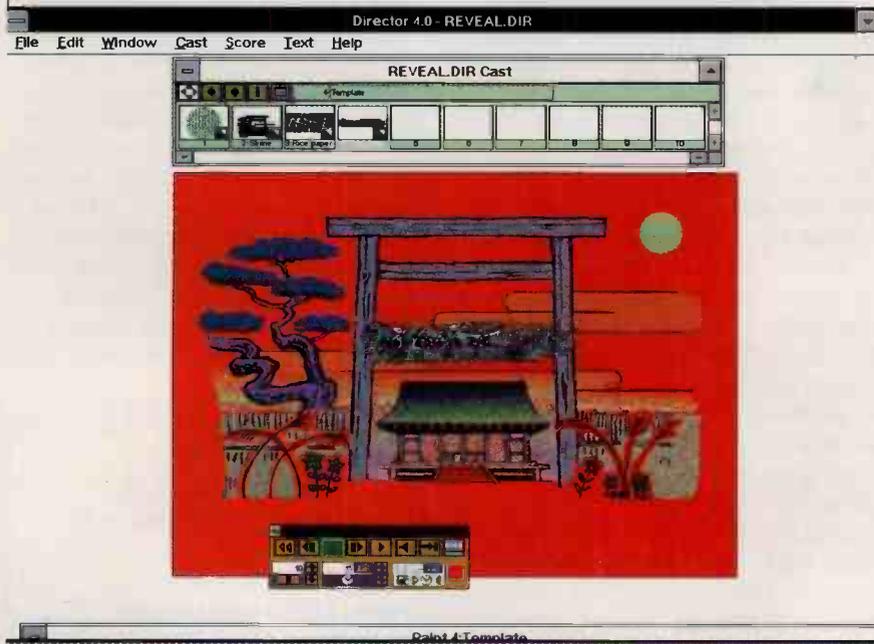
The next step is to create a cast member, in this case using the Paint module included with the package. Rather mystifyingly, the module loaded without any of the tools shown in the screenshot in the Learning Director Guide. Eventually I did something which brought up an error message to explain that too many

colours were in use. Once I'd returned to the Windows setup to switch my display down from 32kb to 256 colours I was back in business. Although Director can cope with 16-bit and 24-bit colour cast members, it's only able to display 256 colours on the stage at any one time.

Once I'd drawn a rather nice yellow moon in the Paint module, closing the window automatically added it to the Cast window, which was a nice touch. After importing Shrine.bmp, a sample file in Director's Learning directory, it was time to add the cast member to the score. To include a cast member in part of a movie's action you need to add it to the Score. The score looks a bit like a spreadsheet worksheet with each column representing a single movement in a movie or a frame. Each row is a channel which can contain transitions, colour palettes etc. That means each individual cell in the score/spreadsheet is information about one cast member at one moment in the movie. You can cut and paste between cells and select whole channels just as you would with 1-2-3.

At the top of the score is a playback head which displays whichever moment of a movie is currently on the screen. When you eventually play a movie the play head whizzes across the top of the score like a hare at a dog track. You can add cast members to the score in two different ways, either by dragging the cast member directly to the score or by dragging it to the stage. The Stage, incidentally, is the window where the movie that you're creating appears. In practice, you're not dragging the cast member itself to the stage but a sprite or image of the cast member.

Director lets you create animations in realtime by drawing the movement of an object directly onto the stage. For greater refinement — and accuracy — you can step record an animation. In Director's tutorial the animation is to make the moon rise from behind a Japanese shrine and move off the screen. Once the basic animation has been done, quite a bit of refinement is required. For example, the moon created in the paint module is in a white box which needs to be removed using the Matte effect. Next, a background colour has to be added. The moon has to be made to rise behind rather than in front of the shrine by changing the layering in the score. The nearer a channel is to the top of the score, the further forward it appears. After that there's a whole range of ink effects that can be added to the score.



It does everything except make eyes scream.



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PERSONAL COMPUTER WORLD
MARCH 1995

Changes you make to a cast member in the paint module are permanent whereas ink effects can be made to come and go during a movie.

The next stage (no pun intended) is to add text to the basic animation. This can be done as bitmap text in the paint window if it's fast animation and special text effects you're after, or as vectors if you want good looking editable text objects which can be printed out and don't take up a lot of space. When you eventually get around to adding sound and music to your animation it's done in exactly the same way.

Creating even a ridiculously simple animation is an involved process. And getting the hang of the score, the cast and the stage is just the first tiny step in becoming a Director expert. With practice you get quicker, but even if Macromedia slashed the price of Director and arranged a bundling deal with Microsoft Office you wouldn't see a rash of whizzy multimedia presentations. The product is certainly not for casual or even occasional use. It's something you need

to use intensively and preferably do a course on to get to grips with. And that's before you begin to get stuck into Director's Lingo scripting language. This has an English-like syntax but the 414 pages of the Lingo dictionary should be a warning that you're not going to build complex Lingo scripts in a day.

It would help if Director were a little more compliant with Windows application standards. When I was struggling with the myriad of unfamiliar buttons, pop-up yellow tool tips would have been useful. As it stands, the only way I could find out what various buttons were for was to turn to the manual. Running comparatively small movies, with nothing else running, 8Mb was just about adequate but anyone serious about creating movies in Director will want 16Mb or more.

For non-programmers Director is easier to get going with than something like Microsoft Viewer, and it has the great advantage of being cross-platform. The more I worked with Director the more I liked it, but I think there's plenty of scope for making the program more intuitive.

The way the program is designed also makes it best suited to relatively short movies. Although version 4.0, on Mac and Windows, has no restriction on file sizes, the Score metaphor makes big movies unwieldy. As each frame of the movie represents a row in the score, a 10-minute movie at 32 frames per second would mean a score 19,200 rows long.

For serious multimedia developers the price tag of £1,000 is unlikely to be a problem, but Macromedia has treated its Macintosh installed base rather unkindly. Mac developers wishing to port an application to Windows have to fork out the full price for the Windows version.

PCW Verdict

Powerful high-level, cross-platform multimedia authoring tool, but not terribly intuitive and expensive in time and money to get started.

Contact Macromedia Europe

0181 200 8282.

Fax 0181 200 3788

Price £999, upgrade £279

HARDWARE

Matrox MGA Impression Lite

3D graphics acceleration and real TrueColour? Yours for just a few hundred pounds, and you won't need to upgrade if you buy a bigger monitor. This card is no Lite-weight, concludes Karl Dunkerley.

Amid all the discussion about the rapidly plummeting prices of processors, memory and hard disks, the drop in graphics card prices has almost gone unnoticed. As a result, most people still live in the relatively drab world of Windows 16 or 256-colour modes. Matrox has long been one of the great innovators in the market and now the MGA Impression range is set to increase the price pressure by bringing in 3D graphics acceleration on boards costing only a few hundred pounds.

The Impression range includes both the Lite (reviewed here) and the Plus. For most people, especially those using 14in or 15in monitors, the Lite will be more than adequate for their current needs and they won't need to change their graphics card if they move up to a

bigger monitor. The card can handle pixel resolutions up to 1280 x 1024 and even at 1024 x 768 will deliver 16-bit colour or 65,536 shades. With a feature called QCDP, or Quality Colour Dithering Process, it can achieve a near TrueColour range even at the highest resolution. Those who insist on the whole rainbow can have real TrueColour at 800 x 600.

If there is a drawback, it is that the Lite cannot be upgraded from its 2Mb VRAM to the full 4Mb. The Impression Plus can be. This enhances its TrueColour range to 1280 x 1024 and 65,000 colours in 1600 x 1200 for monster monitors. The Plus is also capable, with the aid of a daughterboard, of linking to Vesa Media Channel (VMC) devices such as video capture cards.

Although this method promises low-cost cards thanks to its ability to share memory and other components, the number of actual cards is still fairly low.

One of the biggest monitor issues today is ergonomics. Fears such as radiation and the effects of flicker are aired regularly. As long as your monitor can cope, the Impression Lite can exceed 90Hz refresh rates at all the resolutions and colour depths it can handle. A 4Mb Plus still gives the specified 72Hz even at 1600 x 1200. The special version, the Plus 220, gives even better results. Whichever board is chosen, the user will have a rock-steady display.

The PCI card is a dream to install. For a start, it has no jumpers. The only DIP switches are to support non-standard VGA frequencies. Special drivers come with the board for AutoCad and MicroStation users as well as O/S2 and Windows NT. For Windows 3.1 *et al*, the usual File/Run A:\Setup.exe loads the installation program; you will be asked for your monitor type.

At the end of the process you will be presented with the MGA PowerDesk group and asked for the default bootup configuration for Windows. Drivers for Windows' AutoCad and the new Win-G games system are included. In the PowerDesk window are icons for several



Top quality images and colours that come to life, courtesy of the Impression Lite

a toolbar and you can instantly switch modes and zoom in and out without restarting Windows — a heaven-sent utility for anyone working with fine graphics or with less than perfect vision.

No complaints about image quality. When viewed on a monitor of similar

class, colours jump out and come to life. The redrawing speed is excellent and moving even large, complex images around the screen is smooth and quick. The only proviso is that the PC can hold the display back if the processor is not fast enough or the RAM is too limited for the size of graphics. It complements a

utilities. MGA Control Panel allows you to set up the display defaults; it includes four preset combinations of screen resolution and colour depths plus whether to use QCDP and other features. The preset combinations come into their own when used with the other applet, Quick-Access. This can reside on the screen as

Pentium 90 with plenty of RAM beautifully.

The Impression comes with a CD containing a number of DOS and Windows demonstrations to show the speed of 2D and 3D rendering. Games freaks will think they are in an arcade. Caligari's truSpace and 47-Tek's Sento are particularly impressive.

With its all-round abilities in terms of colour depth, resolutions and speed, the Impression Lite is an excellent graphics adaptor. Even better, it costs little more than its rivals even though it will outlast most of them.

PCW Verdict

The QuickAccess and zoom features alone would justify many people upgrading. This is a card to use now and keep as your needs increase.

Contact Matrox 01793 614002.

Fax 01793 614336

Price MGA Impression Lite PCI £245, VLB £265; Impression Plus PCI (2Mb) £299, 200 VLB (2Mb) £369, 220 PCI (2Mb) £369; 2Mb upgrade £175

SOFTWARE

Espresso

Finding he had a window in his schedule, Paul Begg took the opportunity to look at a calendar and address book that's easy to use and always available. Was Espresso his cup of cappuccino?

Berkeley Systems, those wonderful people who gave you the flying toasters screensaver, describe Espresso on the package as an electronic calendar "with the elegant simplicity of pen and

paper". This raises a horrible thought: does that mean pen and paper are preferable to an electronic version which presumably is neither as elegant or as simple? Perhaps it's best not to linger here, but move

hastily on. Some Personal Information Managers are primarily directed at managing contacts. Others are designed to keep control of activities. Espresso falls into the latter category. It is also designed to be

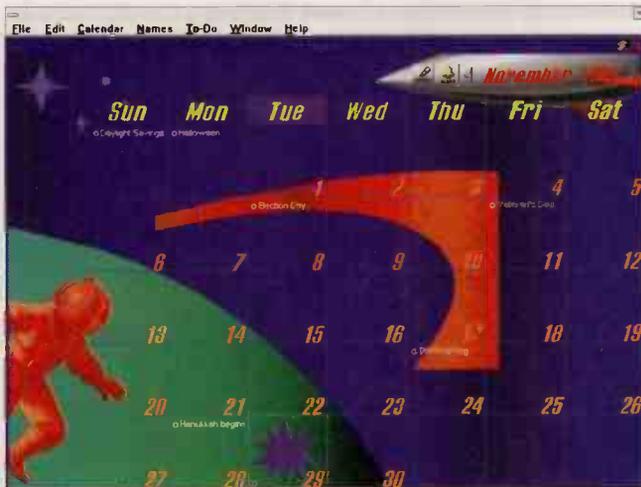
Using an Espresso window as a desktop background

available at all times and comes with a feature called Flashback. This captures the Espresso window and uses it as your desktop background.

The main Espresso window (otherwise the main screen) is a calendar. You can view the calendar as a month, a week or a day, or as a non-editable mini-calendar. Simply click on the day in the month and enter the details of what you have to do, where you have to be or who you have to meet. You can set a time simply by typing the time with an 'a' or a 'p' for a.m. and p.m. Espresso then schedules the event. Or you can enter an unscheduled reminder, such as "get turnips on way home".

Every event is bulleted: a square bullet indicates a linked item, a round bullet indicates an unlinked one; a solid bullet indicates an alarmed event, hollow bullets indicate no alarm. Double clicking on a bullet opens an Event Detail window. Here you can set alarms, specify repeating events, and attach durations.

Linking items is a simple matter of drag and drop. For example, you can simply drag a name from your address book and drop it on the Calendar for the appropriate day and event. Similarly, if you want to move an appointment from one day to another, drag it from the old day and drop it on the new one (but be





† Through installed modem.
 * Prices exclude VAT. Dealer prices may vary.

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warned that alarms do not copy across).

The calendar provides most of the features you'd look for in a wall-planner. You can create a strip or banner across several days or weeks to indicate periods when you are on holiday or away on business. Multiple banners can be created and they can overlap, so you can use this feature to quickly indicate such things as staff holidays, when the kids are off school, and so on. The banners can be differently coloured and titled, so you can see overlapping events at a glance.

A nice feature is the ability to create multiple calendars. If you share Espresso with a co-worker or with other members of your family, everybody can have their own personal calendar. Or you can create separate calendars for your work and social life.

On the Calendar (or anywhere else for that matter) you can add stickers in the style of Post-it notes. They are mainly intended for short reminders, though each note can store up to 4,000 characters (about one and a half pages). Their main drawback is that closing a note also deleted it. The facility to close the note,

its existence being indicated on the calendar, and also to be able to automatically archive notes so that they could be reviewed at a later date if necessary, would have been welcome. It is possible to retain a note by making it a calendar event or a To-Do item, but this forces you to decide its importance before choosing to delete or copy.

Espresso has an address book. It is columnar, which is not as useful as being able to see all the contact details at a glance, not just the number of columns visible on a screen (in this case a maximum of five). There also is a Name Card, but this only seems to be available by selecting Edit Names from the Edit drop-down menu and isn't available by default. Records can be sorted by various criteria and searched.

To-Do's can be listed and archived. You can assign due dates and priorities and set a status such as "completed" or "in progress". You can print calendars, address books, and To-Do lists in a variety of formats for pocket planners, labels and envelopes. And finally, Espresso lets you personalise the whole kit and

caboodle to suit your mood, the time of year, or any other preference. There are 22 design styles in total, and some of the screens are animated.

At first the design styles seem too gimmicky, but Espresso grows on you. It's fairly powerful and easy to use, and if the forthcoming upgrade of Lotus Organizer isn't up to scratch... well, it could be tempting.

Espresso can be installed on Windows or a Mac. For Windows it requires a 386SX, min 4Mb disk space (7Mb if you install all the options), 4Mb min RAM, Windows 3.1 or Windows for Workgroups 3.11. On the Mac you'll need a 68020 processor or better, 4Mb of disk space (6Mb with all the options), 4Mb of RAM, System 7 or later.

PCW Verdict

Powerful, easy to use and almost as good as Lotus Organizer.

Contact Berkley Systems/Softline
0181 401 1234.

Fax 0181 401 1235

Price £49

SOFTWARE

Idealist for Windows 3.0

This unconventional database has lost none of its appeal, especially if you're willing to redefine your relational view of things. Eleanor Turton-Hill is making her relationship with it permanent.

Idealist for Windows isn't your average, run-of-the-mill database package. It's a bit of a hybrid, designed mainly as a text retrieval system but with the look and feel of a Windows database.

It isn't new on the market, either. The first version was produced by Blackwell Software back in 1989, with Windows and Mac versions following in 1992. The product has now reached version 3.0 and has achieved reasonable success with an installed base of about 10,000.

If you're familiar with databases, Idealist will seem a little confusing at first. Most database boffins are used to thinking in terms of tables, fields and records, with indexes defined for the most effective searching. All these things exist in Idealist, but they hang together in a very different way and you'll soon find yourself trying to redefine your relational view of the world. If you've never used a

database before, you'll be unhampered by any preconceived ideas and will probably get along fine.

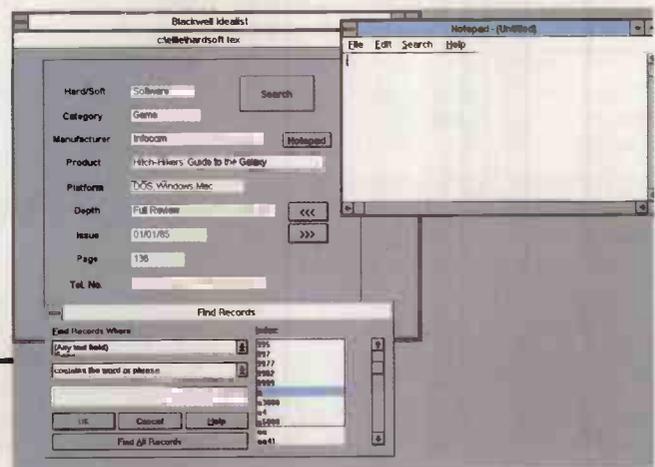
The minimum system requirements for Idealist are pretty modest — just 4Mb RAM, 5Mb free hard disk space and a 386 processor. The whole thing is pretty minimalist compared with other database packages: it's installed from just two disks and comes with a single 300-page manual.

The opening screen is plain and

Only an hour's work went into the design of this app in Idealist

uncluttered, with a small row of buttons at the top and just seven menus. The sample database provided with the software gives you a pretty good idea of what kind of applications you can build. The first few records are long text records, giving information on how Idealist databases are structured and how to search them effectively.

Embedded in the text are pushbuttons which take you to other parts of the database. You can examine these buttons by pressing the circular arrow button at the top of the screen, which toggles between source mode and result mode. In source



mode, a simple tool box appears which allows you to design the database front-end; here you can view the commands which define embedded buttons. You can also store graphics files as data. These sit in a window which automatically adjusts itself to the size of the particular image.

The most striking aspect of the sample data is the irregular structure of the records. In a relational database each record in a file has a standard structure. In Idealist, each record can contain an entirely different selection of fields. Selections of fields are grouped together into "record types"; when you create a new record, a dialogue box prompts you with a selection of "record type" names. If none of the record types suit your needs, you can insert extra fields on the fly.

This flexible approach is ideally suited to the kind of information which cannot easily be arranged in any strict or regular structure. Obviously, files cannot be linked together in the same way as in a relational system, but you can link individual records to each other, creating "one to many" or "one to one" relationships between groups of data. What you have to remember is that there is no permanent underlying structure defining the data. Relationships are created as links between individual records, and they're set up if and when you want them. Defining data in this way may seem a

little haphazard, but the advantages become clear when it comes to searching your database. Idealist indexes all terms automatically as they are entered so you can search any or all fields immediately after typing data in. The familiar relational method requires you to define indexes on the fields you will search most often so that you can access records by specifying the value of one of the indexed fields, scanning down an index looking for the first occurrence of a particular term. Idealist doesn't work this way. Instead, it looks up the term in the index and moves almost instantaneously to the first occurrence. A successful search produces a hit list of records.

If you're a database novice you'll find Idealist easy to use, but it has some powerful tools which will appeal to database developers. There's no fully fledged programming language but many functions can be automated by way of command buttons, or commands which are set up to execute automatically on loading. Some of the more impressive commands are: Autodial, which invokes an automatic telephone dialler via your modem; Dde-Execute, which allows you to access information in other Windows programs; and MCI, which enables sound files to be played. You can also customise the button bar and menus for your applications.

I've found this package extremely useful since I've had it installed on my

machine, and unlike most review software it's going to stay there. It took me about an hour to design the small application shown in the screenshot from data imported from our office database of reviews. It has a built-in Search dialogue box, scrolling arrow buttons, and access to the Windows Notepad via a push button. The menus and button bar have been disabled so that control is limited to those functions provided by the front-end.

Idealist is the perfect package for creating simple applications which can be searched effectively without having to agonise over design principles. Some aspects of the package, particularly the layout designer, seem underdeveloped compared with other Windows applications on the market, but Idealist makes up for this with its innovative searching methods, easy command language and flexible way of structuring data.

PCW Verdict

This package is not about to replace FoxPro, nor should you use it to rewrite your stock control system. It's ideal if you need a system for storing information which is difficult to structure, or if you need to store and search through a lot of text-based documents.

Contact Blackwell Software Phone/Fax 01865 791738

Price £149.50 (single-user version)

HARDWARE

Obodex Disklite-1

If your current hard drive is getting you down, the Disklite could be the answer. It's fast and reliable, but its design could lead to cable fever on your desk. Steven Helstrip reports.

Flicking through *PCW* recently I came across an advert for hard drives. My attention was drawn to one particular drive, a 540Mb Quantum Maverick for less than £150. Before you rush for your calculator, that's approximately 30 pence per megabyte. It hurt to recall paying upwards of £300 for a 20Mb drive for my Atari ST only four years ago. Just as disk prices continue to fall relentlessly, they also get smaller.

One company taking advantage of this is Obodex, which has produced a "pocket-sized" external drive for use with notebooks. It's about the size of a Walkman and plugs straight into the parallel

port, making it compatible with just about every PC built. It doesn't use cumbersome batteries as it takes its power from the keyboard port using a unique adaptor. A short parallel cable is also included in the package.

The installation program was a little less than obvious to work out, but after five minutes of scratching my head I rebooted my machine to find that it had worked, although I wasn't exactly sure what I had done. The drive has a single LED for power, but nothing to show drive activity, which is disappointing. On the front of the case is a parallel-through port for connecting a printer. The overall



The pocket-sized Disklite is compatible with just about every PC there is

design isn't particularly clever as leads have to be plugged into the front and rear of the unit, which results in cables poking out in all directions — rather messy.

The Disklite shuttle comes in two varieties: Disklite-I for IDE drives, Disklite-II for SCSI. The review model was the Disklite-1 which had a Maxtor 250Mb 2525AT drive installed. Obodex

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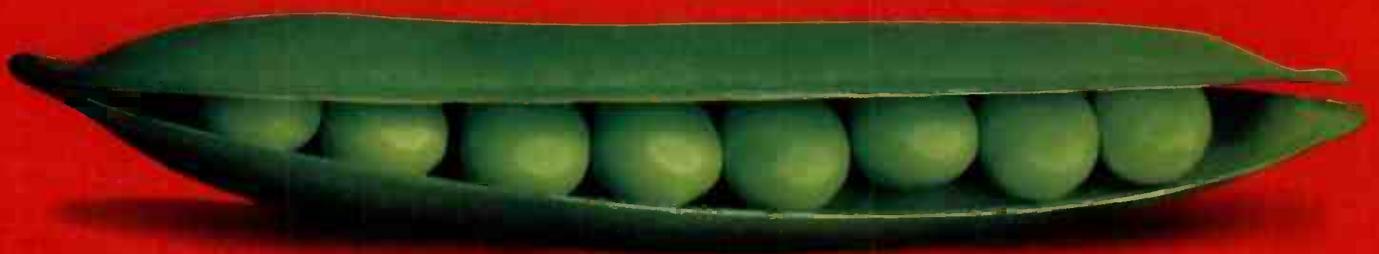
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currently offers five sizes ranging from 120Mb to 520Mb. The shuttle device is available "driveless", should you want to fit your own 2.5in drive. IBM has an 810Mb 2.5in IDE drive, in case you need to go beyond 520Mb.

Although the data transfer rate over an enhanced parallel port is limited to around 1,500kb/sec, parallel does have one big advantage over other buses — it works, all the time. This means the drive can be used reliably from one machine to the next without any configuration nightmares — particularly welcome when

transferring large files between systems.

I used the Disklite on my current desktop system, an Elonex Pentium 90 with enhanced parallel port, and achieved data transfer rates of 447kb/sec (read) and 391kb/sec (write). The read performance is comparable to a triple-speed CD-ROM drive, but approximately half the speed you could expect from the equivalent drive over an ISA bus.

There are many applications for the Disklite drives, the most obvious being transferring files between systems. But as the drives are easily removed, they can

be used for securing sensitive data, high-speed data backup, or to increase storage capacity for notebooks. The Disklite-I is sensibly priced and many PC users will find it valuable.

PCW Verdict

An extremely useful product marred only by its poor design.

Contact Obodex 0181 841 3555

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SOFTWARE

Hijaak Graphics Suite 3.0

This newly named graphics suite comes bundled with utilities to make image capture and manipulation a breeze. Paul Begg thinks it's a good investment, if a little hard disk-hungry.

If you're serious about graphics then you will almost certainly have encountered Hijaak, the screen capture and graphics format conversion program. To justify the upgrade to the Hijaak Graphics Suite you'll need to be serious not only about graphics, but also a serious graphics user. This package does a lot, perhaps too much, and takes up a frighteningly large chunk of your hard disk space — something in the region of 40Mb.

You can reduce this terrifying amount by choosing not to install the collection of artwork that comes with the pack, and perhaps by dumping those elements of the suite you think you may not use. But even a basic installation will cause you to wave farewell to about 18Mb. Okay, so 18Mb is peanuts compared to some other programs, but it is still a sizeable chunk of hard disk space and, as said, to justify it you'll have to be serious about graphics.

The graphics software suite consists of a new version of Hijaak Pro and several fairly powerful image processing utilities: Hijaak Draw for creating vector-based images; Hijaak Touch-Up for retouching bitmap images; Smuggler for importing almost any image into almost any Windows applications; and Browser, an image organiser and viewer utility which has been expanded to include



Smile, please: whatever image you want, and whichever way you want to present it, courtesy of the new Hijaak

various multimedia files such as WAV, AVI, FLC, and so on.

Inset, the company which designed Hijaak, has improved its functionality, increasing the formats it supports to include CorelDraw CDR, WPG2, full EPS and 3D DXF support. The suite also contains a raster-to-vector conversion utility. Somewhat confusingly called Trace, it uses a technique called Intelligent Graphics Object Recognition, abbreviated to a Frankensteinian-sounding IGOR. All these additions have been introduced to Hijaak as a result of long and detailed discussion with users in the

US and the UK, including several computer journalists.

Hijaak Browser creates bitmap thumbnails of your graphics files. Other files are represented by the icon of the program that created them — a Microsoft Word document by a Word icon, for example. Each thumbnail is indexed. The index

contains a variety of information about the file, including the name, location, size, creation date, class, file type, and attributes. Moreover, it lets you add quite extensive notes. This facility to describe the graphic in detail is especially useful if you have extensive graphic collections. You can not only describe the graphic, but you can give the date it was created and even copyright ownership. Notes can be categorised under a title, so you could create categories such as "people", "London", "screenshots" and so on, then cycle through the

notes associated with each category. Browser lets you manipulate graphics in a variety of ways and even delete them. It is also the core application from which the other packages can be launched. I must admit to finding this a little aggravating. I would have liked to be able to launch Hijaak Touch-Up, say, from Hijaak Pro.

Hijaak Pro itself lets you view, edit, and convert and print images. You can use one of about 20 image processing tools and capture both DOS and Windows screens.

Hijaak Smuggler is a nifty little utility that lets you import any image into a program that supports pasting graphics through the Windows Clipboard.

Hijaak Draw and Hijaak Touch-Up are

...and new
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probably the two most requested additions. Draw is a fairly sophisticated vector drawing program. You can create your own artwork, draw circles, arcs and other shapes (including polygons and stars), and manipulate text (wrap text to a curve and such like). Draw also offers a range of special effects tools for blending, distorting, and so on.

Touch-Up is a raster editing program. You can view, edit, process, and give effects to raster graphics.

A neat little addition is Hijaak's ability to search for words encoded in graphics files — code that describes parts of the on-screen image, such as a colour or shape. Hijaak can search for this code and display thumbnail images of all the files it finds with the specified code, a great way of searching for graphics files containing certain logos, for example.

Hijaak 3.0 requires a 386 or better, Windows 3.1 or later, DOS 3.0 or later, a minimum of 1Mb disk space, with a mere

40Mb for full installation onto hard disk; 4Mb RAM is the minimum, with 8Mb recommended.

PCWVerdict

Hijaak Graphics Suite 3.0 for Windows is a solid upgrade and worth investing in, but check your spare disk space.

Contact LTS 01386 792617.

Fax 01386 793147

Price £119 + VAT

SOFTWARE

Outside In vs KEYview

These two Windows viewers have different strengths and weaknesses. Which one you go for is a matter of personal needs and taste, reports Clive Akass.

A major irritation of the standard Windows file manager is that it lacks any kind of viewer. If you want to look at a file, you have to launch an application that can read it. The same goes for other applications that present you with lists of files, such as mailers and browsers.

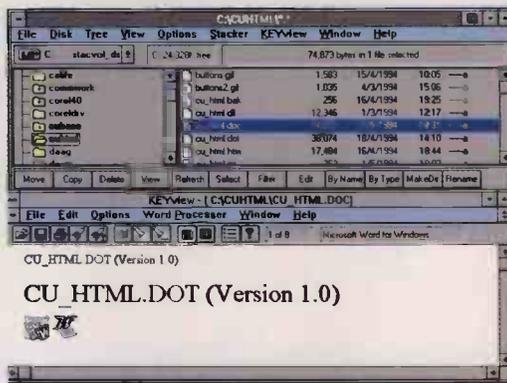
The reason is that major developers to date have not wanted the hassle of keeping up with all the emerging and changing file formats and have left the task to specialist third-party developers.

Outside In and KEYview are rivals in this market, though the former is better known in Britain. Both install themselves into the Windows file manager, producing a new View option that can cope with graphics (including fax), zipped and spreadsheet files as well word processor formats.

In some ways, Norton works rather better because it injects a view option and other file-management options into the standard Windows Open File dialogue box, so that you can housekeep without switching applications. Also, in View mode, Norton displays any file you highlight whereas both the review products require you to press the view option each time.

But both also allow you to search, copy, print and launch files or applications from within their own dialogue boxes, so you can bypass an application's own file management facilities. And of course they support a greater range of formats.

Outside In, from the Ascot-based



KEYview adds itself to the Norton file manager

Systems Compatibility Corporation, supports far more file formats (about 120) out of the box, including the latest versions of Word, Lotus 1-2-3, Corel, Quattro Pro, and Powerpoint.

New features include the ability to copy and paste graphics files and view OLE objects. Outside In is now fully integrated with email programs like Mail 3.x, cc:Mail, Da Vinci and Perfect Office, enabling you to view attachments. It can view Lotus Notes attachments and it comes with a good printed manual.

KEYview supports only 45 formats (including only the Lotus and Excel spreadsheets) out of the box, comes with only a disk-based manual, and costs £10 more. Formats supported by Outside In, but not KEYview, include WordPerfect 4.2 (still perhaps the best text-only word processor around), Q&A (DOS and Windows), and Microsoft Works, to name but a few.

KEYview also operates rather less happily as a standalone: if you launch Outside In as an application in its own right, rather than as a module with a main application, it can function perfectly well as a file manager.

In fact, the only feature on which KEYview scores is that it will convert between 22 graphics and word processor formats, though more are available free on request (you can also obtain converters from Outside In).

It is possible to set the program up so that you can take a word processor file in one format and launch it straight into another word processor, converting on the fly.

KEYview comes on four disks and took up more than 12Mb of disk space when installed, as opposed to Outside In's 3.5Mb offloaded from two disks. Strange this, considering that Outside has more filters. Outside In offers an application programming interface, and a free software developer's kit is available for KEYview.

You might choose KEYview for its Notes facilities (which we could not test) and conversions, but Outside In scores most in elegance, features and price — and for most purposes, cut and paste is all the conversion you need to swap information between Windows applications.

And if you simply want to view major formats, you may wish to wait and see what Windows 95 comes up with. The revamped interface includes a basic file viewer.

PCWVerdict

Outside In is very good value if you need a versatile file viewer. Notes users might try out KEYview for a network.

Contacts Software Compatibility Centre (Outside In) 01344 885224, fax 885238 Viatick (KEYview) 0276 684506, fax 0276 676373

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HARDWARE

Memory Technology ELS 250

Funny, isn't it, how you never think of backing up until your hard disk goes down. Karl Dunkerley recommends you get sorted out now, and reckons this tape streamer is as good a solution as any.

"My hard disk's crashed!" is one of the most heart-rending cries ever to be heard in an IT-based office. It's an empty feeling, sitting at your desk, staring at your screen, thinking: "How could this happen to me?" This is usually followed up by the self-pitying "Why, oh why, didn't I use a backup machine?". But by then it's too late. All your hard work has gone. If you're lucky you might recover some data; chances are you won't.

Tape streamers are a Cinderella item. They're never there when you need them because most people wait until too late to install them. A few years ago, this was understandable. They were either big, bulky and external or small, limited in capability and difficult to use. Today, the situation is different. The technology is easier to install and use and the capacities are keeping up with the growth in hard disk sizes. Memory Technology has now introduced a new parallel port tape streamer with both DOS and Windows interfaces, designed to allow greater flexibility in backup strategies.

The unit is small and neat, with a stippled cream finish that should blend in

unobtrusively with most desktop PCs. At the rear are the power switch and parallel in and through ports. Hardware installation could hardly be simpler. You take your printer's parallel cable and redirect it into the ELS250, connect the supplied parallel cable to the other port and link this to your printer (if you're on a network and don't do any local printing, you won't need to do this), and finally, switch the machine on.

The machine accepts the small DC2000 series cartridges, which nominally handle 120Mb of data but with compression can reach 250Mb. Cartridges cost around £12 and they're pocket-sized, so they won't take up too much space on your shelves. At this price it's worth buying five and labelling them Monday to Friday. As long as you remember to back up every day, this way you'll never lose more than one day's work.

To install the software, you first need to ensure that you have the line "Files=20" (or more) in your Config.sys file. If you don't have it, reboot to make sure the change takes effect. The DOS and Windows software comes on separate disks and installation is fairly straightforward. For most machines, with limited additional hardware, there should be few problems.

Unfortunately, DosArch, the control software,

Avoid being a crash dummy with the ELS 250 tape streamer

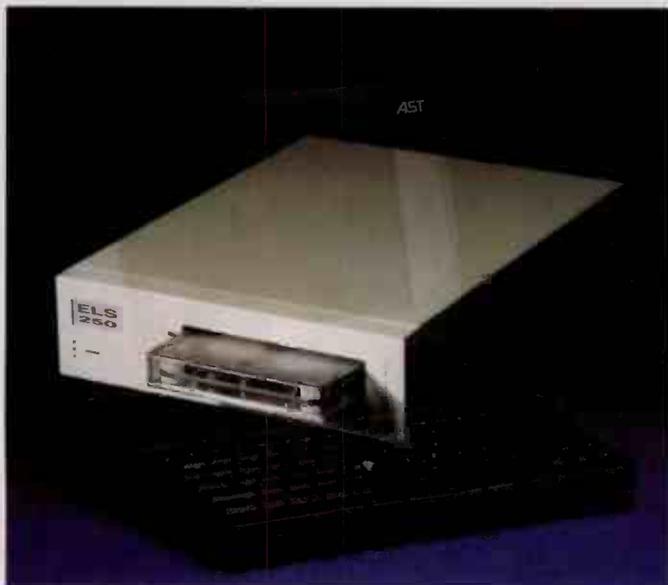
requires a great deal of conventional memory to be free: something in the region of 511kb. Many machines with multimedia add-ons or those linked to a network may have much less. The answer is to load everything into higher memory using something like Memmaker or QEMM. Network commands may need moving from your Startnet.bat file into Autoexec.bat first so that they are moved into higher memory along with other items.

The DOS interface is reasonably good if a little cramped. Pressing F2 brings up a host of options including the type of compression to use, whether to verify the data after backing up, and whether to append the new to the old or overwrite it. Windows has all the same facilities. You can set filters to select only documents, graphics or whatever. Backup sessions can be run in one of three ways: Interactive, Scripted or Scheduled. With Interactive you tell the machine which files to back up, restore or verify, set the options, and go and make a coffee or do something similarly useful.

Scripted sessions have already had the files selected and options set during earlier sessions, and you are simply running the same "program" again. With Scheduled sessions, these will auto-activate as long as your machine and ELS250 are set up and the right tape is in place.

The machine works well enough but it's no speed demon. It also makes quite a noise when formatting, rewinding or retensioning the tape, which might upset colleagues in an open office. If you need to move it to use with other machines, you will have to install the software and configure it first. After that, all you do is unplug the unit.

As a network streamer, the ELS250 probably has little use unless connections go down. Where it comes into its own is with non-networked machines, with machines in different sites, and those which need only occasional backups.

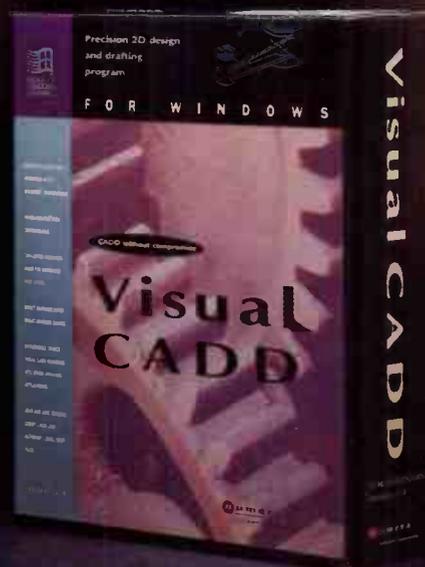


PCW Verdict

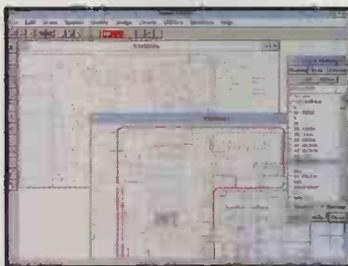
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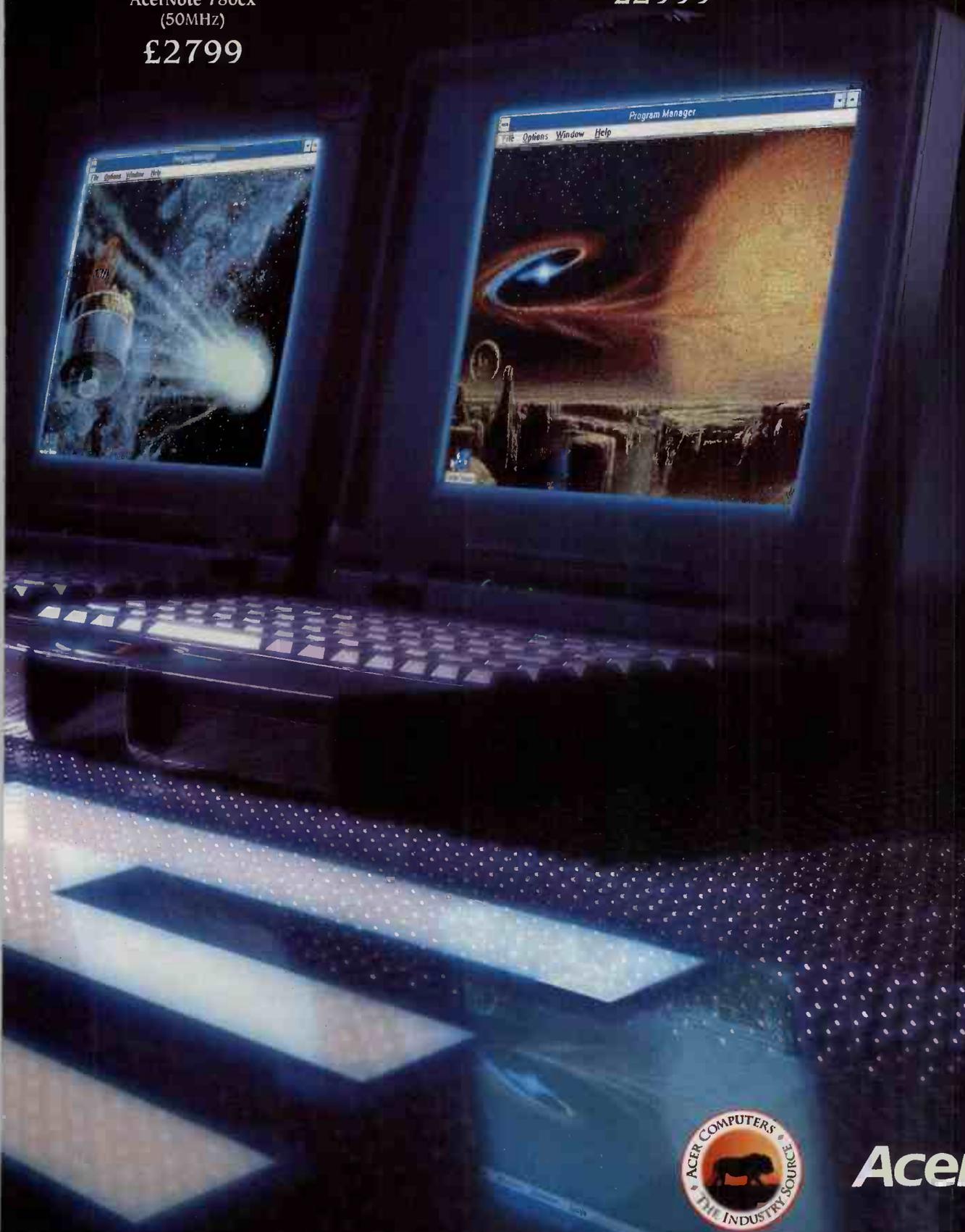
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HARDWARE

Portable Sound Plus

If you want to add sound capabilities to your notebook and aren't after the last word in high fidelity, this is an acceptable solution, reports Karl Dunkerley.

For anyone wanting to add sound capability to their currently soundless notebook, there's a solution from DSP Solutions: the Portable Sound Plus, which adds SoundBlaster and AdLib capabilities to even the most humble portable PC, and even better, plugs into the parallel port.

The Sound Plus comes in two parts. It's the first, the adaptor, which uses the parallel port. Even though it sticks out some six or seven inches, it has been hinged to allow it to stand up when your screen is raised. The one on test, however, would not stay in place and flopped back to the horizontal, which rather defeated the object of the exercise. Plugging in is straightforward although the screws are a little awkward to access. For those using a printer as well, you don't lose a parallel port as there's a pass-through connector.

A number of connectors allow you to channel sound in and out of your notebook. The Audio In jack allows you to record from any normal source such as a CD or cassette player, while the mono microphone connector is suitable for a tie-clip mic. With this combination, you can record WAV files for use in multimedia and voice messages for email or embedding in documents. No tie-clip mic has been included, which has to be considered a marketing mistake by DSP. The stereo Line Out jack connects the unit's sound output to an amplifier's AUX channel. It won't, however, be of any use for driving phones or speakers.

Even though the main unit looks like it's a speaker, it isn't. It uses a telephone-type adaptor to link to the second unit, which contains the speaker, meaning that this is effectively a mono unit in normal use. On a more positive note, this unit can be replaced with a set of active speakers which you can connect to the main unit with the supplied adaptor. The speaker unit contains the phones jack, the sound level control and the on/off switch. For power, you have the choice of a 9v transformer plugged into the main unit which reduces portability and adds to the spaghetti, or 6



AA batteries in the speaker unit. You should be able to use rechargeables although these will have a shorter lifespan compared to normal ones.

On the software side, both DOS and Windows drivers and applications are included. Once installed, the DOS drivers must be called up before each session using Load. The basic command Digiplay gives you access to a wide range of functions including text-to-speech conversion of phrases and files. Digirec lets you use the built-in mic to record your words or sounds to a file in a large number of formats. DOSTalk lets you run text-to-speech conversion from within any DOS-based program, and DOSreader is a user-friendlier version of Digiplay.

On the Windows front, the software is somewhat disappointing. Winreader is a glorified version of DOSreader, and Lotus Sound simply plays .WAV files and is no more useful than Windows' built-in utility. DSP has bundled Show and Tell

for Kids, a simple magic theatre application, but this is hardly going to inspire many adults (or indeed, many kids). DSP really should take a leaf out of Creative Labs' book and start bundling lots of goodies. Multimedia-ready notebooks generally come with many more utilities as standard.

If the sound of silence is not what you'd like to hear from your notebook, the Portable Sound Plus could help

Where the Sound Plus does score is that it is not confined to the notebook. As there are now many people with two PCs, the parallel port connector allows you to buy just one unit for both desktop and laptop. Once drivers are installed on both, you're just about there. With this sort of setup, having just one set of software and hardware to contend with makes life much easier, since it avoids any compatibility problems.

PCW Verdict

Though the Portable Sound Plus does what it does well, its sound is basic. It needs better apps to give it oomph.

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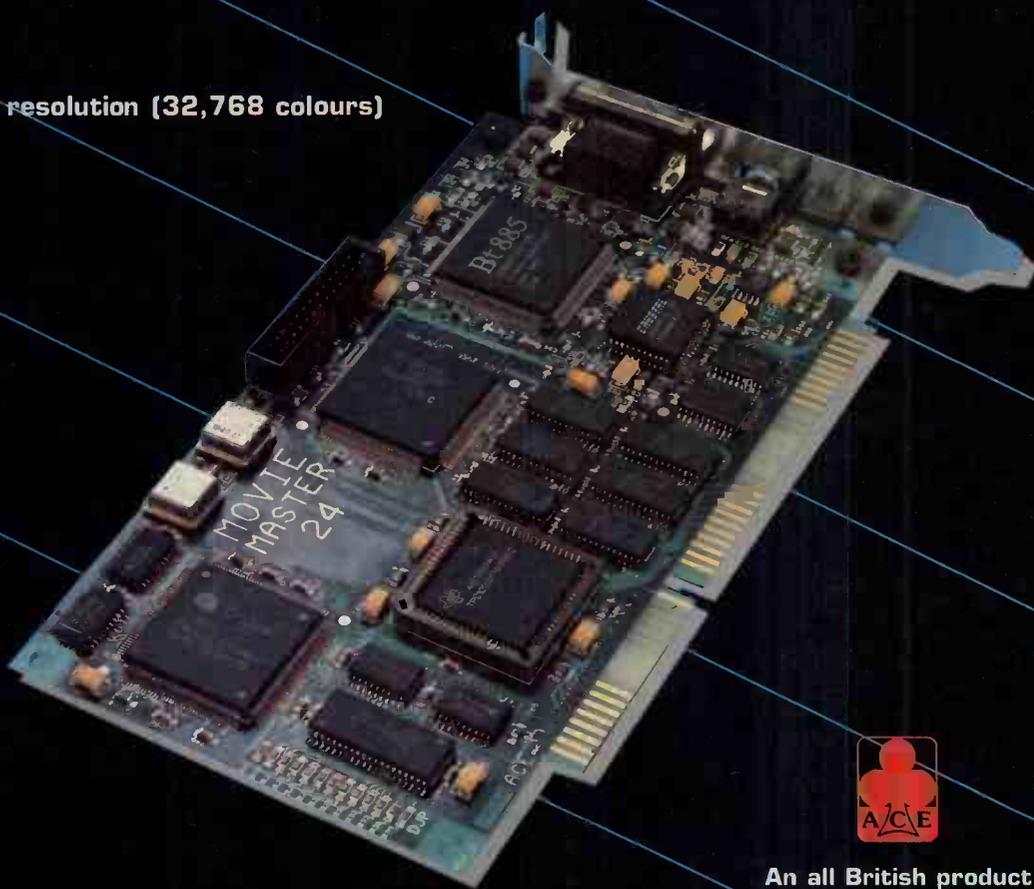
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We welcome contributions from readers for our Long Term Tests section. If you've been using a piece of hardware or software intensively for some time, just write a 450-word article (for hardware) or a 750-word piece with screenshot — GIF format — for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

Hardware

Toshiba T4400SX/80

Chris Hill, of Raleigh Bicycles, Nigeria, wanted a full computing setup on the move — and found the T4400SX/80 more than equal to the task.

QuikMenu

Following last month's Long Term Test of QuikMenu, a number of readers have been in touch asking where they can get a copy of the software in the UK. It is available from Transend Services, Moorview Business Park, Leeds Road, Thackley, Bradford BD10 8HN (01274 622228) and Testware Publishing, 46 The Avenue, Harrogate, N. Yorks HG1 4QD (01423 886415).

Travelling as I do to Nigeria, I need a portable not only for the convenience of carrying and updating information, but for the peace of mind of having what is in effect a UPS permanently connected. Power supply in Africa is somewhat erratic, to say the least.

My first computer was a faithful T1600 with 1Mb RAM and a 20Mb disk. This was followed by a T2200 with 2Mb and 40Mb disk. Both gave me a year of constant and faultless service, and the only reason for upgrading was the need to

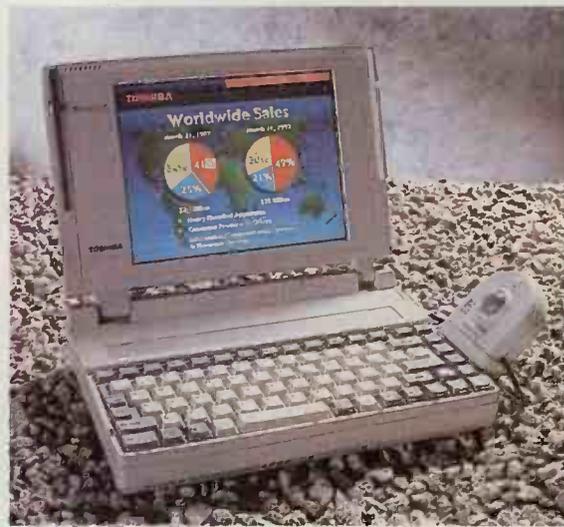
move with the demands of technology and succumb to the requirements of RAM needed for Windows, and disk space needed for mammoth programs such as MS Office.

I wanted and indeed needed the larger 120Mb disk for the T4400SX, but at the time of purchase, December 1992, everyone and his brother was in the market for Toshiba and I was left with Hobson's choice and an 80Mb disk, which I immediately Stack-ered to give me approximately 160Mb. The 8Mb memory card purchased with the 4400 was certainly the most important add-on, and has proved to be worth its weight in gold. Over two years' service the T4400 has not really faltered, even with the rough treatment to which it has sometimes been subjected. I say "not really faltered" because the only problem has been with the PS2 mouse port which has never worked with the MS Ballpoint Mouse connected (or any other rodent, for that matter). I have to connect the mouse via the comms port which leaves me no room for other devices, such as the serial cable I use to connect my Pison Series 3a for file transfer. It's one or the other.

The battery has never let me down, although I have to say that most of the time I have used the computer on mains power.

The bright mono screen is great, and I really can't find justification to move to a colour machine at the prices TFT screens are still commanding. (I couldn't live with

a passive.) At home I connect the machine to a VGA monitor and have almost all the facilities of a desktop. I only use two



fingers to type but am sure that even if I employed all ten fingers I'd still love the keyboard. I use the Toshiba in conjunction with a Canon BJ10SX bubblejet and the outcome is a fully equipped mobile office on call at any time.

The 4400SX/80 has travelled over 60,000 miles in two years and is performing as well today as the day I received it. I cannot give it any better recommendation.

PCW Verdict

A good, solid workhorse which has proved reliable under adverse conditions.

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Software

PagePlus 3.0

After his initiation into PagePlus via a demo of version 1.2, Hugh Saunders graduated to version 3.0 and has never looked back.

One of the first pieces of software I ever had when I started using a PC was a demo version of PagePlus 1.2. It was a full working version and it merely bugged you to register it every ten minutes or so. It was also surprisingly easy to use and I produced many newsletters, posters and flyers using it. It also had an

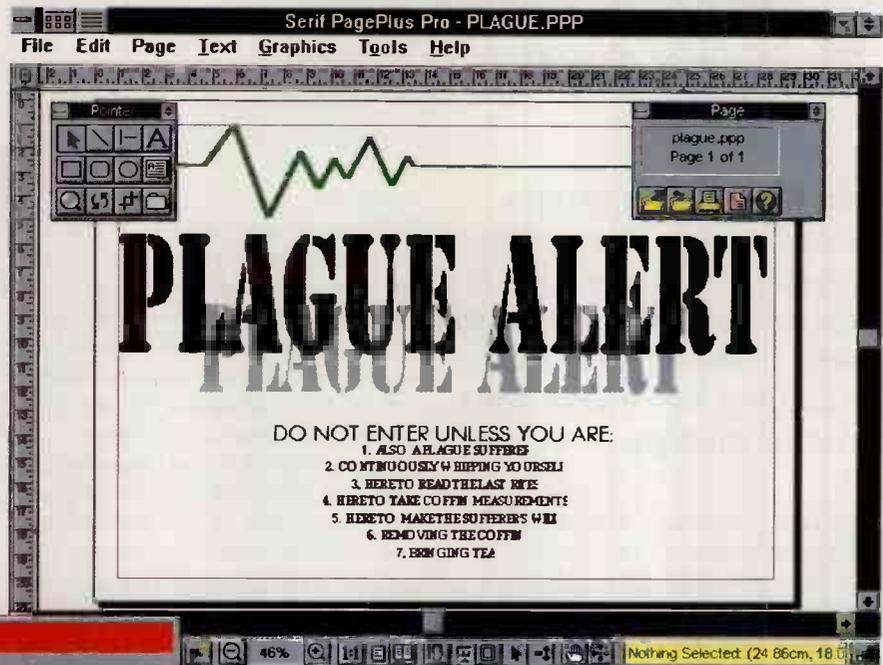
alarming tendency to be about as stable as an Italian Prime Minister, but the autosave feature allowed you to keep most of your hair. So for a year and a half I happily used PagePlus 1.2. Then came the only one of the tens of mailshots that Serif has

6 MONTHS
TEST

sent me which has ever caught my eye: Buy Page Plus 3.0 for £19.99 plus VAT. The 60-day money back guarantee swung it and I phoned that very morning to give my details.

PagePlus 3.0 has been improved cosmetically, beyond recognition from version 1.2. It now looks very much like a Microsoft application and it shares Word's affection for giving you a "Tip of the Day", which can thankfully be turned off.

There are now three different "levels" of PagePlus, each giving varying degrees of hand-holding and flexibility. Intro level is for people who are new to DTP, turning off the full tools palette and giving a floating help box which acts like a hint bar, as well as the little yellow tool-hints that



PagePlus is not a Microsoft application, but you're still not safe from the tip of the day

PagePlus 3.0 offers highly competent DTP at a bargain price. It should spread like the plague

appear if you hold the mouse pointer over a button. Publisher is a little more advanced, giving you buttons for cropping pictures, rotating objects and importing pictures. The help box remains present but can be relegated to the bottom of the screen with a double-click. Professional level is a bit of a misnomer. I am not a DTP professional, but I use this level all the time. Once you have grasped the basics, this is probably the level to use, since the difference between using this and Publisher level is minimal. However, you do get to move objects by exact amounts (a feature missing from earlier versions); you can, for example, position or size a box to 1000th of a centimetre or rotate it to 100th of a degree. Although I can't say I have ever needed a box of exactly 6.002cm square, I am sure some people need this accuracy.

All levels allow you either to type either free text (floating text) or to enter text into frames, which can be linked. Text can be flowed around objects such as pictures, or other text. You can import text from a variety of sources; all the pop-

ular word processor formats are there and of course the ubiquitous RTF and ASCII. This works very well, which is a relief, since the feature always used to hang Windows in version 1.2. The variables for any object (line thickness, font name, shading colour etc.) can be quickly changed using the ChangeBar, which is surprisingly functional. If you find the level you are on does not give you a button to perform the feature you want, it can easily be accessed through the menus.

For me, PagePlus's winning feature is its handling of pictures. You can import all major formats from predefined categories within the PagePlus directory or through OLE embedding (you can insert anything using OLE, from Word-Art through to an Excel spreadsheet). If you're really serious, you can use a Twain-compliant scanner or Kodak Photo CD as well. It is also possible to export objects from your publication as pictures, which is useful for creating logos to be used in other applications. If you need professional bureau output,

PagePlus supports Pantone colour separations and you can export publications as PostScript files.

In the time I have had PagePlus 3.0, during some pretty intensive use, it has only ever crashed once. This was during an OLE link to Word-Art and I eventually traced the fault to a dodgy TrueType font. PagePlus became frozen like wallpaper, but Windows carried on running and by threatening to leave Windows and my unsaved publication and then cancelling the request, I was able to save my work.

All in all, PagePlus is an excellent piece of software. It has all the features I need to produce high-quality output, plus the ability to use professional publishing if I need to, and it costs under £80, which makes it excellent value. PagePlus is also content to work on a limited setup, such as my 386SX-25 with 4Mb RAM, which is a boon for the SoHo users at which it is probably targeted. For a change I am looking forward to the mail-shot from Serif offering me Version 4.0.

PCW Verdict

An extremely competent, simple to use DTP system which doesn't need a super-powerful machine to run.

Contact Serif 0800 413444

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Software

Borland C++

Ian Brockbank thinks Borland C++ is a great product, and has developed two major projects with it. He wishes the interface were just a bit faster, though.

I bought my first copy of Borland C++ in July 1990, when it was at version 2.0 and still completely DOS based. I followed it through 2.1, to Windows with 3.0 and 3.1, and then upgraded to v4.0 when it came out last November.

Why do I like it? The integrated development environment is wonderful. I like the way everything is at hand. Coding, compiling, linking, debugging and project management are all done in the same window and resource (interface) and now help-file editing are only a menu-click away. Better still, you can add your own tools, making it as flexible as you wish. The syntax highlighting is nice, too, making it much easier to spot comments and read code. But why can't you insert one file into another?

The project management is effectively a graphical drag-and-drop implementation of make. You can have multiple targets in one project, and you can set up "Source Pools" so files are included only once.

A lot of work has obviously gone into the compiler, too. Shortly after version 4.0 came out last year I saw complaints about its speed compared with version 3.1. While it is certainly true that the interface is sluggish, I have found the compiler itself to be faster than before, and v3.1 was widely acknowledged to be the fastest on the market at the time. V4.0 also supports the latest developments in C++, conforming to the AT&T v3.0 draft standard. This brings the added advantages of templates, which save writing the same code repeatedly, and exceptions, which make stable code and centralised error handling a lot easier to achieve. It supports Win32, although sadly my 4Mb 386SX gives up

on that one.

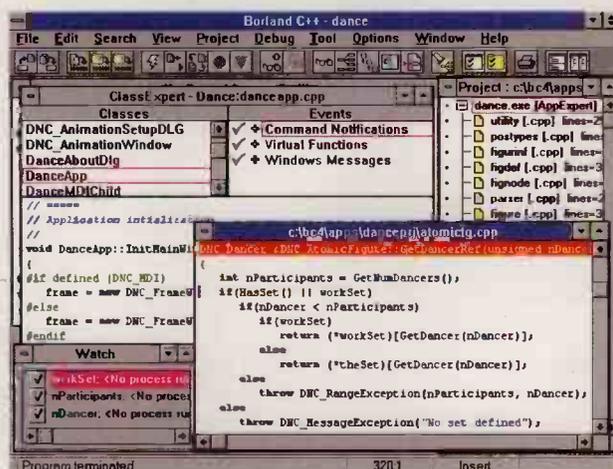
Which brings me to OWL — the ObjectWindows C++ class library. This greatly simplifies the interface handling by providing ready-made classes to do most of the dirty work. There are classes for applications, windows, dialogue boxes, buttons, list boxes and all the other elements which make up a Windows program. There are even classes to handle Visual Basic VBX controls. Version 2.0 of these class libraries makes extensive use of templates and exceptions to provide robust code which can be compiled on any compiler which supports AT&T C++ v3.0. This differs from OWL version 1.0, which used a non-standard

functions and so on to your various OWL-based classes by clicking on a tree. You are then given a basic function and position, and you're ready to fill in the details. However, it only works for classes which it knows about — i.e. the OWL classes — and pays no attention to anything it doesn't recognise. It is also very sensitive to manual changes. This is a shame, because this could be a wonderful tool if it could handle any class and build stub functions for any functions in the parent class.

The biggest problem I have found with this package is the speed. Not the speed of the compiler, but the speed of the interface. Okay, so a 20MHz 386SX is not ideal, but surely it shouldn't take five seconds to start paging down in an editor window. This is supposedly addressed in version 4.02, so I eagerly await my upgrade.

Another, more worrying problem involved floating point code. I found that if I single-stepped over something as innocuous as `float a = p;` where `p` was another floating point variable, I would get a floating point error from the runtime library. If I ran past that code, or even set a breakpoint and stopped on it, everything was fine.

But, speed apart, I have found this a great package. I have developed two major projects with it, one initially using OWL 1.0 and converted, and one done in OWL 2.0 from the start. The second made use of AppExpert to do the initial work, which allowed me to concentrate on the more technical and interesting aspects of the program. I really like the way everything works together, the class libraries and code pre-generation save so much time, and the AT&T v3.0 extensions are extremely useful. If only the interface were a bit faster.



Here you can see the integrated development environment in action with the Project Management, Class Expert and main code windows on one screen

extension to the language to implement the message handling. One drawback of this reworking is that anyone who has code developed using OWL 1.0 has to rework the interface code for OWL 2.0. Borland provides a utility, OWLVCVT, with the compiler, but I had so many problems trying to get it to work, I found it quicker to generate a basic application and add in my code by hand.

The "Experts" which come with the package are a mixed bunch. AppExpert speeds up creating an application, by generating basic code according to your specifications, but I found ClassExpert rather a waste of space. In concept it is great. You can add handlers, response

PCW Verdict

A great product with simple interface code and comprehensive libraries. A little slow.

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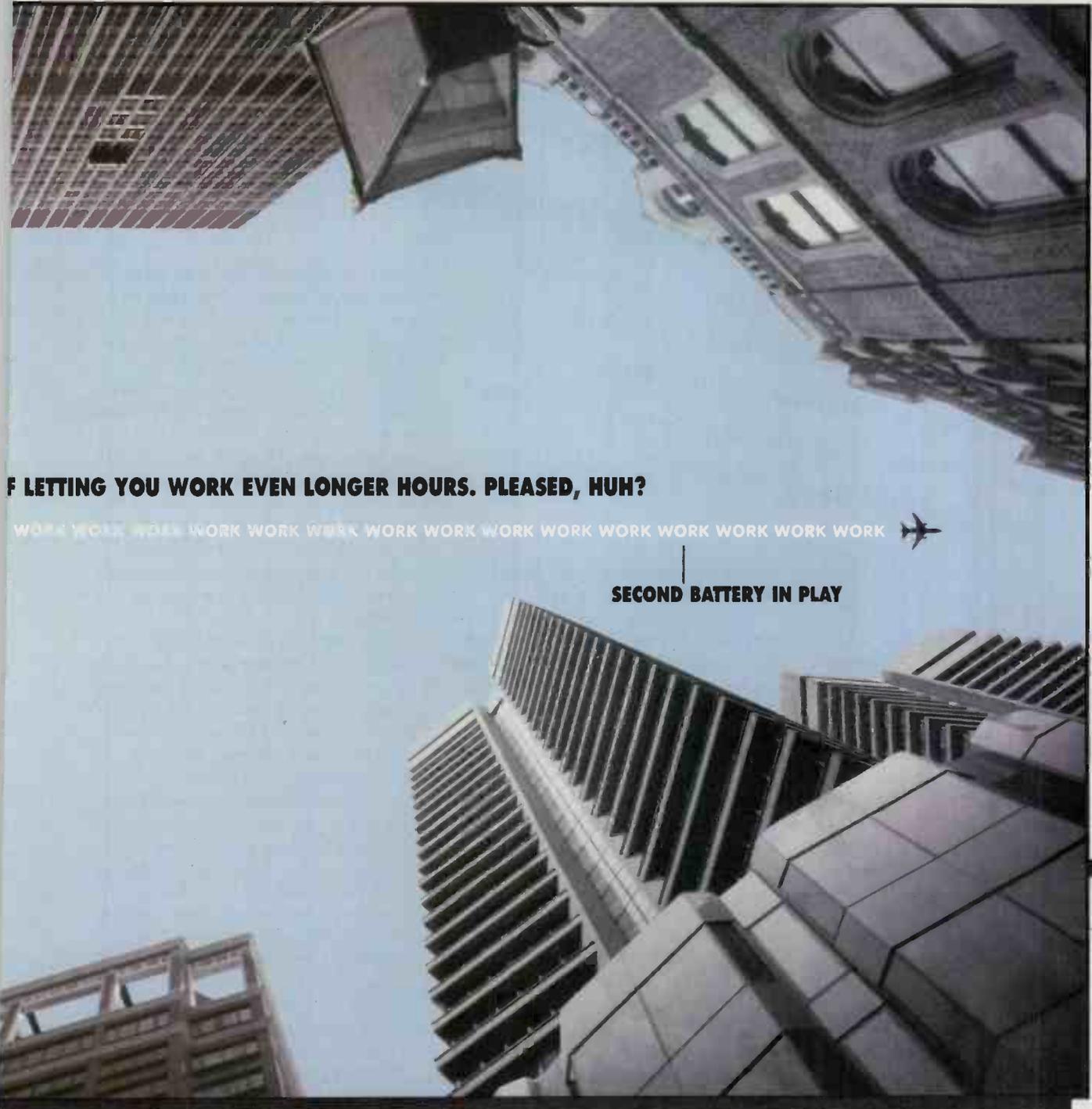
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Family business

TALKING ABOUT YOUR GENERATIONS

For anyone serious about tracing their roots, genealogical software is fast becoming indispensable. But how, exactly, does it work, and what should you look for when choosing a package? Paul Begg reveals all.

What seems to me like a year ago, though it may be longer, I undertook (for another publication) an extensive review of genealogical software. At that time there was only one package for Windows and it was a poor offering. Over the months that followed I became aware of some commercial Windows packages available in the US, but didn't realise they'd become available in the UK. Naturally, when one of them did become available here and I reviewed it in the hallowed pages of *PCW*, I said it was the only Windows genealogy software currently available in Britain.

My lamentable ignorance was quickly brought to the attention of the world through the letters page of *PCW* by Nigel Bayley, whose company, S&N Enterprises, specialises in genealogical software. It seemed the world of computer genealogy had become engulfed with Windows software. The relatively sudden appearance of five or six such packages is interesting. It is testimony to the speed with which things change in the computer industry and to the growth of the home computer market.

Above all, it illustrates the incredible popularity of genealogical software.

If you have ever traced or tried to trace your family tree you'll know that you can very quickly accumulate a mass of names and details. In theory, your ancestors double with each generation: you have two parents, four grandparents, eight great-grandparents, sixteen great-great-grandparents, thirty-two great-great-great-grandparents, sixty-four great-great-great-great-grandparents... With an average of three generations a century, it's quite likely that even getting back to your g-g-g-grandparents will only have taken you back to the early 1800s, maybe only to when the registration of births, death and marriages became law in 1836.

Working on this average of three generations per century, if you were lucky enough to be able to trace your ancestry back to the Battle of Hastings in 1066 you would have a total of 268,425,456 great-great... great-grandparents!

Of course, the reality is that you wouldn't and, indeed, couldn't. The number of your grandparents would exceed the total estimated population of England and Wales in 1066, which is thought to have been about 1,250,000. So

obviously, separate lines of descent converge, as happens when cousins marry, but you can see how quickly you'll gather an army of ancestors. And you'll gather information about each one of them — birth, marriage and death certificates, wills, maybe service records if your ancestor was in the military or some civil job such as the police. Details will be furnished by parish records, gravestones, even newspaper reports and books. And, of course, you'll probably be able to collect information from elderly relations (who you should always record on tape — oral family tradition is especially valuable).

The quantity of information you can gather can be unmanageable. Papers get lost, certificates mislaid, and sources forgotten. Just trying to find the information you know you once had can prove so frustrating that it tarnishes the fun of ancestor hunting. The first aim of genealogical software, therefore, is to give you control over the data you amass and make that data easier to use.

This sounds a simple enough aim, but the software itself can hinder things by being very difficult to use. One reason is that the software has to cater for all the complexities of human relationships, not the least being divorce, remarriage and adoption. Easy-to-use genealogical software therefore usually means software that limits the variety of information it can handle. Broadly speaking, therefore, genealogical software is divided into three types. There is inexpensive — often called budget — software. This generally lets you record basic data such as names and birth, marriage and death dates. It also offers a limited number of ways of displaying and printing the information.

The next step up is designed for the

fairly experienced family history hobbyist. Far more detail can be entered and these days there is a facility to include pictures and even sound (which is one reason, albeit not a particularly important one, why you should tape interviews with elderly relatives). The main strength of these packages, however, is the number of ways they let you present your accumulated data.

The top end of the market is home to professional packages. Designed to satisfy professional genealogists, these packages are expensive and almost impossible to learn without a considerable investment of time. At risk of letters piling into the PCW offices to prove me wrong, I'll say that the top end of the market still lacks a Windows product. I will qualify this observation, however, by saying that as programs in general become easier to use, the division between the middle and top end of the market blurs.

Most people start with budget software, often with shareware, which has been home to the best DOS-based genealogical software packages. As their interest and information grows, they graduate to the middle range of hobbyist software. This makes one thing fairly important. Whatever software you start out with, you should make sure it supports GEDCOM.

GEDCOM

GEDCOM is an abbreviation of Genealogical Data COMMunication and the standard for transferring genealogy data between different genealogical software packages. Essentially it is a middle-man; one package exports its data in the GEDCOM format and another package imports from a GEDCOM format. Apart from its value as a means of transferring your data from one package to another, it also enables you to supply your data on a floppy disk to someone else, or for them to supply their data to you. GEDCOM is also essential if you plan to make any use of the LDS International Genealogical Index and Ancestral File (see panel on page 366). GEDCOM isn't brilliant but it is a standard and you should make sure that any genealogical package you buy supports GEDCOM transfer.

Most genealogical software is DOS-only and some of the very best titles are shareware. Shareware has had something of a bad name, many people thinking that it is poor quality software that could never hack it as a commercial product. While this idea is not wholly

without justification, there are many excellent shareware programs and this is especially true of software designed to meet specialist needs. They may be rough and ready, but often they have been written by an enthusiast who actually understands the subject that the software is for. In no area is this truer than with genealogical software. Many DOS packages have been around for years, constantly improved and upgraded, and are now extremely sophisticated.

The Windows environment has helped to make a lot of complex software easier to use, and this is no less true of genealogical packages. Much to my surprise — spurred and assisted by Mr Bayley of S&N — I discovered at least ten Windows packages. We can't look at them all (mainly because I couldn't get them all in time for this feature), but I've tackled several of the best and most easily located.

Family Origins 3.0

By the time you read this, Family Origins 3.0 from Iowa-based Parsons Technology may well be part of Microsoft. Parsons produced a range of popular and popular-priced information-based software in categories that included finance, legal, tax, and so on. This made the company an attractive acquisition for Intuit, the company which has a highly popular range of SoHo (Small Office, Home Office) accountancy and finance software packages. Intuit accordingly acquired Parsons. Then Intuit was acquired by the mighty Microsoft in the largest software deal ever. How this will effect further development of Family Origins remains to be seen. If Microsoft backs the product, who can tell how central to genealogical research both the company and the software could become in the future.

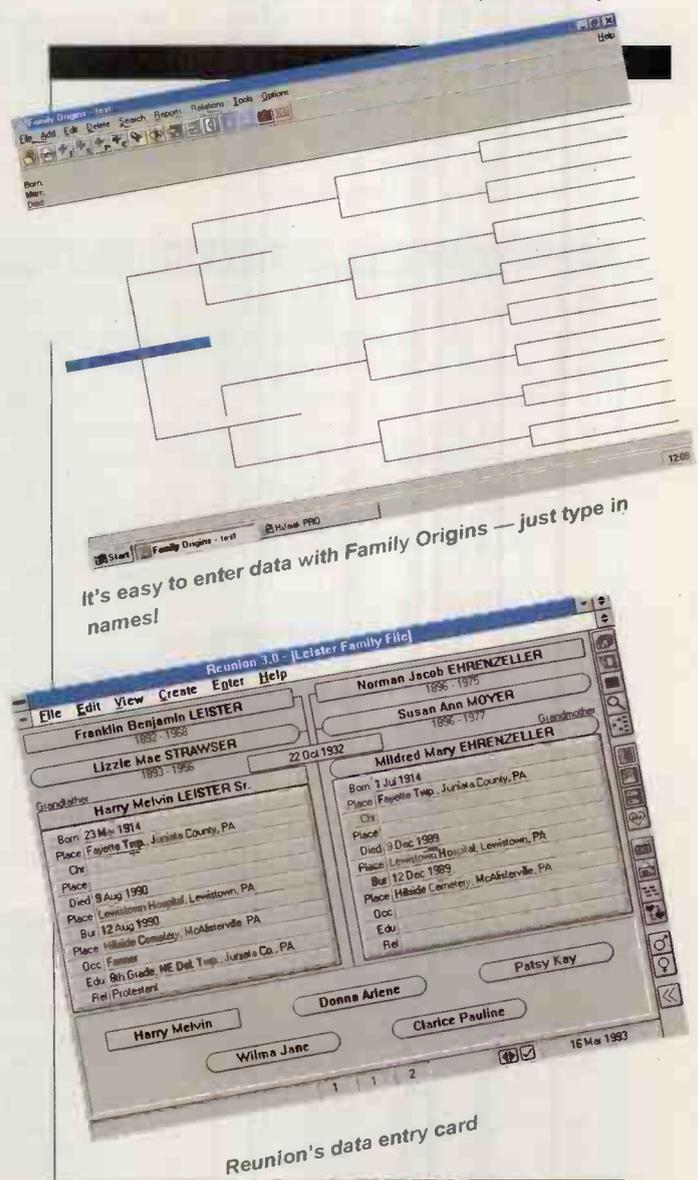
Family Origins has an established pedigree as a DOS package and

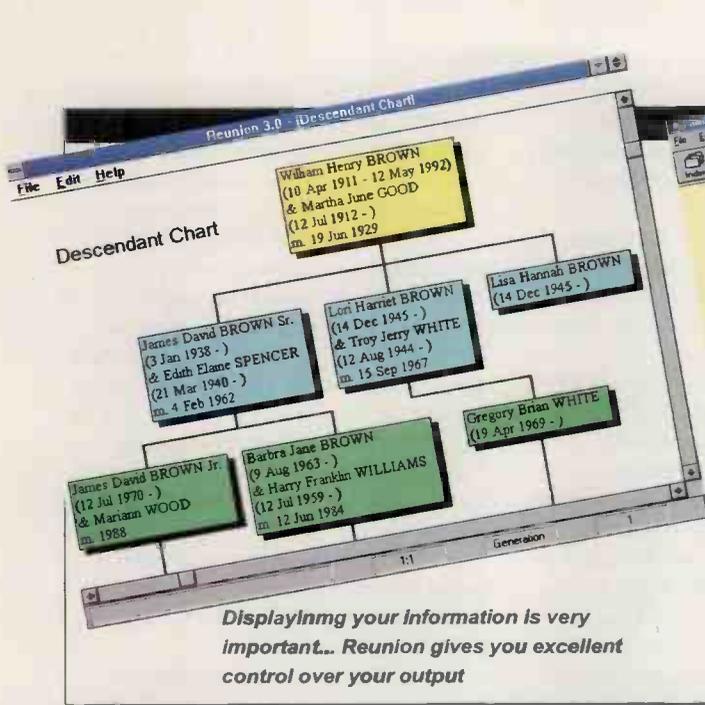
the Windows version was launched in 1992. It has become a very popular Windows package and has a good selection of charts and reports, excellent search facilities and, most important from my point of view, it handles source referencing very well. In common with other Windows genealogical software packages, Family Origins has recently added picture support. This means you can insert a picture of your ancestor into the biographical data and display and print the picture. This is a nice idea, but pictures take up a lot of disk space and, of course, you'll need a scanner.

Family Origins comes with a booklet called An Introduction to Family History. It contains both UK and US sources, but gives only US addresses.

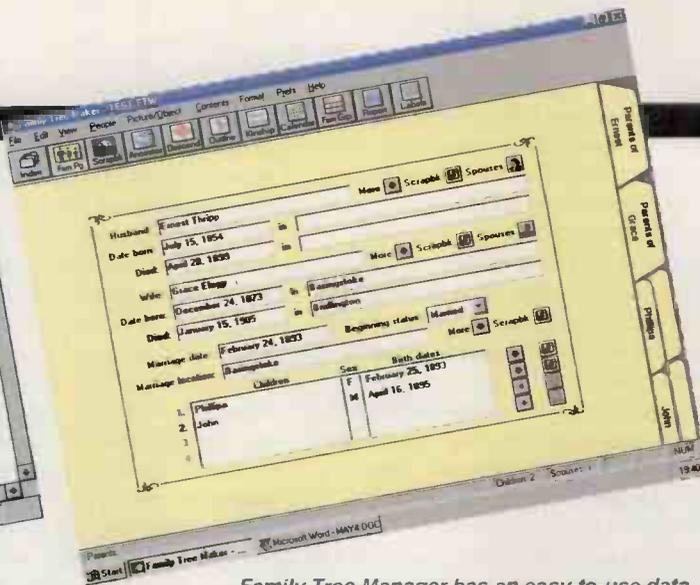
Full LDS ordinance is supported, though you can opt to switch it off, and there is full GEDCOM import and export.

Data is entered on a simple and easy





Displaying your information is very important... Reunion gives you excellent control over your output



Family Tree Manager has an easy-to-use data entry screen and packs in a lot of power at a near giveaway price

to use Pedigree Chart. Various data can be added, including sources and notes. It is the ability to add free text information that in part distinguishes a genealogical database from an ordinary database with columns and fields. For my money, notes are what genealogy is ultimately all about. It's where you can add anecdotes, memories, stories, and other such stuff

that brings your ancestors to life and makes them more than just a list of names and dates. It's also where you can add all kinds of extraneous personal details that won't fit in fields of their own. For example, a service record of someone who served in the armed forces or in the police will contain all manner of information from hair and eye colour to

birthmarks and distinguishing marks and scars. Storing sources is also vital. The time will come when you'll need to check where your information came from (when, for example, you encounter conflicting data; this is more common than the beginner will imagine — birth years often change from one record to another, for example.)

I liked Family Origins — a product well worth looking at.

The Church of Latter Day Saints

Carved deep within the Wasatch Mountains in Utah there is an incredible vault containing the originals of documents that compose the greatest collection of genealogical information in the world. It is the vault of the Family History Library, which was founded in Salt Lake City back in 1894 by the Church of Jesus Christ of Latter Day Saints.

The LDS Church, better known as the Mormons, take ancestry very seriously because they take literally Christ's statement in John 3:5 that nobody can enter heaven without baptism. However, appreciating that people in the past were ignorant of the importance of or were otherwise denied baptism, they hold that the dead can enter heaven if a living person is baptised for them. These baptisms of the dead are performed in LDS temples and are called Ordinances. Other types of Ordinance are also performed, many having a family orientation.

Family, living or dead, is so important to the LDS Church that it's involved in practically every aspect of genealogical research. It has gathered information from around the world. Its record collection includes 1.5 million rolls of microfilm, 200,000 microfiches, over 195,000 books, and 8 million Family Group Record Forms. Much of this

information is now distributed on CD-ROM to major libraries and universities and through the hundreds of LDS Family History Centres around the world, and it is available to everyone (and nobody will attempt to convert you).

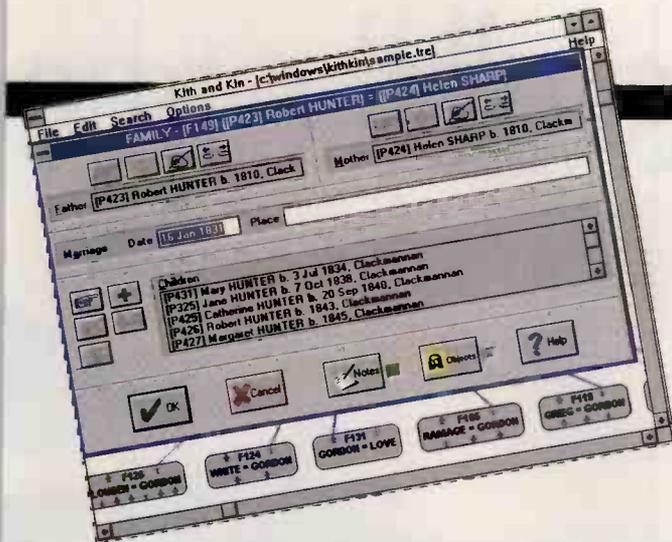
The LDS pioneered GEDCOM transfer with its own software, Personal Ancestral File. This, though, is DOS-only, costs under £30 and should be shipping with a new version now.

- The Church of Jesus Christ of Latter Day Saints distributes on CD-ROM information drawn from its family history records. A search engine, FamilySearch, enables users to search through the millions of names, even matching names that sound the same as those the user has specified. This CD-ROM is available at the Family History Library in Salt Lake City and at major libraries elsewhere around the world. Files are constantly being added to the FamilySearch CD-ROMs and hopefully one day this mass of valuable information will be available at local libraries everywhere. For the records at St Catherine's House in London to be computerised is high on the wish-list of all genealogists — unfortunately, it is still a wish.

Reunion

Reunion comes on a single floppy disk and the manual is supplied in a solid, simulated leather three-ring binder. Overall, the feeling is of a program that means business — and that's exactly what Reunion does mean. It does practically everything you could ask of a genealogy package, but isn't too hard to use. It will store references, notes and photos, and will link to your word processor so that you can use all its facilities such as the spell checker, thesaurus, and grammar checker (if it has one). I also liked the "Super-Chart" editor. This automatically draws graphic descendant and pedigree charts, but names are in boxes and you can move the boxes around to produce whatever chart you fancy. The Super-Chart editor is just one example of the extent to which this package lets you customise your information. You also have control over fonts, the colour of boxes, and much else besides.

Reunion was reviewed in a recent issue of PCW [January '95] and it would be pointless to repeat what was said there. It does practically everything you could ask of a genealogy database, is strong on report and chart creation, but also lets you create and print family



A shareware title that does the job. The screen lacks the smooth ease-of-use look and feel, though

histories, birthday calendars, mailing lists, questionnaires, and indexes. A nice though not uncommon feature is the program's ability to calculate and identify relationships. This is a great help when it comes to hacking your way through the second cousin twice removed maze.

Reunion meets the three requirements of a genealogy package: it provides the means for recording all necessary (and some unnecessary) data, it does so in a way that it is easy and intuitive to use,

Genealogical Information Online

If you have a modem you can access online services where you can share and discuss genealogical material and research, perhaps meeting people from other parts of the world, researching the same names as yourself and who could undertake some work for you (and/or you for them).

- CIX: the newsgroup is Gene
- Usenet: alt.genealogy
- World Wide Web:
http://www.xmission.com/~jayhall. This is a new World Wide Web page for genealogical resources sponsored by Salt Lake City-based Everton Publishers. There are links to over 200 files, Web pages, gopher menus, and databases. Other areas currently under construction.
- CompuServe: Go Roots
- A Genealogy forum will also be available on the Microsoft Network, Microsoft's new online service à la CompuServe, which will be offered to users of the forthcoming Windows 95.
- There are also hundreds of genealogical dedicated BBSs and BBSs with a genealogy section. Practically every country in the world seems to have one and the unity forged through a shared interest generally makes people more than happy to share their information. This is one subject where going online can really help.

and it gives the user the opportunity to impose their personal taste of the look and feel. I liked Reunion a lot. The interface is clean and uncluttered, the information easy to access, and the learning curve is low. It looks good and is reasonably priced (for software — even though it is the most expensive package reviewed here).

Family Tree Maker 3.0

The box flashes the legend "Copies Sold 350,000", which is testimony to the popularity of

Banner Blue's Family Tree Maker. It's an award-winning package and, while I have been a great fan of Reunion since long before I knew it was available in the UK, Family Tree Maker has been a favourite package and an especially good buy for the beginner.

It has been improved immeasurably since its DOS days and the latest version lets you store photos and video clips. I was particularly impressed with the way in which the program used Kodak Photo CD as a way of bringing organisation to the family photo collection. Thousands of photos can be stored in each person's "Scrapbook".

Family Tree Maker's claim to fame was the range of ways it could print out the data. It was possible to print out some very pretty charts which, when framed, made interesting and unusual family presents. These features are still present, but the program has advanced considerably. It is particularly strong on searching for data. You can conduct a search for a match on any field and look for matches when you only know a little information, such as part of a date or name.

The interface is very easy to use and you can store all manner of information, including adoption information, medical data, address details, notes, and sources.

To the best of my knowledge, Family Tree Maker is also moving towards being a research tool as well as a recipient of information. In the US a deluxe CD-ROM version contains American birth, marriage and death indexes, and I understand Banner Blue is looking at the possibilities of adding UK genealogical data too.

Shareware

If genealogy is something you'd like to have a bash at, but you don't fancy making a substantial investment in the software until you know whether you're going to like it or not, the shareware market is the place to look. There is some excellent software available and especially under DOS you'd be hard pushed to find better in the commercial domain.

Shareware Windows packages are rarer. David Risley has produced a package called Wingenea. It is easy to use. You simply add people, indicating their relationship to other people. For example, you might enter a husband's name, then his wife's and link them as husband and wife. Then enter another name, linking it to the husband and wife as their child. Wingenea allows entry of a reasonably extensive range of personal details, notes and pictures in bitmap format. Wingenea gives you good control over designing and printing pedigree charts. The only downer is that it doesn't support GEDCOM export.

Kith and Kin by Nick Hunter, on the other hand, does support GEDCOM import and export, but doesn't have baptismal or burial fields. It is nevertheless a tidy little package, gives good control over charts and supports OLE, so you can add pictures and sound bites.

One word of warning, however: neither package would work under the current beta of Windows 95.

PCW Details

Family Origins 3.0

System Requirements: 386 or higher, 4Mb RAM, Windows 3.1 or higher
Price: **£34.95**

Reunion

System Requirements: 386 or better, Windows 3.0 or later, 2Mb RAM, mouse
Price: **£89 inc VAT**

Family Tree Maker 3.0

System Requirements: 386 or higher; 7Mb hard disk; 4Mb RAM (8Mb recommended), VGA display, Windows 3.1 or higher; mouse
Price: **£49**

Wingenea

£25 registration

Kith and Kin

£24 registration

These are variously distributed and the shareware titles will be available from any good shareware distributor. The review copies were supplied by **S&N Enterprises on 01252 510486** and **Roderick Manhattan Group on 0181 875 4400**

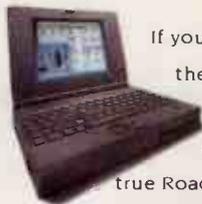


You can always tell the true

He's the one with a Z-NOTEFLEX on the back seat



Road Warrior



If you only buy one computer this century, Z-NOTEFLEX is the five you need. We're talking modularity and upgradeability here, and while the mere mobile professional might be content with a Datsun Daffodil and a lap-top, the true Road Warrior wants to hit the fast lane of the superhighway with something a bit beefier.

From notebook to desktop to fully-fledged multimedia presentation machine, the Z-NOTEFLEX will simply blow the rest away. Part of the secret is Z-NOTEFLEX's modularity - the processor, memory, drives, SIMMs and display are all user-upgradeable. This offers you the flexibility to order the features you need today and to add others as and when you choose from a broad spectrum of system enhancements, multimedia capabilities and peripheral solutions.

Yet it's far from the most expensive notebook on the market. And it's hugely portable - the colour Z-NOTEFLEX weighs in at just 6.3lbs (and to make it even more user-friendly, there's an extra battery providing up to 4-8 hours colour use on the move*).

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FLEXSHOW**
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"The ability to upgrade practically every part of the Zenith Z-NOTEFLEX makes it stand out from the notebook crowd." **PC**

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Cooling off

Pentium notebooks are no longer the portable heaters they once were, although lower temperatures mean higher prices. Simon Rockman took to the Northern Line with the latest models from Viglen and Toshiba.

For a long time it wasn't sensible to build a 60MHz or 66MHz Pentium notebook. The 5v Pentium put out a good 15W and needed substantial cooling in desktops. A couple of manufacturers did make machines for the limited user base which needed the increased performance and didn't mind the 30-minute battery life, but the smart money was always on the P54C, codename for the Pentium 90, the chip with less of a taste for electricity.

At 9W, the smaller, faster Pentium is still too hot for the plastic package favoured by notebook manufacturers. The newer chip not only runs cooler but at 90MHz and 100MHz is faster, thanks to a more advanced manufacturing process. Intel developed a new type of mounting, a tape carrier which makes cooling easier. This was launched with the Pentium P54T. While the original Pentium was clearly unsuitable for notebooks, the newer Pentiums, and in particular the 75MHz P54T, had the big market for little computers clearly in their sights.

The notebook market knows no bounds to what people are prepared to pay. Companies that would blanch at paying more than £2,000 for a desktop machine will pay double that for a notebook and docking station. But then, an executive who takes the machine — and work — home is much more productive than one who leaves work at work.

The two notebooks we look at here are at the very top of the tree: a Pentium 90 from Viglen at £3,899, and a Pentium 75 from Toshiba for a whacking £5,499.

Viglen Dossier P90

Only the "Intel Inside — Pentium" badges on the case give away the fact that this Viglen is something special. They serve as go-faster stripes on this hot-rod: it's very, very quick. This hot-rod is part of the family of Viglen Dossier notebooks made for Viglen by Compil. You may well see the same machine from other manufacturers wearing different badges.

Marching down the checklist of features, the Dossier scores on almost every point. It has an LCD panel showing battery charge, sleep mode, the settings of the Num and Caps Lock keys, and disk access. The hard disk in the review machine was 340Mb; bigger disks are available but are substantially more expensive. The machine is well featured with ports and connectors. There are audio jacks for SoundBlaster support and two speakers built into the keyboard which give something approaching stereo sound, but for real stereo you'll need external speakers which can be spaced further apart than the width of a notebook. There is a Type III PCMCIA socket which can be used as two Type II ones. This seemed quite robust and cards ejected easily.

The large, flat area between the keyboard and the front of the computer offers ergonomic support for your wrists and an area for the trackball. This works well although it's not as good as the trackpoint "nipple" used by IBM and Toshiba; after a few games of Windows Solitaire you soon get used to it. And it's worth playing Solitaire just to see how fast the cards

bounce when you complete the game.

The Opti is a conventional design. It uses a Western Digital hard disk controller on a local bus which gives fast 32-bit access, and a Chips & Technologies 65545 video display processor to speed up Windows.

The 3.3v processor has fewer heat problems than the 60MHz version which runs at 5v, but still uses the standard ceramic package. A normal hedgehog-shaped heatsink won't fit inside a notebook so the designers have come up with a novel solution. A large metal plate is pressed against, but not connected to, the top of the processor. This warms your legs if you are typing on the train but it doesn't get unpleasantly hot and certainly seems to be in no danger of causing any damage. The use of a standard PGA (Pin Gate Array) will make upgrading to Pentium processors without the floating-point bug much easier than on other systems.

The software on this machine is a curate's egg. PCMCIA is one of those standards with so many subsets it has become impossible to get it working all the time: drivers clash and systems fall over. The Viglen drivers proved better than most, working easily with modem and digital data cards but needing some tweaking to co-operate with an Ethernet adaptor. Support from Viglen has always been good. There is a telephone hotline and next-day collection.

Viglen's best software, which it bundles with all its sound-enabled machines, is the sound recording and editing software. It would be entirely possible to





have a machine sitting on your desk acting as a tape recorder although you'd rapidly run out of disk space.



I had a few problems with the suspend mode. It occasionally crashed, although this might be attributable to the early BIOS. I suspect it is difficult to reliably suspend a 90MHz Pentium and the BIOS writers at Phoenix are still learning how to do it.

But it's the video software which is the most impressive. Viglen shows it off with a corporate advertisement, complete with rousing music and a Union Jack fluttering in the wind. This uses Indeo, Intel's video compression scheme, showing just how much horsepower the software needs. Intel reckons Native Signal Processing is the way to go: let the CPU do all the work. With no communications, and external chips handling the sound, the Viglen Pentium can just about pull off good results on a portion of the 640 x 480 screen. Just to be able to cope with Indeo video at 1024 x 768, Intel machines of the future are going to have to pull their socks up.

The last Pentium notebook I reviewed had a battery life of about an hour with the screen powered down. That was a 60MHz machine and it was more effective as a heater than as a computer. The improvements in the Pentium are most marked in this portable. It managed some two-hour stints, which used to be considered par for the course before big strides were made in battery saving.

Toshiba T4900CT

The 75MHz 4900CT didn't outstrip the Viglen in the performance stakes but it has a lot going for it. It may have a processor which runs 15MHz slower but the system bus is faster. While the Pentium in the Viglen runs at 90MHz it does so by tripling a 30MHz bus. The Toshiba has a 50MHz motherboard and addresses its RAM at the full 64 bits.

This is no ordinary RAM, either. It's EDO, or Extended Data Out, RAM which has a little cache built into the RAM chips and should make every access very much faster. The result is a system which, according to the champions of EDO RAM, doesn't need a second level cache. The review machine had just 8Mb RAM. Toshiba currently only offers conventional (uncached) RAM for the expansion but it hopes to offer extra EDO memory in the future.

The lack of a separate cache, however, could be one of the reasons why the Toshiba is so much slower than the Viglen; other experiments have shown that second level cache performance is important to the Pentium. A more obvious reason is the hard disk performance. Windows offers 32-bit acceleration for machines with a Western Digital hard disk controller. It "hits the metal" direct and avoids all the cycle-sapping misdirection of an operating system. The Viglen has the right controller, the Toshiba does not. You should bear in mind that this only affects Windows performance.

The T4900CT is the first Toshiba machine to use the Chips & Technologies video chipset and the results are startling. Video performance on the little Toshiba proved to be as good as some of the quickest full-length boards we've seen. A desktop machine has to be able to cope with cards and needs to adhere to standards, the best of which is a 32-bit wide, 33MHz, PCI bus. The Toshiba can run at 64 bits and 50MHz.

At the price Toshiba is asking for this notebook, buyers would expect the build quality to be second to none and they won't be disappointed. I'm writing this review on the Tube. I'm tough on notebooks: I've worn them out — the hinges go, the keyboards die and pointing devices stick. Experience has taught me that Toshiba makes the toughest machines. And there is an air of quality about it. The keyboard, despite a reduced depth, feels great. The pointing device is an excellent trackpoint "nipple" with equally good supporting software, which allows it to be configured sensibly.

The T4900CT is unusual in having separate Type II and Type III PCMCIA ports. They allow you to fit a PCMCIA hard drive and a modem or network card simultaneously. The need for more capacity on a machine with an 810Mb hard disk is hard to fathom, but it's useful to have the separate 170Mb disk as a transfer medium.

Part of the luxury of a machine with such a big hard disk is ease of installation. I installed CorelDraw by LapLinking the CD-ROM onto the hard disk. The computer has high-speed serial ports with 16550 UARTs but for most comms I used a number of PCMCIA cards. The socket services were brilliant: it's the only time I've ever seen PCMCIA work the way it's supposed to. Network support isn't quite as good since Novell's client software can't cope with the

network card suddenly disappearing, but a quite obscure card which had given me trouble in another machine worked effortlessly.

The T4900 uses the Microsoft sound system and can deal with WAV and MID files. There is only one speaker so for stereo you need to plug speakers into the jacks on the side. System software support is excellent and the suspend mode is very reliable. Only two things crashed the machine: removing the network card (which is a Novell client problem and not Toshiba's fault) and Doom. The Max Time manager has been improved and now has separate settings for mains and battery-powered operation.

A particularly useful aspect of the Max Time software is its ability to predict battery life to the nearest five minutes. If the machine is on, the level of power drain (either max, a preconfigured low power setting or a user-configured one) is displayed along with a strange icon, used on all Toshibas to indicate that suspend mode is active. Battery life is a reliable two and a half hours.

The 4900CT really is more than the sum of its parts.

Conclusion

Usually, when I get to this point with any leading edge product I advise caution. Computer prices tumble and it is the prices of the fastest computers which tumble fast. But these machines will be bought by people for whom time is money, and for these people it's worth going for the best. The only technological note of caution is that DX4 machines offer much better battery life.

It's hard to recommend a five and a half thousand pound computer over a machine which is faster and two grand less, so I'll resort to a car analogy. The Viglen is the machine you'd buy if you wanted a Ford, perhaps an Escort Cosworth — very quick, very capable but with no *je ne sais quoi*; the Toshiba is an Alfa Romeo, perhaps a Zagato — quick, but not as quick as it looks: bags of style and very desirable. The Viglen is a machine you buy with your head and the Toshiba you choose with your heart. If I could afford either I'd choose the Tosh.

PCW Details

Viglen Dossier P90

Contact Viglen 0181 997 3000

Price £3,899

Toshiba T4900CT

Contact Toshiba 01932 841600

Price £5,499

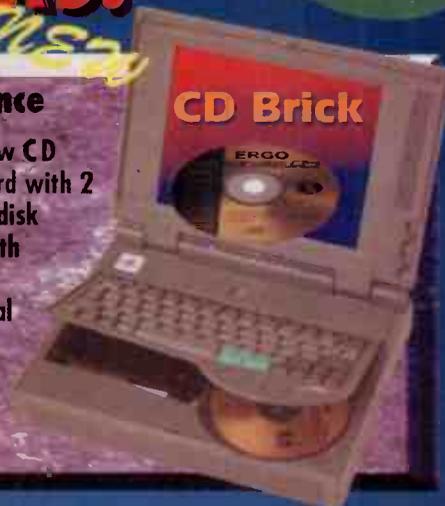


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1200

Ergo 486DX4-100MHz 3.3Volt Colour PowerBrick

Featured by the August '94 edition of Personal Computer World as "Highly commended", and by PC Magazine as appealing "to power users who need both speed and screen quality", the exceptionally well-engineered PowerBrick with its Intel 486DX4-100 CPU is a thoroughbred amongst notebooks. It's now been upgraded to include the new 16-bit Sound System sampling at 44kHz, and enhanced IDE and Parallel Interfaces. Also the Local Bus Western Digital 90C30 accelerated graphics controller the PowerBrick has outstanding video performance rated at 18 million Winmarks! Besides the two PCMCIA slots the PowerBrick comes with optional internal 14,400 fax Modem, and up to 32 MB bytes of RAM.

*Intel 486DX4-100MHz, 4MB RAM, 340MB HDD, Dual-scan.



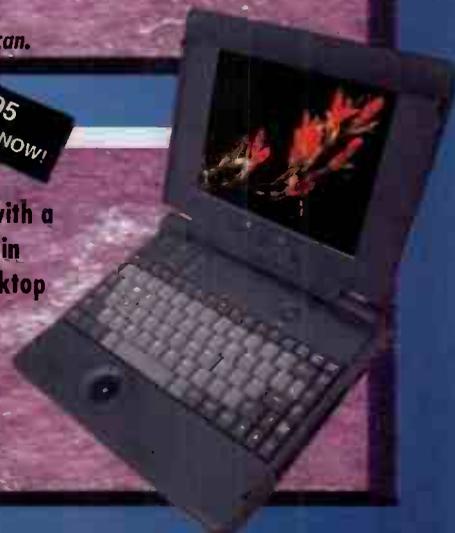
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Ergo's Pentium P-90 Notebook

The EnergyBrick Pentium 90 Mhz 3.3Volt Notebook offers the ultimate in portable power with a specification matching the very best of desktop Pentium computers. Reviewed by PC Direct in October '94 as a DX4-100MHz offering "many features usually only found in Powerful desktop machines". On the road you have 810MB Hard disk capacity, full Local Bus technology, Graphics accelerator, PCMCIA III and a 16-Bit sound system. In the office the 4 slot docking station (2 VESA) also has built in SCSI, Stereo Speakers, and 3.5ins and 5.25ins drive bays ensuring you stay on top of your-desk bound cousins!

*Intel Pentium 90MHz, 8MB RAM, 340MB HDD, Mono Display.



All Ergo notebooks are equipped with 32-bit Local Bus Graphics, 1024 x 768 x 256 CRT, 4 - 36MB RAM, up to 810MB HDD, TFT active, Dual Scan, or Mono displays, NiMH batteries, and 2 PCMCIA Type II/III slots. Included in the price are a smart shoulder bag, leatherette briefcase sleeve, a Microsoft profile mouse, a power supply/charger and a one year warranty which can be extended to 5 years.



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Chip wars

Few battles in the IT world are being as closely fought as the one currently raging between Cyrix and Intel. But with Cyrix working overtime to release its promising new M1 586 processor, it could finally give the much larger company something to worry about, writes **Simon Rockman.**

When you visit most companies they usually talk about themselves. When you visit Cyrix in Dallas they talk about Intel. There is constant paranoia — the reception has a garden-type area with a tombstone reading "Intel inside RIP". Posters on the wall show the senior management as "Intel busters" with Intel's CEO as the ghost.

Looking at the figures makes it all seem a little crazy. Intel's profits are four times Cyrix's turnover, but when you are talking millions of dollars the business is worth having.

Getting sensible figures out of Intel is impossible, but Cyrix estimates that each Pentium chip costs Intel around \$60 to make — although other estimates quote twice that figure. Still, with a retail price of around \$400 and a market of around 20 million chips in 1995, you can see why Cyrix is doing very nicely with a one-percent market share of 486 processors which, being smaller, have an even better margin. Aiming for one percent may not sound ambitious, but Cyrix doesn't think even that will be possible in 1995. Its new 586 chip, the M1, is running a year late and we won't see M1-based PCs until June.

Successfully getting the M1 onto the market is crucial for the future of Cyrix. Steve Domenik, VP of Marketing, says: "The three most important things for Cyrix to do are M1, M1 and M1." The M1 is touted as "the chip the designers always wanted to make" and accounts for the

weird Cyrix numbering policy. The first microprocessor, the M0.5, was deemed to be halfway there, but in time the 486 project became known as the M5. This was followed by M6 and M7. But the new chip isn't a progression, it is the new one, hence the M1.

How the delays occurred

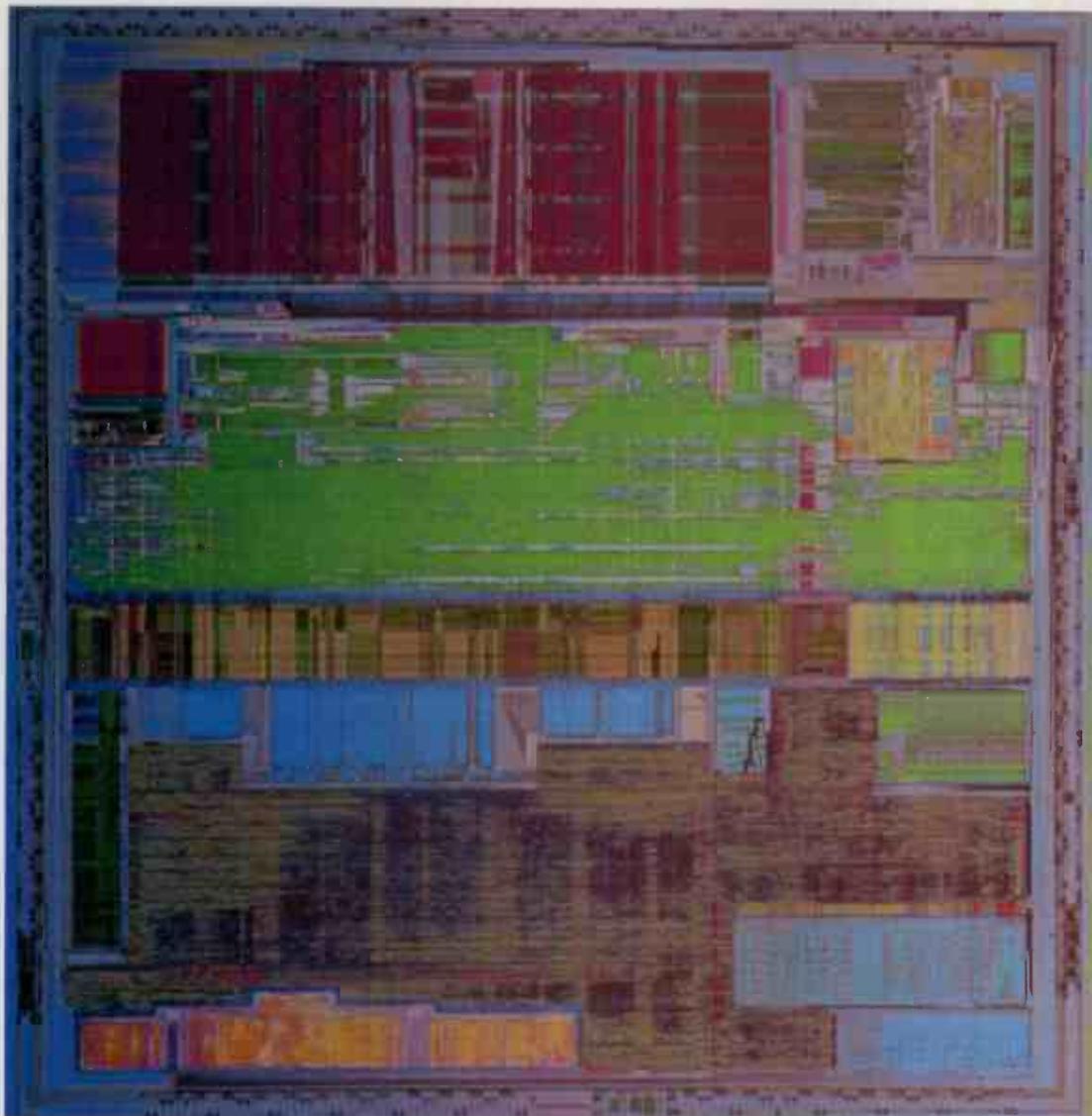
The M1 delays are attributed to two sets of problems: software and Intel. Chips are designed using standard tools which show where the gates go on the chip and juggle all the parts so that they fit together in the most compact way possible. Parts dealing with power need to be near the pins at the edges, and you want some areas very close together to cut down the time it takes for signals to get down the wires. Even at the speed of light the tiniest of distances can make a huge difference. This sub-micron engineering is incredible — the Lord's Prayer on the head of a pin has nothing on what the engineers in Dallas consider part of a day's work. To fit all the parts into the optimal positions, special routing software is used. This runs on Sun workstations but there is a precedent of using other makers' computers to design systems. Apple uses a Cray supercomputer to design Macs and Cray uses Macs to design its supercomputers.

The routing software takes the logical design and positions the gates on the silicon. The closer the gates, the smaller the chip; and smaller is better, not just

because it takes less time for signals to go down the wires, but because the nature of chip manufacture makes it far more efficient to make smaller chips. So the routing software optimises for size. The slightest change, the addition or removal of a few gates, can make a huge difference to the size and efficiency of the design, and Cyrix had a lot of problems getting the software to work with the 3.3 million-transistor design of the M1. It turned out that there was a bug which occurred with 256 design objects, and the bug took months to identify. The final design needed 2Gb RAM to complete the routing operation.

The Intel problem was more conventional. Once the Pentium started shipping, the Cyrix designers started looking at its strengths and weaknesses. They looked at how it performed against their theoretical models of how the M1 would work and set about making improvements in their design. M1 will be a year or so behind Pentium so it has to be faster. Cyrix claims 30 percent more performance for the same clockspeed.

Cyrix claims to be able to do this, on a smaller budget, by being cleverer than Intel, and is fond of pointing out that Intel's R&D budget for telecommunications is bigger than Compaq's entire development budget. It claims to be five times more efficient on R&D than Intel. But then, Intel is looking to a lot of markets, whereas Cyrix only wants a slice of the PC CPU market where the standard



is now the software, regardless of whose processor is running it. Cyrix is not interested in the embedded controller market, where the PowerPC is dominating.

Despite this, there are other projects underway. There are plans for an M2, of course, but perhaps the most interesting is an attempt by a team of system designers in Colorado to look again at the fundamental design of the PC. If they can get around the clunky design IBM put together in a hurry ten years ago but can still run the same software, it could free Cyrix from the long battles with Intel.

Original design

Cyrix has spent a lot of time and money in legal battles with Intel. This, and the need for product differentiation led to an original design, and they developed the Cyrix patent portfolio. Cyrix has always done well in court and there has never been an issue over microcode. Litigation seems to be calming down now, but that

wasn't the case in the early days. The maths co-processor case cost between \$5m and \$10m at a time when Cyrix was only turning over \$30m. Cyrix won for \$5m.

This allows Cyrix to get on with making chips. But Cyrix doesn't actually make them. Like a large number of chip companies, it is fab-less. The chips are made by SGS Thompson and IBM. There was an earlier arrangement with Texas Instruments, but after a series of disputes the agreement collapsed. After this, Cyrix planned to have a joint partnership with SGS Thompson but IBM offered a five-year arrangement. If they build a wafer for Cyrix, IBM can build one for themselves. IBM has a licence to make Intel 386 and 486 processors, but the licence limits these to being sold as whole motherboards. There is no such restriction on chips IBM makes for Cyrix. IBM doesn't currently use Cyrix's 486 chips, though it makes them for Cyrix. It

is widely believed that IBM will use Cyrix's 586-class chips, though, especially since it announced it was to stop shipping Pentium machines as a result of the bug in the floating point arithmetic.

Even if IBM doesn't become a Cyrix customer, the deal is great for Cyrix. IBM is a huge company and will be able to sell chips into markets that Cyrix, with just 250 people, cannot reach. A more important issue is one of credibility. If IBM is so fussy that it will not sell Pentiums but will stand behind the M1, the other major manufacturers are likely to take the small company from Dallas more seriously.

The chips are made at one of IBM's Burlington fabs, which also make Blue Lightning and PowerPC. There is tremendous capacity which goes some way to countering critics' arguments that Cyrix can never pose a real threat to Intel, which has nine fabs.

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straight purchase of capacity. Cyrix owns a lot of equipment in the plant which it has paid for through a complicated finance deal using a loan from IBM. The first batch of M1 chips have been built by SGS on a 0.6-micron scale and IBM has 0.5-micron capacity. SGS is rapidly moving to 0.5 while IBM will move to 0.35 this year. This will increase the number of chips per wafer significantly — IBM currently gets around 200 of the 486 chips per wafer and should get 70 M1's per wafer when initial production starts. The two sources and IBM's wide spread of processes and technologies give Cyrix, a \$250 million company, the resources of a \$2 billion company.

Doing battle with Intel

The PC market is maturing at different rates around the world and Cyrix sees this as a way to do battle with the might of Intel. Cyrix has become more international with the US share of sales dropping from 74 percent in 1991 to 48 percent in 1994. The South American (Brazil and Argentina) market is booming, and Cyrix has 30 percent of that, helped by the market being slightly trailing edge, since Cyrix doesn't yet have a Pentium rival ready for sale.

Traditionally, Cyrix has been seen as an upgrade manufacturer, with its 386 to 486 upgrade chip. This is still proving popular with 386 notebook owners who like the extra speed.

A very large quantity of upgrades were sold to IBM, which uses Cyrix upgrades internally — not for resale. There are rumours of an M1-type chip which will plug into a 486 socket, like Intel's much delayed P24T or "Pentium Overdrive", but if Intel is having compatibility problems after laying down the initial guidelines then it's a much harder task for Cyrix.

It looks as though 1995 will be the most interesting year yet for Cyrix, particularly since IBM announced that it was to stop shipping Pentiums. Paul Rubin, general manager of the Desktop Business Unit, was looking for 20 percent growth in 1995. He thinks that the world market is more conservative than Intel claims and that there's resistance to change, so he expects that only 20 million Pentium processors will be sold in 1995 and that Pentium sales will not overtake the 486 until next year. Naturally, Intel expects the changeover much sooner (this summer) and that may well be the case in the faster developing

markets like the UK. But Mr Rubin has a vested interest. Chip development takes time. Cyrix claims that their advanced software and the skill of their engineers helps cut lead times but they do not have the "Quickturn" hardware Intel uses to simulate and debug chips.

These lead times mean that the M1 will not be significant in 1995 and will have to compete with the Intel P55C — the 120MHz and 150MHz Pentium. Hundred-megahertz Pentiums using the current design are difficult to build and so the P55C is a design revision to make it easier to clock the chip faster.

The initial M1 should work well against the next generation of Pentiums, since Cyrix claim a 30 percent speed advantage at a given clock speed. The first M1s will run at 100MHz and so should be equivalent to a 130MHz Pentium. Intel's other new chip, the 75MHz Pentium, will be the mainstream Intel product for the second half of 1995 as higher-end purchases slow in anticipation of the 120/150MHz parts.

Cyrix and AMD won't have 586 rivals until the second half of 1995, and even then the combined volumes won't be enough to affect Intel, but come 1996 we may see a significant shift. IBM has a

Small Is Beautiful

When it comes to chip manufacture, size is everything. And smaller is better. The smaller the chip, the less time it takes for a signal to travel across it, and more importantly, the greater the likelihood that it will work. Chips are etched onto wafers, slices of very pure silicon, but however careful the manufacturers have been in growing the crystals there will always be some microscopic impurities. Only chips which lie in between these impurities will work. If a chip took up the whole of a wafer there would always be some impurities and the chip would never work. If the chips were tiny, only just bigger than the impurities, then only the very few which covered the bad areas would be affected, and the number of good chips would be very high. The way square chips fit onto a round wafer means that as the size of the chip halves, the number which can be fitted on quadruples so there is a constant need to make chips as small as possible, and the wafers

as big as possible to reduce the waste around the edge. Wafers used to be 3in and 5in in diameter, but now the most modern plants run by companies like Intel and IBM use 8in wafers.

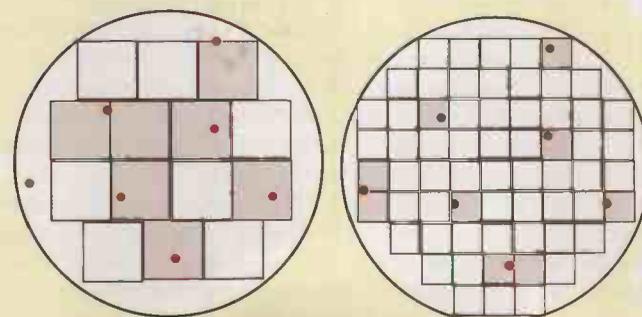
One way to make the chip smaller is by improving the routing — the way in which the different elements of the chip are wired together. Most manufacturers, including Intel and SGS Thompson, use a three-layer system

where three sets of tracks are laid one on top of the other. The IBM process allows for up to five layers, so some routes can be very much shorter, with a fourth layer taking direct lines rather than having to work around components.

Cyrix will improve the yield on the M1 chip with an optical shrink. This is good for about 20 percent, and then a re-routing using four layers will give a further 27 percent. This will allow Cyrix to narrow the gap with Intel in the size stakes — the M1 is currently very much bigger than a Pentium — but Intel will also be moving ahead.

There have been attempts to avoid the process of building lots of chips on silicon slices, cutting them up and wiring them all together. The technique, known as Wafer Scale Integration, puts the design for the whole computer on a single wafer with smart circuitry and redundancy to identify the flaws. But the projects, which have been going, on and off, for 10 years, have so far failed to produce commercially viable computers.

Defect Density Reduces Yield



50% success

Larger die = Lower yield

82% success

Smaller die = Larger yield

loyalty to Cyrix and NexGen, the company which made Intel could be instrumental in breaking it. Compaq has been quite vocal in its disdain of Intel's branding, which backfired with the Pentium bug. The move to a Cyrix or AMD chip in the 586 class will ultimately be down to price, but one Compaq spokesman believes it is a matter of "when" rather than "if".

By the time this happens, Intel will have the P6, an even more advanced processor with two chips in the package. As with all new high-end Intel chips this will initially be positioned as a processor for servers. Sample boards which PCW has seen use two P6 chips. Initially these will be in short supply — it is estimated that they will only be able to make between 400,000 and 1.5 million P6's in 1996. This has to be contrasted with Intel's production of 90 and 100MHz

Pentiums. Intel can make 1.5 million of these per month now and by the end of 1995 this should have risen to 2.5 million per month.

Over the next year or so there is likely to be a game of cat and mouse between Pentium and its rivals as to which is faster. Differences between announcements and availability will probably mean that everyone will claim to be ahead all the time, particularly since there will be aggressive cost reduction and performance enhancement activities underway for 1995 production.

Cyrix needs to get the size of the chip down. The M1 is 70 percent bigger than the Pentium so Intel can build a Pentium for less than Cyrix can build an M1, but Intel's pricing is not based on cost, but on what the market will bear — a good position to be in when you have a virtual monopoly. More competition will bring

prices down but Cyrix does not intend to cheapen the part and won't underprice as well as over-perform. Whatever you believe it costs Intel to build a Pentium (P90) — \$60 or double that — there's plenty of potential profit for Intel and the other chip companies. The processor cost of a PC is rising as a percentage of the hardware cost.

It's desperately sad for Cyrix that the M1 is six months late. If it had been shipping when the furore over the Pentium FDIV bug broke out then it would have been in a position to snap up market share. Even with Intel's policy of fighting the fire with petrol it seems that the situation will be under control by the time the M1 is ready. While we have seen a chip, we have not been able to test it. Cyrix say that while it will boot DOS and run Windows, it isn't ready and will take some time. We wait with baited benchmarks.

The M1 in Depth

Cyrix is billing the M1 as "The fastest 586 for the ultimate PC in 1995". It's a physically big chip at 17mm square using a 0.5-micron die, but there are two ways to shrink — optical and more layers. The M1 was originally designed as a three layer design without a fab in mind. It will be smaller as a four layer system and this will increase yield. The layer shrink will reduce the size of the die by 27%. This will happen before the end of 1995.

The M1 is a more complex part than the Pentium, with super-pipelines and register renaming. The pipeline is seven stages long, including pre-fetch; Pentium has five stages. The larger number reduces the amount of logic needed for each stage and the reduced logic runs faster. This cuts the propagation and allows the clock frequency to be stepped up.

The disadvantage is that it is worse at dealing with misprediction because the pipeline has to be flushed. To alleviate this problem there is a very reliable branch prediction algorithm. Cyrix expects better than 90 percent branch prediction accuracy. This is very important in the optimisation and is part of the reason why the chip should have better performance than the Pentium.

A second reason is the 16kb unified cache, dual-ported to the execution and floating point units so that one part of the chip can insert data while another reads it. Pentium has two 8kb caches (known as a Harvard cache), one each for data and instructions. This is great for code which jumps around a lot, but if you have a longer than 8kb loop or more than 8kb of data you will pay a significant performance penalty. Cyrix's approach, sharing the cache between instructions and data, can slow down the speed at which instructions are pulled out so it has a separate, 256-byte instruction buffer called an instruction line cache.

Register renaming is M1's key to running existing code faster. It uses a system known as data forwarding. The superscalar designs of chips like the Pentium, Cyrix's M1 and AMD's K5 allow them to work on several instructions at a time in parallel, but if one instruction needs data which is further up the pipeline, the execution unit will stall waiting for that data. This causes a hiatus in one of the two (or in the case of the K5, four) execution units. The lack of activity is known as a "bubble". If you know what the data will be in a later operation, but it has not yet been put there, it can be fed down both pipes and used early — no bubble.

The maths performance of the M1 is boosted by speculative

execution, which should give a big performance boost in floating point operations. Up to four floats can be issued at a time (a Pentium would stall). Since the floating point unit reads ahead of the program to pull out the floating point calculations, it may have the answer to a problem before the execution unit even knows what the question is. The results have to be held until the possible contentions are cleared up. This requires eight write buffers to store the answers. All floating point goes down the "x" pipe, the first pipeline, since this has a hardware multiplier. Some instructions (such as repeat string move) goes down both pipes simultaneously.

A final trick in the M1's armoury is out-of-order completion. If an instruction requires data from main (non-cache) memory, then other instructions can "push ahead in the queue".

All these engineering tricks have led Cyrix to expect 30 to 50 percent better performance than a Pentium at the same clockspeed, and experiments with the first chips to come off both the SGS and IBM production lines have borne this out. There will be aggressive testing of the hardware, but with discretion being the better part of valour, the ship date slipped from a projected April to June.

While most of the pins on the M1 are the same, some of the debugging and testing pins are different. There is a different setup for the cache burst mode which has as much to do with Intel copyright as with optimal performance for the different cache design on the M1. The differences mean that an M1 will not plug straight into an existing motherboard, but Cyrix has been working with a number of motherboard designers to produce systems which can take both, and claims the changes necessary to make this so are minor. M1-ready motherboards are likely to be available, and sold with Pentiums, well in advance of processor availability. To ensure that there is a good market for their chips, the engineers at Cyrix do some PC design, both in Dallas and Taiwan.

It should be easy to build a motherboard which will take an M1, and a P54C which makes single chip configurations simple, but there are complications involved in multiprocessor systems. Initial testing was impossible because they only had one working chip, but even before getting to that stage there were implementation problems. Most symmetrical multiprocessor systems use a system called APIC, but the M1 uses its own SMP system called SLIC/MP, a small (1500-gate) external chip. This is because Intel has a number of patents and licence agreements on the APIC design and a vendor would be open to litigation if the Intel APIC chips were used with a Cyrix M1 processor.

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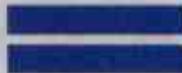
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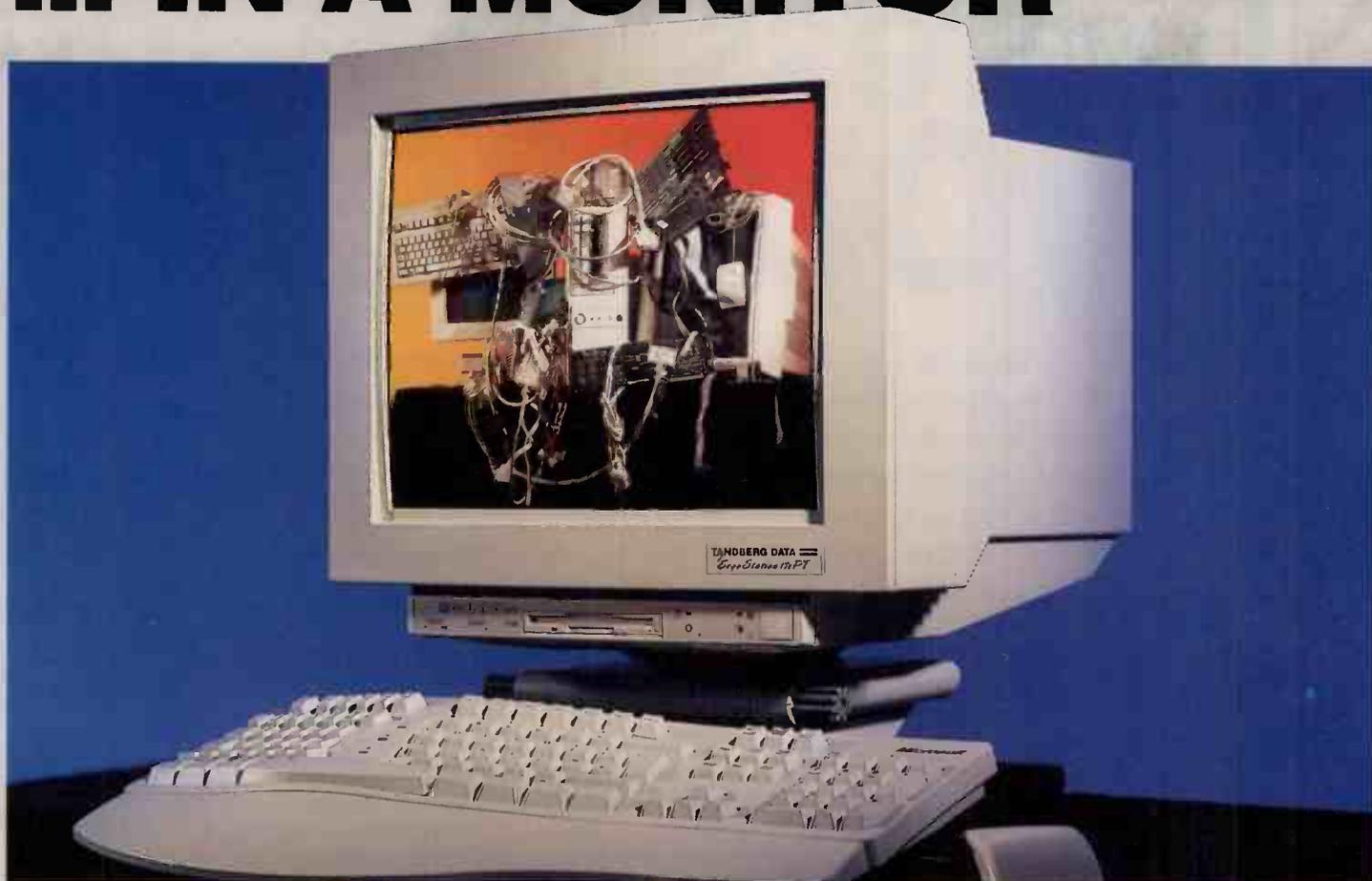
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Express yourself

There's no getting away from it: the digital revolution has changed the way artists work forever. And the technologically aware generation is interacting with music in a very different way from their parents. Wendy M Grossman joins the sombre-suited industry figures at MIT for a day of digital expression.

MUSIC TO YOUR EARS

There's a yellow and white striped marquee outside MIT's Kresge Auditorium and a buzz in the lobby as people rush to check in their coats. The press room is deserted. One guard hovers over a bunch of empty school desks and a coat rack; no phones. You take your stuffed press pack and find a seat. You open the programme. Who's got their Walkman on full blast?

The noise — tinny clapping and cheering — is coming from the programme, which has a recording chip in it, the sort of thing they now put in greetings cards. A number of people used their programme to collect autographs — or maybe autobytes would be a better word — from the bigger names on the bill.

The day of panel discussions and demonstrations is hosted by MIT's Media Lab. The title: "Digital Expression: Are we Witnessing the Beginning of a Technically Mediated Renaissance of the Arts?" The date: 20th October 1994.

9am: Active meaning

This first panel is the day's MC, ABC news correspondent John Hockenberry;

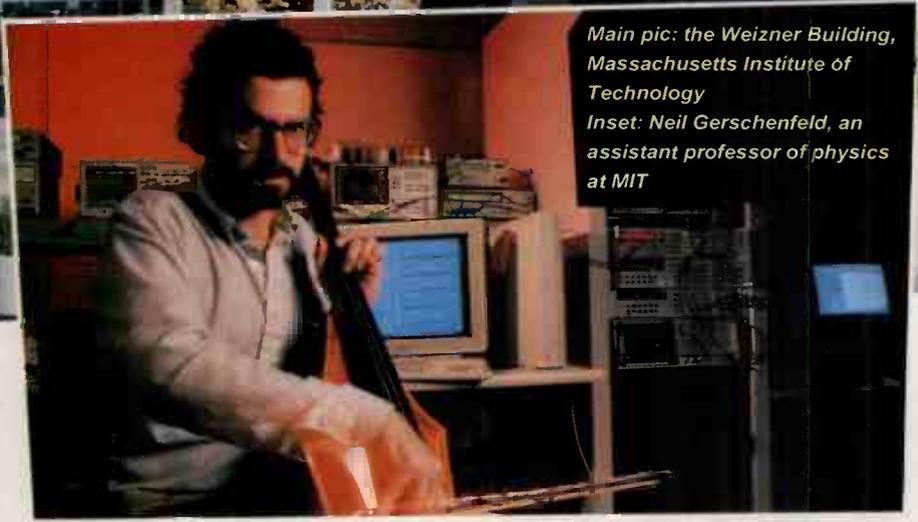
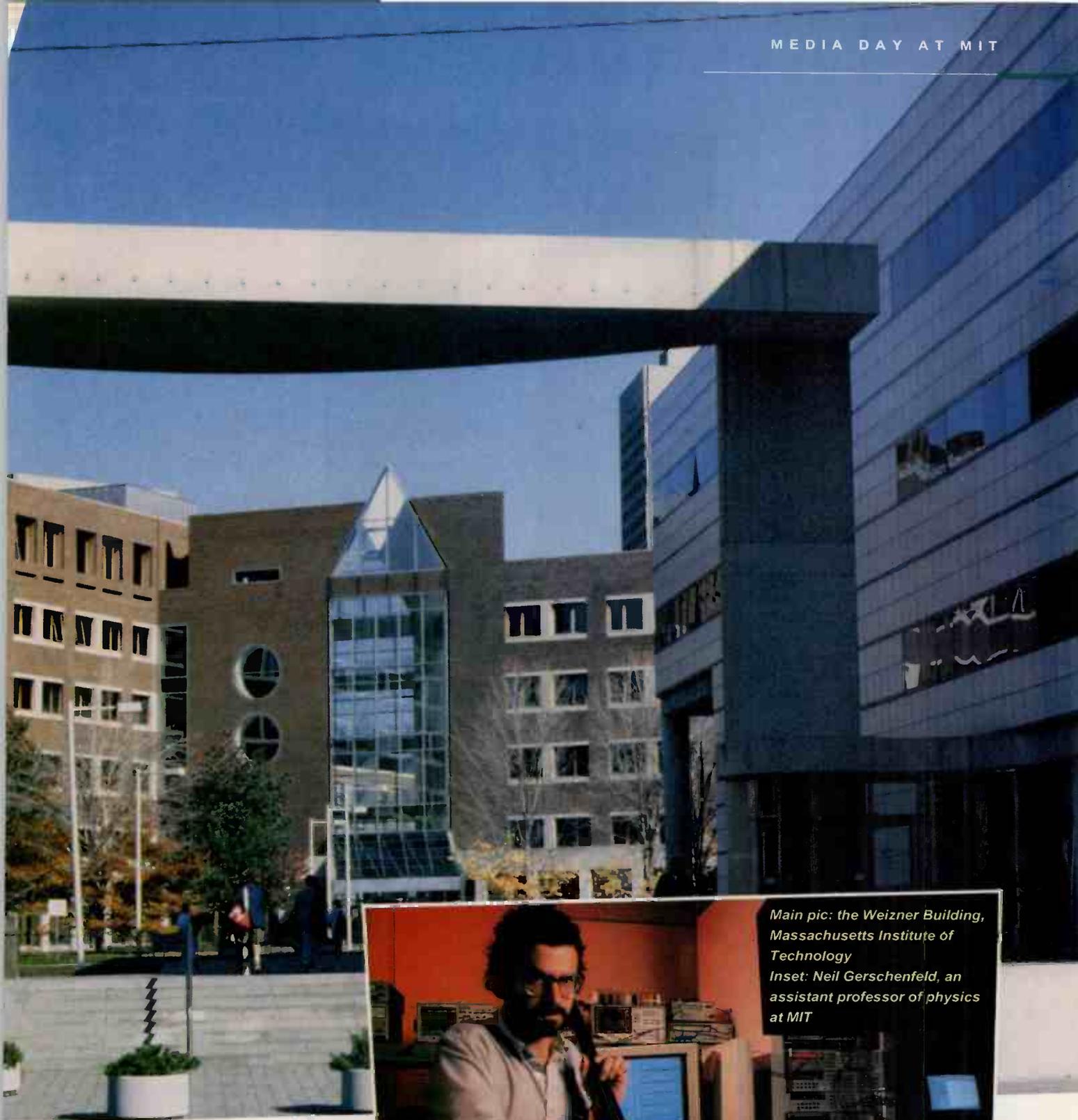
sports director Peter Sellars; pop performer Peter Gabriel; composer and Media Lab researcher Tod Machover; and performance artist Laurie Anderson. A short introduction from the president of MIT, Charles M Vest, stresses the importance of cross-disciplinary research.

The subject is interaction. Machover claims it's only in the last few decades that music has become passive. Every child used to be taught to play an instrument; anyone of any intellectual pretensions played the piano and people sang in church. I find out later that Machover and I share similar backgrounds before he went to Juilliard and I became a folksinger. What he is talking about is alien: everyone I know plays music at one level or another, whether it's the French horn in the local band or noodling on a keyboard hooked to a MIDI interface. But Juilliard may have something to do with it. Machover says the Juilliard ideal is Beethoven: everything happens in your head and you just write it down and hand the score to the orchestra to play.

Machover is working on hyperinstruments, electronically

extended versions of familiar gadgets like violins and cellos, in collaboration with musicians like Yo-Yo Ma — but his dream is to create new ones altogether. It's tricky. You want the instrument to be easy to use, but challenging enough to inspire people to keep practising and improving. He's excited that technology makes it possible for an artist to send a composition out unfinished and let the audience finish, shape or change the work.

These themes are taken up by the other panellists. Peter Gabriel works differently now that he can experiment with a drum machine than when he had to argue with a drummer to hear the sounds in his head. Peter Sellars is more excited about the scope for documenting human experience that still can't be discussed in public forums, or if they're discussed at all are reduced to their simplest denominators. It's obvious to everyone that Sellars was made for Usenet but he says



*Main pic: the Weizner Building, Massachusetts Institute of Technology
Inset: Neil Gerschenfeld, an assistant professor of physics at MIT*

he can't use computers, although he loves the romance of technology. Hock-enberry captions him, as if for an Oprah show: "Can't use computers."

What scares Laurie Anderson is the same thing that scared her when recording equipment became available to people at home: that people will create all this great stuff that no one will ever see or hear. She has recently discovered Mosaic and loves it, comparing it to the early days of cable TV when all sorts of things got on the air, to be cut off as the market grew. She is afraid of the Internet being turned into shrinkwrapped

packages.

But everyone agrees, there's a generation of people growing up with technology who don't have the same fear of exploring and trying things that their parents have. The relationship between information and experience is changing radically. Remember, Sellars says, the Middle Ages, when learning something

might cost two years of pilgrimage.

Meanwhile, it's hard not to notice that the artists may be breaking new frontiers but the day's programme is an audience listening to speakers and asking polite questions. And there's another question: why is everyone wearing black?

11am: Artistic appliances
It's an odd blend: Nolan Bushnell,

founder of Atari; Max Mathews, a Stanford professor and one of the founders of computer music; Douglas Trumbull, vice-chairman of Imax and president and CEO of Ridefilm; and Neil Gershenfeld, an assistant professor in physics at MIT.

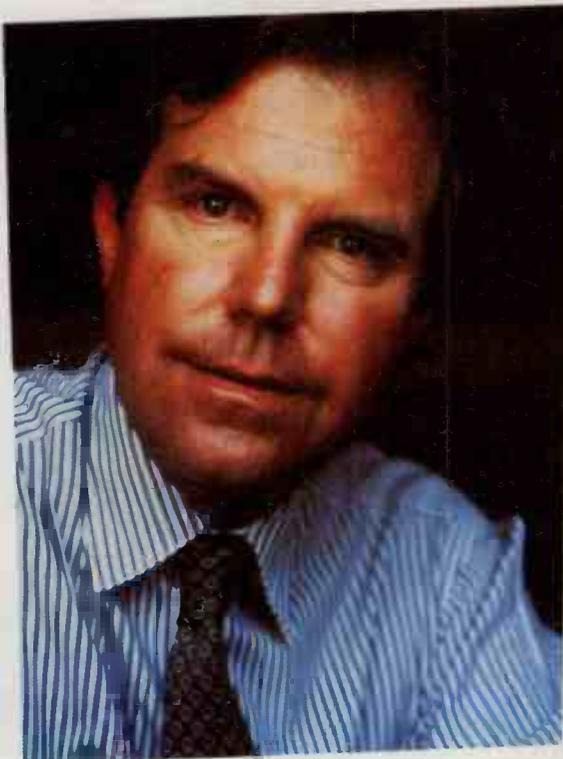
This is the most technical panel of the day and Gershenfeld, who kicks off, is the most difficult to understand. He's been researching ways to measure the movements musicians use in playing their instruments, and finding it unexpectedly difficult: it's hard to attach electronics to a violin bow without interfering with its movement. Gershenfeld also provides the electronics that make Machover's hyperinstruments possible. He demonstrates the work he's been doing on sensors by waving his hand over one to change slides while he talks. These are small receivers and transmitters that set up electrical fields; a board measures the disturbance made by his hand.

Bushnell is a lot easier: he tells the story of video games from early attempts to Pong, a hilarious story of failures and successes. One of his slides highlights an early problem that had to be extensively debugged: "I have found the problem and I think it is something we can fix. The coin box is too small." Another illustrates the perfect user manual: "Insert quarter. Ball serves automatically. Avoid missing ball for high score."

And yet Pong wasn't instantly successful: for four months they tried to sell the game to Sears, Toys R Us and Radio Shack. It was a new category: not technical enough for Radio Shack, too expensive for Sears, too risky for Toys. Eventually they sold it to sporting goods retailers; the rest is a history of 2.5 million units sold and then Atari's self-destruction through stasis...

Bushnell makes a prediction, that this Christmas will see the beginnings of what will become a movement of networked games. By the year 2000, he says, we'll be seeing cybersports leagues, people playing on teams of 10,000 for their home towns, interacting on a global scale. And why not? Doom already paralyses plenty of networks at lunchtime just within London.

Max Mathews starts by playing two samples of synthesised music. The first is a scale, synthesised in 1957 on an IBM 5704 computer. Mathews characterises it as "absolutely terrible", and he's being kind. The second is a section from the



Nicholas Negroponte, director and founder of the MIT Media Lab

Queen of the Night, the most difficult coloratura aria in the repertoire. The liquid singer is synthesised, the piano is real. When you hear it, you wonder whether Mathews is playing tricks and it's the piano that's synthesised; perhaps there were differences in recording technique.

Mathews then traces how scientists got from point A to point B. First was programming, giving musicians a graphical language in which they could work and compose. Second was understanding musical timbres; the differences in attack, decay, and tone that characterise specific sounds. This was more difficult to synthesise than anyone expected: it turns out that musical sounds aren't steady-state affairs but vary over time. Next was efficient algorithms. These, combined with chip making methods and investment and marketing from Yamaha, brought the cost of systems down from \$100,000 to \$2,000. But, Mathews says, the problem with many commercial synthesisers is the loss of the programmability you had on the earliest machines. If a composer writes a piece for this year's model, next year's may be completely different (a problem pianos don't have).

Like Gershenfeld, Mathews is studying electric field sensing and he's experimenting with specially wired batons. But the context is different. While Machover and Gershenfeld are

using real instruments and tapping into the virtuosity and training of world-class performers, he is working with "instruments" that have no trained performers to work with.

"I believe," he finishes up, "that computers have the potential to do anything. But it's vital to ask computers only to do things humans do not want to do." He himself might let a computer compose notes but says: "I want to control expression, because that to me is the joy of performance."

Douglas Trumbull has recently merged his two companies, Imax and Ridefilm, to sell simulator rides into retail spaces — shopping malls and other buildings. He was, he tells us, a young technical illustrator doing science-fiction book covers when he got to work on 2001, one of the

last giant screen 70mm films to be shot. He's missed ever since the immersive quality that came from such a large format: the trend has been to chop up all the theatres into small screen auditoriums. After *Brainstorm*, the last film he directed, he left the industry, moved to Berkshire, Massachusetts, and got the job to direct *Back to the Future: the Ride* for Universal Studios. That helped him find what he was looking for, through the combination of a hemispherical screen, digital sound, and physical motion.

The action is compressed in terms of time. Nonetheless, Trumbull says: "We made an effort in the ride to have the attributes of a feature film in terms of character development, dialogue and emotional content, all in only four minutes." The fun part is: "Movies talk about a threat to you or someone in the movie. In the ride you can let it happen — get eaten, crash through." It sounds great in some ways but it brings home how limited a movie like *Back to the Future* really is, if you can fit all its character development and emotional content into four minutes. "Now," he says, "is the time for creative talents to step forward to figure out what to do with the technology."

We break for lunch. Everyone in the second panel is wearing a black or dark grey suit.

2pm: Infrastructure for creativity

In his lunchtime speech, Quincy Jones traces the history of the development of music in his career. He reminisces about

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the first time he saw a Moog (pronounced "Mogue") synthesiser (Moog himself was in the audience) and talks about the importance of local rather than national and international communities. He is excited about the neighbourhood online system he's set up, called MUSIC (using technology developed at MIT) that's aimed to bring street kids back into the community.

Now we have Nicholas Negroponte, the lab's director and founder; Michael Schulhof, president of Sony America; Ray Smith, CEO of Bell Atlantic; and the actress Jane Alexander, in her role as chairman of the National Endowment of the Arts. At last, we see someone wearing something other than black or dark grey: Alexander is wearing dark blue. Apparently, artists now wear black; artists in the seventies wore wild colours and patterns. In the fifties we had Technicolor and today MTV is dominated by black and white. Today's artists are exploring technology like mad; tomorrow's artists will denounce it as gimmicky and embrace small, intimate, live human productions. The pendulum always swings.

Schulhof is bullish about the information superhighway. He has no doubt that a large percentage of network traffic will be entertainment — and Sony owns a lot of content. Distribution — cable, telephone, satellite, networking — doesn't interest Sony. Historically, Schulhof says, content owners have made more money than distributors. What Sony welcomes is the existence of many more choices for distribution routes for its programming.

The National Endowment of the Arts (NEA) is, says Jane Alexander, the R&D arm for the for-profit industry. She's concerned about access to all these developing tools for the "not-for-profit arts community"; she's equally worried about equal access for all Americans. She tells us to look at the demographics of the room we're sitting in: we do not represent the face of America. She's right, of course. The internationally famous artists on stage are a small elite and not, as Hockenberry said at one point, opposite ends of the spectrum.

Hockenberry's remark came when he was comparing Gabriel's having sold millions of his CD-ROM and Sellars' losing 75 percent of his audience every

night. But the opposite of all of them is the obscure folksinger supporting his music habit by building auditorium seats (name and address supplied on request). He probably didn't set out to be not-for-profit, although he may turn his nose up at success as a "sell-out". It reminds me of Laurie Anderson saying this morning that she's never thought a piece of her work was better just because a lot of people liked it. "In fact, I'm enough of a snob to think the reverse."

Ray Smith, the "construction foreman for the stars", is excited. Today is the day the FCC has approved the video dial tone docket: that is, the delivery of video information on open and equal access over common carriers. It means the telephone companies can deliver TV services.

"We have, he [Ray Smith] believes, 'a stupendously under-utilised creative community' in America that's been held back by finite bandwidth distribution systems. Now, it will be possible for artists to do wonderful things on a smaller palette"

"For once and for all," he says, "the scarcity of carriage has ended." Smith's company is about to roll out interactive services to include video on demand and home shopping from its production facility in Reston, Virginia — "some of the best 1s and 0s in the business," he jokes. We have, he believes, a "stupendously under-utilised creative community" in America that's been held back by finite bandwidth distribution systems. Now, it will be possible for artists to do wonderful things on a smaller palette.

Schulhof: "There's a finite reservoir of creative talent. The reason there aren't more Shakespeares isn't that people haven't tried." He is hissed by the audience but says: "We don't try to pre-empt who's successful and who's not." It's an old question: how much of a role does hype play in who makes it big and who doesn't?

Smith counters with software. Once, IBM produced about 75 percent of all the software in the US. In the eighties that all changed. Of the 100,000 programs that

"exploded" then, only one in 10,000 became Lotus 1-2-3, but the agglomeration of them changed the world. Yes, but how many software companies have disappeared in the last two years?

Negroponte: "It's the difference between atoms and bits." Schulhof is in the atoms business — movies, CDs, video cassettes. "Bits are weightless, and they travel at the speed of light and cost almost nothing to move around. When you take atoms and make them into bits, you can do things that have never been thought of before."

4pm: Really interactive

Take Gershenfeld's sensors, Machover's composing abilities, a host of computers and a specially wired chair; put them together and you get Penn and Teller in a re-enactment of a 19th century séance. The chair, which looks like a wooden throne (with shades of an electric chair) is wired with sensors. When you move your hands or feet you get flashing lights and all kinds of sounds. Machover has written a piece for the chair, which Penn performs. How much control does Penn have over what is played? Is this lip-synching or live performance? It turns out later that Penn was given general areas in which to move. How he makes those

movements is his interpretation. He can affect the standard things like dynamics and, to some extent, tone.

Then Teller comes out and is strapped into the chair. In the 19th century, mediums were "controlled" by other sitters, who touched their hands or feet. Teller is controlled by the chair. For the first segment he taps his feet alternately and you see the lights flash. If he stopped you would know. In the second segment he's silent and dark. Again, if he moved you would know. You think.

A spirit cabinet is wheeled behind him, with hanging noise makers: banjo, trumpet, pie plates, tambourine, bell box. The curtain is drawn around him. And things happen. There are trumpet noises, and pie plates tossed over the top. In one segment a jacket draped over the top of the cabinet has its pockets rifled. It's a wonderful effect and very clever, besides making an intelligent point about scepticism of certain types of claims.

Is it interactive? No. But it's a great show.

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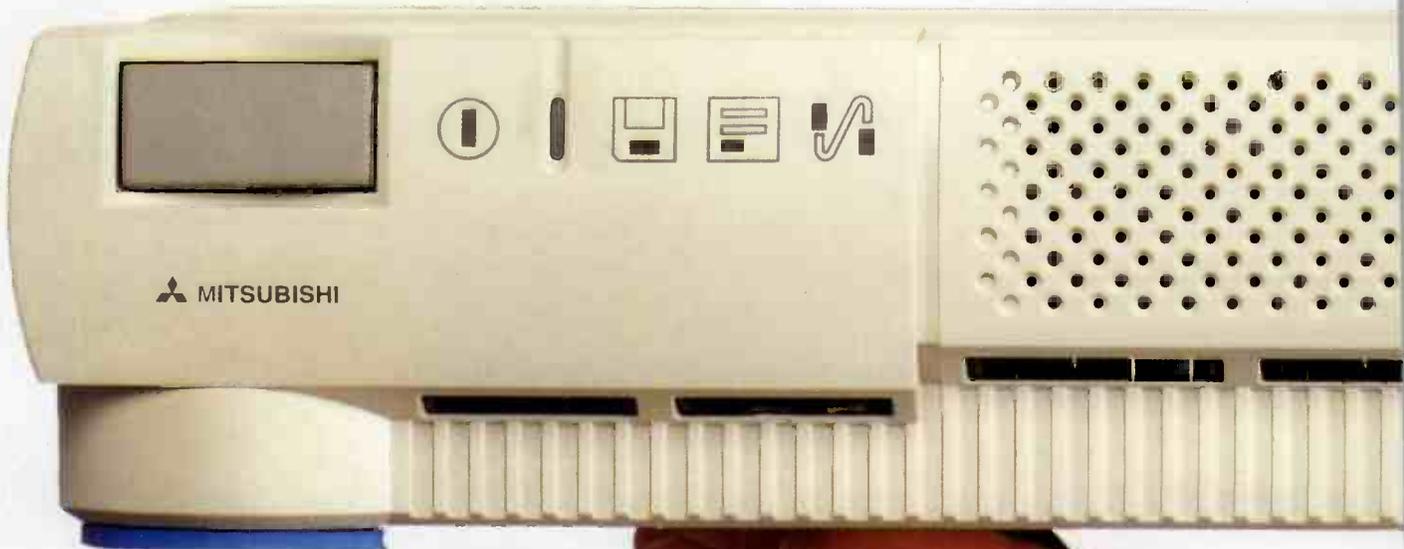
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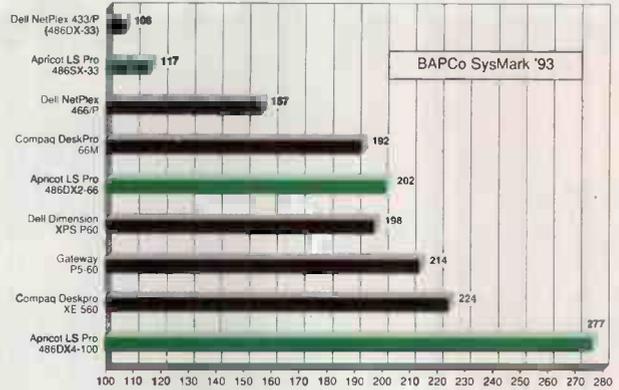
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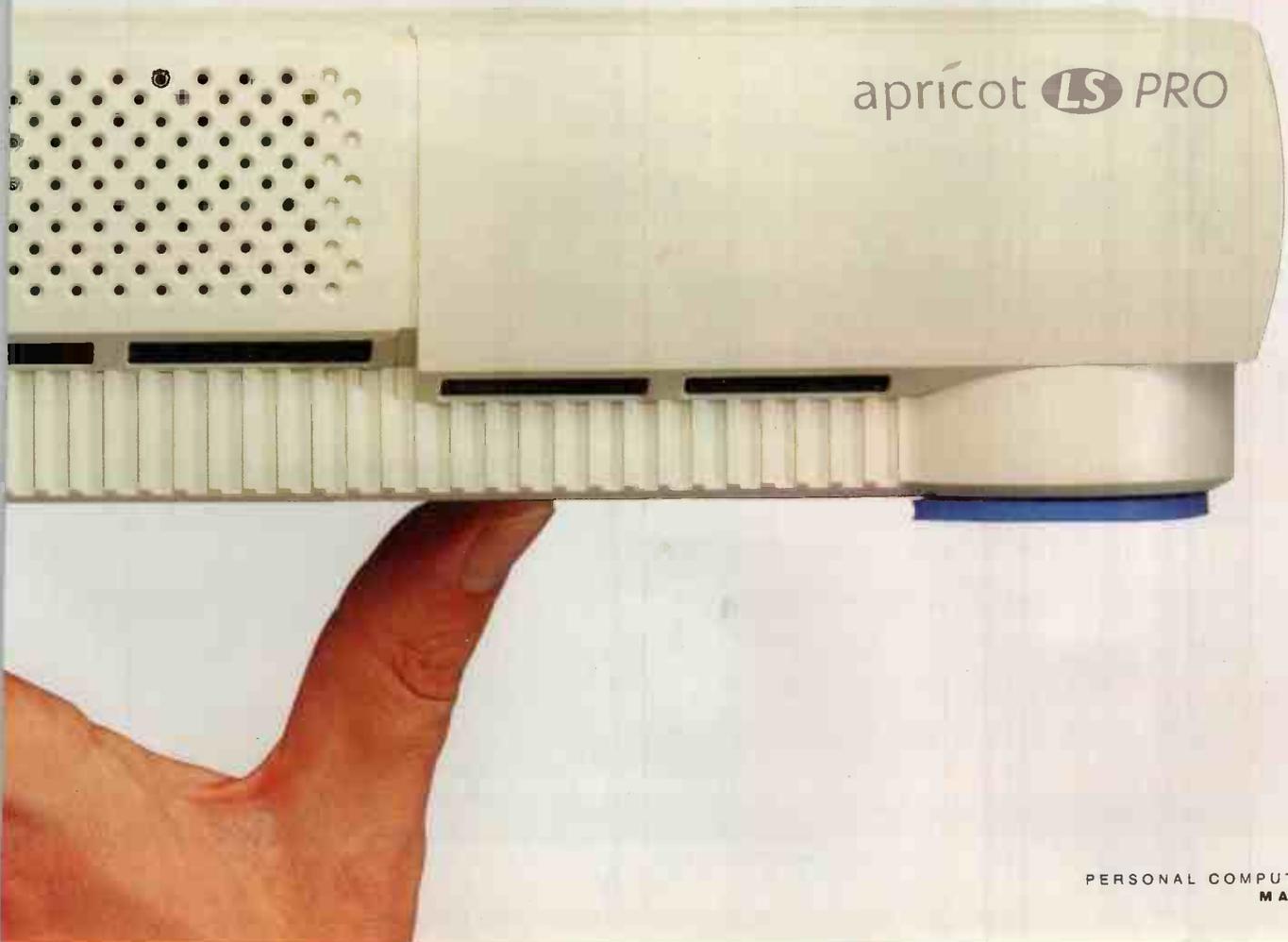
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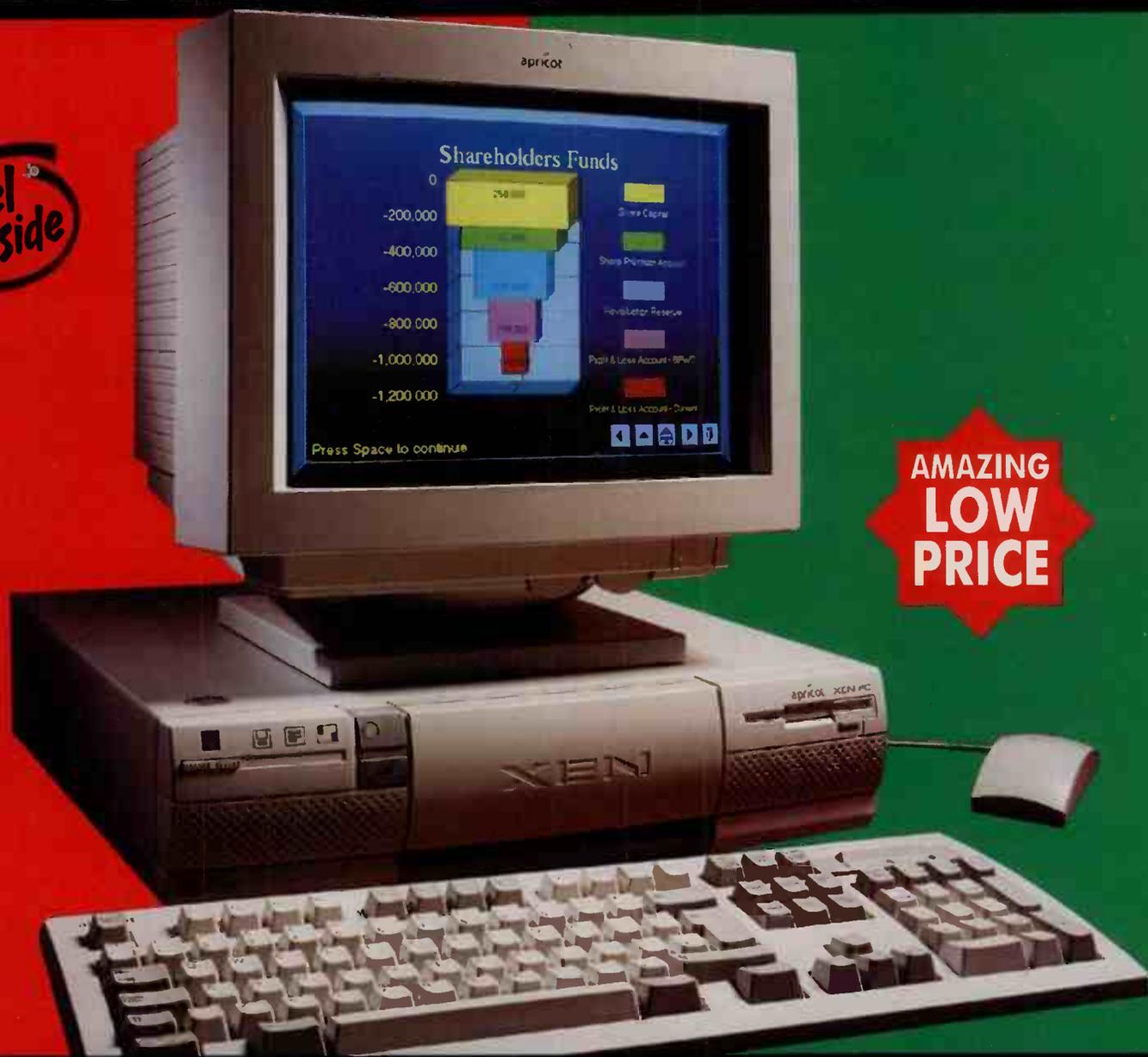
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Group Test

Small wonders

Every bit as powerful and versatile as their desktop counterparts, today's colour notebooks can provide serious computing on the move. Karl Dunkerley tested 40 of the latest models, from entry-level to power-user, and found some highly desirable hardware.

PCW Notebook Photography by David Whyte

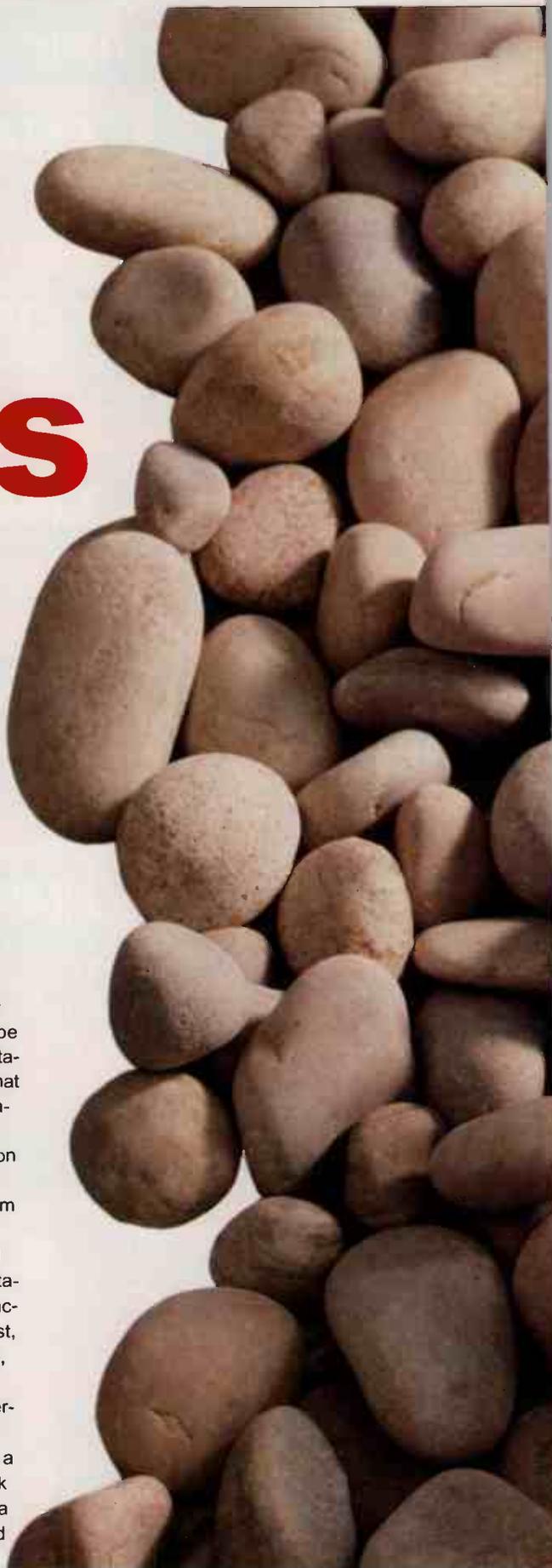
In the last year colour notebooks have taken over to the point where you'd be hard put to find a new full-sized notebook with a monochrome screen. In this group test we look at entry-level and power-user machines from most of the leading manufacturers.

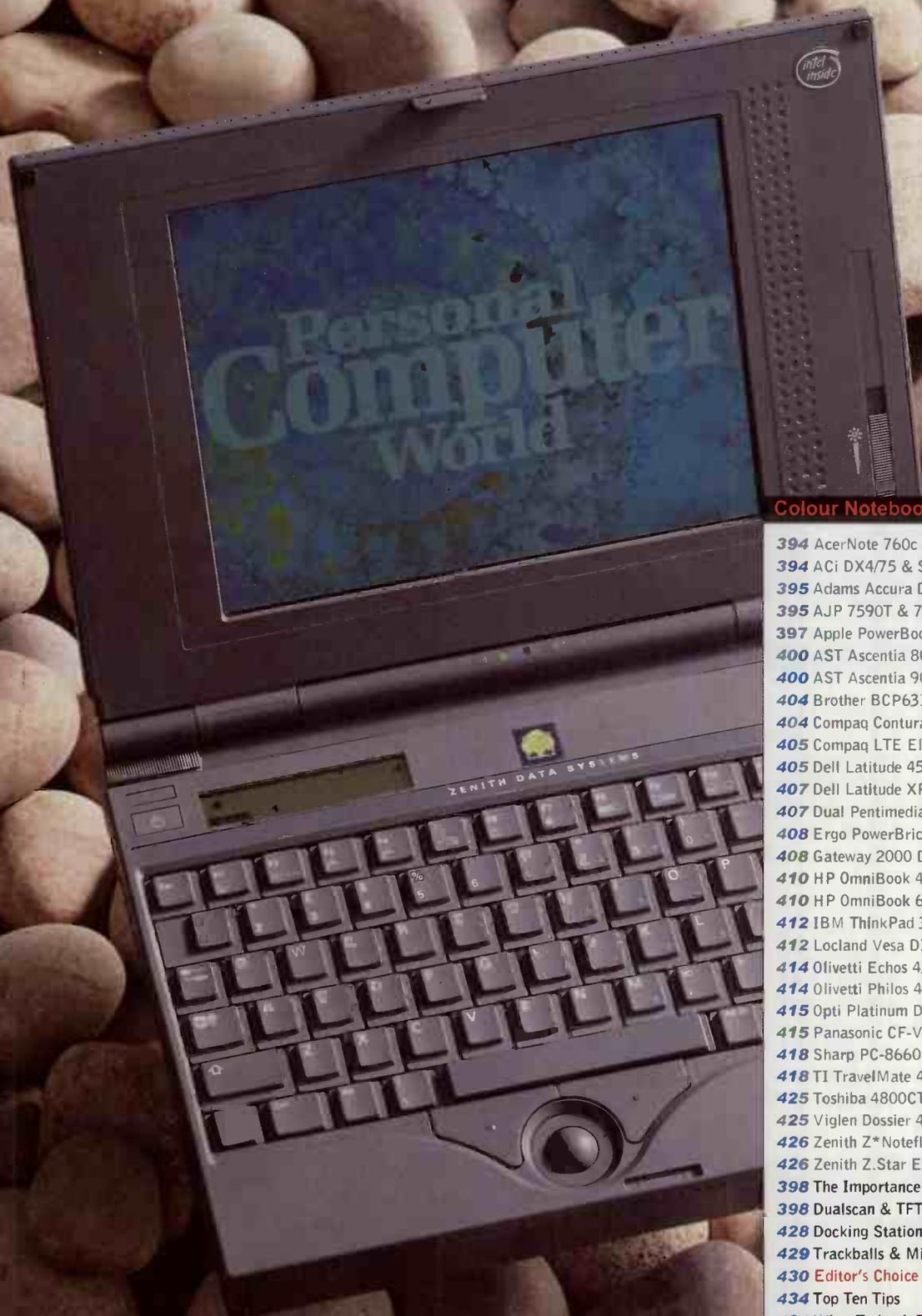
The entry level notebooks we looked at typically have a 486SX 33 or DX2\50 processor, 250 Mb hard disks, a dual-scan LCD colour screen and cost around the £1,500 mark. High-end notebooks generally have a DX4 75 or 100Mhz processor, 340-500Mb hard disks and active matrix TFT colour screens with price tags of around £3,000.

While these are typical price points it's usually possible to buy a specification that's somewhere in between by specifying the memory, processor and hard disk capacity that you require.

As well as becoming more compact, more powerful and with better battery life, today's notebooks can be hooked into a network or docking station and used for almost any task that their desktop counterparts are capable of.

In our reviews, the emphasis is on usability, because this is the most important consideration for long-term notebook use. Unlike desktop machines, where the keyboard and mouse are now fairly standard, portables come in many varieties, and factors such as the size of the wrist rest, the size and type of pointing device, the position of mouse buttons and keyboard layout all make a big difference. Don't be blinded by performance benchmarks because a well-designed, lower-spec notebook often proves more productive than a better-specified but poorly designed one.





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AcerNote 760c & 780cx

This sturdy modular notebook is built to last. The screen holds its position well and should take the vibrations of ordinary travel.

The keyboard layout is reasonably intuitive and the palm rest is deep enough to accommodate a user's wrists. The trackball is good; it has a large, free-moving sphere and big buttons which should be suitable for left and righthanded users. The floppy drive is easily accessible at the side.

Some of the expansion/upgrade ports are under the removable keyboard, with others underneath the base. Changing the processor could be a little tricky, although this isn't difficult for anyone with a little experience. The labelling of the ports lets this machine



down, as with so many others. Power management is through the BIOS which is crude but simple.

Despite having a fast processor, this feels significantly slower than other DX4/75s on test. With a range of tasks that use graphic refresh and hard disk access, as well as moving memory around a lot, there was a distinct sluggishness. Acer doesn't bundle much with this machine, which is fine for those who already have the software they need but means beginners have to buy everything extra. The 760c is supplied with only Windows 3.1.

Both models come with a choice of two screens. The TFT is a little strange. Despite being able to portray some colours strongly, the background was distinctly off-coloured rather than white. This made the colours less vibrant than otherwise and there was no richness to the image.

The dualscan screen is much bluer but the colour rendition is better. It will not handle resolutions higher than 640 x 480 at 256 colours despite having the drivers. There is slight flicker with full-screen graphics.

PCW Details



AcerNote 760c and 780cx

Contact Acer 01628 533422

Price 780cx DX4/75 16Mb/240Mb TFT £2,686; 760c SX/33 8Mb/240Mb DSTN £1,487

Good Points Sturdy and reasonably fast, with a trackball for left and righthanders.

Bad Points Neither screen is brilliant.

Conclusion This notebook feels good, but poor Windows performance and an off-colour screen spoil it.

ACi DX4/75 & SX/33

This may not look the best built portable around but it seems well constructed when in use. Rounded edges everywhere make it comfortable to handle. The screen was a little more difficult to position accurately than it should have been, but the floppy drive ejects disks smoothly.

Using the PowerBook-pioneered layout of palm rest and trackball, the unit is comfortable for the wrists and slim enough to avoid any real strain. The key layout causes the user to hit Page Down rather than Carriage Return though key response is sufficiently clear. The trackball works well enough although it could be a little bigger. The buttons, though, do not



make dragging and dropping an easy operation. Labelling is only passable.

This is the ultimate exploding portable. Virtually everything is removable and upgradable. Some parts, such as the hard disk, floppy and battery come away easily but the RAM and processor modules are tricky as well as delicate.

Power management options can be changed at a basic level through Windows Control Panel or through the BIOS for more control. The DX4/75 feels as if it is reasonably fast in the subjective test carried out. There is little in the way of frills except for audio facilities like the talking calculator which is nothing to write home about.

The TFT screen gives pleasing, rich colours if a little on the dark side. Both machines had drivers for higher than 640 x 480 at 256 colours but these had no effect.

Clarity and colour vibrancy of the dualscan screen is fine but the colour palette is limited and colours are faded. You need a combination of function and cursor control keys to alter brightness and contrast.

PCW Details



ACi DX4/75 & SX/33

Contact ACi 01625 536178

Price DX4-75 £2,500; SX-33 £1,149

Good Points Everything can be changed or upgraded.

Bad Points Lack of support for screen resolutions above 640 x 480.

Conclusion Pleasant to use and sufficiently fast. A good all-round performer.

Adams Accura DX4/100 & SX2/50

If you want modularity, almost every major component of the Accura is removable and upgradable. Some, like the hard disk, floppy and battery can be changed easily, but other parts are more awkward. Only the BIOS gives access to the power management facilities and even these are limited. The top-end machine proved very fast in our tests but more bundled software could be provided. The audio applets will be



of limited interest.

This machine is not alone in taking its cue from the Apple PowerBook layout, with the trackball centred in a palm rest in front of the keyboard. This reduces wrist strain and the well laid out keyboard helps too. The trackball works well but would benefit from larger buttons. Rounded edges make this notebook a pleasure to handle although poor hinges make don't hold the screen in position very well. The floppy drive works smoothly.

The TFT screen gives good clarity and colour vibrancy although colours tended to be dark rather than rich. The palette of colours can be up to 64kb in 640 x 480 and a 256-colour, 800 x 600 virtual screen can be set up with the drivers supplied. A number of key combinations alter brightness and contrast, as well as functions such as on/off and sleep; this was a niggle. The colours are less deeply saturated on the dualscan screen, with better graduation and shading.

PCW Details



Adams Accura DX4/100 & SX2/50

Contact Adams 0161 877 8822

Price DX4/100 20Mb/520Mb TFT £3,248; SX2/50 8Mb/250Mb DSTN £1,568

Good Points Fast; upgradability.

Bad Points Screens. Strange key combinations for important functions.

Conclusion An excellent all-rounder.



AJP 7590T & 7520D

The AJPs are among the better machines in terms of build and toughness: they feel solid and are built to last. The screen holds its position well although the floppy drive isn't particularly accessible. All the components can be upgraded.

The hard disk slides out from the underside while the memory and processor are below the keyboard. At the side are standard speaker out and mic in connectors. Power management is only through the Ami BIOS setup and this is distinctly limited: high, low, medium and off are the only available choices. The NiCad battery runs the



length of the machine, under the wrist rest.

The keyboard is well sprung and can be tilted forward using feet underneath — a handy touch for typists and anyone making presentations. The wrist rest feels a little narrow, especially as there is room on the base to move the keyboard up an inch or so. The recessed trackball is at the front. The left button is assigned as the default; as with most notebooks, swapping to the left makes it more comfortable to manipulate.

The 7590T feels fast and handles Windows with no trouble at all. Bundled with the machine are a number of generic audio applets common to many other portables, giving basic functions but nothing more. The TFT screen clarity is reasonable for Windows in VGA but a disappointment with anything else, being limited to only 640 x 480 and 256 colours. The colours available were deep and clear.

The dualscan gave a good rendition of the test graphic. Colours are strong without being muddy and the shading/dithering reasonably smooth. A worthy alternative to the TFT.

PCW Details



AJP 7590T & 7520D

Contact AJP 0181 452 9090

Price 7590T DX4/100 20Mb/340Mb TFT £2,984; 7520D SX2/50 4Mb/245Mb DSTN £1,299

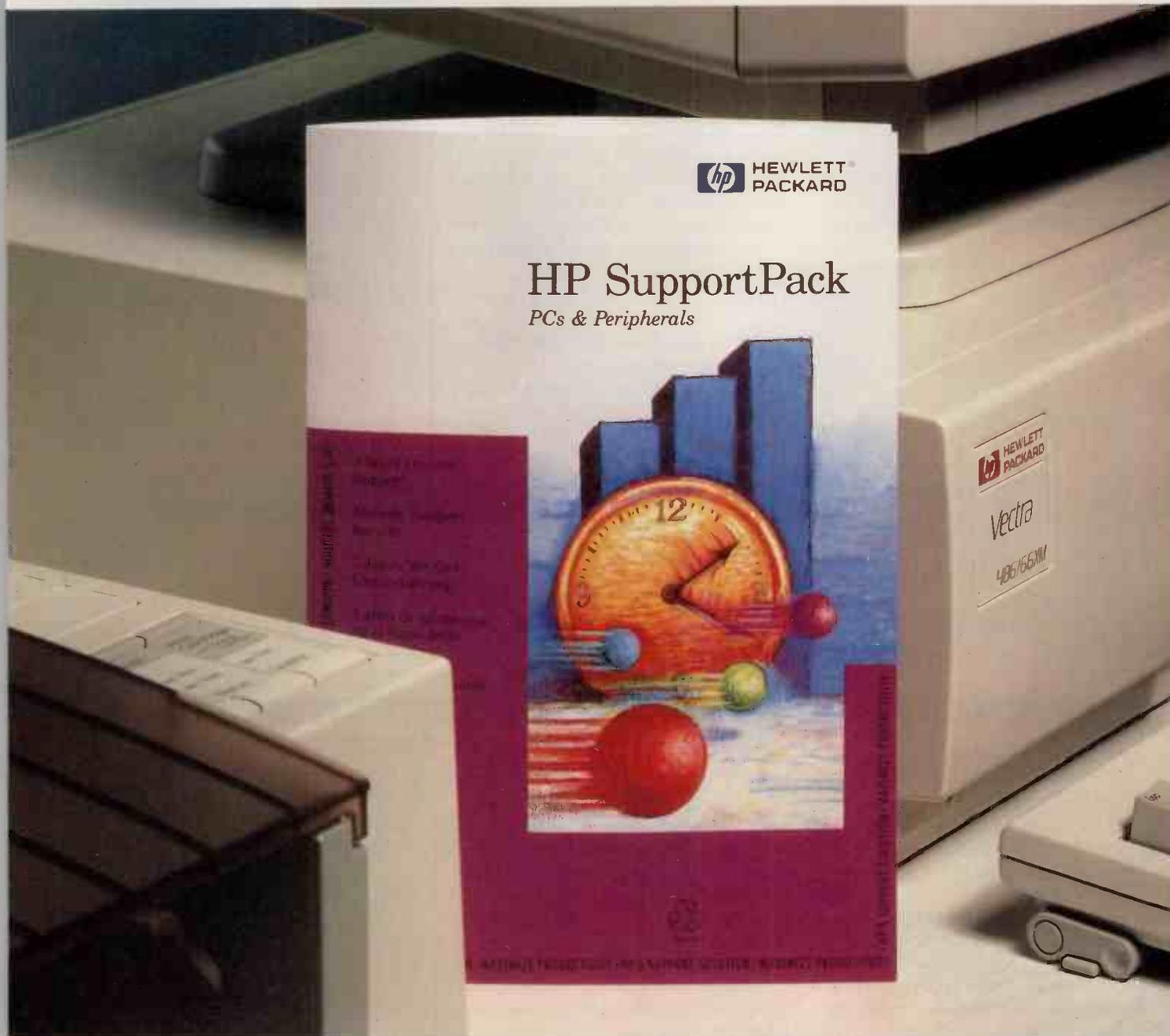
Good Points Good keyboard and design for heavy typing use.

Bad Points Screen resolutions limited on the TFT.

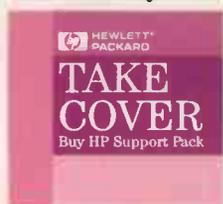
Conclusion Worth taking a look at although the graphics capability lets it down.



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Apple PowerBook 520c & 540c

Last year Apple updated its range of highly desirable notebooks with the PowerBook 500 series. Lots of clever and attractive design concepts, along with virtually every connectivity option available, have been implemented in these notebooks, resulting in a package that is hard to resist.

But despite attempts to offer some degree of Windows compatibility, the operating system is an insurmountable hurdle for some users. Apple's OS is arguably superior and easier to use than Windows, but this is no good if you use a PC at work and need to stick with the same apps.

Right? Well, no, since most Windows apps are available for Macintosh, allowing you to open, save and exchange documents across platforms.

Alternatively, save your documents in formatted text or CSV form, which can be imported into almost anything. Most magazines and newspapers are designed on Macs, with much of the copy originating on PCs, so the cross-platform issue has been addressed for years. The Mac is cheaper than it used to be, too, and prices on all models are competitive with similarly specced PCs.

So, they look good, are easy to use, can exchange documents with PCs, and are no more expensive. But we couldn't run the PC tests on them, so we decided to review Apple's two offerings in a separate boxout. The two colour models in the 500 series are identical except for display, disk, RAM and processor. Same design, connectivity, keyboard and pointing device. Where no differentiation is made, the comment is relevant to both models.

The top-of-the-range, active-colour 540c comes in two standard configurations. We looked at the better one, fitted with 12Mb RAM and an internal 14400 faxmodem. The entry-level model is catered for by the dualscan 520c, fitted with 4Mb RAM. Both are upgradable to 36Mb RAM, and the 14400 faxmodem may be added at a later date if it isn't fitted at the time of purchase.

Both models boast Motorola 68LC040 processors, the low-power version of the 68040 used in the Quadra. The 540c runs at 66/33MHz, roughly equivalent in speed to a 75MHz 486, and the 520c runs at 50/25MHz, somewhere between a 486DX2/50 and DX2/66. Both will be upgradable to the next generation of PowerPC processors when these become available.

The standard hard drive on the 540c is 320Mb, 160Mb for the 520c; System 7.5 is pre-installed. Mac apps tend to use more efficient code than Windows counterparts, so a smaller disk goes further.

At 9.5in, the 540c boasts the largest active TFT colour display used by Apple, but several of the PC notebooks are an inch larger again. The quality is excellent, with no ghosting or trailing, and solid, bright, vibrant colours. The 540c's display may be driven at 640 x 480 in 256 colours, or 640 x 400 in 65,535 colours. In this 16-bit colour mode, 40 rows of pixels are blacked out at the top and bottom of the desktop, resulting in an effect like a widescreen film on TV. The 520c's 9.5in dualscan display offers a 256-colour mode only, at 640 x 480. It looks superb, bettered only by the



ultimate vibrancy of the active-colour 540c. Again, there is no ghosting.

Additional video circuitry in both models may drive a second, external monitor at up to 800 x 600 in 256 colours, either mirrored with the built-in display or as an extension allowing objects to be dragged from one screen to the other.

Build quality is excellent; none of the parts look like they would come loose or break in the field. The keyboard includes a full set of function keys and a power-on button. It feels good if a little plasticky and is located at the hinged end. This offers the nearer surface as a wrist rest and naturally places both thumbs over the centrally positioned pointing device.

Instead of a trackball, Apple has fitted a unique 50 x 40mm flat surface TrackPad. Moving your thumb or finger over this lightly directs the cursor with a surprising degree of accuracy. Below is a large, single button for clicks.

No docking station options are offered since everything you would want comes as standard. All 500 series PowerBooks offer stereo speakers at the top left and right corners of the screen. Ports include LocalTalk serial for printer, basic network or external modem; 16-bit stereo audio in and out jacks; ADB for connecting and daisy-chaining Apple external keyboards,

mice and other pointing devices; SCSI; external video; and EtherTalk Ethernet. PowerBooks with the Apple internal modem fitted additionally offer a US telephone jack with UK lead provided. The floppy drive with software eject is fitted on the right side.

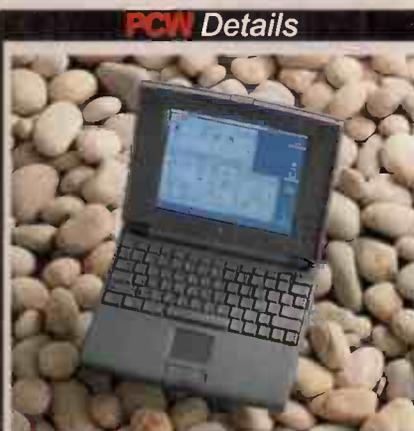
The battery offers one and a half to three hours on the 540c or two to four hours on the 520c. Each 500 series PowerBook may house two of these batteries, doubling the life but increasing the overall weight to 7.1lb (3.2kg). The second battery is an optional extra on the 520c, but standard with the 540c.

A PCMCIA expansion module is offered as an optional extra for £113. User-fittable into one of the battery compartments, it provides two Type II or one Type III slots, which Apple claims are entirely compatible with the cards available for the PC.

In use the 540c felt very fast, performing about 5 percent slower than a Quadra 800. The 520c was no slouch either, again around 5 percent off a Quadra 700 in our tests.

A lot of thought has gone into the excellent design of this series. Comprehensive facilities and the Mac system in colour portable form for £3,500 or £1,900, is surely a bargain.

Gordon Laing



PCW Details

Apple PowerBook 520c & 540c

Contact Apple 0800 127753

Prices 540c 68040 12Mb/320Mb DSTN £3,387; 520c 68040 4Mb/160Mb TFT £2,071

Good Points Everything comes as standard.

Bad Points Only if you're a Windows diehard.

Conclusion Two of the most fully featured and best looking notebooks around. Remarkable value for money.



The Importance of Build Quality

With everyone keen on the latest and greatest spec, the build quality of portables is often overlooked. While a desktop machine is stationary for most of its life, portables, by their nature, are moved and knocked about constantly.

It's not just the occasional accidental drop from a great height that does the damage. The more the machine is used as a portable (rather than as, say, a permanent part of a home office), and the more people who have access to it, the more important the quality of construction becomes.

For example, in one school, cheap Taiwanese portables were used in the portakabins by the control technology labs, and taken

home overnight and during holidays by staff and pupils. These portables were poor-quality and barely fit for their intended purpose to begin with, and many problems occurred straight away. They would mysteriously switch themselves on and off, resulting in lost

curriculum work and angry staff and pupils.

Ask yourself a few questions. Does anything feel loose? Are there rough edges? Do the ports feel stable and are they easily accessible? Do the keys travel and return well? (Particularly important if you often

need to type long documents.) Is the keyboard quiet? (This can be important if you plan to use it in a public place.) Are the special buttons, such as the floppy eject, solid and likely to stay the course? Is the screen hinge substantial and is it easy to fix the screen in exactly the right position for maximum clarity? There's no substitute for picking up a portable and giving it a good feel (and a bit of a shake).



Dualscan and TFT Compared

The earliest portables used traditional (but small) cathode ray tubes (CRTs), which had to be treated delicately. New technologies were clearly needed if portables were ever to catch on.

Scaled up from calculators, LCDs were soon seen as the way forward, but even they had drawbacks. The contrast was low, making outdoor use difficult, and viewing angles were restricted, which stopped groups seeing anything on the screen.

Passive matrix screens use a fine layer of crystalline liquid sandwiched between super-thin layers of glass. A grid or matrix of electrodes allows a current to be passed through lines on the screen, and pixels are formed where two intersect. A couple of polarising filters control how light passes through the screen. When the current is switched on, the crystals in that area change orientation and the filters block out the light, making the pixels appear dark.

To add colour, extra pixels and filters are needed. If you stare closely at your domestic TV screen you will see that each dot of colour is made up of three pixels corresponding to red, green and blue (RGB). Combining these three colours produces the spectrum.

Unfortunately, the imprecise nature of the LCD matrix means that it's impossible to turn a pixel on without affecting adjacent ones. "Crosstalk" reduces sharpness and clarity. Contrast is much reduced and the viewing angle greatly restricted. Colours

are muted and less discernible.

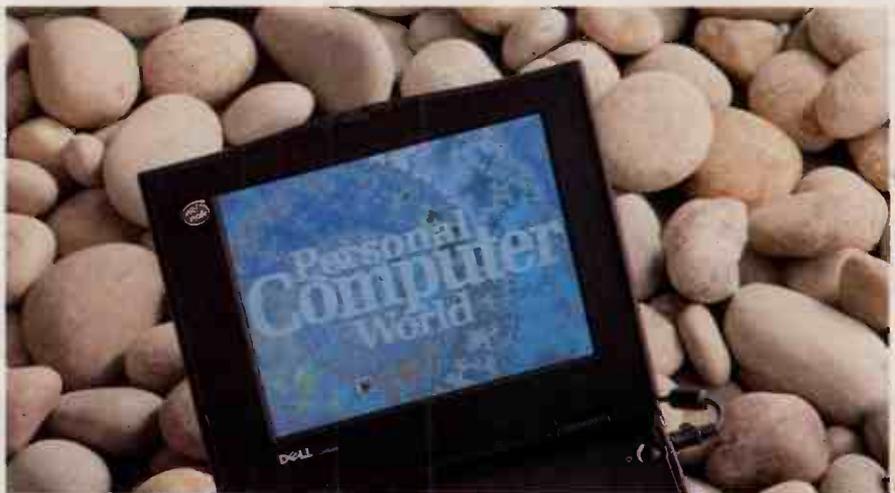
More recently, additional layers of liquid crystal have been added to create dual and triple-scan displays. These correct the original distortion to improve contrast, the number of greyscales and the viewing angle. The other side of the coin is that extra layers mean greater thickness and weight.

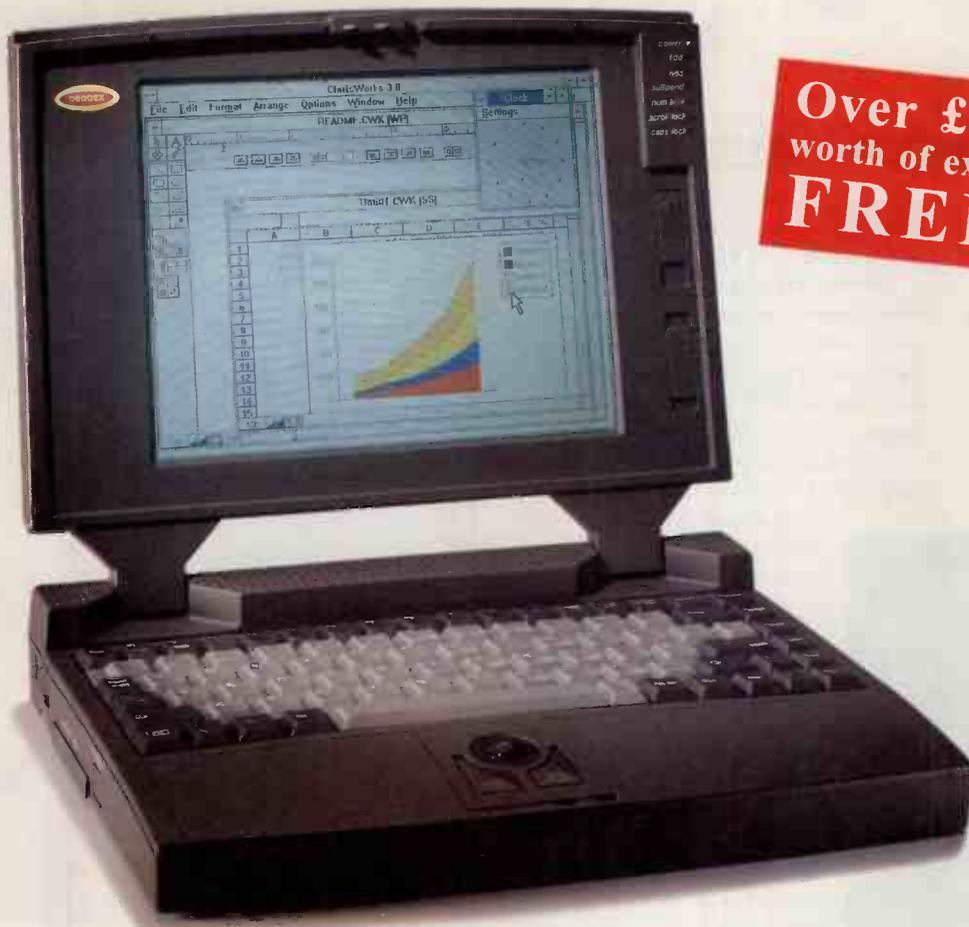
Many companies have adopted Thin Film Transistor (TFT) technology to improve colour portable screens. Microscopic resistors directly (or actively) control how each transistor works. The result is that each pixel is independent of the adjacent ones so that contrast and clarity are much better, and colours are rich and vibrant. TFT screens can be made much thinner than LCDs, and refresh rates now approach CRT speeds,

making simultaneous connection to an external monitor possible.

When choosing a screen type, it's also important to look at the size of the palette. Even if a screen can only display 256 colours simultaneously, being able to choose from many more makes the effective screen quality much higher. Palettes of 64K and 256K colours enhance clarity enormously.

TFT screens are hard to manufacture, and can cost up to £500 more than their LCD equivalent. VGA screens need 921,600 transistors (640 x 480 x 3) and each has to be perfect. Early production techniques yielded only a 20 percent success rate. Today this is around 80 percent — better, but far from perfect.





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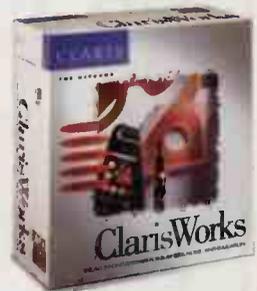
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AST Ascentia 800

Despite being AST's entry-level machine, the 800 feels well built and looks stylish — a good combination when you want to give the right impression. The build quality is reflected in the screen hinge, which has just the right degree of resistance to keep it in position at any angle. Only the disk eject mechanism lets it down slightly.

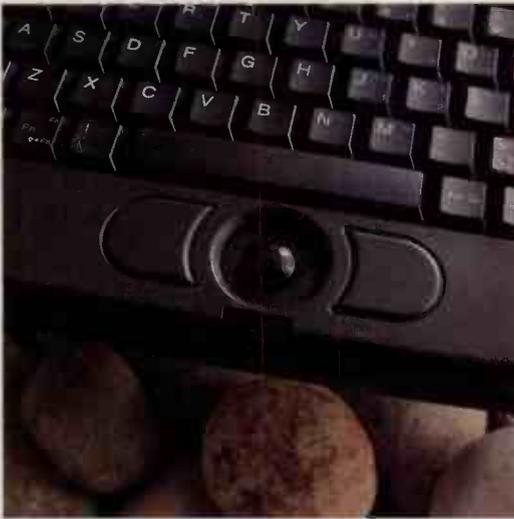
The dualscan screen gives a reasonable range of tones although it

lacks a little warmth and vibrancy. Despite this, the colours were pleasing to the eye and more than acceptable.

There is nothing on the keyboard to differentiate between different key types; colour coding would help. The pointing device is a smooth mid-sized trackball with buttons either side. It's all perfectly usable.

There are only limited options for the upgrader. The chip is soldered in and the RAM and hard disk can only be changed with a small screwdriver. The floppy drive can be replaced with a second battery but there is no provision for a docking station. Power is managed through either a simplistic Windows applet or the BIOS to give a good mixture of usability and flexibility.

The Ascentia 800 has quite a high spec (DX2/50) for an entry-level machine and it handles Windows apps reasonably well. Lotus Organiser is included, as is LapLink Remote Access and CompuServe's WinCIM.



PCW Details



AST Ascentia 800

Contact AST 0181 232 5000

Price SX/33 8Mb/250Mb DSTN £1,795

Good Points Floppy drive can be swapped for a second battery. Good for system administrators.

Bad Points Limited upgrading options.

Conclusion A pleasant machine which should do well in the corporate market. Looks and feels good.



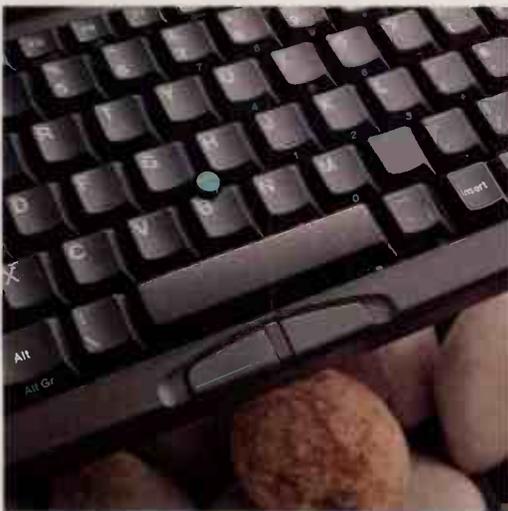
AST Ascentia 900

Although it shares the same family name as the 800, the Ascentia 900 is an entirely different beast at the power-user end of the range. It's an inch larger than the 800 but loses out to it in build quality. The hinge and screen creak and the unit as a whole gives a less than confident account of itself. The floppy drive sounds tinny and the keyboard is a little rough around the edges. Silent keying is impossible,

which could cause problems on public transport.

The pointing device is a comfortable IBM-style nipple, which in many ways is better than the 800's trackball. The 900 is also more upgradable, although the chip is inaccessible. A small plate above the keyboard slides away easily to reveal the memory connectors; adding 16Mb involves piggybacking two pairs of 4Mb PCBs. The hard disk is changeable but not the floppy drive, and a docking station connector is situated alongside the standard I/O connectors. Power management is accessed in a similar way to the 800's although the BIOS options are quite different. The 900 moves smoothly in Windows.

The TFT screen is capable of deep, rich tones but lacks the subtlety of shading you might expect in the power-user sector. The drivers only appeared to allow 256 colours in 640 x 480 mode and no higher, which was disappointing.



PCW Details



AST Ascentia 900

Contact AST 0181 232 5000

Price DX4/75 16Mb/510Mb £3,995

Good Points Better pointing device than its little brother.

Bad Points Worse keyboard.

Conclusion A fast, well designed machine but the build quality is lacking.



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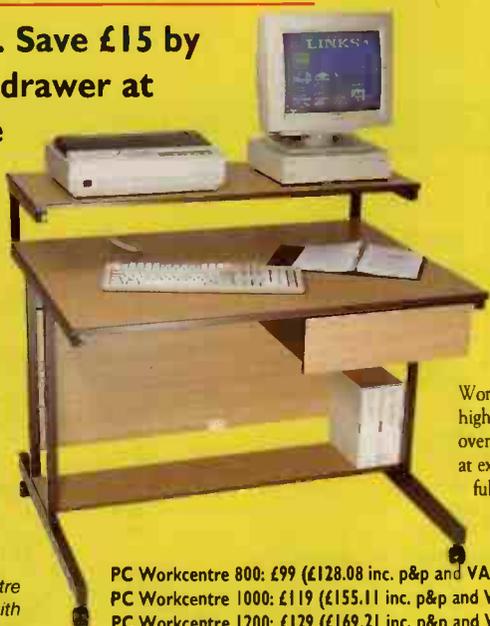
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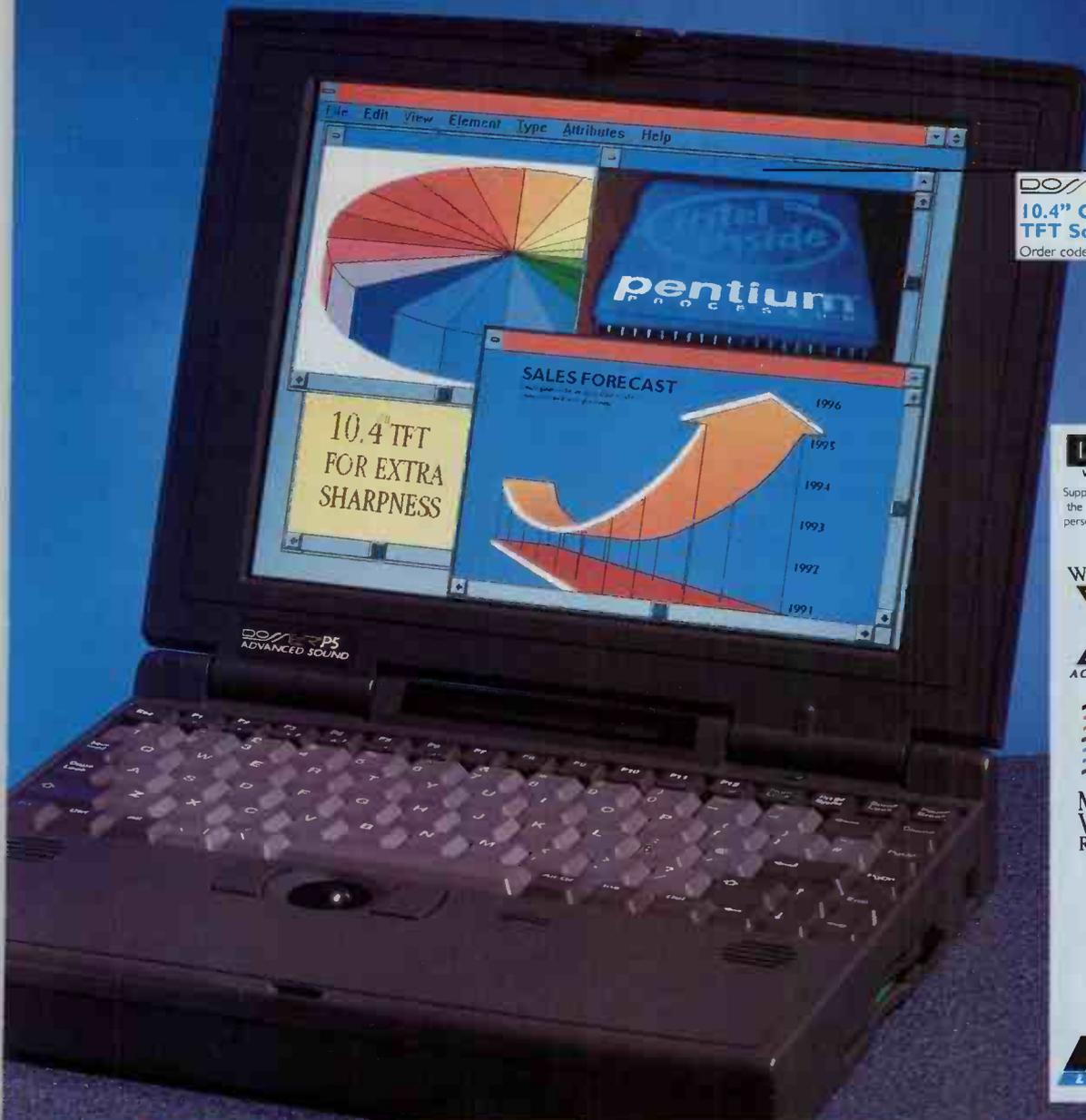


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NOTEBOOK

Dimensions (WxHxD) mm:
 279 x 51.5 x 218 closed.



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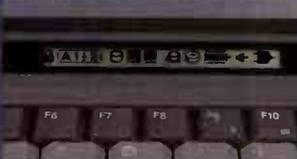
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Brother BCP6310 & BCP651T

Brother isn't a household name in portables but this machine is well designed. Its large wrist rest is a blessing and the space bar is a good size. The main mouse button sits squarely above the trackball with the secondary one below, making it difficult to manoeuvre with one hand.

Unusually, the Brother has slots for a separate Type III as well as Type II slots. You can have one of each instead of having to choose between the two. All the necessary ports are available and a splitter cable allows



simultaneous use of an external mouse and keyboard. An add-on docking station can be connected from the port at the rear. The hard disk is easily removed and the memory and processor are easily accessible below the keyboard.

Power management is through the BIOS setup, which is offputting but does give control and flexibility. The BCP651T is a fast mover but it ran some applications at a slower pace than other machines in the power-user group. The AmiCardz and Video Changer utilities are nice touches designed to make life easier.

Of all the 256-colour screens reviewed here, the Brother had one of the nicest TFTs. Even on such a limited palette, the shading was subtle enough to denote minor changes in tone. It will also act as a virtual 1024 x 768 screen. With 1Mb on the VGA card it should be capable of much higher ranges, although the test machine appeared to have driver problems. Compared with the dualscan, the colours are much dirtier and harder to distinguish.

PCW Details



Brother BCP6310 & BCP651T

Contact Brother 0161 330 6531

Price BCP6310 DX/33 4Mb/120Mb DSTN £1,549; BCP651T DX/75 8Mb/262Mb TFT £2,639

Good Points Nice TFT screen. Large wrist rest.

Bad Points Trackball could be improved.

Conclusion Well-designed portable.



Compaq Contura 400C

The Contura 400C is an entry-level machine from one of the leading names in portability. It's quite sturdy, although the screen hinge has a distinct wobble which could cause problems on the hoof.

The base of the unit is slim, the keyboard designed so as to distinguish between groups of keys, and everything is roughly where you'd expect it. Two sturdy rear feet tilt the

keyboard forward nicely. The trackball has a roughened surface that makes it difficult to control accurately, and the buttons require too much force for prolonged use with one hand.

There are connectors for all the usual I/O devices, plus a small, strange connector. Presumably this is for a port replicator or expansion unit but there was no documentation supplied with the review machine so we couldn't be sure.

There is no flap to cover the ports and connectors at the rear, leaving them exposed.

The RAM and hard disk are removed quite easily but the processor stays firmly where it is. A bespoke Windows applet gives good control over power management. This machine is no flyer, but it handles Windows applications at an adequate pace.

The dualscan screen on this model is above average. The dithering is good although the colours could be a bit richer.



PCW Details



Compaq Contura 400C

Contact Compaq 0181 332 3888

Price DX2/40 4Mb/250Mb DSTN £1,995

Good Points Stylish design, good keyboard layout.

Bad Points Poor trackball construction.

Conclusion A better design than its brother, the Elite LTE.



Compaq LTE Elite 340

The most distinctive feature of the LTE Elite is its trackball. It's on the screen itself, with the buttons at the rear (the top when closed). It works well enough although the ball could do with more resistance. Build quality is fine but the screen hinge was too loose to keep the screen stable even under moderate vibration. At the front, the floppy unit is easily accessed.

Despite having acres of empty space, the keyboard has been brought fully forward so there is no wrist rest. Fortunately the base is reasonably thin, so the strain on the wrist and fingers is not too bad. Full marks to the keyboard: the standard 102-key layout has been



followed as closely as possible and important keys like Return, Backspace and Shift are nice and large.

There is a panel underneath for RAM expansion but Compaq supplied a PCMCIA RAM card for the test machine. At the rear, the usual connectors are supplemented by a proprietary add-on unit connector. The hard disk comes away after a struggle but I gave up on removing the battery unit. There is no need for an external PSU, which is an excellent idea.

Power management is through Windows and the BIOS although the latter seemed difficult to conjure up at times. With only 8Mb RAM it is hard to give a fair impression of speed, but Word 6.0 for Windows still fired up quickly.

The active-matrix TFT screen is adequate for non-graphics Windows work. The graphics card will handle 64,000 colours but these made Windows icons turn a lurid shade of turquoise. A virtual screen beyond the 640 x 480 limit is possible but under certain conditions with some of the drivers there was a high degree of flicker.

PCW Details



Compaq LTE Elite 340

Contact Compaq 0181 332 3888

Price DX4/75 8Mb/344Mb TFT £4,595

Good Points No external PSU needed. Keyboard ideal for typists.

Bad Points Strange colours on screen at higher colour modes.

Conclusion Good, but not as good as you might expect from Compaq.

Dell Latitude 450MCX

Dell is back with a vengeance. This is a classy looking machine with a slim base which makes the absence of a wrist rest unimportant. The only niggle is that the Return key is small.

The 450MCX is a small, solid unit with only a tiny wobble on the screen under vibration to give slight concern. Its memory is accessed and upgraded via a small panel between the screen and keyboard, but it's a shame the



processor is soldered in. Underneath, the hard disk can be unscrewed and removed easily. The battery can be supplemented by another one in place of the floppy drive, extending life and security.

The PSU is small and the Dell applets included are useful, particularly the power management applet in Windows. It gives three presets for saving, plus disable, and the effect of these on various system components such as disk and

video is shown. You can set up your own custom power savings. The Latitude handles Windows well even when compiling an Adobe Premiere AVI file.

Even in 256-colour, the tone and range of the 640 x 480 TFT screen are very good and ambient light does not affect the rendition as badly as on other machines. The graphics card allows 256 colours on a virtual 1024 x 768 screen.

PCW Details



Dell Latitude 450MCX

Contact Dell 01344 720000

Price DX2/50 8Mb/340Mb TFT £2,274

Good Points All-round quality of design.

Bad Points Only a small Return key.

Conclusion An excellent machine.



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WCP 091

Dell Latitude XP 4100CX

If its baby brother is well built, this machine is even better. The whole thing feels solid and the screen hinge is much more stable. A nice touch for typists are the rock solid rear legs, which tilt the unit forward.

The layout is preferable to the non-XP model. It has one of the best wrist rests around although the keyboard layout is non-standard. The trackball is



large enough to be usable and the buttons are huge. You can rest your fingers on the buttons without any danger of clicking them, and they have just the right resistance when used for real.

The memory and hard disk of the XP are easy to access and come away so easily it almost feels like cheating. Only the processor cannot be changed by the user. The standard connectors are supplemented by a port replicator connector and there are plastic inserts to keep the PCMCIA slots free of dirt when not in use. Unlike other portables, this one uses a Lithium-Ion, or Li-ion, battery which is easy to change over. Even the PSU is pleasantly slim. Power management uses the same Windows applet as the 450MCX and suspend mode is almost instantaneous. Everything about this machine says speed.

PCW Details



Dell Latitude XP 4100CX

Contact Dell 01344 720000

Price DX4/100 24Mb/525Mb TFT
£3,798

Good Points Just about everything.

Bad Points Confusing keyboard layout.

Conclusion Dell deserves to do well in the corporate market with this one.



Dual Pentimedia MT400

If you're after something solid, this could well be the machine you want. Its rubberised surface gives the impression that it will stand up well to the knocks. The downside is that it weighs a great deal more than many other portables.

The keyboard is laid out in the most common portable format, with cursor keys towards the righthand edge; subtle colour coding helps keep miskeying down. The keys are responsive and the trackball is large, smooth and easy to manoeuvre.



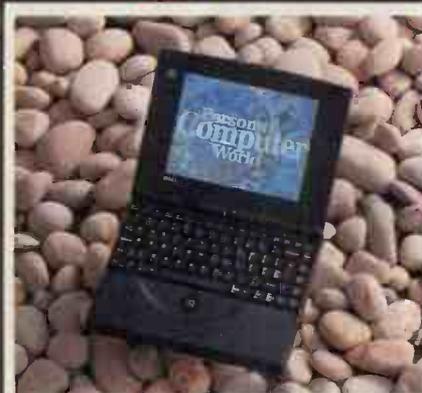
What lets it down is the sheer force needed to click the buttons. A few hours of clicking, dragging and dropping and your fingers will ache. The lack of a decent sized palm rest only exacerbates matters. On the build side, the screen hinge could do with a bit of tightening.

All the essential connectors are present and properly marked and there is a connector for a docking station or multimedia add-on. Most of the components are relatively easy to change although the ones under the keyboard are fiddly. Audio support is built-in with microphone, headphone and line-in connectors.

The Pentimedia turns in an impressive speed. It's no slouch, even with only 8Mb of RAM.

The TFT screen gives reasonably good colour rendition. Being able to handle an 800 x 600 virtual screen on one which is physically 640 x 480 adds more visual real estate for the serious Windows person used to the larger format. The screen is interchangeable.

PCW Details



Dual Pentimedia MT400

Contact Dual 01223 576622

Price DX4/100 8Mb/340Mb TFT £2,885

Good Points Solid as a rock.

Bad Points Weighs a ton. Buttons need dynamite to shift them.

Conclusion Aimed at the higher ground, this fits the bill.



Ergo PowerBrick 100

Brick by name and brick by nature, this is a solid portable that should survive heavy use. The screen angles smoothly, the keyboard is responsive and all the keys are a good size. The wrist rest is too narrow to give adequate support over long periods and the floppy drive is awkward to get to at the front.

Upgrading is generally easy: only a screwdriver and a little care are needed. The only niggle is that the



memory modules don't feel as solid as standard SIMMs. The processor also needs an extraction tool for safety's sake. A built-in sound card provides speaker out, mic in and line in. The lack of a second COM port is a drawback although an internal faxmodem can be installed instead.

NiCad and NiMH batteries are available and a Save to Disk feature allows you to restart your machine quickly and easily where you left off. Ergo has thrown in plenty of software goodies including some for the sound card, although most of this is gimmicky. An icon-driven option would be handy. To help the travelling user, a bundle of software includes the Official Airlines Guide, Xpense-Pro, Trio DataFax and AskSam; manuals are not included.

The TFT screen handles VGA and SVGA well. The higher colour modes are better as screen rendition is crisper and clearer.

PCW Details

**Ergo PowerBrick 100**

Contact Ergo 01159 452565

Price DX4/100 16Mb/340Mb TFT £3,395

Good Points Excellent screen. Plenty of extras.

Bad Points Wrist rest too narrow for comfort.

Conclusion Solid and reliable.



Gateway ColorBook 2000 DX4/75 & SX/33

Good products at competitive prices have helped Gateway conquer the States and, more recently, Britain. This is true of the desktop; the portables are not up to the same standard.

These machines are solid enough but the styling is dated and looks a bit cheap. The keyboard is rather non-standard, even for a notebook, with the Page Down and other keys lining the right edge. The pull-out trackball is too small to be comfortable or accurate, and it takes several strokes to cross the screen. On the plus side, a low base depth makes the keyboard easy on the wrists and the keys bounce well.

With a separate keyboard/mouse



PS/2 connector and parallel, serial and external VGA connectors, there is enough connectivity for most people. Expanding the memory is simple enough through a small plate between the keyboard and screen. The hard disk can be upgraded easily by the user but the processor can't.

As the NiMH battery pack is small and easily removed, carrying a spare would be no great inconvenience. Power management options are changed through the system configuration utility built into the BIOS and accessible only at bootup.

The speed of the DX4/75 can be deceptive. It performs some tasks slowly, but when given demanding tasks such as compiling a Premiere movie or loading a JPEG image it runs quickly. Gateway bundles Microsoft Works 3.0 which has all the functions needed by most people, although its inclusion in a top-end machine is open to question.

The dualscan screen gives a good account of itself. The palette is limited to 256 colours but the range of tones is acceptable for most purposes. Contrast and brightness are controlled by thumbwheels at the side of the screen.

PCW Details

**Gateway ColorBook 2000 DX4/75 & SX/33**

Contact Gateway 0800 552000

Price DX4/75 20Mb/340Mb DSTN £2,519

Price SX/33 8Mb 340Mb DSTN £1,299

Good Points Works bundled. Low prices.

Bad Points Trackball.

Conclusion The ColorBook is intended as a no-nonsense workhorse product.



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Hewlett Packard OmniBook 4000CT

In response to criticism from corporate clients, Hewlett Packard has finally moved into the big notebook league. The OmniBook 4000CT is solid and stylish, with an eye-shaped trackball configuration shaped for left and righthanders. The keyboard layout is reasonable but there is nothing to distinguish the cursor keys.

Upgrading memory is straightforward enough although the hard disk is a little tricky to remove. The floppy drive slides out easily and can be replaced by either a different module or another NiMH battery. Only the processor cannot be upgraded. There is a connector for a standard port replicator/expansion unit. Unusually, there is a serial infra-red port



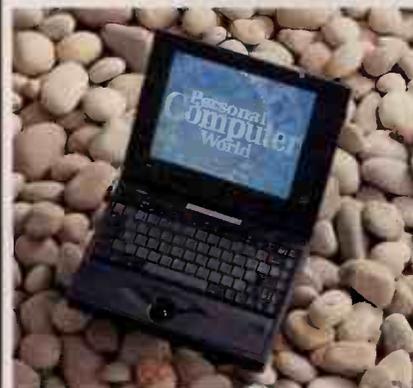
to allow cable-less communications with similarly equipped units.

Power management uses a Windows applet allowing automatic management only at standard and advanced levels. The setup BIOS offers slightly more control. The suspend mode is entered quickly by pressing a button above the keyboard and the restart is equally fast.

The 100MHz chip makes an appreciable difference over the 75MHz. A standard Adobe Premiere clip was compiled in one of the fastest times. Adding a partial multimedia capability, the audio comprises a built-in 16-bit SoundBlaster compatible card. There are internal speakers and a microphone as well as audio jacks and headphone connectors.

The TFT screen handles either 32,000 colours or 800 x 600 pixels on a virtual screen. The clarity on our review model was good but with a distinct magenta tinge, and sometimes blocks of magenta appeared on screen. This could be a one-off fault but it would rule the OmniBook out of anything involving colour work. It's possible the drivers are at fault.

PCW Details



Hewlett Packard OmniBook 4000CT

Contact Hewlett Packard
01344 369222

Price DX4/100 8Mb/524Mb TFT £4,265

Good Points Excellent screen potential, good design.

Bad Points Problems with the screen supplied.

Conclusion Well balanced, with a touch of style.



Hewlett Packard OmniBook 600

Small but perfectly formed is the best way to describe the latest OmniBook. The 11 x 7 x 1.5in matt black case fits easily into a briefcase and weighs just 3.8lb without its external floppy disk, which you get as standard. The eccentric mouse, which flips out from the side on a plastic arm, is good for occasional use but becomes hard work after a while. The keyboard is comfortable to use.

The earlier ROM-based software is now on one of Maxtor's sturdy 170Mb PCMCIA hard disks; a 260Mb option should be available by the time you



read this. On the rear edge is an infra-red comms port, peeping through a cover which hinges back to reveal external SVGA, floppy disk, 9-pin serial and parallel ports. There is also one for an enhanced port replicator, which provides fast SCSI-2, PS/2 mouse and keyboard ports, plus a slot for a LAN card. The supplied floppy disk cable and its connectors have been thoughtfully designed for frequent plugging and unplugging.

The serial port uses the 16550AF chip, which can keep up with the latest V.Fast modems and can be used with bundled LapLink Remote Access (LLRA) software to swap files with another PC. A PCMCIA slot on the left edge takes one Type 3 or two Type 2 cards, and is well protected with flaps and covers. A similar slot on the opposite edge holds the Maxtor disk. The charge life of the NiMH battery is a claimed four hours, falling to around two with a lot of disk accesses. The 600 comes with Windows 3.1 and HP's own personal organiser software, which is capable enough.

The backlit 8.5in dualscan colour screen is clear and easy on the eyes, with vibrant colours and good shading.

PCW Details



Hewlett Packard OmniBook 600

Contact Hewlett Packard 01344 369222
Price DX2/50 4Mb/170Mb DSTN £2,035

Good Points Small and easy to transport.

Bad Points Mouse is quite eccentric.

Conclusion Ideal for the bulging briefcase or long journey.



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IBM ThinkPad 360CSE & 755CE

Eschewing the subtle greys of the Major era, IBM has gone for the full black treatment, and this distinctive styling is matched by a distinctive machine. However, the unit doesn't feel as solid as you might expect of IBM: the plastic and casing feel cheap.

The keyboard layout makes up for these shortcomings. Aside from the lack of a numeric keypad, everything is where you would expect to find it with the cursor keys in the familiar inverted T-shape. The responsiveness of the keys is a minor letdown.

For use with Windows, there is a "nipple" in the middle of the keyboard and two bar-shaped buttons which are



best used with the thumb and middle finger. Though unusual, the system is smooth and accurate. Dragging and dropping is a doddle and makes up for the lack of a palm rest. The floppy disk drive is too far recessed for comfort: you have to push your fingertip inside to seat the disk properly.

You can access most of the components by flipping up the keyboard. The hard drive, floppy and memory are underneath, as is, curiously, the NiMH battery. The processor is not user-upgradable. To upgrade the memory you slide in an IC DRAM card. Battery life can be extended using the Windows applet, and standby, suspend and hibernation modes are available using function keys. The 755CE brings real power to portability and includes an extensive bundle of applications for the mobile worker plus advanced audio capabilities.

The dualscan screen offers subtle colouring even within the confines of a 256-colour palette. The contrast and brightness sliders are difficult to use accurately. The TFT has a much larger range of colours and screen resolutions, and is a pleasure to view.

PCW Details



IBM ThinkPad 360CSE & 755CE

Contact IBM 01345 727272

Price 360CSE DX2/50 4Mb/340Mb DSTN £2,330; 755CE DX4/100 8Mb/540Mb TFT £5,270

Good Points A keyboard for heavy-duty typing. Nipple works well.

Bad Points Not as solid as expected.

Conclusion A typist's delight. Ideal as a workhorse machine.

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Locland Vesa DX/33

Locland has built up a good reputation for cost-competitive machines. This notebook feels solid and tough and the edges are all nicely rounded. In the "shake it about" test the screen stayed in the same position so it should be okay on a plane or the worst of this country's rolling stock. The floppy drive at the side can be accessed easily and the disks come out smoothly and easily.

The keyboard is fine, although the function keys seem a little intrusive and could easily be hit accidentally with large fingers. More annoyingly, the keys have a plastic, slightly loose feel which cuts down apparent responsiveness. The central position of the keyboard on



the base unit leaves little space for the wrist rest, making it less comfortable when using the lower keys and space bar.

The trackball is slightly recessed. It's a good size and very smooth, although the buttons could be larger. As usual, switching the main button helped. Dragging and dropping was accurate and fast.

While the hard disk is easy to access and remove, the memory and processor are located underneath the keyboard; removing it requires great dexterity and possibly an extra pair of hands. Rather significantly, perhaps, the manual makes no mention of upgrading. Power management is similarly ignored. What little the manual does say barely relates to reality.

The Locland holds two NiMH batteries without being unduly heavy. Even with only 4Mb RAM, it's a spritely mover with Windows running well. The built-in audio card can be used to run the bundled sound software which provides for all the basic needs of the average user.

The dualscan screen gives good graphics capability within the confines of its 640 x 480, 256-colour limits. Shading is subtle and colours warm and vibrant.

PCW Details



Locland Vesa DX/33

Contact Locland 01355 228808

Price DX/33 8Mb/200Mb DSTN £1,738

Good Points Dualscan is good enough for most users.

Bad Points Upgrading appears limited. Poor manual.

Conclusion Well balanced and steady.

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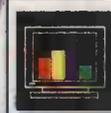
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Olivetti Echos 43

The Italians are world-renowned for their sense of style and fashion, and this is evident in Olivetti's styling of this notebook. It is flamboyantly coloured with a deep sandstone red trim which some users would welcome. With its largely rubberised plastic construction, the Echos feels like it will bounce if dropped; but don't try this at home. The hinge keeps the screen steady and the whole unit feels solid. First class.

The base is very slim and the rubberised wrist rest is more than deep enough. On the keyboard, there are



bold markings to differentiate between the key groups. The trackball is quite small but smooth. The large buttons are covered by the rubber surface and work extremely well.

At the rear, the Echos has all the connectors you would expect with an expansion port underneath. And that's it. There appears no way to upgrade the processor, RAM or hard disk. Only the PCMCIA slots would allow memory or disk space to be increased but this is an expensive way to do it. Power management is through a more advanced Windows applet, with the user-defined settings allowing some flexibility. The battery is NiCad, and online manuals and guides are included.

The dualscan screen produced a mid-range display in terms of colour rendition and dithering, and the pixels appeared to "shimmer" a great deal, which is offputting when carrying out close-up work with dithered colours. The screen is also a little on the pale side.

PCW Details



Olivetti Echos 43

Contact Olivetti 0181 785 6666
Price 486SX/33 4Mb/170Mb DSTN
£1,599

Good Points Something different; a well designed pointing system.

Bad Points Awful colour; upgrade limitations.

Conclusion Good machine, but buy the spec you want from the start.

Olivetti Philos 48C

If there is a joker in every pack, this may well be it. With its unusual looks and strange trackball, the Philos is a non-conformist.

After the well-built Echos, the Philos does not feel solid or well built; in fact, it feels downright tacky. The keyboard unit is made of soft plastic that bends at the edges and the keys clack rather than click. They are just a little too well sprung for constant touch-typing. Although there is no wrist rest, the base is not too deep. The keyboard layout is reasonable and for the busy mobile accountant there is a separate numeric



keypad in the top righthand corner.

The weirdest item is the trackball, which jumps out from underneath on a curved sprung tongue. As designs go, this is poor. The ball will not stay steady and the buttons are too small. The Toshiba version of the side-mounted trackball is far superior. Use a real mouse for precise movement and prolonged use.

The Philos doesn't suffer from lack of upgrade potential. The hard disk is under the keyboard, the RAM slots in at the rear. Only a non-standard external VGA connector lets the side down, plus the lack of processor upgrade capability. A docking station or port replicator slot (it isn't clear which as no documentation has been supplied) adds to the future-proofing.

The Philos is designed as a sound-capable machine and comes with plenty of software for recording and replaying sound. DragonDictate allows you to annotate spreadsheets etc. and there is a built-in speaker plus standard audio sockets.

The TFT is a screen of two halves. Browns and reds come out deep and rich, but the blues and greens are dull and hard to distinguish.

PCW Details



Olivetti Philos 48C

Contact Olivetti 0181 785 6666
Price DX4/75 8Mb/340Mb TFT £4,149

Good Points For audio annotators everywhere.

Bad Points The Zebedee of trackballs. Screen a letdown.

Conclusion With the springy trackball being so awkward to master, it is unlikely to set the market alight.

Opti Platinum DX4-100 & SX2-50

Opti is expanding its dealership network in the UK. By establishing partnerships with dealers and giving them as much support as possible, the company hopes to give a better service to customers than through off-the-page sales.

The Platinum is well built, with a wrist rest several inches deep in which the trackball sits. Both ball and buttons could do with being a little larger. Reversing the buttons made them easier to use. Some of the keys, like Fn, Ctrl, and Alt, are raised and rounded



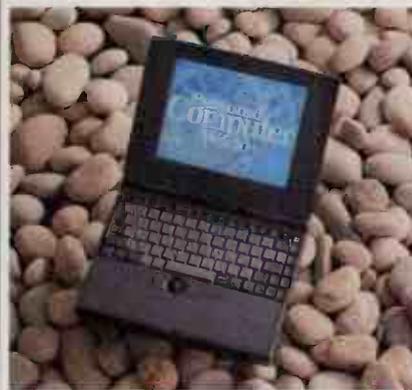
but this seems to serve little purpose.

Opening up the machine is tricky but the disk, memory and processor are easily removed and replaced. A full complement of ports, cardmodem slots, audio connectors and an expansion port is present, and a microphone is built in. Power management is through a mixture of Windows applet and BIOS accessed by pressing Fn and Esc together. To suspend, just close the lid, and restarting is fast. The DX4-100 is fast anyway, but the audio applets are nothing special.

The Platinum comes with enhanced screen capabilities including an 800 x 600 virtual desktop and up to 64,000 colours at 640 x 480 on the TFT screen. These capabilities are taking notebooks into the multimedia arena where good quality images can be displayed without an external monitor. Under tube lighting the colours did look a little pale at most angles, though.

For most users the Platinum's dualscan screen will suffice, and this does give a lovely warmth and richness to colours.

PCW Details



Opti Platinum DX4-100 & SX2-50

Contact 0181 507 1818

Price DX4-100 20Mb/540Mb TFT £3,639; DX2-50 8Mb/270Mb DSTN £1,734

Good Points Great screen. Everything upgrades.

Bad Points Bigger trackball and buttons, please.

Conclusion One of the better portables.

Panasonic CF-V21P

The screen positioning on this machine is fluid yet stable at rest. The screen can be reversed to act as a display terminal at presentations or replaced with one designed for Pen use.

Keyboard layout is fine, but this cannot be said of the trackball arrangement. It's tiny, no larger than a garden pea, which makes dragging and dropping extremely awkward. The buttons need force for clicking. Not a device for extended use. Access to the floppy at the side is perfectly adequate and all the connectors are well labelled.

The Panasonic does have upgrading potential. The floppy drive can be removed and replaced with a CD-ROM



drive. One warning: this is not a full-sized CD player but an 8cm (180Mb) unit and there is little available in this format. It may make a handy alternative to a multimedia docking station, but it's not much use unless the format is more widely adopted. Changing the hard disk is reasonably easy and two Type II and one Type III PCMCIA cards can be connected. Beneath these is the RAM card upgrade slot which is a doddle to use. A full complement of external connectors is included.

The battery is a small NiMH unit which fits in under the base. As it uses a tiny connecting cable, installation and removal is less immediate than the normal slot-in connectors. A second battery goes into the floppy drive/multimedia slot if required.

A TFT screen was not supplied, and the dualscan, while by no means the worst, is only passable. Altering contrast and brightness controls has little effect, and there is a dullness that makes the screen look "tired".

• Panasonic did supply a much better machine with a built-in CD-ROM but sadly this arrived damaged and could not be replaced in time. The whole range is being revamped.

PCW Details



Panasonic CF-V21P

Contact Panasonic 01344 853598

Price £3,799

Good Points Usable keyboard layout.

Bad Points Trackball and buttons unsuitable for real use.

Conclusion Fine for specialised uses such as Pen computing, but not for everyday Windows work unless a separate mouse is used.

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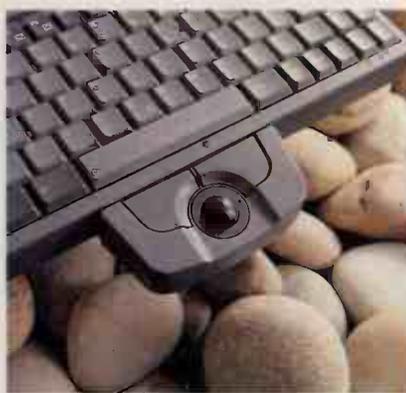
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Sharp PC-8660 & PC-8150

A lesser known name in an overcrowded market, Sharp has gone for a good design to help it out. The keyboard is above average as all keys are full-sized. Keys feel positive and little effort is required, although the damping could be better. The add-on trackball clips to the front edge and is a reasonable size, with the buttons needing very little pressure but giving a clear click when pressed. This is a trackball that can be used long term without your fingers falling off.

Though not built for the toughest conditions, the Sharp would stand up to normal usage and beyond. The screen



hinges smoothly and firmly and even ejecting the floppy proved to be no problem. The button is easily accessed and the disk zips out smoothly.

Upgradability is limited as the processor and hard disk are not removable. You need to buy the configuration you will require long term from the outset, which generally makes sense on cost grounds. There is only one PCMCIA Type II slot although a modem connector is included on the backplate and a special card can be installed internally as an option. Memory upgrades are easy to perform.

Power management is through the BIOS and can be user-configured to a reasonable degree. As the 8660 only uses a DX/50 chip it ought to seem slow compared to other power-user machines, but it moved around in Windows at a fair lick.

Proudly boasting its active-matrix colour TFT screen on the box, the PC-8660 does produce a better than average display. The tonal range is sufficiently wide to give an acceptable portrayal of the original colours. The 8150's dualscan gives a cleaner, brighter image at 256 colours and the dithering is better.

PCW Details



Sharp PC-8660 & PC-8150

Contact Sharp 0161 205 2333

Price PC-8150 DX/33 8Mb/200Mb DSTN £2,395; PC-8660 DX2/50 8Mb/320Mb TFT £2,995

Good Points Build quality and design. Good all round.

Bad Points Even the 8660 isn't a true power-user machine.

Conclusion Clearly a lot of thought has gone into these machines and most of it has paid off.

Texas TravelMate 4000

Texas isn't one of the big names in the notebook world but the 4000 series has deservedly received praise from many quarters.

The keyboard layout is close to the standard 102-key desktop unit and the lowered front lip improves the typing angle of the wrists. The keys feel good for touch-typing and the nipple pointer soon becomes second nature. As to the quality of the case, this is not the most rugged portable ever built but it seems solid enough.

RAM expansion is a doddle. All you do is remove a small plate underneath, plug in the module and replace the plate. There is a MIDI connector, audio



in and out, and a microphone socket. On the negative side there is only one connector for either an external keyboard or mouse, and the tiny switch to set which one is in use is virtually invisible.

An external optional battery charger is a welcome addition for those administering pooled portables or likely to use these machines over extended periods. Only NiMH batteries are available and these can be changed quickly and easily. The TravelMate feels fast and you rarely have to wait for it to catch up on the screen. Only unstable 32-bit file access lets it down. The multimedia docking station is excellent and easily matches the quality of the notebook itself.

If you need top-quality graphics then this range of machines has to be a leading contender. The dualscan and TFT models all give remarkable pictures. Running the Microsoft Home Sampler CD through the optional multimedia docking station gives a clarity and colour definition closer to a quality VGA monitor than a standard portable screen. Textures come to life and the brightness of the TFT version is an example of what the new screen technologies can really do.

PCW Details



Texas TravelMate 4000

Contact Texas Instruments 01932 761595

Price DX4/75 20Mb/341Mb TFT £4,509

Good Points Lovely screens, responsive keyboard.

Bad Points Shame about the 32-bit access.

Conclusion In terms of design and screen quality this is a leader in its field.

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The Secret Of Longer Life

If there's one fundamental rule of portable computing, it's that the batteries will always start to run out at the vital moment. Fortunately, you should be warned by the PC when time is running out, and you should save what you are doing and quit. As portables adopt faster processors, bigger hard disks and better screens, battery life becomes even more important.

The good news is that matters are improving. The bad news is that the ideal battery combining high capacity, fast recharge, low weight cells and low cost to both wallet and environment is still a long way off.

Nickel Cadmium (NiCad) batteries have a number of factors in their favour. Voltage levels remain relatively stable throughout the discharge cycle; repeated discharging and recharging does little damage; recharge cycles are short, and prices are falling. The main drawback for users is energy density. Size for size, they hold less charge than other types, which may mean carrying

extra units around. The constituent materials are also bad for the environment when disposed of improperly.

Nickel-Metal Hydride (NiMH) batteries, on the other hand, may hold up to 80 percent more charge size-wise than NiCADs, but they charge more slowly and cost much more.

One drawback of both NiCADs and NiMHs is that they should be fully discharged before reuse. Failure to do this reduces the charge capacity of the battery and its effective life and is known as "voltage depression".

Other technologies such as Lead Sulphuric Acid have been tried but none have succeeded. Now, Lithium-ion (Li-ion) batteries are being promoted by prominent portable makers such as the industry leader Toshiba.

Lithium itself is highly dangerous but this Li-ion form is very stable. Li-ion batteries are lighter, and cells can supply up to three times more power, display little voltage depression effect, and discharge less when stored. They are greener than

nickel-based batteries when disposed of, and a longer life makes this less frequent.

All portables come with some form of power management facility. These have various "sleep" settings to suspend processor, screen and disk activity when the keyboard and mouse are not being used, which can dramatically extend battery life.

New versions of old processors now use less power. Intel is currently moving to 3.3 volt technology for its 486 range. Hard disks are shrinking in size as recording densities increase. The result is smaller platters that need less power to drive.

It is also useful to know if the batteries can be recharged without being connected to the PC. Where portables are pooled, this allows separate charging of spare batteries and quicker re-issue times.

If you're only going to use the PC off the mains then batteries aren't important. For use on the move, though, close attention to weight, recharge times, life and other factors is essential.

Talkative Toshibas And Communicating Compaqs

Sun computers argue that "the network is the computer". A portable on the road is certainly less powerful than one on the office network, but there are solutions to this problem. PCMCIA modems ensure that most hotel rooms can provide a link to the office network, and some hotels even have separate phone lines for computers — but that won't do you much good parked up in a motorway service station between customers.

A mobile phone provides an invaluable link for the travelling businessman so it seems logical that it should be the solution for the portable computer user.

But it's not quite that simple. Mobile phone links will never be as good as bits of buried copper. Sending information — be it voice or data — over a wireless link is bound to be subject to interference. The problem is complicated by a lack of standards. There is no way to connect any mobile phone to any computer, it's always necessary to choose the right phone and it often helps if you have some control over which computer you are buying.

Analogue cellular and PCMCIA solutions work, but not that well. In practice, you'll see an unreliable 2400bps — unlikely to attract a flashing blue light as you steam down the digital super highway.

More attractive are the digital networks. Current GSM systems are operated by Cellnet and Vodafone and have the advantage of agreements to work with compatible systems overseas. Until recently, using digital mobile phones for data was great in theory, but duff in practice.

Vodafone launched a special service on 19th October last year and Cellnet a more comprehensive package on 28th November. The Vodafone system only has basic data — you can log into a remote computer but Cellnet offers more advanced services — you can use the system to send and receive faxes using your mobile phone. GSM has a standard known as SMS (Short Message Service) which works like a pager. Even if you are on the phone a 160-character text message can be transmitted to the display on the handset. The Vodafone system will receive these messages but since linking digital phones to computers is quite new it's been considered pointless to be able to allow phones to originate messages since that meant typing messages using combinations of keys on the numeric keypad.

Links to computers mean that sending and receiving SMS messages is a good, cheap, alternative to real data. You can establish a pretty reliable 9600bps link and use software compression. Not an amazing

speed but tolerable for most applications such as updating sales information or running an SQL enquiry. With the right hardware, speeds of 57,600bps are theoretically possible.

Motorola will soon have a data card made by Communicate for the super-light 8200 phone and Ericsson will have a PCMCIA card for the tiny GH337. Communicate will have a dual-purpose card to work as both a GSM data card and a conventional modem.

The newest and cheapest mobile phone networks are known as DCS 1800. Mercury offers One 2 One in the South West and West Midlands whilst Orange covers over 70 percent of the UK population. No data service has yet been offered by Mercury, but when it comes it is likely to be a value added service denying you the otherwise free weekend local phone calls — useful for access to the Demon Internet.

Orange has already demonstrated a data service. This uses the same Nokia PCMCIA data card as the GSM system (one card can be used with both phones) and will provide a comprehensive 9600bps service with SMS, data and fax. With much lower monthly bills it will probably emerge as the best bet, but for the moment the best option seems to be Cellnet GSM.

Simon Rockman

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Toshiba 4800CT/500 & 1910CS/500

Toshibas are for serious users and the build quality is everything you would expect from the leader of the pack. This feels like a machine built to travel. The keyboard is responsive and the layout fairly standard although the Ctrl and Caps Lock keys have swapped position which causes problems using keyboard shortcuts in Windows.

If you swap floppies a lot, be warned that the floppy eject button needs pushing right into the case to work, which is awkward if you have large fingers. On a positive note, the side-mounted trackball is easy to manipulate and can be angled to suit the user. The LCD strip below the screen is highly informative.



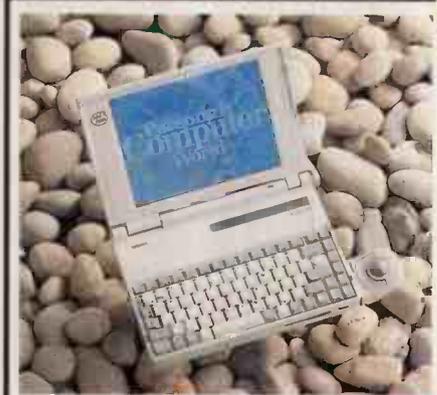
Memory upgrades are via a slot at the side but the supplied hard disk is already 500Mb and so cannot be increased (at least until Enhanced IDE is incorporated). For the battery-dependent "mobiliste", changing the battery is simple in theory but fiddly in practice. The power-saving setup is defined through Windows, which is better for most people than using the BIOS. You can also set up a fast restart which takes only 10 to 15 seconds.

The 4800CT runs fast enough in Windows to keep everyone happy but there are occasional hesitations, probably caused by the power-saving features. If the disk is shut down when you start there will be a fractional delay. The built-in microphone and Windows Sound System utilities will be of little use to most people.

The TFT screen is good in terms of clarity but the overall balance is muddy. The test bitmap is indistinct and lacking in range. Even single tones are dotty.

The dualscan on the 1910 is a distinct letdown; cheap clones often have better screens. It is patchy and would not handle anything more than VGA (therefore its video benchmarks are not strictly comparable with 256-colour tests).

PCW Details



Toshiba 4800CT/500 & 1910CS/500

Contact Toshiba 01932 841600
Price 4800CT DX4/75 8Mb/500Mb TFT £4,495; 1910CS SX/33 4Mb/213Mb DSTN £1,595

Good Points Keyboard great for DOS users.

Bad Points Ergonomics not as good as could be expected from the market leader.

Conclusion Toshiba cannot afford to sit on its laurels while others bring out better portables.

Viglen Dossier 486 Advanced Sound

The Viglen is a no-nonsense machine at a competitive price; concentration on a good all-round design has paid off.

The keyboard is similar to a standard desktop and all keys are full-sized. The layout is uncluttered although the cursor keys are not ideally placed. As the keyboard is at the back of the base there is plenty of room to rest your wrists. To use it effectively, the latest Microsoft Mouse drivers should be used as these give a much greater degree of control over movement.

Although build quality is sufficient some of the port covers seem a little flimsy. The screen, however, is well



hinged and smooth to position. The feel of the keyboard is particularly good — it's one of the best in this test. The floppy eject mechanism works easily, unlike many others.

Upgrading the hard disk, memory and CPU is not for the inexperienced or the nervous. Even removing the long, thin battery is not as obvious as it could be although it's easy enough after you have done it once.

The Dossier is no slouch: as is to be expected of a DX4/100, it really does fly. This is a sound-based notebook and it comes with a number of bundled utilities; Works for Windows and Lotus Organiser provide an appropriate package for the travelling user.

The TFT screen is definitely one of the better ones here, with clarity and pleasing colours plus a wide palette range in 640 x 480 mode and a large virtual screen.

With a dualscan screen the Viglen performs surprisingly well. With a palette of only 256 colours, miracles cannot be expected, but the range of tones produced is more than adequate for most tasks except high-end graphics. Its clarity is excellent.

PCW Details



Viglen Dossier 486 Advanced Sound

Contact Viglen 0181 758 7000
Price DX4/100 20Mb/346Mb TFT £3,821; DX/25 8Mb/128Mb DSTN £1,663

Good Points Well balanced, well thought out design.

Bad Points Very few.

Conclusion A vast improvement on the old Amstrad portables.

Zenith Z*Noteflex

Zenith has always done things its own way, as the Noteflex demonstrates. This power-user's machine is both larger and more robust than its little brother, the Z.Star EX, and in design they are quite different.

Being the larger of the two machines means the Z*Noteflex has a slightly bigger keyboard, although more space at the front would be appreciated to allow a larger wrist rest. The screen hinge could do with being stiffer to overcome vibrations courtesy of British Rail's outdated rolling stock, but the floppy eject works well.

The large cursor keys are easy to use and locate but they are still in the



wrong place. However, adapting to the layout is greatly aided by the discrete and raised keys, which would be of significant help to anyone with typing problems due to either age or loss of motor control. The trackball and buttons are also a decent size. Using the index finger on the ball and the middle two fingers on the button gives a great deal of control, though the buttons do require a little force.

For upgrading and modularity, the Z*Noteflex can barely be faulted. Everything is removed quickly and easily and no-one need be afraid of doing the work themselves.

The machine runs at a decent lick and handles Windows and heavy processing requirements such as compiling a video clip on a par with desktop machines. Windows Sound System and the Crystal Audio applications are bundled, combined with an on-board mic, speaker and head-phone socket to give an all-round audio capability.

Only a dualscan screen was available for review but this did handle the test bitmap with good shading and range of tones. It's quite pleasing and easy on the eye, though a little muted.

PCW Details



Zenith Z*Noteflex

Contact Zenith 0181 568 5050

Price DX4/75 12Mb/210Mb DSTN
£3599

Good Points Bigger keyboard and excellent modularity.

Bad Points Trackball buttons difficult to use.

Conclusion A relief from pokey keyboards and tiny trackballs. An excellent all-round package.

Zenith Z.Star EX

The Z.Star EX is a small, neat, entry-level machine with some interesting features. The keyboard layout is reasonably intuitive and has all the cursor movement keys along the righthand edge and bottom righthand corner. This can make the Enter and Backspace keys a touch difficult to locate but this layout is common to many portables. The keyboard has a very good feel to it and the keys have good travel.

The unusual pointing device, called a "J-Pointer", relies on two buttons along the bottom of the keyboard and the J



key, which has an indent for your finger and can be pushed in all directions. This is more usable than you might expect and is helped by a good wrist rest.

The processor can only be changed by an "authorised person", but everything else can be removed by the user and there's room at the side for an audio module. There are PCMCIA slots and all the standard connectors, and even the floppy can be swapped for an extra battery — a definite advantage. There's also a Smart Cube AC adaptor. This replaces the normal battery for use with the mains, and means you don't need a bulky PSU cluttering the desktop; only a thin cable between portable and wall socket.

The only problem experienced with the dualscan screen was in trying to display 256 colours. Sixteen seems to be the limit with the drivers/graphics card installed. The colours available are a little muted but acceptable.

In general, the Z.Star EX performs more than adequately for a low-spec machine.

PCW Details



Zenith Z.Star EX

Contact Zenith 0181 568 5050

Price DX2/50 8Mb/210Mb DSTN
£1,699

Good Points Smart Cube AC adaptor; small dimensions.

Bad Points Lack of modularity; 16 colours only.

Conclusion If you want your Windows to fly, this is not the machine, but given its spec this is no surprise. It's well suited to the SoHo market.

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Docking Stations, Port Replicators & Multimedia Add-ons

Although we asked all manufacturers to supply a docking station or multimedia add-on, surprisingly few did. Those we did receive varied almost as greatly as the portables to which they attach.

The full-blown docking station designed to turn a portable into a desktop machine is typified by the Viglen and Opti. This kind of unit allows the portable to be slid into place and locked. It adds all the expansion capabilities of a desktop PC including ISA slots and space for extra devices like disk drives and CD-ROM drives.

A port replicator, on the other hand, does only what it says: it has exactly the same facilities and connectors as the portable itself. These include the serial, parallel and external keyboard/mouse connectors. It may seem a strange idea but for a mobile worker calling into the office it has the distinct advantage of not wasting time and effort plugging and unplugging the external units. It also cuts down on wear and tear. Port replicators are much smaller than docking stations and don't usually add expansion capabilities. The Locland unit is a typical port replicator.

The final kind of portable addition is the multimedia add-on, which uses either a SCSI or proprietary connection (possibly via the PCMCIA slots) to give sound and CD-ROM playing capability. A number of units are now available that can link to any standard portable, although some manufacturers such as Texas insist on using proprietary (and often excellent) add-ons.

Thanks to constantly shrinking components, notebooks are appearing that are fully multimedia-capable. Sadly, the latest



Panasonic arrived broken so it didn't make it to review, while the IBM ThinkPad 755CD was just too late. Both have built-in 7cm CD-ROM players and the IBM even has full video capture and external replay facilities.

The Viglen and Opti docking units almost swallow up the portable, and in doing so they add the optimum in terms of expandability. The notebook slides in easily and two catches lock it into place. You then have, in effect, a desktop unit with two 16-bit ISA slots, a full-sized bay for hard disks and other devices, and two serial, one parallel, one VGA and one audio speaker out connector. The lid of the unit allows you sit the monitor on top.

The second 1.44Mb floppy becomes B: drive and the portable's drive, A:, is still accessible from the side for easier installation of software. The whole unit is big — probably bigger than most desktop machines — and weighs over 15lb. One hitch is that when you boot up you must remember to go into the BIOS and disable the notebook's

built-in trackball to allow your desktop mouse to be recognised.

Ergo has taken a more minimalist approach with its PowerBrick docking station. This is a slim base unit that goes under the portable with no top to sit a monitor on. There are no bays but two 16-bit ISAs are accessed by undoing two thumbscrews, swinging up the lid, and slotting them in before closing. It's very easy to do. At the rear are connectors for VGA, two serial, one parallel, external keyboard (full-sized connector) and a switch to choose which keyboard. A SCSI port would be nice but you can add a card if necessary. Unusually, the connector between the station and the portable is at the front, which makes it easy to ensure a proper link.

Even more minimalist, Locland's Easy Docking is a small T-bar unit with two serial, one parallel, audio out and external keyboard and VGA connectors. It also has a CD-ROM connector. Simply plug it in and switch on.

To complement the TravelMate 4000 series, the multimedia add-on gives audio capability with built-in speakers and a full-sized CD-ROM. The unit is small and light, and as stylish as the TravelMate itself. Sound levels, balance and mix can be altered with thumbwheels. The notebook slides in and clips on easily and the unit can be battery-powered. At the rear there is a full-blown SCSI connector.

For anyone making presentations only some of the time, the advantage of a docking station is that the extra weight and size does not have to be carried around at all times. Now, though, the slimline CD drives are reducing this advantage, while remaining heavier than non-CD portables.



Trackballs, Mini-Mice & Nipples

Pointing devices are the area of notebook design with the greatest scope for variety and they are the main reason why you should try before you buy. The trackball may look good on the advert but stiff buttons don't show up in a picture and can make a good machine unusable.

Sadly to say, the booby prize has to go to Panasonic for its combination of a trackball the size of a pea and finger-breaking buttons. Panasonic has already responded to criticisms and revamped its line-up with a new pointer method which looks to be a great improvement.

Italian design may be all the rage as far as cars and frocks are concerned but let's hope it doesn't catch on in the trackball world. Olivetti's Philos 48C has a "Zebedee" trackball that springs out from the side and has buttons around the edge. This bizarre combination is simply too awkward to be really usable. Toshiba's clip-on side trackball, by comparison, is much easier to use comfortably. On the plus side for Olivetti, the Echos trackball and membrane buttons is a useful combination. Sharp's front-mounted trackball was equally good.

Many companies have tried to provide for Windows users with a trackball, but



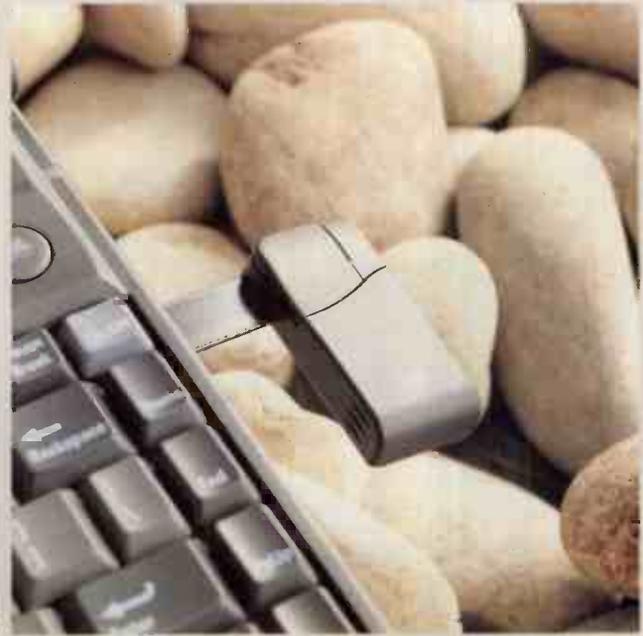
striking the right balance is no mean feat given the huge variation in human hand sizes, mobility and strength. Some balls are too loose, others too stiff, and many are too small to be manoeuvred easily. Others are recessed into the base which can make them difficult to use.

Zenith's Z*Noteflex has the ball right but the buttons need a little too much force. The same is true of Dual's Pentimedia, which is a shame as the ball is an excellent size. Opti, Viglen and Dell are generally good, especially with their substantial wrist rests. The

Compaq Elite's trackball and buttons are in the screen lid, which makes for easy use although prolonged use would tire the arm.

The other major form of pointing device, the TrackPoint or "nipple", is used by IBM (its pioneer), AST's Ascentia 900, Texas Instruments, and Zenith's Z.Star EX. The nickname comes from the shape of the rubber protrusion between the second and third key rows. It is manipulated by the index finger with the thumb being reserved for the primary button. Despite its unusual design, it works surprisingly well and adapting to it is easy for most people. A variation on this theme has been adopted by Zenith, which uses the centrally located J key.

Apple and Hewlett Packard go their own way by adopting a TrackPad and mini-mouse respectively. The TrackPad is a touch-sensitive membrane in the shape of the screen. To move the pointer on the screen you move your finger around this pad in the same way you would move a mouse around its mouse mat. Pioneered by Psion for its MC series of mobile computers, this system is intuitive to use and precise. Hewlett Packard's OmniBook 600 uses a tiny mouse that pops out from the side. Connected by a plastic strip, this is comfortable and accurate to use although long sessions could prove tiring.



Editor's Choice

The great difficulty in choosing the best 486 colour notebook is the sheer variety of designs. While the benchmarks show which machines have the best components in the best arrangement, it is much harder to say that TrackBall A is better than Rubber Pointer B. Personal choice and experience play a great part in individual preferences.

We used two acid tests in this group test. The first was to test ability with a wide variety of tasks ranging from simple word processing to multimedia. The second is how comfortable the machine would be to use day in and day out. This includes criteria such as whether the screen can be positioned accurately, how easy the pointer and buttons are to use, and whether the keyboard is easy to adapt to after using a standard 102-key desktop model. In this area there are a number of notable failures. Excellent component packages are, sadly, often let down by poor ergonomics.

One or two manufacturers have recognised this and are now revamping their ranges. Dell seems to have learned from its earlier mistakes and has bounced back with a good-quality range that the corporate world should take note of. Panasonic is also relaunching new machines and multimedia notebooks, with a full-sized CD-ROM instead of the abortive mini-CD format previously used.

More established players such as Toshiba, Compaq and IBM betray the DOS roots of their machines. For serious Windows use it is worth checking out whether you are happy with their side-attached trackballs, lid-mounted ones and "nipples". These are text-based machines modified for the GUI age. Other manufacturers have

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COMMENDED

clearly designed their machines with Windows in mind.

We have chosen two Highly Commended machines. The first is the IBM ThinkPad, which has an excellent keyboard for the word processing and text-based work that still dominates most people's needs. The nipple looks unusual and even unusable, but it is surprisingly easy to adapt to. Positioning the pointer in Windows is sufficiently quick and precise for most uses. The range has now been extended to include a CD-ROM version using the latest TEAC drive that adds only a few millimetres to the depth of the base. It

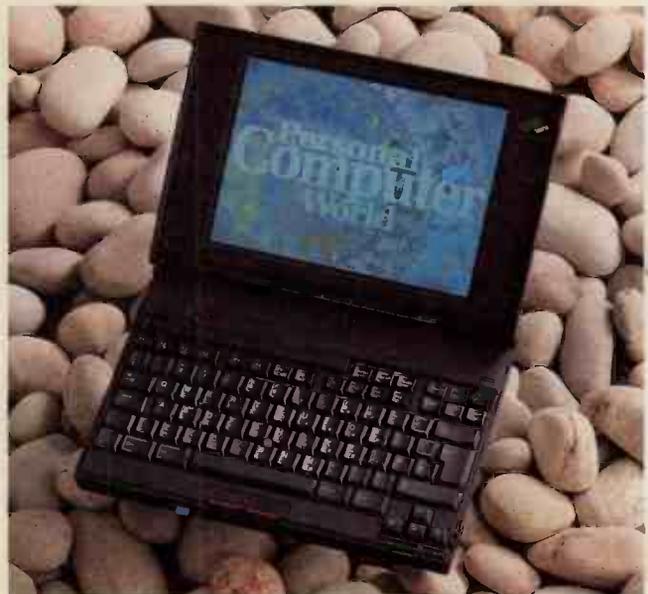
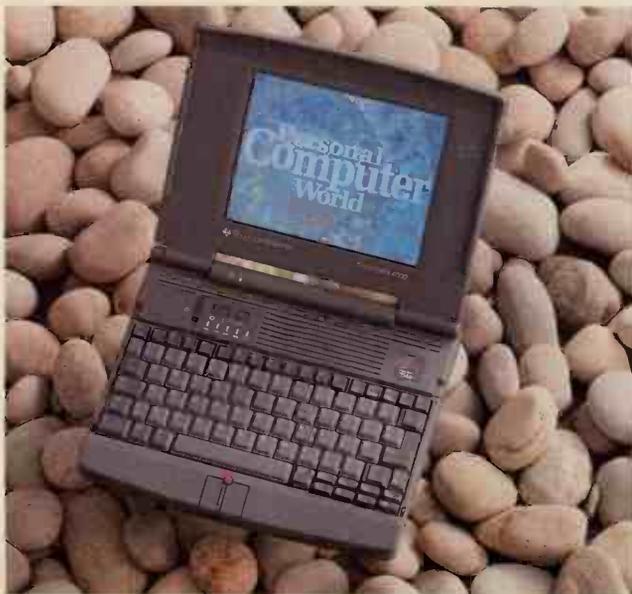
even has a built-in video capture and replay card. Only the fact that batteries are accessed from below the flip-up keyboard could be seen as a real drawback for mobile use. The ThinkPad is a smart machine which will impress.

The other Highly Commended award has to go to Apple's PowerBook range. These continue to lead in terms of usability and simplicity and a lot of thought has gone into making life as easy as possible. The keyboard layout and trackpad are a delight to use, with a powerful machine and good interface. Linking to a network is so straightforward that PC users will probably choke. Only the lack of PCMCIA slots and the proprietary nature of the system holds it back from becoming the Editor's Choice.

This accolade goes to the Texas Instruments TravelMate range. TI has come up with an all-rounder that has no real drawbacks. The keyboard is reasonably well laid out, the nipple is easier to use than the IBM version on account of the lower front lip, and the screens are definitely best of breed. The recently launched DX4/100 machine with the latest TFT screen takes portables comfortably into the realms of graphics use. Combined with a multimedia add-on that is small yet contains all the features needed, the TravelMate range should cater for virtually all needs. The big players in the market had better watch out.

Highlights

- ACI for keeping usability in mind.
- Sharp for its trackball design.
- The HP OmniBook 4000CT for executive good looks and its useful infra-red port.
- IBM and Viglen for particularly useful bundled software.



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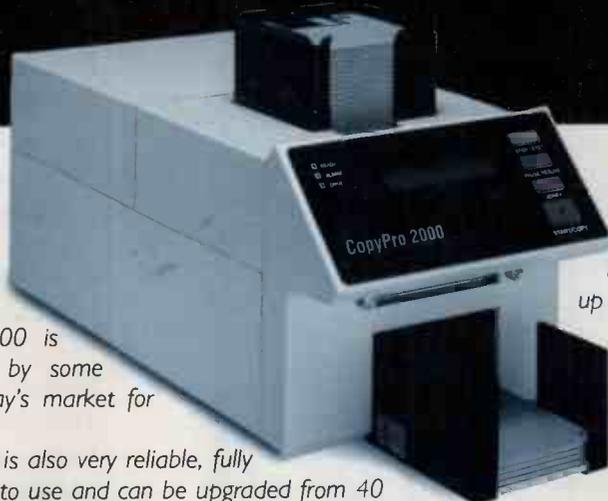
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Monday - Saturday 10am to 5.30pm
Unit 14, The Generation Centre
Dane Street, Rochdale OL12 6BX
Telephone: 01706 861101
Facsimile: 01706 861104

● **Midland Office & H.Q.:**

Monday - Saturday 9am to 5.30 pm
121 Regent Street, Leamington Spa
Warks CV32 4NU
Telephone: 01926 832291
Facsimile: 01926 832279

● **Southern Office:**

Monday - Friday 9am to 5.30pm
875 Plymouth Road Slough
Berkshire SL1 4LP
Telephone: 01753 567899
Facsimile: 01753 567007

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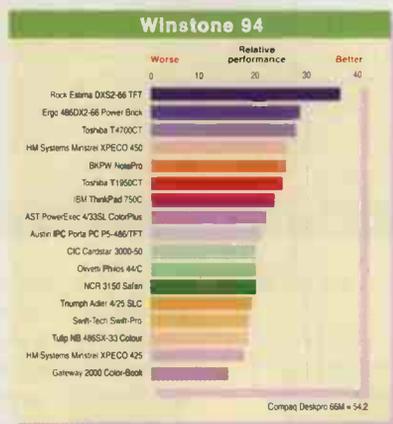


Preceded by the unrivalled success of the Estima, Rock are now pleased to introduce the all new Estima sonata. All the performance of the award winning Estima plus an inbuilt sound capability making this the most affordable hi-speed multimedia 486 based Notebook available.

- Intel 486DX2-66 & 486DX4-100 CPU
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- In-Built Audio int. Speaker & mic
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- MS-DOS V6.22 & MS-WFW V3.11
- Multimedia Docking Station Option
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UPGRADES	
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Spare PSU	£79
Docking Station	£349

*Subject to Availability
 ** Notebook Only, Excludes Delivery Charges and must be returned in "As New" condition. All prices Exclude VAT
 Specifications may be subject to change without notice.
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- DX2-66 10.4" 256 Colour DualScan **£1499**
 - DX4-100 10.4" 256 Colour DualScan **£1699**
 - DX2-66 9.5" 256 Colour TFT **£2199**
 - DX4-100 9.5" 256 Colour TFT **£2399**
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Top Ten Tips For Buying A Notebook

1. Try before you buy

The variety of portables, in terms of design and performance, is astounding. Small differences like the trackball and keyboard layout can significantly affect how usable a portable is.

2. The Solitaire test

One of the best ways to test out a portable's suitability for Windows use is also one of the most simple: fire up Solitaire and have a go. If you find it hard to move and position the cards in Solitaire then it is likely to be difficult to move blocks of text and graphics around in more general use.

3. Analyse your needs

Don't be seduced by that faster processor or a better screen unless you really need it. If your needs revolve around text processing or number crunching, look for the notebooks with the best keyboards. If you are likely to be moving graphics around the screen to a great extent then concentrate on the trackball.

4. Who are the users?

Some portables are forever under the control of one person, others are lent out to many. This has major implications for build quality. Notebooks assigned to particular individuals for long periods will generally be treated better than those which pass through many hands regularly. In the latter case, it is important to buy portables that will take a real hammering. This may be more important in the long term than a better screen or bigger disk.

5. Removable floppies and second batteries

Removable floppy disks no allow longer

times between recharges by giving space to a second battery, but absence of the floppy can help avoid viruses and games clogging the disk and reconfiguration of the setup. File transfer can be done by the systems administration staff centrally.

6. Switching the trackball buttons

For righthanded people, many trackball buttons are effectively the wrong way round. With a mouse, righthanders use their index finger to click the primary button on the left. With a centrally placed trackball, this translates normally to manipulating the ball with one of the middle fingers and using the index finger for clicking. This makes little sense as the middle fingers are longer and out of position and the index finger is much better for fine movements. Even worse, the hand is held at an unnatural angle.

An effective way to deal with this is to reverse the buttons so that the one on the right becomes the primary button, leaving the index finger free for the ball. The Mouse applet within Control Panel allows you to switch the buttons over. Even better, the latest Microsoft Mouse Manager gives excellent control over trackball function and has a Locate feature. This jumps the pointer automatically to where it thinks you will next need to click. For example, when a dialogue box appears the cursor will jump to the highlighted button, saving a lot of mouse work and wrist strain.

7. Buy the right spec

With portables being so modular these days, it is tempting to buy a base model and upgrade later as funds allow. The drawback is the overall cost. Nearly all the major components of a portable are proprietary and therefore considerably more expensive than their desktop counterparts. Look at the RAM

prices in the features tables. You can be expected to pay up to £100 per megabyte for RAM compared with around £30 per megabyte for standard SIMMs. Generally speaking, it works out cheaper to buy the spec you will need long term from the outset than to upgrade later on.

8. Who carries out the upgrade?

Most of the models on test allow the user to make the upgrade — sometimes this is easy, other times it's more difficult. Many manufacturers insist on processor upgrades through recognised engineers or their own staff. Naturally, this will work out more expensive than doing it yourself. It is also an important issue for anyone needing to upgrade a whole batch of machines because of shipping costs and the loss of equipment for at least several days.

9. The one vs the many

The screen type becomes very important if the notebook is likely to be used by a group of people at once, for instance during a presentation. The viewing angle is very much more restricted with a dualscan screen than with TFT models, which allow more people to see the screen simultaneously.

10. Recharging your notebook

In the early days of portables, many batteries could be recharged externally with a separate charger. This had great advantages as a spare could be charged up while the main battery was in use. The trend today seems to be against this with none of the manufacturers supplying external chargers. For anyone managing a large group of portables the logistics of keeping everyone supplied with power can easily become a nightmare, so have a word with your supplier about this before you commit yourself.

Buyer's Guide: What To Look Out For

Desktop PCs tend to be much the same as one another. With notebooks, though, the range of models is far more diverse. For light use almost any decently constructed portable will be sufficient; with intensive use, the keyboard layout, pointing device and screen quality are critical. They become more important than a fast processor or a big hard disk.

Today, with the dominance of Windows-style interfaces, screen size and quality have become more important than ever. Icons need to be easily discernible, so the larger the screen the better. The range of possible viewing angles differs

between screens and for group use this is a crucial factor.

Portables come with a large variety of pointing devices in place of the standard mouse, such as trackballs, mini-mice and the IBM-style "nipple". Of course, it's largely a matter of personal choice, so you should try out a few types before you buy. Also, check that the portable has two serial ports; one for a modem and one for an external mouse. As long as you have a flat surface to work on, a standard mouse can make working with Windows much easier.

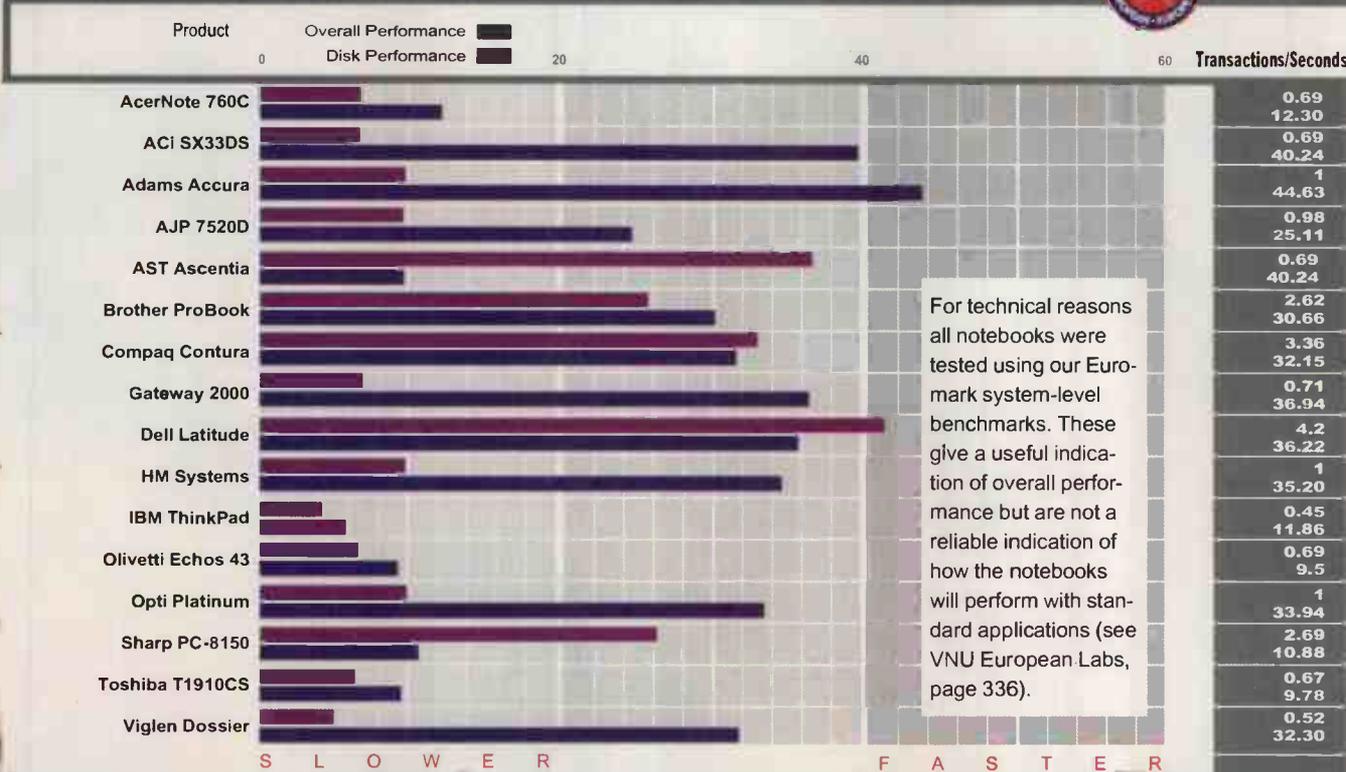
If there is one item that can make or break a portable (and its user) it is the quality

and layout of the keyboard. Choosing a notebook almost always involves a trade-off between size and keyboard usability, so it is important to assess the type of use it will get beforehand. For writing reports on the move, a larger keyboard makes more sense despite the increased shoulder-ache. Sub-notebooks are easier to carry but aren't ideal for intensive typing.

Another problem with keyboard use is that the base unit of the portable is often quite deep and this can soon cause wrist ache. Only a few machines have thin bases and this usually means sacrificing the floppy or some other component.



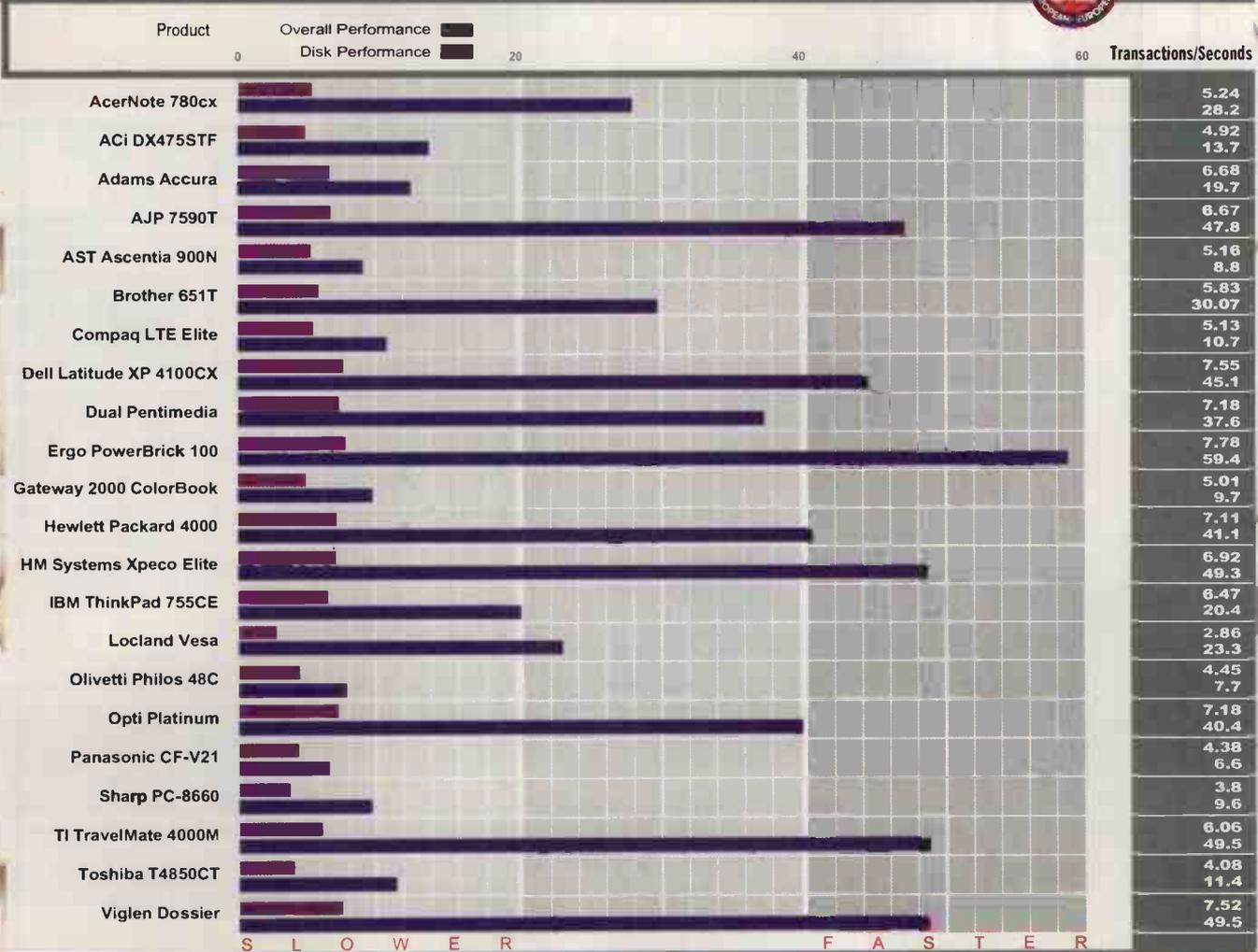
Entry Level Colour Notebooks Test Results



For technical reasons all notebooks were tested using our Euro-mark system-level benchmarks. These give a useful indication of overall performance but are not a reliable indication of how the notebooks will perform with standard applications (see VNU European Labs, page 336).



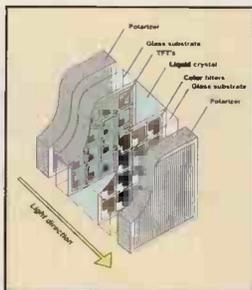
Power User Colour Notebooks Test Results





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NEC

TABLE OF FEATURES ENTRY LEVEL

	Acer	ACi	Adams	AJP	Apple	AST	Brother
MANUFACTURER & MODEL							
Manufacturer's Name	Acer	ACi	Adams	AJP	Apple	AST	Brother
Model Name	AcerNote 760C	SX33DS	Accura	AJP 7520D	PowerBook 520C	Ascentia 800N	ProBook BCP631D
Phone No.	01628 533422	0181 830 1958	0161 877 8822	0181 452 9090	0800 127753	0181 232 5000	01279 416888
Fax No.	01628 524071	0181 830 1959	0161 877 8684	0181 450 6360		0181 568 4600	01279 418130
Price of Reviewed Machine	£1,487	£1,499	£1568	£1,299	£2,070.90	£1,795	£1,549
SPECIFICATION							
Processor Type and Speed	486SX-33	486SX-33	486SX2-50	486 SX2-50	68LC040	486 SX-33	486 DX-33
RAM Supplied	8Mb	8Mb	8Mb	4Mb	4Mb	8Mb	4Mb
RAM Maximum	16Mb	20Mb	20Mb	36Mb	36Mb	20Mb	32Mb
RAM Prices 4/8/12/16Mb (£)	150/300/nk/nk	169/nk/nk/729	169/nk/695/nk	160/320/480/640	150/288/nk/552	170/nk/nk/925	159/299/nk/16
Hard Disk Supplied	240Mb	250Mb 13ms	250Mb 13ms	245Mb 14ms	160Mb	250Mb	120Mb
Hard Disk Maximum	340Mb	520Mb	520Mb	525Mb	320Mb	340Mb	520Mb
Floppy Disk (Int/Ext)	Int	Int	Int	Int	Int	Int & Removable	Internal
PCMCIA Slots Type II/Type III	2/1	2/1	2/1	2/1	0/0	2/1	2/1
Pointer Type	Trackball	Trackball	Trackball	Trackball	TrackPad	Trackball	Trackball
CONNECTORS							
Serial Port (Std/Enh)	1 x Standard	1 x Enhanced	1 x Enhanced	1 x Standard	1 x Standard	1 x Standard	1 x Standard
Parallel Port (Std/Enh)	1 x Standard	1 x Enhanced	1 x Standard	1 x Standard	No	1 x Standard	1 x Standard
Ext Conns Key/VGA/Mouse	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/No	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
DISPLAY							
Display Type DualScan/TFT	DualScan	DualScan	DualScan	DualScan	DualScan	DualScan	DualScan
Screen Size	9.5 inches	9.5 inches	9.5 inches	10.4 inches	9.5 inches	9.5 inches	9.5 inches
On-screen Colours @ 640x480	256	256	256	256	256	256	256
External Mon Cols @ 1024x768	16	256	256	256	Monitor-Dependent	16	16
SOFTWARE							
DOS Version	MSDOS 6.2	MSDOS 6.22	MSDOS 6.22	MSDOS 6.22	System 7.5	MSDOS 6.21	MSDOS 6.22
Cost	Included	£79	£29	£79	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes, if requested	Yes	Yes	Yes	Yes
GUI Version	Windows 3.11	Windows 3.11	Windows 3.11	Windows 3.11	System 7.5	Windows 3.11	Windows 3.11
Cost	Included	With DOS	£39	With DOS	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes, if requested	Yes	Yes	Yes	Yes
POWER SUPPLY							
Battery Technology	NiMH	NiMH	NiMH	NiCAD	NiMH	Enhanced NiMH	NiCAD or NiMH
Claimed Battery Life (hours)	2.75 - 4.4	2.5	2.5	2.4	4 - 7 (2 batts)	up to 2.5	2
Claimed Recharge Time (in use)	2.8	1.5	1.5 / 4	2	not given	2.5	2 - 4
PHYSICAL SIZE							
Dimensions (WxDxH) in ins	11.6x2.0x8.8	11.3x1.9x8.8	11.4x1.8x8.8	11.1x2.0x9.1	11.5x2.3x9.7	10.5x1.7x8.7	11.3x2.0x8.5
Dimensions (WxDxH) in cm	29.0x5.1x22.0	28.2x4.8x22.0	28.5x4.6x22.0	4.4x5.0x22.8	28.7x5.8x24.2	26.3x4.3x21.8	28.3x5.0x21.3
Weight with Battery	6.3lbs / 2.9kg	5.7lbs / 2.6kg	5.9lbs / 2.7kg	6.5lbs / 29.9kg	6.4lbs / 2.9kg	5.9lbs / 2.7kg	5.4lbs / 2.5kg
SPECIAL FEATURES			Soundcard	Soundcard	Ability Bundle	2nd Battery	WinWorks 3.0
SALES AND SUPPORT							
Basic Warranty Length (months)	12 months	12 months	12 months	12 months	12 months	3 Years RTB	12 Months
On-site Service available (cost)	Included 1 Year	£40	From Jan 95	No	Through Dealers	Through Dealers	Yes - Free
Extended Warranty Available	Yes	Yes	Yes	Yes	Through Dealers	AST ExeCare	Yes, 2nd & 3rd yrs
Sold through Dealers or Direct	Direct	Direct	Direct	Direct	Dealers	Dealers	Both



TABLE OF FEATURES ENTRY LEVEL

	Compaq	Dell	Gateway 2000	Hewlett Packard	HM Systems	IBM
MANUFACTURER & MODEL						
Manufacturer's Name	Compaq	Dell	Gateway 2000	Hewlett Packard	HM Systems	IBM
Model Name	Contura 400	Latitude 450MCX	ColorBook SX33	600C	Xpeco Elite	ThinkPad 360CSE
Phone No.	0181 332 3888	01344 720000	0800 552000	01344 369222	0181 209 0911	01345 727272
Fax No.	0181 332 1961	01344 860187	010 3531 848 2022	01344 361236	0181 209 0912	01345 720072
Price of Reviewed Machine	£1,995	£2,274	£1,299	£2,035	£1,799	£2,330
SPECIFICATION						
Processor Type and Speed	486 DX2-40	486 DX2-50	486 SX-33	486 DX2-50	486 SX-50	486 DX2-50
RAM Supplied	4Mb	8Mb	4Mb	4Mb	8Mb	4Mb
RAM Maximum	20Mb	20Mb	20Mb	16Mb	20Mb	20Mb
RAM Prices 4/8/12/16Mb (£)	190/nk/nk/nk	175/na/na/799	160/nk/nk/780	290/470/nk/nk	161/nk/nk/767	205/nk/nk/1,025
Hard Disk Supplied	250Mb	340Mb	340Mb	170Mb	210Mb	340Mb
Hard Disk Maximum	250Mb	340Mb	340Mb	260Mb	524Mb	810Mb
Floppy Disk (Int/Ext)	Int	Int	Int	Ext	Int	Int/Removable
PCMCIA Slots Type II/Type III	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1
Pointer Type	Trackball	Trackball	Trackball	Mini-Mouse	Trackball	Trackpoint II
CONNECTORS						
Serial Port (Std/Enh)	1 x Standard	1 x Enhanced	1 x Standard	1 x Standard	1 x Std/1 x Enh	1 x Standard
Parallel Port (Std/Enh)	1 x Enhanced	1 x Standard	1 x Standard	1 x Enhanced	1 x Standard	1 x Standard
Ext Conns Key/VGA/Mouse	All Thru Docking Base	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/No	Yes/Yes/Yes	Yes/Yes/Yes
DISPLAY						
Display Type DualScan/TFT	DualScan	TFT	DualScan	DualScan	DualScan	DualScan
Screen Size	9.5 inches	9.5 inches	9.5 inches	8.5 inches	10.4 inches	9.5 inches
On-screen Colours @ 640x480	256	256	256	256	256	256
External Mon Cols @ 1024x768	16	256	16	256	16	256
SOFTWARE						
DOS Version	MSDOS 6.0	MSDOS 6.21	MSDOS 6.22	MSDOS 6.2	MSDOS 6.22	IBM PCDOS 6.3
Cost	Included	Included	Included	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
GUI Version	Windows 3.1	Windows 3.11	Windows 3.11	Windows 3.11	Windows 3.11	Windows 3.1
Cost	Included	Included	Included	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
POWER SUPPLY						
Battery Technology	NiMH	NiMH	NiMH	NiMH	NiMH	NiMH
Claimed Battery Life (hours)	up to 6	2	3	3.5 - 4.0	3.5	2.9
Claimed Recharge Time (in use)	2.5	2.5	4	2	1.5	1.5
PHYSICAL SIZE						
Dimensions (WxDxH) in ins	8.9x2.0x11.9	10.4x1.9x8.8	11.7x1.7x8.5	11.0x1.5x7.2	11.0x2.0x8.6	11.7x2.0x8.3
Dimensions (WxDxH) in cm	22.3x5.0x29.8	26.0x4.8x22.0	29.3x4.3x21.3	27.5x3.7x18	27.5x5.0x21.5	29.2x5.0x20.7
Weight with Battery	5.6lbs / 2.5kg	6.4lbs / 2.9kg	5.7lbs / 2.6kg	3.8lbs / 1.7kg	7.2lbs / 3.3kg	6.2lbs / 2.8kg
SPECIAL FEATURES						
	Energy Star		WinWorks 3.0	I-R Port/LapLink		Software bundle
SALES AND SUPPORT						
Basic Warranty Length (months)	3 Years	12 months	12 months	3 years	12 months	1 year int'national
On-site Service available (cost)	1st Year Included	Yes	No	Through dealers	£49	1 yr courier £79
Extended Warranty Available	Yes	Yes, up to 5 years	Yes	Through dealers	Up to 5 years	3 years £439
Sold through Dealers or Direct	Dealers	Direct	Direct	Dealers	Direct	Direct

TABLE OF FEATURES ENTRY LEVEL

	Olivetti	Opti	Sharp	Toshiba	Viglen	Zenith
MANUFACTURER & MODEL						
Manufacturer's Name	Olivetti	Opti	Sharp	Toshiba	Viglen	Zenith
Model Name	Echos 43	Platinum	PC-8150	T1910CS	Dossier Advanced	Z-Star EX
Phone No.	0181 785 6666	0181 507 1818	0161 205 2333	01932 841600	0181 758 7000	0181 568 5050
Fax No.	0181 780 8191	0181 594 2236	0161 205 2638	01932 845606	0181 758 7080	0181 479 2266
Price of Reviewed Machine	£1,599	£1,734	£2,395	£1,595	£1,663	£1,699
SPECIFICATION						
Processor Type and Speed	486 SX-33	486 SX2-50	486 DX-33	486 SX-33	486 SX-25	486 DX2-50
RAM Supplied	4Mb	8Mb	8Mb	4Mb	8Mb	8Mb
RAM Maximum	24Mb	20Mb	20Mb	20Mb	20Mb	20Mb
RAM Prices 4/8/12/16Mb £	180/nk/nk/940	170/320/nk/nk	255/nk/nk/nk	200/nk/nk/1,575	164/326/nk/1,024	165/nk/nk/778
Hard Disk Supplied	170Mb	270Mb	200Mb 12ms	213Mb	120Mb	200Mb 15ms
Hard Disk Maximum	170Mb	810Mb	n/a	213Mb	455Mb	520Mb
Floppy Disk (Int/Ext)	Int	Int	Int	Int	Int	Int
PCMCIA Slots Type II/Type III	2 / 1	2 / 1	1 / 0	2 / 1	2 / 1	2 / 1
Pointer Type	Trackball	Trackball	Trackball	BallPoint add-on	Trackball	Trackball
CONNECTORS						
Serial Port (Std/Enh)	1 x Standard	1 x Enhanced	1 x Standard	1 x Standard	1 x Standard	1 x Enhanced
Parallel Port (Std/Enh)	1 x Standard	1 x Standard	1 x Standard	1 x Standard	1 x Standard	1 x Enhanced
Ext Conns Key/VGA/Mouse	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
DISPLAY						
Display Type DualScan/TFT	DualScan	DualScan	DualScan	DualScan	DualScan	DualScan
Screen Size)	9.5 inches	10.3 inches	9.5 inches	9.5 inches	16.3 x 21.2cm	9.5 inches
On-screen Colours @ 640x480	256	"32,000"	256	16	"4,096"	256
External Mon Cols @ 1024x768	256	256	16	16	16	256
SOFTWARE						
DOS Version	MSDOS 6.2	MSDOS 6.22	MSDOS 6.0	MSDOS 6.2	MSDOS 6.22	MSDOS 6.22
Cost	Included	Included	Included	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
GUI Version	Windows 3.1	Windows 3.11	Windows 3.1	Windows 3.11	Windows 3.11	Windows 3.11
Cost	Included	Included	Included	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes	Yes	Yes	Yes
POWER SUPPLY						
Battery Technology	NiCAD	NiMH	NiMH	NiMH	NiMH	NiMH
Claimed Battery Life (hours)	up to 6	5	2 - 3	3.5	3	3 - 6 (per batt)
Claimed Recharge Time (in use)	1.5	2	2 - 3	1.5	4	1 - 2
PHYSICAL SIZE						
Dimensions (WxDxH) in ins	11.4x1.7x8.6	11.1x1.8x8.7	11.4x1.7x8.8	11.8x2.1x8.4	11.1x2.0x8.6	11.0x2.0x8.8
Dimensions (WxDxH) in cm	28.6x4.3x21.6	27.9x4.4x21.8	28.5x4.2x22.0	29.5x5.2x21.0	27.9x5.0x21.6	27.5x5.0x22.0
Weight with Battery	5.3lbs / 2.4kg	6.2lbs / 2.8kg	6.4lbs / 2.9kg	6.9lbs / 3.1kg	6.2lbs / 2.8kg	5.7lbs / 2.6kg
SPECIAL FEATURES						
	Lotus Organizer	Soundcard/VL-Bus		Added software	Organizer/Works	Audio module
SALES AND SUPPORT						
Basic Warranty Length (months)	12 months	24 months	12 months	12 months	12 months	12 months
On-site Service available (cost)	Dealer dependent	No	Courier service	Dealer dependent	£149	Yes
Extended Warranty Available	Yes	Yes	Through dealers	Dealer dependent	Yes	Yes
Sold through Dealers or Direct	Direct/Dealers	Dealers	Dealers	Dealers	Direct	Both

TABLE OF FEATURES POWER USER

	Acer	ACi	Adams	AJP	Apple	AST	Brother	Compaq
MANUFACTURER & MODEL								
Manufacturer's Name	Acer	ACi	Adams	AJP	Apple	AST	Brother	Compaq
Model Name	AcerNote 780Cx	DX475STF	Accura	AJP 7590T	PowerBook 540C	Ascentia 900N	ProBook BCP651T	LTE Elite
Phone No.	01628 533422	0181 830 1958	0161 877 8822	0181 452 9090	0800 127753	0181 232 5000	01279 416888	0181 332 3888
Fax No.	01628 524071	0181 830 1959	0161 877 8684	0181 450 6360		0181 568 4600	01279 418130	0181 332 1961
Price of Reviewed Machine	£2,686	£2,500	£3,248	£2,984	£3,386.60	£3,995	£2,639	£4,595
SPECIFICATION								
Processor Type and Speed	486 DX4-75	486 DX4-75	486 DX4-100	487 DX4-100	68LC040	486 DX4-75	486 DX4-75	487 DX4-75
RAM Supplied	16Mb	20Mb	20Mb	20Mb	4Mb	16Mb	4Mb	8Mb
RAM Maximum	16Mb	20Mb	20Mb	32Mb	36Mb	32Mb	32Mb	20Mb
RAM Prices 4/8/12/16Mb £	150/300/nk/nk	169/350/nk/nk	169/nk/695/nk	160/320/480/640	150/288/nk/552	175/nk/nk/895	159/299/nk/16	220/nk/nk/nk
Hard Disk Supplied	250MB	510Mb	520Mb 11ms	340Mb	320Mb	510Mb	120Mb	340Mb
Hard Disk Maximum	340Mb	510Mb	810Mb	525Mb	500Mb	510Mb	520Mb	510Mb
Floppy Disk (Int/Ext)	Internal	Internal	Internal	Internal	Internal	Internal/Remove	Internal	Internal
PCMCIA Slots Type II/Type III	2 / 1	2 / 1	2 / 1	2 / 1	N/A	2 / 1	2 / 1	2 / 1
Pointer Type	Trackball	Trackball	Trackball	Trackball	TrackPad	TrackStick	Trackball	Trackball
CONNECTORS								
Serial Port (Std/Enh)	1 x Standard	1 x Enhanced	1 x Enhanced	1 x Standard	1 x Standard	1 x Enhanced	1 x Standard	1 x Standard
Parallel Port (Std/Enh)	1 x Standard	1 x Enhanced	1 x Enhanced	1 x Standard	No	1 x Standard	1 x Standard	1 x Enhanced
Ext Conns Key/VGA/Mouse	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/No	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
DISPLAY								
Display Type DualScan/TFT	TFT	TFT	TFT	TFT	TFT	TFT	TFT	TFT
Screen Size	9.5 inches	9.5 inches	9.5 inches	9.5 inches	9.5 inches	9.5 inches	9.5 inches	9.5 inches
On-screen Colours @ 640x480	256	512	256	256	256	256	256	27,000
External Mon Cols @ 1024x768	16	256	256	256	Monitor-Dep'tent	16	16	16
SOFTWARE								
DOS Version	MSDOS 6.2	MSDOS 6.22	MSDOS 6.22	MSDOS 6.22	System 7.5	MSDOS 6.21	MSDOS 6.22	MSDOS 6.2
Cost	Included	£75	£29	£79	Included	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes, if requested	Yes	Yes	Yes	Yes	Yes
GUI Version	Windows 3.11	Windows 3.11	Windows 3.11	Windows 3.11	System 7.5	Windows 3.11	Windows 3.11	Windows 3.1
Cost	Included	With DOS	£39	With DOS	Included	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes, if requested	Yes	Yes	Yes	Yes	Yes
POWER SUPPLY								
Battery Technology	NiMH	NiMH	NiMH	NiCAD	NiMH	Enhanced NiMH	NiCAD or NiMH	NiMH
Claimed Battery Life (hours)	1.7 - 3.3	2	2	2.4	3 - 6 (2 batts)	8 (2 batts)	2	2.5 - 4
Claimed Recharge Time (in use)	2.8	1.5	1.5 / 4	2	Not Quoted	1.5/2.5	2 - 4	Not Quoted
PHYSICAL SIZE								
Dimensions (WxDxH) in ins	11.6x2.0x8.8	11.3x1.9x8.8	11.4x1.8x8.8	11.1x2.0x9.1	11.5x2.3x9.7	11.5x1.8x8.5	11.3x2.0x8.5	11.8x2.0x8.9
Dimensions (WxDxH) in cm	29.0x5.1x22.0	28.3x4.8x22.0	28.5x4.5x22.0	27.8x5.0x22.8	28.8x5.8x24.3	28.8x4.5x21.3	28.3x5.0x21.3	29.5x5.0x22.3
Weight with Battery	6.3lbs / 2.9kg	5.7lbs / 2.6kg	5.9lbs / 2.7kg	6.5lbs / 2.9kg	7.3lbs / 3.3kg	6.6lbs / 3.0kg	5.4lbs / 2.5kg	6.8lbs / 3.1kg
SPECIAL FEATURES			Soundcard	Soundcard	Ability Bundle	2nd Battery	WinWorks 3.0	
SALES AND SUPPORT								
Basic Warranty Length (months)	12 months	12 months	12 months	12 months	12 months	3 Years RTB	12 Months	3 Years
On-site Service available (cost)	Included 1 Year	£40	From Jan 95	No	Through Dealers	Through Dealers	Yes - Free	First Year Included
Extended Warranty Available	Yes	Yes	Yes	Yes	Through Dealers	AST ExeCare	Yes, 2nd & 3rd yrs	Yes
Sold through Dealers or Direct	Direct	Direct	Direct	Direct	Dealers	Dealers	Both	Dealers

TABLE OF FEATURES POWER USER

	Dell	Dual	Ergo	Gateway 2000	Hewlett Packard	HM Systems	IBM	Locland
MANUFACTURER & MODEL								
Manufacturer's Name	Dell	Dual	Ergo	Gateway 2000	Hewlett Packard	HM Systems	IBM	Locland
Model Name	Latitude XP4100CX	MT-4000	PowerBrick 100	ColorBook DX4-75	4000	Xpeco Elite	ThinkPad 755CE	Vesa Notebook
Phone No.	01344 720000	01223 576622	0161 406 6486	0800 552000	01344 369222	0181 209 0911	01345 727272	013552 28808
Fax No.	01344 860187	01223 576859	01159 234854	010 3531 848 2022	01344 361236	0181 209 0912	01345 720072	013552 44531
Price of Reviewed Machine	£3,798	£2,855	£3,395	£2,519	£4,265	£3,737	£5,270	£1,738
SPECIFICATION								
Processor Type and Speed	486 DX4-100	486 DX4-100	486 DX4-100	486 DX4-75	486 DX4-100	487 DX4-100	488 DX4-100	486 DX-33
RAM Supplied	24Mb	8Mb	16Mb	20Mb	8Mb	20Mb	8Mb	8Mb
RAM Maximum	36Mb	32Mb	32Mb	20Mb	32Mb	20Mb	40Mb	20Mb
RAM Prices 4/8/12/16Mb (£)	175/na/na/799	nk/nk/nk/699	200/nk/nk/700	160/nk/nk/780	340/850/nk/1600	161/nk/nk/767	225/nk/nk/1,145	160/320/480/640
Hard Disk Supplied	525Mb	340Mb 12ms	340Mb	340Mb	520Mb	500Mb	540Mb	200Mb
Hard Disk Maximum	525Mb	810Mb	710Mb	340Mb	520Mb	524Mb	810Mb	520Mb
Floppy Disk (Int/Ext)	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal
PCMCIA Slots Type II/Type III	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1
Pointer Type	Trackball	Trackball	Trackball	Trackball	Trackball	Trackball	Trackpoint III	Trackball
CONNECTORS								
Serial Port (Std/Enh)	1 x Enhanced	1 x Enhanced	1 x Enhanced	1 x Standard	1 x Enhanced	1 x Standard	1 x Standard	1 x Standard
Parallel Port (Std/Enh)	1 x Standard	1 x Standard	1 x Enhanced	1 x Standard	1 x Enhanced	1 x Standard	1 x Standard	1 x Standard
Ext Conns Key/VGA/Mouse	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	No/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
DISPLAY								
Display Type DualScan/TFT	TFT	TFT	TFT	DualScan	TFT	TFT	TFT	DualScan
Screen Size	9.5 inches	10.4 inches	9.5 inches	10.4 inches	10.4 inches	9.5 inches	10.4 inches	10.4 inches
On-screen Colours @ 640x480	65,000	256	4,096	256	256	256	64,000	256
External Mon Cols @ 1024x768	256	256	256	16	256	256	256	16
SOFTWARE								
DOS Version	MSDOS 6.21	MSDOS 6.22	MSDOS 6.22	MSDOS 6.22	MSDOS 6.2	MSDOS 6.22	IBM PCDOS 6.3	MSDOS 6.22
Cost	Included	Included	Included	Included	Included	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GUI Version	Windows 3.11	Windows 3.11	Windows 3.11	Windows 3.11	Windows 3.11	Windows 3.11	Windows 3.1	Windows 3.11
Cost	Included	Included	Included	Included	Included	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
POWER SUPPLY								
Battery Technology	LI-ION	NiMH	NiMH	NiMH	NiMH	NiMH	NiMH	NiMH
Claimed Battery Life (hours)	6 - 8	2 (4 2 batts)	2	3	2.5	3.5	3.3	2
Claimed Recharge Time (in use)	1.5	2	2 - 4	4	Not Quoted	1.5	1.5	1.5
PHYSICAL SIZE								
Dimensions (WxDxH) in ins	11.0x2.1x8.6	11.7x2.2x9.9	11.1x2.0x9.0	11.7x1.7x8.5	11.6x1.9x8.8	11.0x2.0x8.6	11.7x2.0x8.3	11.0x2.5x8.5
Dimensions (WxDxH) in cm	27.5x5.3x21.5	29.3x5.5x24.8	27.8x5.0x22.5	29.3x4.3x21.3	29.0x4.75x22.0	27.5x5.0x21.5	29.3x5.0x20.8	27.5x6.25x21.3
Weight with Battery	6.2lbs / 2.8kg	6.0lbs / 2.7kg	6.3lbs / 2.9kg	5.7lbs / 2.6kg	7.2lbs / 3.3kg	7.2lbs / 3.3kg	6.2lbs / 2.8kg	6.6lbs / 3.0kg
SPECIAL FEATURES								
		16-bit sound	SoundBlaster	WinWorks 3.0	I-R Port/LapLink	Soundcard	Software bundle	MS Sound System
SALES AND SUPPORT								
Basic Warranty Length (months)	12 months	12 months	24 months	12 months	3 years	12 months	1 year international	36 months
On-site Service available (cost)	Yes	No	Yes, 10% of cost	No	Through dealers	£49	1 yr - courier - £79	No
Extended Warranty Available	Yes, up to 5 years	Yes	Yes, up to 5 years	Yes	Through dealers	Up to 5 years	3 years £439	No
Sold through Dealers or Direct	Direct	Dealers	Direct	Direct	Dealers	Direct	Direct	Direct



TABLE OF FEATURES POWER USER

	Olivetti	Opti	Panasonic	Sharp	Texas Instruments	Toshiba	Viglen	Zenith
MANUFACTURER & MODEL								
Manufacturer's Name	Olivetti	Opti	Panasonic	Sharp	Texas	Toshiba	Viglen	Zenith
Model Name	Philos 48C	Platinum	CF-V21	PC-8660	TravelMate 4000M	T4850CT	Dossier Advanced	Z-NoteFlex
Phone No.	0181 785 6666	0181 507 1818	01344 853598	0161 205 2333	01932 761595	01932 841600	0181 758 7000	0181 568 5050
Fax No.	0181 780 8191	0181 594 2236	01344 853847	0161 205 2638	01932 780126	01932 845606	0181 758 7080	0181 479 2266
Price of Reviewed Machine	£4,149	£3,639	£3,799	£2,995	£4,509	£4,495	£3,821	£3,599
SPECIFICATION								
Processor Type and Speed	486 DX4-75	486 DX4-100	486 DX4-75	486 DX2-50	486 DX4-75	487 DX4-75	488 DX4-100	487 DX4-75
RAM Supplied	8Mb	20Mb	12Mb	8Mb	4Mb	8Mb	20Mb	12Mb
RAM Maximum	32Mb	20Mb	20Mb	20Mb	20Mb	20Mb	20Mb	24Mb
RAM Prices 4/8/12/16Mb (£)	180/nk/nk/940	170/320/nk/nk	249/499/nk/999	255/nk/nk/nk	185/nk/nk/1,170	200/nk/nk/1,575	164/326/nk/1,024	165/nk/nk/778
Hard Disk Supplied	340Mb	540Mb	455Mb	320Mb	455Mb	500Mb	455Mb	340Mb 13ms
Hard Disk Maximum	510Mb	810Mb	455Mb	n/a	455Mb	500Mb	455Mb	700Mb
Floppy Disk (Int/Ext)	Internal/Remove	Internal	Internal/Remove	Internal	Internal	Internal	Internal	Internal
PCMCIA Slots Type II/Type III	2 / 1	2 / 1	2 / 1	1 x Type II	2 / 1	2 / 1	2 / 1	2 / 1
Pointer Type	Trackball	Trackball	Trackball	Trackball	Rubber Pointer	BallPoint add-on	Trackball	Trackball
CONNECTORS								
Serial Port (Std/Enh)	1 x Standard	1 x Enhanced	1 x Standard	1 x Standard	1 x Enhanced	1 x Standard	1 x Standard	1 x Enhanced
Parallel Port (Std/Enh)	1 x Standard	1 x Standard	1 x Standard	1 x Standard	1 x Standard	1 x Standard	1 x Enhanced	1 x Enhanced
Ext Conns Key/VGA/Mouse	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
DISPLAY								
Display Type DualScan/TFT	TFT	TFT	TFT	TFT	TFT	TFT	TFT	TFT
Screen Size	9.5 inches	9.6 inches	10.4 inches	9.5 inches	8.4 inches	10.4 inches	9.4 inches	9.4 inches
On-screen Colours @ 640x480	256	32,000	256	256	256	64,000	4,096	64,000
External Mon Cols @ 1024x768	256	256	256	16	256	256	256	256
SOFTWARE								
DOS Version	MSDOS 6.2	MSDOS 6.22	MSDOS 6.2	MSDOS 6.21	MSDOS 6.2	MSDOS 6.2	MSDOS 6.22	MSDOS 6.22
Cost	Included	Included	Included	Included	Included	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GUI Version	Windows 3.1	Windows 3.11	Windows 3.1	Windows 3.11	Windows 3.11	Windows 3.11	Windows 3.11	Windows 3.11
Cost	Included	Included	Included	Included	Included	Included	Included	Included
Pre-Installed? Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
POWER SUPPLY								
Battery Technology	NiCAD	NiMH	NiMH	NiMH	NiMH	NiMH	NiMH	NiMH
Claimed Battery Life (hours)	up to 6	2	1.5 - 3	2 - 3	3 - 5	3.5	3	2 - 4 per batt
Claimed Recharge Time (in use)	1.5	2	2	2 - 3	3	1.5	2 - 4	1 - 2
PHYSICAL SIZE								
Dimensions (WxDxH) in ins	11.2x2.0x8.6	11.1x1.8x8.7	11.7x2.1x8.7	11.4x1.7x8.8	8.5x2.0x11.0	11.8x2.1x8.4	11.1x2.0x8.6	11.9x2.2x8.7
Dimensions (WxDxH) in cm	27.9x4.9x21.6	27.9x4.4x21.8	29.7x4.9x22.0	28.5x4.3x22.0	21.3x5.0x27.5	29.5x5.3x21.0	27.9x5.0x21.6	29.8x5.5x21.8
Weight with Battery	6.1lbs / 2.7kg	6.2lbs / 2.8kg	7.0lbs / 3.2kg	6.4lbs / 2.9kg	6.4lbs / 2.9 kg	6.9lbs / 3.1kg	6.2lbs / 2.8kg	6.3lbs / 2.8kg
SPECIAL FEATURES								
	Lotus Organizer	Soundcard/VL-Bus			SBPro/Indeo/SCSI	Added software	Organizer, Works	Audio module
SALES AND SUPPORT								
Basic Warranty Length (months)	12 months	24 months	36 months RTB	12 months	12 months	36 months	12 months	36 months
On-site Service available (cost)	Dealer dependent	No	Thru dealers	Courier service	No	Dealer dependent	£149	1st yr on-site
Extended Warranty Available	Yes	Yes	No	Through dealers	No	Dealer dependent	Yes	Yes
Sold through Dealers or Direct	Direct/Dealers	Dealers	Dealers	Dealers	Dealers	Dealers	Direct	Both



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Portable Computers

TOSHIBA

T1910 4/33s, 4m, 200m, Mono	929
T1910CS 4/33s, 4m, 200m, STN	1359
T3400CT 4/33s, 4m, 120m, TFT	1699
T1950CT 4/40slc, 4m, 200m, TFT	1874
T4800CT 4/75slc, 8m, 500m, TFT	3119

COMPAQ

Aero 4/25s, M170, Mono	842
Aero 4/33s, M170, Colour	1180
Contura 4/25s, M120, Mono	1177
Contura 4/25s, M120, Colour	1599
Contura 400 4/50, M170, Mono	1261
Contura 400 4/50, M250, Colour	1683
LTE Elite 4/50E, M250, Mono	2189
LTE Elite 4/75CX, M340, Colour	3877

ICL

ErgoLITE 4/25s, 4m, 120m	1015
ErgoLITE 4/33s, 4m, 210m, Colour	1571
ErgoLITE 4/50d, 8m, 210m, Colour	1738
ErgoLITE 4/75d, 8m, 210m, Colour	2928
ErgoLITE 4/33s, 4m, 120m, Sub	845
ErgoLITE 4/33s, 4m, 260m, Colour, Sub	1274

Panasonic

CF-41 4/50d, 4m, 260m, CD, STN	2439
CF-41 4/50d, 8m, 260m, CD, TFT	3137
CF-41 4/100d, 8m, 450m, CD, TFT	3922

Trust

Essential 4/50slc, 2m, 200m, Mono	799
Essential 4/50slc, 2m, 200m, Colour	1149
Contraito 4/66d, 4m, 340m, Mono	1339
Contraito 4/66d, 4m, 340m, Colour	1779

IBM

340 4/50slc, 4m, 125m, Mono	969
360 4/33slc, 4m, 170m, Mono	1369
360 4/33slc, 4m, 170m, Colour	1749
360 4/50d, 4m, 170m, Colour	1999
755 4/50slc, 4m, 170m, Colour	2739
755 4/75slc, 4m, 340m, Colour	3469
755 4/100d, 8m, 340m, Colour	4599
755 4/100d, 8m, 540m, CD, Colour	5499

486-25/33 Desktop PCs

apricot

LS Pro 4/33s, 4m, 210m, 14" c	871
XEN-PC 4/33s, 4m, 210m, 14" c	871
XEN-PCm 4/33s, 4m, 210m, 14" c, mm	1089
XEN-PCls 4/33s, 4m, 210m, 14" c	1133
XEN-LS II 4/33s, 4m, 170m, 14" c	1064

HEWLETT PACKARD

Vectra VL2 4/25s, 4m, 210m	659
Vectra VL2 4/33s, 4m, 210m	679
Vectra VL2 4/33s, 4m, 210m, mm	956
Vectra N2 4/25s, 4m, 106m	836
Vectra N2 4/33s, 4m, 210m	941
Vectra M2 4/33s, 8m, 210m	984

Trust

Liberator 4/25s VLB Minitor	299
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COMPAQ

Enhanced ProLinea 4/33s, M1	513
Enhanced ProLinea 4/33s, M200/w	663
ProLinea Net1 4/33s, M1/E	640
ProLinea Net1 4/33s, M1/TR	665
ProLinea Net1 4/33s, M200/E	843
ProLinea Net1 4/33s, M200/TR	868
ProLinea MT 4/33s, M200/w	691
ProLinea MT 4/33s, M270/w	725
Deskpro XE 4/33s, M170/w (4m)	780
Deskpro XE 4/33s, M270/w (4m)	823
ProSignia VS 4/33s, M1 E'net (8m)	983
ProSignia VS 4/33d, M1 E'net (8m)	1181
ProSignia VS 4/33s, M1 TR (8m)	1333
ProSignia VS 4/33s, M535 (8m)	1591
ProSignia VS 4/33s, M1050 TR (16m)	2118

486-25/33 Desktop PCs Cont

ICL

ValuePLUS VL 4/25s, 4m, 210m	616
ValuePLUS VL 4/25s, 4m, 270m	661
ValuePLUS VL 4/33d, 4m, 210m	774
ValuePLUS VL 4/33d, 4m, 270m	787
ValuePLUS VL 4/33d, 4m, 520m	850
ValuePLUS MD 4/33s, 4m, 210m	760
ValuePLUS MD 4/33s, 4m, 525m	985
ErgoPRO P C4/33s, 4m, 270m, LAN	832
ErgoPRO P C4/33s, 4m, 525m, LAN	917
ErgoPRO P C4/33s, 8m, 1G, LAN	1240
ErgoPRO V C4/33s, 4m, 210m	704
ErgoPRO V C4/33s, 8m, 210m	806
ErgoPRO V C4/33s, 8m, 420m	849
ErgoPRO V D4/33s, 4m, 210m	730

IBM

Aptiva 4/25s, 4m, 170m, 14" c	659
Aptiva 4/33s, 4m, 270m, 14" c	749
Aptiva 4/233s, 4m, 170m, 14" c, mm	957

486-50/66/100 Desktop PCs

apricot

LS Pro 4/366d, 4m, 365m, 14" c	1395
LS Pro 4/100d, 4m, 365m, 14" c	1559
XEN-PC 4/50d, 4m, 270m, 14" c	980
XEN-PC 4/66d, 4m, 270m, 14" c	1067
XEN-PCm 4/50d, 8m, 270m, 14" c, mm	1264
XEN-PCm 4/66d, 8m, 270m, 14" c, mm	1395
XEN-PCls 4/66d, 4m, 270m, 14" c	1329
XEN-LS II 4/50d, 4m, 170m, 14" c	1187
XEN-LS II 4/66d, 4m, 270m, 14" c	1482
EPX 4/66d, 4m, 270m, 14" c	1228

HEWLETT PACKARD

Vectra VL2 4/50s, 4m, 210m	751
Vectra VL2 4/50d, 4m, 210m	843
Vectra VL2 4/66d, 4m, 210m	894
Vectra VL2 4/66d, 8m, 340m, mm	1427
Vectra VL2 4/100, 8m, 540m, mm	1680
Vectra N2 4/50s, 8m, 270m	1054
Vectra N2 4/50d, 8m, 210m	1100
Vectra N2 4/66d, 8m, 540m	1318
Vectra M2 4/50s, 8m, 210m	1096
Vectra M2 4/50d, 8m, 210m	1143
Vectra M2 4/66d, 8m, 340m	1275
Vectra M2 4/100d, 8m, 540m	1536

Trust

Liberator 4/50d VLB Minitor	394
Liberator 4/66d VLB Minitor	441

ICL

ValuePLUS DLi 4/50s, 4m, 210m	719
ValuePLUS DLi 4/50s, 8m, 420m	859
ValuePLUS DLi 4/66d, 4m, 210m	836
ValuePLUS DLi 4/66d, 4m, 210m, mm	985
ValuePLUS VL 4/66d, 4m, 210m	850
ValuePLUS VL 4/66d, 4m, 520m	927
ValuePLUS MD 4/66d, 4m, 210m	872
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Mission statement

Compaq is riding the crest of a wave: sales and profits are on the up and major changes are on the horizon. As it prepares to make further inroads into the consumer market, with the imminent UK launch of the Presario range, **Geof Wheelwright** talks to key company figures about what's in store.

"Compaq is undaunted by the challenge and is ready to charge further into the consumer market at warp speed"

Compaq Computer has set out on a new mission. Not a company generally given to undertaking new challenges lightly, or indulging in idle speculation, flights of fancy or wild predictions, Compaq is boldly going into markets that it has never gone into before. It is espousing some decidedly unconventional ideas on the development of the home PC sector, railing against the trade practices of Intel (its largest computer processor supplier) and putting the universe on notice that Compaq will be going through some major changes in the next few years.

The first inklings of what we may see in "Compaq: The Next Generation" came with the announcement last year of Compaq's new, consumer-oriented Presario range, which came bundled with functions such as telephone answering machine, speakerphone, fax, CD music and CD-ROM playback, and even television display capabilities.

This bold new crew of technologies took Compaq into unexplored parts of the consumer market and left the company yearning to venture further into a galaxy dominated by the likes of Panasonic, Sony, Matsushita, Toshiba and Hitachi. But Compaq's new management crew, headed by Eckhard Pfeiffer (who took over three years ago from Rod Canon, the original "captain" of the Compaq ship), appear undaunted by the challenge and ready to charge further into the consumer market at warp speed.

According to Gian Carlo Bisone, a senior vice-president at Compaq and former top-ranking executive in Olivetti's PC business, a greater concentration by Compaq on the home market is simply a recognition of where the growth lies in the business. He says that in the US, more than 50 percent of all PCs sold in 1994 were bought by individuals — half of those for use in "income-generating activities" and the other half for leisure and entertainment. To make an even bigger impact on consumers, Bisone says the computer industry must take a cue from other home entertainment product manufacturers.

"PCs still look like.... machines for work,

with a display, CPU and a keyboard," he says. "In the future, PCs will follow the same path as radios, TVs and stereos, and be offered in different colours and have different levels of functionality so that people think of them more as an information appliance. Our new Presarios are referred to as 'personal information centres' more than PCs."

Response from the community

Clear evidence of the direction this work might take Compaq can be found in the fruits of a recent market research project which saw the company go out into the community and ask various groups of users what they would like their ideal PC to look like, and what functions that PC should be capable of carrying out. One of the most innovative solutions came from a group of seven- and eight-year-old schoolchildren who came up with the idea for something they called "Mr. PC Head". As mocked up by Compaq, it features a small display with rounded speakers embedded on either side to look like "ears", a handle at the top that looks like a hat, a tilt and swivel base shaped like feet, and a keyboard that looks like a door mat.

A group of teenagers, meanwhile, came up with a design concept that looked like a tall "boombox" stereo with CD-ROM and display built into it. These ideas were well received by the US financial press when they were unveiled in late November, causing a rise in Compaq stock prices and prompting the Wall Street Journal to describe the move as "an aggressive and risky push into home electronics that could eventually result in computer-based machines that could replace stereos, televisions and games machines".

Bisone says these are all just ideas at the moment; but the major thrust behind them is a commitment to broaden the franchise of personal computing by making PCs friendlier and easier to use.

"A significant portion of Compaq R&D dollars is being spent on making products easier to use... because people are still somewhat scared of PCs," he says, citing software such as Compaq's "Media Pilot" (included with the Presario) as a strong example of the work it is doing in this area. He predicts that



with the arrival of Microsoft's Windows 95 operating system later this year, software developers will be following a much tighter set of development guidelines and

Compaq CEO and president, Eckhard Pfeiffer: taking the company in new directions

will thus end up offering users a more consistent way to use applications.

"They will provide users with much tighter control so that you don't end up in a place where you can crash the system," predicts Bisone. "The whole industry has to accept the fact that it has to be better behaved [in the way it designs applications]. Apple's whole system [on the Macintosh] was very tight so it has always been slightly ahead of the game. On the PC, from the early days of Microsoft Flight Simulator there was a tradition of playing with the hardware and writing directly to the system and not following rules."

The part played by PCMCIA

Another factor that Compaq predicts will make life easier for users, and allow the company to be more creative in how it designs PCs for the consumer market, is the improvement in PCMCIA (Personal Computer Memory Card Industry Association) expansion card standards.

According to John T. Rose, senior vice-president and general manager of Compaq's desktop computer division, PCMCIA has a big role to play in future desktop computer systems. "We clearly intend to offer PCMCIA on desktop

systems — that is part of our strategy. That will occur in 1995 if there is more standardisation around PCMCIA," he says. "I see, over time, that we will use PCMCIA in the desktop."

In fact, PCMCIA cards will be one of the key elements in liberating the PC from its traditional look or "form factor". Removing the need for PCs to have to accommodate full-length ISA-bus expansion cards (in favour of a simple requirement to take PCMCIA cards) means that PCs don't have to be built around an expansion card shape.

"We are not staying just in the traditional industrial design form factor at all," affirms Rose. "You'll begin to see different kinds of form factors in 1995. There will be different consumer products with different form factors: we are going to use industrial design and packaging as a differentiator for Compaq products. We will make it more fun, make it more eye-appealing, make it more acceptable in the home environment."

He reiterates the idea that these products will look more like consumer electronics products such as stereos and VCRs than traditional PCs. And that is the rationale behind market research ideas such as "Mr PC Head". Despite this move into the home entertainment market, Rose dismisses the notion that future home electronics purchases will put the TV against the home computer, and suggests instead that the two will co-exist and even work together.

"In a number of homes there will be multiple [computing] devices, and some may use TV as the display mechanism; others may have their own display capability," he says. "I don't see all these being integrated into a single device. If you look at the use of the PC, it's a one-on-one environment — or maybe two-on-one for games — but it's not a one-on-many kind of thing like the TV."

The prime directive

Just what kind of role Compaq will play in this changing environment becomes even clearer in conversation with CEO and president, Eckhard Pfeiffer. He admits that Compaq is having to considerably widen its traditional scope to embrace the consumer market and completely re-examine its prime business directives.

"We are very interested in exploring opportunities beyond our current well-defined business strategies and we have made that statement more frequently in recent weeks," he explains, admitting that Compaq is now actively considering further investments in non-hardware companies and technologies that will help it achieve these goals.

He says things like the answering machine and speakerphone technology in the Presario represent appropriate targets for investment and development. "These are enabling technologies that allow us to offer a better product than the competition," he says. "We are prepared to make investments there if it is

Home PCs: Compaq's Presario line is opening up a major new consumer market for the company



Environmental Testing Lab

Compaq is entertaining some wild ideas on how it designs its next generation of PCs, but they pale in comparison to what the company already does to some of its existing PCs at the Compaq environmental test laboratory at its world headquarters in Houston, Texas. The company has spent several million dollars building a facility to listen to, drop, shake, bake and freeze its PCs.

In one part of the lab, for example, PCs are placed in a soundproof room and surrounded with acoustic measurement equipment. The systems are then switched on and all sounds that emanate from them are duly recorded — even those that are above the range of the human ear. In a number of European countries (particularly Scandinavia and Germany), ergonomic regulations require that any noise from PCs does not exceed certain limits.

To make its PCs quieter, Compaq finds ways of using lower-voltage fans, runs the fan at slower speeds, and looks for the quietest floppy disk and hard disk componentry possible. The company has also discovered that women generally have better hearing than men, and quite often can hear annoying, high-pitched noises that are above the pitch at which they are audible to men.

Next door to the soundproof room is a vibration and shock compression machine, ovens, and a "salt fog cabinet", designed to simulate all kinds of transport conditions for Compaq PCs.

The idea is to make sure that PCs shipped by plane and road do not suffer due to the vibration of the vehicles they ride in, as well as examining their performance in the surrounding environment. There's also an "altitude chamber" which can create conditions that allow Compaq to simulate using its PCs at various different elevations.

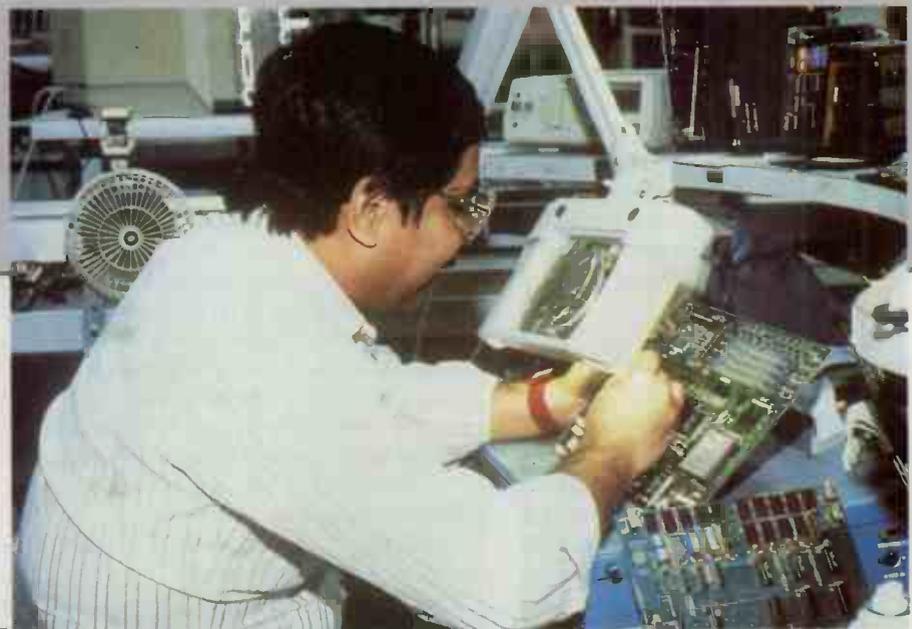
The most fun, however, comes with the vibration and shock testing, where Compaq takes machines that are up and running (often portable) and starts shaking them about and dropping them until they start to get read/write errors on the hard disk.

The integrity of the hard disk is concerned with the most important element of the PC to protect because

"the data on your drive is often more valuable than the computer itself". The lab can use its hydraulic equipment to simulate dropping equipment onto different surfaces, from linoleum to steel floors to concrete.

The impact of these drops is examined by videotaping the event on a high-speed digital VCR system that runs at a staggering 12,000 frames a second. In carrying out these tests, the lab destroys more than \$250,000 worth of equipment per year, not including a number of priceless prototypes which are literally irreplaceable if they fail in the environmental test lab (they have to be redesigned and recreated).

So spare a thought for your Compaq computer's ancestors the next time you use it: many have been beaten, frozen, blasted with heat and vibrated to pieces before the company arrived at the final design of the machine you probably use relatively gingerly every working day.



Top Compaq PCs endure a rigorous testing procedure before they leave the lab, including being frozen, and dropped from a great height on to steel and concrete. Reliability is a priority

Bottom Checking the minutiae during the manufacturing process

The Future Of Colour Systems

According to Hugh Barnes, a senior vice-president at Compaq and general manager of that company's portable PC division, monochrome notebooks are very much on their way out. "One of the things we have really seen this year — and a little bit last year — is the accelerated acceptance of colour," he says. "The demand for colour has gone up considerably: today we see mono as a kind of price-point solution. People really want colour and to the extent that colour is becoming more affordable, it is in very high demand."

In fact, he says that demand for active matrix colour screens (or TFT, as they are otherwise known) has long exceeded demand, and that 1995 will see the expensive TFT colour flat screen technology come down in price and be produced in greater volume, while the passive matrix colour flat screen (or STN), which offers slightly less resolution and ease of viewing than the TFT screens, will start to move into the market sector traditionally dominated by monochrome notebook systems.

"We expect the supply/demand balance in colour/TFT to occur in the second half of next year (1995)," predicts Barnes. "So far, colour TFT has been an allocated technology — the demand has outstripped the supply. It has not been as widely available as the demand would request it to be."

Part of that problem has to do with where it is produced, he explains. "It is solely from

Japan at the present time," says Barnes. "But what we are seeing is a major expansion of capacity by the Japanese manufacturers and the addition of manufacturers in Korea, in particular Samsung. You may recall that when the Koreans entered the memory market, they really put a lot of pressure on pricing; so that's another expectation we have."

The impact of this change on the economics of TFT notebook systems becomes clear when you look at the prices currently charged for TFT displays. "Today, a large colour TFT costs \$1000 to \$1200, depending on what your volumes are and how big a customer you are. But the 9.5 inch to 10.5 inch colour TFT panel is in that range," explains Barnes. "The smaller 8.4 inch colour panel is in the \$700 to \$800 range."

The many uses of TFT displays

Despite this increase in supply, Barnes says it still may be outstripped by demand, due to the many additional uses of colour TFT displays. "The real leaders in those uses are smart phones, display phones (with a 4 to 5 inch display), the navigation systems being designed into the next generation of automobiles, and the entertainment segment [such as the seatback displays of first class and business class cabins in airplanes or those used in Japanese 'pachinko' games]," he adds. "The Japanese are adding capacity,

but they are also adding demand."

Barnes also predicts that in the next year, we will see the arrival of larger panel and higher resolution TFT displays. "Today the maximum is 10.4, but we are seeing 11.3 inch in lab stages with both 800 x 600 and 1024 x 768 resolutions in the laboratory stages," he says. "I would guess that of those, the 800 x 600 will actually show up in production next year."

STN to dominate on notebooks

None of this is to say, however, that the whole world is likely to be using colour TFT screens on their notebooks any time soon. It is far more likely that the predominant display technology for notebooks over the next year will be STN passive matrix colour. "Although TFT is faster and offers better viewing angles, contrast ratio and brightness, STN is improving its contrast ratio. But it is not yet as fast as TFT," says Barnes. "TFT will be what you use for speed. For full-motion video you would still want a TFT rather than an STN. And due to its better viewing angle, you would also want TFT for presentations."

He says that for most other applications, however, the STN colour panels will win out, particularly as they have already dropped down to the \$400 price range. "The smaller TFT panels will give way to larger STN panels. You can get a nice, large, colour STN panel for about half the price of a small TFT," Barnes observes.

something that could have a longer-term benefit, not just to solve one problem."

In addition, Compaq expects to invest in what Pfeiffer calls the "conduit and the content" of information flowing down the so-called information highway, and may buy into a number of software houses and content-providers and become more involved with online services. "We want to participate in both... the conduit and the content," he says. "Ultimately [we] want to participate with more than just the hardware; clearly we want to participate in other revenue streams and that is part of our direction."

Backing away from PDAs

Despite all the new directions that Pfeiffer is taking Compaq, don't expect a warp speed diversion to the world of PDA (personal digital assistant) handheld systems. Although Compaq had earlier committed to producing a PDA-style device in 1995 using Microsoft/Intel WinPad technology, Compaq is now backing away from that plan and suggests that it will be 1996 or

1997 before it is ready to produce something that people can actually use. "It is a concept well ahead of its time at best," says Pfeiffer. "We think that area will develop, but they [PDA systems] are not really satisfying to use right now."

In terms of general market predictions, Pfeiffer further predicts that Intel profits will decline as greater numbers of x86-compatible products from competitors hit the market, and that Compaq will continue to look for alternative suppliers to Intel.

He rejects, however, the notion that Microsoft is developing an unfair monopoly on the software side of the business, despite a perceived lack of competition in many parts of its business. "In the software area it is hard to tell — Microsoft is doing lots of the right things," he says. "But there are still lots of cottage industries [developing new products] and Microsoft is not about to own the software world, lock, stock and barrel."

Pfeiffer does not have very cheering words for Apple users, however. He

predicts that Apple will continue to lose share and that "Windows 95 will close a lot of the gap [between the Mac and the PC] and diehard Mac users will have nowhere to go".

Despite the fact that Compaq offers OS/2 as an option on some of its systems, Pfeiffer opines that "I think OS/2 is doomed" and that Windows does not really face any serious competition from any other operating system platform.

Meeting the challenge

Compaq's new crew has a tough mission ahead. Capturing the hearts and minds of the consumer market will prove far more of a challenge than anything the company has experienced in the traditional PC market. But having taken Compaq from around the \$3 billion annual revenue mark to a \$10.6 billion company in just three short years, Pfeiffer and his colleagues seem to have a better chance than most to succeed where many others have failed.

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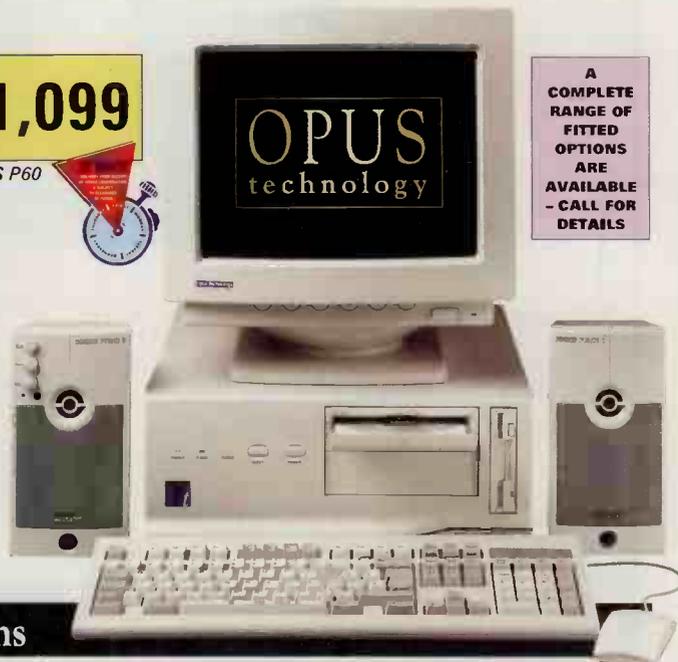
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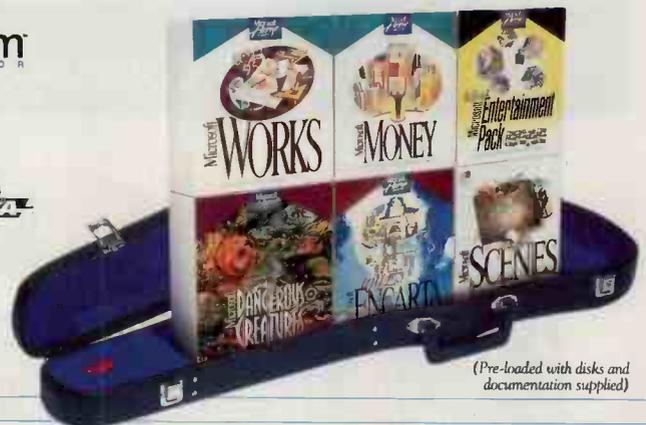


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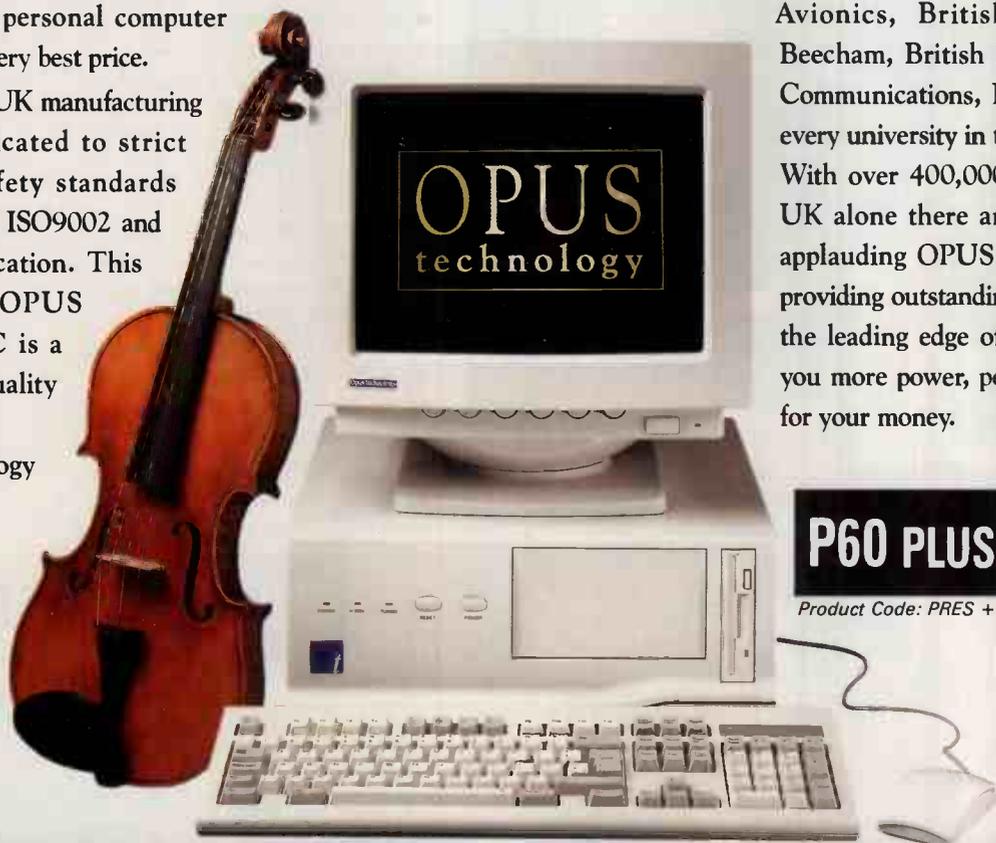
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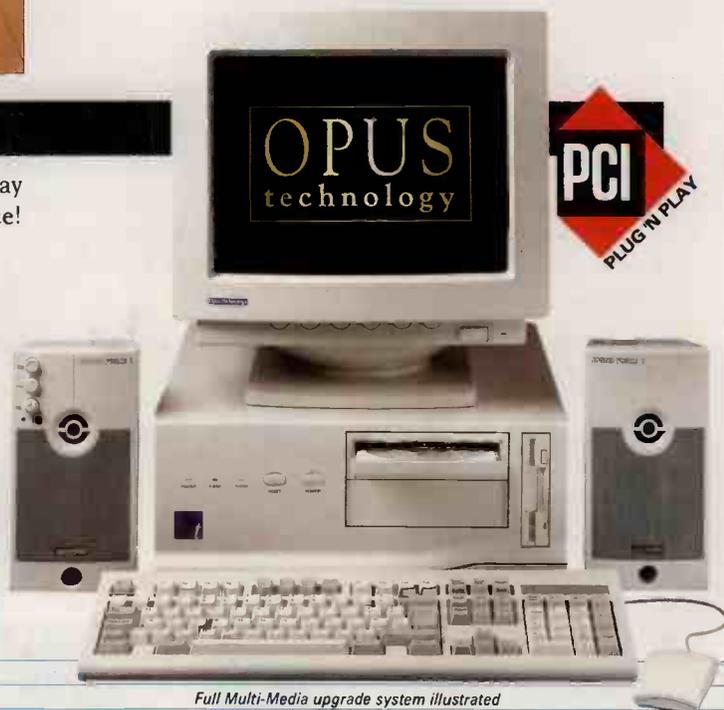
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SUPPLY and Demand

Video on Demand is destined to become yet another variation of computer server technology, releasing us from the tyranny of The Schedule. **Tim Frost** looks at the technology involved, and at its current use in the hotel business.

With broadcast video, whether it is over the airwaves, on satellite or over cable, you get a schedule that tells you what and when programmes are going to be transmitted. You don't have any say in the matter.

The advantage for the broadcaster is that they only need one signal source and one delivery channel. The disadvantage is that the user is tied down to the schedule and cannot pick and choose when to watch what. But now, as the number of delivery channels increases, as with the multi-channel capacity of cable and satellites and the far more local cable networks used in in-flight and hotel distribution, it is possible to open up these options to the viewer.

Finding the right carrier

While it's all the rage to talk about VOD in terms of nationally broadcast TV, there are a lot of problems still to be resolved and these mainly surround the carrier — getting one wide enough to transmit masses of VOD to a large user base. Secondly, there is the problem of getting the "I want to start now" instruction and charging information back to the TV company —



The Micropolls AV server, for use in VOD. The whole package is completely automatic — no tapes to worry about

an obvious complication when considering satellite distribution.

That doesn't mean that VOD isn't already happening, but it's starting commercially in areas where the user base is quite small and the multi-channel distribution system is cheap to implement. So for the time being, the leading edge of VOD

is the smaller closed systems of movie delivery to hotel bedrooms and in-flight movies.

The traditional way of producing video in both these areas is simple and effective. The film is played back on a VCR which is connected to one of the distribution channels. Each one starts at a pre-determined time, and when the tape is finished it rewinds ready for the next scheduled showing. The more movies and channels you have, the more VCRs, but it's all relatively cheap and straightforward.

The more sophisticated option is to offer "near-VOD", which instead of running movies with starting times every one and a half hours,

you increase the number of distribution channels and the number of VCRs, by maybe a factor of three, and start three versions of the same show at half-hour intervals.

Although this is still running to a schedule, from the users' point of view there is a much shorter wait before the start of the next show so they are much more likely to tune in (and pay). Experiments so far show that near-VOD and VOD increase the number of takers of

hotel movies by at least 50 percent, so the hotels are all for it.

How Hyatt does it

But true video on demand cannot really be achieved using the VCR approach, unless the hotel is willing to vastly increase the number of VCRs. An alternative solution is already being implemented in the Hyatt hotel chain in the US, using large hard disk arrays storing MPEG compressed versions of the movies and delivering them direct from hard disk into the hotel's cable network.

Behind the scenes are Micropolis, the hard disk manufacturer who specialises in those bigger disk drives, anywhere up to 9Gb. Micropolis have been looking closely at the audio and video markets. First they have produced A/V optimised hard disk drives, which have their operating software optimised for the high-density continuous data flows that hard-disk audio and video requires. Now, as a logical extension of this thinking, they have developed a video server that can be used for VOD. The whole package is completely automatic — no tapes to worry about, and even the movies are delivered into the hotel's system automatically.

At a central office the movies are encoded using the MPEG1 data compression, which squeezes the video and audio down to a 3Mbit/sec data stream. This is the same compression system used by Video CD although running at a higher data rate, so the quality is somewhat better. Once encoded, the movies for the month are up-linked to satellite and beamed down to each of the hotels and straight onto hard disk. This is a very cost-effective way of distributing video to what could expand to several thousand locations. Because there is no human intervention to check that the video was received without glitches, the whole transmission process is repeated. If the two copies of the movie match bit for bit, then it is accepted as a clean copy and automatically put onto the hard disk server.

It's a RAID!

In a big system this could be three arrays of seven large drives per array. These are built up as RAID (Redundant Array of Inexpensive Drives) arrays, which spread the data evenly across six of the seven disks. Alongside the data blocks is also stored error correction information, so should one drive go down, the system can use the error codes with the informa-

tion on the other five drives to reconstruct the missing data blocks. This can all be done on the fly, so that the viewer is unaware that something has gone wrong. In the event of a disk failure, the RAID system goes into a background backup mode, recalculating and re-recording the missing data onto the spare drive. After that, the system is up and running as though nothing had happened, leaving the engineer simply to pull out and replace the faulty drive.

Apart from high fault tolerance, the RAID configuration increases access and data transfer times. The system can output one second of video in 25ms, around forty times realtime. Since viewers only want to see the movies in realtime (fast forward and fast rewind not being offered as an option), this means, after a certain amount of overhead, it is quite possible to simultaneously extract 30 or more copies of the movies stored on each array.

When the first customer requests a movie, the array starts playing out the file to an MPEG decoder which turns the data into a normal TV picture. The picture is run through a VHF modulator and sent down the hotel cable system where it is picked up and tuned into by the tuner box by the TV. Ten minutes later, another room chooses to watch the same movie: they hit "start" and the heads on the disk array search out the start of the file again (while still happily playing out the first copy) and starts playing that out through a second decoder with the pictures modulated to a second video channel, and so on.

Minimal hardware required

The added bonus to the array VOD is that the computer hardware required is absolutely minimal. The disk arrays appear to the controlling computer as three (admittedly, large) SCSI hard drives. The video data itself passes from the disk into dedicated MPEG decoders which do all the hard number crunching to produce a normal colour TV picture. So the computer just has switching and general housekeeping chores, nothing a 486 can't handle.

In reality, the number of rooms that can be serviced with VOD is restricted by the cable infra-structure within the hotel. This can normally carry around 40 to 50 channels including the radio information and non-movie channels. The rule of thumb is that around 10 percent of the rooms will want to use VOD at any one time, which will take up 30 channels for a

medium sized 300-bed hotel.

In the first generation systems, the Micropolis VOD server runs essentially as an analogue system, with the MPEG digital-to-analogue decoding happening before the video is fed into the cable system. While the cost of the decoders is still high, the hotel only has to invest in 30 or so decoders to serve all the rooms.

A new MPEG

But a new variant on the MPEG system, MPEG2, is about to be adopted for several major consumer video projects in the US, including satellite and the digital Advanced TV service. Consequently, the MPEG2 decoder chips will be manufactured in large numbers and at low enough prices to be included within the TV set itself. As the price drops right down, it will then become more cost-effective to keep the VOD and other TV and radio signals in the digital domain through the hotel's cable system and do the conversion at the TV set. Digital transmission through the cable will increase both quality and the number of channels available.

At this point you are looking at not so much a hotel entertainment and VOD system, but something that is looking suspiciously like a standard LAN. It has a two-way data flow (movies going one way, billing information the other), a large server at one end and smaller information processors at the other, and a multi-carrier digital line linking it all together.

This points the way for other more computer-based VOD applications. One that is predicted to take off in the next 12 months is to use VOD servers for remote learning. Using almost the same technology, the server can easily store 100 hours or more of video files, any of which can be called up at any time by a user on the network. Just as in the hotel model, a separate VHF cable link is used for the video data, which is transmitted as a VHF modulated analogue signal. The added sophistication is that the server will automatically assign a VHF channel for the video and then send data to tune the PC's receiver card to that channel, so making better use of the available resource of channels.

True cable-TV distribution of VOD is quite possible using the same techniques, but cable stations are more likely to wait for a fully digital cable system using ATM before implementing it. Again it is the carrier infrastructure, rather than the server technology, that is going to limit the impact of VOD for the near future.

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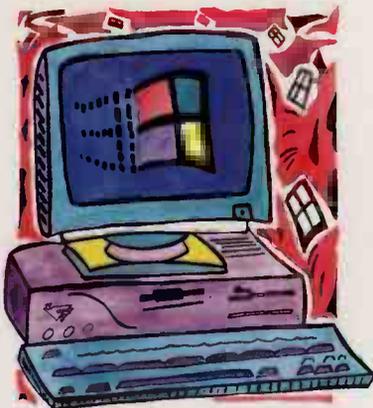


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A new partnership

With more and more computer manufacturers working on combined TV/PCs, the PC could eventually become many people's central household appliance. Chris Mellor talks to some of those involved in the new technology, and wonders whether it will catch on.

"A lot of people have said to us, 'we don't want a TV on the PC'," says Sue Forkin, Compaq's consumer product manager. "If my son is working upstairs I want him doing his homework, not watching TV."

That may be so, but it doesn't mean there isn't a market for the combination. Compaq US models can have a TV tuner card incorporated but the UK machines can't — yet. The Olivetti Domus or PCS TV comes with a TV tuner card, and both ICL and Packard Bell will be launching PC/TVs this year.

Mike Chandler, marketing manager for Olivetti UK, agrees with Forkin that the home PC/TV has its downside. "Most people have PCs in a third room. They don't put it in the sitting room — people tend to want to work in peace and quiet." He does see a business use for it, though. "The Haupage card we use has the ability to link up to Reuters, so you can bring up financial news."

So a convergence seems to be happening; but is it really? The personal computer has been a great absorber of new technology. It has had 16-bit audio capability added to it and can now play audio CDs as well as data CDs. And it has absorbed TV technology. In the nineties, TV tuner cards became available, like the Philips Electronics DOS TV tuner card that can show TV on the whole screen. Olivetti's PCS goes further, with TV in a window.

Apple's Performa 630 also has a TV tuner card for TV in a window. The TV display can come from a broadcast signal, a VCR, a camcorder or satellite. You can capture the display, store it on hard

disk, include it in QuickTime movies and add sound and additional graphics to it, although Apple says it's best viewed at no more than three-quarter screen size. VideoLogic produces cards which enable any Windows PC or Mac to have fully scalable TV in a window. Compaq has just signed up to use VideoLogic cards in the Presario range next year.

Different styling

TVs are styled differently from PCs. And moreover, they are controlled differently. One has an infra-red remote control unit, the other a mouse. TVs are also sold differently from PCs. PCs with TV tuner cards have not been purchased as TV alternatives by family buyers. For that to happen, PCs have to become more like TVs in styling, in how they're controlled and in the way they're sold.

In March 1995, ICL will go some way in this direction and launch a real PC/TV combo. Although most commentators accept that market convergence is likely to happen, Compaq's Sue Forkin suspects ICL may be too early. "I don't know what their insight is," she says, "but Compaq's UK research doesn't show a demand for it yet."

ICL's PC/TV will be built around a black 14in Sony Nicam screen. It sits on a 2in-deep box holding a double-speed CD-ROM drive, 300Mb hard disk, 4Mb (or maybe more), TV tuner and a 486 DX2/66 CPU. There's space for an MPEG card and the motherboard has sound card functionality built in. There are twin Philips turbo sound speakers plus a keyboard with built-in trackball.

Although the PC will have Windows preloaded onto it, users' first interaction with the system will be using an infra-red remote. When the system is powered up, a GUI called The Den is displayed with icons, such as a games cupboard, for the various functions. The remote has a numeric keypad with arrow key functionality. You can drive a screen cursor with it and click the remote's Action button once the right icon is selected. Listening to an audio CD, playing a game, watching the TV or powering up the PC and heading into Windows can all be accomplished using the remote control, and the TV can be set to automatically save teletext pages to view later.

ICL sees this unit as a "consumer electronics item" and expects to price it against Compaq's Presario multimedia package. The whole package is designed to appeal to families with its mix of business applications (WP and spreadsheet), games and edutainment CD-ROMs and TV programmes, teletext pages and audio CDs.

Packard Bell plans to launch a similar machine, the Spectria PC/TV, next year. The Spectria, already shipping in the US, is a sleek, sculpted, all-in-one unit with speakers fitted each side of the monitor.

Packard Bell, the number-three supplier of PCs worldwide by volume according to IDC figures, believes that the PC is now becoming another consumer electronics item, albeit the most "intelligent" one.

The Spectria amalgamates several technologies in one grey box: TV, radio, VCR, CD-i, audio CD, VCR, voice/fax-modem and PC. A drawer at the back slides out to reveal a regular upgradable PC chassis. There is no infra-red remote control unit. Instead, a picture of one with the appropriate buttons is shown on the screen. A real remote may come in the future.

The price point will be around £1,200 and European shipments should start early this year. Packard Bell believes the market is ready for this. Some 70 percent of its sales now are multimedia systems so TV could be the next wave. The highly

appealing Navigator front-end with its 3D rooms-off-a-hallway metaphor will be the user interface, which the company feels is more appropriate for the home than the desktop metaphor of Windows. Peter Bromage, Packard Bell marketing director, says: "People feel comfortable with walking into a hallway. The rooms comprise a kids area (games), learning centre (education), work area (Windows apps) and (software) cupboard."

Neither the ICL unit nor the Spectria can be characterised as an "interactive TV", unlike the TV/set-top box combinations used in the two planned interactive TV trials in the UK. The BT Home Services trial will link up to 2,500 consumers' TVs via normal voice phone lines to an nCube server running the Oracle Media Server database. Users can see video on demand and a variety of home shopping services will be available. The set-top box is a 68040 system running the Mac OS but minus keyboard, mouse and, maybe, hard disk. Users don't see the Mac OS: they use a remote control unit and screen icons. Apart from its use of TV cable, an ARM set-top box and the ATM networking protocol, Online



Media's interactive TV trial being run with Cambridge Cable is pretty similar.

Boxes, boxes, everywhere

PC/TV or interactive TV? Bromage thinks so many boxes already surround a TV that it's best to combine them with the PC in one unit, and doesn't expect to see the demise of the TV set. There could be multiple TV sets in the house with the PC distributing feeds to them, "like a filesaver for the home". Bob Stearns, chief strategist for Compaq, sees "a proliferation of different flavours of PC in the house". What about the TV makers? Stearns says: "The Sonys and Matsushitas have to come in, because the nature of the devices they sell is changing too. We're all heading towards the same room from different places."

Matsushita already ships a combined PC/TV/CD-ROM player in Japan under its Panasonic brand. According to the president of Sony Electronics, Carl Yankowski: "There is tremendous opportunity for an integration box that can tap CD-ROM and computer databases as well as TV broadcast, satellite broadcast, fibre-optic broadcast, wireless digital broadcast. The question becomes, at

PCITV as presented by Packard Bell: the Spectria is a sculpted all-in-one unit with fitted speakers. It amalgamates several technologies, including CD, VCR and PC

what point do we develop a PC or set-top device? That work is all in progress."

One gets the strong impression that it's the PC vendors making the running, not the TV manufacturers. This year, US homes will buy more PCs than US businesses will. PC/TV will be a domestic phenomenon and consumers want ease of use. Brad Silverberg, head of Microsoft's Windows group, repeats the Steve Jobs mantra: "The PC should be like an appliance. Using one should be as easy as toasting a bagel." Packard Bell and ICL may be heading in the right direction with Navigator and The Den, but are probably a long way from the final destination of the PC in the home. Says Sue Forkin of Compaq: "We're in exciting times... The vision of the future where a device like the PC becomes the centre of the home... It's all possible." **PCW**

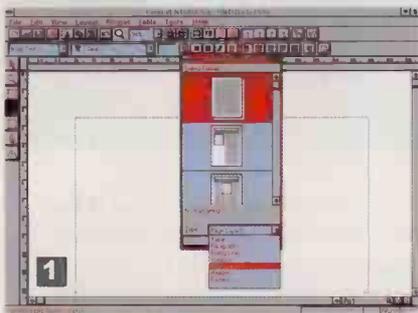
Corel Ventura 5.0

In at the beginning of the DTP revolution, Ventura's chequered history has led to it being Corel-owned and nurtured as an integral part of the company's product line, especially as a complement to the illustrious Draw. Kathy Lang catches up with where it's at.

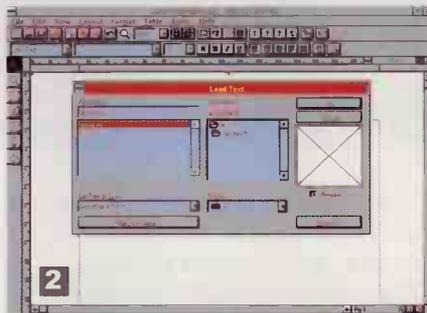
Ventura, where did you come from? When Ventura first appeared in 1986, laser printers were pretty new on the scene, PageMaker was aimed largely at very short, every-page-is-very-different documents, and the graphical capabilities of the Mac far outstripped those of the PC. Apart from

PageMaker, PC products were text-based, and the user had to insert formatting codes into the text just as the (human) typesetter did. In this environment Ventura sold extremely well, because by providing accessible publishing power for producing long and complex documents, it enabled people to publish

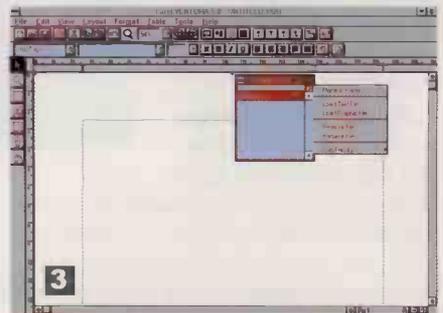
Step By Step Guide To Using Ventura



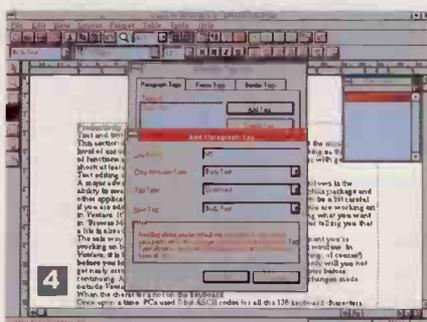
1. When you want to begin a new publication in Ventura 5.0, one option is to choose Quick Format, which has several basic styles to get you started



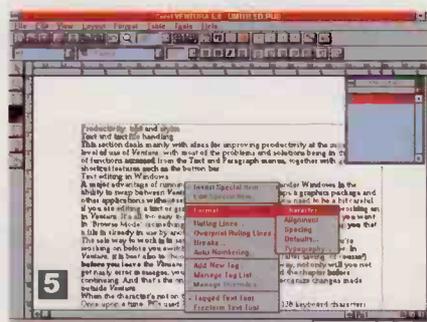
2. Once the initial page layout and basic style sheet (if any — you can just begin with a default style sheet) have been decided, you can start typing text or, as here, loading a word processor file



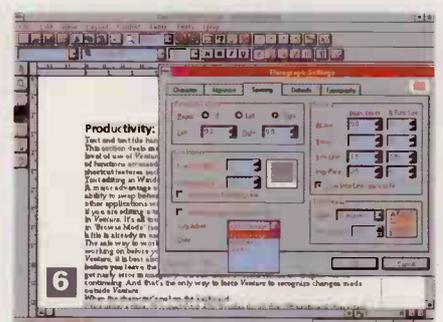
3. The filename appears in the file list; you then click on a particular frame or, as here, on the base page to choose where the text should flow. If you choose the base page, Ventura creates as many pages as necessary to accommodate the text



4. To begin laying out the page, you select the first "paragraph" that needs to be different from the Body Text, and create a style tag for it. There are also numerous other options for manipulating tags, as this dialogue shows.



5. Once the tag name exists, you can begin assigning attributes to it, either by clicking the right mouse button, as here, or by choosing a menu option.



6. When you choose a particular type size for a paragraph tag, Ventura will normally adjust the spacing automatically. You can do this by choosing a percentage of the type size, or (a new feature in version 5.0) by addition, so that you always get integer numbers, not point sizes to two decimal places.

in-house much that had previously to be done outside at far greater expense.

The Ventura approach, of assembling a document from a set of files, was extremely attractive to corporates. A project could be parcelled out among several typists, text prepared very simply and

imported into Ventura. Once the initial layout phase was complete, the individual text files could then be passed back for further editing in the word processor. This made the productivity of the most expensive hardware and software high, since not everyone needed Ventura:

much of the work could be done with text-based word processors. And the GEM system on which Ventura ran demanded lower resources than Windows, which was needed to run PageMaker.

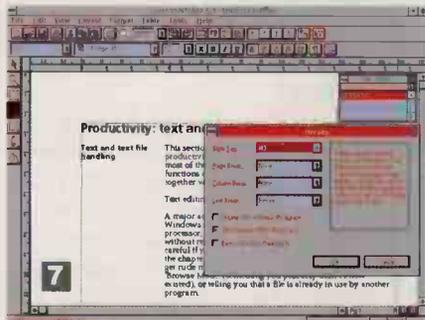
By the early nineties, these advantages were fast becoming liabilities. As hardware became cheaper, Windows with its simpler user interface became more popular, and the very late arrival of a clumsily adapted Windows version was a major drawback. The lack of word processing capabilities, and rigid adherence to paragraph styles, gave Ventura a hard time in competition with high-level word processors such as Ami Pro and Word for Windows. Ventura was still the product of choice for large projects, but FrameMaker became a strong contender.

The overhaul of the user interface in version 4.1, with a context-sensitive, editable button bar and new productivity features such as frame styles, just kept Ventura in the running, backed by a loyal user base and effective user groups, notably in the UK. But new users were thin on the ground, Xerox was playing its usual role of starving its best products of investment in development and marketing, and early in 1993 word went round that its subsidiary, Ventura Software, was for sale.

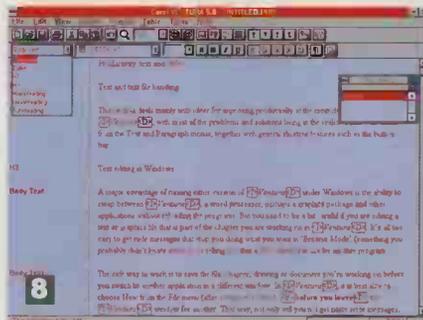
Corel Corporation began life producing software add-ons for Ventura and, by one of those ironies that become part of legend, launched its first product from the Ventura stand at Comdex. CorelDraw leapt to its current dizzy heights of graphic pre-eminence on the PC as Ventura's star began to wane, but Corel continued to produce all its documentation in Ventura and to be fans of the product. Perceiving the long-document, power publishing features of Ventura to be a natural complement to CorelDraw, Corel took the opportunity to buy Ventura 4.1 from Xerox and make it a major part of its product line. Corel launched version 4.2 (with minimal changes apart from rebranding) just two months after the takeover, with the usual Corel bonus of hundreds of fonts and thousands of clip art files.

Ventura, where are you now?

Corel has for the last three years produced an annual upgrade to CorelDraw, the company's main product. Ventura 5.0 was included in the purchase price of the Corel 5.0 suite, though rewriting more than half the code delayed Ventura 5.0's arrival for three months. Much effort went into harmonising the product with Draw, mainly to Ventura's benefit. Despite its reputation as a long-document

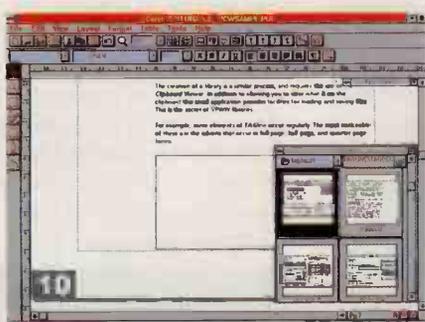
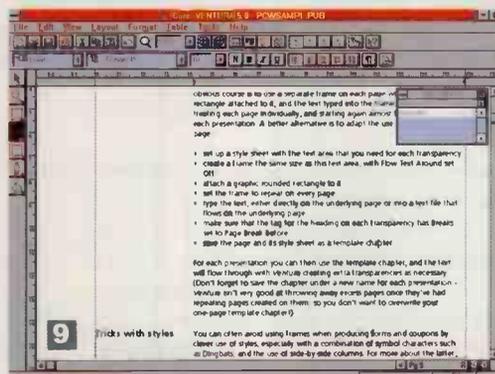


7. To create a heading in the margin with paragraph text alongside, you adjust the Line Break settings for both paragraphs: the Heading has a Line Break Before, while the text has a Line Break After the paragraph

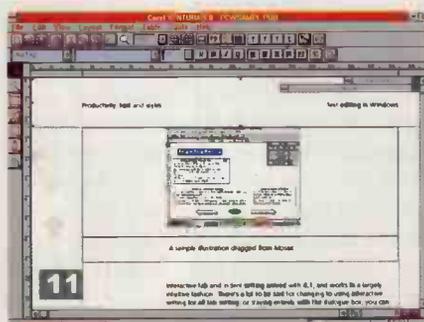


8. The Copy Editor gives word processor-like editing within Ventura. You can also assign paragraph tags to text in this View

9. The bulleted list shown here is set with no line spacing between each paragraph, so that the list is kept visually together. But the last bullet needs extra space to keep it distinct from the paragraph below. This being a Body Text paragraph, it cannot have Space Above (see right) or the margin headings will not line up correctly. In previous versions, a new tag would be necessary to vary the spacing on the last Bullet paragraph. The solution now is to use the Override Attributes feature of version 5.0, to add extra space just for the one bullet point: this is shown by the icon attached to the tag in the Tag List (top left)



10. Importing pictures is much easier in this version of Ventura. The Mosaic utility can run as a roll-up; here an empty frame is shown alongside some Mosaic thumbnails of TIF files. To import, you just drag the thumbnail onto the desired frame



11. Once the picture is imported, you can close the roll-up tidily away with others. Note also the header, which is automatically echoing the headings on that page of the text

package, Ventura, especially in versions 4.1 onwards, is also excellent for forms and for many shorter documents such as brochures: version 5.0 continues this trend.

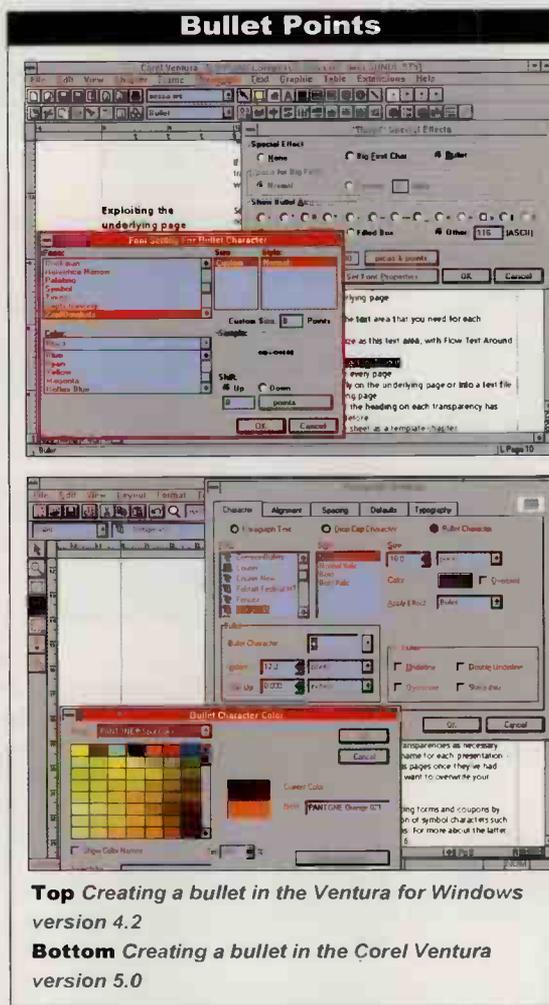
To a long-standing Ventura user, the new user interface comes as a real culture shock; users of Draw and other Windows products will find it familiar. Version 5.0 has some excellent Draw features such as roll-ups, a full range of pen and fill styles, much-improved printing features complete with proper previews and simple imposition, and tabbed dialogues to minimise the number of menu accesses. It also has powerful right mouse button access and a host of new shortcuts, an alternative tagging mode that allows one-time override of paragraph styles, better text processing, and a new and mostly better housekeeping suite called Publication Manager.

Among the drawbacks is the new button bar: unlike earlier versions, it stays the same whatever the current task. When you're placing graphics, easy access to emboldening is of no use at all! And since the bar includes some much used functions such as Print, Save and Open, it's awkward to turn it off altogether. The new importance attached to Publications seems to have confused an already tricky area. The approach to placing text and frames is more like Draw (though still without the ability to snap to non-printing guidelines), but this makes it less easy to make frames snap to text, so that lines on adjacent columns match across the page. And the vast number of features, many implemented through different methods, can be quite bewildering to both new users and old friends. But I've cracked that problem with an excellent utility called *WhereIs*, which becomes a tool under Extensions. It behaves like any other roll-up, allowing you to find and, if you like, go to any of the 500-plus operations for which Ventura has menu options, hotkeys, roll-ups, or pop-ups on the right mouse button.

Highlights

● **Text formatting**

Paragraph styles are a huge productivity boon, but they hog-tie you when creating more variable documents. You can now avoid having dozens of tags with very small differences by using the Free Format Text tool, which allows you to override almost any tag attribute just for the



Top Creating a bullet in the Ventura for Windows version 4.2

Bottom Creating a bullet in the Corel Ventura version 5.0

current paragraph.

Corel is unusually responsive to users' requests. Prompted by the UK user group, the handling of different languages and dialects has been much improved: hyphenation and spelling dictionaries for 18 languages are provided on the CD-ROM. You can apply any of them to any paragraph tag, and override this for particular paragraphs. The same influence accounts for the widening of paper sizes available: all the main European variants, including RA and SRA sizes.

● **Text processing**

For those who prefer to prepare text within Ventura, or at least make major changes there, the new Copy Editor is a boon. You can see the text and the style name for each paragraph, any format codes such as inline italics (though you can't change them there), and spell check and do search and replace.

● **Graphics**

The range of graphics import formats is extensive: it includes import from Draw directly or via CMX, the new condensed Corel transport format. The Mosaic utility can behave like a roll-up and gives you great preview facilities. Precise control of

placement is available through a roll-up. Internal graphics are still pretty weak: they don't include any ability to group or align the graphics themselves, and the flexible facility for wrapping around irregular objects applies only to imported graphics. But all Draw outline and fill features are available to both types of graphic.

Ventura, where are you going?

There is a great danger that, in making the product more like Draw, some of the existing benefits for producing long and complex documents may be lost. But at the moment, Ventura 5.0 is still the best product for that kind of work.

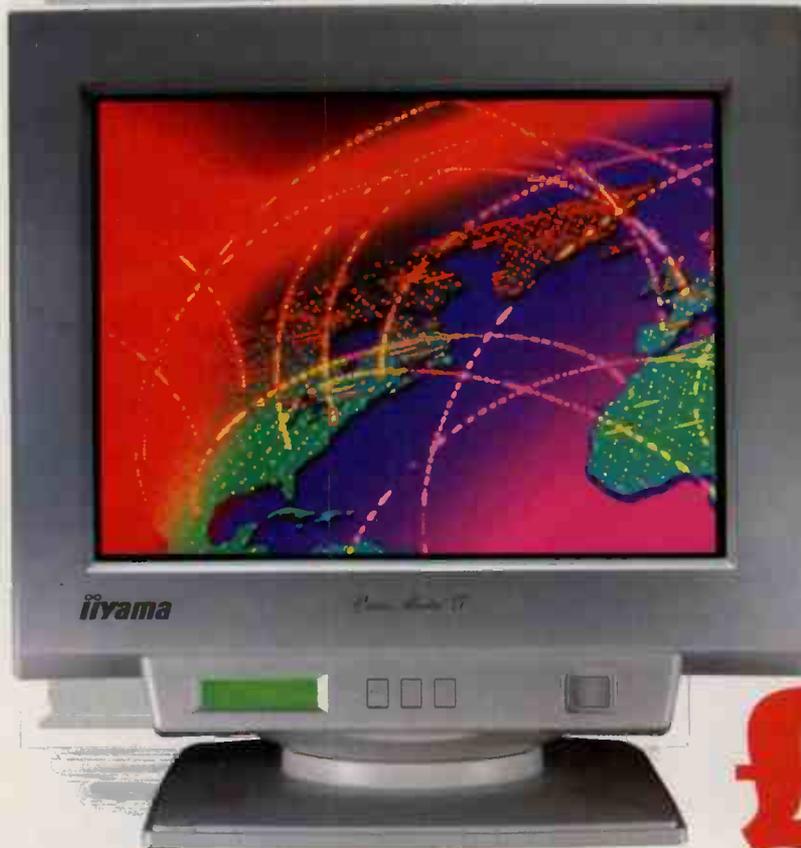
If you're already using Ventura 4.2, version 5.0 offers many advantages; but it's worth making the move gradually, using it for new projects and for documents that you can migrate completely to the new version. If you have Draw 5.0 and haven't yet experimented with Ventura, you may find the extra discipline imposed by paragraph styles and the publication approach rather a bore at first, but for structured documents you'll make big gains in productivity.

If you don't yet have either product, you have several options. If you need Draw, or components of the suite other than Ventura or PhotoPaint, it has to be the CorelDraw 5.0 suite. But Ventura 5.0 is also available bundled with PhotoPaint, providing an excellent range of image massaging features and good graphics conversion. And Ventura 4.2 remains for sale at a real knockdown price: around £125 on the street, including Database Publisher. All versions contain hundreds of fonts in (if you have a CD-ROM drive) PostScript format as well as TrueType, and stacks of clip art. And it's expected that both versions of Ventura will continue to be supported for the foreseeable future, just as Draw versions 3.0 and 4.0 are still available — especially as version 6.0 of the Corel suite will need Windows 95.

FOR Further Details

For the Corel suite and Corel Ventura itself, **Channel Market Makers** on 01703 812755, fax 813830. *WhereIs* is shareware, available from **Corel Ventura Users**, the independent user group whose monthly 32-page colour magazine covers all Corel applications: tel 01234 241234, fax 713757.

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Group Test

The Freehand-Illustrator dominance in the Mac market continues apace, while for Windows, competition is thriving. The top contenders in the drawing software stakes are scutinised by Ken McMahon.

If text is one half of the DTP equation, the other is graphics. And the development of graphics packages over the last five years has roughly paralleled that of their text equivalents. The story has been one of progressively more and more power, functionality and versatility as successive software releases have struggled to take advantage of the speed and processing power afforded by new CPUs.

With development has come diversification. First there was the bitmap/vector divide. The market for bitmap image editing tools has largely been cornered by Adobe Photoshop, but in the vector graphics arena things are much more interesting. On the Mac, the two-horse race between Adobe Illustrator and Aldus (as was) Freehand looked to be all over. Adobe's motive for acquiring Aldus must, at least in part, have been due to a desire to nobble the only serious competitor to

many Corel stalwarts actually prefer the older versions, spurning such new additions as lenses, presets and Powerlines.

The trend to ever increasing features is also apparent at the budget end of the market. It's incredible to think that there are sub-£100 packages offering features like autotrace, charting, layer control, sophisticated blends and fills, text on paths, and even colour separated output. This level of sophistication would have been no more than a dream at any price as little as four years ago.

Some of the enhancements have come about as a result of more general development at the operating system level. The widespread adoption of TrueType and PostScript Type 1 fonts for example has made the implementation of text effects widespread, and all of the packages on test will produce editable paths from fonts in

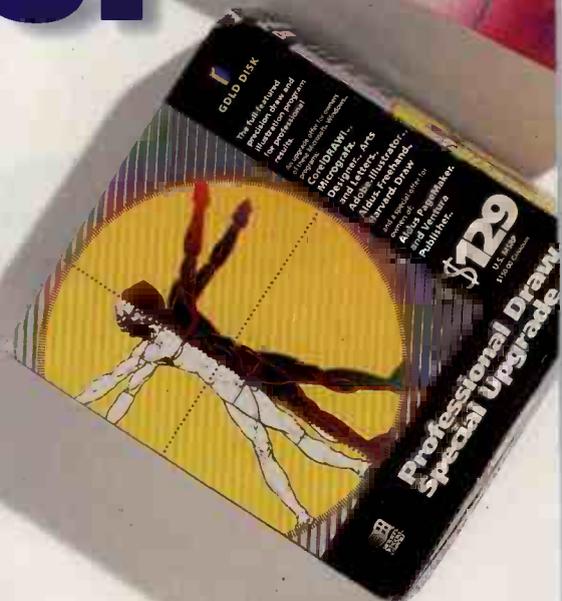
Top drawer

Illustrator. Then, in the closing stages of 1994 Freehand's developer, Altsys Corporation, wrested back the rights to Freehand and was promptly taken over by multimedia software developer Macromedia. The continuance of the Freehand-Illustrator duopoly is thus assured, a situation that can only benefit the users of both products. Here we look at what the latest versions of both packages have to offer the Mac-based design professional and anyone else who can afford to pay for such a high degree of functionality.

Meanwhile in the PC market, competition continues to thrive. At the top end of the market Corel continues to dominate with version 5 of its awesomely equipped general purpose design package CorelDraw. Corel is still selling versions 3 and 4 of Draw at a discount price and

one of these formats. All but one of them provides OLE2 support allowing object linking and embedding. On the Mac both Illustrator and Freehand make extensive use of "modeless palettes" in their interface design and Freehand in particular has extended the bounds of the drag-and-drop metaphor.

But increasing power also means increased complexity. And if packages are not to become impossible to use then attention will need to be focused on emerging options like plug-ins. It may be that the only solution is an entirely new approach to applications development such as Apple's new OpenDoc operating system. In the meantime, a little online help can go a long way to making life easier and in this respect the Mac products could learn a lot from their Windows counterparts.



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Macromedia Freehand 4.0

In the last months of 1994 Freehand's future hung in the balance. The rights to Freehand were sold under licence by its developer, Altsys Corporation, to Aldus. Following the takeover of Aldus by Adobe, Freehand's developers, Altsys, were understandably concerned about the future of their product. They were worried that Adobe would try to bury Freehand (or at least sit on it for a while) to give their own product, Illustrator, free run of the market.

Altsys argued that, by selling to Adobe, Aldus had broken the conditions of the licensing agreement and sued Aldus/Adobe for the publishing and distribution rights to Freehand. But before the case got to court Aldus and Adobe agreed to hand the rights back to Altsys. Shortly afterwards, leading multimedia software developer Macromedia snapped up Altsys in a \$69 million deal.

Freehand's future now looks a lot rosier. Macromedia is best known for its multimedia authoring tools, Director and Authorware Professional. In addition to Freehand, Altsys is well known for its font design and editing package, Fontographer. The deal not only means continued backup and support for users of existing versions of Freehand, including

the current one: Macromedia president and CEO, Bud Colligan, has made clear the company's intention to "accelerate research and development in both the design and publishing market for Freehand." That could of course mean he's just going to spend a lot of money advertising it. But it's probably fair to assume that there will be a version 5 some time in 1995 and when it arrives it will have some interesting new features.

We got off to a bad start with Freehand. The installer program crashed the Mac before it got to the first dialogue box, but restarting with extensions off got us rolling. The complete installation including sample illustrations, features at a glance and fonts creates a 14Mb folder on your hard disk.

From this context sensitive palette you can specify most of an object's attributes. The inspector palette is in fact five palettes in one. Depending on which of its five icons you select, you can set attributes for objects, fills, paths, text and pages. The object inspector displays dimensions of geometric shapes — the number of points they contain, whether open or closed, and the flatness. If you select a text object three additional icons appear below the object icon. When

selected, these icons — dimensions, column and row, copyfit and text on a path — provide three additional pages of information and format options on the currently selected text block.

To change formatting of the text itself rather than the box in which it is contained, you need to select the text inspector. You then get some extra icons — character, paragraph, spacing, and hyphenation and alignment. The fill inspector starts out simple — one dropdown menu with nine fill options, everything from a basic no-frills fill to graduated (linear or log), PostScript, radial, textured and tiled fills. The bottom half of the palette reconfigures depending on which option you select from the dropdown. Opt for a graduated fill, and "from" and "to" colour wells appear together with a taper option menu and a big knob for setting the blend angle.

The stroke inspector offers a similarly comprehensive set of options for basic, custom, patterned and PostScript stroked paths including colour overprint, cap style, join style, mitre limit, dash style and arrowheads. Last of the inspectors, the document inspector, lets you set preferences for page size and layout, measurement units, grid size and so on.

The object inspector is Freehand's most important palette but by no means the only one. Freehand's designers have adopted the floating palette idea in a big way. The palette format is central to the way that colours are created and applied in Freehand and the introduction of drag and drop colour swatches means that not only is it a lot quicker and simpler to create and apply colour styles, but you can use palettes interactively, transferring, say, a tint created on one palette to another palette to define a style.

Three palettes take care of colour in all its forms, the colour mixer, colour list and tints palettes. Experimental types can start with the colour mixer which works on the same principle as the Mac colour picker. You can select from three models and either enter component percentages or make adjustments using slider bars. The resultant colour is displayed in the colour well which is large enough to be able to make a good assessment of its suitability. But while mixing inks is fun, for professional work the colour list is the place to start. Unless you open a document the colour list dis-



Drag and drop colour. Just drag the colour swatch from the colour list to the tints palette for instant tints

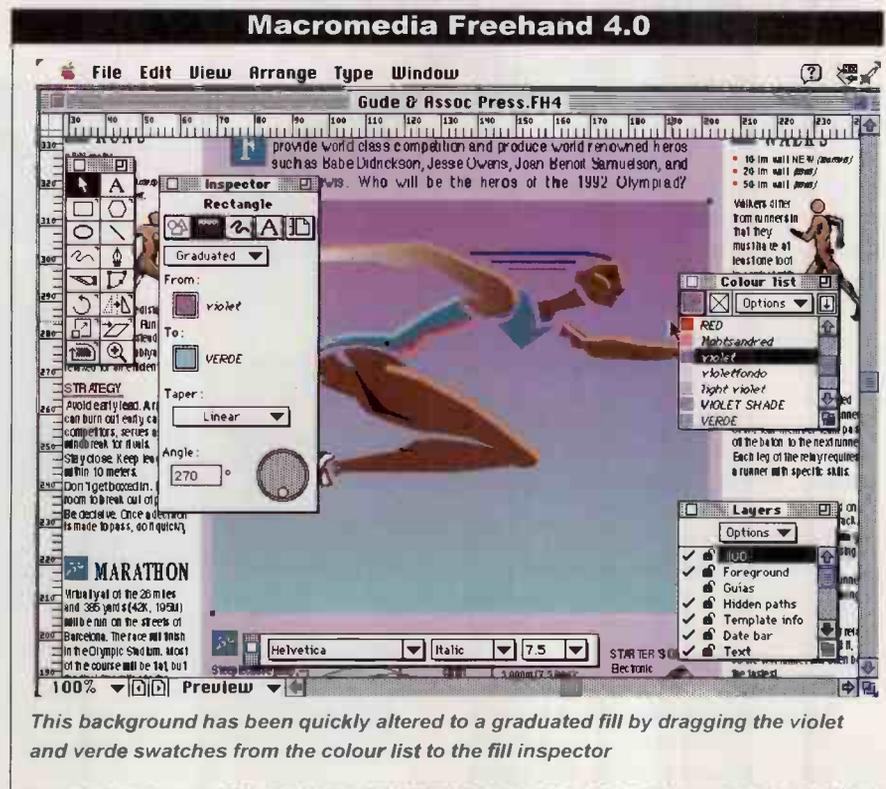
plays the default white, black and registration colours. An options pulldown provides access to the colour libraries which include Pantone spot and process systems, Truematch, focoltone, Dianippon and Toyo matching systems as well as Freehand's own crayon library.

To add colours from any of the libraries to the list you just select the appropriate library from the pulldown, select the colour swatches you need and click OK. Spot colours names are displayed in roman type, process colours in italics. If you want to change a spot to a process colour or vice versa you just select "make spot" or "make process" from the options menu. Here's the clever bit though. If you want to check that "make process" has converted your Pantone spot colour, say yellow 103 into the four colour split specified in the Pantone guide, you just drag the swatch from the colour list into the well on the colour mixer palette and you have your confirmation. Freehand converts Pantone 103 to 100Y 18K: according to my specifier it should be 18.5K but who's going to argue over .5 percent black? Likewise if you want to create a colour using the mixer and add it to the list, you just drag the swatch in the other direction.

Freehand is a mature product and looks it. It has a Macromedia Director movie, demonstrating new features which include multiple pages, drag and drop colour, copyfitting and flow, text table and columns. Ironically, the Freehand movie isn't anything like as interesting as the Illustrator one, probably because it confines itself to a features list. Nonetheless, this is something the new owners will no doubt be keen to put to rights.

What you see when you open a Freehand document, commonly if unexcitingly referred to as the user interface, has been updated to take advantage of what the user guide calls "interactive floating palettes". Gone are the days when to change any of an element's attributes you had to select the relevant option from the menu, amend the dialogue box and close it to see the results.

When you open one of the excellent sample files you are confronted with so many floating palettes that not much of the illustration is visible. If you want to make the most of floating palettes you will need something bigger than an Apple 13in monitor. I often use two, one for the illustration and another for the palettes. But if your screen space is limited you can roll up the palettes when you're not using them.



This background has been quickly altered to a graduated fill by dragging the violet and verde swatches from the colour list to the fill inspector

You can create styles combining line and fill attributes. You can also use drag and drop to fill and stroke colours to paths. You simply pick up a colour swatch and drop it onto the target object. Drop it in the middle to change the fill or on the path to change the stroke colour. The other attributes remain unchanged, so if your object has a graduated fill from red to blue you can drop a green swatch at either end of the graduation to change the colour.

Freehand's draw tools palette features some new additions. There is a polygon tool which draws equilateral shapes and stars. Double clicking the tool produces a dialogue box in which you can specify the number of polygon sides or star points. The inner and outer radius of stars cannot be specified; instead, a slider control varies the point angle from obtuse to acute. This approach doesn't work as well as Illustrator's star filter and what's more feels out of place and coarse compared with the rest of the Freehand interface.

The poetically named Bezigon tool is designed for those who want to draw now and play later. It works in pretty much the same way as the pen tool, producing corner, curve and connector points in combination with the option and control keys. Unlike the Pen tool, the Bezigon tool doesn't permit the repositioning of curve point handles; it sets them automatically as you draw.

The idea is you can do a quick outline and go back and tidy up later.

Like Illustrator, Freehand now includes more advanced path features. The path operations submenu provides path combination operations such as blend, intersect union and punch, as well as a simplify command which tidies up your paths and removes unnecessary, or pointless, points.

Freehand 4.0 includes a trial version of Aldus Fetch, a mixed media database application. Fetch lets you catalogue items — images, movies, sounds — and provides thumbnail views. The trial version is restricted to a maximum catalogue size of 50 items but is network capable. You can upgrade to the retail version for £99, though it's unlikely this offer will remain open long as Fetch is an Aldus product and Aldus no longer owns and distributes Freehand.

PCW Details

Macromedia Freehand 4.0

Contact Macromedia 01344 761111

Price RRP £450, SP £270

Good Points Superb use of floating palettes and drag and drop. Colour work made easy. Future now assured. No clip art.

Bad Points None.

Conclusion For ease of use on the Mac, and now that its future is in safe hands, Freehand has the edge.

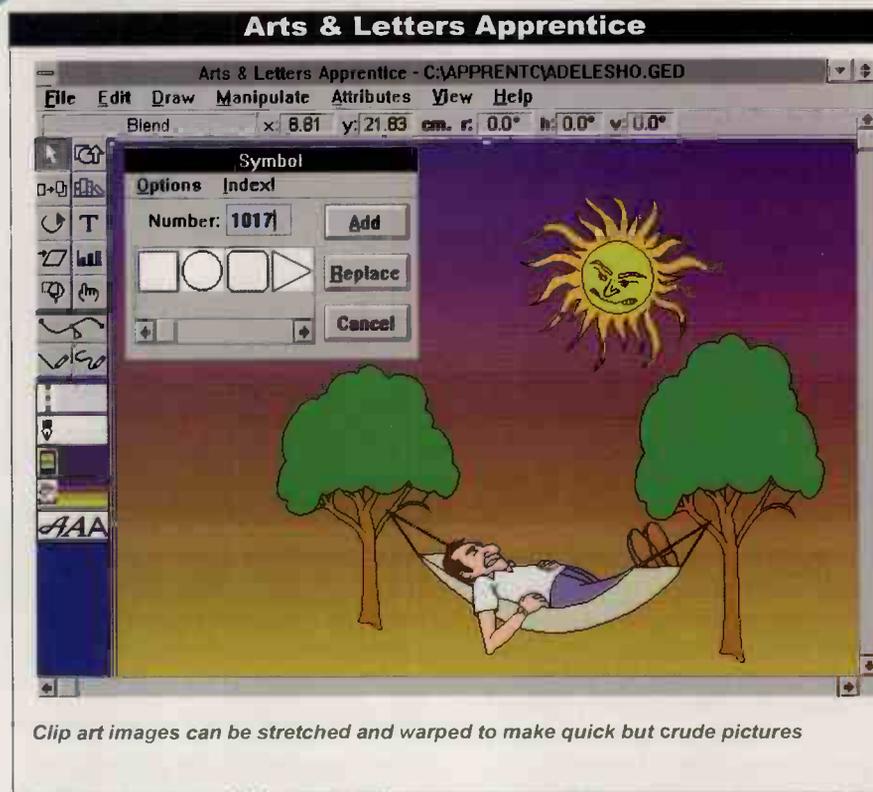
Arts & Letters Apprentice

Cheap and crude but effective are not a bunch of adjectives that normally fit together easily, but they describe Arts and Letters Apprentice very well. First impressions are not, well, all that impressive really. Hang on though: Apprentice has some pretty sophisticated features, like blends, graduated fills and text along a path and it only costs £49. Be that as it may, a few fancy effects do little to make up for a very kludgy interface. But perhaps that's what budget software is all about, making do with a less than ideal situation in order to save a few quid.

Installation is an 11-disk job which installs all 4,000 clip art images, a symbol library and 90 TrueType and Type 1 fonts. Registering entitles you to free tech support and of 100 extra clip art images, just in case you couldn't find what you were looking for in the original 4,000.

The Apprentice draw window is a simple affair. A status bar along the top of the window provides some basic information on cursor position, object type and size. A fixed position toolbox contains 13 tools. There's no polygon tool, so if you want to draw rectangles you have to start from first principles, i.e. individual lines. There's no ellipse tool either so those circles will take a little more effort than the usual click and drag. The idea is that if you want simple shapes like this you select them from the symbols library and edit them. What there is is a pointer (somewhat essential), a duplicate button, rotate and slant transformation buttons, a magnifier, text tool and two buttons for accessing symbol libraries. There's a button you must first press if you want to marquee select multiple objects, and a chart tool. These two tools are indicative of Apprentice's odd combination of kludge and refinement.

At the base of this odd assortment lie the Bézier drawing tools — a straight line and a curve tool together with an edit button. The straight line tool does just that — draws one straight line. For a more complicated path you position the pointer over the endpoint of the line you've just drawn and draw another, and the two paths are automatically joined. Curves are produced using a freeform drawing tool: you produce a squiggly line and the software does its best to interpret it and produce something more elegant. Not much Bézier about it then, you might say. Well, that bit comes later. Because, unless you're some sort of steady-handed artistic genius, your approxima-



Clip art images can be stretched and warped to make quick but crude pictures

tions of curves will leave much to be desired even after the curve algorithm has done its level best to clean them up. So you then click on the points with the editing tool and try to sort out the mess. Once you get to this stage, things bear slightly more resemblance to the usual Bézier manipulation tools. Each point has two controls which can be moved in and out or rotated around the point to alter the shape of the curve. The clip art libraries bear witness to the fact that excellent results can be achieved this way. But given the choice, it's not the way I'd do it.

Once you have created your outline, filling and stroking is less of a problem. A further four boxes at the bottom of the toolbox allow you to define line and fill colours and styles. You can choose from CMYK, RGB, or HSB colour models.

Type is entered in a dialogue box and then placed on the page as an object. It can be filled and stroked, run along a path and converted to outline paths and edited like any other path. Typographic controls include letter and word space, condense and alignment options. The type dialogue box provides a scroll bar for adjusting kerning, but in actual fact this is a duplication of the letterspace option and letter pair kerning is not possible.

Version 1.2 has several new features, the most notable of which, unless you're a

clip art fan, is the warp command which applies perspective and envelope distorts to text and objects. In contrast with some of the other functions, the warp dialogue does the job quickly and intuitively and produces excellent results. The additional clip art consists of several preconstructed scenes as well as the usual extensive library which I would classify as fair. Some of the scenery pages are impressive and show that you can achieve good results with this software; what you can't tell from the clip art is how much effort it's going to take you to get there.

This is one for those who want to produce the occasional floor plan or birthday card, in which case it's more than adequate. Those with serious design ambitions should steer well clear of it.

PCW Details

Arts & Letters Apprentice 1.2

Contact Roderick Manhattan
0181 877 1388

Price RRP £79, SP £49

Good Points It's very cheap.

Bad Points Very crude drawing tools make producing even the most elementary illustrations more hard work than it needs to be.

Conclusion Find the extra cash and buy GST Designworks.

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ClarisDraw 1.0

ClarisDraw 1.0 is, like its predecessors MacDraw and MacDraw Pro, aimed at the non professional user, or as Claris calls them, "Generalists". Apple Computer's ex software arm, Claris, has in this major revision attempted to upgrade the original Mac graphics package and provide a new level of power and versatility while maintaining the simplicity of the MacDraw interface. With an installed base of more than 800,000 MacDraw users Claris has clearly been doing something right with its basic but functional approach. But it clearly needed to equip Draw with some powerful new armoury if it was to hold its own on the Mac and compete with the plethora of budget priced Windows graphics packages. The Windows version of ClarisDraw is slated to ship this year.

Both the native PowerMac and the 68kb version of Draw ship in the same box. A smart installer figures out which platform you're using and installs the appropriate version. The system requirements are the most minimal you will see on any application that does more than tell you the time. Draw will even run on a Mac Plus providing it has 2Mb of RAM. If you are running System 7 you'll need double that (8Mb on a PowerMac) and 12Mb spare hard disk space.

Draw has been redesigned from the ground up with a new faster "Claris graphics engine" which, it's claimed, will provide seamless transparency across platforms and applications; meaning you'll be able to swap files between ClarisDraw and Claris Impact, Windows and Mac versions. The new features list runs to more than 75 items including new Bézier drawing tools, sophisticated text formatting, 24-bit colour bitmap image editing, precision editing and alignment tools and slide show presentation facilities.

First sight of the new interface inspires hopeful anticipation. The toolbar does indeed accommodate a comprehensive suite of tools and the button ribbon is logically organised into controls for selecting fill and line styles and type. It's quite easy to do all the standard things you would expect in even the most budget graphics packages like create simple shapes, add line and fill styles and transform them. So what about the new stuff?

Of most interest to the Generalist will be Draw's Smart tools. Claris thinks this is such a great idea they've trademarked the name. SmartSymbol Manager is a clip art browser which allows you to drag and drop images from the view window onto the draw area. It also has graphics search and replace functions. The SmartShadow

and SmartEmbossing buttons create instant effects without the usual duplicate, fill and send to back messing around that makes life difficult for generalists as well as the rest of us. Other members of the smart clan include SmartSize, SmartAlign, SmartShapes and SmartConnectors.

SmartAlign allows you not only to align objects vertically and horizontally along any edge, but you can also distribute them with equal space between. The smart bit is that you can create a relationship between aligned objects so that if you move one, the others will also move to maintain the specified alignment.

Draw can be used for the creation and presentation of slide shows. Compared with dedicated slide presentation packages like Persuasion, Powerpoint or even CorelShow, Draw's features are basic. You can nonetheless quickly produce good looking slides. A master page with elements common to all slides — background, corporate logos and so on — is first created, then you create new slides in sequence. Slides can include Quick-Time movies set to autoplay when the slide is displayed. There are basic editing features, slides can be rearranged, annotated with speaker's notes and set to progressively reveal.

If you don't want to get involved in the complexities of power designing with Freehand or Illustrator, ClarisDraw is a good alternative. Not because it's a good package — by the standards of Windows budget software costing much less it's distinctly average — but for Mac users it's all there is. Claris is going to get a nasty shock if it releases Draw for Windows at the same price as the Mac version because Claris can't rely on the installed base of users they have in the Mac world, and programs like GST Designworks will wipe the floor with it.



Easier to learn than Illustrator or Freehand, but that's about its only saving grace

PCW Details

ClarisDraw 1.0

Contact Claris 0181 756 0101

Price RRP £275, MacDraw Pro upgrade £70, SP £249

Good Points Shallow learning curve and built-in slide presentation.

Bad Points Lack of colour separation on the Mac is unforgivable.

Conclusion For the extra £20 or £30, Freehand or Illustrator respectively offer ten times the functionality.

CorelDraw 5

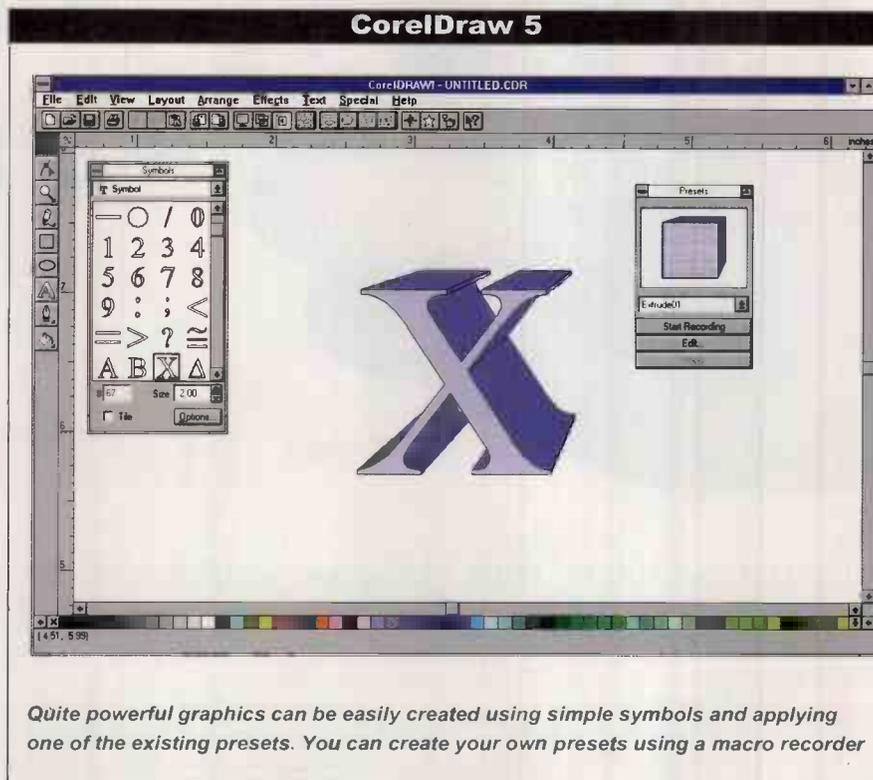
You cannot help but be totally gobsmacked by the sheer volume of material inside a Corel box. Corel's marketing philosophy seems to be, "buy one of our products — and we'll give you the rest free of charge". When you buy Draw you also get, whether you want them or not, Corel Ventura, PhotoPaint, Show, Move, Chart, Trace, Mosaic and Query. Those whose function you can't guess from their titles are Ventura, Corel's flagship DTP product; Show and Move, static and animated slide presentation packages; and Mosaic, a rollup image browser. That's just the software. There's also over 800 TrueType fonts and enough clip art to fill a book of telephone directory proportions.

The whole bundle is supplied both on CD-ROM and compressed on 18 floppy disks. The full install will eat up nearly 62Mb of your hard disk space, the recommended minimum install on the other hand requires a mere 40Mb. You can reduce the space requirement drastically by customising the install: selecting only Draw, Trace and Mosaic reduces the disk space requirement to less than 23Mb. If you really are hard up for disk space you can run applications from the CD, though obviously this will slow things up somewhat.

The quicktour presentation is highly recommended. Friendly presenters Fiona Rochester and Doug nosepick (the sound could be better) guide you through the basics of the CorelDraw interface using a combination of video and animated demos all displayed in a futuristic setting straight out of the Jetsons. There must be worse ways to get started than watching someone else go through the motions to the muted accompaniment of jazz and classical music.

The Draw interface relies heavily on floating palettes and as a consequence when you first open or create a new document the Draw window is clean and unimposing. The tools are arranged in a single column bar on the left, a button "ribbon" extends along the top and the colours palette is a single strip of swatches along the bottom. Below this a status area provides ancillary information like grid co-ordinates, button and layer information.

In CorelDraw Bézier curves are produced in the time-honoured fashion of using a pen, or in this case a pencil tool to place points on the page. The curve



Quite powerful graphics can be easily created using simple symbols and applying one of the existing presets. You can create your own presets using a macro recorder

between two points is defined by the positioning of control handles which can be extended from and rotated around the point. Draw's pen tool can be used to create curve, corner and cusp points and by using a combination of these three it is possible to create a line segment of any shape. This model is pretty much the standard way of creating paths in all vector drawing packages these days.

Draw's pencil tool is actually six tools in one. If you hold down the mouse button a "flyout" bar appears with a subsection of pencils. The first two let you alternate between Bézier and freehand drawing mode and the remaining four provide variations on a theme, the theme being dimension lines. Dimension lines are those things you see on plans that specify the distance between two points. No doubt there are people for whom dimension lines are the only thing worth losing sleep over, but in my toolbox they'd be tucked away where you couldn't find them even on the odd occasion when you needed them. To tag specialised, limited use tools on the end of one that you use all the time is fairly typical of the Corel approach and it can overwhelm. It's a bit like using one of those Victorinox knives that has a blade for every occasion: by the time you've

found the one that gets stones out of horses' hooves, someone else has opened the bottle using their teeth.

Once your path is drawn you can edit it using the shape tool. If you select a node with the shape tool, the node edit rollup appears. This handy palette lets you add and remove nodes, change from one node type to another, close open paths and vice versa; it also provides a bank of editing buttons which allow you to transform selected portions of a path. The node edit rollup also features an auto reduce button which works in the same way as Freehand's simplify. Any superfluous nodes on a path are automatically eliminated. What's wrong with superfluous nodes? Well, apart from sounding unpleasant, it doesn't pay to have more points on a path than you need. Firstly, paths with extraneous points tend to look less smooth than they might. But more importantly, the more nodes you have on a path, the more complicated it is to edit, the more memory it consumes and the longer it takes to print. In extreme cases, a page with a lot of complex paths may cause a PostScript error and not print at all. So something that turns your scrawly point-ridden efforts into smooth, economical lines is very much to be welcomed.

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MR. W. JUAN, QUICKEN USER

Date	Description	Amount	Balance
21/07/94	Lot Casino	76.00	357.04
26/07/94	Direct with Sharon		262.31
26/07/94	British Gas	117.45	144.86
26/07/94	British Gas	50.45	94.41
26/07/94	Postoffice Pk	85.92	8.49
26/07/94	Adrian - Full Heat		145.71
26/07/94	Adrianus Vrasind		145.71
26/07/94	Transfer from High Rate Deposit Account	1,500.00	1,645.71
26/07/94	John Michael	148.90	1,496.81
26/07/94	RP Mortgage	450.00	1,046.81
10/08/94	Equilibrium Ltd	78.99	967.82
10/08/94	Customer Holiday Deposit		967.82

Your transactions are entered into a screen which looks and works exactly like your bank statement.

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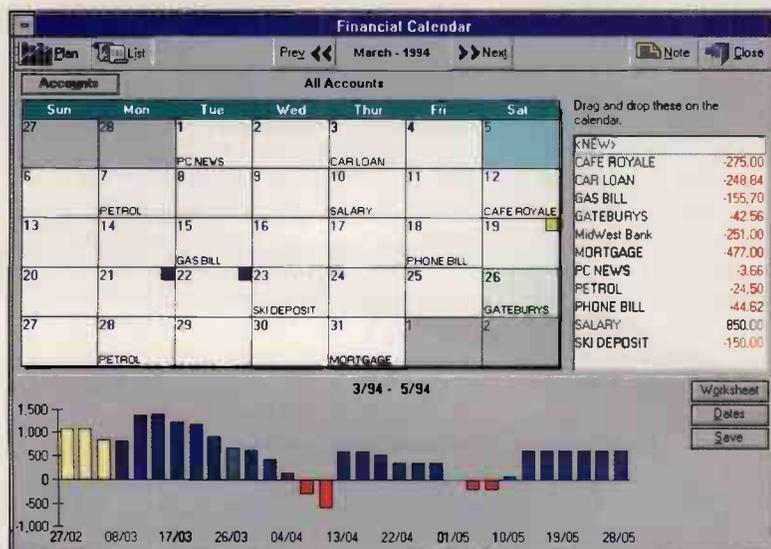
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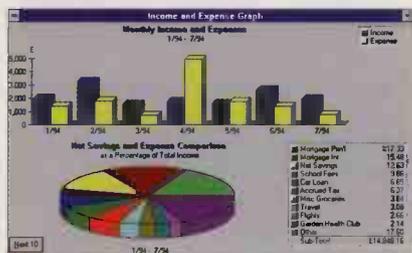
Keep your finances up-to-date in half the time

Quicken minimises data entry by learning recurring transactions. To enter a regular bill, simply start typing the name of the company you need to pay – Quicken automatically fills in the remaining details for you. Within Quicken's unique Financial Calendar, you don't even need the keyboard at all. Simply use your mouse to drag transactions from a list and drop them



The Financial Planning Graph helps you shape your financial future. Make 'What If?' projections and see the effect of each plan on your overall net worth. Plan when to meet payment demands, or when to arrange an overdraft.

onto the calendar. Quicken automatically updates your account as they fall due.



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Quicken Home Inventory - C:\QUICKEN\QHI.IDB

File Locations... Categories... Policies... Reports Preferences... Help - F1

View by Location: Living Room Update Quicken Go To Quicken

Item Description	Item Category	Replace Cost	Resale Value
Bookcase	Furnishings	350	250
Books	Leisure & Hobbies	750	1,000
CD Collection	Entertainment	3,500	3,000
CD/Cassette Player	Electronics	395	300
Coffee Table	Furnishings	120	60
Ivory Chess Set	Decorations & Art	230	230
Mirror-cedar frame	Decorations & Art	155	110
Sofa - 3 seater	Furnishings	495	250
Stereo-amplifier	Electronics	480	350
Stereo-speakers	Electronics	150	75
Television	Electronics	595	400
Living Room Total:		9,025	7,480

Sort Living Room Total: 9,025 7,480

Record Restore Delete Copy New Add Selected Item

Suggested Items for Furnishings: Blinds, Bookcase, Books, Bureau, Carpets, Chair, Changing table, Chest, China cabinet, Clock, Coat rack, Coffee table, Cot, Couch, Curtains, Desk, Dining table & chairs

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Another welcome addition to the pencil tools armoury is Powerlines. Powerlines let you draw lines that vary in thickness along their length and look like they were created with traditional tools like calligraphic pens, rather than non-traditional ones like computers. The Powerlines rollup lets you design your own Powerlines and add them to an existing selection of presets. You can vary the maximum line width, nib shape, speed spread and ink flow. Using the pressure preset you can alter the width of the line by applying pressure with the cursor keys or using a pressure sensitive stylus and tablet.

Clicking the outline pen tool opens a flyout from which you can choose preset outline thicknesses and colours. If you want more than the presets have to offer you can open the outline pen dialogue which gives you access to line widths, colours, styles, arrowheads, caps and corners and calligraphic pen shapes. You can get faster access to these facilities using the pen rollup. Both the dialogue and the rollup let you set default styles when no object is selected and you can select an object as a basis for a new outline style using the "update from" button.

The last tool, the fill, works in a similar way with a dialogue, a rollup and several preset buttons on a flyout. As is the case with most of Corel's tools, you get about twice as many options as you would with any other package, though you might

only use half of them. The fill options include a flat colour uniform fill, four flavours of fountain fill — linear, radial, conical and square, two and four-colour pattern fills, bitmap textures, PostScript textures and grey fills.

All the important colour modes are provided, including CMYK, Pantone spot and process, Focoltone and Trumatch. A minor problem with the Corel colour charts is not that they don't provide you with enough options, but that it's often not easy to know which colour you're selecting until you've selected it. If you select a fill colour from the draw window palette, its reference, say a Pantone number, is displayed in the status area, which is fine. But if you are using the pen or fill rollups the limited colour palette doesn't let you know, other than visually, what colour you have selected until you've applied it. If you tend to work a lot with specified colours, as opposed to the "that looks rather nice" visual method, this makes the rollups pretty useless.

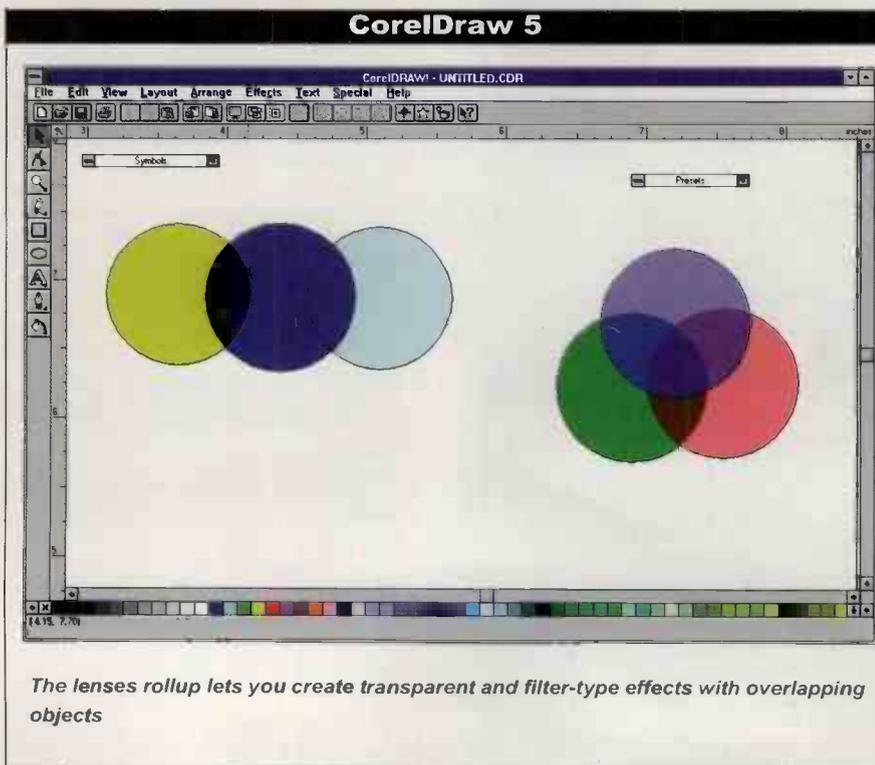
If Corel's toolbox provides the basic graphics apparatus, the bells and whistles are to be found on the menu bar and button ribbon. Nearly all are accessed via rollups. Rollups that do everything from basic transformations (rotate, flip, scale, shear), rollups that provide symbol libraries, and special effects rollups that distort text, create blends, extrusions, contours and transparent overprint effects. Two in particular are worthy of

more than a passing mention, the lenses and the presets rollups, and not just because they are new to version 5.

The lenses rollup provides eight lenses which can be applied to objects. Applying a lens to an object causes whatever is behind the lens object to display through it. The transparency lens, for example, mixes the colours of background objects with that of the lens object, simulating a transparent effect. As with nearly all CorelDraw features some lenses are a lot less useful than others. Less useful lenses include magnify, tinted greyscale and heatmap (you don't want to know). Among the more useful ones are invert, colour limit (which works like a photographic filter), and colour add.

The presets rollup is in effect a macro library. You can choose from the existing effects or create your own using the record facility. The presets include a variety of bars, buttons, 3D extrusions, metallic effects and, in true Corel style, much more. Using a combination of the symbols and the presets rollup you can very quickly create stunning 3D graphics.

To complain that there is too much to CorelDraw might sound churlish; after all, you can always ignore what you don't need and most people want as much as they can get for their money. The problem is that the more features you pack into a piece of software, the more difficult it becomes to keep the interface simple, elegant, and usable. Many software publishers from Apple and Microsoft to Quark and Adobe are discovering this and circumventing the problem either with plug-ins, or by adopting an entirely new approach to applications and how we use them. If Corel doesn't watch out, its reputation for producing feature filled software could backfire.



The lenses rollup lets you create transparent and filter-type effects with overlapping objects

PCW Details

CorelDraw 5

Contact Corel Corporation

0101 613 728 8200 (Canada)

Price SP £385, CD £299, v4-v5 upgrade £121

Good Points Corel is the de facto standard for PC draw software. Lots of users, hence lots of support. It's also very good with the most comprehensive features and extras.

Bad Points Has been criticised in the past for being bug-bound. Not easy to work with proprietary colour system palettes.

Conclusion Best value for money deal going. You'll not want for anything else.

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Gold Disk Professional Draw

Although it has not undergone a major revision in more than two years, Gold Disk Professional Draw shows remarkably few signs of its age. There's the lack of OLE2 support, of course, but it has a comprehensive array of tools and such a powerful interface that you can probably live without the frills.

For a start you'll have to live with an 11-disk install because there's no CD-ROM version. The full install copies the application, 150 PostScript Type 1 fonts, 1,000 pieces of clip art and some sample images. You can probably also do without the clip art collection that time forgot, in which case the custom install will require around 10Mb of your hard disk space. Minimum system requirements are a 386 with 2Mb RAM running Windows 3.0.

The draw window adopts the familiar configuration with toolbox permanently docked on the left, button bar along the top and status bars — there are three — at the bottom. The colour palette runs in a strip down the left of the draw window next to the toolbar. Professional Draw relies a lot on menus for its wide range of features, most of which have keyboard shortcuts.

As far as the draw side of it goes, Gold Disk has not left anything out. What distinguishes Gold Disk's offering is not so

much what it does, but the way that it does it. There are more alternative methods of drawing the same objects than the average user is ever likely to need and in this respect it closely parallels Micrograf Designer 4.1 TE. You get the feeling that only someone who did nothing else but draw circles, squares and lines from dawn to dusk could have thought some of these tools up. In that sense you could say the "Professional" tag is well justified.

The toolbox is a nine-button affair housing pointer, rectangle, marquee text, Bézier, line, rectangle, ellipse, arc and 90 degree line tools. It doesn't sound like much, even when you add the few extra pop-outs provided by some tools. When you click with the right mouse button, however, most of the tools present a further set of "method" options.

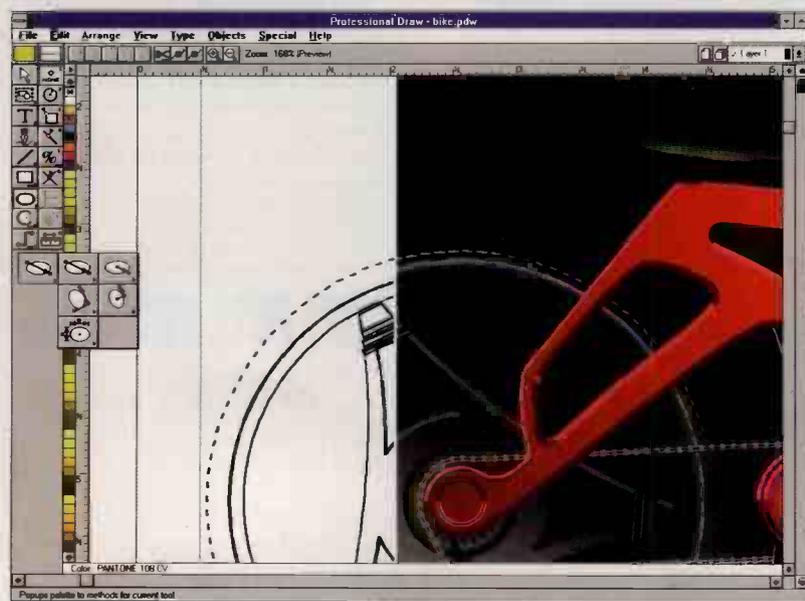
The circle/ellipse tool, for example, provides four method buttons. Selecting any one of them sets the default method for drawing ellipses. You can do it the usual way, dragging the diameter, by dragging the radius from the centre, clicking three points on the circumference or specifying dimensions in a dialogue box. For some reason there is a circle as well as an ellipse tool even though when using the ellipse tool you can constrain yourself to a circle by holding down the shift key. Having two tools gives you some extra

method options, but it seems a little excessive all the same. The line tool pops out to reveal irregular and regular polygons and a star tool which I would have expected to find under the rectangle tool, but once you know where they are it's not a problem. There's also a handy gratings tool which draws a box filled with regularly spaced horizontal and/or vertical lines.

Drawing method is not the only thing over which you can exercise a high degree of control. Secondary tool mutation is made possible by a suite of modifiers. These can be accessed via a modifiers palette which appears next to the toolbox or, more easily, via keyboard shortcuts. Modifiers allow you snap to certain parts of existing objects. Options include snap to centre, edge, perimeter and intersection. You can constrain your tool, if that's not too painful a metaphor, to draw perpendicular, parallel, or at a tangent to existing paths. When you get close enough to the selected point a pink spot appears to let you know the tool is within snapping distance. With no modifier selected, when you get within snapping distance of a point it flashes and the tool cursor changes to an outline pointer. All this makes life very much easier for accurate drawing and positioning of objects and saves having to continuously zoom in to high degrees of magnification to make sure things are exactly where they should be.

One user described Professional Draw as a good package that was going nowhere. An upgrade certainly wouldn't do it any harm, if only to persuade potential as well as existing users that there is a future for it. Gold Disk says that version 2 is under development, but until they come up with a planned release date or at least a list of new features, that claim is bound to be treated with some scepticism.

Gold Disk Professional Draw



You can show the modifiers palette next to the toolbox, though they are keyboard selectable. There are four different methods of drawing an ellipse

PCW Details

Gold Disk Professional Draw

Contact Gold Disk 01734 814230

Price RRP £139.99, SP £59

Good Points Good range of highly versatile tools.

Bad Points Two years old, no upgrade yet announced, future uncertain.

Conclusion Wait and see.

A new generation of graphics software

Drawing and illustration programs are one of the most popular types of software in use, but many have the reputation of being slow and tedious to use. Anyone who has ever manipulated even a slightly complex picture in any of the current drawing programs will be painfully aware of just how much time can be wasted waiting for basic editing operations to complete or the screen to redraw. This is **your** time it's wasting.

But **Xara Studio** offers not just one significant new advance over the state of the art, but half a dozen major new developments, any one of which would make **Xara Studio** stand out from the crowd.

For example, **Xara Studio** is the only drawing program in the world that offers fast **real-time anti-aliasing**. This is a technique for improving the quality of computer graphics by eliminating the rough 'jaggy' edges that so typify computer screen displays. It offers 'smart blends' where all the intermediate steps in a 'tweened' or blended object **require no memory**. So, if your illustration requires a complex blend of say 100 intermediate steps, **Xara Studio** can do this and use only 1% of the memory required by other programs.

For example, a typical illustration such as the CorelDraw 'Snowbarn' will usually take 40 seconds or more to display on even the most powerful PC now available. So imagine a program that is not just twice, or even three times as fast, but one that is **twenty times as fast**. In other words it can display a picture such as the Snowbarn in just 2 seconds. This sort of performance gain is beyond anything you can achieve by just upgrading your computer.

XARA Studio

TO BE LAUNCHED AT:



Windows™ 95
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OLYMPIA 28th FEB to 3rd MARCH 1995

Xara Studio is the only drawing program to support full object transparency, including graduated transparency. It includes comprehensive bitmap support, including transparency controls, allowing **layered bitmap compositions** to be created with click-drag ease. Oh, and it's file compatible (import and export) with the popular graphics programs so your existing graphics can still be used.

Xara Studio is a brand new, designed from scratch, **32-bit drawing and illustration program**. It carries none of the baggage of older 16-bit software and has been designed with the sole aim of providing PC owners with a new generation of graphics capabilities, performance and ease of use.

Which could go on about the many other great new features of **Xara Studio**, but why not come and **see it for yourself?** Its first public showing will be at the **Windows Show at Olympia on February the 28th to 3rd March on stand 358.**

Xara Limited Gaddesden Place, Hemel Hempstead, Herts, HP2 6EX
Tel: 01442 350000 Fax: 01442 231632 Email: Info@Xara.co.uk

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Xara is part of the Computer Concepts Group, UK software developers for 15 years. Xara Studio has been developed and previewed under the Camelot name.

GST Designworks

GST is a British software company that specialises in DTP software for the home and small office (SoHo) market. It is probably best known for GST Pressworks, formerly Timeworks Publisher, and its super budget DTP package, 1st Press.

Perhaps surprisingly for a such a low-priced piece of software, Designworks is supplied on a CD-ROM. Perhaps not, when you consider that CD is a cheaper and more convenient medium for suppliers as well as consumers of software, and has the bonus of being able to include large clip art libraries and sundry other goodies of questionable value.

Install options are the program itself, sample and tutorial files, clip art library and browser, a couple of utilities, a Photo-CD browser, and fonts. The install program creates a Windows program group with all the relevant icons.

The first sight of the Draw window and interface is always a good guide to the merits of a program's overall design. If you find your eyes wandering round from one indecipherable button to the next wondering where to start, it's not a good sign. With Designworks just the opposite is the case. A six-button tool area on the left of the screen houses big, bright, well designed buttons with text labels underneath to tell you what they are: a pointer, text, box, scale tool and magnifier.

The context sensitive button bar along the top accommodates smaller but equally recognisable symbols. If you need more work space you can drag the tool-box or button bar onto the draw window and they become floating palettes. When you click in the small black triangle to the side of the box tool you discover seven other polygon tools, and when any of these is selected it takes its place on the toolbar in place of the default. The scale tool thus reveals itself to be a general purpose transformer with rotate, skew and reflect functions and the magnifier doubles up as an autotracer.

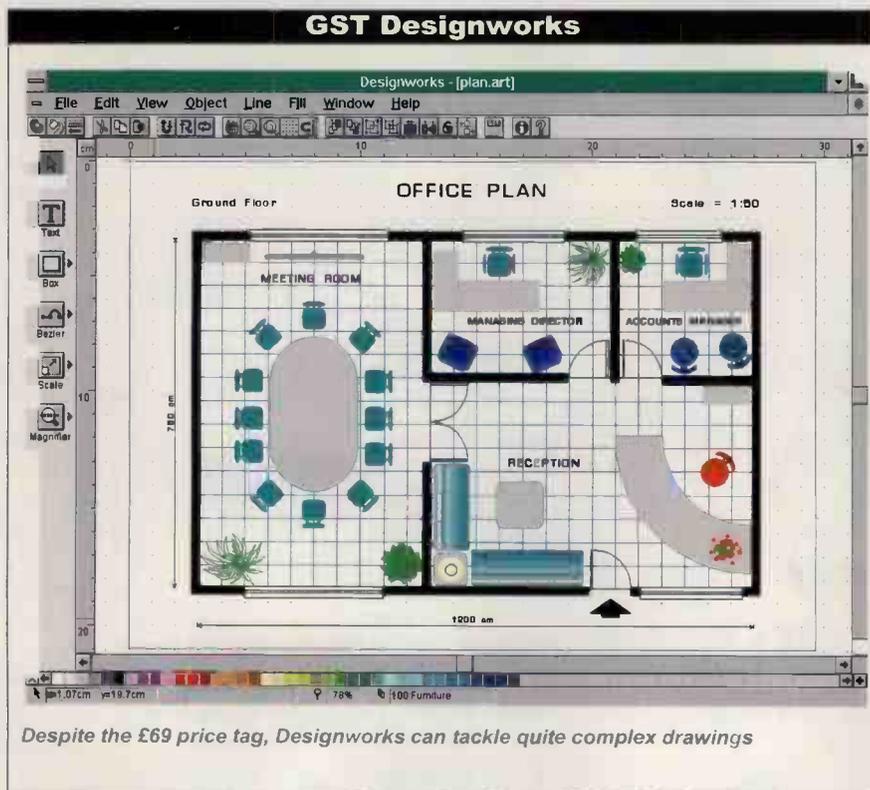
The Pencil tool in default mode is a freeform drawing tool: you scribble, it converts to a Bézier path. Open it up and you discover a very Freehand-like Bézier tool triad for the creation of corner, curve and connector points. Unlike its Freehand equivalent, which let's not forget costs several hundred pounds more, there didn't appear to be any way of creating connector points. Holding the control key down constrains the draw angle and the shift key lets you alter the direction of the trailing curve by moving one control handle independent of the other. Another criticism, albeit a fairly minor one, is that when drawing curves, the lines have a slightly straight and angular appearance until you release the mouse button, which

makes it difficult to judge whether you've got a path exactly right before committing yourself. But it's nearly always necessary to go back and make minor adjustments in any case.

Colour is provided by a strip palette along the bottom of the screen just above the status and information panel. Clicking the palette button on the button bar pulls up the colours dialogue which lets you create and add additional colours to the menu. You can pick from CMYK, RGB, HLS and, another surprise in a supposedly budget package, the Pantone colour library. Yet more surprising is the fact that Designworks supports process colour separations, so you can send a file to a PostScript colour bureau for output to separated film. The print options dialogue box lets you specify values for screen angles and frequency and the four colour set or individual plates can be printed to a PostScript file for output by a bureau.

Designworks has lots of other features you would expect to find in more expensive packages. A broad range of fills includes radial, spherical, cylindrical and linear gradations and its blend tool lets you achieve more subtle tonal gradations. It's OLE2 compatible so you can drag and drop objects between open Designworks documents and carry out in-place editing of design objects in other OLE2 supportive applications.

The documentation is provided in two concise manuals, a quick start guide and user's guide, and there is a well thought out and put together Windows help file. You shouldn't really need them, though. The program works well on an intuitive level and I got through most things by trying what seemed right and getting the expected result. Another winner from GST.



Despite the £69 price tag, Designworks can tackle quite complex drawings

PCW Details

GST Designworks

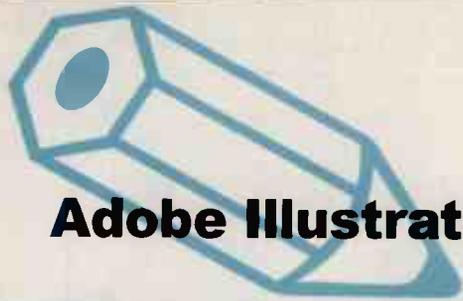
Contact GST Software 01480 496789

Price SP £69

Good Points Everything about it. Has all the really important bits, none of the unnecessary extras. Some things, like colour separation, you have no right to expect in a budget package.

Bad Points None.

Conclusion There's nothing to touch it for less than £100.



Adobe Illustrator 5.5

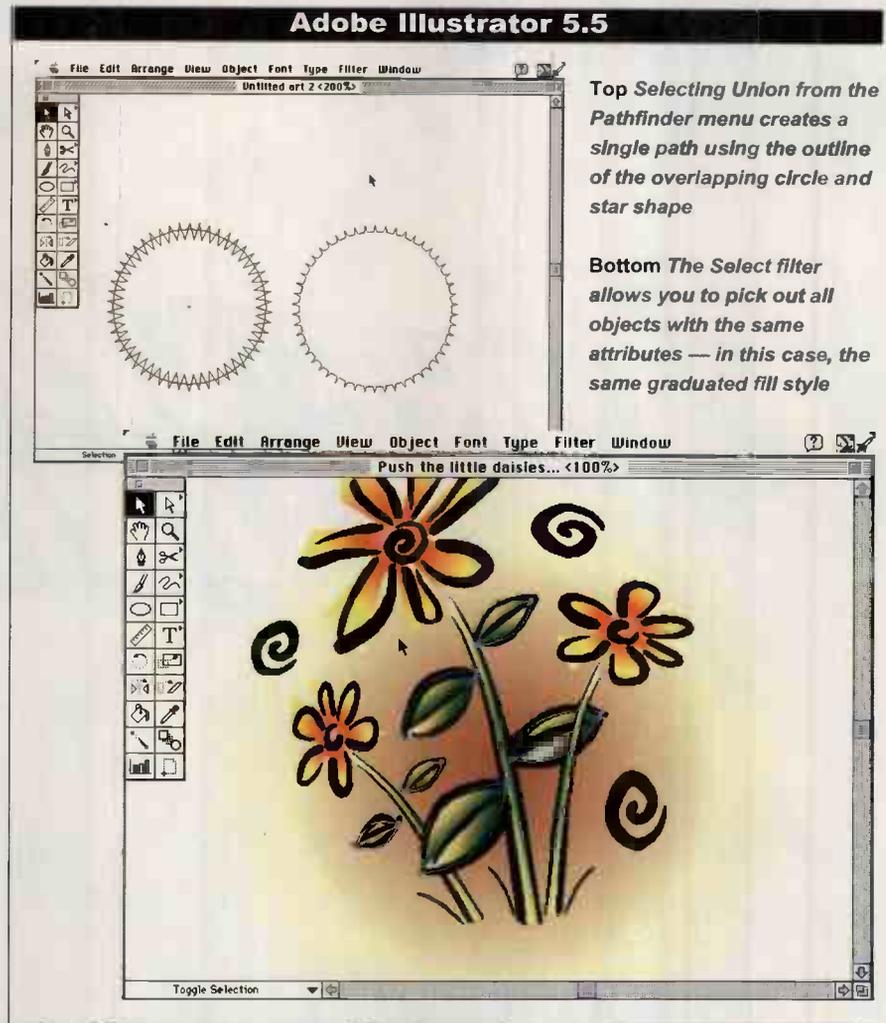
Before Adobe Illustrator arrived on the scene in 1987, producing illustrations on the Mac was a crude business conducted with the aid of packages like MacDraw and CricketDraw. MacDraw was at least free; with CricketDraw you paid for the privilege of producing primitive rectangles, ellipses and lines in black and white. Illustrator changed all that with the introduction of Bézier curves that made possible the drawing of complex shapes like antelopes.

The intervening years have seen a battle for dominance in the Mac market that has spurred the development of both Illustrator and its major rival, Freehand. Illustrator 5.5 is a mature product, the result of five years' development in a competitive environment, and it's getting to the stage where just about all the things one used to wish for have now been included.

Version 5.5, which was reviewed in beta in the July issue of PCW, has progressed from its predecessors on two fronts. Firstly, you can now do some things which weren't possible before, or were only possible using Freehand. Secondly, it's now possible to do many things quickly and easily that used to take all day and be a complete pain.

Both of these advances have been made possible by the adoption of plug-ins. Plug-ins are program modules which provide additional functionality, usually in the form of special filters, peripheral support, or specialised functions for niche users. Photoshop uses them extensively and they were first introduced in Illustrator 5.0. Plug-ins are good news. Software enhancements or additions become available, often from third party publishers, in between version upgrades. Specialist applications can be catered for without burdening other users with the additional code overhead and the core program can be kept to a minimum, reducing system requirements and keeping applications as simple as possible.

Illustrator 5.5 has made extensive use of plug-ins to provide extra features. Unfortunately, in some instances the convenience of plug-ins has fostered a "more the merrier" approach. Why, for example, was it thought necessary to include a whole host of text editing filters? If I want to check spelling, find and replace or change fonts, I think I would probably rely on my word processor. Although Illustrator now has the wherewithal to cope with



Top Selecting Union from the Pathfinder menu creates a single path using the outline of the overlapping circle and star shape

Bottom The Select filter allows you to pick out all objects with the same attributes — in this case, the same graduated fill style

complicated multicolumn layout, I don't think people are going to throw out their copies of XPress, PageMaker or whatever and start producing these kinds of jobs using Illustrator just because it now has a spell checker. To be fair, the inclusion of comprehensive text editing facilities in draw packages has been a widespread development. Redundancy of a different kind is offered by the distort filters. These provide you with an opportunity to turn your work into something unrecognisable by applying mathematical transformations to objects. You can thus turn geometric shapes into spiky or bloated versions of their former selves, or go even further. The twirl, scribble and roughen filter will turn the most accomplished drawing into an indescribable mess. Oddly, there doesn't appear to be an indescribable mess filter.

That's the bad news on filters; fortunately there's lots of good news. Many of the Illustrator filters would be more accurately described as macros. Rather than

altering existing shapes they perform a series of operations, usually to create new shapes or make selections. The create filters, for example, can be used to produce simple polygons, spirals, stars and trim marks. It takes about five minutes to create a five-pointed star and if I had a pound for every time I'd spent five minutes adding trims to a piece of artwork, I'd use it to buy a copy of Illustrator 5.5 for this one feature alone.

Even better news are the pathfinder filters. These allow you to combine, divide and crop existing paths to produce new ones. Suppose, for example, you wanted to create a cog shape. You just draw a circle, draw a multipointed star shape over the top, apply the unite filter and you have a single path cog shape. Why not just draw the circle and star and leave it at that? Well, all sorts of reasons: you might just want a stroked path with no internal lines, you might want to use a graduated fill, or you might want to use the shape as a transparent window in a



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larger object. The intersect filter does the same thing in reverse, tracing the outline of overlapping areas. The entire suite of pathfinder filters including back minus front, front minus back, divide fill and divide stroke, enable you to make just about any composite path you are likely to need. The mix hard and soft filters mix overlapping colours, in the first instance to simulate overprinting of colours and in the second to give a semi-transparent effect.

The select filters are the graphics equivalent of find attributes in word processing and DTP software and are designed to overcome the following problem. You spend three days producing a complicated illustration, say a technical drawing in which different components, hundreds of them, are colour coded. When the colour proof comes back from the client they love it, but they want all the bits outlined blue changed to green and all the green bits changed to blue, all the blue outlined parts with a yellow fill need to have a purple fill and the grey fill on the orange outline components is too dark, while the orange outline is too bright and needs to be toned down a bit. Previously the two options open to you were to spend another three days selecting and changing as requested or a similar amount of time talking the client out of it. Now you can select on the basis of same fill colour, same stroke colour, same stroke weight, or same paint style (fill and stroke attributes). There's even a filter to round up and delete all those stray points you created inadvertently.

Aside from the mistake of trying to turn Illustrator into a word processing package, the text handling tools have been further improved. There is every text feature you would expect from a drawing package that allows you to edit your own hyphenation dictionary in no less than twelve languages. Things like text along a path, within and around objects are now considered standard fare, but Illustrator handles letter and word spacing very well when these options are selected, minimising the tweaking necessary to achieve a visually acceptable result. Some initiative is occasionally required. To set text above and below a circle for example you need two circles one on top of the other because you can't set two bits of type on the one circle as you can in Freehand. Most of the type attributes can be adjusted in infinitesimally small increments. You can, for example, track and kern in units of 1/1000 of an em space, lead in 1/100pt

increments. You can baseline shift, horizontal scale, paragraph indent, hanging indent, space before paragraphs and otherwise manipulate text to your heart's content. And if you're still not satisfied you can convert text to path outlines (providing you are using a Type 1 or TrueType font) that you can manipulate like any other object.

The Illustrator documentation treats the subject of prepress preparation and colour output with the thoroughness it deserves. Too many colour draw packages either ignore it altogether or nervously assure the hapless user it's so simple a four-year-old could do it. The truth is that preparing any electronic document for spot or four colour process printing is fraught with more danger and pitfalls than your average Indiana Jones. At least if the documentation tells you what needs to be done and how to do it, the only thing you need to worry about is your own mistakes.

In Illustrator there are two ways to trap colours. You can either do it manually, or use the trap filter. Manual trapping could be time consuming, but providing you do it properly and don't accidentally miss anything out, it is the safest method. Manual trap is applied by creating an overprinting stroke on all foreground objects that knock out their backgrounds, i.e. do not overprint. The degree of trap is determined by the width of the stroke, hence for a 0.5pt trap you would create a 1pt overprinting stroke as Illustrator strokes paths from the centre out. For a spread trap the stroke is set to the foreground colour, choke is created by selecting the background colour for the stroke. Lines are a little less straightforward. You need to duplicate the line on top of itself, make it slightly larger and set to overprint. This is the method recommended by most other packages that support colour separations including Freehand and CorelDraw. Manual trapping is not difficult, just boring, fiddly and time consuming.

For some reason there's no mention of the trap filter in either the User Guide or the animated guide to trapping, though you will find it explained in the 427-page 5Mb Acrobat pdf file which serves as an online guide. "...it is not intended to be used with highly complex artwork" it says here, by which it means anything with gradients, patterns, placed objects or strokes. This is a shame, because it's precisely these kinds of jobs where you'd most like to be relieved of the tedium of having to do the job yourself. There are,

it seems, still limits to what can be achieved in software. Maybe next time.

Most people use software like Illustrator to produce artwork which is then imported into a page make-up package such as Quark XPress or Aldus PageMaker. If you do this you won't need to worry about colour separation because the page make-up software will handle it, though you will still need to take care of all that trapping. If the Illustrator file is the end of the electronic line, however, and you want to produce something that a commercial printer won't get snuffy about, you will need to use the Adobe separator program to produce four colour process or spot colour plates. Adobe Separator is intended to provide a full range of options and a wide range of flexibility for prepress four colour output. If your knowledge of this end of the process is limited, you might be better off leaving it to your bureau to sort out. If, on the other hand, you have a good idea of what you're doing and what you want, Separator will allow you to specify everything from the output device PPD (PostScript Printer Description) to the amount of bleed. There is also a lot of in between stuff including halftone screen values, emulsion side, neg or pos image, transfer function, and where the crop marks, targets and colour bars go. You can even create your own test strip if the default isn't good enough for you.

Illustrator is one of those packages that defies you to invent a job it can't handle. It has reached that mature stage of development where it can do most things asked of it, and do them very well. Adobe is working hard to create links between Illustrator and its other electronic publishing products — Photoshop and Acrobat — that will make it very difficult for competitors to offer an equivalent level of functionality and connectivity.

PCW Details

Adobe Illustrator 5.5

Contact Adobe 0181 547 1900

Price SP £279

Good Points Very versatile: if you can't do it in Illustrator, you probably can't do it. Good tutorial and online help.

Bad Points Overburdened with unnecessary gizmos like distort filters and "everything you wanted to do with text but used a word processor for" functions.

Conclusion For professional use only and with a steep learning curve attached, but if you're good enough for Illustrator it will be good enough for you.

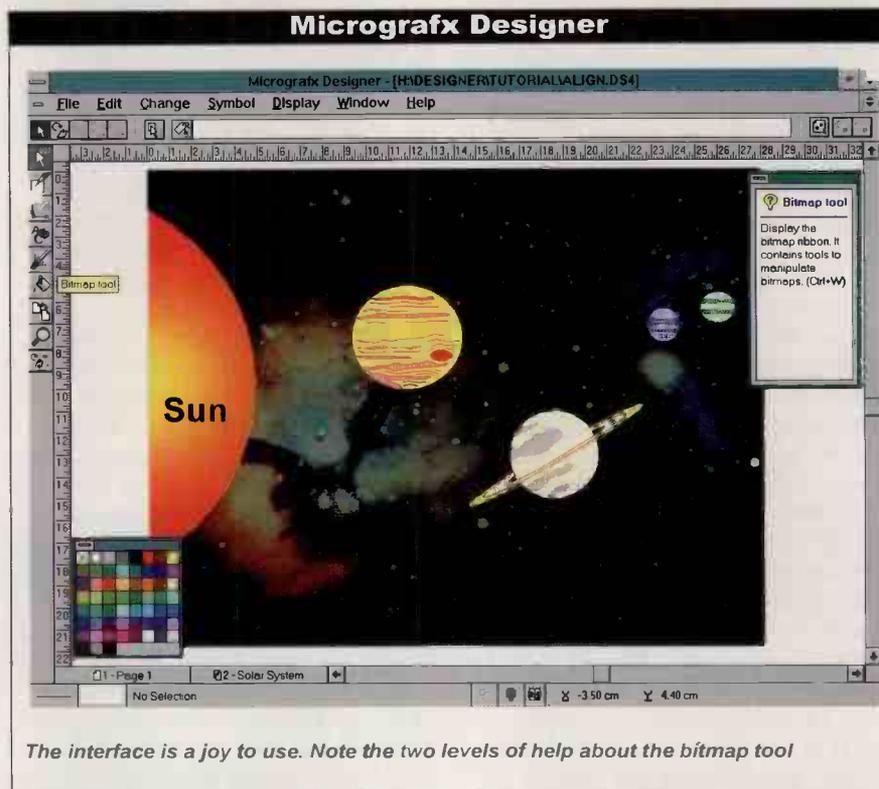
Micrografx Designer 4.1 Technical Edition

Designer 4.1 TE is a major revision of version 4.0. Micrografx is attempting to corner the technical illustration market, which it sees as pretty much virgin territory. Micrografx also markets Windows Draw, a budget package aimed at the home and small office market which offers a basic Bézier drawing environment together with a small (hundreds) clip art library and twelve TrueType fonts.

New tools apart, the major differences in 4.1 TE are in speed and the addition of new export filters for CAD users. The speed improvement has been brought about by the omission of the 3D code from version 4.0, and 3.1's keyboard shortcuts, absent from v4.0, have returned. The software is supplied on CD-ROM and floppies. The diskettes include 64 TrueType fonts, 1,000 clip art symbols and some sample files. CD-ROM users get more than 280 fonts in both TrueType and Type 1 formats and a 13,000 item clip art library which includes 500 technical symbols. You probably don't want to know, but I have to tell you it also contains no fewer than 14 toilets, 7 urinals and 4 water closets. The CD also contains an online tutorial with commentary soundtrack. The full install requires 56Mb free disk space, or you can opt for a minimum install of only 20Mb.

As the name suggests, this package is aimed at technical illustrators. It's geared to the needs of those who produce machine drawings, cutaways, architectural plans and technical illustrations of any kind. Having said that, the fact that Micrografx have aimed for a niche market shouldn't discourage those who are looking for an all-round design and illustration tool. This is an accomplished and versatile piece of software.

The interface is a joy to use. Elegantly designed context sensitive toolboxes, button bars, status panels, floating palettes, dialogue boxes and mouse menus work together to help you achieve results quickly and easily. There are only eight tools in the toolbox, but each one displays its own button bar along the top of the document window. When the draw tool is selected the appropriate button bar is displayed. The selection of one of the first five buttons configures the remainder of the button bar. The five options are simple and compound lines, rectangle, polygon and ellipse. If you select the compound line tool an additional six



The interface is a joy to use. Note the two levels of help about the bitmap tool

buttons appear, providing tools for straight line paths, freeform drawing, irregular polygons and no less than three methods for drawing curved paths. Traditionalists will go straight for the Bézier curve tool, but, while powerful, for the novice this can be a difficult tool to get to grips with. So in the meantime you can experiment with either the B-spline or parabolic spline tool.

Likewise, selecting the ellipse tool produces a six-button extension. How many ways can you draw an ellipse? Only four, as it happens. The fifth tool allows you to quickly draw arcs, the sixth is an ingenious device for splitting ellipses into pie segments. Is this gilding the lily? I think not. Particularly in technical illustration you often need to do the same thing half a dozen different ways. To be able to draw circles by dragging to the diagonals of a bounding box, or dragging the diameter, or dragging the height then width, or by specifying three circumference points, can save a lot of time if you are producing new elements relative to existing ones.

Line and fill styles are accessed from the style tool which, like all the tools, activates its associated style button bar. This one contains sample swatch windows, and pull-down menus too. From here you can set line styles, widths and ends, and

fill with flat colour from user-defined palettes (no proprietary ones supplied), gradients, hatch, bitmap and symbol fills.

Although Designer's features list is extensive, it's more impressive for the way it manages to accommodate so many things without seeming overburdened with gizmos and intimidatingly difficult to use. This is all down to the excellent design of the interface. Enhancements in this area have made for a real improvement in the program's usability. You can achieve quite a lot using just the mouse. Designer's interface is one of the best you're likely to see in any Windows 3.1 application. Even after a short period of time you find yourself carrying out what could be tricky operations with consummate ease.

PCW Details

Micrografx Designer 4.1 TE

Contact Micrografx 0800 626009

Price RRP £375, SP £270

Good Points Lovely interface, good range of tools for technical applications.

Bad Points No colour separation.

Conclusion Others offer as good a range of tools for technical drawing, none bring them together in such an easy to use way.

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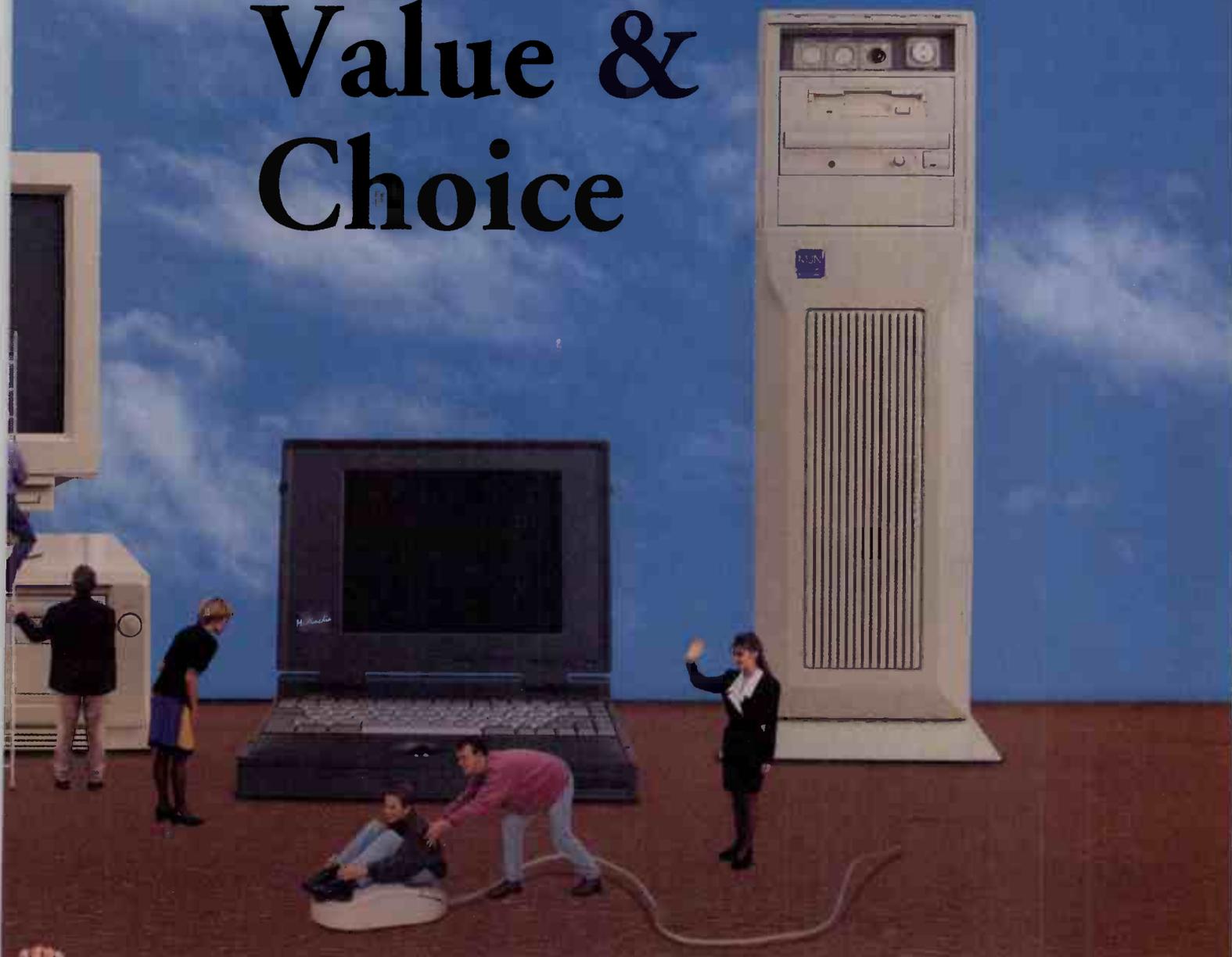
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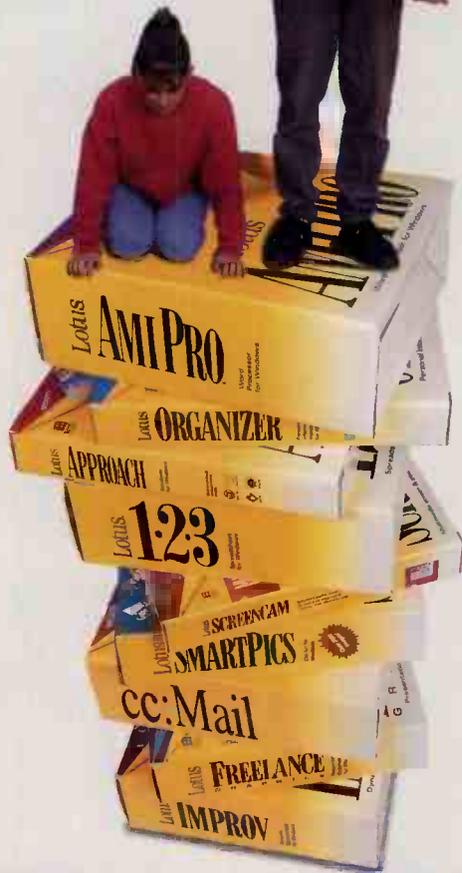
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- VLB Accelerated Graphics w/1Mb
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- Stylish Desktop Case
- Enhanced 102 keyboard & Mouse
- MS-DOS 6.22 & WFWG 3.11
- Lotus Windows Software Packages
- 1-2-3 ● Freelance Graphics
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- Improv ● Organizer
- SmartPics ● ScreenCam
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- Stylish Desktop Case (Tower Option)
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- Lotus Windows Software Packages
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- Double Speed CD-ROM Drive
- PCI Local Bus IDE Interface
- PCI Diamond Stealth Accelerated Graphics with 2MB Video RAM
- 15" ProScan MPRII SVGA 1024 x 768 Colour Monitor
- Stylish Desktop Case (Tower Option)
- Enhanced 102 keyboard & Mouse
- MS-DOS 6.22 & WFWG 3.11
- Lotus Windows Software Packages
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- PCI Local Bus IDE Interface
- PCI Diamond Stealth Accelerated Graphics with 2MB Video RAM
- 15" ProScan MPRII SVGA 1024 x 768 Colour Monitor
- Stylish Desktop Case (Tower Option)
- Enhanced 102 keyboard & Mouse
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P-100P/CDT

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- Double Speed CD-ROM Drive
- PCI Local Bus IDE Interface
- PCI Diamond Stealth Accelerated Graphics with 2MB Video RAM
- 15" ProScan MPRII SVGA 1024 x 768 Colour Monitor
- Stylish Desktop Case (Tower Option)
- Enhanced 102 keyboard & Mouse
- MS-DOS 6.22 & WFWG 3.11
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- 1-2-3 ● Organizer
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- Dimensions: 11x8.5x1.8 inches
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- MS-DOS 6.22, Windows 3.1 & Mouse
- AutoRoute Express for Windows
- Lotus Windows Software Packages
- 1-2-3 ● Organizer
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- SmartPics

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- Removable 260MB IDE Disk
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- Built-in Stereo Speakers
- VESA Local Bus Graphics w/512K
- 9.4" VGA Dual-Scan Colour LCD
- High Quality Carrying Case
- Built-in 25mm Trackball
- Dim: 11.5x8x1.9 inches, 6.2lbs
- MS-DOS 6.22, Windows 3.1 & Mouse
- AutoRoute Express for Windows
- Lotus Windows Software Packages
- 1-2-3 ● Organizer
- Ami Pro ● Approach
- SmartPics

£1499

Powerlite 4DX4-75/C

- Intel 75MHz 486/DX4 Processor
- 8MB RAM, Exp. to 32MB
- Removable 1.44MB 3.5" FDD
- Removable 500MB IDE Disk
- 2 PCMCIA Type II Slots
- Built-in Stereo Speakers
- VESA Local Bus Graphics w/1MB
- 9.4" VGA Dual-Scan Colour LCD
- High Quality Carrying Case
- Built-in 25mm Trackball
- Dim: 11.5x8x1.9 inches, 6.2lbs
- MS-DOS 6.22, Windows 3.1 & Mouse
- AutoRoute Express for Windows
- Lotus Windows Software Packages
- 1-2-3 ● Organizer
- Ami Pro ● Approach
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Adobe Streamline

It's often the case that you need to include bitmap images in your vector artwork. A company logo or a piece of line art, for example, that's been scanned in. Most packages allow you to place these images as TIFF or EPS bitmaps in your document, but this isn't an ideal solution. Firstly, you sacrifice the resolution independence of your document: the placed bitmap will deteriorate if you increase the size of the image itself or the entire document when it's printed. But a more important consideration is that you cannot edit bitmap images other than to rescale them.

One solution is to use the trace option found in most of the packages reviewed here. The trace tool is a useful starting point for converting bitmaps to vector graphics, but their results depend very much on the type and quality of the original which usually has to be a line image. More often than not you'll have a lot of cleaning up to do afterwards.

Adobe Streamline is a standalone alternative to the trace tool. It takes bitmap graphics of virtually any description — line art, greyscale or colour images — that can be traced to provide a file that you can open and edit in Illustrator, Freehand, or any other package that can import PICT or DFX files. It will convert TIFF, PICT, PCX, MacPaint, and

Photoshop 2 and 2.5 files.

The secret of Streamline's success is in its flexibility. It offers a number of different ways of converting bitmaps and a whole host of parameters can be individually tweaked to get the best results from different kinds of image. There are two fundamental methods for tracing, outline and centreline. The first treats image areas as shapes and traces around them. A 3pt circle would be translated as a black filled circle with a white filled circle of 3pt smaller diameter on top. The centreline method would convert the same image with a 3pt black rule. The centreline method is recommended for technical illustrations, blueprints and forms, where there are no filled areas and line weights tend to be uniform. The outline method covers everything else. Of course few images fall neatly into one category or the other, most contain both lines and filled areas, so you can use a combination of the two methods where necessary.

The conversion method and other options are selected from the conversion options dialogue box. You can set the noise suppression factor to ignore stray pixels that scanners tend to pick up even on virgin white areas of your original. Line thinning determines how accurately the centreline method follows the path of lines with variable thickness. The Tolerance

setting allows you to adjust how closely the program converts straight and curved line paths: it's often not the case that you want to capture every squiggle and dent in an outline so you can loosen the tolerance to create a smoother contour.

Curved and straight line options allow you to optimise line conversion for images that contain a predominance of either curved or straight lines. Most images will of course contain both, but if you are converting a plan or a schematic diagram it's worth selecting the straight line only option to avoid having to change all the circle points to corner points later.

Earlier versions of Streamline were restricted to line art bitmaps, but you can now convert greyscale and even colour images. The conversion algorithm first smooths contrasting edges to ensure you don't end up with more points than you can handle, then posterises greyscale images to 16 levels and colour ones to 256. Threshold, contrast and boost options give you further control over the level of detail rendered in the converted image. Streamline provides a basic toolbox for editing images both before and after conversion. This is more of a time-saver than anything. It's fair to assume that if you're using Streamline you have powerful editing tools already available at both ends of the process. All the same, it's handy once you've opened an image for conversion, to be able to do a little tidying up without having to close the file, switch to Photoshop, open the image, edit, save, and reopen in Streamline.

Streamline works on two fronts. It's a lifesaver if you need to quickly convert simple bitmaps to line art and you don't have the time to do it manually, and it can produce stunning results from greyscale and colour images as a basis for the creation of PostScript illustrations.

If you are a professional user of Freehand or Illustrator, you really can't afford to do without a copy of Streamline. For anyone else it's less of a necessity, but you still ought to have it.

Adobe Streamline



Although not a drawing package, Streamline is the essential add-on for professional users

PCW Details

Adobe Streamline

Contact Adobe 0181 547 1900

Price £160 + VAT

Good Points The ultimate timesaver.

Bad Points Some images require careful tweaking of the setup options to get good results. Several attempts may be necessary.

Conclusion The only way to do it.

Case Studies: The Software In Use

Illustrator 5.5: Concept DTP

Wilson Hynd works for London PostScript bureau, Concept DTP. As well as the usual bureau services — film and bromide output from high resolution imagesetters, slide imaging, high resolution scanning and digital colour proofing — Concept provides design and production services for its clients.

Concept needs current versions of all the packages its clients might use to produce artwork before sending it to them for output. So when it comes to originating work in-house, Hynd can afford to be choosy about which software he uses. For graphics work he chooses Illustrator over Freehand every time. "I was put off by the fact that in earlier versions of Freehand there were four pen tools, none of which was as efficient or precise as Illustrator's one pen tool," he says.

The current version of Illustrator, he agrees, has many features he could easily live without. Is there anything he would like to see that's missing, a plug-in he would die for? "Apart from the 'do the whole thing automatically and print it' filter, which would be nice, not really. I tend to use only the Objects and Pathfinder sub-menus. Most other filters are virtually useless as far as I'm concerned.

"From a bureau standpoint Illustrator is more flexible. Before version 4 you couldn't open Freehand EPS files to edit them. If there was a problem we would have to phone the client and get them to send either the original Freehand file or an updated EPS. Freehand gradients very often step and that appears to be less of a problem with Illustrator. In fact, there's only one common PostScript error we get when outputting Illustrator files and that's the Limitcheck which occurs when there are too many points on a path."

As someone who uses both Illustrator and Freehand on a daily basis Hynd is in no doubt about his preference. "At the end of the day, Illustrator is much simpler in operation with less chance of operator error," he says. Which is all very well; but what if you do your best work in the morning?

Freehand 4.0: Artworkers

Artworkers is a partnership of nine designers working from premises in Clerkenwell, London, an area traditionally associated with the design and prepress industry. Set up more than ten years ago, the partnership, whose current client list includes

companies such as the BBC and Gillette as well as the TUC, started the move from traditional paste-up artworking methods to all electronic Mac-based production in the late eighties. Each of the partners works from their own Mac and all of them can make use of shared resources like laser printing and high resolution scanning facilities.

Most of the designers at Artworkers use Aldus Freehand in preference to Illustrator. Partner Sophie Gibson admits that this is probably due as much to inertia than the respective capabilities of the two packages. "We started using Freehand because at the time we felt it was the better of the two options, the other, of course, being Illustrator. Although I've heard it said that Illustrator 5.5 is now a more powerful package, the cost in terms of retraining and working through a familiarisation period would, I think, be prohibitive."

Besides, Artworkers are impressed with the new features of Freehand 4. Pete Hammarling uses it to produce logos and other graphic elements that he then incorporates as EPS files in Quark XPress layouts. "It's nice to have precise mathematical control over what you're doing and Freehand allows you to specify all parameters numerically as well as just by making visual adjustments to control points. The best new feature as far as I am concerned, though, is the path operations menu. This makes producing complicated paths and layered effects much much easier and saves hours of messing around."

If there was one feature above all others for which they would rate Freehand? The general consensus at Artworkers was that Freehand's colour facilities and the

ease with which it's possible to create spot and process colour separations made it an obvious choice for professional designers.

CorelDraw 5: ABC

ABC started life in the early eighties as a 35mm slide production company, producing their own stuff and providing a bureau service for Lotus Freelance and Harvard Graphics users. Then desktop publishing came along and with the addition of a high resolution imagesetter they became a more conventional PostScript bureau. That's about as far as convention got them because what's unusual about ABC is that their operation is largely PC based.

As well as providing a bureau service for users of CorelDraw and other Windows DTP and graphics software, ABC produce their own work on behalf of clients. They use CorelDraw for the production of 35mm slides, OHPs packaging and exhibition display boards among other things.

"As a user, the things about Corel that appeal most to me are its ease of use and the comprehensive list of tools and features," says ABC's Nigel Gibb. "As a bureau, its excellent selection of import/export filters and the fact that it offers very good prepress control of output make it ideal in a professional environment."

Gibb is, however, less than complimentary of Corel's handling of the program's development over the last two releases. "Corel has always had a good lead over Illustrator and Freehand. I'm not sure why they have adopted this policy of releasing a new version every year. Since version 3 it's taken them approximately three attempts to sort out some basic problems. If Corel aren't careful they'll end up alienating people. All the Corel users I know say that if they had just cleaned up CorelDraw 4, that would have been enough."

Gibb is clearly no lover of shovelware. "I think that the inclusion of things like PhotoPaint, Chart and Move, none of which are up to the standard of Draw, detract from the strength of the package," he says, though I doubt whether many would agree with him on that one. Six packages for the price of one is excellent value whichever way you look at it, and will be a big customer winner for Corel in the Small office/Home office (SoHo) market.



Key
F fax
S6.07 System 6.07
S7 System 7
W Windows
III Illustrator
f font
nvs no version specified
fds free disk space
upg V4-V5 CD upgrade
MdP MacDraw Pro upgrade
cai Clip art images
pCDi photo CD images
V5 Ventura 5
Pp5 Photopaint 5
C5 Chart 5
M5 Move 5
Sh5 Show 5

TABLE OF FEATURES

Product	Adobe Illustrator 5.5	Macromedia Freehand 4.0	CorelDraw 5.0	Micrografx Designer 4.1 TE
Supplier	Adobe	Macromedia	Corel Corporation	Micrografx
Telephone	01815471900 fx 0818137301	01344 761111	0101 613 728 8200 (Canada)	0800 626009
Price	SP £279	SP £269	SP £385, CD £299 V4-V5 CD upg. £121	RRP £375 SP £270
Min system requirements	68020 Mac, 3.1Mb RAM, S6.07 with 32-bit QuickDraw	MacII, S6.0.7, 4Mb RAM 6Mb free disk space	386, 8Mb RAM, W 3.1	386 with maths coprocessor, 8Mb RAM, 10Mb HD space, W* 3.1
Rec system requirements	68030 or 040 Mac with 8Mb Ram running S7 or higher	IIci or better, P'bk or Quadra S7, 8Mb RAM 120Mb HD	486, 16Mb RAM, CD-ROM	486 DX, 16Mb Ram, 25Mb HD space
Platforms	Mac, PowerMac, W 4.0	Mac, Windows	Windows	Windows
CD-ROM	Yes	No	Yes	Yes
Multiple pages	Yes	Yes	Yes	Yes
OLE2 support	n/a	n/a	Yes	Yes
Layers	Yes	Yes	Yes	Yes
Online help	Acrobat .pdf file	Yes	W. Help file hint bar	W* Help, bh*, hint bar/win
Trace	Yes	Yes	Yes - Corel Trace (with OCR capability)	Yes
Blend	Yes	Yes	Yes	Yes
Graphs	Yes	No	Yes - Corel Chart 5	No
Pressure sensitive tool support	Yes	Yes	Yes - with Powerlines	No
Text on a path	Yes	Yes	Yes	Yes
Convert text to paths	Yes	Yes	Yes	Yes
Columns	Yes	Yes	Yes	Yes
Kerning	Yes	Yes	Yes	Yes
Colour modes	CMYK, Pantone, Toyo, Focoltone, Trumatch	CMYK, DIC, Focoltone, Pantone, Toyo, Trumatch	RGB HLS CMYK, Pantone, Trumatch, Focoltone	RGB, HLS, CMYK
Colour separation	Spot and CMYK using Adobe separator software	Spot and CMYK	Spot and CMYK	None
Import formats	MacPaint, PICT, EPS	RTF, ASCII, TIF, PICT, PICT2, III. 1.1, 3.0, 88, EPS, PAINT	BMP, G GIF, CGM, JPG, PCD, PCX, TIFF, WMF, III. 88, 1.1, 3.0, DXF, PICT, SCT, TGA, ASCII, RTF, WordStar	III* (nvs*), BMP, CDR (nvs*), CGM, CH3 and CHT, DRW, DS4, DXF, EPS, GEM, GIF, GRF, JPG, MGX, PCD, PICT, PCX, PIC, PLT, RND, RTF, TGA, TIF, TXT, WMF, WPG
Export formats	12 text export filters incl. Wp, Word, RTF, ASCII. Save as all III. formats, EPS and Acrobat PDF	RTF, ASCII, MacDraw, III. 1.1, 3.0, 88, EPS, PICT, PICT2	III* 88, 1.1, 3.0, DXF, GIF, PCX, GEM, HPGL, JPG, PICT, BMP, SCODL, CGM, TIFF, BMP, WMF, EPS, TGA,	III* (nvs*), BMP, CGM, CH3 and CHT, DRW, DS4, DXF, EPS, GEM, GIF, JPG, PICT, PCX, PLT, RTF, TGA, TIF, TXT, WMF, WPG
Extras	Ac* Distiller and Exchange, 40 fonts (220 on CD)	120 Type 1 fonts, some sample files	Ven 5, Pp* 5, Ch* 5, Mv* 5, Sh* 5, 800 fonts, 22,000 cai*, 100 PhotoCD images	60 fonts 10,000 cai* incl. 500 technical symbols.

Editor's Choice

The first thing to say is that overall the quality and level of functionality of all the products tested is extraordinarily high. Predictably, there's a great deal of difference between what you get for £70 and what you get for £400. Roughly speaking, graphics software splits down the middle. On one side are packages over £300 aimed at professional designers of one sort or another, on the other lower priced software aimed at the home or small office user with little or no design experience.

On the PC there can be no doubt that Corel is the market leader, and justifiably so. No other package gives you so much in one box. If CorelDraw 5 was second rate, this would be a clever piece of marketing, because people would be forever harping on about how much other stuff you get and would overlook it. But the fact is that on its own CorelDraw is more than a match for the competition. It has lots of fancy features which are impressive but in practice you would probably rarely, if ever, use. It also has very powerful basic draw and fill tools and a highly user configurable interface. Even the clip art, usually the butt of reviewer ridicule, is quality stuff: lots and lots of the Corel clip art is beautifully exe-

cuted full colour illustration. And lastly, the online help and introductory tutorial is not only excellent, but great fun.

Micrografx has recognised that Corel has established a daunting lead, which is why it has repositioned Designer 4.1 in the technical arena. But essentially, there's nothing you can do in Designer that you can't do in Draw; it's just that some things are made that much easier by the specialised tool palette. If technical illustration comprises the bulk of your work then Designer 4.1 might be a better bet, if you can live without proprietary colour matching systems and colour separated output. In a technical environment a plotter or colour printer output is more likely to be the preferred option anyhow. Technical illustrators would do well to check out Gold Disk Professional, which offers a similar technically oriented toolbox to Designer and in some respects is even more flexible. Though, as the Gold Disk product seems to be in a state of arrested development, it might pay to wait a while.

In the PC budget category the choice is a simple one. For a low priced package for the non professional you just can't go wrong with GST Designworks. Installation is a one-step process with the

TABLE OF FEATURES

Product	Arts & Letters Apprentice 1.2	Claris Draw 1.0	Gold Disk Professional Draw Gold Disk	GST DesignWorks
Supplier	Roderick Manhattan	Claris	Gold Disk	GST Software
Telephone	0181 877 1388	0181 756 0101 Fax 0181 573 4477	0734 814230	0480 496789
Price	RRP £79SP £49	RRP £275 MidP* upg* £70.50 SP £249	SP £59 RRP £139.99	SP £69
Min system requirements	286, 2Mb RAM, HD, Windows 3.0	Mac Plus 2Mb (4Mb for S7*, 8Mb for PowerMacs) and a HD	286 2Mb RAM, W* 3.0"	286, W* 3.1, 4Mb Ram, 4Mb free disk space
Rec system requirements	386	None given	386SX	386, W* 3.1 4Mb RAM, 16Mb free disc space
Platforms	Windows	Mac (Windows 3.1 in 1995)	Windows	PC
CD-ROM	No	No	No	Yes
Multiple pages	No	Yes	Yes	No
OLE2 support	No	n/a	No	Yes
Layers	No	Yes	Yes	Yes
Online help	Windows Help	Online help files and balloon help	W* help and a hint line	W* help and a hint line
Trace	No	No	PD Trace - as standalone	Yes
Blend	Yes	Yes	Yes	Yes
Graphs	Yes	No	No	No
Pressure sensitive tool support	No	No	No	No
Text on a path	Yes	Yes	Yes	Yes
Convert text to paths	Yes	Yes	Yes	Yes
Columns	No	Yes	Yes	No
Kerning	No	No? (check help)	No	Yes
Colour modes	HLS, RGB, CMYK	HLS, RGB	RGB,HLS, CMYK, Pantone	RGB, HLS, CMYK, Pantone
Colour separation	None	None	Spot and CMYK	Spot and CMYK
Import formats	TIFF, WMF, PIC, DIA, TXT	PICT, PICT2, TIFF, MacPaint, EPSF	III*(nvs*), CDR, EPS, WMF, CGM, PCX, TIFF, BMP, GIF	III*(nvs*), EPSF, CGM, GEM, IMG, GIF, JPG, PCX, TGA, TIF, BMP, WMF
Export formats	EPS, CGM, TIFF, SCD, WMF, WPG, CSP	PICT, GGM, EPSF, MacDraw 1.1, II and Pro	III*(nvs*), EPS, WMF, SDL, HPGL, ACT, PCX, TIFF, BMP	EPSF, GEM, GIF, PCX, TGA, FIF, BMP, WMF
Extras	4,000 cai* and 90 fonts	Bitmap editor, Slide presentation module, Claris Art cai*	150 Type 1 fonts, 1,000 image clip art library	280 fonts, 2800 image clip art library.

CD-ROM version. Users paying under £100 don't need a tool that can draw a square six different ways, and they probably don't need 5,000 bits of clip art. This simple program has everything you need to easily create and print colour illustrations. GST has got the balance between price and features exactly right. And neat little touches like the pointer becoming transparent on non-selectable buttons are icing on the cake.

On the Mac platform, the choice is narrower and less clear cut, unless you are a non-professional user looking for a lower priced package. In that case ClarisDraw Professional is the only option available that offers the promise of good support and continued upgrades, though the professional tag is stretching it a bit. In the professional market, it's almost too close to call. Both Freehand and Illustrator have their devotees, but the preference tends to come down to personal prejudice as much as anything else. If you are a power user (by which I mean you know one end of your Mac from the other, not you've just bought a PowerMac but haven't yet found the on switch), you will probably revel in Illustrator 5's unprecedented and unequalled performance. Illustrator also offers

the promise of yet to be released third party plug-ins, so this should also be the choice for niche users with a yet-to-be-realised feature wish. Freehand, on the other hand, has an interface to die for. The use of drag and drop colour management is inspired and makes the creation of four colour artwork a pleasure.

Highlights

- **Freehand**
Superb use of drag and drop.
Colour management.
Path operations.
Simplify filter.
- **Illustrator 5.5**
Plug-ins.
Select and pathfinder filters.
Works well with Photoshop, Acrobat and Dimensions
- **CorelDraw 5**
Macro presets.
Autoreduce (simplifies paths).
Many extras.
Superb clip art.
Good online help and tutorial.
- **GST Designworks**
Easy to use.
Comprehensive featureset.
CD-ROM.
Pantone matching system.
Colour separation.

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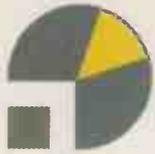
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On the

CUTTING EDGE

PCW

Welcome to **Cutting Edge**, the section in *Personal Computer World* that combines our regular reviews of games, books and CD-ROMs with features bringing you the latest news about computing and consumer technologies and online services.

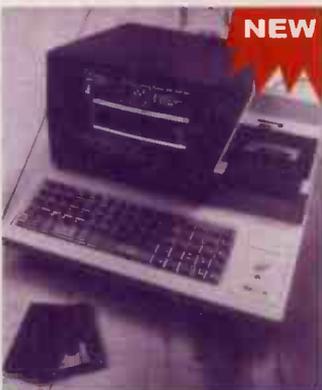
We now have the most comprehensive coverage of these topics available in a general computing magazine. Stay with us and we'll take the pain out of keeping on the cutting edge.

Screenplay



Win a copy of *Klik & Play*, reviewed on page 552

Retro Computing



Take a trip down *Memory Lane* with our new section, page 533

PCW Online

- 5 0 2 **Focus** — Love is all around... Thomas Barrett and Carol Wallace look at the way email changes the way we communicate.
- 5 0 6 **net.answers** — David Brake answers readers' questions about finding fun or information on the Internet and online services. This month, why you can't use the World Wide Web with CompuServe or Delphi (yet!), why some of the sites we mention don't seem to work, and what HTTP is all about.
- 5 0 8 **net.surf** — Netsurfers David Brake and Stephen Cobb bring you the latest new resources. This month, lots of new CompuServe services aimed at the UK, crosswords by email, jobs online, and some guides to help you do your own surfing.
- 5 1 2 **net.news** — CompuServe drops its prices dramatically but runs into flak when it tries to enforce a patent on the GIF graphic standard; plus Internet tips, and downloading a commercial relational database from Oracle via the Internet.
- 5 1 6 **net.comms** — Let's put the Internet to one side for a moment, says Stephen Cobb: the FidoNet online network has been around just as long. And while not as flashy or fashionable, it plays an important part in global comms.
- 5 2 0 **net.newbies** — The section for new Internet users, guiding you through the jargon jungle.

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CD-ROMs

Battle of the encyclopedias

Crazy little thing called love

Been looking for love in all the wrong places? Maybe you could try the Internet, where relationships of all kinds can be conducted from behind the safety of your screen. The virtues of virtual encounters are extolled here by Thomas Barrett and Carol Wallace.

Although we tend to think of the Internet as primarily a means of exchanging information, many members of the virtual community find themselves quickly embroiled in exchanges of a more intimate nature, whether friendly or hostile. Some couples, although they have never heard each other's voices and have only the vaguest notion of what each other looks like, have formed friendships or fallen in love through exchanges of words on their PC screens.

Why are these relationships, often quite enduring, formed so quickly and easily? The answer may be that on the Internet, people can communicate in a way that differs vastly from their ordinary daily encounters. The primary difference is that Internet communications are not conducted face to face, but computer to computer. People may spend weeks or months communicating with each other, with no more clue about their physical identity than the accuracy of their typing. There are no other reliable visual or aural cues. This type of communication can have dramatic effects — some positive, others negative. Every day, people swear friendship or enmity with other Net users. Often the relationships between friends and foes develop more quickly than those in the "real" world.

Computer-mediated communication lets us interact

with others while remaining physically alone. Yet by virtue of an Internet connection, you are at the same time at the centre of a potentially large number of individual or simultaneous communications. Internet use is similar to Ham radio communication in that both media allow users to communicate in isolation. The Net, however, lacks one key feature of Ham radio: the element of sound. Net users generally do not use their voices to transmit inflections that indicate irony, sadness, affection, or anger. Like the telegraph, with its similar lack of visual and auditory cues, Internet communication is reduced to the barest essentials — words etched in light on a glowing screen.

Smileys

The loss of physical variables has its drawbacks, which are apparent in the proliferation of smileys sprinkled throughout Internet messages — little faces that attempt to indicate the feelings that accompany the verbal text. Many variations on the smiley have been created — frowns, laughter, boredom, and even a twinkle in the eye. Emotion has been reduced to emoticons.

This same lack of visual and aural information, however, can have positive consequences that far outweigh the negatives. One of the benefits, paradoxically, results from the

stripping of information. Because we interact solely by written messages we can hide behind our terminals. So, we are unencumbered by the non-verbal distractions that so often interfere with the exchange of messages. On the Internet, height, weight, race, and gender may be unknown. Beauty doesn't impress us, nor does ugliness appall. We become our messages, pure and simple.

This physical anonymity can benefit the sender. The stripping of nonverbal cues allows some individuals to create alternative personalities. Some Net users on the extreme end wander the ether as anthropomorphic entities or characters from fiction. On a more realistic note, some Net users masquerade as members of the opposite sex, while others simply construct a personality they wish they could assume in real life. A shy, homely girl might become an attractive flirt, while a timid male might become verbally aggressive and abusive. And of course, the unattractive girl won't find herself in a desperate sexual clinch, and the timid boy is unlikely to receive a black eye for his excesses.

For those whose communication is more open and honest, there may be another benefit. The protection afforded by hiding behind the terminal may make it easier to express real emotions, and may protect the correspondents from embarrassment if they inadvertently

overstep social bounds.

The most important way that Internet communication shields us is in the control it gives us over our behaviour. Participation in any Internet communication is always purely voluntary. When face-to-face interactions turn ugly, awkward, or embarrassing, we can be left with no graceful (or socially acceptable) escape. When we communicate on the Net, we can always escape. We simply quit communicating.

A chance to think

Hiding behind our terminals gives us another luxury: the chance to think, reflect, and formulate the optimal reply to a communication. Internet messages are not delivered instantly, as are those in face-to-face conversations. There is a time lag before messages reach their destination. Once they arrive, the recipient may be too busy, or disinclined, to respond immediately, or may even be offline. Because Internet users do not always expect immediate replies to their messages, shy individuals and ones who would love to spend half an hour in thought before replying in a verbal conversation can indulge in additional thinking, composing, and editing until they're satisfied with their written reply. It also allows people who quickly formulate ideas to fire back immediate retorts. In addition, the terminal can shield us from the interruptions that can plague face-to-face conversation — perhaps not the ringing phone or doorbell, but other intrusions that often occur when people speak in person.

So how does this affect the way we form Net relationships? To answer the question, we

must first look at how people form relationships in face-to-face situations.

In everyday life, people move from being strangers to friends in several clearly defined stages of communication. A certain code of manners determines appropriate conversation for a first encounter, which is cordial and masks any insincerity: "How do you do? (and wouldn't I be surprised if you really told me)." Pleased to meet you (although I'd really rather meet that other person on the sofa)." Making comments about the weather and observations about the surroundings are typical of new-acquaintance conversation. We typically use small talk in an attempt to find some common ground for more meaningful conversation.

From this first stage, we may progress to exchanging facts about ourselves, other people, and topics of general interest. This is a relatively non-threatening form of encounter because it reveals little about our inner selves other than the extent of our knowledge and tastes. At this stage we gossip about mutual friends, give out our favourite recipes, and discuss our cars, homes, jobs, and so on. We are trading information until we hit on topics that may reveal common interests. If we fail to discover any common ground, we have risked nothing. If we manage to find some mutual interests, we may form a friendship that can lead to the next, slightly more risky level of communication.

At the start of a relationship, we often find ourselves reluctant to share our opinions. As we grow more comfortable with another person, we test the waters. We may venture a negative remark about a film we saw, but until trust has been established, we are likely to backpedal if the other person disagrees. "Well, the cinematography was nice, and I really liked the costumes" may

restore the harmony that our divided opinions appeared to be upsetting. Sharing opinions involves sharing values. It also means taking the risk that others might judge those values negatively. Until people reach a level of comfort that allows them to disagree amicably, they remain acquaintances, not friends.

Friends, however, reach a more intimate level in which they can reveal their emotions, which can be the most frightening thing of all, to the other person. To reveal our inner feelings is to show another person who we really are. We can share opinions without revealing the feelings and emotions that are unique to ourselves. For example, two people may agree that a neighbour's home is beautiful. This is a shared opinion. However, the beautiful house may give one of them pleasure — in being able to visit and drink in the lovely surroundings — while in the other person the house might stir up only jealousy because he or she can't afford similar luxuries. In this way we define our individuality. When we start to share these types of feelings with another person, we can enter into a friendship in which we both understand and respect our individual differences.

If feelings are truly shared and we are completely honest with another person, we may say that we are friends. We accept each other for our similarities and differences. Open, honest communication leads to the ultimate in relationships, which is love. Not necessarily romantic love, but a deep and abiding trust in another individual who knows us as well as we know ourselves. This ultimate sharing and trust is the fifth, and rarest level at which

we communicate with others.

In face-to-face encounters, the bulk of our communication occurs on the first three levels; we reserve the sharing of feelings and emotions with very few of the many people with whom we interact each day. When we communicate on the Internet, however, things change. Most importantly, most Internet citizens have little need to spend time on levels one and two. The network is organised not by geography, but by areas of interest. Rather than entering into conversations with a dozen strangers

to respond.

So, both the shy and the particular can discriminate among the conversations in which they wish to participate. They can enter and leave conversations until they find ones that satisfy them. If a topic wearies or disinterests them, they have absolute freedom to withdraw without recrimination. There is no-one in the room to insist that they return and take part, nor can anyone stop them from trying to interject the last word, as often as they want.

Responses also can lead two people to a more general discussion of personalities, hopes, and fears about the topic under discussion. Individuals may find themselves suddenly engaged in a more personal dialogue with a member of the newsgroup. At this time, they may move the discussion out of the public arena and into a more private one via email. Email correspondences such as these function as the equivalent of a face-to-face visit to someone's virtual home. There is no need for small talk because the areas of common interest have already been explored; the grounds for a friendly relationship have been established.

Although email may be more personal than mere newsgroup participation, it still allows us to hide behind the terminal. Thus protected, it becomes relatively easy for people to move to the next level of communication — exchanging opinions with a freedom rarely enjoyed in face-to-face encounters. At this level, the worst that can happen if someone disagrees is that they cease to communicate. Because we are only at an opinion and acquaintance stage, this breakup can be relatively painless.



who are attending the same gathering because they work in the same place or know the same hostess, people on the Net can proceed immediately to conversing about their areas of interest.

A flower lover tuning into rec.gardens already knows that he or she most likely will find common ground with the other people there. Newsgroup readers have the luxury of browsing within their areas of interest to find topics in which they have definite ideas and opinions, and they can ignore others that interest them only peripherally. Users also can lurk, reading posts without ever contributing to a conversation. Or they can post a question or response, which indicates that anyone is free

Freedom

Perhaps because they need not fear painful reprisals, many Netizens appear to enjoy taking advantage of the freedom to express their opinions strongly and vehemently. Unlike real life, where most of us normally strive for harmony, people on the Net can be emboldened by their isolation. They become verbally aggressive, even abusive in defending their viewpoints. This phenomenon, called flaming, is so common that an entire newsgroup, alt.flame, is dedicated to these types of disputes. However, flame wars can and do break out in any newsgroup where disagreement is even a remote possibility.

Why such volatility of emotion on the Net? It may be caused partially by the lack of visual cues, the stripping away of information that makes it easier to be misunderstood. Face-to-face encounters can lead to disagreements when we misread each other's words and cues. In terminal-to-terminal discussions, we have no cues other than the ubiquitous smiley. Friendly advice can be read as sarcasm, and friendly overtures as come-ons. We have only the intonations we hear in our own heads.

Reprisal is simple: send out a flame. Emotions rise easily on the Net because we are so shielded by our terminals. No matter how ugly the flame war gets, there is rarely any danger of physical violence.

The same goes for positive, friendly Net relationships. We may tentatively offer concern if the other person sounds worried or depressed. There is no danger that our extended hand will be rudely brushed away. We can, after an interlude, when we feel secure because we have survived differences of opinion and found similarities,

offer even the deepest of emotions, secure in knowing that there is always an avenue of escape.

We will never know if the recipient of a tender, earnest message receives it with a scowl. Even the most insecure person can assume that the lack of a reply means the message was lost or that the intended recipient merely is not online. Knowing that we cannot be seen to blush or that the tension we feel in offering our sympathy or love cannot be perceived in the words etched on the screen, even the



shyest among us can risk expressing emotions without fear of reprisal or shame. And because of this feeling of being able to speak so freely, we open ourselves to the possibility of forming close relationships.

Forming real, lasting relationships, however, is only possible when the people involved have been open and honest with each other throughout the correspondence. People who wander the Net in disguise are unlikely to form genuine relationships.

But people who strike up an electronic conversation because they happen to share an interest have little reason to lie to each other. Why construct an elaborate façade to advise someone about the joys

of pet ownership or the best way to strip an antique desk? If our advice is heeded and responded to, we can begin to build real relationships on the groundwork laid by that openness and honesty.

For some people, this relationship may lead to something more. Emotions are expressed, and long-buried secrets are told. Eventually, these individuals find themselves turning to snail mail to exchange photos or small gifts. They pick up that old-fashioned instrument, the telephone, to discover the voice behind the communication; plans to meet face to face then can be made.

The initial face-to-face meeting becomes the final stage in these Net relationships. Some of them, the ones based on falsity, are doomed to fail as soon as one person discovers that the other is not as they had presented themselves. False expectations become dismal reality, and the two part no better acquainted than when they first exchanged letters.

But people who have been forthright throughout their email correspondence have already gone behind the façade that so often hinders face-to-face communication. Their hardest work in communicating has already been accomplished, and they become more real to each other, even when communicating in isolation behind terminals, than are many people when seated across a table.

Thus, Internet relationships can achieve the same high level of communication as face-to-face encounters, and perhaps they can achieve the state more quickly. The ability to venture out of trite exchanges to those in which we express opinions

and emotions is facilitated by our abilities to hide behind a terminal, to probe into another's deepest feelings while maintaining a safe distance. Absolute honesty is as essential from behind these terminals as it is in any face-to-face encounter if people are to become more to each other than mere repositories of information. With honesty can come some real rewards.

Open your heart

And so, heart in mouth but with steady fingers, a woman thousands of miles away may write to a man she has only known by email, "I love you, you know — in a funny kind of way." Perhaps there will be no reply; perhaps she has been too honest, come on too strongly too quickly. Perhaps she has been inappropriate. But perhaps, after all of their exchanged messages, shared information, opinions, and even laughter, she has come to trust in a certain honesty that this strange, isolated type of communication fosters in those who have not only discovered but developed their common ground together.

Real communication can finally coax people from behind their safe shields and into the uncertainties of real life. But real, honest communication can make that real life encounter surprisingly easy. So that for a lucky few it should be easy to say, one day, with all sincerity, "I love you," even without a terminal to hide behind.

PCW Further Details

Thomas Barrett
tjbarre@srv.pacbell.com is a network programmer for Pacific Bell in San Ramon, California. He has been surfing nets since the Bitnet days of the early 1980s.

Carol Wallace teaches communication at the University of Scranton. She lives in Clarks Summit, Pa., with her husband, two cats, and three computers.

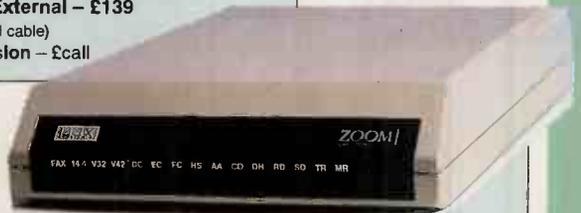
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net.answers

How to get there

Q: I have downloaded NetScape but I can't get it to work through my CompuServe/CIX/Delphi account. What am I doing wrong?

A: Nothing; it just won't work (for the present, anyway). I am sorry I haven't dealt with this question earlier; to date it is the most popular query from newcomers. It grieves me that some online services have confused matters by advertising that they are connected to the Internet without pointing out that their system only gives access to a limited subset of the Internet resources available and sometimes only at a substantial cost.

Unfortunately, the Web — the most useful, easy to use and talked about Internet resource — is also the most difficult to connect to. As things stand at the moment, the only way you can browse the Web (anything you get to by typing `http://` and an address) is to have a full SLIP or PPP Internet account as provided by Demon, Cityscape, the BBC Networking Club and dozens of other, smaller, companies. Fortunately, all the existing online services recognise that being able to offer the Web alongside their existing ones is crucial, and by the end of the year you should expect to be able to get to the Web through any of them. The Compulink Information eXchange (CIX) is one of the first of these companies to come to terms with the need

for complete Internet connections. It has announced plans to offer such access alongside its regular conferences downloadable files (see `net.news`).

Even if some kind of Internet access is offered by everyone, you won't be able to use the latest Internet software through your favourite online service unless it offers a SLIP or PPP connection. CompuServe plans to complete its range of Internet services by the middle of this year, but it looks as if you will be restricted to using its software to connect to the outside.

Why should you be worried about how you get at the Web as long as you can get to it? Some sites (particularly the increasing number offering shopping using "electronic cash") are likely to require that you connect using software with advanced security and

other features which may not be supported through the gateways provided by online services. Full Internet connection (via TCP/IP) allows you to do several things at once — read your mail while connecting to a Web page, for example. Most online services only let you do one thing at a time. And most importantly, most online services charge by the hour while most "pure" Internet service providers charge a flat monthly or yearly rate. CompuServe's rates used to be extortionate, but even at the new, much reduced rates, an hour of connection to the Internet via a local call to CompuServe off-peak would cost around £4 or £5.45 peak rate (a considerable improvement on the old rate of £13.50!) while the same time connected to the Internet via a local "Point of Presence" from any flat rate service provider would cost £2.25 peak and just 80p off peak (plus a flat fee of £10 to £15 a month, compared to CompuServe's £6.63 monthly charge). Even this is more expensive than some North American commercial Internet providers charge, incidentally. Some of my friends in Canada are connected for less than 25p an hour (since local phone calls cost nothing there).

Of course, online services offer much more than just the Internet (this month's `net.news` item about CompuServe's added UK services demonstrates this clearly) and the gateways they provide give a more user-friendly way of connecting than the "raw" Internet; but if you get seriously hooked on the Internet, direct connection is the way to get your fix, even if it means having two accounts.

A funny thing happened on the way to the forum...

Q: Conversely, I occasionally get a query like this from Robin Pell at the University of East London: "Where can I find the Manufacturers' forums on the Internet? I have access to WWW, Archie, Gopher, Janet, Telnet and Niss, but have not yet been able to find any of the Forums I've heard about. I particularly need to get to Media Vision's forum, for an OS/2 2.1 device driver for the SCSI on the Pro-Audio Spectrum sound card."

A: Bad luck again, I'm afraid. At the moment, online product

One of the increasing number of companies with presence on the Internet



Support Desk

In the Media Vision Support Desk you can access many of the same resources that the technicians at Media Vision's Technical Support center use everyday. The Support Desk is structured by product. Please feel free to browse through the Support Desk as much as you like.



This area under construction. Please excuse our dust!



Video



Audio

support tends to congregate in the existing online services, particularly CompuServe. (If people have directed you to a forum they are almost certainly talking about CompuServe). You can't get into those without an account, which you would have to pay for. On the Internet it can be hard to find the appropriate place to ask your question, but once you do you can generally count on a large number of people with similar problems who are willing to give you a hand, and representatives from hardware and software companies will read your comments or complaints and help you informally.

As more commercial companies create public presences on the Internet, you will increasingly be able to bypass traditional online services altogether. As it happens, Media Vision is one such company, and has a Web page at <http://www.mediavis.com/>.

Establishing contact

Q: John Barnes (100116.2424@compuserve.com) said: "Using the information in your October 1994 column I attempted to establish email contact for FTP and WWW, but without success".

And in a similar vein, pjesus@individual.puug.pt (in Portugal) said: "I want some help from you because I can't contact LISTSER@CC1.KULEUVEN.AC.BE".
A: There are a number of possible explanations if you find you can't reach a resource which is mentioned in PCW. The first is that it is spelled wrong. Internet addresses are rarely intuitive and they have to be typed in exactly as written so it is worth double-checking them if you get an error. Occasionally, we even mangle them ourselves as they go through the production process. John couldn't reach ftp-mail@src.doc.ic.ac.uk because it was hyphenated on the page. As a rule any hyphens in addresses should be ignored if they fall at the end of a line (because they were probably inserted by our page layout software).

Other times you can't reach a resource because of a temporary problem with the network between you and your "target". Often new resources are overloaded early on as hundreds of thousands of internetters try to log on at once to see if they are any good. If you get an error the first time around, try connecting another day.

If after all that you still can't contact a resource, it is quite possible that in the time between my writing about and your testing a resource it has changed its name or been withdrawn or moved. Many Internet resources are run solely by volunteers

on "spare" space on university and business computers. If a service gets too popular and nobody else on the Internet is willing to take responsibility for running it, its creators will sometimes have to abandon it.

Normally, you'll find some kind of message left behind to tell you what happened, but sometimes a service just disappears completely, just as listserv@cc1.kuleven.ac.be appears to have done. What Pedro Jesus was after was a list of newsgroups which are available by email. These days you can get it by sending a message containing GET NETGATE NETLIST to LISTSERV@8yAUV.M.AMERICAN.EDU.

HTTP: the facts

Q: Pedro Timoteo (pedro.timoteo@skyship.alce.pt) says: "What is HTTP and how do I use it? Is it a command or a tool for WWW?"

A: HTTP stands for HyperText Transfer Protocol, the "native language" of the World Wide Web. The Web is made up of pages and each page can be accessed individually by typing in its address (Universal Resource Locator or URL), in the form: datatype://machinename/pathonmachine. Datatype can be HTTP (standard Web) or one of several other resource types — FTP, Gopher, email (mailto), news and others — all of which can be translated by the Web surfing software to display as pages.

If you want to see whether your favourite company or organisation is on the Web and you haven't found it on one of the many indices, there are some useful rules of thumb you can use to find it by trial and error. If it has a Web page (and any new entrant to the Internet who wants to be found should have one) it will usually be at <http://www> (or web).companyname.co.uk/ (or .ac.uk if a university or possibly .com if it is a multinational or an ambitious British company). Therefore, Oracle's web page is <http://www.oracle.com/>, Oxford's web page is <http://www.ox.ac.uk/>, and Demon's is <http://www.demon.co.uk/>.

Fortunately, you should rarely need to laboriously type in Web addresses. Once you have found a page you want to access in future, you can save its address into an index, built into all Web browsing software. Many of the new pages you look at will be ones you find by following links from other pages. These links can be followed with a single click of the mouse, which automatically "fills in" the relevant text for you.

PCW

GET ON-LINE TO

Internet

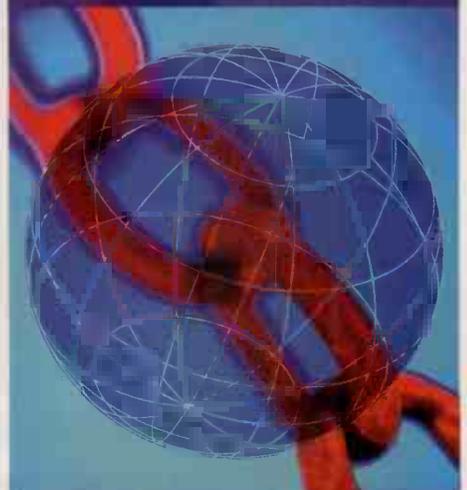
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net.surf

Keeping the British end up

Generous Internet-using individuals and companies provide hundreds of new sources of information every week. And the Internet isn't the only game in town: established services like CompuServe, CIX, and newer ones coming across here like eWorld and Delphi are all expanding the breadth of information. Even the busiest netsurfer can only cover so much every month, so please tell me about any new and interesting discoveries you have made. If you find something and we print it, you'll get a brand new copy of Random House's entertaining and quirky Net Guide which, like us, finds information from the Internet, CompuServe, and a host of other services.

New CompuServe UK services

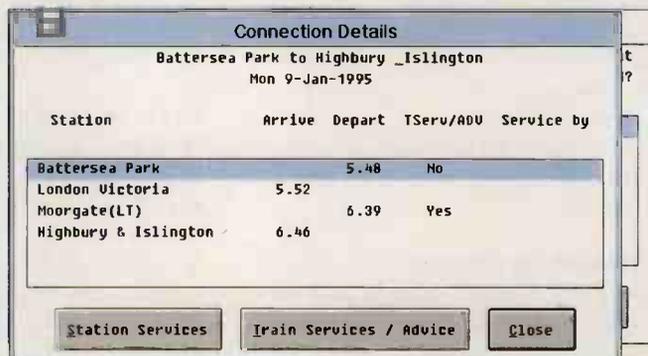
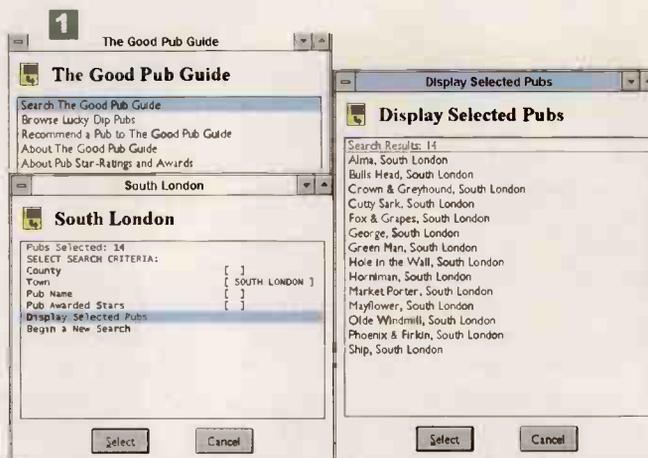
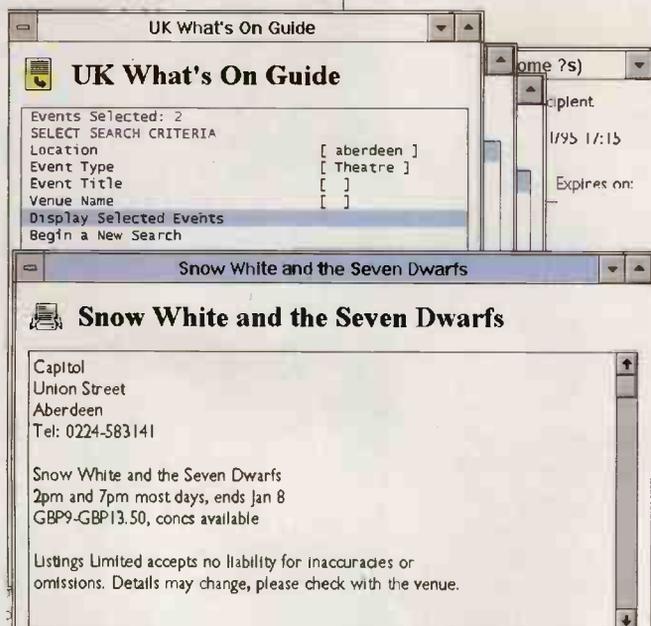
For a long time, CompuServe was chiefly useful because of the American resources it connected you to — technical support from American software and hardware companies, American share and financial

information etc. More recently, CompuServe has recognised that it will not be able to expand significantly into other countries unless it offers online services tailored to their local markets.

Britain is one of its most successful overseas markets, with roughly 80,000 members (CompuServe's total membership now approaches 2.5 million). Recently it has launched several new services and there are ambitious plans for more this year. Many of these are "basic services", which means most members calling off-peak can access them for just the cost of a local call.

CompuServe's arts listings have been beefed up significantly. Not only are television, satellite and radio listings available three to four days ahead through the Press Association (GO PAO), but theatre, film concerts and other events across the UK are all now in a

CompuServe's GO UKWD makes it easy for a Londoner to scour Aberdeen's theatres



searchable database (GO UKWO). CompuServe can even help you get there, providing you with up-to-date reports on traffic conditions and public transport by region from the AA (GO AAROADWATCH). If you are travelling by train instead, why not stop in for a pint after the show at a Good Pub Guide pub (GO GPG)?

The above are all basic services but there's an intriguing "extended service" available too: UK and European timetables (GO RAILWAY). When I checked, it wasn't possible to co-ordinate a trip from Barnsley to Verona as the software doesn't incorporate the cross-Channel trains and you can't order tickets through CompuServe either. But the software is easy to use and it does work. A few pence-worth of time spent on this when you want to go Euro-railing could save a lot of calling around.

This month, a British encyclopedia (not the Britannica) is due to go online, with pictures as well as text available. British stock quotes should also be

- 1 GO GPG from CompuServe lets you find a good pub wherever in the UK you travel
- 2 Negotiate British or European rail networks on CompuServe

available this month. April will see the first serious opportunities for British people to shop through CompuServe, with our own British "mall" and online share trading.

If you want a comprehensive list of services on CompuServe aimed at a British audience, type FIND UK: there are now more than 40 available.

The Internet may be growing by leaps and bounds, but this impressive array of services demonstrates that for most people, the kind of thing they hope to be able to do through the Internet in a few years they can do on CompuServe today.

● See net.news for news of dramatic price reductions.

Do you take Visa?

Visa International now has a public presence on the Internet. Its Web site at <http://www.visa.com/visa/>

includes free financial software for PC or Macintosh, sketchy summaries of future products, and advice on how to manage your money. A database of bank machines and information on what to do if you lose your card was "under construction" at press time, though they may be available by the time you read this.

Towards the end of 1994, Visa and Microsoft announced an alliance to work on standards for electronic commerce, so this could well prove to be a good site to watch if you are interested in buying or selling across the Internet.

MCA joins the Net

MCA/Universal, the movie and music giant, and Sony (likewise) have both come to the Internet. So far, MCA's site seems more developed. Its Cyberwalk Web site (at <http://www.mca.com/>) features online music magazine AMP, and what it claims is the first interactive movie premiere on the Internet. The occasion was the launch of Junior, the latest Arnold Schwarzenegger flick. In addition to the preview clip, net-surfers can look at the CVs of the stars and download some "behind the scenes chats".

MCA has big plans for its Web site, it seems. It is planning a new site dubbed Universal V/IP (for Visual/Interactive Previews) which will contain additional coverage including "exclusive footage you won't be able to find anywhere else". Junior, of course, is ancient history now, but as a general rule American movies open in the US several months before they arrive here, so you can stay a step ahead of your movie-going friends (provided, of course, you don't mind several-megabyte downloads!).

Sony's site (at, unsurprisingly, <http://www.sony.com>) is half-empty at the moment, with music and games but no

information about movies or consumer durables. Still, as you can see the buttons are there, ready for you to push when the company manages to get them set up.

The useless pages

Electronic commerce and interactive entertainment are doubtless important reasons to get an Internet connection, but I must confess to being fascinated by the ridiculous ways some people choose to exercise their freedom of expression on the Web. Fortunately, someone

else is too, and they have a Web page of their own which keeps track of such zaniness so I don't have to. If you just have to know where the page is that allows you to speak to a cat, you find yourself wanting to know the contents of a complete stranger's CD collection or you just want to play Find the Spam, surf on down to Paul Phillips' Useless WWW Pages, page — <http://www.primus.com/staff/paulp/useless.html>.

Crosswords by mail

Yes, I know that not everyone can surf the Web, so I'm particularly pleased when someone comes up with a resource that everyone on the Internet can access. AUS-PC-SOFT sells a Windows-based crossword com-

piler, and as a nifty way to promote the package it has set up an automatic server to email a crossword puzzle to anyone who requests it. The puzzles change daily, and to get them you just send a message to xword@acy.digex.net with the subject "send puzzle". A demo of the software is also available.

DIY news gathering

In these pages we try to provide you with the cream of the newest sites on the Internet, but given the sheer volume of stuff available, what we provide is only the tip of the iceberg. Given the deadlines we face, what we write is also at least a month out of date. If you are on the Net and don't mind sifting through lots of announcements yourself, here are some of the information sources we consult to keep ourselves up to date:

By mail

Edupage: The name is a bit misleading. It's a free, bi-weekly digest of IT and Internet news. Much of it is gleaned from American newspapers, which makes it difficult to follow up, but it's still well worth subscribing. To do so, send mail to listsproc@educom.edu containing "subscribe edupage your name".

Scout Report: A weekly digest of the new stuff on the Net. Rather dry, but useful. To subscribe, send mail to major-domo@is.internic.net and in the body of the message type: "subscribe scout-report".

WEBster: A newsletter which, for a nominal fee, gives a bi-weekly digest of Internet news. You can get a free trial by mailing 4free@webster.tgc.com.

Newsgroups

The best way to find new resources in the areas you are interested in is to keep an eye on the newsgroups relevant to that interest, but if you want an overview of what's available or stuff that is difficult to classify, try:

comp.internet.net-happenings: a moderated newsgroup. Only announcements, not chatter,

20		21		22	23			
24		25						
26	27	28		29	30	31	32	33
34		35		36				
37		38		39		40		
41	42			43		44		
45		46		47				
48		49		50				
51	52	53		54		55	56	57
58		59	60			61		
62		63		64				
65		66		67				

1 The CLUES

Monday, 01/08/95

ACROSS	DOWN
1 Meath	1 Clublike weapon
5 Small nails	2 Gemstone
10 Fellow	3 Hog sound
14 Capital of Western Samoa	4 Hurred
15 German submarine	5 Bell-shaped flower
16 Sharpen	6 Showing unusual talent

1 Get your daily crossword from Australia

2 & 3 Two of the sillier pages from Paul's Useless WWW Pages

Welcome to Find-The-Spam

Somewhere in the picture below, is spam. If you think you see it, click on the picture to find out if you're right.



For those of you using a text-only browser, here is the non-graphical version of Find-The-Spam. Select the one which is Spam: **Spam** ... **A Moose**

Talk to my Cat

This is a searchable index. Enter search keywords:

The time is 4:40AM on 09 Jan 1995 here in Pittsburgh.

This web document uses speech synthesis to talk to my cat. It is written in asex, and running on an amiga. Type a sentence to say to my cat in your browser's search dialog. The computer will say it, and, if the cat is around, it will hear it.

This is a rather abstract act.

The cat, though, is quite concrete, as you can see in this picture, by popular demand, of the cat.

are allowed, and all postings are written by the same people based on information provided by those with new services. They are even coded by type of resource so you can quickly see all the WWW sites or conferences at a glance.

comp.infosystems.announce: A rather busier, less well organised collection of new software and sites. There's not that much overlap between the two newsgroups, so it's worth reading both of them.

alt.internet.services: Considerably busier than either of the above since it contains announcements, requests for help, commentary and waffle. Unless you are serious about keeping up to date, you'd be better off reading PCW (or one of the Internet magazines) to read what we've gleaned.

Jobs on the Internet

The Internet is full of adverts and Web servers with American IT jobs, but until fairly recently the only place to look for jobs was in the uk.jobs newsgroups. Now several

Not many native jobs on the Papyrus Media server, but plenty of overseas ones

employment agencies (for computer jobs) have got in on the act here in Britain as well, offering jobs indexed and easily searchable on Web pages, plus ways to register yourself with them by email.

The JobServe server at <http://www.demon.co.uk/jobserve/index.html> is just for UK jobs and though it had just nine permanent British positions when I checked, it had loads of contract positions — 11 in London for 9th January alone. In addition to Web-based browsing, the company will put job-seekers onto a mailing list which notifies members of any work matching their particular skills. According to the company: "in the last 3 months of 1994 JobServe was used by 105 computer contract recruitment agencies to advertise a total of 2084 new requirements."

In addition to the jobs themselves, the Web server also has links to several useful job-related resources. To subscribe to the email service, mail to subscribe@jobserve.com, and to set up keywords to match, mail to filter@jobserve.com.

If you would like to leave Britain, Papyrus Media, the UK

MarketNet Services

List of available and forthcoming services on MarketNet

Live

- [LawNet](#) - Legal Services (LawNet is the registered name of the LawNet organisation)
- [FlowerNet](#) - OnLine Florist

Very Soon

- [CraftNet](#) - Craft products
- [ArtNet](#) - Art

Soon

- [InvestNet](#) - Investment
- [TaxNet](#) - Taxation Services
- [BankNet](#) - Banking Services

Well in the future

- [RiskNet](#) - Insurance
- [JobNet](#) - Employment
- [TravelNet](#) - Travel Services

One of Britain's first Web-based shopping malls

MarketNet

Online "malls" — collections of Web pages selling goods and information — are all the rage in the US, but there are relatively few here. One of the newest is MarketNet at <http://mkn.co.uk/>. At the moment it features the first British online florist, British TeleFlower Service, and LawNet, a group of 77 solicitor's firms across the UK.

Pioneering though they are, these early Web merchants seem a little uninspiring at the moment (TeleFlower doesn't offer pictures of its arrangements, for example). The legal service, which only currently handles wills, doesn't seem to be passing on the lower transaction and marketing costs of an online-based service to consumers: they want £85 (including VAT) for the service.

It's early days, though. Soon, MarketNet plans to run NetScape's security software which would (in principle, at least) allow you to exchange credit card details and other confidential information with the mall's vendors without fear of eavesdropping. The range of its customers is due to expand as well. It plans to offer banking, tax and investment services, arts and crafts, and even (one day) travel, insurance and employment. The high street at your fingertips!

PCW

Select the country you wish to search

European Union

- | | | | |
|---|--|---|--|
|  Belgium . . . |  Denmark . . . |  France . . . |  Germany . . . |
|  Greece |  Ireland |  Italy |  Luxembourg |
|  Netherlands |  Portugal |  Spain |  United Kingdom |

 [Switzerland](#)

Pacific Rim

- | | | |
|---|---|---|
|  Australia |  New Zealand |  Hong Kong |
|---|---|---|

North America

- | | |
|---|--|
|  United States |  Canada |
|---|--|

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net.news

CompuServe drops rates

CompuServe has dramatically dropped most of its prices, particularly in Europe, in an attempt to retain its leadership and stem competition from the Internet.

Those who connect to CompuServe's own nodes across Britain no longer have to pay a £5.13 an hour surcharge during peak hours. Those who connect via Mercury and other private networks will still have to pay the charge, but it is unlikely that the savings they will get from local call access to the service through the network will be enough to make it worth continuing to use them.

The cost of accessing "extended services" (most of CompuServe's support and other "value added" forums) at 9600baud or faster has been halved to £3.20 an hour, and the number of "basic services", which are included in the monthly subscription has been expanded from 78 to over 100.

Electronic mail charges have also dropped. A message of up to 7500 characters used to cost 10p: it now costs 6.6p, and each additional 2500 characters will cost 1.3p, down from 3.3p.

To offset the rate drop, CompuServe has raised its monthly charge, from £6 to £6.66.

The changes should bring savings of 50 percent or more for business users, though home users benefit less because they didn't suffer as badly from the peak time surcharge and probably didn't use extended services as often.

CompuServe's PR gaffe

The welcome news of CompuServe's dropped rates was

somewhat overshadowed by a PR gaffe over the Christmas break. It concerned something known as the CompuServe/Unisys patent deal, and according to Pat Clawson, head of California-based TeleGrafix Communications and publisher of RIPscript software, this was "the online communications community's equivalent of the sneak attack at Pearl Harbor." In simple terms, the 29th December announcement, made jointly by CompuServe and Unisys, declared that developers using the GIF image format in CompuServe-related software must register by 10th January 1995, and pay a royalty or face lawsuits for their past usage.

GIF is an eight-year-old standard for compression and display of graphical files originally developed by a CompuServe employee, and widely adopted by the online and graphics communities. It uses the LZW compression algorithm and this is the source of the current problem. Unisys Corporation, a maker of main-frame computers, has obtained a patent on LZW despite the fact that the algorithm had been openly published in a professional journal in the early eighties and widely used in just about every version of Unix (in the program called Compress). It seems that the engineer who wrote the article worked for Unisys and the company considered it proprietary information. A patent claim was filed and granted in several countries including the US and Britain.

During the first half of 1994 Unisys took steps to enforce that claim against CompuServe,

reaching an agreement in June of that year. For reasons which are not yet clear, CompuServe saw fit not to make the agreement public for six months, but it may be that the company feared, quite rightly, the effect that the sweeping terms of the agreement would have on CompuServe's popularity, since it boldly states: "Members of the public are prohibited from using any software product containing GIF until they have become a REGISTERED user of the product." Early observers thought that this virtually eliminated the concept of freeware or shareware containing GIF capabilities, since prospective customers can no longer try out these software products without registering them first.

Furthermore, companies and individuals who develop software that uses GIF and connects to CompuServe must pay one dollar for a licence, plus a fee equal to either 1.5 per cent of the selling price of the product, or 15 cents per "Disposition", whichever is greater.

Targeting developers

The head of Unisys' public relations, Oliver Picher, pointed out that the precise terms of CompuServe's licence were up to it to determine, but more than a hundred companies have already licensed LZW and a licensed implementation is inside the V.32bis compression standard. According to him and Tim Oren, the companies do not intend to target individual users, only commercial developers who incorporate the GIF standard in their software. Small shareware companies and freeware authors would not be targeted, though technically they should also have licences, whether paid for or not. In a subsequent clarification, Unisys said that it did not intend to pursue inadvertent infringement by GIF-based software marketed before 1995 and it doesn't require fees to be paid for non-commercial GIF-based applications.

As the wires buzzed with

amateur legal opinions, many of them from shareware authors predicting the death of the GIF format (likely to be replaced by JPEG), the whole thing became strongly reminiscent of the Pentium fiasco. For example, because the agreement defines the term Disposition to include "the sale, lease or licence or any other grant of rights to a Product or any new Product" early observers worried it could be construed to mean that money is due to CompuServe/Unisys each time a GIF image is transmitted via BBS or Internet. According to Clawson at TeleGrafix: "The operators of a BBS or World Wide Web site with hundreds or thousands of GIF images online could easily be bankrupted by these licensing requirements." Oliver Picher at Unisys insists that this is not Unisys' intention.

Infringement suit

Many CompuServe members took issue with the statement, made by CompuServe staff, that "Unisys proposed an infringement suit and we had no recourse but to settle." Characterising CompuServe's position as giving in to corporate bullying, several members observed that: "Every Unix vendor ships a program called compress which uses the LZW algorithm, and none pays Unisys a dime."

One programmer who worked for Convex Computer Corporation, which makes Unix systems, said: "Eight lawyers researched this issue, including contacting Unisys... Convex now ships compress with ConvexOS, and doesn't pay Unisys anything." It is not clear whether or not Unisys, which recently announced 4,000 redundancies, will go after Unix vendors next. Some have pointed out that LZW compression is also part of the popular TIFF format for image files.

The online community has reacted very quickly to the apparent threat with some possible solutions to the problem.

Within days of the CompuServe-Unisys announcement some shareware authors had uploaded "GIF-free" versions of their graphics utilities, and Telegrafix has designed a freeware version of the GIF standard, called "GEF", which replaces the disputed compression code based on LZW with LZHUF code. It has also produced a program which converts GIF files to GEF files. According to Telegrafix, it should be easy for developers to adapt their code which originally manipulated GIF files so that it would manipulate GEF files instead.

For the latest information from Unisys about the controversy, send mail to LZW_INFO@UNISYS.COM. Within days of the beginning of the dispute, a Web page was set up by Michael Moncur, an independent consultant, with extensive links to relevant press releases, email addresses and other information. It is at <http://www.xmission.com/~mgm/gif/>.

Stephen Cobb and David Brake

Internet Config makes for the Mac

The Mac's famous ease of use advantage may extend to the installation of Internet software with the introduction of Internet Config. This application will keep all the preferences for various Internet functions together in a single database, making installations of additional software easy and preventing errors through typos.

Before its invention, a user of several Internet packages might have had to enter a default email address, preferred fonts, preferred text editing and graphics viewing applications and other data three or four times each.

Application vendors need to support it, of course, but according to Tidbits, a useful mailing list of Mac-related news, many developers of public domain and shareware

Mac Internet software have committed to it. It makes developers' and users' jobs easier and one developer, John Norstad, said that supporting it required "just a bunch of really easy code".

The the best place to discuss Internet Config is the newsgroup comp.sys.mac.comm. It is available via FTP at [src.doc.ic.ac.uk](ftp://src.doc.ic.ac.uk) in the [computing/systems/mac/info-mac/dev](ftp://comp.sys.mac.info-mac/dev) directory.

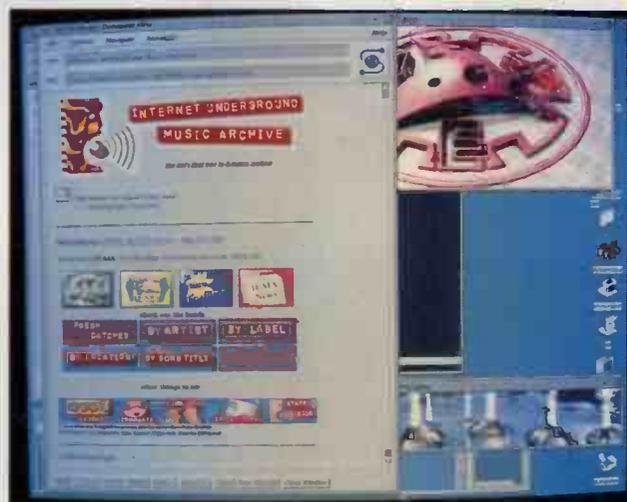
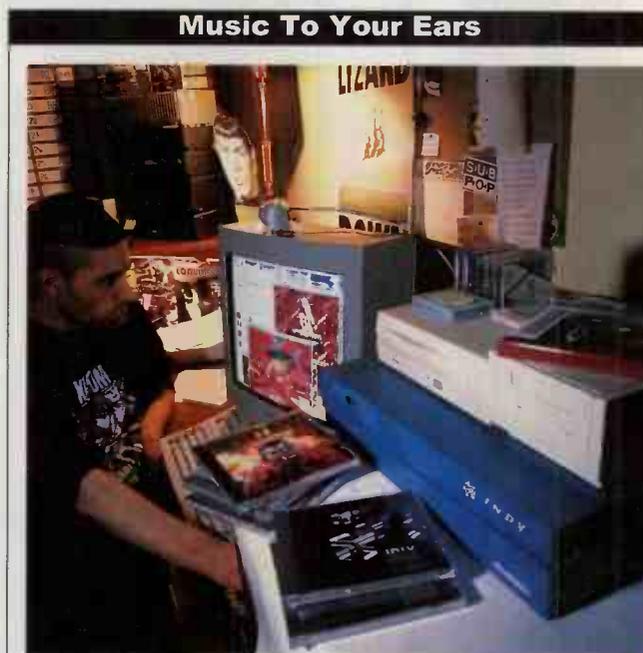
Probably the best single page to look at, though, is Cyberdyne CS at <http://www.demon.co.uk/cyberdyne/cyber.html>. They are Web publishers who made a British careers page to demonstrate their skills. It includes pointers to various agencies in Europe, America, Asia, Australia — even Africa, plus the relevant newsgroups.

IUMA blossoms

Music on the Internet isn't new. In fact, IUMA (the Internet Underground Music Archive) has been in existence for well over a year, providing an outlet for unsigned bands to distribute samples of their music to an online audience.

It has proved so popular that Southern Studios, a London-based music distributor, has set up a European site in the UK to take up some of the strain. Up until now, IUMA has been administered from the University of California at Santa Cruz, but like most popular sites it has been mirrored across the globe in no time at all. Plans are currently underway to set up sites in Japan and Australia.

In America, Warner Brothers is just one of many record companies using IUMA as a marketing tool to distribute music and video clips, artists' biographies and photographs. Bizarre licensing regulations still mean you have to log onto the original site (IUMA West) to download material from Warner. That said, it won't be long before agreements are made allowing these files to be mirrored on UK file servers.



Top This modest looking machine hosts one of the more impressive British services on the Net

Bottom The friendly interface to the Internet Underground Music Archive

For UK bands, IUMA provides an excellent opportunity to have their songs heard, ultimately by A&R departments within record companies. It also gives artists the chance to promote concert dates and meet up with other musicians.

As much of the music is sampled at 44.1kHz, file sizes can be quite intimidating, even though they are compressed. A three minute audio clip could take anything up to 10 minutes to download; video clips take considerably longer. If you're prepared to hang around online for long enough, you

should find something to you're liking.

IUMA doesn't charge unsigned bands to upload material; it asks them to make a donation instead. In the US, this is around \$50 to cover administration costs. Fees have not yet been finalised for UK bands. For more information contact Southern Studios on 0181 888 8949 or surf over to see them at <http://iuma.southern.com/IUMA/>.

Steven Helstrip

Crafty Internet tips

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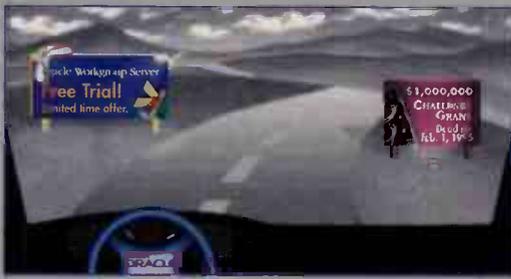
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The Oracle Information Highway



Welcome to the Oracle Information Highway home page. Now you can use the World Wide Web to test drive the latest products from Oracle

credit card details across the Net via email? Frank Kroger has offered a tip to the readers of the Internet Marketing mailing list. "In sending my CC# over the net I have been writing out the numbers as words rather than digits. I am hoping this will throw any sniffer off the scent. I avoid using the word 'Expires' or 'Expiration Date'." Is that smart, or what? And Ivan Pope, consultant editor of .net magazine, points out that if you are using Netscape, if you are typing in the URL to a Web page, you can leave out the initial "http://". Seven characters saved is seven characters earned... or something.

To join Internet Marketing, send mail containing "join inet-marketing your name" to listserv@einet.net.

Oracle sells Oracle 7 via Internet

Oracle has become the first major PC business software company to use the Internet to sell its software, following the successful example of ID Software's Doom.

Oracle doesn't come up in the pages of PCW often, because although it is one of the most successful software companies, it sells (in PC terms) high-end relational database software and "middleware" (linking databases to different computer systems). It doesn't have any experience

This page spells out the informal laws against intrusive Internet advertisers and the punishments they can receive

Blacklist of Internet Advertisers

- 1. What is this?
- 2. Who gets on the list, and for how long?
- 3. What is the philosophy behind it?
- 4. What can I do with it?
- 5. What if I wanted to punish YOU?
- 6. How about other ways of dealing with commercial junk?
- 7. What other blacklists are out there?
- 8. How can I help?
- 9. The Blacklist in itself.

I. What is this?

This is the Blacklist of Internet Advertisers. It is intended to curb inappropriate advertising on usenet newsgroups and via junk e-mail. It works by describing offenders and their offensive behavior, expecting that people who read it will punish the offenders in one way or another.

The list is posted regularly to several newsgroups and the most recent version is always available on the WWW as <http://math-www.uni-paderborn.de/~axel/blacklist.html>.

If you read the non-html version and you don't know what to do with all the links given or what the WWW is, send mail to mail-server@ntf.mt.edu with the text "send usenet/news.answers/www/faq/*" in the body of the message.

Oracle's Web site from which you can download a full-featured relational database

or channels to sell software directly to end-users, so rather than spend a fortune on advertising and marketing to sell its new Personal Oracle 7 relational database it is distributing it as "shareware" over the Internet. It is available now from <http://www.oracle.com/>. You can download it and use it free for 90 days. After that period, you are expected to purchase it or delete it from your hard drive.

Advertisers' blacklist

The Internet has ways of policing itself, as insensitive companies have found to their cost when they send unsolicited electronic mail or messages to newsgroups advertising their wares.

Internet "vigilantes" frequently send huge files to such companies or use other forms of sabotage against them. Now these vigilantes are getting organised and going public. Axel Boldt, a grad student at the University of California at Santa Barbara, has produced a "blacklist" page at <http://math-www.uni-paderborn.de/~axel/blacklist.html>.

There you will find instructions on how to nominate a company which annoys you and what to do to filter them out or punish them.

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Comms

Hear Fido Roar
by Stephen Cobb

Few people would argue with the statement that 1994 was "the year of the Internet". Stories about "the net" were everywhere, from the tabloids to the tube. However, most of the coverage left the distinct impression that the internet had just been invented (it is more than ten years old) and that it was synonymous with "the information superhighway". This has been particularly galling for the hundreds of thousands of people who have, for many years, been using that other global, ad hoc, non-commercial, online network known as FidoNet.

In existence for almost as long as the internet, FidoNet now encompasses many of the privately run bulletin board systems (BBSs) that we have mentioned in these pages, as well as tens of thousands of others across the globe. They may not be as flashy as commercial services such as CompuServe, or as fashionable as the internet, but these inter-connected bulletin boards continue to play a very important role in the networking of people and countries around the world. In these pages we cannot hope to give FidoNet all of the coverage it deserves, but we can at least try and tell you something about where it came from and what it does.

Going public

In the rather stiff, academic language of the Association for Computing Machinery, FidoNet is defined as "a public wide-area network (WAN) that users employ to exchange electronic mail (E-mail) messages among bulletin board systems (BBSs) across telephone lines." In fact, the August 1993 volume of the Communications of the ACM contains a good technical overview of FidoNet, which at that time consisted of "over 20,000 nodes which move email and enews...using a unique protocol and data format."

The first Fido systems ran on DOS machines but "semi-formal specifications for the data formats and protocols have facilitated implementations for Unix, Apples from the II to the Macintosh, CP/M, MVS, and many other platforms." Today FidoNet is even larger but remains

financed and supported mainly by individuals. This is one of the major differences between FidoNet and the internet, which was, at least until recently, funded mainly by government and educational institutions. It also accounts for some of FidoNet's technical features. As the ACM article observes, "minimisation of modem/telephone time has been the principal driving force behind design of the data transfer protocols."

FidoNet started in 1984 when Tom Jennings, author of a program called Fido that provided bulletin board services on a PC running DOS, wanted to move messages from his Fido BBS to that of a friend, John Madill. As a programmer Jennings was able to modify Fido so that he could extract messages from a specially designated local message base, then queue them for sending to the remote BBS. He wrote a separate external program to run this email transfer at a specified hour during the night, when phone rates are at their lowest.

This idea caught on and by early 1985 Jennings was sending messages to some 200 nodes. A list of all known active nodes, called a nodelist, was developed as a distributed external file and at first this was maintained by Jennings. However, when a version of FidoNet was developed for the DEC Rainbow (one of DEC's first attempts at creating a personal computer) FidoNet BBSs became quite popular with the DEC Users Group in St. Louis, Missouri, and two members, Kaplan and Baker, took over organisation and maintenance of the nodelist.

They realised that dozens of telephone calls were being placed to all the various nodes within each city from each of the other cities that had nodes. Although calls within a US city are cheap or even free, calls between cities are not and so they decided to batch all intercity traffic into one call per night. Thus the nodelist was restructured into city-based segments, transforming the FidoNet address notation from node to net/node.

By the end of 1986 there were FidoNet nodes in various countries around the world and there was a need for batch communication between continents. The answer was "power users," or points, who, instead of using the BBS interface, worked directly with FidoNet data formats and transport protocols to forward and receive mail and news. The nodelist was redesigned as a four-level hierarchy of zone (continent), net, node, and point, with the address becoming zone:net/node.point. This was formalised

at a FidoNet Standards Committee meeting in October 1986 and the same addresses structure is still in use.

That same year, FidoNet's form of news, called echomail, was developed by Jeff Rush. Within two

weeks, an international echomail conference called MODULA-2 was propagated between Europe, Australia, and North America. By 1993 the daily volume of compressed echomail was over eight megabytes. Nowadays, the FidoNet nodelist is automatically updated and distributed weekly. This is a substantial undertaking as the list contains the data phone number of each host plus the location and sysop's name.

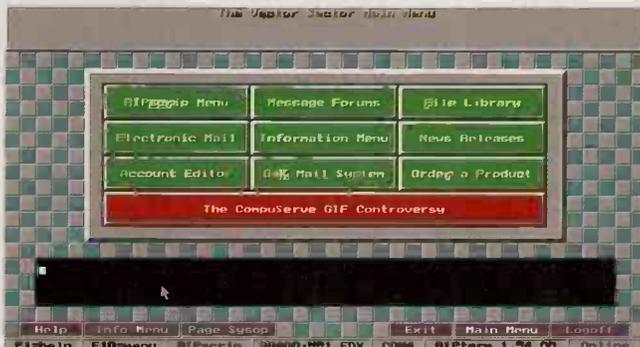
Each city sends local data to a regional co-ordinator who forwards it to a continental co-ordinator. When the continental co-ordinators exchange data they create something called the nodediff, a list of differences between the current and previous week's nodes. Nodediff is then fed back through the system, all the way to individual nodes.

Since November 1991, FidoNet has been using the Internet to transport mail and enews between Europe and North America. The files are moved directly between the zonegates via IP, courtesy of RIPE and EUnet. This saves FidoNet operators thousands of dollars a month. Since late in 1992, this "tunnelling" of the internet has been extended to Taiwan, Southern Africa, Chile, and other areas.

FidoNet technology is not just used by amateur bulletin board operators. Big companies such as AT&T and large public institutions such as the Canadian post office use FidoNet, as do many Non-Governmental Organisations (known as NGOs). This is particularly true in Africa where FidoNet has allowed poorly funded academic institutions to stay in touch with the wider academic community. In countries where the postal services are slow and unreliable and telephone calls can be hard to connect, the worldwide email facilities provided by FidoNet offer an important lifeline to the outside world.

What's that RIPPING sound?

If you haven't taken a look at non-commercial bulletin boards lately you might be wondering why they continue to be so popular. Aren't they just boring character-



With RIPscrip from Telegrafix, bulletin board operators can create attractive interfaces without using Windows

based systems that pale in comparison with colourful point-and-click interfaces like Mosaic and CompuServe Information Manager for Mac and Windows?

The answer is an emphatic No and one of the main reasons for this is something called RIP, as in Remote Imaging Protocol (as opposed to Raster Image Processor or Routing Information Protocol). RIP is at the heart of RIPscrip, a scripting language developed by a company called Telegrafix. The purpose of RIPscrip is to enable some impressive looking point-and-click graphics on any online system that can display text to work. We're not talking ANSI-based lines and boxes here, but sculpted buttons and icons. Because Telegrafix has openly published the RIPscrip specification it has been widely adopted by bulletin boards and writers of shareware comms packages. For example, there is a Windows shareware comms program called WinRamp that supports RIPscrip (you can find it in the IBM BBS forum on CompuServe).

A freeware version of RIPterm, a DOS-based package that allows you to call any RIPscrip-based BBS, is widely available on bulletin boards (on CompuServe it is in IBM BBS). If you are a regular reader of these pages you will have already seen RIPterm in action. Last year we published a screenshot of NEWSdesk, the Online IT News Network, developed by the public relations company, IPMG. This uses a RIPscrip interface.

The non-proprietary nature of RIPscrip has meant that it has also proved popular with commercial makers of BBS software, such as The Major BBS from Galacticom and Mustang Software's Wildcat. One big advantage of RIPscrip over some of the proprietary alternatives is that it can save session logs. Other programs draw text in a manner that is difficult to capture. Because RIP graphics are basically a very clever extension of ANSI or ASCII text, a

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RIP terminal program can strip graphic details (such as icons and buttons) to log a session as text.

The dominant role of RIPscrip is likely to be enhanced by the imminent recent release of RIPscrip 2.0. The limited 640 x 350 resolution EGA graphics of the previous version (1.54) are superseded by "resolution independence". The program automatically maps to the resolution of the BBS caller's display, up to 1024 x 768.

RIPscrip 2.0 also includes support for 24-bit colour pictures and JPEG files (which can be viewed as they are downloaded). This is part of a push towards providing online multimedia capabilities such as auto-sensing of a wide range of digitised audio boards.

You can contact TeleGrafix on 001 379 2131 or through the Vector Sector BBS on 001 714 379 2133. Contact can also be made via the internet at rip.support@telegrafix.com.

Sidewinder

One of the main differences between the Internet and other online facilities such as bulletin boards is the nature of the connection you make when you log on. If you have a fully fledged Internet connection you actually become part of the network, just as if your computer was connected to a local area network in the office. This means that the connection works both ways. Just as you can visit other computer sites around the world, the world can come to you.

Unfortunately, a few of the folks who people that world have less than honourable intentions. They get a kick out of breaking and entering areas that are supposed to be off-limits, either to steal information or just make a mess. This has led organisations, particularly businesses, to look for defensive measures that will protect their Internet connections.

This is the goal of "firewalls", which typically use a combination of hardware and software to segregate internet traffic. Typically a firewall routes the packets of information coming from the internet to a dedicated computer that has a limited configuration of software. This machine is then connected to a second router that limits its access to a specific set of internal systems. But this falls short of the ideal defence, which would allow legitimate internet users within the organisation to have full access to the internet, while at the same time restricting outsiders from entering the organisation's own network.

In fact, if you were really serious about protecting your organisation from internet

interlopers, you might go one or even two steps further. That is the goal of Sidewinder, a security device developed by Minnesota-based Secure Computing Corporation. Not only does Sidewinder, which runs on a dedicated 90MHz Pentium system, keep intruders out, it identifies them, and goes after them. That's right: instead of just sitting there fending off intruders, Sidewinder sets a trap for them, allowing them to think they have gained entrance, while secretly monitoring their activity. It does this by feeding false data and fake applications to intruders while alerting the host to the attack.

Remember that the Internet connection is a two-way street. The person trying to get into your system has to have come from a system somewhere else. Sidewinder can, if so programmed, put that system on a blacklist, or even contact that system and feed it mis-information. The message is as clear as the pose of the rattlesnake on the Sidewinder logo — this is security that strikes back! It is also a viable real-world product that has been rigorously tested. Just as Sidewinder eschews the traditional passive, "security by obscurity" approach, Secure Computing Corporation has actively encouraged Internet hackers to try and break in.

In November of last year the company set up a Sidewinder site and challenged anyone to break in. Since then there have been almost a thousand visitors to the site from every continent. More than half of these people have made some attempt to break in. According to company spokesperson Kevin Sorenson, "we would classify about 70 of these attempts as serious and about a dozen of these could be qualified as very sophisticated." But nobody has yet won the black flight jacket and considerable prestige that await the first successful hack.

If you are a serious internet buff the challenge site is 199.172.160.10. A technical FAQ is available from ftp.sctc.com in the public directory. Questions can be addressed to sidewinder-challenge@sctc.com. If you want to know more about how Sidewinder can protect your organisation's internet connections Secure Computing Corporation is on 001 612 628 2700.

PCW Further details

Stephen Cobb is a freelance technology journalist who can be contacted on CompuServe 72662,546.

He regrets that he cannot answer all messages, but promises to do his best.



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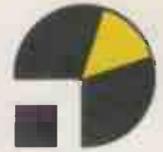
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net.newbies



Getting started on the Net

If you don't know what a "newbie" is, you probably are one. These pages are designed to be an easy-to-use reference guide to the Internet for the novice — or newbie, as hardened netters will call you.

If you don't understand what I have written or you have any suggestions, please don't hesitate to mail me at David_Brake@pcw.ccmail.

compuserve.com, or via "snailmail" — Internet-speak for paper mail.

Meanwhile, here's an easy-reference guide to the tools which will help you make the most of the Internet.

Mail

Almost every BBS and on-line service can offer you some kind of gateway into the Internet for electronic mail — it is the "lowest-common-denominator" service. The standard way of addressing Internet mail is person@organisation.something.something. But the way you send mail out from a local system varies from system to system.

On CompuServe, to send a message to me at CIX you'd type "internet:derb@cix.compulink.co.uk" in the address field. To send a message from the Internet to my CompuServe account (70007,5442), you'd send to "70007.5442@compuserve.com".

Because many users are limited to electronic mail-only access to the Internet, a number of ways have been devised to allow you to read newsgroups and search for and download files. All these methods are very clumsy, though, and not to be recommended unless you are desperate or don't have any choice.

One of the most commonly asked (and understandable) questions about the Internet is "how do I find a person on the Internet?". There are at least ten different ways of doing this, none of them particularly reliable. It is a subject in itself: to get a mail message giving some of the options, send mail to mail-server@rtfm.mit.edu with "send usenet/news.answers/finding-addresses" in the body of the message.

It is hardly surprising that finding people is tricky, since there is no central authority with which every user has to register to get on-line, the population of the Internet is growing incredibly quickly, and many companies and individuals don't want their internal electronic mail addresses listed.

Mail was Tool of the Month in last October's Internet column.

Newsgroups & Mailing Lists

The ability to read and post to these is probably the second most popular service after mail. They are the equivalent of forums or special interest groups on bulletin boards, and cover every special interest imaginable.

In both cases the idea is simple: any subscriber can post queries or comments which can be read and replied to by all other subscribers across the globe.

A mailing list, as the name suggests, uses mail, which has the advantage that anyone with mail can use it. Accessing newsgroups requires a newsreader program — there are dozens available — and they generally allow you to organise messages by subject and produce "kill files", which enable you to ignore messages on boring subjects or by boring or offensive people. (Sadly, there are a lot of the latter, and the problem is getting worse.)

Specialist newsgroups such as bionet.molbio.embl.databank (discussion about the EMBL nucleic acid database) generate a manageable number of messages each day. But a popular newsgroup like rec.arts.movies generates thousands of messages a month from its huge readership — estimated at 100,000 in May last year, which means it could be twice that now. Reading through a couple of newsgroups of that size without sifting through them beforehand could be a full-time job and run your phone bill into the stratosphere.

WWW — the WorldWide Web

This tool was designed at CERN (the European Laboratory for Particle Physics) in

Switzerland. As discussed in the July issue, it is by far the sexiest interface to the Internet, and if someone wants to produce an impressive Internet demonstration, nine times out of ten they'll use WWW to do it.

The good news is that it can provide a graphical front-end to almost any Internet resource, and like Gopher it provides links to information all over the Internet. The bad news is that unlike Gopher, it lacks mature search tools to allow you to find just the item you want. Instead it encourages you to browse from link to link. This is a good way to learn and have fun but a poor way to get things done.

There are many WWW searching tools you could try — the best one is probably http://cui_www.unige.ch/w3catalog. There is a less user-friendly but more comprehensive database called Lycos that might be worth a try if the CUI index draws a blank — it's <http://fuzine.mt.cs.cmu.edu/mlm/lycos-home.html>.

The WWW's graphical interface requires a lot of speed. Unless you have a V.32bis modem, you may as well forget about the pretty pictures, alluring sounds and even video clips on the Web. A large number of the more interesting resources on the Net are arriving on Web servers, so it's worth knowing that a much faster, if less glamorous, connection to the Web is available via telnet (see the telnet entry opposite).

For the moment, at least, CompuServe subscribers have no WWW access at all, and most other BBS-based services like Delphi and CIX offer text-only access. For full graphical WWW access, you need a TCP/IP connection (ask for it by name).

Gopher & Veronica

Gopher, designed in 1991 at the University of Minnesota, is called that because it "goes for" information and because the football team at the college

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is called the Golden Gophers.

It resembles the WorldWide Web in that it provides a way of linking together different information resources. While the WWW provides links in the form of "hot buttons" on pages of styled text with pictures, Gopher takes the form of a series of menus and sub-menus on each server, some of which lead to other Gopher servers.

CIX and some other service providers allow you to run it from their systems, but if your provider doesn't have it set up you can download your own Gopher client software and use it or telnet to gopher.ebone.net to try it out.

Rather than wander through the maze of menus to find the information you are interested in, you can use Veronica to search through all the menu entries on all the world's Gophers (in theory) for the information you want. To use it, direct your Gopher software to gopher.unr.edu and select the Veronica menu item.

Gopher and Veronica were featured in August's Internet column.

Anonymous FTP & Archie

Both these services are all about files — how to find them and how to get them. FTP stands for File Transfer Protocol. It is "anonymous" because FTP servers require a username and password before you can connect to them but allow you to connect to parts of them by giving them a login name of "anonymous" and your email address for a password.

Once you are connected, looking around the server for a file usually works much like DOS. DIR or LS tells you the contents of your directory, cd directory-name puts you into that directory, and so on.

There are several graphical interface programs available to make FTP easier to use.

Many files stored on other servers are compressed or encoded in various ways, indicated by an extension at the end of the file name. .HQX, .TAR, .ZIP, .SIT and .ZOO each indicate a different kind of file requiring one or more utility programs to convert them.

Finding the file you want on the Internet is not as hard as finding the person you want. But it is still not straightforward or dependable.

There are several tools available to help you find specific documents, but Archie is, as far as I know, the only tool which helps you find the file you want from the 2.5 million or more binary files in its database. You can use it via

mail (send mail to archie@doc.ic.ac.uk to find out how), via telnet (to archie.doc.ic.ac.uk or one of 23 other Archie servers), via the WWW (<http://src.doc.ic.ac.uk/archieplexform.html>) or using one of several pieces of front-end software.

If you know the name of the file you are looking for, your task is fairly easy. Archie allows you to search for exact file names or files containing a set string. If you don't know the name and it isn't obvious, life gets more difficult. There is a database which indexes files by keyword — it's called "whatis" — but it isn't very well kept.

Archie is supposed to provide a complete index of publicly accessible files and each of the several available servers should have the same data.

This is not the case in my experience. Each night, the servers index one thirtieth of the files on the Internet, so they should be a maximum of a month out of date. Unfortunately, the Internet is growing so fast that being a month out of date can exclude many files. Also, not every publicly accessible file archive is indexed. Demon, a service provider for personal and small business use, maintains a 5Gb archive of useful software at ftp.demon.co.uk — because of a technical problem, Archie used to be unable to index Demon's files, but it now can.

Lastly, each server seems to have a slightly different database, so if you're sure a file is out there somewhere but you don't find it on one of the UK servers, try one in the US.

Telnet

This is probably the easiest command to understand — telnet to a site by running one of the many available telnet programs (in many cases this is as easy as typing telnet <site> from the prompt of the computer you normally dial into) and you will be confronted by the login prompt of your target computer. Whatever you type will be transmitted directly to the remote computer as if you were typing on its keyboard, and its replies are sent back to your screen.

Normally when you log in like this, you either have an account on the target machine already or it is set up to give you access for specific tasks. To see what you can do, try telnetting to telnet.w3.org (a computer in Switzerland). This gives you text-only access to the World Wide Web. The Web program runs on the Swiss machine, but you can manipulate it from the comfort of your chair.

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Innovations

The new network chart

After much speculation, downloadable music is finally making it to the Internet. Tim Frost looks at the technology and costs involved, and wonders if '95 could see the first Net-hit.

It seems the first commercial music downloading service is about to hit the Internet, to try out the claims of those who say that buying music over the counter is doomed.

The London-based Cerberus should be open for business by the time you read this, offering a range of music from the independent labels over the Net, with a range of charges depending on what the artist or the label wants to charge.

The theory of delivering audio or video by email is pretty straightforward, and not exactly new. There are huge databases of audio clips and an increasing range of video and film clips available from various sources, many of them legal. Browse through CompuServe and there's a good number of movie clips from Lion King onwards. In fact, because of the US nature of CompuServe, you can get to see bits of movies long before they are released in the UK.

But back to audio, or more specifically, music. Any music track can obviously be filed as a standard WAV format. If the record company wants to maintain 16-bit 44.1kHz sampling rate CD quality, you are looking at a 20Mb to 50Mb file per track. That is quite a storage problem, even with the decreasing cost of hard-disk storage which makes computer based audio files a much less attractive proposition than recording onto cassette.

The bigger technical barrier to music over the Net is the downloading times. With a super-fast V.Fast modem you can achieve 28,800bps but even so you are still looking at hours, literally, to download a single track. And if you want to download a whole CD then you'll be on the line for a couple of days.

For most, a £600 V.32terbo modem is not really the most essential add-on to the computer, and using the more common V.22 or V.32

modems you can multiply those download times by four or more.

So the first problem is to reduce the file size without seriously compromising the sound quality. A simple answer is the psycho-acoustic audio codecs along the lines of MPEG or Dolby's AC3. These can reduce the file size by factors of between ten to twenty. Cerberus is going to be launching with a file compression system generating something like a 15:1 reduction in file size. This brings file transfers down to more acceptable levels, with claims of around ten minutes for a single track at V.Fast rates and around half an hour using V.32. It is still not instantaneous, but it's a good start, and compression technology is improving all the time. The hope is that codec formats and modem technology will increase in power to the point where CD-quality audio can be transferred in real-time. In fact, this is already quite possible providing you are using an ISDN all-digital phone line rather than a standard analogue line. (A cue, maybe, for BT to start actively pushing digital telecoms sockets at home rather than overpricing ISDN.)

Distributing the software to download, decode and, most importantly, pay for the software may have been a problem a couple of years ago, but the advent of the

computer magazine cover disk, both floppy and CD-ROM, means that an interesting bit of software can be in a million or two homes within a month. This would be impossible to via any other route, although the Net offers a better long-term distribution system as the software files will be available over a long period of time. Estimates vary on the number of potential users who will at least have the software to register, but over a period of a year this could easily reach three or four million.

To download music, users will first register with Cerberus and then be charged via their credit or debit cards for the music that has been downloaded. The costs will vary. Many independents may well use the system to offer music-try for free as a taster, and then charge for full download or offer CDs by snail-mail. Others will charge whatever they think is the going rate for their music is - unlike the normal over-the-counter sales system, price control is directly in the hands of the artist or the label.

There are a couple of interesting political sub-plots involved in selling music over the network. The first is the copyright issues. Nothing could legally happen until an agreement was made with the MCPS, the organisation that collects copyright fees in the UK. At the end of December last year a licensing agreement was completed. The MCPS will take their fee as a percentage of the charge made by the label or artist each time the track is downloaded, at a rate just a fraction higher than the copyright charged on cassette or CD.

What is more interesting is the various implications this may all have on the charts. If the music track is a legitimate single, and the charge to access it is commensurate with the cost of buying a single, why shouldn't the number of downloads be considered as directly equivalent to over-the-counter record sales? Is 1995 going to be the year of the first Net-hit? **PCW**

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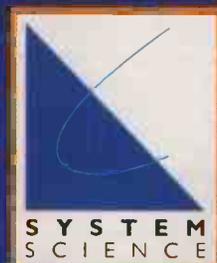
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NEWS

- New version 4.5 of Borland C++ has support for OLE apps via OCF, VBX support in 32-bit apps and hosted on Win, Win NT and Windows 95.
- Microsoft Visual C++ 2.0 now shipping, with option of special offer Windows NT Workstation version 3.5.
- Visual C++ for Windows NT-MIPS & Alpha hosted, are now available. Visual C++ 2.0 cross development tool for Macintosh target released.
- PowerBuilder Desktop new version 4.0 with OLE 2.0 support shipping.
- New PVCS Tracker, Track Record and Bug-Base, for recording bugs and managing their resolution.
- Eiffel for Windows - Personal or Professional versions are now available.



Horizons

Laying it all on the line

Digital phones which handle voice and data simultaneously on the same line are still some way off. The new DSVD standard is designed to mimic this effect on our current analogue network without the financial burden of two separate lines. Simon Rockman explains.

Wouldn't it be great to talk to someone on the same line you're using to send them data? Most of the time you want to add voice to data, but sometimes it works the other way around. You're using a voice line and want to send some data to the person you are talking to. If you're chatting to a colleague it's great to be able to send a spreadsheet and get some feedback on the figures. In a technical support environment it might be useful to be able to send the data you are having trouble with, have the expert fiddle with it and send it back, all while talking about your problem. A designer might want to send work to a client for approval; the ability to email it gives the option of colour which a fax does not.

Within a company with a good network this kind of thing is simple. On PCW we all share the Excel file used for issue planning and can use the internal phone or shout across the office to discuss things. Move outside the office and things get more complicated. Typically

we'll email copy and then phone. The email will go through CIX or CompuServe, which is fine if the data needs to be sent in a batch — someone submitting a long article — but not terribly interactive. If the data needs to be punted back and forth it's a pain. For each exchange the two parties need to stop talking, hang up and log onto CIX.

With two phone lines each life becomes a lot easier: one can be used for voice and the other for data. With this kind of setup it becomes much more sensible to connect the two machines directly and miss out on uploading and downloading to CIX.

But with the increased bandwidth of high-speed modems it seems a little redundant to have

two lines; what is needed is a system which will mix voice and data. This is the idea behind the new DSVD standard. DSVD stands for Digital Simultaneous Voice and Data and it allows you to use the one line as though it were two over a normal analogue network.

DSVD works by digitising your voice and mixing it in with the data. You plug a conventional phone into the back of a DSVD modem and the line shares the bandwidth between the voice and data. This "sharing" is fixed. The voice channel occupies 8kbps, leaving 20.8kbps for the modem.

This might not be the most efficient method. There are schemes for analogue communications which intersperse the data in between the two people speaking. Telephones are full duplex. It is possible for both people to talk at the same time although etiquette and the need to hear what the other person is saying mean that usually only one is talking. This leaves space for computers to communicate the other way. The technology is used by the American analogue mobile phone systems for CDPD, but in practice it doesn't work very well.

DSVD benefits enormously from being digital. There is a lot of expertise, mainly European, in digital voice compression. Most of this comes from the pan-European GSM phone system, which has been optimised to compress the human voice to get as much capacity as possible out of a packet-based mobile phone network. GSM compression has been selected for the DSVD specification, although it notes that the specification is flexible and will allow for other schemes as compression technology improves. The choice of GSM is politically interesting since the DSVD specification is led by Intel with the co-operation of US Robotics, Rockwell, Creative Labs and Hayes. American companies do not generally like adopting European standards.

One major advantage is that the CODEC chips needed for this

"The promotion of a sensible, universal standard is no doubt a good thing. Intel is keen to see this happen and is promoting DSVD as an interface to the ProShare video-conferencing system"

CUTTING EDGE

Simon Rockman

are used in digital mobile phones. This makes them a mass-market item and very much cheaper than implementing a custom compression scheme. But there are some drawbacks with GSM. It can sound a bit metallic — although the fixed bandwidth should eliminate this — and it is optimised for the male German voice, so anyone with a squeaky voice will sound a bit odd. It is impossible for voices compressed in this way to sound better than they do through conventional analogue lines but they should be acceptably clear. The GSM optimisation means you cannot transmit DTMF tones through the voice channel, so the DSVD specification treats DTMF as a very complex, special case.

If you make an ordinary voice call to another user with a phone plugged into the back of a DSVD modem they will receive a normal analogue call, just as though the phones were plugged straight into the wall. If the line is used just for data the two modems will run as standard V.34 units communicating at 28.8kbps as with a conventional modem.

The magic happens when you do both at once. If you are on a data call and want to speak to the other person, you just pick up the handset. The modem senses the change and shares the data between the voice and data channels, using 8kbps for the digital voice channel. This all happens transparently.

The technology is even more clever the other way around. If

Glossary of Telecommunications Terms

- CODEC** — COmpression DECompression; a chip which can be used to handle digital voice data
- DCE** — Data Communication Equipment; a modem or terminal adaptor; the ISDN equivalent
- DSVD** — Digital Simultaneous Voice and Data
- DTE** — Data Terminating Equipment; a data terminal or PC
- DTMF** — Dual Tone Multiple Frequency (tone signalling on the GSTN), also known as "touch tones"
- GSM** — Global System for Mobile communications, also used as a compression protocol
- GSTN** — General Service Telephone Network (same as POTS)
- ISDN** — Integrated Services Digital Network; a digital phone system
- ITU** — International Telecommunications Union, formerly the CCITT, which sets standards
- LAPM** — Link Access Procedure for Modems; a form of error correction, part of the V.42 specification.
- POTS** — Plain Old Telephone System (analogue not digital)
- PSTN** — Public Switched Telephone Network, aka POTS or GSTN
- V.32** — 4800 or 9600bps
- V.32bis** — 7200, 12000 or 14,400bps with the modem selecting the optimal speed
- V.34** — 2400, 2743, 2800, 3000, >3200 and 3429 and up to 28800 bits per second
- V.42** — An ITU-T standard protocol for error correction between modems which includes MNP up to Level 4
- V.42bis** — An extension of the ITU-T V.42 standard modem protocol to include compression

you are in the middle of an analogue voice call and want to transmit data, the modem has to switch the voice channel to a digital one. It does this by muting both phones and logging in, using modem-like negotiation and a carrier. You won't hear this as anything other than a short pause in communication.

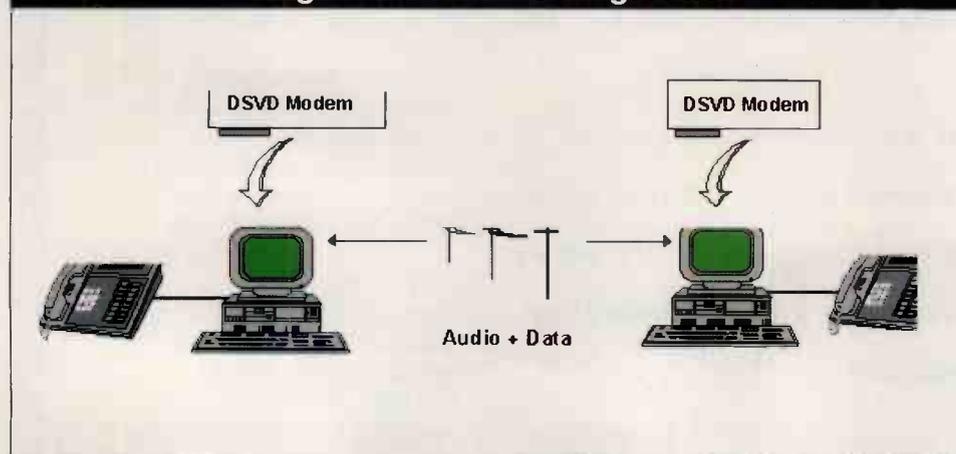
The first manufacturer to have a DSVD modem will be US Robotics, which had a demonstration at Comdex and should be shipping a £399 unit soon. The archaic British approvals procedure means the UK arrival of the device

will be later this year and the price is likely to be a little higher. It should still be substantially cheaper than installing a second phone line. The ideal solution is ISDN, which has two 64kbps lines and a little used 16kbps line which would allow voice and access at floppy disk-type speeds. But only the UK has a good ISDN infrastructure and many parts of Europe and the US have no ISDN links.

The promotion of a sensible, universal standard is no doubt a good thing. Intel is keen to see this happen and is promoting DSVD as an interface to the ProShare video-conferencing system. The idea is that users with ISDN ProShare systems can video-conference, sharing voice, data and pictures. Those offices without ISDN who want to join the conference can use the POTS (Plain Old Telephone System) with DSVD to share voice and data. This may be a backdoor attempt by Intel to support the Indeo-based ProShare system, which isn't compatible with the H.320 standard all the other video-conferencing manufacturers are supporting, but while this planned integration of two types of communication (voice and video) sounds good it is unlikely to be a long-term solution and we will end up with two good, but different, standards — DSVD for voice and H.320 for pictures.

All new technologies need a "killer application" and DSVD is lucky in that such an application exists. One of the main reasons why people don't use direct connections is that setting up two systems to the right protocols and speeds is difficult without a second line to agree the settings. Anyone who has played network Doom will know that it is worth the hassle, but with DSVD you can talk to your prey before you unleash the BFG 9000.

Single-Line DSVD Configuration



PCW Details

The full DSVD specification is available in the Intel forum on CompuServe. Type **Go IntelA** and then look in the Software Specs directory.

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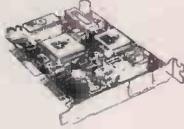
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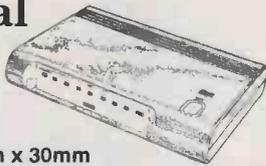
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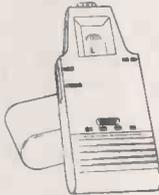
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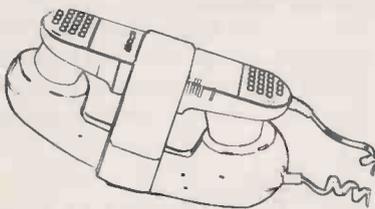
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It's good to talk

Continuous speech recognition software still lacks sophistication, despite the fact that nearly everyone finds talking easier than typing.

Nick Beard explains the difficulties in translating speech into a coded signal.

Computers of the future do not need keyboards — just read any sci-fi book. Instead, computers will convert speech into action. “Smart” machines accept normal speech; not terse, cryptic instructions like contemporary computers.

Speech recognition is a realm where BlueSky has almost been reached, and the once seemingly insurmountable computational problems are close to being solved. Extracting words from the garbled signals which issue from our throats is no trivial feat, but it can be done. IBM's Personal Dictation System (PDS) has a reported accuracy of 95 percent and can manage a word rate of some 80 staccato words per minute. The goal is to rid systems of the need for pauses between words, and IBM already has a system running on an RS/6000 which manages 93 percent accuracy on continuous (normal) speech. Since speech recognition is a software problem, it is only a matter of time before these figures are improved and the hardware requirements are more accessible. Here we will look at the main steps involved and disentangle the progress from the remaining problems.

Speech recognition has already been a goal for decades. But speech rarely meets the grammatical standards of written words and it misses the spaces marking boundaries between words. The absence of these spaces produces problems for speech recognition systems. Look how important the boundaries are: written without pauses, phrases are tough to understand. “You have a nice chest!” could be a shout guaranteed to cause trouble in a “modern” American



IBM's Personal Dictation System (PDS) has a reported accuracy of 95 percent

Politically Correct university — or just glee on the happy discovery of a drinks cabinet on a hot day. Varying intonation subtly varies the meaning further, though this is to over-complicate the problem. We seek simple text entry tools.

Natural language understanding (NLU) is a different problem and one that is much harder than speech recognition. In its simpler guises, NLU allows people to type database queries in something akin to normal human language instead of using strange query languages. For example, most doctors would prefer to simply type (or speak!): “Get me all cases of ischameic heart disease where there was raised potassium on admission”

instead of having to learn SQL and construct reports from “IF... THEN... JOIN...” commands. So, speech recognition is simply a method of getting text into computers: speaking the “IF... THEN... JOIN...” commands. Most people find talking easier than typing, yet the subtle, unpredictable variants of human speech are still too difficult for (most) computers.

Many PCW readers will be familiar with the C: prompt. It suggests: “Go ahead! Type what you like!” Yet most things typed produce unhelpful messages: “Error T23: contact SysAdmin” or “Bad command or file name” are generally useless to users. Windows helps by hiding computers' constraints. A restricted choice means users are frustrated less often than when offered an apparently unconstrained choice. This highlights the difference between “word recognition systems” (which is what most “speech recognition” systems are) and “speech understanding systems”. Speech recognition should be considered a variant on a keyboard. It does not make the computer understand commands more flexibly. Even a modern speech recognition system would still require you to say “Change directory”, rather than “Okay computer, get me the other bunch of files!” There are two processes at work. The first turns sound into a representation that machines can grasp (ASCII code or whatever), the second turns the code into meaning. Turning codes (or symbols, or text) into computational actions is the job of another program: an operating system or an application. Speech recognition systems are about turning sound into codes: building machines with ears. Understanding the codes more flexibly is another topic.

Pick two from three...

The basic architecture of most speech recognition systems is generally the same. First, a signal from a microphone is converted to a computer-readable form via an analogue to digital convertor. Usually, some signal processing takes place before digitisation. Another process converts the digital signal

into a code, and finally the strings of codes are associated with words. As ever, the Devil's in the detail and there are technical choices to be made in building real systems.

The target for speech recognition systems is, of course, accuracy. This comes at a price. Remember the joke about selecting a PC: "What kind of PC would you like? Pick two of the following three characteristics: good, fast, cheap...". With accurate speech recognition systems, you can pick any two from: large vocabulary, speaker independence, continuous (versus discontinuous) recognition.

So, there are some highly accurate speaker-independent systems which operate even over telephones and pick out what they need to "hear" from continuous (normal, unbroken) speech. However, they have tiny vocabularies: ten digits (with variations on how to say "0" — nought, nothing, zero...); yes; no, account number; and not a lot more! There are speaker-independent systems with huge vocabularies but they require a distinct pause between each word. Speaker independence is becoming easier. The first speech recognition systems required the user to spend many hours "training" the system to recognise his or her voice. This is rarely required these days as most systems have minimal training requirements. However, the need for discontinuity can be reduced if the system "knows" the speaker's voice.

Recognition routes

The three basic steps in speech recognition systems are: (1) the microphone signal is converted from analogue to digital form, then (2) the digital signal is converted into a code, and (3) the code is changed to a word.

Analogue to digital (AD) conversion is usually preceded by a Fourier Transformation (FT), a well known signal processing step named after mathematician Jean Fourier (1768-1830). He showed that complex waveforms which vary with time — speech, music — can be represented as the sum of a series of sine waves. A sine wave has two parameters: amplitude

and frequency. By lumping together a lot of sine waves with different frequencies and amplitudes, specific signals can be generated. Conversely, a specific signal can be split into its component frequencies; the human ear performs FTs when listening.

An FT takes a signal where amplitude varies with time, and converts it into one which "plots" the "amount" of sine waves of various frequencies. Speech recognisers usually take small "snapshots" of speech from a microphone and perform FTs on them. These transformed chunks represent speech and have the advantage of being compact, requiring less data than the original digitised speech sample and thus able to be processed more quickly. Sometimes a second FT is performed, to produce an even denser signal — a further abstraction from the frequency plot which is called a "cepstrum" (an anagram of "spectrum").

Signals to codes

The computer now has a digital representation of the speech signal. This must be converted into something which can be looked up (in stage 3) in a catalogue of English (or German, French, whatever) words. Early efforts in this arena were generally rule-based attempts to use "expert systems" to convert sounds. IF (sound) = (x) kHz for (y) ms THEN (sound) = "b". Sadly, this was too rigid and was readily defeated by the vagaries of normal speech. Moreover, the computer power available at the time was inadequate. IBM brought statisticians to bear on the problem. Sounds which are similar may have different probabilities of following or preceding some clearly unambiguous sound. "K" and "C" sound similar; yet preceding a clear "A" and "T," it isn't hard to guess which (K or C) is more likely.

Sound codes are derived through vector quantisation (VQ). The sound signal is a vector, which needs to be turned into a discrete quantity. Imagine a street map, divided into squares with 2D co-ordinates: the co-ordinates can be replaced by a direct, single-digit coding. Each 2D vector map reference is instead represented by a single quantity. So, in the case of VQing speech signals, the sound signal is represented as a series of axes (the precise number varies with implementation technique) and the "space" bounded by the axes is then divided into a number of sections. Each square (on a 2D representation) or cube (in a 3D version) is given a code. This allows for a highly efficient storage of sound templates and some useful inexactitude in labelling a sound that is pronounced in many subtly different ways. The probabilistic element of the representation is in the variation allowed inside a square (or cube) which still results in the same code.

Matching codes to words

Sounds represented as codes must be linked to real words. This is generally done by looking up the codes in the database of templates, which are built up from lots of recordings of real speech using a mathematical idea called Hidden Markov Models (HMM). An HMM is a statistical model of the probability of a sound evolving in one direction rather than another. At the initiation of an utterance there will be a probability, based on experience of speech, of what the next state will be. Starting

with a particular sound — state — the overall probability of moving to each possible next state (or staying in the same state, as when a long vowel sound occurs) is known from the database of HMMs. This helps sounds to be recognised as words. Some sounds, while ambiguous as a discrete sound, are obviously a particular sound when considered in the context of the surrounding sounds.

Neural network computers have been applied to speech recognition, typically in the area of coding. Neural networks promise much through their ability to learn. Among the most promising are Kohonen nets, a form of unsupervised neural network. Neural nets are usually trained to produce a conclusion by using data for which a "correct answer" is known. Kohonen nets — "wired" in a fashion similar to the parts of the brain associated with learning — are just shown data and allowed to self-organise into a state in which specific nodes then maximally respond to particular patterns. If the data is speech, the nodes in the Kohonen network each learn to respond to different sounds.

Steps towards the goal of accurate, speaker-independent, continuous speech recognition are still being taken. Improvements are coming through using shorter pieces of sound to build HMMs, having larger HMM databases, and improving database search techniques.

PCW References

Talking to your Computer
IBM Research Magazine, No 3, 1994.

Encyclopedia of Artificial Intelligence
Stuart C Shapiro (Ed);
Wiley Interscience

An authoritative two-volume set with a wealth of readable, thorough background on the whole scope of AI.

Natural Language Processing Technologies in Artificial Intelligence
Klaus Obermeier; Ellis Horwood
A wide-ranging book covering speech recognition and generation, text handling, and many different paradigms for achieving these things.

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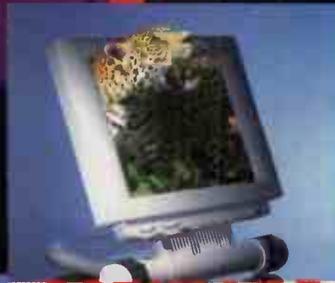


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Back to the future

In the first of a new series Simon Rockman travels back to the early eighties, when 24kb was positively elephantine and the Sharp MZ-80K was one of the machines to have.

In an industry as young as computing it seems odd to talk about history. But if a dog year equals seven years of human life, a computer year must be a lifetime. In the last decade computing has changed incredibly. Today, no-one saves programs to tape, or commandeers the family telly to sit programming into the small hours. This is our heritage, a time when computers were as different from one another as breeds of dog or types of food.

Does anyone remember the first sub-£50 colour computer? Or the Japanese clone of the Commodore PET? The first was a Mattel Aquarius, the second a Sharp MZ-80K. There was a time when appearing on the front cover of *PCW* sounded the death knell for computers, but this was just a matter of numbers. There were so many new computers that the *PCW* of the early eighties could very easily have a new one each month and the majority were bound to fail. The Aquarius (November 83) did, but the Sharp didn't — in fact, it was something of a minor success, although always in the shade of the PET, Apple and Tandy (a combination so common that *PCW* ran them together into one word, petappletandy). In those days even clones were different. If anything the MZ-80K was only a PET in ethos, as the internals were very different. The CPU was a Z80 while the

PET used a 6502. In the pre-Intel days computers were divided more or less equally between these two camps. The PET and the Apple II used the Mostek 6502 but the Tandy and the huge base of CP/M machines (the first microcomputer operating system to gain widespread acceptance) used the Z80. A few oddballs used other chips, like the Dragon with its 6809, but for the most part Mostek and Zilog were dominant.

The MZ-80K ran its Z80 at 2MHz, which today is the kind of speed computers slow down to in power-saving sleep modes, but it seemed fast enough at the time. What was really strange, though, was that the MZ-80K looked good. This was down to form conquering function. The steeply

Sharp's MZ-80K, a PET clone



raked case was modern but the keyboard was not designed by a typist. Normal keyboards are offset so that the Q and a bit of the W sit above the A, but the MZ-80K was regular, with the Q directly above the A and the A above the Z. This, and the poor feel of the keys, made it difficult to type quickly, but it

was great for games.

The screen was, of course, black and white. Not monochrome, there were no shades of grey; this was 1980. The display was full-size — 40 characters x 25 lines — but games were helped by the inclusion of face and stickman characters as standard. Each character was 8 x 8 pixels, so with the right additional third-party hardware it was possible to address 320 x 200, but doing so was incredibly slow and the necessary hardware expensive.

The base machine had 24kb RAM, which seemed a lot, but the Basic interpreter had to be loaded from tape. The standard SP5025 Basic used 20kb, but 4kb was still adequate for most home programming purposes. RAM expansion took the form of plugging in chips, and it was possible to expand the machine to 48kb, although memory cost £1 per kilobyte. A more radical improvement was a new CPU and switch on the system clock which took the machine to 4MHz. At £549 the MZ-80K compares well with a modern £1,000 486 machine even when allowing for inflation. (Expansion was very expensive, though.) Twin floppy disk drives cost £800 and the crude dot-matrix printer was around £400.

Despite having a good presence in the early market, Sharp failed to capitalise on the situation. The successor to the MZ-80K was the MZ-80A, with a slightly better Basic and a much better keyboard, wasn't such a hit. Nor was the fabulous MZ-80B, a sci-fi-styled business machine (albeit still tape-based) with commands in Basic to rewind, fast forward and eject the cassette. Sharp UK didn't import some of the more exotic machines from Japan, like the MZ-700, a keyboard only machine, and like many of the early machines the MZ-80K has faded into obscurity.



The Mattel Aquarius: what do you expect from a toy company?



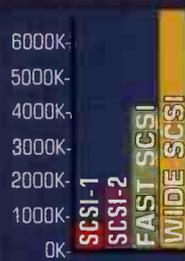
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CHEYANNE	5USER	25USER	50USER	250USER
ARCserve V5	£200	£500	£700	£900

HARD DRIVES

Prices are for internal drives + £75 external

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MICROPOLIS AV	1.0MB	F-SCSI	3MB	9ms	£450
IBM SPITFIRE	1.0GB	F-SCSI	3MB	9ms	£425
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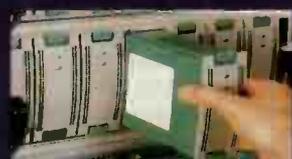
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IBM 0632 + 1 DISK	1.3GB	2MB	£1450
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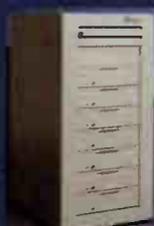
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BOOKS

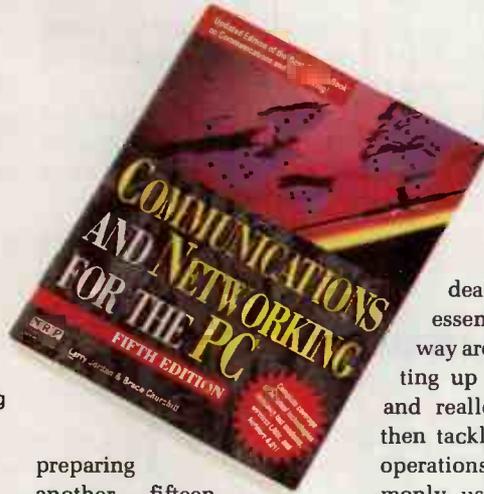
Communications and Networking for the PC

Authors: Larry Jordan & Bruce Churchill
 Publisher: New Riders Publishing
 Price: £27.99
 ISBN: 1-56205-405-8
 Rating: ●●●●●

Let's face it: you can't cram a subject of such never-ending proportions like "communications and networking for the PC" into a single book and expect to have enough room to go into every single important detail. In fact, you'd be lucky if you can go into any detail at all. For a detailed overview of this area you would need an entire library.

As an alternative, this book represents a good abbreviated guide through these areas, devoting up to half a page to most subjects within this field and a full page to crucial themes. Come to think of it, it reminds me greatly of a college manual: these single sips of information are basically useful but they will not make for any kind of linear reading.

The publishers suggest this is appropriate material for intermediate to advanced users. Looking at the topics, that may well be so; but judging by the depth in which the topics are covered, advanced users have an embarrassingly low level of knowledge. Either that, or subjects the size of NetWare, Windows NT and so on are banal and not as complex as computer magazines suggest. Knowing how New Riders Publishing works, it probably means they are



preparing another fifteen books on the subject.

The blurb on the back of the book claims it was written by two communications consultants targeting the needs of professional LAN and data communications technicians. Judging from the style and the content, it looks more like it was written by two technicians for the needs of communication consultants. It's a useful book but not nearly as useful as the rather ambitious title suggests. And I can't wait for the other fifteen volumes.

Jelena Rupnik

Mac Made Easy

Authors: Caroline Bassett & Guy Sneesby
 Publisher: Carlton
 Pages: 144
 Price: £7.99
 ISBN: 1-85797-565-0
 Rating: ●●●●●

Macs are known for their ease of use, so what's the point of having a book to spell out the blatantly obvious? One suspects a cunning plan to attract readers to Mac User, since this book is written by that magazine's former editor and technical editor; but maybe that's unfair.

Stepping through from the startup routines, the book

deals first with the basic essentials of finding your way around the system, setting up your ideal desktop and reallocating memory. It then tackles some interesting operations in the most commonly used applications on the Mac, namely word processing, graphics, databases, spreadsheets and multimedia.

The advice is always easy to understand and to follow, with hints sections covering the more advanced features of whatever is discussed, although the graphics are at times overpowering. There are plenty of screendumps to show exactly how your screen should look while carrying out complicated manoeuvres, and a jargon-free glossary.

However, the information is not always well organised. The cross-referencing, for instance, is sloppy. There is nothing more infuriating than having your imagination spurred by talk of some wonderful shortcut, only to have to hunt through the book to find out

how to perform it. Subtitled "The essential book for the Mac user", this useful little book is perhaps not for all users as old hands will find it too basic. Mac Made Easy is perhaps better dubbed for the new or unadventurous Mac user.

Adele Dyer

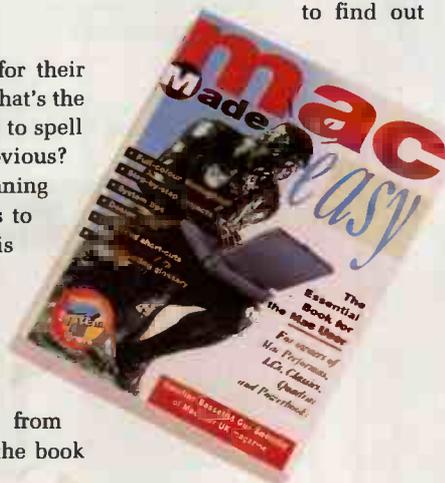
How Virtual Reality Works

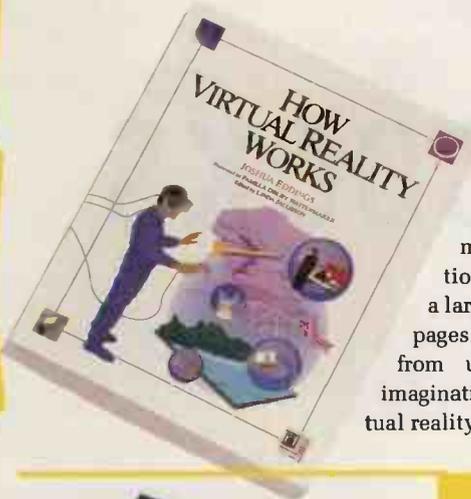
Author: Joshua Eddings
 Publisher: Ziff-Davis Press
 Pages: 155
 Price: £22.99
 ISBN: 1-56276-230-3
 Rating: ●●●●●

With the world becoming an ever more complex place to live in, it is good to see publishers making an effort to explain the complexities simply and graphically. The latest in the "How... Works" series, this book attempts to explain the wonders and technology behind the expanding world of Virtual Reality.

As a large-format book, it should have the edge over standard sized ones as it allows plenty of room for graphics. But while the layout is stylish, it is not always lucid. The text is generally laid out in blocks and the graphics and text do not always match up. Furthermore, the graphics seem only to show rather than explain the processes.

For instance, the text concerning LCD shutter glasses is accompanied only by a graphic pair of goggles. What I expected from this series was a step-by-step guide to how the image is formed and the 3D effect created.





Despite this niggle, the book does contain a lot of useful information in manageable portions even if there are a large number of blank pages. It takes the reader from using the human imagination as a built-in virtual reality tool through tech-

nology currently under development, to the William Gibson-inspired world of future cyberspace. The uses cover the merely recreational, the socially important, the financially valuable, and the darker side of VR stemming from its military roots.

This is a good book for beginners. Its value lies in telling the reader what VR is

and what it will be able to do. However, its title is misleading as it does not show how it really works. There are no worked examples and the graphics work more as icons than as informatics.

At half the price *How Virtual Reality Works* would be a good purchase for a school library; at nearly £23 it is not.

Karl Dunkerley

COMPARATIVE REVIEWS

Visual C++ 1.5

Master Visual C++ 1.5

Authors: Ori Gurewich & Nathan Gurewich
 Publisher: Sams Publishing
 Pages: 1,352
 Price: £45.50 (with CD-ROM)
 ISBN: 0-672-30468-6
 Rating: ♂♂♂♂♂

Visual C++ Programming

Author: Steven Holzner
 Publisher: Brady
 Pages: 556
 Price: £36.95 (with disk)
 ISBN: 1-56686-142-X
 Rating: ♂♂♂♂♂

Lean & Mean Visual C++

Author: Brian Overland
 Pages: 502
 Price: £18.50
 ISBN: 1-56686-135-7
 Rating: ♂♂♂♂♂

Using Visual C++

Author: Namir Shamma
 Pages: 964
 Price: £37.95 (with disk)
 ISBN: 1-56529-625-5
 Rating: ♂♂♂♂♂

Inside Visual C++ version 1.5

Author: David Kruglinski
 Pages: 732
 Price: £34.95 (with CD-ROM)
 ISBN: 1-55615-661-8
 Rating: ♂♂♂♂♂

For professional Windows developers, C++ has become one of the most popular programming languages. The language provides high-level programming constructs that allow complex algorithms and data types to be created, and yet still enables low-level access to the underlying operating system. Moreover, C++ Class libraries such as the Microsoft Foundation Class (MFC) library, part of Microsoft's Visual C++ development package, can be used to hide many of the complexities associated with Windows, providing a framework that can be used for application development.

Though its object-oriented capabilities make C++ a powerful development tool, programmers need an in-depth understanding of the language and object-oriented design to realise its potential fully. In the case of Windows programming using Visual C++, it also requires a good knowledge of the MFC. Good books on the subject are, unfortunately, few and far between. The five books reviewed here are all aimed at programmers with some degree of proficiency in C++, looking to program for Windows in C++ using Microsoft's Visual C++ compiler. As Microsoft's C++ programming paradigm is built firmly around MFC, all the books focus primarily on the class library, although some also cover the tools that make up the Visual C++ development environment.

The first of these is *Master Visual C++ 1.5*, which takes the current trend of providing disks with computer books one step further by including a CD-ROM which contains a variety of video and audio tracks, which run to several megabytes. This, and the book's bias towards multimedia development, separates it somewhat from the other books in this review, though it is still very much a general introduction to Windows programming. Given that





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the book runs to over 1300 pages, the depth of coverage is disappointing. The excessive use of trivial screendumps, the clumsy way in which code segments are highlighted using comment lines, and the rambling nature of the step-by-step instructions, are mostly to blame. A lot of the relevant information is there; it is just difficult to access in a concise form. The book's main redeeming feature is its multimedia coverage. In addition to the source code samples, the CD-ROM holds a variety of bitmap images, audio and video sequences, with enough material to interest anyone wanting to explore sound and video under Windows.

Unlike most other Visual C++ books, *Lean & Mean Visual C++* attempts to distill the key elements of Windows programming into a concise programming guide. The text covers the Visual C++ programming environment, the C++ language, and Windows programming using the MFC. The book is short on code samples and there is no accompanying disk. Instead, it is a pot-pourri of step-by-step pointers, reference tables, tips and general discussions about Visual C++. The result is a strange concoction that makes for interesting reading yet is ultimately too haphazard to be of real use. Its brevity makes it unsuitable as the main text for a novice, and for the experienced developer, the vast wealth of online help is a more obvious place to look for advice and help. Notwithstanding that, there would be few programmers who would not find a few interesting pieces of information within its covers.

In a more traditional vein, *Using Visual C++* is aimed squarely at C++ programmers using the Foundation class libraries for their Windows development. A small footnote on the back cover indicates that the book is applicable to Visual C++ 1.0 and 1.5, though the text doesn't address OLE 2.0

and ODBC, the key elements of version 1.5. The book is over 900 pages long and adopts a fairly dense format, packing in a fair amount of information. The text narration is not particularly clear, despite pitched at about the right level for C++ programmers using the MFC. Arguably, too much of the text is source code listing which, while commented, proves heavy going. Worse of all is the non-standard format for the listings, in which header files are merged into the main body of the listing and little use is made of the application and class wizards, negating some of the most powerful features of the Visual C++ development environment. If the whole presentation were revamped, this would be a much more approachable guide.

The revised and updated *Visual C++ Programming* boasts coverage of OLE 2.0, but it devotes only a small part of the text to it and that is fairly lightweight. Apart from this weakness, this is a reasonably well balanced introduction to the MFC, adopting a tutorial-style approach which makes reasonable use of diagrams and code fragments. As the book is

a little over 500 pages it does not attempt to cover the Visual C++ development environment, focusing instead on developing applications. The main downside is the limited depth of discussion, which though informative, often does not cover subjects in as much depth as the Microsoft material supplied with the Visual C++ compiler. This ultimately restricts it to an alternative introductory guide, rather than a supplement to the core Microsoft documentation.

Finally, there is the second edition of Microsoft Press's highly successful *Inside Visual C++*, which has been updated to cover version 1.5. As with most of the other books here it focuses on the MFC, but what really separates it is its breadth and depth of coverage. Author David Kruglinski worked with the Microsoft development team when writing the book, and this comes through in the authoritative writing style. The format of the text is a tutorial which works through the foundation class library, gradually building more complex and sophisticated applications. The pace is good, with plenty of hands-on examples, and there

is a CD-ROM which holds all the code samples. Apart from a general update to the first edition, which tightens up the main text, this new edition now covers ODBC and OLE, and although the coverage amounts to less than 50 pages, the OLE automation material is one of the best introductory guides around, providing an excellent starting point for programmers.

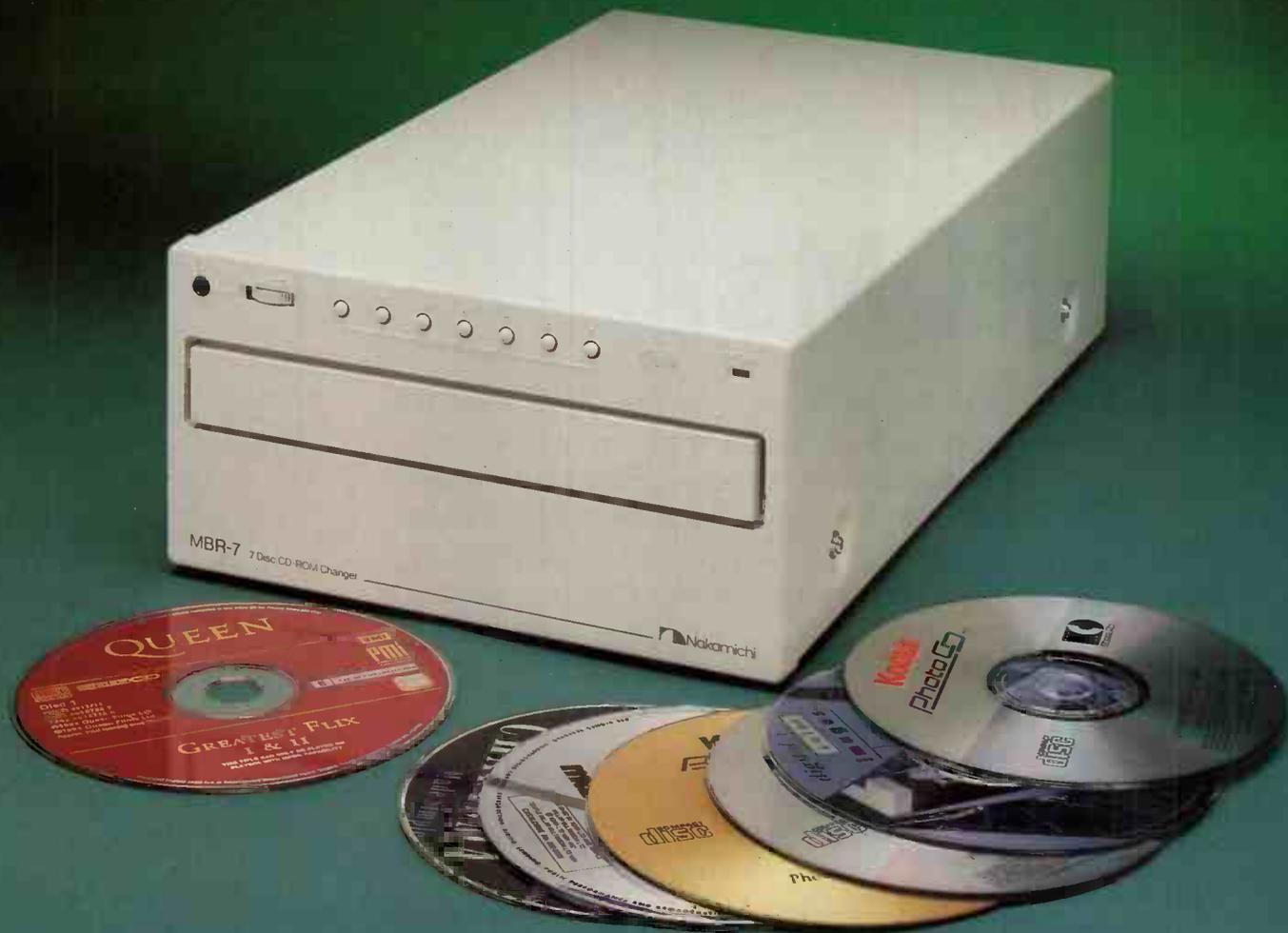
Learning to use Visual C++ is a task that requires expert guidance. The definitive guide is still *Inside Visual C++ 1.5* from Microsoft Press. None of the other books reviewed here add much that isn't already covered by this text, and all fall short in terms of breadth and scope. This is particularly disappointing given that all of them have been supposedly updated to cover version 1.5, yet none really tackle OLE and ODBC, the two key elements in this release. There are plenty of good books on the C++ programming language, and the best advice is to buy one from the likes of Bjarne Stroustrup, Stanley Lippman, or Bruce Eckel, rather than one that simply has the words "Visual C++" in the title.

David Gristwood

TOP TEN BOOKS : DECEMBER 1994

Author	Title	Publisher	Price	This	Last
Schulman, Andrew	Unauthorized Windows 95	IDG Press	£28.99 (£38.99 with CD & Disk)	1	—
Schofield, Sue	The UK Internet Book	Addison-Wesley	£19.95	2	2
King, Adrian	Inside Windows 95	Addison-Wesley	£21.95	3	1
Krol, Ed	The Whole Internet: User's Guide & Catalog, 2nd Edition	O'Reilly	£18.50	4	—
Kruglinski, David J	Inside Visual C++, 2nd Edition with CD-ROM	Microsoft Press	£34.95	5	3
Kent, Peter	10 Minute Guide to the Internet	Alpha	£9.95	6	—
Jennings, R	Database Developer's Guide with Visual Basic 3 (Book/Disk)	Sams	£41.67	7	5
Gurewicz, N & O	Teach Yourself Visual Basic 3 in 21 Days	Sams	£22.95	—	4
Jennings, Roger	Access 2 Developer's Guide (Book/Disk)	Sams	£41.67	—	7
Levine & Baroudi	The Internet for Dummies	IDG	£17.99	10	6

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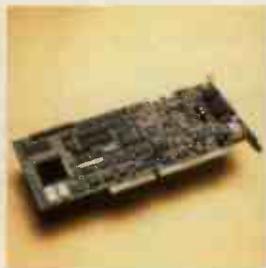
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CD-ROMs

So: Anthony Eden is Prime Minister, Tony Blair doesn't exist, and radar had nothing to do with the Battle of Britain, right? These are just some of the pearls from four of the latest CD-ROM encyclopedias — three from the US, and one from Blighty. David Brake found them quite entertaining, but no match for the Britannica.

It's time to take another look at multimedia encyclopedias, now that all the major publishers have sent us their new editions. There are four main contenders: Grolier's 1995 Multimedia Encyclopedia, Microsoft's Encarta 95, Compton's Interactive Encyclopedia 1995 and the new Hutchinson Multimedia Encyclopedia.

Encarta 95 is the best presented and coming from Microsoft it is inevitably the best marketed. Many people will end up with an encyclopedia because it has been bundled with their PC or CD-ROM drive of their choice, and Encarta looks like the most popular choice for bundles, though the Grolier comes with Creative Labs' CD-ROM kits.

I reviewed Encarta 95 in February and criticised it heavily for its American bias, but to my dismay I have discovered that the other American-based discs appear little better. Compton's was the only one of the three American discs to have an entry on the Channel Tunnel, for example, but it was hardly impressive. It read, in full: "Channel Tunnel, underwater tunnel that links England and France by rail".

Presentation

Take it for granted, then, that for the "big three", the world starts getting hazy east of Man-



hattan. How do they compare? It's easiest to compare the way they look. Encarta used to have a striking edge over the others in the amount of multimedia material available and the quality of its presentation. This gap has narrowed, but it is still visible.

It is hard to put my finger on exactly why I prefer Encarta's interface to, say, Compton's — it just feels more polished. Of course, Windows veterans may find it difficult to get to grips with Encarta's new way of doing things, but sooner

or later they will have to: the disc is the first glimpse many people will have of the way Windows 95 will operate.

The Grolier encyclopedia is the weakest in its use of multimedia. Although its interface has improved in the last few years, you still get the impression that multimedia elements are bolted onto the disc rather than being integrated with it. Its Knowledge Explorer nar-

rated slide shows give good, but brief, overviews of historical periods and major topics. It's a pity there are only 18 of these. The Pathmakers are an even better idea, an attempt to personalise the contents by having American celebrities show users to their particular favourite entries. This could have been developed much further; as it is there are only six Pathmakers, each of which gives a brief video interview and ten-second voice clips introducing each of three items.

While Grolier's features the highbrow Kurt Vonnegut Jr, Compton's has signed up a real crowd-pleaser — Patrick Stewart, aka Captain Picard of Star Trek, the Next Generation. He doesn't add much to the value of the disc, though, being no more than a talking head reading out the online help and doing an introduction to the disc's features. The whole of Compton's has been given a facelift and some innovative features have been added, particularly in the area of navigating around the information. You can search through the data by article, of course, and follow the Topic Tree for information by subject area, but there is also an InfoPilot option which shows you graphically a selection of articles linked to the one you are currently reading, and a new Explore function which lets you choose one of four "rooms" which provide animated, clickable interfaces to various encyclopedia functions including "today in history".

The cleverest feature, one I have only seen on one other disc, is the Editing Room, which allows you to take pictures, articles and other multimedia elements and combine them with titles and recorded

sound to make a presentation — ideal for doing “show and tell” at school.

It's a pity that Compton's also has the worst of the search tools for finding text within articles. It is easy to use, and has a certain amount of artificial intelligence built in, but it doesn't give you enough control: you can't, for example, ask it to only match “channel” and “tunnel”. You just type in a word or phrase and it will attempt to find articles which match. This can result in too many matches and some silly results. Ask “Who is the Prime Minister of Britain?” and top of the list is Anthony Eden — for some reason John Major doesn't even make the list (although he does have an entry).

The original Hutchinson's was never competitive. It had an old-fashioned interface and crashed too often. It disappeared for a year or two and has been replaced by a much improved product which, like Compton's, nearly gives Encarta a run for its money as far as the prettiness of its interface is concerned.

Content

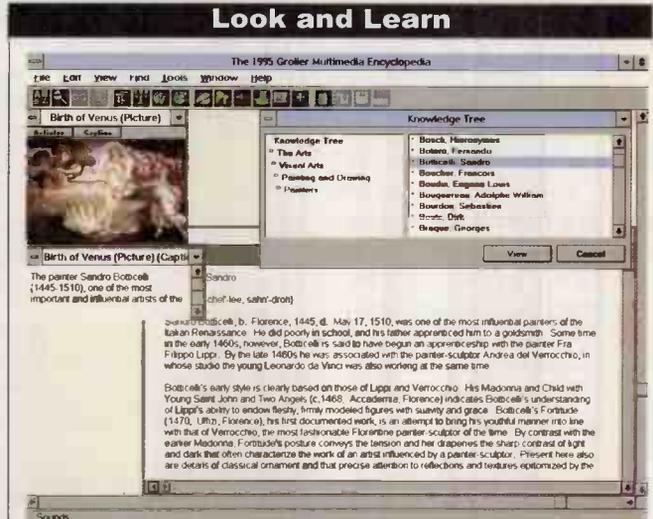
Presentation is important, but for all the gloss on each of these CDs, what matters most is the quality of their content, which for the most part means the text, un-glamorous though it is. Even the 8,000-plus pictures most of the discs share, for example, can only illustrate a small proportion of the items covered, and it will be a

long time before such encyclopedias can offer animations, videos and maps for even the majority of the entries in them.

With all of human life to cover, it was difficult to choose representative topics for testing, but each of the five subjects examined illustrated the strengths and weaknesses of the CDs as reference works. Sadly, we're mostly talking weaknesses here. I don't think I'm being hyper-critical when I observe that in nearly every case the discs' responses to the queries I posed ranged between adequate and abysmal. Of course, I wasn't playing to their strengths. Ask any one of the three American discs about, say, Richard Nixon or the American Civil War and you'll get all the details you need. Try to find out about European issues, though, and you get the barest outline of the facts. The biography of Martin Van Buren, the eighth American president, in Encarta 95 is more than twice the length of Thatcher's and more than four times the length of Major's. This should give some idea of the extent to which the “special relationship” between Britain and the USA has declined. Both Compton's and Grolier's offer significantly better coverage of British domestic politics.

Hutchinson is based on a British encyclopedia and, as such, is much better on such matters. It even had a couple of paragraphs on Tony Blair (whom no other encyclopedia even mentioned).

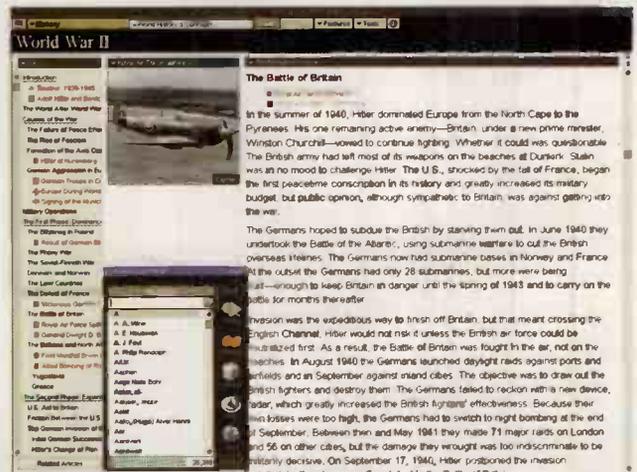
Hutchinson's coverage of The Battle of Britain was worse even than that of the Americans. It didn't have a single picture, and its coverage failed to mention the importance of radar to the outcome of the battle. You would



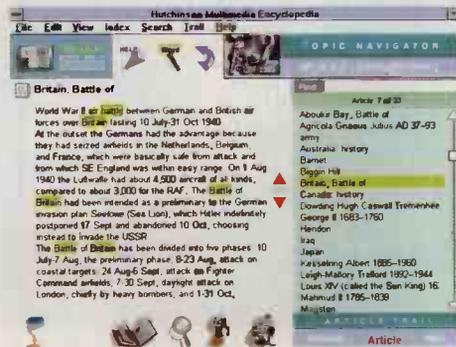
Although it has a similar amount of multimedia content to other discs, Grolier's interface looks old-fashioned



It's always a pleasure to see old chrome dome, but he doesn't add much to the sum of human knowledge in Compton's



Encarta's Windows 95-like interface can take a little getting used to, but for my money this is still the most visually appealing encyclopedia



The Hutchison interface is appealing, though it cannot be customised

think that coverage of an international topic like science would be good, especially something like novae — plenty

of room for pretty pictures and even animated explosions, perhaps? But I ran the results past some astronomer friends of mine and they hit the roof. They weren't just simplistic, they were often inaccurate, too. They particularly disliked Encarta's explanation of how novas happen, and they weren't too happy with what Compton's had to say, either (which isn't surprising, since it was the only one of the three not to have a separate entry for novas). Hutchison's was correct, but rather sketchy. Only Grolier's entry was really satisfactory.

So which one should you choose? None of them stand up well to close examination, and certainly none is a "must have". Each has its strengths but Grolier appears to have the best text and should therefore be the CD of choice, despite its slightly antiquated interface and higher price. Hutchison's is cheaper and has better European coverage than the others, but the individual entries are

Comparison of Features

CD	Compton's	Encarta	Grolier	Hutchison's
No. Pictures	> 8,000	> 8,000	> 8,000	3,500
No. Articles	> 35,000	> 26,000	> 33,000	> 34,000
Atlas	Yes	Yes	Yes	Yes
Dictionary	Yes	Yes	No	Yes
Quiz	No	Yes	No	Yes
Timeline	Yes	Yes	Yes	Yes
Test articles:				
John Major				
Coverage (words)	219	136	237	424
Quality	Fair	Poor	Fair	Fair
Multimedia	None	None	Picture	2xpics + sound
Eurotunnel				
Coverage (words)	66	306	93	144
Quality	Poor	Fair	Poor	Good
Multimedia	None	Picture	None	2x pics + chart
Novas				
Coverage (words)	238	407	316	99
Quality	Poor	Poor	Fair	Poor
Multimedia	None	Picture	None	None
Japan (politics)				
Coverage (words)	393	159	247	215
Quality	Good	Fair	Fair	Fair
Multimedia	None	None	None	None
Battle of Britain				
Coverage (words)	382	402	452	204
Quality	Poor	Fair	Poor	Poor
Multimedia	Picture	Picture	2 pictures	None

shorter in most cases than those in the American discs. It's hard to pick a winner between Compton's and Encarta. Encarta's interface is more polished, but Compton's has some useful features which Encarta lacks. The text content on both is erratic enough to stop me recommending either, except as a recreational tool.

PCW Details

Compton's

Contact: Computer Manuals

0121 706 6000

Price: £59

Rating: ●●●○○

Encarta

Contact: Microsoft

01734 270000

Price: £70 (approx)

Rating: ●●●○○

Grolier

Contact: Mindscape

01444 246333

Price: £85.09

Rating: ●●●●○

Hutchinson's

Contact: Attica 01865 791346

Price: £49.95

Rating: ●●●○○

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256KB Cache 64-bit Memory	yes	yes	yes	yes	yes
730MB 13ms IDE Hard Drive	yes	yes	yes		
2 GB Audio/Visual SCSI Hard Drive				yes	yes
3.5" 1.44MB Floppy Drive	yes	yes	yes	yes	yes
Double Speed CD ROM Drive (VideoCD compatible)		yes	yes	yes	yes
16-bit Sound Blaster Sound Card with Speakers		yes	yes	yes	yes
MPEG Master MPEG/ VideoCD Decoder		yes		yes	yes
Choice of metal Desk-Top or metal Mini-Tower case	yes	yes	yes	Mini-Tower	Midi-Tower
Spare PCI & ISA slots	yes	yes	yes	yes	
2 Serial Ports, 1 Parallel Port, 1 Controller Port	yes	yes	yes	yes	yes
High-Performance PCI Local Bus graphics card 1MB RAM	yes	yes	yes	yes	yes
15" High Resolution FST SVGA Colour Monitor	yes	yes	yes	yes	yes
Professional Keyboard and Mouse	yes	yes	yes	yes	yes
MS DOS 6.2 Windows for Workgroups 3.1 (loaded)	yes	yes	yes	yes	yes
Internal Nikon 35mm film scanner (to 2,700 dpi, 24-bit colour)			yes		
Internal Yamaha CDR100 Quad Speed SCSI CD Recorder				yes	yes
WinOnCD To Go - CD recording software (loaded)				yes	
VideoPack - VideoCD recording software (loaded) + full WinOnCD				option £1,398	yes
OPTIVision real-time MPEG Encoder/ VGA Decoder				option £9,669	yes
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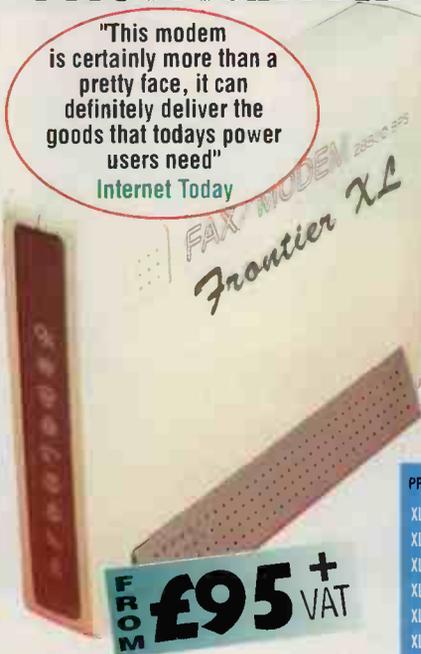
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XL14E Frontier XL V.32bis External faxmodem	£99
XL28I Frontier XL V.34 Internal Faxmodem	£185
XL28E Frontier XL V.34 External Faxmodem	£189
XL14M Frontier XL V.32bis Apple Mac Faxmodem	£99
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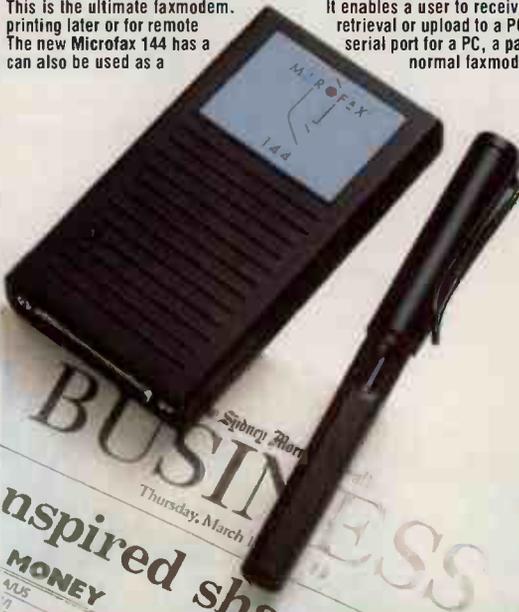
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A Revolutionary New FaxModem The Microfax 144

This is the ultimate faxmodem. printing later or for remote. The new Microfax 144 has a can also be used as a

It enables a user to receive faxes directly to a printer even with the PC off. It also stores faxes for retrieval or upload to a PC.

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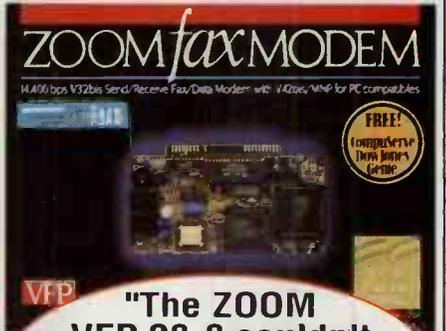
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Kids' Stuff

Armed with an Amazing Dictionary, Paul Begg experiences the hard life aboard an 18th century Man-o'-War, joins a safari, and faces up to robots in his travels through this month's Kids' Stuff.

Stowaway

The creaking of the wood, the booming noise of the wind, shouted instructions or barked orders; poor food, poorer water, and from time to time the crash and thunder of a fight and the bloodcurdling cries of the wounded. Life can be hell in the PCW office.

Only joking. But of course you guessed that. What I'm really describing are the sound effects that accompany your tour aboard an 18th century warship in Stowaway.

Based on Stephen Biesty's bestselling book *Incredible Cross-Sections: Man-o'-War*, the disc is essentially a series of exceptionally detailed cut-away drawings of what went on aboard a warship in the days of sail. Each drawing is accompanied by a short explanatory text which guides you to other topics of interest, and sometimes narration is available. All is backed by sound effects such as those mentioned above.

Searching the vessel deck by deck is a simple matter of clicking an icon, as is returning to earlier screens or moving from the blunt end to the pointy bit. And you can copy the screen or export the text to a word processor for incorporation in a school essay.

There's also a game in

which you have to explore the ship to find the stowaway, but the game is so cleverly integrated that children can easily forget they are playing it as they get engrossed in the daily, dangerous and often bloody doings aboard ship.

There are over 400 screens and pop-ups (giving more in-depth information), 500 illustrations, 200 animations and two hours of audio. All this adds up to great fun with an unusual but fascinating topic.

PCW Details

Stowaway

Price £49

Contact Dorling Kindersley
0171 753 3593

Good Points The subject matter makes a change and almost everything else is excellent.

Bad Points The animation needs beefing up a bit. I'd like several animations to each picture.

Conclusion An excellent disk which still has room for improvement, but it seems churlish to criticise.

System Requirements Windows/MPC (Mac version available) 386SX or higher; Windows 3.1 and DOS 3.1 or higher; 4Mb RAM; 256-colour SVGA monitor; Windows supported sound card; CD-ROM drive; mouse.



Stowaway: Learn about life under sail, but there should be more variety to the animation

My First Incredible, Amazing Dictionary

One problem this month has been selecting just a few programs from a large pile that have generally proved superb. Indeed, so good is some of this stuff that the danger is that the less visually stunning but nevertheless solid and valuable stuff gets pushed aside. This said, I must draw your attention to the discs coming from Dorling Kindersley (DK), of which Stowaway was one. Not only are these discs distinguished by a clean, bright interface, brilliant colours and ease-of-use; they are also British.

But don't think patriotism is running away with me. Dorling Kindersley's being British is important because its discs contain British spellings and pronunciation. This is particularly important with a disc like *My First Incredible, Amazing*

Dictionary. Designed for children aged three to seven (although I think it could still be useful for children aged a couple of years above that upper limit), it contains definitions for 1,000 words, is very simple to use, and is one of the nicest children's dictionaries I've come across.

At the top of every screen is the alphabet. Clicking one of the letters produces a window listing the words which start with that letter. Click on a word and a screen is displayed with a short and easily comprehensible definition of that word. The definition generally contains other red-highlighted words (clicking on anything red produces a result) and clicking on these takes you to a pronunciation and an icon-like picture. Click on the picture and you are taken to the definition of that word. This encourages exploration.

The definition screen also contains a picture. Clicking on the picture produces a sound



effect and often an animation. The animations are very basic, though not without a subtle charm and wit. Unfortunately, the animations don't vary. While young children like and need repetition, older children will enjoy and even laugh at a wet dog shaking itself dry the first time, but after three or four times the animations in Amazing Dictionary soon look less enticing than Sonic or Doom. Given the money involved, you don't want your children getting bored too quickly.

As mentioned above, words are pronounced and the definitions are read out, so Amazing Dictionary can be used by children who can't read or for whom reading is only a recently acquired skill.

There are three games: a simple matching game called What's That Noise in which children must select the picture of

My First Incredible, Amazing Dictionary: Choose a picture to learn more about the word, how to spell it and what it means

the animal that made a noise; Spell It, which is self-explanatory, but takes the drudgery out of learning to spell by providing clear pronunciation; and Guess What, in which you have to answer simple word questions. A very nice disc.

Other titles so far released by DK are The Ultimate Human Body, Encyclopedia of Science, and The Way Things Work. If you get the chance, check them out.

Professor Iris' Fun Field Trip: Animal Safari

The Muppet-like Professor Iris features on The Discovery Channel and The Learning Channel. Here he is with friends Ms Principal (who teaches reading and spelling), Plant (a pot plant who's the guide to colouring), Piano (your host to music and movies) and Skeleton (who pops out whenever you knock on his door). There's a colouring book and games (during which Professor Iris teaches quite a few facts; my daughter is a little old for this program, but even she came away from it with some new knowledge), and Ms Principal's reading and writing lessons. There's also a selection of reasonably long videos, these being a fair balance between extracts from Professor Iris' TV appearances where he sings with other characters, and wildlife movies.

The main screen, though, is a picture. Clicking on practically anything in the picture produces an animation, dialogue

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PCW Details

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Good Points Almost everything is superb.

Bad Points I'd have more (and better) animation.

Conclusion Value for money, help with what words mean and how to spell them... this has to be one of the first disks you look at.

System Requirements
Windows/MPC (Mac version available)
386SX or higher; Windows 3.1 and DOS 3.1 or higher; 4Mb RAM; SVGA 256-colour; Windows supported sound card; CD-ROM drive; mouse.

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or sound effect. Some animations are quite fun, like a little figure sliding down a pyramid, and you can choose the dialogue to be read in English, Spanish, French or Japanese!

I found Animal Safari a little repetitive, but it is intended for children aged three and up (I would guess that seven is about as far "up" as you can go) where repetition is important. My only concern is that the whole thing could have been done on video and cost a quarter of the price, though video doesn't have the interactivity and doesn't teach keyboard, mouse and computer skills.

It is almost impossible to quantify star quality, that special something which one either has or hasn't got.

PCW Details

Professor Iris' Fun Field

Trip: Animal Safari

Price £44.95

Contact Computer Manuals
0121 706 6000

Good Points Enough to do to keep young children amused.

Bad Points Given the average specs of a home computer, the program runs like glue. Also a little buggy in the drawing section.

Conclusion Tries to be many things and just about succeeds. Could be better.

System Requirements
486SX or higher processor,
8Mb RAM (recommended),
Windows supported sound
card; CD-ROM drive; mouse.

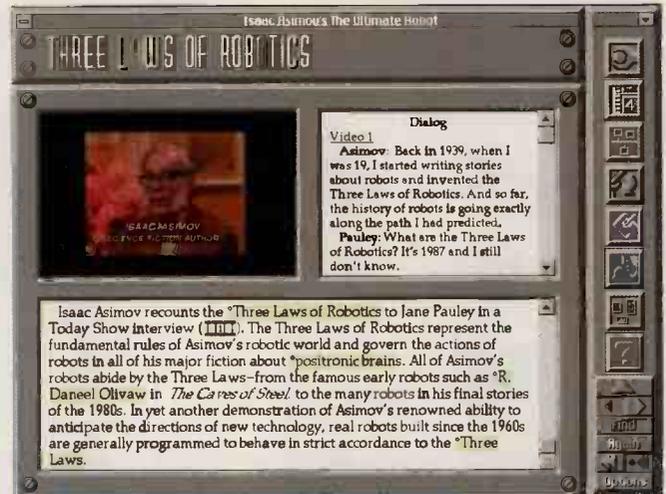
Arthur's Teacher Trouble in the Living Books series has it; Animal Safari hasn't. This is not to say the disc is bad. It isn't. It just doesn't have the charm or the wit of Arthur. Otherwise, it's worth taking a look at — but beware, it is heavy on system resources; even on my machine, which meets the minimum spec, it ran slowly.

Isaac Asimov's The Ultimate Robot

I think I was introduced to "real" science-fiction through the novels of Isaac Asimov, particularly his robot stories, and in my teens and pre-teens I would recite the Three Laws of Robotics to anyone who stood still long enough for me to do so. Isaac Asimov's The Ultimate Robot was therefore a sheer indulgence for me and will delight anyone (young or old) who has any interest whatsoever in robots.

The disc contains over fifty of Asimov's stories and writings about robots. There's a goldmine of fantastic cover art from Asimov's books and original magazines that featured his tales. And there's video of Asimov himself, explaining his Three Laws and talking on related topics.

On top of all this, you can track robots from the fictional to the real. There are film clips from classic sci-fi movies such as Metropolis, Forbidden Planet and Star Wars, award-winning computer animation,



The Ultimate Robot: Science-fiction nostalgia takes you back to the future

and real-world robots. You can build your own robot by selecting the parts — all drawn by Ralph McQuarrie, who designed the robots for Star Wars — and putting them together. You can even turn robot images into screensavers.

Hidden among the fun is a lot of serious stuff. There are explanations of many aspects of real-world robotics, such as the principles of robot motion and industrial robotics.

When first released for the Mac, Isaac Asimov's The Ultimate Robot was criticised for several deficiencies, most notably its inability to copy material from the disk to another program such as a word processor. These failings have been corrected in time for the Windows release.

To be honest, I haven't had

as much time to play with The Ultimate Robot as I would have liked — this column would never have been written — but what I've seen I've liked. Well worth grabbing a look at.

The Ultimate Robot comes from Byron Preiss Multimedia but is sold under the Microsoft Home banner. Also from Microsoft is Ancient Lands, a winner for anyone who wants to walk in the Coliseum, wander among the pyramids or live with the gladiators. I'll warmly recommend any good title that brings history alive. Microsoft has brought out a special edition featuring UK spelling and narration. Jolly good show. **PCW**

PCW Details

Isaac Asimov's Ultimate Robot

Price £45 approx
Contact Microsoft
01734 270001

Good Points Jam packed with stuff to explore and all Asimov's robot writings.

Bad Points You have to be into robots to find this of lasting fun.

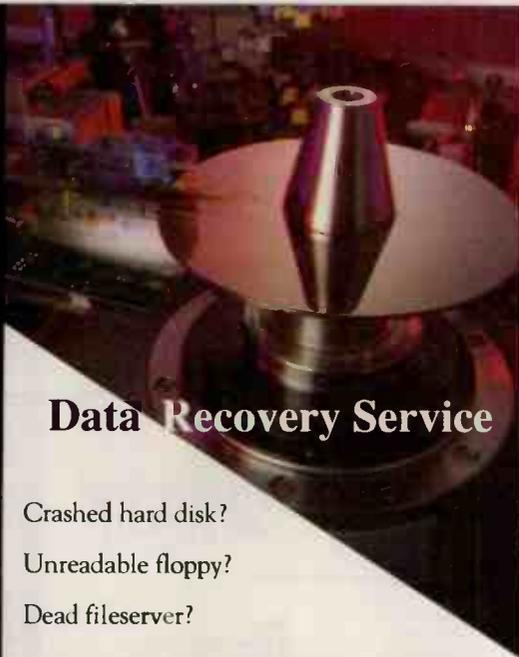
Conclusion A novelty disc that's difficult to assess. Asimov wrote in the forties and fifties, and it's difficult to know whether older kids will find him relevant — on the whole, though, greatness survives fashion.

System Requirements
386SX or higher, 4Mb RAM (recommended), 1 to 3Mb hard disk space, Windows supported sound card; CD-ROM drive; mouse.



Fun Field Trip - Animal Safari

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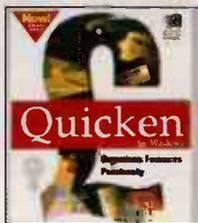
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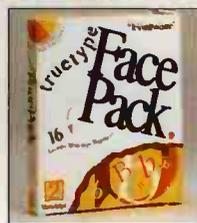
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screenplay NEWS

Cyberia sees the light of day



After two years in development and more than \$2 million investment, Interplay has released Cyberia. It's another cinematic adventure set in a time many years from now where global terrorists rule and mankind lives on the brink of destruction. The game features full-screen, full-motion video and some of the best action sequences to hit the PC. Cyberia is available on PC CD-ROM priced £49.99.

Interplay 0235 821666

Mission accomplished for a tenner

Once you check out Descent on this month's cover CD, it won't be long before RSI sets in with all the keys you'll have to master. So maybe it's time you bought yourself a joystick. The PC Mission is the latest handstick to hit the streets and will only set you back a tenner. It's got everything from an extra long grip to two fire buttons and X,Y axis trim controls. What more could you ask for? Spectravideo 0181 900 0024

Looking Glass makes you sick

Looking Glass Technologies, those clever chaps responsible for Ultima Underworld, and more recently System Shock, are about to release a flight sim so realistic that they're thinking about supplying air sickness bags with the product.

What makes Flight Unlimited different from other flight sims is the technology used for constructing terrains. Instead of relying on polygon graphics, five locations across America have been aerial photographed, digitised and texture mapped to produce the most realistic views possible.

Having learned the basic flying procedures, your in-flight aerobatics instructor takes you through 25 heart-stopping stunts, assessing your skills along the way. When you feel up to it you can attempt the race courses which take you down through deep canyons, nearby jagged mountains and many other pretty scary places. I'm even looking forward to this one myself!

Flight Unlimited will be available in March for PC CD-ROM. Price to be arranged. Virgin Interactive 0181 960 2255

All Mana of things from Nintendo

Nintendo's compelling role-playing adventure game, Secret of Mana, has finally been released in the UK after breaking all records in Japan and the States. It has been released exclusively for the SNES and is tipped to become one of the all-time greats.

The one force that keeps a balance between good and evil throughout the universe is the Mana tree, but someone has disturbed it. As a result, evil is now spreading throughout the land.

As the chosen warrior, you must free our land of evil. Sounds easy enough, doesn't it? You do so by searching the land for eight Mana seeds. Only when all eight have been found will you restore the balance to our world. On your quest you will visit some pretty gruesome places and meet some of the scariest characters ever to be shown on your screen.

Secret of Mana is available now priced £39.99

Nintendo 01703 652222



Screenplay

Klik & Play

So you think you can improve on Donkey Kong? Steven Helstrip creates his own game using the new Windows authoring tool.

Until now, games programming has been left to those with the know-how: people with millenniums of programming experience and just as much time to spend writing code. If you've tried creating the ultimate shoot 'em up lately, you'll have some idea of why this situation has persisted for so long. But help is finally at hand with Klik & Play, which should unravel some of the complexities of programming.

Klik & Play is a Windows-based authoring tool for creating games to run under Windows. As it's capable of combining sound, graphics and animation, it can be used to create multimedia presentations in much the same way as a presentation graphics application. The core engine enhances the Windows graphics speeds and provides access to extra colour palettes. Up to four sounds can be played simultaneously rather than the usual one.

Often, the hardest part of games creation is developing sprites, graphics and backdrops for the scenery you require. While you can still do this, thousands of objects are thrown in for you, from lost cities to fantasy lands and from swashbuckling pirates to giant blood-sucking ants. There are also several hundred sound effects (WAV files) and sound

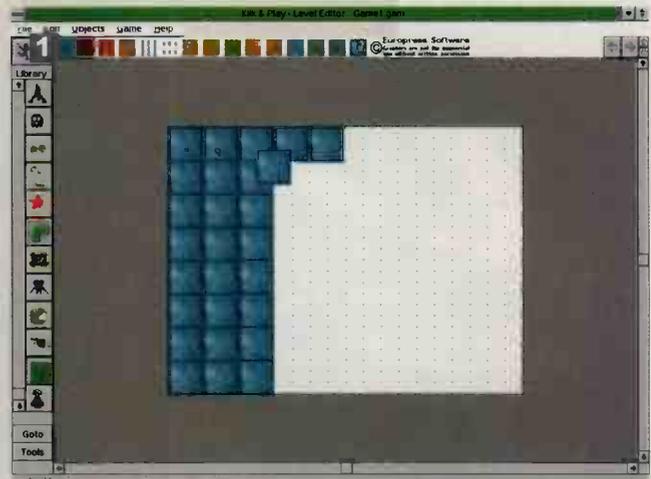
tracks (MIDI files) to add the finishing touches. The CD-ROM version contains more graphics and sounds than the floppy version, which justifies the £5 extra cost.

Once Klik & Play has been installed, a utility checks for compatibility between your graphics card and Klik & Play's video drivers. If there are problems, standard Windows drivers are used. I didn't have any problems using a Diamond Stealth64, so speedy graphics were on the menu.

The entire package is mouse-driven. Once you're in the package a basic menu presents you with the option to play a game, modify a game, create a game or run the tutorial. The video tutorial takes you through the steps for creating a simple Breakout game, only this rendition uses a boy on a skateboard for the bat, with tin soldiers and spinning tops as the bricks. It doesn't show off the application to its full advantage, but gives some idea of how quick and easy it is to piece together a game.

What types of games can you create?

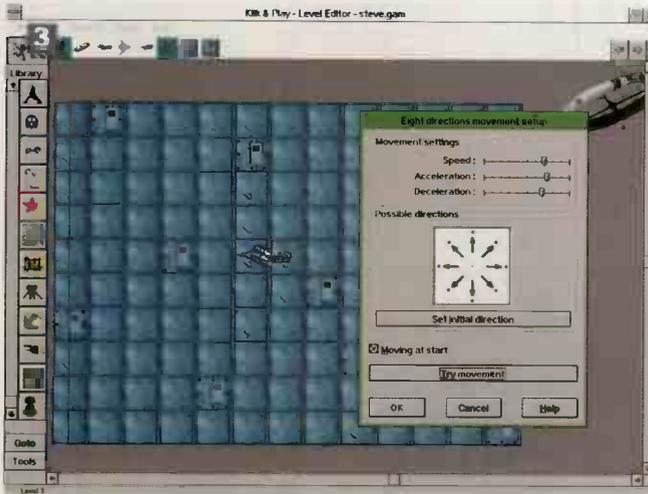
Although 3D is expected in version 2, Klik & Play is currently limited to two-dimensional programming. That means Doom-type games are definitely out. Scrolling is also



1 First, select a suitable backdrop from the object library. I chose Metal Plate from the textures category, tiling each bitmap to create a futuristic environment. In the Preferences menu is a snap to grid facility which helps when it comes to lining up objects neatly. Once objects are placed in the play area they can only be repositioned with the mouse. This is one of a few niggles: I would much prefer to use the cursor keys for greater accuracy.



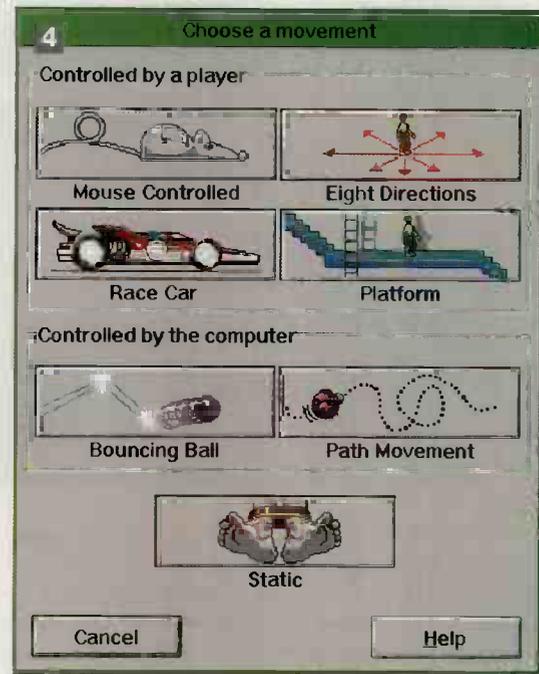
2 Having designed or positioned the backdrop (a non-active object) I selected a ship for the player and three spacecraft for the bad guys (active objects). As with the backdrop you simply drag the objects into the play area, or just outside should you not want them visible at the start of the game. Many of the sprites are animated. For example, the ship chosen for the player is made up of three frames to show animated flames coming from the ship. A built-in utility allows you to create your own animations or edit those supplied. Both FLI and FLC animations can be imported.



3&4 Once you have selected your active objects, you need to give them something to do. The player's ship needs to be controlled using the cursor keys. As most space ships these days come loaded with laser-guided missiles, we'll be needing some of those too.

Clicking the right mouse button over any object brings up a menu with options to edit the movement, animation and object size. The movement panel has submenus to apply a specific movement to an object. For the player's ship I chose eight-directional movement. As well as the number of directions, you need to set acceleration, speed and deceleration rate. This is all straightforward, done within the same dialogue. You can try and edit your movement before committing it to an object.

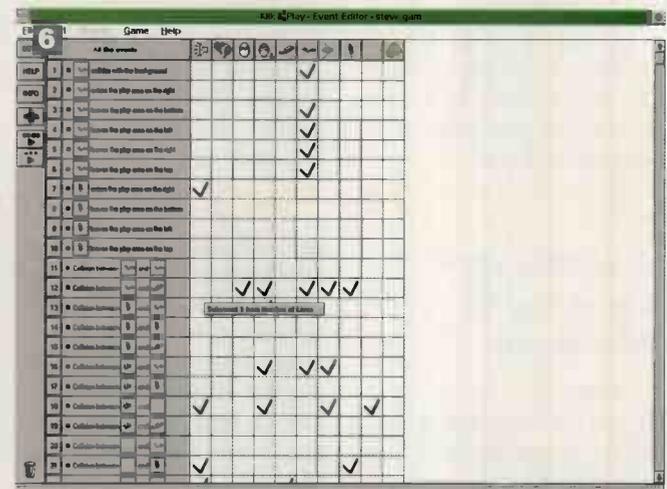
When using path movement, lines can be drawn for objects to follow. Two of my enemy space craft were brought to life this way. The two ships fly across the screen at regular intervals in



the hope that the player will collide with them, resulting in loss of a life. For the movement of the third enemy space ship I set up a more complicated routine for its movement, which I'll talk about later.



5 The game takes shape quickly but cannot be played until the Step Through Editor has done its bit. This plays the game through, stopping when an event occurs e.g. when two objects collide, or you hit the fire button. It then asks what should be done when the event occurs. You can hit the resume button and nothing will happen, or you can opt to have an explosion, have the player lose a life, shoot an object etc. Up until this point, much of Kik & Play is intuitive with little need to consult the user manual. When it comes to fine-tuning your game, another editor comes into play, the Event Editor.



6 The Event Editor is similar to a spreadsheet with objects in the columns and game events in the rows. Pointing the mouse over the cell calls up a dialogue box to explain what the event is. Most events say something similar to: "When Biting Ship collides with Space Station, Destroy Biting Ship." Other events associated with this include the triggering of a sound sample, the creation of an explosion, and the instruction to deduct a life.

More sophisticated instructions can be found within the depths of Kik & Play's dialogue boxes, and there are hundreds of them. The third enemy ship was made to be "shot" sequentially from four fixed points at two-second intervals. This was only possible after a call to technical support as there were few clues in the manual as to how to do this. Having said that, it was achieved with only several clicks of the mouse, which undoubtedly beats programming in the traditional sense. At any stage you can change the properties of any object, add more, or simply start to create a new game if all is not going as planned.



7 Once you're happy with your game, you can go on to create title screens, game instructions, and eventually save your game as a standalone EXE and distribute it among your friends.

on the cards for a later release. What you can create in this version are multilevel platform games like Donkey Kong, or shoot 'em ups. Breakout games are the easiest to do well; the more adventurous will no doubt create interactive adventures.

Putting a game together begins with the Storyboard Editor, where you define how many levels your game or presentation will have.

The Level Editor is where the game takes shape. In many respects, it's similar to a DTP package: you place objects on the page, reissue them, and move them around until it looks something like how you want it to. If you're not quite up to creating your own backdrop there are plenty to choose from in the library. Alternatively, graphics can be imported.

annual music festival. Each of the musicians contributed one piece and each played one at the festival. Moreover, no musician wrote or played the piece of music which began with the same initial letter as his name — also, none of the musicians played the piece that he had written.

Arne wrote the piece played by Coates; Dukas wrote the one played by Arne. The person who played the Divertimento had the same initial letter as the name of the piece played by Arne; the name of the person who played the Bolero began with the same letter as the name of the piece played by Bliss.

Who wrote the Chorale?

Answers on a postcard or the back of a sealed envelope — no letters or floppy disks, please. Then send it to our new special puzzle address:

Klik & Play Competition

If you own a copy of Klik & Play, or intend to in the near future, you're in with a chance of winning a holiday for two in Florida, courtesy of Europress. Along with several other computer titles, we're looking for the UK's best games creator using Klik & Play. There's also £250 and a baseball jacket up for grabs for the best game written by a PCW reader, with £50 for runners-up.

Once PCW has a winner, the game will be put forward to battle against winners from other magazines for the main prize. The holiday will cover all expenses, including some spending money. The winning game will also find its way onto our cover CD-ROM. Over the next two months, in Screenplay, we'll be giving hints and tips for creating the best games and how to get the most out of Klik & Play.

To enter, all you have to do is send your totally original game along with details of who you are, where you live, and your daytime phone number, to: Klik & Play/Screenplay Competition, *Personal Computer World*, VNU House, 32-34 Broadwick Street, London W1A 2HG. All entries must arrive no later than 25th April 1995.

Conclusion

I don't think we're going to see any blockbuster games written in Klik & Play as it doesn't yet support 3D or scrolling. There are also bugs which need to be tidied up, one of which is the sound. Although it claims to mix four channels in realtime I couldn't get it to work.

When I finished my game, I was surprised to find that it worked as a standalone product, although the animation wasn't quite as smooth as some

of the games which came with the package, but it was playable. An experienced user could use Klik & Play to create more than simple shoot 'em up games. Talking books, educational software and multimedia help files are all possible.

PCW Details

Contact Europress
Software 01625 859444
 Price Klik & Play CD-ROM
£44.99, floppy £39.99

LEISURE LINES

Brainteasers courtesy of JJ Clessa.

Quickie

At my local secondhand book shop, hardbacks cost £8 each, paperbacks cost £3 each. My wife visited the shop the other day and spent exactly £28 — how many books did she buy?

This Month's Prize Puzzle

A nice not-too-difficult logic puzzle this month.

By a remarkable coincidence, in my home two there are five amateur musicians named Arne, Bliss, Coates, Dukas, and Elgar. Recently five pieces of music were commissioned by the town's Performing Arts council — an Allegro, a Bolero, a Chorale, a Divertimento and an Etude — for the town's

PCW Prize Puzzle — March 1995, P.O. Box 99, Harrogate, N. Yorks HG2 0XJ, to arrive not later than the last day of March 1995.

Winner of December 1994 Prize Puzzle

A large entry, probably because the puzzle was easy and also because people had more time to spare at Christmas than usual. We had over 250 entries, all correct.

The winning card, drawn at random, came from Anita Patel of Bilston, Staffs. Congratulations, Anita, your prize is on its way. The winning solution is shown below. To all the others, keep trying — it could be your turn next.

This month, we received an entry for the prize puzzle on a floppy disk. Reluctantly, we must ban this type of entry. It's certainly original, but think of

5	2	4	2	4	5	5	3
8	8	1	3	7	3	2	4
4	4	1	2	8	4	5	2
6	6	9	4	8	9	7	6
2	4	9	9	5	9	7	1
5	4	6	2	8	4	7	1
6	2	5	8	7	8	6	2
4	4	3	2	8	8	6	4
8	6	4	5	2	1	6	7
4	4	1	3	7	8	1	6

the hassle in choosing the winner if we received 250 floppy disks. Also we received a program (also on floppy disk) which a reader had written for solving the problem. Many of you send in program listings together with your solutions. If they are unusually clever or original, we are willing to print them for other readers to see, but only if they are just that.

So please, all entries on postcards or backs of envelopes, please.

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BRANDED (10's)	Standard	Formatted
3M	£5.00	£5.50
SONY	£5.10	£5.60
TDK / MAXELL	£4.90	£5.40
VERBATIM		£5.40

VERBATIM 100 x DS/HD
Formatted Disks + Box **£49**

UNBRANDED	Standard	Formatted
50 HD Disks	£18.00	£19.00
100 HD Disks	£35.00	£37.00
250 HD Disks	£82.50	£87.50
500 HD Disks	£155.00	£165.00
1000 HD Disks	£300.00	£320.00

Guaranteed (1 for 1 Replacement)

MAXELL
FORMATTED
SPECIAL OFFER
3 1/2" DS/HD
100 Disks £ 48
250 Disks £115
500 Disks £220

100 UNBRANDED
3 1/2" DS/HD
+ 100 CAPACITY DISKBOX
only £37
3 1/2" Formatted
+ 100 CAPACITY DISKBOX
only £39

WITH 100 CAPACITY DISK BOX

Brand	Unformatted	Formatted
3M	£49	£54
SONY	£50	£54
TDK	£48	£52
VERBATIM		£49

3 1/2" DS / DD DISKS

BRANDED (10's)	Standard	Formatted
3M	£5.20	£5.50
TDK / MAXELL	£4.60	£5.00
50 DD Disks	£15.50	£17.00
100 DD Disks	£30.00	£32.00

DATA CARTRIDGES

DAT TAPES

MAGNATO OPTICAL & CDR

SEAGATE HARD DISKS

DATA CARTRIDGES 3M MAXELL

DC 2000	£7.95	£7.75
DC 2080	£11.50	£9.25
DC 2120	£9.25	£9.25
DC2750	£18.50	

3M 10 x DC-2120
Data Cartridges for **£85**

DC6150 / 600A	£11.95	£10.95
DC 6250	£15.00	£14.00
DC 6525	£16.50	£15.50

Dat Tapes 3M MAXELL

HS4 / 60 4mm	£7.50	£6.25
HS4 / 90 4mm	£7.75	£7.25
HS4 / 120 4mm	£15.50	£14.50
HS8 / 112 8mm	£6.95	£6.75
HS4 Cleaner	£7.95	
HS8 Cleaner	£7.95	

SYQUEST CARTRIDGES

SyQuest SQ400 (44Mb)	£49
SyQuest SQ800 (88Mb)	£59

3M MAXELL

3.5" 128Mb	£23.00	£20.00
3.5" 230Mb	£32.00	£32.00
5.25" 600 / 650 Mb	£69.00	£58.00
5.25" 1.2 / 1.3 Gb	£85.00	£76.00
CDR-63 (550Mb)	£12.00	£10.00
CDR-74 (650Mb)	£13.00	£11.00
UNBRANDED CDR-63 / 74	£9.00	

Cherry Keyboard
(Genuine) 102 Key **£29.95**

IDE HARD DISK DRIVES

ST3391A (IDE)	340Mb	£139
ST3491A (IDE)	428Mb	£149

SEAGATE ST3660A IDE
• 545 Mb • 14Ms
Hard Disk Drive **£169**

SCSI HARD DISK DRIVES

ST5600N (SCSI)	525Mb	£245
ST31200N (SCSI)	1.0Gb	£415
ST12400N (SCSI)	2.1Gb	£755

BRANDED INKJET CARTRIDGES

INKJET REFILLS

INKJET & LASERSUPPLIES

HP

HP Paintjet / XL	£20.95	£22.95
HP Paintjet XL300	£14.95	£16.95
HP Deskjet 1200C	£19.35	£22.75
Deskjet Portable	£13.50	£18.50
Deskjet 500 Series	£16.25	£18.50

HP DESKJET Double Capacity
3+ Ink Cartridge @ **£15.95**

Canon BJC4000 (BJ201)	£24.50	£38.50
Canon BJC4000 (TANKS)	£6.50	£13.95
Canon BJC600 (201)	£5.50	£6.75
Canon BJC800 (643)	£15.50	£19.95
Diconix 150 / 300	£9.95	
Epson Stylus Colour	£13.95	£29.95
Xerox 4020 (Pack of 2's)	£8.50	£8.50

Canon BJ10 / 20 (BC01)	£13.75
Canon BJ200 (BC02)	£15.95
Canon BJ130 (BJ1-481)	£10.50
Canon BJ300 / 330 (BJ1-642)	£11.95
Canon BJ101 (BJ22 Notebook)	£4.95

EPSON STYLUS 800 / 1000

3 + Twin Packs @ £15.35

Epson Stylus 800 / 1000	£8.25
Epson Stylus 300	£13.95
Epson SQ2550 / SQ850	£21.95
Epson SQ1170 / SQ870	£23.95
Olivetti JP150/150W/350	£16.95
Olivetti 250 Printhead + 4 Ink	£34.95
Olivetti 250 Ink Refills (2's)	£9.95

Also for JP150WS/350S/350WS

Jetfill Epson Stylus800Refills 2's	£10.95
Jetfill Canon BC01/02 Refills 2's	£10.95
Jetfill Canon BJC600 Black	£4.50
Jetfill Deskjet Standard Refills 2's	£9.95
Jetfill HP Double Cap. Refills 2's	£17.95

MULTIMEDIA

Soundblaster 16 Value	£69
Orchid IDE CD-Rom	£105
Creative 563 CD-Rom upgrade	£109
Creative CD16 Discovery Kit	£229
Creative CD16 Gameblaster Kit	£229

ORCHID Soundwave 32 +
Double Speed CD-Rom Drive
Now with 2 CD Games **£225**

INKJET PAPER

HP LX Glossy Inkjet Paper(50)	£35.95
HP CX Inkjet Paper (200)	£14.95
Canon BJC4000 Paper (250)	£19.95
Epson Stylus Paper 720Dpi (200)	£19.95
Epson Stylus Paper 360Dpi (200)	£16.95
Esselte Inkjet Paper Colour (250)	£12.50
Esselte Inkjet Paper Mono (250)	£4.95
PlusJet Inkjet Paper 90gsm(500)	£4.95

INKJET FILM TRANSPARENCY
HP LX Inkjet Transparency(50) £32.95
EpsonStylus Transparency(50) £54.95
Stabillo Inkjet Film (50) £24.35

LASER FILM TRANSPARENCY
HP Laser Film (HP-92296U)(50) £13.95
3M Laser Film Unbacked (50's) £13.95

LASER PRINTER • TONERS • DRUMS • PHOTOCONDUCTORS • DEVELOPERS • FUSERS

****Photoconductor Unit *Fuser TONER..DRUM**

Apple Laserwriter Pro 600/630	£95
Apple Personal Laserwriter 300/320	£60
Apple Select 310	£59
Canon for all LBP Series see HP	
C.ltoh LIPS 10	(4's) £139 £198
C.ltoh CI 4 / 6 / 8	(2's) £19
C.ltoh CI 5	(4's) £38
Citizen Overture 106	£39 £69
Citizen Overture 110 / 110+ / 112	£24 **£149
Citizen ProLaser 12 / Proscript 12	£95 £275
Compaq Pagemarq 15/20	£225 **£295
DataProducts LZR 600/650/900/960	£35 £103
DataProducts LZR 855	£109 £99
DataProducts LZR 1200	(6's) £90 £189
Digital Dec LN03	£27
Digital Declaser 1000	£56
Digital Declaser 2100 / 2200	£59
Digital Declaser 3000	£80 **£155
Digital Declaser 5100	£85
Digital Dec LPS17	£88
Epson GQ3500 / GQ5000	£16 £95
Epson EPL4000 / 4100 / 4300	£67 **£105
Epson EPL5200	£95
Epson EPL5600	£129
Epson EPL7100 / 7500 / 8100	£119

****Photoconductor Unit *Fuser TONER..DRUM**

Facit P0660 / 8040 / 8045 / 8048 (2's)	£21 £90
Fujitsu VMS600	£129
Fujitsu VMS800	£130 **£215
Fujitsu RX7100	£99
Genicom 7040 / 7080	£23 £89
HP II / IID / III / IIID	(92295A) £48 *£189
HP IIP / IIIP	(92275A) £48 *£169
HP 4L / 4ML / 4P / 4MP	(92274A) £45 *£169
HP 4 / 4M	(92298A) £69 *£199
HP IIIISi / 4Si	(92291A) £78 *£289
HP 4V / 4MV	(C3900A) £115
IBM Lexmark 4019 / 4028 / 4029	£149
IBM Lexmark 4039 / 3916	£139
Kodak Ektaplus 7008	£20 £89
Kodak Ektaplus 7016	£89 **£65
Kyocera F800 / 800T / 820	£27 £105
Kyocera F1000 / 1010	£23 £105
Kyocera FS1500 / 3500	£35
Kyocera FS1800 / 3300	£28
Mannesmann Tally MT904 / 908 (2's)	£18 £75
Mannesmann Tally MT905 or MT906	£18 £85
Mannesmann Tally MT910	£14 £119
Mannesmann Tally MT911	£34 £189
Mannesmann Tally T9005	£20 £155
Mannesmann Tally T9014	£10 £75

****Photoconductor Unit *Fuser TONER..DRUM**

Nec LC08 / Silentwriter OPC Kit	£10 £75
Nec Silentwriter S60P/S62P/S102P	£109
Nec SuperScript SS610	£79
Oki Laserline 6	£12 £85
Oki 100 / 410 / 800/830/840/850/870	£18 £159
Oki Lasertoner OL400E / 410E-EX	£17 £132
Olivetti PG306 / 308 / 404 / 408 (2's)	£26 £89
Panasonic KXP4400	£12 £65
Panasonic KXP4420	£26 £69
Panasonic KXP4410 / 4430	£28 £105
Panasonic KXP4450 / 4451 / 4455	£19 £89
QMS 860 / 860+	£155
QMS PS2210 / 2220	£55
QMS PS2000 / 2025	£105
Qume LaserTEN	(2's) £103
Qume Crystalprint	(3's) £98
Ricoh PC 6000	£12 £85
Ricoh 4080 / 4081 / 4150	£28 £95
Ricoh LP1200	£82 £99
Sharp JX9400 / 9460 / 9600 / 9660	£114 **£99
Sharp JX9500	£35 **£97
Star LS-5 / LS-5 EX / LS-5 TT	£72
Texas Instruments MicroLaser	£38 £116
Texas Instruments MicroLaser XL	£49 £129
Xerox 4030	£79 £218

DISK BOXES

3 1/2" Lockable 40 Capacity	£3.50
3 1/2" Lockable 100 Capacity	£3.95
3 1/2" Stackable Box 240Cap.	£9.95

MICE

Microsoft Serial Mouse Ver.2	£45.00
Imsi PS/2 Mouse	£15.95

Logic 3 Serial Mouse £15

CABLES

Parallel Cable Standard 1.8m	£2.75
Parallel Cable Moulded 3m	£6.95
Parallel Cable Moulded 5m	£8.95
25M-25M D-Sub Moulded 2m	£6.95
36M-36M Cn. Moulded 2m	£7.95
Serial / Null Modem Cables 2m	£7.95
SVGA Monitor Extension 2m	£8.95

DATA SWITCHES

2 Way Manual (Parallel / Serial)	£8.95
3 Way Manual (Parallel / Serial)	£12.95
4 Way Manual (Parallel / Serial)	£16.95
2 Way Crossover (Parallel/Serial)	£19.95
AutoSwitch 2 PC to 1 Printer	£27.95
AutoSwitch 4 PC to 1 Printer	£39.95
AutoSwitch 8 PC to 2 Printer	£159.95

RE-CON. TONERS

SAVE £'s on Re-Manufactured Toner

HP II / IID / III / IIID	(95A) £36
HP IIP / IIIP	(75A) £35
HP 4L / 4ML / 4P / 4MP	(74A) £34
HP 4 / 4M	(98A) £59
HP IIIISi / 4Si	(91A) £62

All Cartridges are Fully Guaranteed



Carriage	Standard	Next Day
UK Mainland	£3.50	£5.00
Outside UK Mainland	P.O.A.	P.O.A.
Hardware	£7.50	£10.00

TERMS & CONDITIONS
TRADING HOURS: 9.00 A.M. - 5.30 P.M. (MON - SAT)
PAYMENT MUST ACCOMPANY ALL ORDERS. TELEPHONE CREDIT CARD ORDERS ARE NORMALLY DESPATCHED SAME DAY. PLEASE ALLOW 5 WORKING DAYS FOR CHEQUES TO CLEAR.
WE ACCEPT VISA, MASTERCARD, ACCESS, DELTA & SWITCH. NO CREDIT CARD SURCHARGE.
PRICES & SPECIFICATION MAY CHANGE WITHOUT NOTICE. (ALL TRADEMARKS ACKNOWLEDGED)
GOODS OFFERED SUBJECT TO AVAILABILITY. ALL PRICES EXCLUDE DELIVERY & V.A.T. (E. & O. E.)

THE DREAM IS A LASER PRINTER ON EVERY DESK. THE REALITY IS £399

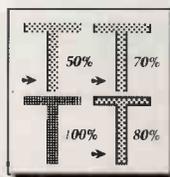


So why share a Laser Printer when everyone can afford the revolutionary Star WinType 4000. It's the first true Windows* Laser Printer from Star. And it blows the rest away: in price & performance, in lower operating costs, in fast first page print, and with a compact footprint that's virtually A4.

It's also so easy to use. Apart from the on/off button, all printer functions are controlled from the screen in Windows - including a DOS icon to print from DOS applications. Unique Star developments in Microfine Toner and Edge Enhancement Technology give 600 dpi quality. And the Toner Save facility can double the life of the toner cartridge.



All printer controls appear in the Windows menu.



Toner Save mode gives choice of 4 print densities



Unique Star technology gives 600 dpi Class output.



Environmentally friendly features include Power Save Mode, recyclable packaging, and no CFCs.

No you're not dreaming. The 4ppm WinType 4000 gives all that, plus benefits like 35 extra TrueType fonts for only £399†. For more information return the completed coupon, or phone the Personal Laser Line on:

☎ 0494 471111



COMPUTER SHOPPER AWARDS
BEST PRINTER 1994

Star Micronics U.K. Ltd., Star House, Peregrine Business Park, High Wycombe, Bucks HP13 7DL. Fax: 0494 473333.

A division of Star Micronics Co. Ltd., Japan.
*Minimum system requirements apply - Windows 3.1 in Enhanced mode necessary.

NAME: _____ POSITION: _____
 COMPANY: _____
 ADDRESS: _____

 POSTCODE: _____
 TEL: _____ FAX: _____

†RRP excluding VAT. Windows is a trademark of Microsoft Corporation.

L
A
S
E
R

PRINTERS

Win a True 1200dpi Laser Printer

LEXMARK™



Lexmark have given us their brand new Optra R to give away, along with an ExecJet IIc as a runner-up prize. The Optra is the first true 1200 x 1200dpi laser printer to reach our shores. It has a sensible price tag and offers both enhanced PCL5 and Postscript Level 2 as standard. With 25MHz RISC processing, 2Mb RAM (expandable to 64Mb), a high-speed bi-directional parallel port and a 12ppm engine, it's also one of the fastest.

Optra is the ideal printing solution for single users and small workgroups through to large LAN printing environments where print quality and speed is paramount. The network-ready mean, lean printing machine also comes ready to accept MarkNet, providing connectivity for up to 18 network operating systems.

For high volume printing, the Optra offers a 200-sheet

input tray as standard with automatic papersize sensing and further options to increase capacity. There's a duplexing option and the ability to print on a variety of label and card stock media. An envelope conditioning feature helps to keep envelopes from creasing.

To simplify printing, the MarkVision utility takes advantage of bi-directional communications to allow printer configuration from the desktop control panel. The user can also receive extensive feedback on job statistics and print status.

ExecJet IIc

Using PQET (Print Quality Enhancement Technology) the ExecJet IIc can print at 600 x 300dpi mono, or 300dpi colour, resulting in near laser quality. The printer comes with 12 resident scalable fonts and offers 256kb and 1Mb flash font storage options. The ExecJet IIc has a 150-sheet paper tray

and is capable of handling transparencies and labels with ease. The IIc's reliability is backed by a three year "Return for Replacement Warranty".

How to Enter

Just circle the correct answers on the entry form and send it to: Lexmark/PCW Competition, Personal Computer World Editorial, VNU House, 32-34 Broadwick Street, London W1A 2HG.

Lexmark/PCW Competition Entry Form

1. What does PDL Stand for?

- a) Picture Developing Liquid b) Page Description Language
c) Printer Description Language

2. What does PQET Stand for?

- a) Picture Quality Enhancement Technology b) Print Quality Enhancement Technology
c) Printing Quietly, Effectively and Thoroughly

3. Where is Lexmark's Manufacturing and Development facility?

- a) Basildon b) Dublin c) Lexington d) Glasgow

4. What is the maximum RAM for the Optra R?

- a) 8Mb b) 16Mb c) 32Mb d) 64Mb

5. What does the "R" stand for after Optra?

- a) Regular b) Revised

Name

Address

Daytime Telephone Number

Please tick if you do not wish to receive further related material.

Rules of Entry

The competition is open to all readers of *Personal Computer World* except for employees, and their families, of VNU Business Publications Ltd and Lexmark International. Each application must be submitted on the official form on this page — no photocopies will be accepted. All entries to arrive no later than 28th April 1995. The Editor of *PCW* is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of prizes.

PINEAPPLE GRAPHICS!

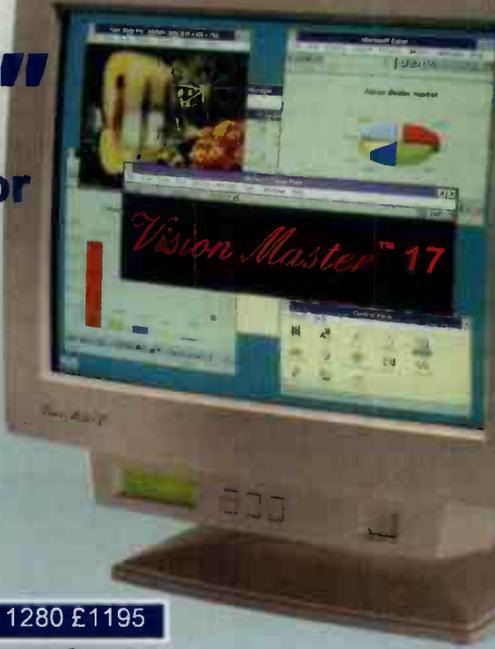
HEWLETT PACKARD

MONITORS

MITSUBISHI		
DimondTron 21" Monitor		£1595
IDEK		
MF-8617 17" 1280x1024ni	EPOA	
MF-5221A 21" 1280x1280 FST		£1195
MF-8421 21" 1600x1280		£1249
MF-8621 21" 1600x1280 FST		£1649
NOKIA		
447L090 17" Trinitron		£469
447B090 17" Trinitron 1280x1024 60Hz		£509
447M090 17" Trinitron 1280x1024 76Hz		£645
447M092 17" Trinitron 1280x1024 60Hz		£695
445M092 21" TCO 1600x1200 60Hz		£1420
445X092 21" TCO 1600x1200 80Hz		£1575
SONY		
15SF 15" 0.25mm dp 1280x1024		£299
1730 17" 0.25mm dp 1024x768		£649
GDM17SE1 17" 1600x1200 77Hz		£835
20SE1VT 20" 1280x1024		£1295
20SE1 20" 1600x1200		£1425
EIZO		
T 660i 20" 1280x1024 0.31mm 76 Hz		£1799
T 560i 17" 1280x1024 0.26mm 76Hz		£1345
T 240i 14" 1024x768 0.25mm 75Hz		£599
HITACHI		
17mVx Plus 17"		£895
20MVXplus 1280 x1024 20"		£1239
CM2187-304 21" FST 1600x1200		£1879
CM2188 21" FST 1600x1200		£1479
PHILIPS		
17A" 17" 1280x1024		£663
17C 17" 1024x768		£455
20T 20" 1280x1024 Trinitron		£1412
20C 20" 1280x1024		£865
NEC		
4FG6 IPM 15" 0.28mm 1024x768		£372
5FG6 IPM 17" 0.28mm 1024x768		£675
5FGp 17" 0.28mm 1280x1024		£862
6FGp 21" 0.28mm 1280x1024		£1428

IDEK

17" Monitor



21"1600 X 1280 £1195

£BEST

0.26 dot pitch FST
1280x1024 at 80 Hz
135 MHz band width
MPR II, TuV and
ISO 9241/3

3 years warranty

GRAPHICS CARDS

ARTIST HURCULES
ORCHID DIAMOND
TAXAN MATROX

VIDEO CARDS

VIDEOLOGIC CARDINAL

NOKIA

447L090
17" TRINITRON

£469

445X 21" £1420

SONY

15" Trinitron
15SF

£299

CDP 1730 £699

GOLD STAR

15" monitor
1280 x 1024

£249

2082 20" Trinitron £1397

LASER PRINERS

UPTO
1200dpi

QMS	
PS410 600DPI	£1038
PS420	£1225
PS815	£1279
PS860	£2885
PS860 Plus	£3895
PS1725 17ppm	£3349
QMS 210	£3349
QMS 230	£5995
Colour Laser 600dpi	£7995



TEXAS INSTRUMENTS	
MicroWrite PS	£525
MicroLaserPro 600 (23 fonts)	£799
(56 fonts)	£949
LaserMaster	
LaserMaster Unity 1200 XLO	£8495
LaserMaster 1000/4 TX-AFM	£2495
LaserMaster 1200KX	£9995
CALCOMP	
CCL600 A3 PS	£2499
CCL600 A3 PS 16MB	£2695

DIGITAL	
1152 PS (1 year Onsite)	£449
DEC LASERPRO	£1149
Panasonic	
KXP 4400	£275
NEC	
SuperScript 610	£289
IBM LEXMARK	
4039	£1575
4029 030-P	£1475
4029 040-PS	£1775
4079 A3 Colour	£2749

SCANNERS

EPSON		AGFA	
GT 6500+PicPub LE /Omni OCR	£509	STUDIO SCAN	£625
GT 6500+PicPub LE SCSI	£569	ARCUS	£2225
GT 8000+PicPub LE /Omni OCR	£660	MICROTEC	
GT 9000+PhotoShop LE	£885	ScanMaker IIx	£499
GT 6500+PicPub 3.1 full version	£709	ScanMaker IIx2	£755
GT 8000+PicPub 3.1 full version	£849	ScanMaker SMIG	£325
GT 9000+PhotoShop full version	£1045	ScanMaker SMHSP	£595
LOGITECH		ScanMaker SMHSPx2	£775
SCANMAN 32+Catchword win	£81	ScanMaker 35T	£869
SCANMAN 256 PC	£104	ScanMaker 45T	£3879
SCANMAN COLOUR	£252	ScanMaker 45T	£925
PHOTOMAN PLUS PC	£375	ScanMaker 2HR 1200x1200dpi	£1945
POWERPAGE	£324	ScanMaker 3 2400x2400dpi	
		HEWLETT PACKARD	
		HP IICX 24bit A4 Flatbed	£688
		HP IIP A4 Flatbed Scanner	£349

SCANNERS

NEW SCANTOUCH !!!

Features: **Nikon**

- High Resolution 1200x1200 dpi
- The Nikon ScanTouch offers an impressive 1200x1200 dpi hardware interpolated resolution, with software interpolated resolution of 2400x2400 dpi.
- 10 Bit Internal Processing Per Colour
- A 10 bit A/D conversion for each colour (R, G, B) with ColorSync compatibility.
- SCSI II compatibility

For fast transfer rate of image data to your computer, this high-quality scanner supports the advance SCSI-II standard.

SCANTOUCH AX-1200 **Nikon**
£875



COOLSCAN !!!

Features: **Nikon**

- High resolution 2700x2700 dpi
- Built in SCSI interface
- 35mm scanner with coolrunning LED
- 8-Bit RGB colour reproduction for a total of 16.7 million colours.



NIKON	
COOLSCAN LS10 EXT	£1145
COOLSCAN LS10 INT	£1470
LS-3510AF SCSI	£4895
LS-3510AF GPIB	£4895

TEKTRONIX COLOUR PRINTERS

- PHOTO-QUALITY PRESENTATIONS
- PRE-FILM PROOFING
- PHOTOGRAPHIC PRINTING
- COLOUR SCREEN PREVIEWER
- PANTONE APPROVED

FARGO WAX TRANSFER

£585

Dye Sublimation kit for 16.7m colours £ 155

AGFA ARCUS +

WITH FULL POTOSHOP & POTOTUNE
£2225
STUSCAN £635

DIGITISING TABLETS

CALCOMP		
Drawing Slate	12x12 A4	£375
Drawing Slate	12x18 A3	£549
Drawing Slate	6x9 A5	£375
Drawing Slate	12x12 A4	£475
Drawing Slate	12x18 A3	£675
Drawing Board III	12x12 A4	£425
Drawing Board III	12x18 A3	£835
Drawing Board III	18x24 A2	£1415
Drawing Board III	24x36 A1	£1895
Drawing Board III	36x48 A0	£2385
Drawing Board III	44x60 A00	£2895

BEST STORAGE!

NOVELL

NETWORK 3.12		CARDS	
5 USER	£389	NE1000 8bit BNC	£48
10 USER	£888	NE2000 16bit BNC	£87
25 USER	£1295	NE2000T 16bit TP	£101
50 USER	£1779	NE2000+ BNC	£101
100 USER	£2488	NE2000+ TP	£101
250 USER	£3695	NE2000+3 COMBO	£125
		NE2/C MCA BNC	£185
		NE2/2-32C MCA BNC	£445
		NE3200 32bit EISA	£445

NETWORKING

3 COM		
3C503-16 TP OR BNC	£122	
3C507 BNC	£232	
3C509 TP OR BNC	£92	
3C509 COMBO	£105	
D-LINK		
DE400 32 BIT EISA COMBO	£348	
DT100 8 BIT 164 TOKEN RING	£335	
DT300 MCA 164 TOKEN RING	£364	
POCKET ADAPTER BNC	£158	
POCKET ADAPTER BNC/TP	£188	
INTEL		
ETHEREXPRES 16 BNC OR TP	£85	
ETHEREXPRES FLASH C COMBO	£127	
ETHEREXPRES MCA BNC OR TP	£171	
ETHEREXPRES RJ45 HARMONICA	£52	

HEWLETT PACKARD

HP LASERJET4L

£387

HP LASERJET 4MP £849
HP LASERJET 4+ £949

BACK-UP

TAPE BACK-UP INT EXT
COLORADO TRAKKER 250MB £99 £199
IOMEGA 250MB 3.5" £99

DAT DRIVES

WANGDAT 3100 2.0GB	£579	£635
WANGDAT 3200 2-8GB	£649	£705
SONY SDT5200 4GB	£600	£650
SONY SDT5000 4-16GB	£609	£659
EXABYTE 4402 8GB	£CALL	£CALL
EXABYTE FS10G 5GB KIT*	£1949	£2099
EXABYTE FS4000 2-4GB KIT*	£949	£1039
EXABYTE EXB-210 LIBRARY 55GB	£CALL	£CALL
EXABYTE EXB-440 LIBRARY 200GB	£CALL	£CALL
EXABYTE EXB-480 LIBRARY 400GB	£CALL	£CALL

* KIT INCLUDES - EXT DRIVE, SCSI CABLE, 1 PC OF MEDIA & HEAD CLEANING TAPE.

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Hands On Contents

OPERATING SYSTEMS



Windows 562

When your PC tells you it's out of memory, it's probably not telling the truth. Tim Nott finds a solution in Standard Mode, and shows why vectors are just water off a duck's back.



DOS 566

Simon Collin turns his attention to redirecting batch files and accessing foreign characters from the keyboard, and ERRORLEVELs make a reappearance.



32-Bit 568

Remember the mysterious little Awk program from last month? It's back, as Chris Bidmead delves a bit deeper. And when things fell over under Warp, what was IBM's response? Er, there wasn't one.

APPLICATIONS



Word Processing 572

The indexing facilities within a lot of today's word processors are great, if you can figure out how they work. Michael Hewitt explains.



Spreadsheets 578

Stephen Wells comes to the rescue of a hospital sister who does her duty rotas with a not-so-trusty pencil and rubber, and continues his financial analysis.



Databases 582

Superbase has been given a new lease of life by SPC, and Mark Whitehorn reports that it's now more responsive to the needs of its users. Plus Ted Codd's much misquoted rules for relational databases.



Graphics & DTP 586

It's all go at Adobe as, following the merger with Aldus, development follows development. Gordon Laing tries to keep up, and finds relaxation in curvaceous text boxes.



Multimedia 590

Chris Cain signs off as Multimedia editor this month, but not before he explores new worlds with QuickTime VR. George Cole looks at multimedia authoring.

PROGRAMMING



Visual Basic 596

Hands-on experience with FarPoint has given a user a cautionary tale to tell: Tim Anderson urges users and developers alike to share their VB experiences.

Welcome to our new-look Hands On section. The Internet and Comms columns have moved to the Cutting Edge section starting on page 501, but new to Hands On is Mike Mudge's Numbers Count, a real PCW Institution that has appeared in every issue bar one since 1982.

You won't find reviews in Hands On but you will find plenty of hints and tips, upgrade news and practical advice. Hands On remains the place where readers can contribute to PCW, and as always we'll pay for anything we use. Macros, sections of code and hints and tips will be rewarded with a £20 book or record taken (please say which you prefer) and we'll pay hard cash for longer, more involved pieces. Please include screenshots, in GIF format, to illustrate what you're describing.

All submissions should be emailed to the author of the appropriate section or posted to Hands On, Personal Computer World Editorial, VNU House, 32-34 Broadwick Street, London W1A 2HG. Alternatively, send your entries to ben@cix.compulink.co.uk or to CompuServe 71333,2330. Questions and short hints and tips can be faxed on 0171 895 8098.



Low Level 600

Everyone likes Mandelbrot patterns, but you can take an alternative tack and produce some surprisingly complex results from a single Visual Basic formula. Mike Liardet shows you how.



Numbers Count 610

Mike Mudge's mathematics page turns in the direction of the beginner, with a look at the Greatest Common Divisor. For the more advanced reader, how about Wang Tiles?

AND THE REST...



Networks 614

Intel Storage Express 1.4 is a high-class, high-cost backup machine for large networks, given the once-over here by Stephen Rodda. And he has fine words for Delrina's Fax Box.



Macintosh 618

Now that SuperCard is fully System 7 compliant, Mick O'Neil has discovered no end of things you can do with it. And finally, there's a Mac marketing campaign that hits the spot.



Computer Answers 622

Help! A schoolteacher wants to know how to stop his pupils from breaking out of Autoexec.bat with Ctrl-Break, a portion of a 286 hard disk has been sectioned off, and there's a nasty example of the 1999 problem. Frank Leonhardt is on hand with the answers.

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The Mystery of Standard Mode

Don't believe your PC when it says you're out of memory. Tim Nott finds a solution in standard mode, and demonstrates how vectors are just water off a duck's back.

A golden rule with Windows is never to take anything at face value. Such as the error messages, mentioned in this column passim, that advise you've run out of memory when you've got megabytes of the stuff, or that you should "use another disk" when trying to delete a file from a write-protected one.

So, herewith the Mystery of Standard Mode. This is the configuration of Windows which will run on a 286 processor despite being unable to perform 386-specific tricks such as using virtual memory or windowed DOS sessions. Under Windows 3.1 you can force standard mode on a 386 by typing "WIN /S" at the DOS prompt.

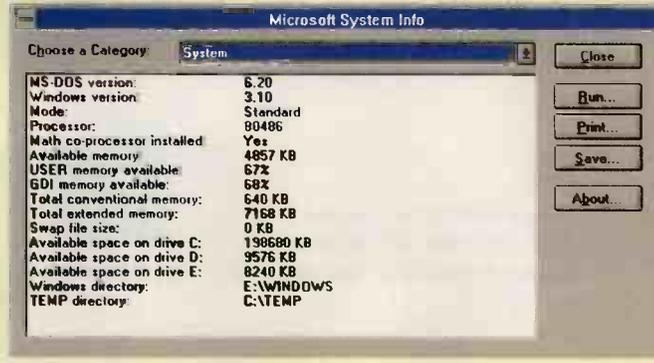
Although there's no compelling reason to do this, I do have a vague memory of using a scanner that would only work in standard mode. As everybody knows, the release of Windows for Workgroups 3.11 saw the death of standard mode Windows. Presumably the presence of 286 boxes on a smart company's network

generates the same sort of embarrassment as a car park full of clapped-out Alleghos.

Typing "WIN /S" under 3.11 returns the rather stern rebuke: "Windows for Workgroups does not run in real or standard mode." Typing "WIN /?" gets a list of all the possible command line switches, and naturally, /S is not among them. Nor, for that matter, is /D:T. And here the plot thickens, as using this switch launches Windows into what looks very much like the lamented standard mode. Virtual memory disappears and the MS Info utility reports, as the screenshot below shows, that you are running (or at least I am) version 3.10 rather than 3.11, but it seems to do this in 386 enhanced mode as well. As I said, never take anything at face value.

Another piece of trivia, for anyone who battled through my recent columns on INI files, concerns the ScreenLines= entry in the [NonWindowsApp] section of SYS-

TEM.INI. Last December I said this controls the number of visible lines in a DOS window which "defaults to the standard 25-line DOS screen



Windows for Workgroups' dark secret

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unless you set it to something else. When, in my case, it still defaults to 25 lines." Further experimentation shows that setting this to 43 or 50 does in fact work. By some incredible coincidence these are the same values that the MSDOS "MODE" command supports — apologies for not spotting this at the time.

Vector co-ordinates

Last month we looked at bitmapped pictures in Windows, and this month it's time to tackle vector images. As I mentioned briefly, these take a completely different approach as they are made up of "objects". An object can be a simple shape such as a line, or a much more complex one such as an irregular shape filled with graduated shades of different colours. The important thing is that the objects stay independent of each other. If you take a bitmap of, say, a cartoon character, you can only work on it dot by dot. With a vector image of the same character you can move its component parts around, change their shape and colour, make them larger or smaller and so on.

The basic unit of currency of vector

drawing, which makes it possible to draw complex shapes, is the Bézier curve. This consists of a line with a series of nodes along its length, controlling the way it behaves. Each node marks the transition from one section of the line to the next, such as straight-to-curve, smooth curve, or a vertex. Each node also has two handles attached to it; these control the direction and curve of each section of line that leaves the node. It sounds more complicated than it is, but dragging nodes and handles around in a drawing program soon gives you the hang of things. At the risk of stating the obvious, the nodes and handles are only visible when you edit the shape — they don't print out.

The other major difference is that vectors are scalable and can be displayed or printed at the best resolution the output device can manage. Look at the two screenshots below. In the one from Microsoft Draw I've removed the duck's glasses and zoomed in by a factor of two; the vector lines and fills are still displayed to the best of the monitor's ability. In the Paintbrush screenshot, the lines and fills become "blocky" as the dots just get

larger. Although it's possible (but rather tricky) to "cut" around the glasses with the scissors tool, moving the cutout would leave a hole in the picture instead of revealing what was underneath, and permanently obliterate anything it was pasted over.

Vector file formats tend to be far more program-specific than bitmaps. While practically all paint programs can load and save BMP or TIFF files, for example, drawing packages such as CorelDraw and Micrografx Designer have proprietary formats. Add to this CAD programs, which are essentially

Top The 2X bitmapped duck in Paintbrush looks rather ruffled

Below The 2X bitmapped duck in Draw is smoother all round — especially with his glasses off



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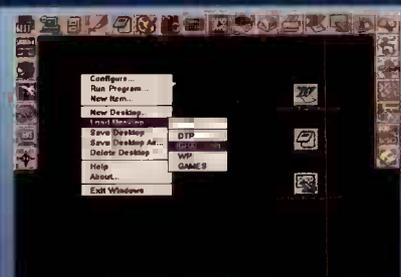
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very accurate (but less arty) drawing programs, and there are even more formats. Getting drawings created by one application into another can therefore be something of a challenge.

Of the common formats, the Computer Graphics Metafile (CGM) is probably the

enormous iceberg of possible problems. Sometimes text will come out a hundred times larger; sometimes objects disappear altogether, even when the DXF is saved and loaded into the same program. And sometimes shapes undergo some sort of MUBAR (Messed Up Beyond All Recognition) transform. There are other formats predating Windows, such as WordPerfect Graphic (WPG), which can include bitmaps as well, GEM and Hewlett Packard Graphics Language, but the good news for Windows users is that we have a format all of our own.

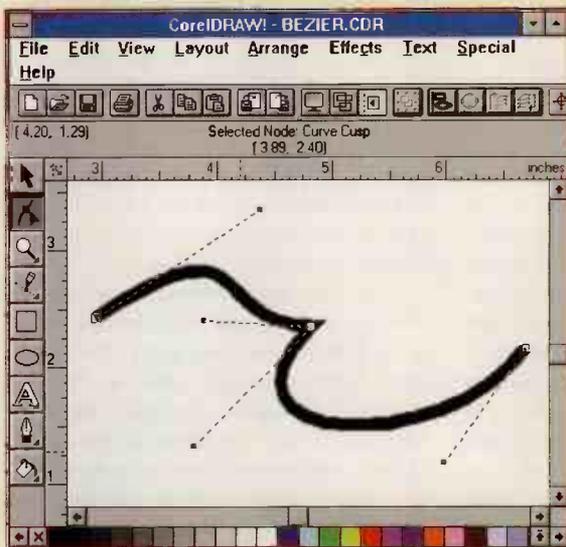
The Windows Metafile is the native clipboard format for copying vectors between applications, so in theory it should work with any application capable of displaying vector graphics. The bad news is that it is rather limited in its capabilities. It won't, at least in my experience, deal

with Bézier curves; it breaks them down into lots of short lines. Similarly, graduated or "fountain" fills get broken down into a set of single-colour stripes.

Another thing to watch is that the Paste command usually defaults to OLE. If you copy a Corel graphic to the clipboard and then paste into Word for Windows, what you end up with will not be a WMF but an embedded Corel object. To paste a WMF (which can then be edited with Word's drawing tools) choose Paste special and then tick the Picture option. This will paste the item as a WMF-type Word picture, which can then be edited with the built-in drawing tools.

Squeeze me

Last month we also took a look at compression for bitmaps, so perhaps it's time for a brief look at file compression in general. At system level, there are some who regard "disk doubling" software as a diabolic invention that holds data in a precarious limbo that can trash itself at the slightest provocation. Certainly, since Stacker and Microsoft DoubleSpace (or DriveSpace in later versions of MSDOS 6.0) store the compressed data in one big file, there is an element of risk: if a small part of that file gets corrupted the whole lot could be rendered unreadable. Again, hard disks are getting cheaper all the time. You can buy a 500Mb one for under £200, or about three times the street price of a copy of Stacker.



Getting busy with a Bézier

longest established, being developed by the American National Standards Institution (ANSI) and the International Standards Institution (ISO). However, it comes in a variety of dialects, none of which support typeface information, and the CorelDraw manual for example advises: "The typeface you see in CorelDraw will probably not correspond to the one used in the originating program."

Other universal, published formats include Autodesk's Drawing Exchange Format (DXF) and Adobe's Encapsulated Postscript (EPS), the former being widely used in CAD and the latter in DTP. Both of these are text-based, although the latter can include a bitmapped preview of the picture. The text is a series of instructions to the importing software to draw the objects therein, and while it's not exactly plain English, it is possible to program a drawing from a text editor. Bearing in mind that a simple rectangle in CorelDraw produced 4.5kb and 20kb of text in DXF and EPS respectively, you probably won't want to try, though.

Transferring files in the DXF format can also be something of an adventure. A frequent problem, dating from when most CAD work was done on a black screen, is that lines which appear black in one application come out as white in others — hence invisible against a white background. This is only the beguiling tip of an

The other criticism of disk compression is that it slows the system down, and the reply to this is, "Yes and No". Files that compress well mean less time is spent accessing the hard disk, and the compression/decompression routines can convert the data and still come out ahead. On less compressible files such as those already compressed as a GIF or ZIP file, it loses out. In either case, from some fairly rough and ready experiments performed here with large bitmaps stored on Double-Spaced and uncompressed drives, the difference was small.

For the defence, there's a certain logic to using whatever space one has to maximum advantage. Programs get bigger with each new version. The current record for a word processor is held by WordPerfect 6.1 at 32Mb but this won't stay unbroken for long. Not only that, but the files saved by such monsters get bigger too. Word 6.0 seems to add 6kb to even the most simple file created in Word 2.0, and importing the legendary Corel 2.0 train into version 5.0 added 100kb to the existing 130kb. So that voluminous new 500Mb drive might start to pinch in a year or so.

I've used a variety of disk compression software (DRDOS Superstor, Stacker and MS DoubleSpace) continuously for more than three years. I've had just one foul-up, using an early version of the first of these, and even then the evidence was insufficient to convict. There are, however, certain precautions and caveats.

1. Don't be too greedy. Leave enough space on the uncompressed partition for DOS drivers and programs loaded at boot time, and essential DOS utilities such as Chkdsk (or Scandisk), Format, a text editor, the programs needed to maintain or repair the compressed partition, and any other life-savers such as Undelete. Leave additional space for a Windows swap file. If you try to create a permanent swap file on a compressed partition, you'll get a "The permanent swap file is corrupt" error message next time Windows loads. This time it really means it, too.
2. Don't take "Double" too literally. The amount of compression varies with the type of data, but 1.7 to 1.8 is probably a more realistic overall figure.
3. Similarly, don't trust the "space free" reported by File Manager. It's only an estimate based on a default compression ratio, and you can end up with an "Insufficient disk space" message when copying from a floppy even though there are apparently several megabytes free.
4. Don't cram a compressed drive (or any other disk, for that matter) full to the brink:

you may fall foul of the Catch-22 situation that produces the infamous "Not enough space to delete file — delete some files and try again" message. The only practical solution I've found to this is to use the setup program to increase the size of the compressed partition slightly — another good reason for leaving some spare uncompressed space.

5. Don't use disk editing software such as Norton or PC Tools on a compressed drive. Use the utilities supplied with the compression software.
6. Don't try and cache a compressed drive directly with SMARTDRV or similar utilities. If you compress part of drive C: as D: then if the "host" drive C: is cached, D: is automatically cached as a "guest".

System-level disk compression isn't the only way of saving space. You might think that with Stacker or DoubleSpace you could cheerfully forget about using GIFs rather than BMPs to store bitmaps, as discussed last month. This isn't the case. Disk compression software is built for speed, so it won't compress as efficiently as piecemeal compression. A quick test shows that a 1024 x 768 x 256-colour screenshot in BMP format is compressed by 7.5:1 by DoubleSpace. This sounds quite astoundingly efficient, until I try saving the same file as a GIF, which shrinks it by a factor of 18.

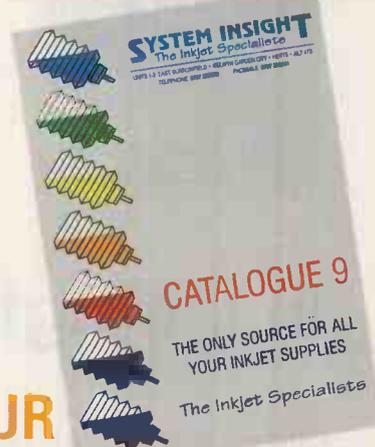
Zip-a-dee-doo-dah

PKZIP is a shareware utility that probably offers the most efficient lossless compression of all — the previous BMP file shrank by a factor of 28 and a large text file by nearly 3:1 — a great improvement on DoubleSpace's factor of 1.3:1. It has a number of other advantages. For instance, although the ZIP files it produces can be expanded with the companion PKUNZIP, it can also create standalone EXE files which unzip themselves, so the recipient doesn't need to have PKZIP or UNZIP installed. You don't have to look further than a PCW cover disk to find examples of these. You can also condense multiple files, and even nested directories, into one ZIP file, which stops bits and pieces getting lost. This column and its screenshots, for example, travelled via a modem link in one ZIP file. It can also split a ZIP file over several disks, so you are not limited to the 1.44Mb capacity of a normal 3.5in floppy.

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In the right direction

Simon Collin has the low-down on redirecting batch files and learning foreign languages, and ERRORLEVELs make a reappearance.

Batch file blues

I have a problem with a batch file that's been puzzling me for some time: the batch file searches through named files for the occurrence of a particular word and displays the name of any matching files. The problem is that at the moment, the batch file displays the filename "hits" on-screen. I would like to redirect the output to a text file so that I can edit this, but I cannot find any simple way of redirecting the output from the batch file.

PCW You've come across one of the big problems with batch files: it's very difficult to redirect the output from a batch file to a text file or other device. For almost any DOS command, you could redirect the output of the command to another device or file using the ">" redirection symbol. For example, if you want to produce a catalogue of all the files on your hard disk, you would move to the root directory and type:

```
DIR /S > CATALOG.TXT
```

This uses the "S" switch of the DIR to scan subdirectories and redirect the output to a file called CATALOG.TXT. If your batch file is called BATCH.BAT, the one thing you cannot do is to enter:

```
BATCH > OUTPUT.TXT
```

Batch files are not alone in not working with the redirection or pipe commands; the FOR command similarly cannot be redirected or piped. To get around your problem, or for anyone who's using a FOR loop to repeat a command, you have to use a little trick: you can redirect the output of the command "COMMAND". This actually starts a second copy of the command

interpreter (COMMAND.COM) and runs any program that's included on the same line. For example, instead of typing in:

```
BATCH
```

you could run your batch file in a second command interpreter using the line:

```
COMMAND /C BATCH
```

Now, you'll see that since you're using COMMAND, which can have its output redirected, it's easy to redirect the output of your batch file with the line:

```
COMMAND /C BATCH > OUTPUT.TXT
```

Incidentally, the "C" switch I'm using with COMMAND tells it to start as a second copy of the command interpreter just long enough to run the following command, then exit to the current interpreter again. Without this switch, you'll have multiple copies of the command interpreter running.

To end, perhaps your batch file could be replaced using the FOR and the FIND commands together to search a list of files for a particular phrase. To do this you would use the following command:

```
FOR %F IN (*.TXT) DO FIND "Search Text" %F
```

This would search all TXT files for the text string "Search Text". In case you happen to write a lot of documents with this search string in, you would find it useful to pipe the output of the command to the MORE function, which displays text one page at a time — or redirect the output to a text file. You cannot do either with the FOR command, but using the trick described above, you could achieve either with the following lines:

```
COMMAND /C FOR %F IN (*.TXT) DO FIND
```

```
"Search Text" %F | MORE
```

or, to redirect output to a text file:

```
COMMAND /C FOR %F IN (*.TXT) DO FIND  
"Search Text" %F > OUTPUT.TXT
```

Country capers

After struggling for some time to get the COUNTRY switch to work properly, I've given up. I am obviously doing something wrong, but I cannot work out what; all I want to do is switch between English and Polish keyboard layouts so that I can gain access to the Polish character set. Even setting the DOS COUNTRY variable to what I think is the correct Polish value of 852, I cannot access the foreign characters from the keyboard. What do I need to do?

PCW There are several things you need to do in order to access foreign characters from your keyboard. Perhaps the clearest way of describing the process is to explain what the different, but often confused, utilities do. First is the COUNTRY setting. This does nothing more than set the time, date and number formatting information for a particular country. For example, England uses a point "." as a decimal point, whereas France uses a comma ",". Setting COUNTRY to 852 will correctly format displayed time, date and numeric formats for Poland, but will get you no further.

The second utility is KEYB. This lets you emulate a country-specific keyboard layout. For example, the standard English layout has QWERTY running along the top row of characters, whereas the standard French layout uses the AZERTY sequence. Setting KEYB to 852 will provide the correct keyboard layout for a Polish keyboard.

Lastly, we come to code pages. Your display adaptor (that controls the monitor) and your printer both have code pages built in for a range of countries. Code pages describe the character that each extended ASCII code will produce. In order to display all the new characters that you can access from the changed keyboard layout, you'll need to change the code page. Each code page has the same characters up to ASCII code 127 — this is the standard ASCII character set. Between 127 and 255 are the different, foreign characters.

To use a different code page takes a few extra lines in your CONFIG.SYS file since before you can use a different code page to display foreign characters, you have to prepare the code page. First, you have to load the DISPLAY.SYS device driver which will enable the foreign charac-

ters to be correctly displayed. You can do this with the line:

```
DEVICE=C:\DOS\DISPLAY.SYS
```

Since you want to use English and Polish, you should specify the default code page (English) and that you want DISPLAY.SYS to handle two code pages. To do this, we add the following switches so that the previous command now reads:

```
DEVICE=C:\DOS\DISPLAY.SYS CON=(EGA, 437, 2)
```

where 437 is the English code page to be used as a default and we want to load two code pages.

Finally, we can prepare the code page that you want to use: the Polish code page. To do this, you use the MODE command, specifying the CON (for console) switch and the code page. The Polish code page is 852, so the line would read:

```
MODE CON CODEPAGE PREPARE=((852)
```

```
C:\DOS\EGA.CPI)
```

The EGA.CPI file specified contains details of the code pages for EGA or VGA displays.

That's it! As you can see, we've come a long way from the simple COUNTRY command, which, incidentally, for Poland would set the date format to 1995-01-20 rather than the UK default of 20/01/95. The complete command list for your changes would be:

```
CONFIG.SYS
```

```
COUNTRY=852, 437, \DOS\COUNTRY.SYS
```

```
DEVICE=C:\DOS\DISPLAY.SYS CON=(EGA, 437, 2)
```

```
AUTOEXEC.BAT
```

```
MODE CON CODEPAGE PREPARE=((852)
```

Fig 1 "Please Wait" Message from Batch File

```
\DOS\MSAV > NUL
IF ERRORLEVEL 86 GOTO VIRUS
GOTO END

: VIRUS
SEND "VIRUS DETECTED ON USER-A's PC" TO SUPERVISOR
ECHO Please wait for the Supervisor, a problem has been detected on your PC
PAUSE

:END
```

```
C:\DOS\EGA.CPI)
```

```
KEYB PL
```

You can now switch between Polish and English keyboard layouts using the KEYB UK and KEYB PL commands and switch between the two codepages using:

```
MODE CON CODEPAGE SELECT=852
```

```
for Polish, or
```

```
MODE CON CODEPAGE SELECT=437
```

```
to return to default for the UK.
```

ERRORLEVEL revisited

Two months ago I looked at how to use ERRORLEVELS in your batch files to help get more feedback on the state of DOS commands. I've had a number of letters from readers showing how they've used ERRORLEVELS, but one I thought was particularly neat was the following.

If you manage a network, even a small one, you have to be doubly cautious about the spread of a virus. Most network managers put a line into the AUTOEXEC.BAT file of each workstation to run a virus checker, such as MSDOS's own MSAV or

a third-party product. If a user's PC has managed to pick up a virus, it's rather worrying to display a message alerting them. One manager has devised a short batch file that runs MSAV and checks its return code (the ERRORLEVEL) to see if any virus was detected. If it was, the batch file sends a message to the administrator alerting him and displaying a "Please wait" message on the user's screen.

The MSAV utility will return an ERRORLEVEL of 86 if a virus is detected, so the program looks like Fig 1.

Although this takes away control from the user, it keeps the supervisor informed and makes good use of the ERRORLEVEL returned from the MSAV command.

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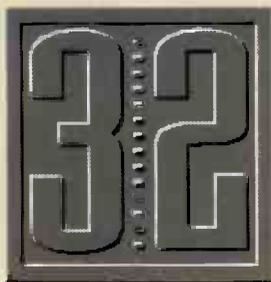
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Now you're Awking

... or at least you should be, says Chris Bidmead. He delves further into Awk, one of the best programming languages around, looks at Warp, and admits the error of his ways.

I ought to be right at the end of the stone-casting queue when it comes to pointing out howlers in print. But I can't resist passing on to you the following definition of "32-bit computing" that appeared not long ago in what I'd better just call "a rival computing magazine". Keen to cut through a lot of technical waffle and get right down to the meat of what 32-bit computing is really all about, the journalist in question states:

"The principle on which it operates is fairly simple. If you have a look at a micro-processor, or chip, in a computer, you will note that it has 32 prongs on one end of it. These 'prongs' are in fact called 'bits' and 32-bit computing is quite common in modern computers."

Anyway — time to put right a few recent howlers of my own. Last month I lamented the fact that the new Warp LaunchPad won't allow you to get rid of the "four fixed standard buttons". A few of you have pointed out, correctly, that I've overlooked page two of the LaunchPad's Settings Notebook, where you can do just that. I'd like to slip in a quick whinge about the ergonomics of the Setting Notebook, which makes it easy to overlook hidden pages in multiple page sections, but basically, yes, it's a fair cop.

I've received a fair stream of email about my discussion of MORE, pointing out that under DOS and OS/2 you don't need to use the pipe. Here's what Ian Brame has to say about it:

"I've just been reading your column in December's PCW and would like to comment on your example of the DOS MORE command.

The command line:

```
TYPE text_file | MORE
```

is rather inefficient, especially for larger files, since DOS redirects the output from TYPE to a temporary disk file, and then inputs the contents of this disk file to MORE.

A more (pun intended) efficient means of using MORE is actually closer to the Unix method you give a few lines further on:

```
MORE < text_file
```

This method dispenses with the temporary pipe file, and inputs the file directly into MORE."

Silly me. In the dark days when I was stuck with DOS I used to do this all the time. I still much prefer LESS, because it lets you travel backwards, and doesn't suddenly fall off the end of the input file like MORE. Even so, MORE is much more usable than I was making out.

Not a major howler, you might think. Unlike the reference I made in print earlier this year (but not, happily, in this column) to the MIT as the "Minnesota Institute of

Technology". I hope the hardworking tecchies in Massachusetts will forgive me in the fullness of time.

Awk

Last month I left you with this Awk puzzle. What does the program in Fig 1 do?

Obviously it's something to do with dates. There are three statements, and each statement comprises an event (or pattern) on the lefthand side, with the righthand side showing the associated action (enveloped in curly brackets) to be carried out when that event occurs. Ignore the BEGIN event for a moment and look at the other two statements.

You need to know that FNR is a variable, and the initials stand for "file number record". Classic Awk just has a variable NR, which returns the number of the record currently being processed. By default a line end is the record marker, so a line represents a single record and NR is therefore the number of the current line in the input file. But most modern Awks allow you to process multiple input files, either by using wildcards or naming them explicitly on the command line. So:

```
awk -f control.awk myfile.txt yourfile.txt theirs.*
```

will in turn read each of the files designated in the command line and use control.awk to process each input line consecutively. NR increments this sequence as if the input lines were concatenated into one big file. FNR starts again from 1 with the first line of each new file.

By the way — what's the shortest Basic program you can write that will print the first line of every file in a directory? Here's what that program looks like in Awk:

```
FNR == 1
```

It might be more useful to have the name of each file attached to each first line. I haven't been near Basic for years, but I seem to remember that expansion of command line wildcards was fairly tricky stuff. I'm sure Bill Gates has cleaned this

Fig 1 What Does This Program Do?

```
BEGIN {day = "[0-3]?[0-9][ -]?"
        month =
        "(JAN|FEB|MAR|APR|MAY|JUN|JUL|AUG|SEP|OCT|NOV|DEC).*[ -]"
        year = "((19|)?)?[89][0-9]"
        date = day month year
        IGNORECASE = 1}

$0 ~ date&&FNR==1 {print FILENAME " OK!"
                  print $0}

$0 !~ date&&FNR==1 {print FILENAME " BAD!"
                  print $0}
```

up since then, but I'll bet Basic offers nothing quite as simple as:

```
FNR == 1 {print FILE-NAME, $0}
```

\$0 stands for the whole of the current record. \$1, \$2, \$3 etc stand for the contents of the first, second and third field in the record. As the default field delimiter is a space, this simplifies down to \$0 representing the current line and \$n standing for the nth word in that line. A nice example of the kind of neat Unixy stuff that is now being widely adopted in other environments.

Let's get back to our date example. Once you know that "~" means "matches", "!~" means "not matches" and "&&" is "logical AND", you can more or less read off the last two statements in plain English:

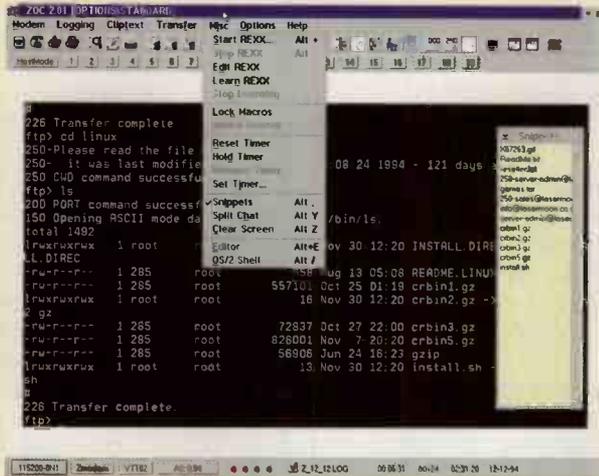
"If the current input line matches 'date' (whatever that might mean) and we're at the first line of a new input file, then print the filename, tack on 'OK!' and then print the whole of that first line.

"If the current input line doesn't match 'date', and it's the first line, do the same, but mark it 'BAD'."

So now we come to the "date" bit, which is set up in the BEGIN statement. As I mentioned last month, BEGIN is functionally like a pattern, but just means "Do this before you start processing any input lines". BEGIN happens just once per run; it doesn't get retrigged each time Awk starts to munch the next file in the input queue.

We use BEGIN to set up variables. "Date" here is an arbitrary variable name that I'm using to hold a character string. This happens to be a special kind of character string, representing a regexp, or "regular expression". Regular expressions are the power behind Awk's pattern matching (and are also used, with minor variations, in other Unix utilities like grep and sed). This particular regexp is rather complex, so from the point of view of code maintenance it's very useful to be able to set it up in a modular fashion by defining sections of the final string and then concatenating the sections.

I call the sections "day", "month" and "year". Let's take them in order and learn something about how regexps work. And take them slowly, because this exercise is reminding me how hard it is to translate regexps into plain English (not the same thing as saying they're too weird to



Zap-O-Com's new "Snippets" window floats on top of the screen and collects files names and internet addresses you might need [see "ZOC revisited"]

understand). The regexp for day is enclosed within quotemarks to the right of the assignment sign. The meat of the regexp is inside brackets, followed by a question mark. The question mark means "let day be one or zero instances of whatever the expression in the preceding brackets evaluates to". (A simple example of "?" would be the expression "ac?r", which matches the first letters of "acrid" and "arid" but not "accredit".)

The question mark occurs again inside the main expression. The square bracketed expression that precedes is what's called a "set". It stands for a single character position in the pattern and includes a set of characters that the pattern is looking for at that position. This particular set means "any character that matches the numbers 0 to 3 inclusive" — i.e. the day can begin with 0, 1, 2 or 3. The query that follows says, in effect, "or you can skip this".

The second square-bracketed expression works in the same way to take care of the units part of the day number, which must be a digit between 0 and 9. The absence of a question-mark after this requires this character position to be present, so the first two square bracket expressions will match any of the following day numbers: 09, 19 and 29. The whole thing is then bracketed with a question mark after it, which means: "The day pattern may be any of the foregoing, or it can be blank".

Yes, you'll probably have spotted that it will also match 00 and any number between 32 and 39. For now I'll simply shrug my shoulders and remind you that when you pay £1,000 for a piece of software from Novell it comes with a cheerful

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disclaimer that: "This software is provided 'as is' and without any warranties of any kind...". You can console yourself with the thought that this particular bug is fixable, once you know a bit more about how reg-exps work.

ZOC revisited

Markus Schmidt, author of the superb OS/2 comms package Zap-O-Comm, has come up with a brand new version, 2.0. Get hold of it. It's multi-threaded (at last) and runs like a bat out of hell. The scripting is radically improved — Schmidt has gone over to using Rexx with some special Rexx extensions devised for ZOC, and scripts now run in their own thread. The old ZOC script language is carried over for compatibility, but he says he won't be taking it any further. A new installation routine can intelligently pick up your old scripts and settings and translate them for the new version.

Many cosmetic changes have been made to the user interface — there are now user-definable buttons, for example, and the menu can be popped up from any point in the ZOC window with the righthand mouse button. ZOC has always had the handy feature that you can copy anything off the screen into the system clipboard just by drawing a marquee round it with the mouse (no explicit Copy operation is required, which speeds things up enormously). Text from the system clipboard can be pasted back in the usual way, so the most obvious use for this feature is in replaying filenames and Internet addresses while you're online, instead of typing them and getting them wrong.

Version 2.0 takes this feature a whole automated step forward by introducing "Snippets". With Snippets switched on, ZOC monitors your incoming data for character strings that look like filenames, CompuServe user ID's or Internet addresses and stacks them up in a resizable window that floats on top of the console. Double-clicking with the mouse on any one of the items gathered into the snippets windows will stick it back into the input stream — very clever stuff. ZOC also claims to be the only comms package with a built-in JPEG viewer, but I haven't had a chance to try that yet.

Warp

At time of going to press I still haven't reserved the afternoon it might take to install the official shrink-wrapped version of Warp, but I don't think it's noticeably dif-

ferent from the pre-release version I've been running for the past couple of months.

This is a critical time for IBM and OS/2. The company's ObjectMeister, Cliff Reeves, is doing the rounds again demonstrating OpenDoc on the OS/2 platform, promising us that this time OpenDoc really, really is just around the corner. Warp is here. The user base is now a respectable 6 million plus.

Just a month or so before the launch of version 2.1 somebody in Austin got the bright idea that the desktop could be made a lot more responsive by changing the data structure of the OS2.INI and



OpenDoc is the IBM/Apple approach to compound document architecture

OS2SYS.INI files. Developers weren't supposed to be writing directly to this file structure, but some of them were, and a few apps got broken in the process. As the number of OS/2 apps at the time was close to zero anyway, this was a dangerous move. IBM hastily restored the old INI file structure.

I'm getting hints that something similar may have happened with the move to Warp, and this time it seems not to have been corrected. In an earlier column I had some good things to say about the PostScript viewer program, PageTurner, from Magus, which allows you to use regular PostScript files as an online document reading system similar to Adobe Acrobat. You can print out PS files onto a non-PS printer with it too. All in all, a very useful piece of software to have around.

Well, I don't have it around any more, because Warp has broken it. The issue is wider than just this one app, because PageTurner uses a SmallTalk runtime environment from DigiTalk, and it seems that at least part of the problem is that the DigiTalk sub-system is wrecked by the Warp changes.

That's unpleasant, of course, but not as unpleasant as the news I'm getting from PageTurner's developer about IBM's response to this. Here's what Kevin W Thompson of Magus says:

"There appear to be three problems:

- 1. IBM changed the DLL-calling mechanism. Prior to Warp, the OS took the responsibility of managing the save and restore of register states, but with Warp that responsibility was moved to the application. Digtalk had to change its virtual machine DLL (VPMVM20.DLL) accordingly, and has done so.*
- 2. Many Smalltalk/IV users have reported peculiar and erratic failures under Warp even with the register fix. Digtalk has been unable to reproduce any of these, which suggests that the problems stem from particular hardware and software configurations. Video driver bugs are a prime suspect, since Smalltalk makes some relatively obscure calls which video drivers must respond to. Although unable to reproduce the problems, the Digtalk developers have attempted to provide a fix based on their best guess as to what may be causing the problems. Reports have come in saying that the new fix has helped quite a bit, but evaluation and debugging continues.*

- 3. A non-Digtalk problem: Printing from PageTurner was slow under OS/2 2.1, but grinds to a halt under Warp. Unfortunately the print system is not well-documented, and our particular print requirements (which revolve around bitmaps) are considered obscure. We have exhausted our own investigative efforts, and have been badgering IBM twice a week for some weeks now to help us fix the problem.*

All in all, this has been a tough time for us. We are completely dependent on two other companies to fix problems for us. This is not a comfortable place to be! IBM is particularly unresponsive; we have been prodding them about printing from well before Warp shipped. However, if there is one thing we're good at, it is persistence, and I fully expect we will resolve these problems and ship a fix in the near future."

My sympathies go out to Kevin. He's providing an application that constitutes a compelling reason to buy OS/2. And then IBM behave like this. I'm gob-smacked.

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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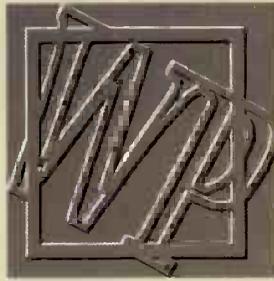
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How to be index-linked

Today's better word processors feature indexing facilities, which are great, if you can fathom out how they work. Michael Hewitt shows how to get to grips with them, and looks at your letters on Hanging Indents in Word, and WordStar page numbers.

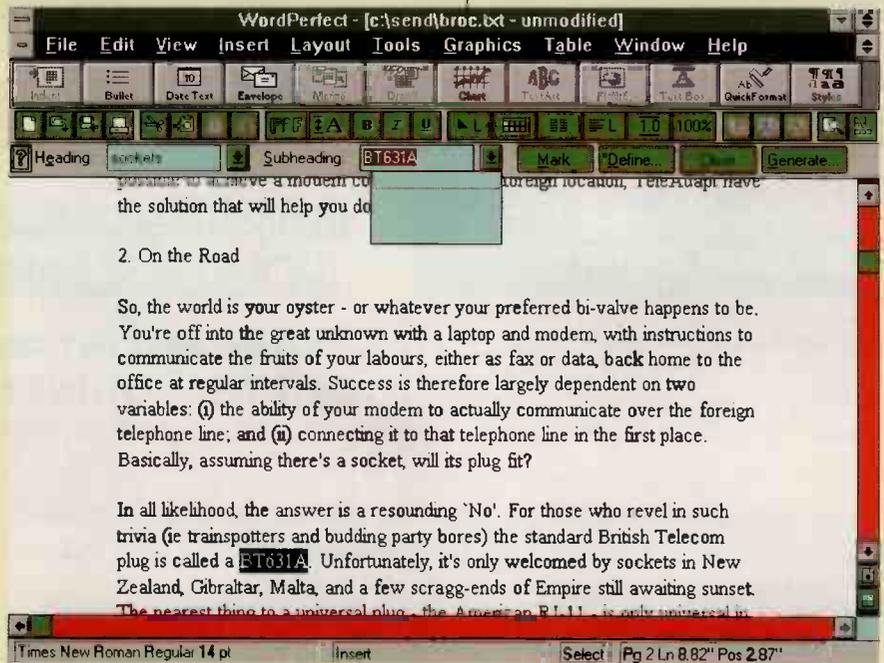
If you're writing a longish reference book and are trying to negotiate a publishing deal, one of the first things the publishers will ask you is if you require the services of a professional indexer. If the answer's yes, then they'll reduce the amount they pay you for your work. This is because they have then got to go off and find some mug who's willing to plough through your embryonic tome, page by page, and extract the guts. Every noun and verb has to be checked. Is it relevant to the main theme of the book? If it is, then it has to be noted down, along with its page number.

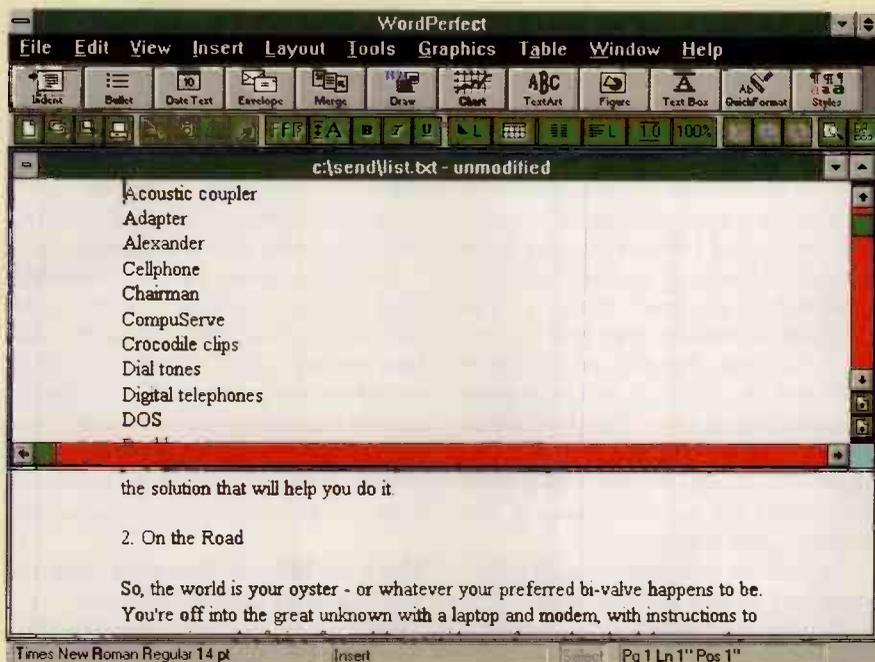
Finally, all these references have to be arranged in alphabetical order at the back of the book, cross indexed if necessary, and formatted.

Thus, for example:
Cartland, Barbara 47-53, 67, 87-89, 101, 103 — emetic effect of 49 (see also Jeffrey Archer)

Fortunately, some of the better word processors now have indexing facilities,

Generating an index interactively requires you to go through the whole document manually





which automate and speed up the whole tedious business. It's still a bit of a to-do, though. Irrespective of make, there are basically two ways they go about it. The first is interactively. Here, all the chapters of your book are merged into one big Master Document. You've then got to open this and go through it manually, clicking on every instance of a verb or noun you want listed in the index. This tells the program that the word is to be stored in the index, and its page number in the document. Finally, you'll select a command such as "Generate Index". All the stored words are extracted and assembled in alphabetical order, with their page reference numbers beside them.

The second method — my preferred one — is to create a so-called Concordance File. In a way, it's a bit like creating the index first. You make a list of all the indexable words and phrases in the book and, using a Sort command, arrange it in alphabetical order. Then you tell the word processor "Go index", or whatever the command happens to be. Thereupon the program goes through your list, item by item, searches for each item in the body copy of the document and, when it finds it, takes a note of its page number. Finally, the index items are married up with those page numbers and formatted. Under normal circumstances, you'd try to combine the two methods.

Let's take a look at a typical indexing function in action. Although I'm not entirely happy with WordPerfect in its present, buggy Version 6.0, I'm happy to announce that its indexer is probably the best of them all, so it will serve as my example. First,

Using a concordance file with entries listed in alphabetical order, you can automatically reference, albeit without headers and subheads

the interactive method.

It goes without saying, of course, that all your chapters have to be merged into one big master document before you can start. Indexers can't perform on individual chapters. Anyhow, this done, choose Index from under the Tools menu. The Index menu appears at the top of the screen, marked with the buttons Heading, Subheading, Mark, Define, Close, and Generate. Then being searching through your documents for all those words you want to include in your index.

There are two ways of categorising those words: either as headings or subheadings. Normally, it will be a combination of both. For instance:

Jim Smith 11 - 22
girlfriends 17 - 18
wives 21

Here, Jim Smith is the index heading, while girlfriends and wives are of course the subheadings. To define a word as a heading, highlight it with the mouse and then click on the down arrow next the Heading Window. The word then appears in that window. If there aren't going to be any subheadings, click on the Mark button. This "registers" your heading and you can move on. However, if there are going to be associated subheadings, highlight each relevant word, click in the down arrow box next to "Subheading", and then click on "Mark". And so on through the document. Each time you define something

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as a subheading, it's automatically listed under whatever is showing in the Heading window at the time.

Long-winded, isn't it? As I said earlier, a Concordance File is my preferred way of working, because it will help speed things up. If you've got any nous about you, anyway, you'll have planned out your book beforehand, detailing chapter headings, subjects to be discussed, and so on. This can serve as the basis from your Concordance File. Then, from this, extract a list of all the major subjects that are discussed in your work, one to a line. The result will be a single column list of a dozen or so pages. Finally, sort this into alphabetical order using the word processor's Sort command, and save the file.

To generate an index from such a Concordance File, click on Index under Tools, and then on the Define button. This brings up the Define Index box which, amongst other things, allows you to alter the style of the index, whether chapter numbers are to be included, and so on. One important feature to note here is the box "Use Dash to show consecutive pages". Always, always make sure this is checked. If not, and you have identical references on each of the pages 1 to 100, then your index will print with every one of those pages' numbers, each separated by a comma, arranged in a long line. Far better to have:

Jim Smith 1-100

At the bottom of this is the Concordance File window. Key in the name of the

Always remember when indexing to click on the Consecutive Page Numbers box, otherwise your index could become unwieldy.

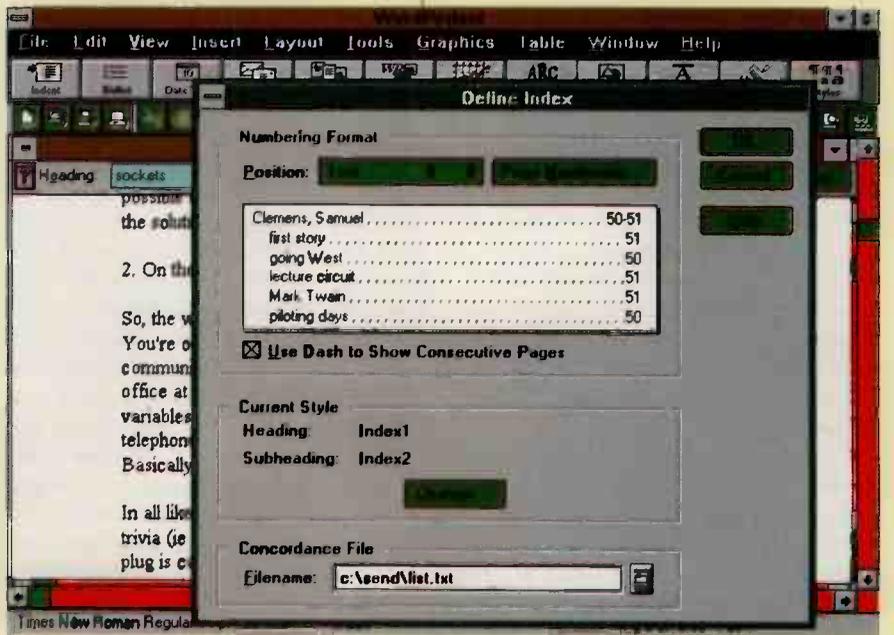
file here, plus, of course, its directory, and hit OK. Then select a point in your document where the Index is to appear — usually right at the end. This done, click on the Generate button. If it's a long book with lots of indexable items, go and make yourself a coffee. Indexing, even on a fast PC, isn't in the Daley Thompson league.

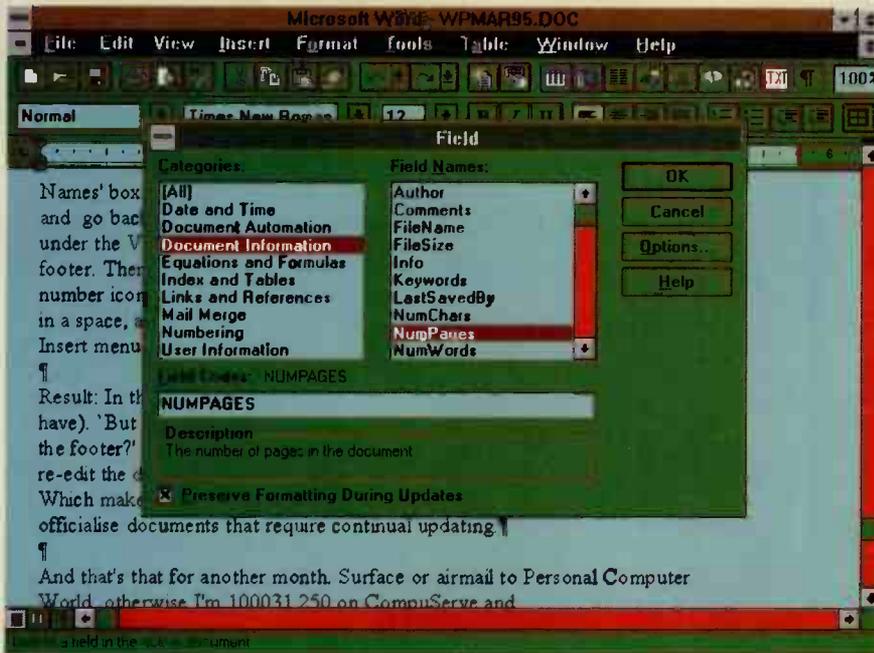
Having returned, caffeine refreshed, you'll find an index in alphabetical order, with page number references by the side. Nice and neat, but WordPerfect isn't clever enough to arrange them into headings and subheadings. None of them are. So if you want the index arranged in this way, you'll have to go back and create them manually in the interactive method described above.

More on Word's Hanging Indents
 Storm Dunlop — just one of many — berates me for my sledgehammer v. walnut solution to the implementation of hanging indents in Word.

"Your description of implementing hanging indents makes the whole process seem very complex," he writes. "A far simpler method is to use the standard keyboard short cut of Ctrl+T to increase the hanging indent, and Shift+Ctrl+T to decrease it. Both shift the second and subsequent lines to align with either the default tabs or to custom ones.

Alternatively, if you want to align the body text with the end of a heading, type the whole text, heading and all. Turn on the ruler, pick up the bottom triangular marker, and pull to where you want the indent. All the text will be indented except the first line. That is controlled by the top, triangular marker, so you can also fiddle with that if you wish.





Another method is to place a tab on the ruler, then hit Ctrl+T. If you want a wide space between the heading and the text, then you do have to insert a tab character into the first line of text, of course."

WordStar Page Numbers

Just to prove there's life in the old dog yet, I recently got a question concerning WordStar 7.00. "I read somewhere that it is possible to position page numbers in the top righthand side of the page," says Michael Piggot. "However, I can only manage to position them either in the bottom right or the top left. Is there a solution?"

By default, WordStar automatically generates a page number at the middle bottom of every page. To get rid of it, you have to use the dot command .op. But to get numbering at the top of the page, it's necessary to use a page header.

First, turn off the default page numbering as described above. Then, on a blank line at the top of the page type the number sign #. (The number sign is a special code when used in a header; it tells WordStar to print the current page number here.) To the left of this, insert a right tab command, Ctrl+O. This sends the number symbol to the far right of the screen. Next, turn on Insert Mode, go back to the beginning of this line, and key in the header dot command .h1.

The result is page numbering in the upper right corner of the page.

Page 1 of 10

Here's a handy hint. You're probably familiar with those legal and official documents whose pages are numbered "1 of 250", or whatever, thus giving you a good idea of

Creating a document info field for a page footer in Word for Windows

exactly how much more you've got to plough through. Here's how to do it in Word.

First, go to Field under the Insert menu, and under Categories select Document Information. Thereupon, a list of same appears in the Field Names box. From them, select NumPages. Having done so, click on OK and go back into the document. Next, select "Header and Footer" from under the View menu, just as you do when you normally add a header or footer. Then, in either the header or footer, key in "Page" and click on the number icon. As usual, this causes the page number to appear. Next, key in a space, and then the word "of". This done, go back to Field under the Insert menu, click on Document Information and NumPages, and hit OK.

Result: In the header or footer, "Page 1 of 250" (or whatever). "But why not just add up the pages at the end and key their total into the footer?" you ask. Yes, you can. But if you subsequently re-edit the document, that total could alter, so you'd then have to re-set it. Which makes my method preferable, I think — at least for those longer, officialise documents that require continual updating.

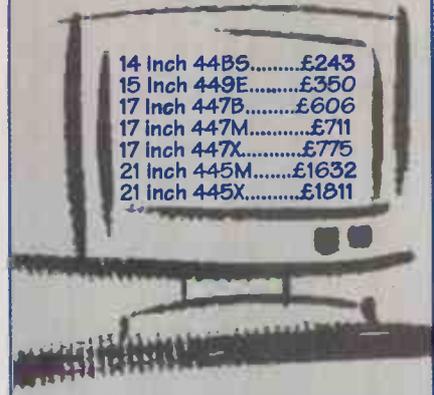
PCW Contacts

And that's that for another month. Surface or airmail to PCW, otherwise I'm 100031,250 on CompuServe and hewitt@cix.compulink.co.uk.

The Delphi ID quoted in the last couple of issues is no longer active, so you'll be bounced if you try to reach me that way.

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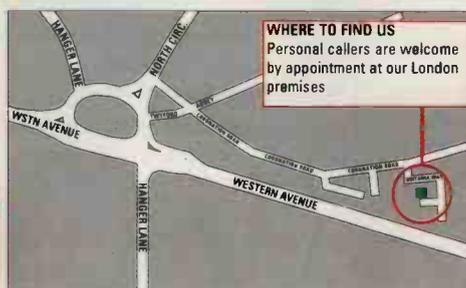
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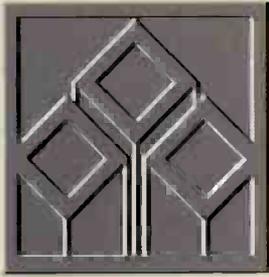
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New sheets in the hospital

The patients require patience in the hospital where a reader's relative struggles with pencil and rubber to prepare staff duty rotas. Enter PCW's own spreadsheet doctor, Stephen Wells, with a more practical solution.

I received a request from a namesake this month which painted a charming family picture. Neville Wells emailed that his wife, a sister in a hospital, was regularly struggling with "paper and a pencil and a lot of rubbing out" to prepare a duty rota for the staff, who work three shifts. "I'm sure there must be an easier way of using a spreadsheet."

Neville says he can replicate her efforts except that Mrs W. uses letters to represent shifts: E for "Early"; L for "Lates"; N for "Nights"; and D for "Day Off". What he wanted to know was how to count the entries of a certain letter in a column and total them at the bottom.

Hoping that they intended to use the solution at home and I wouldn't have someone like fellow-columnist Nick Beard after me, I sent by return a simple solution that would work in any spreadsheet.

Look at Fig 1. However the spreadsheet is designed, you can always add another column just for the key letters. In this instance, the letters are in cells A2 to A21. Then you can use separate columns (hidden, if you like) for a little sub-calculation of each shift. In this example, Early, Lates, Nights and Day Off are figured in columns B to E respectively.

The simple formula in B2 is =IF(A2="E",1). This is replicated throughout the block so E2 is =IF(A2="D",1) and E21 is =IF(A21="D",1). This block displays logical values. Cell A8, for instance, has an "L", so FALSE shows in the Early, Nights and Day Off columns, and 1 shows in the Lates column.

Row 22 holds the totals. B22 is

	A	B	C	D	E
		Early	Lates	Nights	Day Off
8	L	FALSE	1	FALSE	FALSE
9	N	FALSE	FALSE	1	FALSE
10	N	FALSE	FALSE	1	FALSE
11	E	1	FALSE	FALSE	FALSE
12	E	1	FALSE	FALSE	FALSE
13	L	FALSE	1	FALSE	FALSE
14	N	FALSE	FALSE	1	FALSE
15	D	FALSE	FALSE	FALSE	1
16	E	1	FALSE	FALSE	FALSE
17	E	1	FALSE	FALSE	FALSE
18	L	FALSE	1	FALSE	FALSE
19	N	FALSE	FALSE	1	FALSE
20	N	FALSE	FALSE	1	FALSE
21	E	1	FALSE	FALSE	FALSE
22	Totals	7	5	6	2
23					
24	Early	7			
25	Lates		5		
26	Nights			6	
27	Day Off				2

Fig 1 Two solutions to a hospital staff rota: the long way round, and using formula arrays

=SUM(B2:B21). E22 is =SUM(E2:E21).

To show the totals at the foot of columns A and B, you could enter the category labels in cells A24 to A27, as shown, then B24 is =B22, B25 is =C22 and so on.

In the example given, out of the 20 entries, 7 of the staff are on the Early shift, 5 are Lates, 6 are Nights and 2 are on a Day Off.

I'm quite happy with that solution. Others may not be, because what we've produced are the answers for just one day. As there are 365 days in the year, it would

simplify matters if we could eliminate all those subsidiary columns.

We can, of course, if your spreadsheet offers the facilities.

If you have Excel 5, you can use the COUNTIF command. To total the Early shift, B24 would have =COUNTIF(A2:A21,"E").

Financial analysis

If you've been following this series, you'll know that a financial ratio can be expressed in numerous ways. The Current Ratio of a company with £2 million of Current Assets and £1 million of Current Liabilities, for instance, can be expressed as 2, or 2 to 1, or 2:1, or 200% (percentage), or 2/1 (fraction), or 2 Times, or 2X. However it is expressed, it is still termed a financial ratio. The format used is just a matter of convenience, or tradition in the industry of that company.

Last month we looked at those Activity Ratios which are expressed as Times. This month we examine six of the most common Activity Ratios which are usually formatted in other ways.

Many readers have sent for the financial analysis template on disk. If you have been entering it yourself from the listings (see panel), you'll be up to row 57. Rows 58 and 63 are blank, to make spaces. Rows 59 to 62 and rows 64 to 67 show the Activity Ratios which are usually expressed as Days and as a Percentage, respectively.

Columns D, E and F can be replicated from column C. Column G holds average results for the industry, if you can get them.

If you entered the sample Balance Sheet figures given in the October column and the Income Statement results shown in November, then the ratios should come out as in Fig 2.

Again, trends are most easily spotted using a chart. Excel offers a number of ways of creating charts, but I'll just recap the best method for this template.

Open the worksheet we've been creating, EXAMPLE.XLS. Select the range, A60:G62. Select, Edit, Copy. Then select File, New, Chart; and then Edit, Paste Special. In the dialogue box choose Values in Columns; and Categories in First Column. Make the other options blank.

Then choose Chart and Add Legend. The years will not initially be displayed but instead, the names Series 1, Series 2, etc.

Select Chart, Edit Series, and Series 1. Then put an equals sign in the "Name" box and select Window on the standard toolbar and EXAMPLE.XLS. The worksheet

EXAMPLE.XLS						
	A	B	D	E	F	G
58						
59	ACTIVITY RATIOS (DAYS)					
60	Payables Turnover	50	40	50	72	50
61	Collection Period	8	10	13	12	11
62	Average Stock	84	75	85	75	74
63						
64	ACTIVITY RATIOS (%)					
65	Fixed Assets to Net Worth	38.47	36.30	46.04	64.32	18.02
66	Asset Turnover	27.32	23.60	29.05	33.73	25.73
67	Accounts Payable to Sales	9.50	7.69	9.05	15.43	9.53

Fig 2 The Activity (Days) and (%) Ratios for the Example Company

will appear and you can point to cell B41. Select the Define button. Then repeat that action for each of the six series. Then close the Edit Series box by selecting OK.

Select Chart, Attach Text and choose Chart Title. In the Formula Bar, enter an equals sign, select Window, EXAMPLE.XLS, point to cell A59, then delete the word, Title.

If all is well, you should now have a chart as shown in Fig 3.

Using rows 65 to 67, and the title in A64, you just repeat this simple procedure to create the chart shown in Fig 4.

I would reiterate that the ratios produced by this template should be examined for trends and also compared with others in the industry, if available.

Reference to a high ratio, here, means it is higher than the media ratio for the industry, or a trend to a higher ratio over the five years of the company's results. Conversely, a low ratio means lower than the average for the industry, or trending down each year for the company.

Payables Turnover shows the number of days, on average, that the company is

taking to pay for its purchases. If the number of days taken to satisfy creditors is trending up over the years, it is likely that the company's working capital is declining in relation to sales. If this ratio is low, it confirms that the company is prompt in paying.

To summarise: If a company prefers to deal with the best suppliers, it should pay vendors' bills as promptly as is expected in the particular industry.

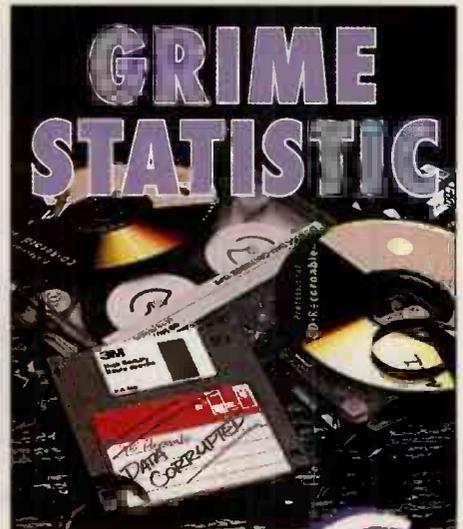
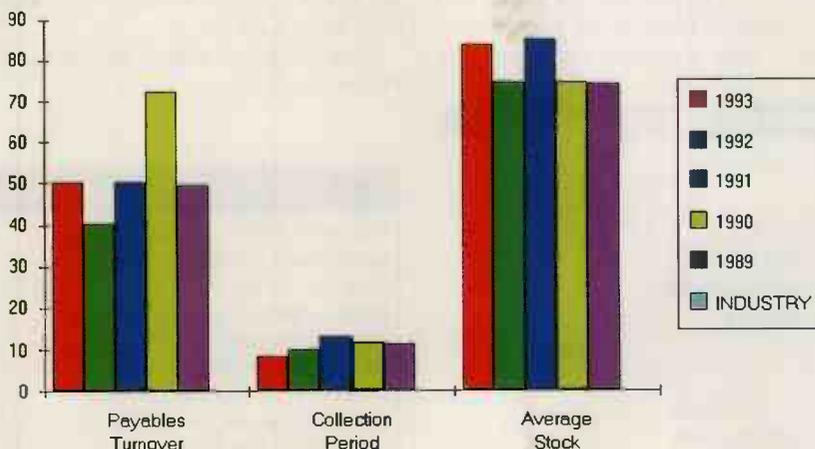
Prompt payment may seem to be foregoing a cheap line of credit, but in the long run it can pay when a company needs a supplier to come through with the best price or faster service.

The Collection Period is the number of days taken to collect receivables. If debtors are increasingly taking advantage of the company from year to year, it indicates that an increasing amount of working capital is being tied up in uncollected bills.

When compared with credit terms norms for its industry, the quality of the receivables can be determined: The longer a receivable is taking to collect, the

Fig 3 A chart of the Activity (Days) Ratios given in Fig 2

ACTIVITY RATIOS (DAYS)



The regular cleaning of personal computers, terminals and office equipment can mean a lot more than just providing a cleaner and healthier working environment for all your users.

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Regular cleaning maintenance will help prolong the life of your equipment and can greatly reduce the risk of data corruption or system failure, so it makes great business sense to implement a regular cleaning policy throughout your office environments. In addition, dust build up on screens due to static can contribute to eye strain, and minute particles of everyday dirt and grease can foul system cases and keyboards, causing sticky keys which both frustrate the user and cause errors when inputting data.

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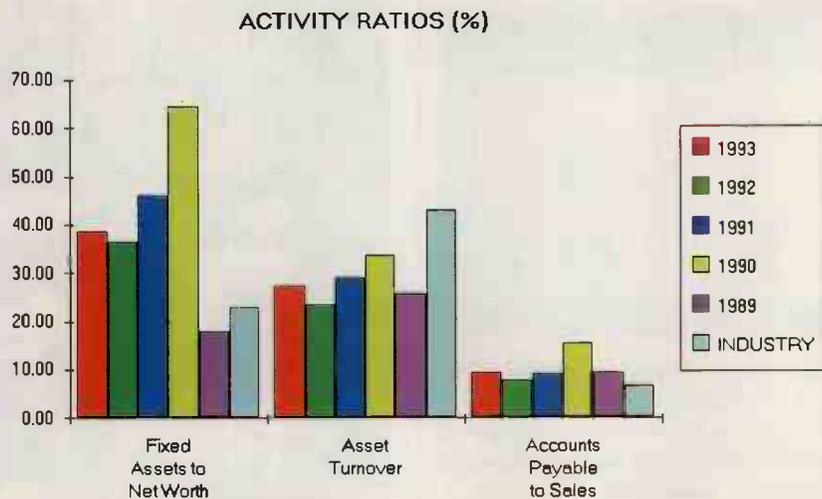


Fig 4 A chart of the Activity (%) Ratios also given in Fig 2

less likely it is to be collected, because neglected receivables become bad debts.

The smaller the number of days, the faster the company is collecting what is due from its customers. Obviously it is important to bear in mind selling terms. A company, like the Example Company, with a high proportion of cash sales, will have a low average ratio. Also note that too low an average collection period compared with the industry and company policy indicates that credit is being excessively restricted. It could be excluding marginal customers whose purchases could bring in added revenue.

To summarise: This ratio partly measures the internal collection efficiency of the company; determines the probability of bad debt write-offs; and offers a comparison of the company's receivables position with others in its industry if the averages are available.

Some industries, like department stores, think in terms of the number of times a year that they replace their stock. That's why Stock Turnover was included last month among the Activity Times

ratios. Other businesses think in terms of the number of days' stock they are carrying, hence the Average Stock ratio given here. It's just an alternative expression of the same thing.

Again, a high turnover (fewer days of average inventory in stock) for a particular industry is usually a sign of good management. Many car manufacturers, for example, will deal only with suppliers who will deliver what is needed on the day it's needed. This keeps the amount of capital tied up in stock to the bare minimum.

This not only reduces the need for capital, but also guarantees fresher stock.

Inadequate inventories, however, may result in higher costs due to buying in smaller quantities and the possible loss of business if what the customer wants is not on the shelf.

To summarise: The Average Stock is the numbers of days' inventory carried. The ratio is used in some industries for spotting understocking, overstocking, obsolescence and the need for merchandising improvement.

The Fixed Assets to Net Worth ratio measures the extent to which owners' resources are being used to finance plant and equipment acquisitions. If the investment in land, buildings and machinery

exceeds the owners' or stockholders' equity, it can restrict a company's mobility or the type of product sold. That's why many companies prefer to lease facilities and machinery.

To summarise: If this ratio is higher than desirable, a company can sometimes work its way out of the situation by increasing stock turnover or speeding up collections, thus generating a higher profit on sales and enabling it to carry the excess capacity.

A declining ratio, or ratio lower than comparable businesses, is desirable. More funds are available for working capital. Depreciation charges are reduced, enabling competitive sales prices and higher profits.

An Asset Turnover ratio of a higher percentage than the industry, or increasing percentages for the company, suggest poor sales management and a more aggressive sales policy is necessary.

Significantly lower percentages than the industry can indicate over-trading, which can lead to financial difficulties.

To summarise: Ideally, this ratio will remain fairly constant over the years, trending neither up nor down, and staying in line with the industry.

If the Accounts Payable to Sales ratio is high for the industry, it indicates that the company may be using suppliers to help finance operations. This might be positive for a time, but negative for short-term creditors, who would be concerned about the company's potential problems in paying suppliers. A low ratio indicates the company is in a good position to pay its suppliers.

To summarise: Not to be confused with the Payables Turnover, this ratio measures how the company is paying its suppliers in relation to the volume transacted. Service companies are an exception to this, but we'll come back to that when we get to the template for companies which don't carry stock.

In next month's column, we'll look at the Profitability Ratios.

Activity Ratios Template Listing

	A	B	C
58			
59 ACTIVITY RATIOS (DAYS)			
60 Payables Turnover		=B14/B24*365	=C14/C24*365
61 Collection Period		=B38/B22*365	=C38/C22*365
62 Average Stock		=365/B54	=365/C54
63			
64 ACTIVITY RATIOS (%)			
65 Fixed Assets to Net Worth	=B10/B36*100		=C10/C36*100
66 Asset Turnover	=B12/B22*100		=C12/C22*100
67 Accounts Payable to Sales	=B14/B22*100		=C14/C22*100

PCW Further details

Stephen Wells welcomes feedback on spreadsheets via PCW Editorial at the usual address or at stephen_wells@pcw.cmail.com. compuserve.com For the financial analysis template for companies which carry stock, in Excel 4 format, send a formatted 3.5in disk and a stamped, self-addressed envelope.

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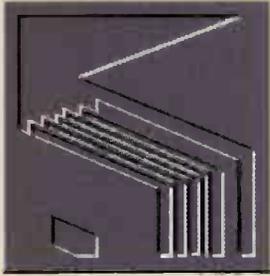
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Superbase lives!

The doomed database has been rescued from the clutches of the grim reaper by SPC, and it's more responsive to the needs of its users, reports Mark Whitehorn. And as promised, here are Ted Codd's much misquoted rules for relational databases.

Superbase was originally developed by Precision Software, and bought by Software Publishing Corporation (SPC) in 1992. When the news broke in 1994 that SPC was to stop development, it sounded like the end of the road for this particular Windows RDBMS. Since then, I've received a considerable volume of email from those worried about what the future holds for them as users of the product.

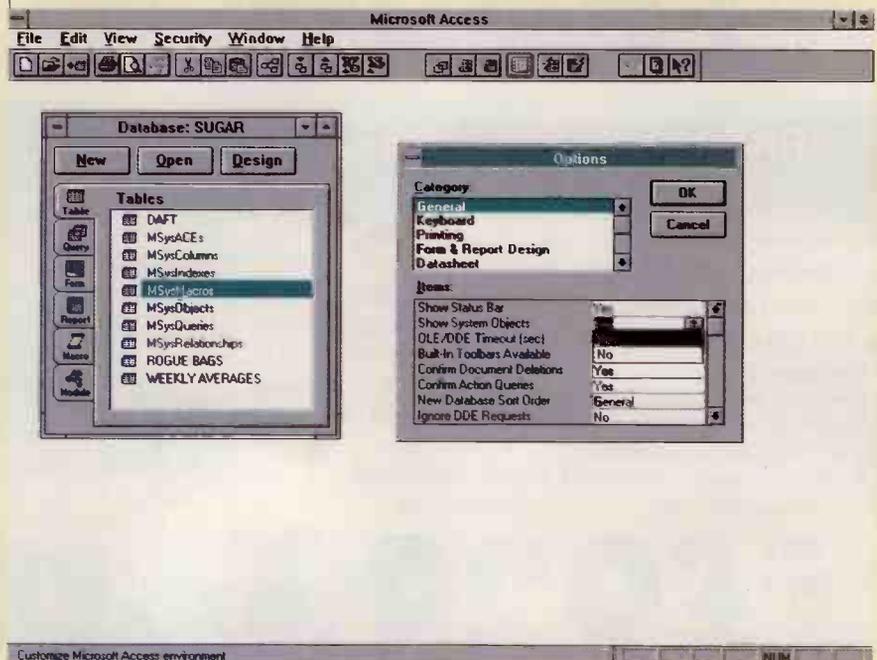
Superbase was then sold to Computer Concepts Corporation, which seems dedicated to keeping it in the running. Superbase Inc, as the American company is known in the UK, says the product concentrates on the needs of the application developer, unlike Microsoft and Borland whose database products claim to be all things to all users. Superbase Inc declares that this approach enables it to be more responsive to the requirements of its customers.

The latest version, Superbase95, has implemented an object model comprising over 70 object types and hundreds of methods, properties and events, and the programming language has been extended to become object-based. Now called Object SBL, it is described as largely compatible with Visual Basic. ODBC connectivity has been added and data stored on SQL servers can now be queried. Help for users appears as SuperSteps which offer instruction on common tasks, and ToolTips for pop-up instructions as the cursor pauses on an active icon. Superbase (the company) says: "With all these changes, we've still kept faith with the Superbase legacy.

Programs developed in previous versions of Superbase will still run perfectly in Superbase95."

For a package which looked like it had been given the kiss of death, Superbase seems to have a healthy new lease of life. This will be excellent news for existing users who have a heavy investment in code and expertise. For other users who are looking for a new RDBMS, the position is less clear. The prudent among them will want to examine this new product in detail before committing to it. Bearing in mind

Making the system objects visible in Access 2.0



that the effort required to develop an RDBMS under Windows is enormous, it remains to be seen whether the new owners have the resources to do this successfully.

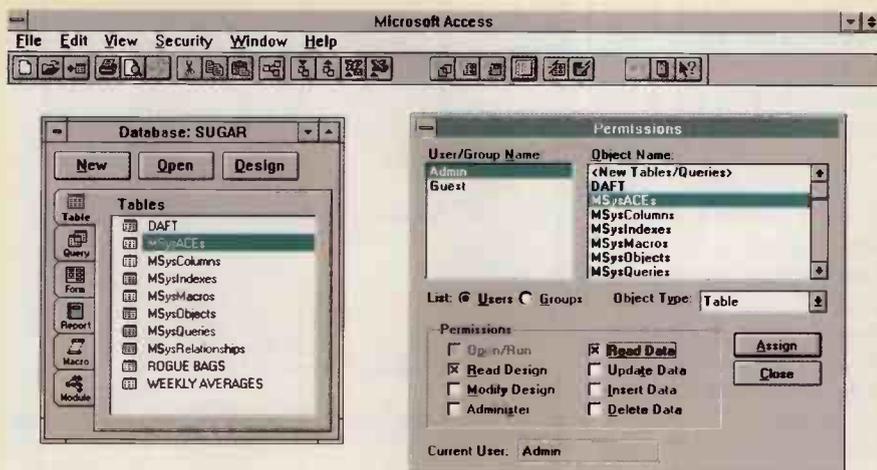
Database Workshop

I said I'd start describing Ted Codd's rules for relational databases. These have been quoted and misquoted so many times that, in the interests of accuracy, I went back to some original articles by Codd himself (Computerworld, 14th-21st October 1985). In the first of these he writes:

"In this paper I supply a set of rules with which a DBMS should comply if it is claimed to be fully relational."

Some of the quotes I intend to use from these papers only make sense if you are aware that by 1985 a great deal had been published about relational databases, but few products existed. Several manufacturers were producing systems for mainframes with the word "relational" on the box (or on the crate in the case of the bigger systems). Most of these products appear to have offended Codd deeply; indeed the articles are, in places, simply a vehicle for his diatribe against them. This can be seen in the introduction to the first paper:

"...some vendors of nonrelational DBMSs have quickly (and recently) added a few relational features — in some cases, very few features — in order to be able to claim their systems are relational, even though they may not meet the simple requirements for being rated "minimally relational". We shall refer to this kind of DBMS as "born again". It is a safe bet that



Assign permissions to users and groups

these Johnny-come-lately vendors have not taken the time or manpower to investigate optimisation techniques needed in relational DBMSs to yield good performance."

I love those "born again" and "Johnny-come-lately" references.

In excellent propeller-head style, Codd starts with rule zero, not rule one.

"Rule zero. For any system that is advertised as, or claimed to be, a relational database management system, that system must be able to manage databases entirely through its relational capabilities."

This always reminds me of that wonderful definition of recursion:

"Recursion: see recursion."

A relational database is relational as long as it is entirely relational. Again, it is important to see this rule in context. Many of the DBMSs of those days were based on a system other than relational (e.g. hierarchical) and had just had a few relational "features" bolted on in the hope that everyone would believe the products were fully relational. Nowadays few products are still hybrid in nature, so this isn't a major problem any more.

"The information rule.

Rule one.

All information in a relational database is represented explicitly at the logical level and in exactly one way — by values in tables."

This rule says that all data should be stored in tables. At first sight this seems logical enough: after all, that's what tables are for. But Codd makes it clear that this goes deeper. Consider what happens

Altering the security permissions on MSysACEs to allow the table to be viewed

when you build a database. You design tables, you give the tables fields, you build queries etc. Have you ever stopped to think where that information might be stored: where does the database store the the information about which tables have which fields? In Codd's view the answer is quite simple: it has to be stored in tables.

RDBMSs often have a data dictionary or system catalogue which manages the tables that hold this information. In Access you can see the system objects being constructed whenever you create a new database; see screenshots. (The message Verifying System Objects appears briefly on the status line.) Thereafter the system files are normally hidden, but you can see them by selecting View, Options, General and Show System Objects. They will appear as tables in the Database window, with the name MSys*. It is *not* recommended that you do anything but look at them. Don't edit them by hand! You may find that by default, some of them are unviewable. You can alter this if you really want to by highlighting the file and choosing Security, Permissions, and resetting the options; but remember to change it all back once you have had a look.

The idea of storing all this information in tables is to provide consistency. No matter what information you need from, or about, a database you will find it in the same format. This was important in the days of text-driven mainframe environments. My view is that now, given GUIs

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and much more sophisticated controls, this rule is less important than in 1985. Still, it is interesting that DBMSs like dBase are instantly excluded by this rule from those which can claim to be relational.

Facetious codes

I'm sure you are as annoyed as I am that programmers appear to enjoy wasting time and effort inserting facetious pieces of code into otherwise serious products. In Access 2.0, if you open a database container, click on Module, New, View, Immediate Window and type: ? SysCmd(888, "Any Questions?") you will get a fatuous answer. Try it again and a different answer appears.

I don't know. It would never have happened at IBM. (In fact, it's the 888 that is significant here, not the text in quotes.)

This works fine on most machines but inexplicably causes a GPF on one that I have seen, so save all work before trying it.

And please don't waste your time calling up the About screen in dBase 5.0 for Windows and typing Alt+Campus or Alt+I. And even if you do, under no circumstances try Alt+FOX: it's too macabre for words.

Access form design

When & why would you base a form on a query as opposed to just basing it on the underlying table? I have seen forms designed over queries, and I've seen them defined over just the table. Is there a rule of thumb as to which is preferred and when, or is it better to simply "always" use a query (and if so, why?)

PCW This is a simple question which justifies a complex answer because it tells you a great

deal about the way in which Access was designed to be used; information which isn't directly obvious from the documentation.

Access, unlike many RDBMSs, allows you to edit data via a query. Thus, if you have a table of Customers and query that table to show only those who live in East Grinstead, editing their addresses in the answer table will update the original data in the Customer table. Further, you can base forms on queries so you can perform this editing from a form. It gets even better because your query can span several tables and, under most circumstances, you can still edit the data.

So, you can base forms on queries as well as on tables, but what are the pros and cons?

For a start, data in tables is often not sorted as the user requires, and you can use a query to do that. So you do not need to control the order in which the records are added: you simply control the order in which they are viewed. At the same time you can also use the query, if required, to subset the data, removing records that the user doesn't need to see at that time.

"Ah!" I hear you cry, "but what about the 'performance hit' involved in using a query between the form and the table?" The answer is that there isn't one. In fact, Access never opens a form directly against a table. Even if you specify a table as the record source, Access still opens it as a dynaset (basically, it does a "select *" from the table). So, whichever way you do it, a dynaset still gets

Database	Name	DateCreate	DateUpdate	Del	Flags	Form
MSysObjects		00:00:00	00:00:00		-2.1E+09	
MSysColumns		00:00:00	00:00:00		-2.1E+09	
MSysIndexes		00:00:00	00:00:00		-2.1E+09	
MSysACES		00:00:00	00:00:00		-2.1E+09	
MSysQueries		00:00:00	00:00:00		-2.1E+09	
MSysRelationships		00:00:00	00:00:00		-2.1E+09	
MSysMacros		01/12/94 21:34:54	01/12/94 21:34:55		2	
DAFT		01/12/94 21:40:11	01/12/94 21:40:13		0	
ROGUE BAGS		01/12/94 21:40:19	01/12/94 21:51:40		0	
WEEKLY AVERAGES		01/12/94 21:46:02	01/12/94 21:51:54		0	
Tables		00:00:00	00:00:00		-2.1E+09	
Databases		00:00:00	00:00:00		-2.1E+09	
Relationships		00:00:00	00:00:00		-2.1E+09	
MSysDb		00:00:00	00:00:00		-2.1E+09	
Forms		01/12/94 21:34:55	01/12/94 21:34:55			
Reports		01/12/94 21:34:55	01/12/94 21:34:55			
Scripts		01/12/94 21:34:55	01/12/94 21:34:55			
Modules		01/12/94 21:34:55	01/12/94 21:34:55			
SysRel		01/12/94 21:34:55	01/12/94 21:34:55			
Graph of Average values		01/12/94 21:58:42	01/12/94 21:58:44			

The MSysObjects table is probably the most interesting

built. Restrictive queries are often faster than opening against the "table", since the underlying dynaset may have many fewer rows.

Ultimately, I find I usually have some good reason (like sorting or sub-setting) for basing most forms on queries rather than on the underlying tables. This has become such a common occurrence that, purely for the sake of consistency, I now base all forms on queries.

As a side issue, if you are going to use a form for data entry (say, adding customers to a base table), the correct approach is to open the form in data entry mode. It opens faster because it isn't retrieving any data from the table. You can do this in the openform action or by setting the forms default editing property to 1 (data entry).

Paradox index sorting

In Paradox for DOS, I have a need for part of an index to be sorted in descending order: I have a table with a field called "acctno" and "daterec". The first is an account number and the second is the date a payment was received; I have the primary index set to both of these fields. Now, I need to have the daterec field in descending order (newest dates first). How can I go about doing this?

PCW You need a little "trickery" to make this work. Create another type "N" or "S" field, then pick a date way in the future and seed that new field with the calc:

[future date] - [real date]

The older the [real date], the bigger the number. Now use that field as part of your index, instead of the real date field.

Bug Tracking

You would think that databases is an area where fashion might be frowned upon, but no: attitudes in the database world can be as fashionable as a DB7 or as passé as a Capri. And, in keeping with tradition, ours are about as sensible as a back-to-front baseball cap.

The release of Access 1.0 prompted an inexplicable fashion for loud proclamations about the product's bugs. And it was true: it had bugs. All products have bugs, but a reasoned and rational study of the product revealed that it actually had fewer bugs than most other RDBMSs. Nevertheless, the chattering classes had a field day. The release of 2.0 has come and gone without so much as a whisper, despite the fact that it has the usual quota of "features"; no more than usual, but still more than version 1.0. Clearly not wishing to prompt another fashion stampede, Microsoft has very quietly released the Microsoft Access 2.0 Service Pack.

The Service Pack includes the latest version of the Jet database engine (version 2.5) including new Paradox, Btrieve and DBF drivers, and the newest OLE libraries (2.02). It is particularly important that version 2.0 users should install the Service Pack because it corrects problems and adds new features:

- Involved in multi-user database work.
- Using OLE custom controls in their database applications.
- Working with Btrieve, Paradox or xBase data.

The announcement of this pack coincided with the closing of this column, and Microsoft UK has yet to decide how it is to be distributed. More next month. The good news is that it is already available for download on CompuServe, the Internet, Microsoft download service and AOL.

PCW Further Details

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. He's on penguin@cix.compulink.co.uk

At the security company

What other equipment have these cowboys sold us?

At the headhunter's

How long will it take to see who we've got with experience in VB, security and comms?

In the MD's office

What do you mean "we don't know how many fault calls relate to this" - it's on the computer isn't it?

In the PR office

Do we have any contacts in the Belgian press?

In the research section

You mean we can't just look for everything in the database that mentions it?

In the library

I don't suppose you've got any back-ground on [fill in pet hate]?

In customer service

I'm sorry; do you have a part number?
Oh...
We're stuck then, aren't we?

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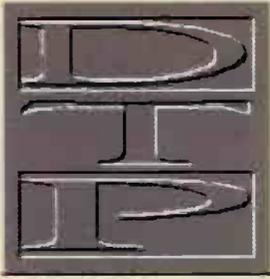
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A prize draw

As the Adobe/Aldus deal moves into its final stages, the likelihood is that Quark will soon be selling a drawing package. Gordon Laing sorts out the mess, monitors a new campaign, and extols the virtues of curvaceous text boxes.

It would seem that every time I check out the situation at Adobe, something else has happened. The Adobe/Aldus merger is now complete, with only the finer details to resolve, but there have been a few further interesting developments.

A few months back, we were all speculating that Quark would merge with or take over Altsys and its products, FreeHand and Fontographer. The Securities & Equities Commission, the US version of our Monopolies & Mergers, had decreed that Adobe should only control Illustrator. But then, lo and behold, out of nowhere came multimedia authoring developer Macromedia, now with an ex-Adobe head, to take over the reins. From early 1995, around the time that we can expect version 5.0 for Macintosh at least, look out for Macromedia FreeHand. Incidentally, FreeHand and Illustrator are expected to be able to read one another's files by the middle of 1995, using the Adobe Acrobat PDF format.

The question remains as to what

Quark will do, particularly with reliable rumours that it would develop a drawing package or take over a highly respected one. I think we can rule out Corel, which will currently be working hard to rush us CorelDraw 6.0 (for Windows 95, we hear — isn't that combination tempting fate ever so slightly?).

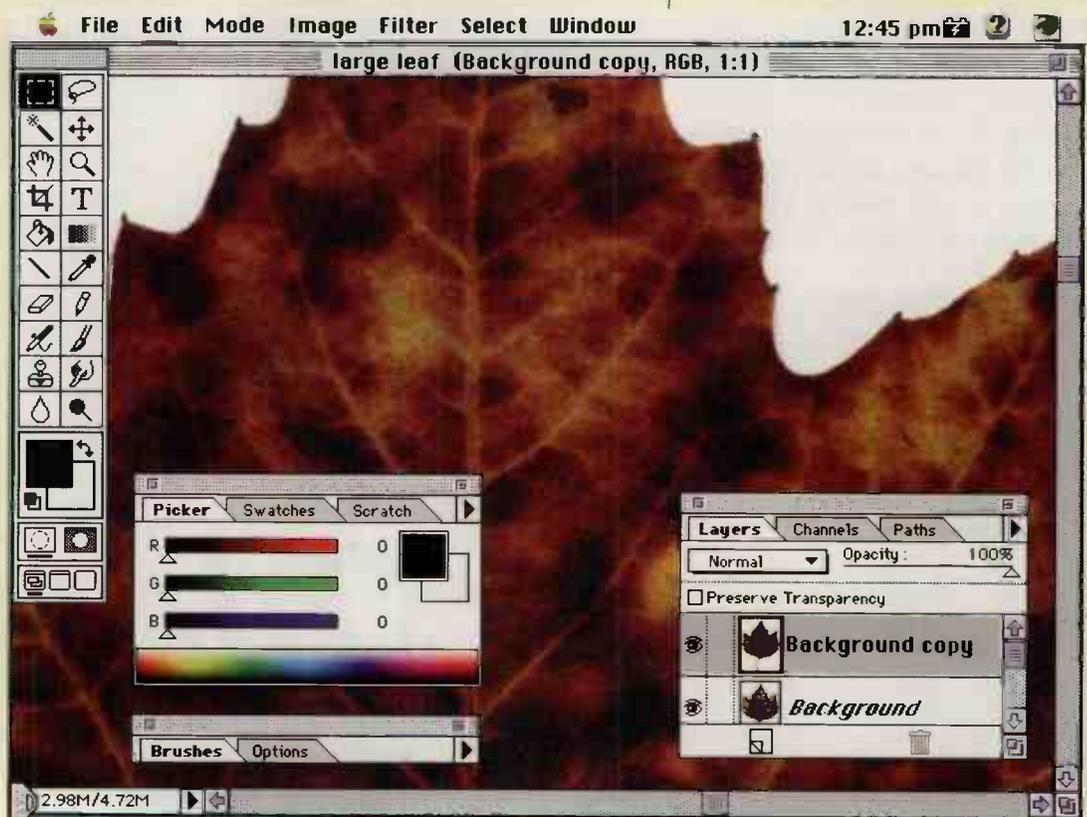
It is so far unknown whether the drawing tools will be sold as a separate package,

or incorporated into XPress at an inevitably inflated price. Quark is still infuriating Mac users, who are forced to pay £225 to upgrade to the PowerPC version of XPress 3.3, while almost every other software developer, including Adobe, ships dual-platform versions for the normal price. Upgraded XPress users get to keep their old non-PowerPC disks, but these are unlicensed and therefore illegal to use.

So, Adobe loses FreeHand but retains a couple of parallel products. Aldus PhotoStyler has been discontinued, and current registered users are being offered an upgrade to Adobe Photoshop 3.0. Customers who bought PhotoStyler after 1st September 1994 will receive a free upgrade, while older customers can do so for £79. PhotoStyler SE will continue to be bundled with many PC scanners and a full upgrade from this to Photoshop 3.0 will cost £151.

Photoshop 3.0 for Macintosh arrived on my desk in final shrinkwrapped form just as I was finishing this column, so I can't reveal too much except for customisable palettes and long-awaited layer control. With any luck, the Windows and other platform versions should arrive in the first quarter of 1995. Our first review of Photoshop 3.0 will be in April's paint/photo

Photoshop 3.0 for Mac seen here with customisable palettes and layer control — at last



retouching software group test, which will cover the budget packages alongside the traditionally high-end ones.

In January's column I commented on GST's forthcoming PressWorks 2.0, which looked like it would represent remarkable value for money at £39.95. It's still not quite finished, but we looked at a beta version which confirmed our hopeful expectations. Congratulations to Serif for PagePlus 3.0 (£59.95) and GST for PressWorks 2.0, both of which demonstrate that highly capable Windows DTP is readily available for well under £100.

Monitors Matter

Everybody, particularly those reading a column on graphics and DTP, should be interested in monitors and ensuring that they're running to the best of their ability. Unfortunately, it's often difficult to know the capabilities of unique combinations of monitor and graphics cards, especially in different modes.

We've all heard of Plug and Play in the case of expansion cards, but standards have emerged for monitors. The relevant categories have been developed by NEC, and adopted by VESA and Microsoft for Windows 95.

A Plug and Play monitor knows information about its own capabilities and communicates them to the OS via a compliant PC or graphics card. Typically, the monitor will be saying: "I can do 1024 x 768 at 70Hz, so if you want to switch to that mode I'll happily display it without going beserk". NEC developed several levels of Plug and Play, the higher ones enabling the computer to reply to the monitor, in certain cases allowing it to adjust display controls such as brightness, colour or geometric corrections.

Another standard, known as Access.bus, allows up to 125 I/O devices such as monitors, keyboards and mice to communicate with each other along a daisychain — somewhat like Apple's ADB. It's not really supposed to be a competitor to SCSI by any means, but it is an easy way to drive a whole line of displays simultaneously.

Unsurprisingly, NEC has announced a new range of monitors which feature Plug and Play facilities, while the more expensive models boast Access.bus. Right now there aren't any suitable graphics cards or motherboards to do all that much with video Plug and Play communications, and Windows 95 is a while away, but the standard has been defined and it's only a matter of time before other manufacturers jump on the bandwagon. By the end of

Monitors Matter Campaign

How do you test a monitor? Looking at the squareness of boxes and sharpness of text is a valid test, but additional help is at hand in the form of utilities which display geometric patterns and coloured shapes. Any distortions are obvious, and easily rectified. Shown here are two such tests, part of the CGSA's Monitors Matter campaign, which are available free of charge

1995, end-users will hopefully have any monitor compatibility problems eliminated — as long as they've reinvested in official Plug and Play hardware.

So, you've discovered your monitor and video card can do whacking great resolutions at flicker-free refresh rates, but you are perhaps a little concerned about geometric distortions. Utilities such as Sonera Technologies DisplayMate for Windows are useful for revealing any

problems and are used by many systems and testing departments, including our own.

Not all of us can afford to go out and by something like DisplayMate, but would still like to diagnose any nastiness going on. Fear not, for salvation is at hand, in the form of the Computer Graphics Suppliers Association, CGSA, which is launching the Monitors Matter campaign. The CGSA was founded in 1985, represents the UK

Computer Graphics, CAD/CAM and Document Management Vendor community, and has around 100 members including most of the world's leading monitor suppliers. It has put together a free information pack consisting of a booklet with safety and setup tips, and a floppy disk containing tests similar in concept to those offered in DisplayMate.

A timely reminder is the EC Directive on Health and Safety in the Workplace which came into effect on 1st January 1993 stating that employers must ensure all existing monitors meet the following requirements by 31st December 1996: that characters be well defined and clearly formed, that the image is stable "with no flickering or instability", and that the screen be free of glare and reflections.

With any luck, the days of poor displays are numbered. PCW's monitor group test in February's issue reviewed 27 models from 15in to 21in, and covered the technologies and issues concerned.

Irregular text boxes

Many elements of design go unchanged or unchallenged for years. An area where almost all of us have been less than original in our thinking is the workhorse columns of text. There they are, always four-sided, always tall and thin. And this may not be a bad thing with all other elements on the page getting frequently out of control: wild headlines, crazy illustrations and freaky folios.

I'm not trying to suggest that respectable papers start messing around with their front page design, but there's room for innovation elsewhere. How about the short, sharp news stories, the snippets of Hollywood gossip, the objects of desire he or she would love for Christmas? Here are blocks of text often placed on the page with lots of white space and bold pictures dotted liberally around, just dying for something a little different from the norm. Time for an irregular text box.

The whole idea is to alter the number of sides, or the shape of the sides of a box or frame containing text. Text flowing inside a many-sided polygon or something like a fish or star shape can work if you're careful. Sadly, or perhaps fortunately, this design trick is becoming less frequent these days. Considerably more fashionable are curvaceous boxes: still vertical, still tall and thin, but this time with the added interest of a wavy side.

It's easy to do, particularly if your application allows you to create irregular shaped frames. Most drawing applications will, and some DTP apps too, although

Font Of The Month

LITHOS

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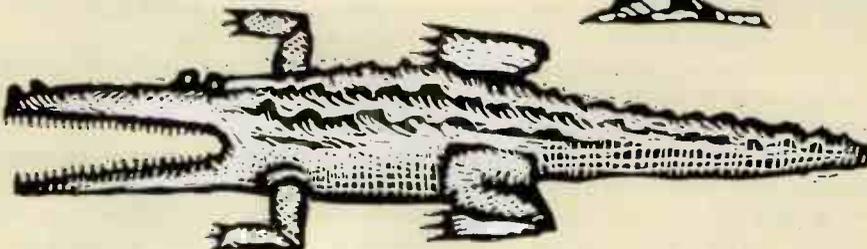
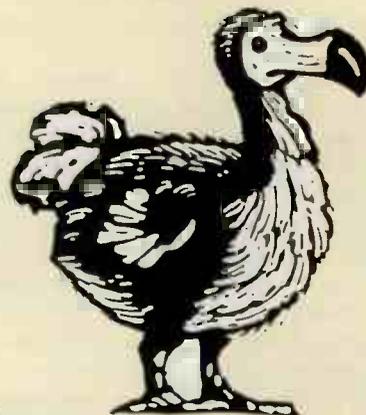
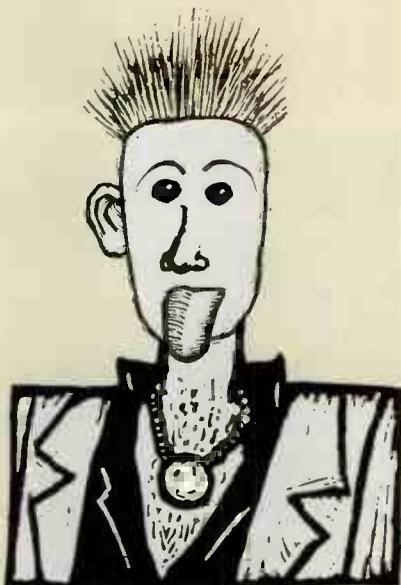
there are surprising exceptions. Take Quark XPress, which will only do irregular shaped picture boxes if you have the latest version 3.3. You can be a little clever, though, with the resources and tools which are offered.

If you can't alter the shape of a text frame, stick an irregular shape in the way, make it invisible and have the text flow around it. This can be done in more than one way, and the two most obvious in my book are as follows.

Draw the required shape in something like FreeHand, then import it into your layout as an EPS. Alternatively, and this keeps the number of imported elements down, draw an irregular shaped frame — in XPress, an irregular picture box — and place it over the edge of the text box, forcing it to wrap around.

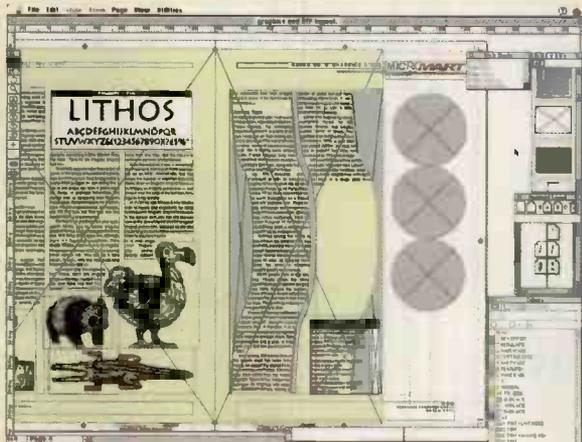
At PCW we use XPress 3.1 for Macintosh at layout and implement the latter technique for irregular shaped text boxes. In the screenshot, you can see this column at the time of layout and the irregular shaped picture box, coloured so it's visible, forcing the text to follow curvey edges.

● *Clip art gets stylish — a selection of FontHaus's Art Parts*



● None other than this column at time of layout. Check out the irregular boxes forcing the text into curved columns

Want to see how it looks in a real magazine? Presumably you've already noticed the somewhat less than straight edges to some of the text boxes in this column...



Just my Type

At Apple Expo this year I met some lovely people, especially those from Faces Limited, the Camberley-based font dealers.

In the blink of an eye I was put on their mailing list, and a few days later furnished with a rather attractive luminous mouse mat. On a slightly more serious note, Faces supplies fonts from numerous sources such as Adobe, Linotype and Agfa, along with the rather interesting FontHaus.

My first encounter with FontHaus is with its attractive, slightly quirky range of clip art collections, known as Art Parts. Each of the 13 Art Parts sets contain 50 or more illustrations on a theme and are available from Faces for £39. Macintosh and Windows formats are both catered for, although Mac users also have the option to buy all 13 Art Parts on a CD-ROM for £265; a Windows format CD will be available soon.

Pictured among the words in this column are samples from the Art Parts, including various animals and an attractive looking individual, made up from the composite body parts on offer. Art Parts for Windows are saved in Windows Metafile (WMF) vector format.

When people think of clip art, they usually picture the often appalling range of useless images that have flooded the market. There are some decent collections out there but you have to look hard for them. Faces, with its artful parts, is a good place to start.

Faces also distributes a thrice-yearly American publication called "x height". Along the lines of Adobe's Font & Function, it is a large-format booklet containing font lists, features and type ideas. Subscriptions are £12 a year, or

free upon your first font purchase from Faces.

After all that, this month's Font of the Month does not come from Faces, or indeed my eternal FontFont catalogue favourites. It is none other than Lithos from the Adobe Originals Type Library. Adobe now packages its Originals with really nice illustrated booklets, offering a wealth of useful and just damned interesting information. It certainly makes my job a lot easier, so here we go with a little shameless plagiarising...

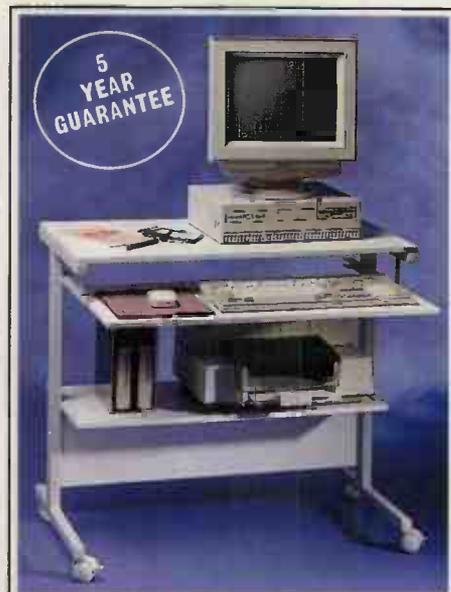
Lithos was inspired by stone inscriptions carved by the ancient Greeks, and actually means "stone" in Greek. The typeface was designed by Carol Twombly in 1989, a year after she joined Adobe. It's ideal for use in posters and titles, and looks best at 18 points or larger.

MTV has adopted Lithos as its on-screen corporate font. Lithos is a capitals-only typeface, available in five weights from extra light to black in a single pack from Adobe.

PCW Contacts

Gordon Laing has managed to sustain 4.5Mb read and write rates on a 1Gb SCSI 2 drive over a PCI SCSI bus, by copying the SCSI BIOS into RAM. Any electronic tips but no abuse please to Gordon_Laing@pcw.ccmil.com

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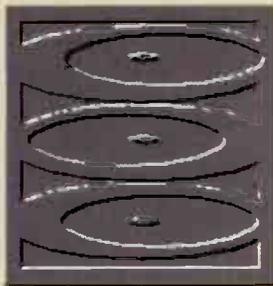
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Keeping in Time

In his last multimedia column, Chris Cain gets stuck into the exciting world of QuickTime VR and gives the latest from Sony and Philips, while George Cole looks at multimedia authoring.

Digital video has always been a hot topic in multimedia, and recently I've received a lot of calls and email about QuickTime VR. In this, my last column, I'll try to explain the theories behind it and how it's used, and generally see what it's all about. There's also news on an exciting development in CD technology, and George Cole gives us his views on the problems facing developers.

Reality check

QuickTime VR is the latest extension to QuickTime 2.0, Apple's system software architecture for handling multimedia. The VR stands for Virtual Reality, but before you start to turn the page it has nothing to do with dancing around a room dressed as an astronaut. Apple has come up with a purely software system that lets Mac and Windows users explore new worlds and manipulate objects within them from the comfort of their keyboard. To use VR movies you'll need either a 25MHz 68030 Mac or better, or a PC-compatible configured to MPC2 specifications.

The technology behind VR is split into two parts: a panoramic movie system and an object-based bit with definable hotspots.

The movie process works by panning around a 360° photograph, where the view is exactly the same as you would see if you stood on one spot in a room and looked all the way around.

You can turn to face any part of the room by moving the mouse left or right, and you can move through the space within by zooming in and out.

To catch a complete panoramic view



on film would normally require expensive equipment, but with VR you can achieve the same results using a standard 35mm camera. Adjacent individual images can be shot and merged seamlessly to create the desired effect, which brings costs down significantly. The 35mm also makes it easy to apply filters to each image and gives greater control of exposure.

The more images that make up a virtual world the smoother and better your visits to fantasy land will be. More images usually means more storage space, but thanks to data compression a finished photorealistic quarter-screen VR world can take up as little as 1Mb. Computer-generated images could well turn out to be even smaller.

The object side of the technology lets developers define hotspots which can trigger a variety of actions, such as a sound, the presentation of a photograph or another VR movie. To set up objects that can be manipulated, all you have to do is film the object from every angle, stitch the views together and define the spot on the main film that links in the object movie. Simple, but extremely effective.

To show just what can be achieved by this new video system Apple has developed an interactive museum demonstration. In this you get to walk around a small section of a museum, look at exhibits and then pick them up for close inspection. The first commercial example of QuickTime VR can be seen in Simon and Schuster's Star Trek: The Next Generation Interactive Technical Manual. The disc, reviewed in last month's CD-ROMs section, isn't astounding, but it gives a glimpse of what

QuickTime VR technology lets you explore strange new worlds, and in Simon and Schuster's Interactive Star Trek manual you can look around the bridge of the USS Enterprise

we can expect in the future.

If Apple can get its act together with the distribution of development software, which it hasn't exactly done in the past, QuickTime VR could have a profound impact on the multimedia market. The fact that it's purely software-based makes it attractive to even the smallest software producers, and its cross-platform nature gives it a head start in the standards race. Interactive movie technology could have a major impact in areas such as education,



MAIN BRIDGE

The central area of the Main Bridge provides seating and information displays for the commander and two other officers. Directly fore of the command area are the Operations Manager and the Flight Control Officer, both of whom face the main viewer.

Directly aft of the command area is an elevated platform on which is located the tactical control station. Also located on the platform are five workstations, nominally configured as Science I, Science II, Mission Operations (Ops), Environment, and Engineering.

LCARS diagnostic updated

games, architecture and museums. It could even be used simply for surrogate travel — you may not be able to afford a trip to New York but you could still wander along Fifth Avenue.

CD-ROOM

While all this is exciting news for the future, the best new development this month was an announcement from Sony and Philips, who invented the compact disc: they have come up with a proposed specification for a new Multimedia CD

Alternatively, you can always turn round and stare into space

*Like the look of the Captain's chair?
Why not zoom in for closer inspection*

format.

Designed with high-quality MPEG2 digital video in mind, the multimedia CD would hold approximately 3.7Gb of data — more than five times the current amount of storage available on today's discs. This will be achieved by using a 635nm red laser, reducing both the distances between tracks and the sizes of the pits, and by using improved error correction and modulation techniques. The new specifications will allow discs to be produced at conventional manufacturing facil-



MAIN BRIDGE

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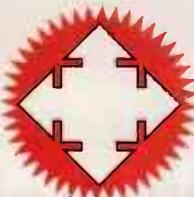
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ities with only minor modifications.

A 3.7Mb disc could carry around 135 minutes of MPEG2 video, with multiple tracks of compressed digital audio and

subtitling. A variable data transfer rate between 1 and 10Mbits/sec (with an average of about 3Mbits) will, says Philips, give better picture quality than any current

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Clip Media

Up and down the country, thousands of people are using DTP packages to create magazines, fanzines, newsletters, posters and leaflets. But how many PC owners are using multimedia to create things? Not as many, I think. I've lost count of the number of the articles I've read about vicars who are using PageMaker or Quark XPress to produce the parish mag, but I've yet to hear about any who are using multimedia to deliver The Message. Yet multimedia can be a powerful form of communication. When an unemployed person created a multimedia CV and put it on the Internet, it caused quite a stir, and the author was inundated with job offers.

It's fairly obvious why DTP has captured the imagination of many people, while multimedia authoring hasn't caught on in anything like the same way. There's timing of course — the DTP revolution took off in the mid-eighties, while multimedia has just about found its feet. Cost is another factor. These days, almost anyone can knock up a magazine on a low-end PC and cheap DTP package. It may not be a glossy product, but for most people, it does the business.

Multimedia authoring requires more expensive hardware and software, but

even so, prices are falling and high-end machines are becoming more affordable. And you no longer need to be an expert programmer in C to create a multimedia presentation, thanks to the increasing the number of user-friendly multimedia authoring tools that use point-and-click interfaces.

The biggest problems when it comes to multimedia authoring are time, and the fact that most of us are not great artists, video directors or sound recordists. Leaving aside the time taken to record sound or video, there's also the question of digitising, editing and manipulating the various media, then adding the titles and special effects. This is where DTP scores over multimedia, because users are well catered for with ready-to-use clip art packages. There are literally dozens of CD-ROMs stuffed full of fonts, graphics and even high-quality photographic images, but where are all the clip media packages for budding multimedia authors?

Education is fairly well catered for in this respect, probably because companies know that teachers and students are always on the lookout for images and text that can be used for presentations and project work. For instance, AVP has developed PictureBase for Windows and Acorn RISC OS computers (such as the Archimedes). PictureBase is a

consumer video format.

Before you start saving your pennies, though, bear in mind that these are only proposals and that the technology is not likely to be at consumer level until 1997. Also, the press release issued on this didn't contain any word from the music industry, the single biggest user of the CD format. It's all exciting, but we'll just have to wait and see.

Philips update

While on the subject of Philips, this month I discovered a compatibility problem with Philips 205 CD-i players and newly released White Book Video CDs. It appears that video playback is sometimes interrupted by large green flashes across the screen, especially on titles like the new James Bond collection and Dorling Kindersley's Shark.

There are two things which can cause this problem: a badly connected digital video cartridge or a faulty multimedia controller chip inside the player. If you've noticed this on some discs and want to check the status of your player, I've found that choosing the "align picture option" from the settings menu can force an incompatible player to display these

unwelcome lines everytime.

According to Philips the problem only happens on a small number of 205 players, and the company will replace any faulty controller chips free of charge. If you think yours is faulty you should contact your dealer for further information.

TransJammer

Another bit of news which will interest Premiere people is the release of TransJammer, the first package to offer transition plug ins for Macintosh and Power Macintosh. Premiere plug ins work in the same way as those produced for Adobe Photoshop, and TransJammer offers over 100 new transitional effects with up to 800 variations. Anyone interested should contact Softline Distribution on 0181 401 1234.

And finally...

Well, that's it. As from next month Hands On Multimedia will be in the capable hands of our new Technical Editor, Karl Dunkerley. Karl is a real video whiz, so look out for his tips on working with Premiere and the PC. I'm moving over to take over from Mick O'Neil in our Macintosh section, so if you're an Apple addict I'll see you there. Until next month.

series of modules, each with around 20 to 30 images and text. Some also have sound files. The modules can be stored on a hard disk and customised by the teacher. For example, text, sound or pictures can be added, and a variety of pathways can be created.

But what if you're outside education? Trick of Light (£66.89, plus VAT, published by KimTec) is a CD-ROM of photographic backgrounds designed for Macintosh users. The CD-ROM contains a collection of backgrounds that are stored as lossless JPEG-compressed files. The images are stored in three resolutions, including 1536 x 1024 pixels for large-screen multimedia. The nice thing is that the images are royalty-free for normal use, including broadcast.

Royalties and rights are probably the main reason why there aren't that many clip media titles offering music and/or video. Not surprisingly, few artists and composers are keen to see their creations put into commercial packages without some form of remuneration.

But there's a gap in the market for companies who are prepared to offer clip media for multimedia authors, as some are already doing. Multimedia Music Library by Midsoft (£34.30 from Multimedia Warehouse) is designed for PCs using Windows 3.1, and

the minimum requirements are a 386/25MHz PC, with 4Mb RAM, 8.5Mb free hard disk space and a MIDI-capable sound card or MIDI interface card and external MIDI device. The Multimedia Music Library contains over 100 pieces of music stored as MIDI files, which users can edit. The good news is that the music library is royalty-free, provided it's not broadcast or used for more than 100 copies of a commercial product.

Jasmine Royalty-Free Clip Media (prices from £55 from FOS-CD) is a series of titles designed for MPCs and Macs. The CD-ROMs contain a mix of text, music, photos and video (in the form of QuickTime or Video For Windows movie files). The titles cover various themes including science, nature, business and amazing exploits such as daredevil riders.

It's a promising start, but let's hope more and more companies publish clip media titles. Who knows, we may even see clip media Video CDs. In the meantime, if you come across any interesting or useful clip media, please let me know.

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Hidden weakness

Product reviews can only go so far, argues Tim Anderson. It's developers and users that uncover hidden flaws.

Thanks to Keith Jeram (Greystones Publishing) for the following letter:

"The December feature covering third-party RTF edit controls I found very useful and would certainly like to see more in-depth reviews of third-party custom controls. Trying to judge a control from the manufacturer's literature alone can be difficult. We have had this experience with

the Spread/VBX 2.1 control from FarPoint. Only after working with the control for some time did we become aware of some of its fundamental limitations. For example:

- (i) All calculations in formulae use the displayed values in referenced cells rather than the internal stored values.
- (ii) Similarly, when a spreadsheet file is saved, the displayed values in data cells are saved, not the internal values, e.g. 3.152 formatted to display with one decimal point will be saved to file as 3.2.
- (iii) Formulae do not use any operator precedence when calculated but are simply calculated from left to right, e.g. $=1+2*3$ evaluates as 9 rather than the correct result of 7.

This can be dealt with by using parentheses, e.g. $=1+(2*3)$, but to force the user to think about this is poor. I was staggered to discover this particular weakness.

None of this is even hinted at in the manual and so it took a while

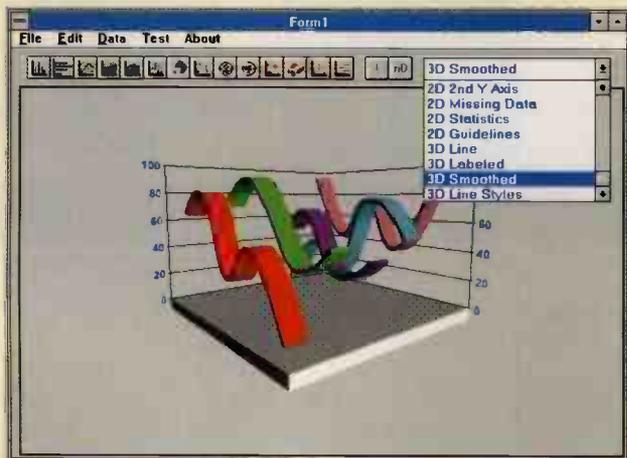
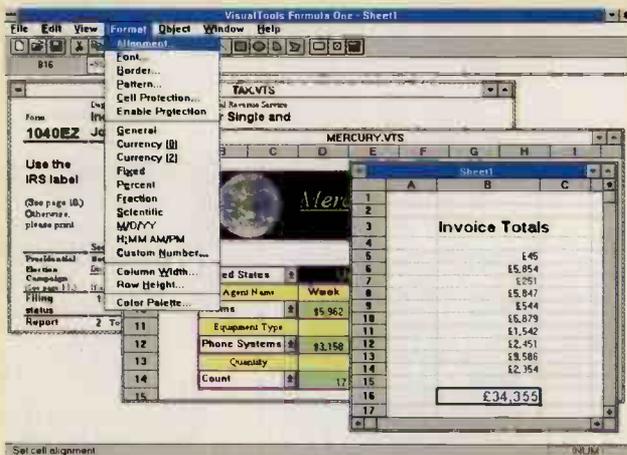
to realise how weak the product is, and there are more things I could add to the list. Also, since all cell references are absolute, it is not easy to implement copy and paste so as to maintain data and formula integrity. And it is far from free of bugs, although to be fair, the fax and bulletin board support from the US has been okay. The Formula 1 spreadsheet control that was reviewed in December's *PCW* seems a much more competent product."

Here is an example of an attractive VBX showing its limitations when put to use in the real world. Now, why can't magazine reviews expose flaws of this kind? Every product reviewed in *PCW* is tried and tested; we are not in the business of printing press releases or wrapper wordings. Some flaws, though, only emerge when a product is used in development, rather than the small test applications built by a reviewer. And the limited space available means that not every detail can be covered, especially with development products that may have hundreds of features or a complex API. One way to bridge the gap is by logging on to a bulletin board where developers share their experiences, good and bad. Another is to do what Keith has done: write to me c/o *PCW* (or email to the address at the end of this column), and share your long-term results from Visual Basic add-on products. Don't forget to mention what works well alongside any problems. We'll print the most helpful of your comments and that way other VB users can benefit from your experiences.

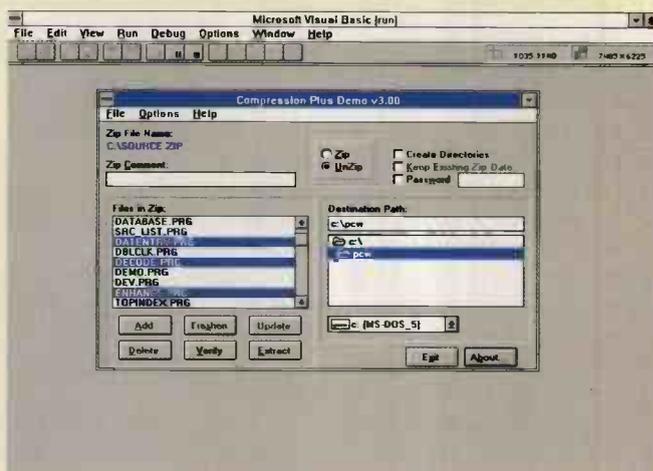
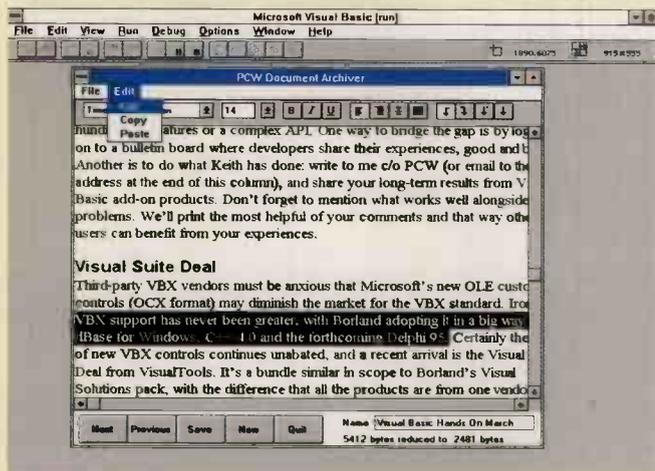
Visual Suite Deal

Third-party VBX vendors must be anxious that Microsoft's new OLE custom controls (OCX format) may diminish the market for the VBX standard. Ironically, VBX support has never been greater, with Borland adopting it for dBase for Windows, C++ 4.0 and the forthcoming Delphi 95. The flow of new VBX controls continues unabated, and a recent arrival is the Visual Suite Deal from VisualTools. It's a bundle similar in scope to Borland's Visual Solutions pack, except that all the products are from one vendor, simplifying technical support and improving consistency.

VisualTools are best known for their Formula One spreadsheet control, included here in version 2.0. The box says they are "unabridged", unlike many bundles which contain cut-down versions. Alongside it is a rich text edit control (Visual Writer), a charting control (First Impression), a spell check control (Visual Speller), and an image control



Top *Formula One, the most advanced spreadsheet VBX so far*
Bottom *The options in First Impression*



(ImageStream). But developers should be warned that the standard version of Visual Writer is supplied, not the Pro version which adds mailmerge, hypertext, database support and zooming. Most of the controls are licensed for free runtime distribution, except ImageStream which requires an additional licence if you sell on more than 100 copies.

Formula One 2.0 deserves its good reputation. It can save and load files in Excel 4.0 format, and supports a subset of Excel's features including a wide range of cell formatting options, named ranges, and many formulae. Version 2.0 supports graphic objects such as lines and polygons, buttons, list boxes and check boxes, but not all these objects are compatible with their Excel equivalents. It is important to be realistic. The value of Excel compatibility is to ease the exchange of data between spreadsheets and VB applications. You cannot build a spreadsheet to rival Excel with VB and Formula One. If you need full Excel compatibility, the solution is to build the application with Excel and Visual Basic for Applications, or else to control Excel itself through OLE automation. What Formula One does is provide a way of building spreadsheet functionality into a VB application. It is fast, data-aware, and unlike Excel runtime distribution is free. If your main need is for a data-aware grid, I would still recommend True Grid Professional, but for spreadsheet functions Formula One has the edge. The runtime files are about 500kb.

There are useful links between the Visual Suite controls. First Impression is a graph control, and a natural companion to Formula One. It justifies its massive runtime engine (over 1.1Mb) by providing a wide range of chart types, including polar, radar, hi-lo, bubble and Gantt charts. Charts can be 2D or 3D, and 3D charts allow control of lighting and perspective. Used on its own, First Impression is best

Left The document archiver at work, saving nearly 55% of disk space in this example
Right If you want to write your own ZIP manager, Compression Plus is ideal

thought of as a data grid, with row and column properties, that can also be displayed as a chart. Used with Formula One, First Impression can be linked to a range on the spreadsheet control instead.

Visual Writer is rich text edit control, a fair implementation with little to set it apart from others available. That said, these controls are a great asset to VB programmers wanting to make use of the fonts and styles that Windows offers. Visual Writer is easy to program, comes with button bar, ruler and status bar controls, offers RTF import and export, and rather unusually, enables formatted text to be cut and pasted from the Windows clipboard. It is not data-aware and lacks any support for pictures or graphics. Visual Writer links well with VisualSpeller, a sophisticated spell checking engine supplied with the Visual Suite Deal. Runtime files are just under 100kb in size. Sadly, the dictionary is American, but a dictionary maker is supplied to enable localisation. Features include multiple dictionaries, custom dictionaries, suggestion lists, word or block checking, hyphenation, and even control over memory usage. VisualSpeller is very impressive.

Last in the Suite is ImageStream, an image control with support for 22 image types via import and export filter files. The control is data aware. ImageStream improves on the standard VB image control, but offers disappointing image manipulation features, limited to gamma, contrast and brightness. A nice touch is the custom file open dialogue, which included a preview image. ImageStream rounds off a very capable suite of controls, and I rate the Visual Suite Deal one of the best value VB add-on packs around.

Compressing VB

Last month I mentioned Elltech's Compression Plus, a data compression library for Visual Basic, and can now report in more detail. It's aimed at the more technical VB user, and provides ZIP-compatible compression functions. There's no VBX, as all the functions are contained in a 40kb dynamic link library. Calling the DLL functions directly requires care, as it involves allocating and releasing blocks of memory. So, Elltech has wrapped the low-level functions in higher level functions written in VB. The recommendation is that VB programmers call only these high-level functions, providing a shield from these complexities. These user-level routines include progress thermometers to give visual feedback; these are VB forms which can be customised or eliminated as needed. There are also routines to compress and decompress blocks of memory: this could be invaluable in getting extra performance from apps designed for low-end hardware.

The Compression Plus documentation is poor, and jumps confusingly between the three different versions of the product. The routines themselves work well, and assuming you have not already compressed your hard disk, the Compression Plus library offers many possibilities for writing utilities or applications that store data efficiently.

PCW Contacts

Tim Anderson would like to receive your VB comments, tips and sample code. Contact him via *PCW* at the usual address, or freer@cix.compulink.co.uk, or 100023,3154@compuserve.com

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Building a Document Archiver

To try out the Compression Plus and Visual Writer add-ons, we set ourselves the task of building a simple document archiver. The idea was to store rich-text documents in an Access MDB, displaying them in a Visual Writer control. Because RTF documents are stored as plain ASCII text, they compress very effectively, so we used Compression Plus to store them as ZIP-compatible compressed documents. For convenience, the MDB was created using Access itself, and contains two fields, a memo field called ZippedDoc and a text field called DocumentName.

Setting up the document archiver required several files to be added to a new VB project. These are the Visual Writer control, TX4VBL.VBX; COMPRESS.BAS and ECTPRNT1.BAS, which contain the VB functions used by Compression Plus; and ETCPRNT.FRM, which displays a status message when Compression Plus is working. On the main VB form for the project we placed a Visual Writer text control and button bar, a simple menu, several buttons, and an ordinary text box for the document name.

Getting the application to work took several steps. Hooking up Visual Writer to the button bar was a matter of setting one property, ButtonBar, for the TextControl. Next, we used the OpenDatabase and OpenTable functions to make the Access .MDB available for business. The following routine, DisplayZip, extracts the zipped document from the database, writes it to disk, calls Compression Plus to unzip the document, and then loads it into the Visual Writer control for display:

```
Sub DisplayZip ()
' Displays Zipped document in memo
field in Visual Writer control

Dim itmpfileno As Integer
Dim sdoc As String
Dim lfilelength As Long
Dim iretval As Integer
Dim lZipSize As Long
Dim lRTFsize As Long

itmpfileno = FreeFile

Open "C:\TMP\TMP.ZIP" For Binary As
#itmpfileno

' get zipped data from MDB
' allow for null fields by adding
""
```

```
sdoc = "" & doctb!zippedDoc

' put document name on form
text1.Text = "" & doctb!documentname

' write zipped data to disk
Put #itmpfileno, , sdoc

' store size of zipped document
lZipSize = LOF(itmpfileno)

Close #itmpfileno

' clear the text
textControl1.Text = ""

' unzip the file

' first open the Zip archive
iretval =
EtZipOpen("C:\TMP\TMP.ZIP", 0, itmp-
fileno)

' then actually unzip the file
iretval = ETUnZip%(itmpfileno,
"C:\TMP", "RTFDOC.RTF", "-o")

' close the zip file
ETZipClose (itmpfileno)

' delete the ZIP file
Kill "C:\TMP\TMP.ZIP"

' measure the RTF file size
' making sure file exists
If Dir$("C:\TMP\RTFDOC.RTF") <> ""
Then

lRTFsize =
FileLen("C:\TMP\RTFDOC.RTF")
' load the RTF file
textControl1.RTFImport = "C:\TMP\RTF-
DOC.RTF"

' delete the file from disk
Kill "C:\TMP\RTFDOC.RTF"

Else

lRTFsize = 0

End If

' show saving

label2.Caption = Str$(lRTFsize) & "
bytes reduced to " & Str$(lZipSize) &
"bytes"

End Sub
```

The code to save an RTF document to a zipped data record is very similar. First, Visual Writer's RTFExport method is called to create an RTF document on disk. Then, the following code ZIPs the document and stores it:

```
itmpfileno = FreeFile

' Now zip the file
' first store filename in array
ReDim sfilestozip(1 To 1)

sfilestozip(1) =
"C:\TMP\RTFDOC.RTF"
iretval =
EtZipOpen("C:\TMP\TMP.ZIP", 0,
itmpfileno)
iretval = ETZip%(itmpfileno,
sfilestozip(), "")
ETZipClose (itmpfileno)

' get zip into a string

Open "C:\TMP\TMP.ZIP" For Binary
As #itmpfileno
lfilelength = LOF(itmpfileno)
sDOC = String$(lfilelength, " ")
Get #itmpfileno, , sDOC
Close #itmpfileno

Kill "C:\TMP\TMP.ZIP"

' now save into table
doctb.Edit
doctb!zippedDoc = sDOC
doctb!documentname = text1.Text
doctb.Update
```

The conclusion? In a short time, we had a working application which stores rich-text format documents in a compressed form in an Access MDB. With savings of well over 50% on offer, the technique has great potential, with text documents as well as other kinds of multimedia files. There's more work to do in providing a fuller range of features, search facilities, error handling, and maybe an option to fax documents using EITech's companion FaxPlus VB add-on. Another approach would be to store documents in a native word processor format such as Ami Pro or Word for Windows, using OLE or DDE to call the original application as needed.

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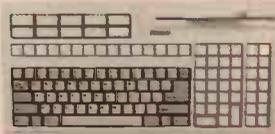
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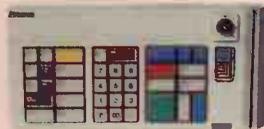
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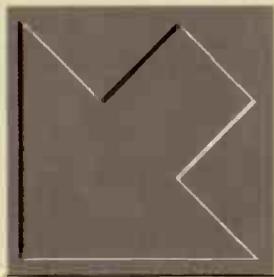
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Moving on from Mandelbrot

Mike Liardet presents an alternative pattern generation program which applies a single Visual Basic formula to each point in the image to produce some surprisingly complex results.

In this month's Low Level we will explore some of the possibilities for pattern generation by computer. Perhaps the best known pattern generation technique is the so-called Mandelbrot Set, but Mandelbrot is computationally expensive and therefore rather slow when implemented in an

interpreted language like Visual Basic. Instead of looking at Mandelbrot, we will use a technique which applies a single formula to each point in the image and decides immediately what to draw for that point.

The basic idea is quite simple, but with

the right formula some surprisingly complex and interesting patterns can be generated. To draw a pattern on a screen (or in the case of VB, in a picture box) we need to know the number of colours to be used and the region and scale of the pattern to be displayed. For each point on the screen, we calculate the position it represents in the underlying pattern, apply the formula, and then take its result modulo the number of colours being used. This always produces a number in the range zero to one less than the number of colours. We must also have a colour palette, preset with appropriate colours for

Creating The Right Image



Fig 1 The Picture program in action

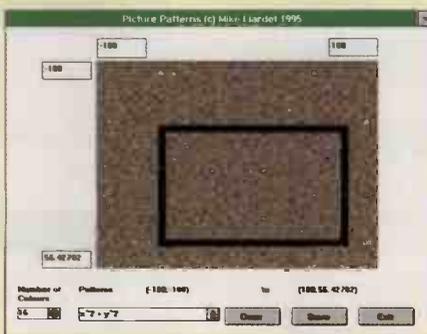


Fig 2 Dragging the mouse to define a box in the picture, so that the image can be redrawn at higher magnification

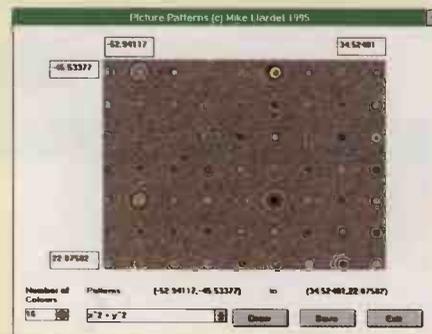


Fig 3 The new picture, with limits defined by the box in Fig 2. In this instance the result is not quite what you would expect as increasing the magnification also changes the pattern to some extent

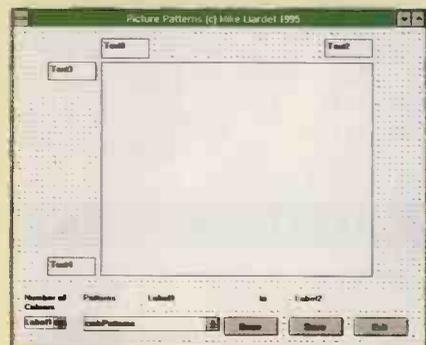


Fig 4 Visual Basic form design for the program



Fig 5 The pattern produced by the formula $(x^2 + y^2) \text{ mod } 16$ at a scale of 65 to 1

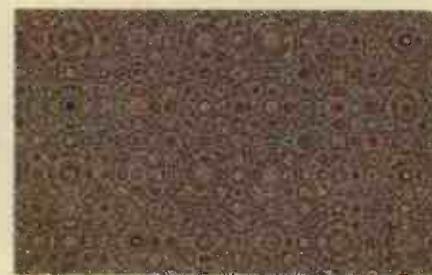


Fig 6 The centre of the pattern in Fig 5, magnified ten times to a scale of 6.5 to 1

each possible number. From the generated number a colour can be selected and a single point plotted on the screen using that colour. By repeating this process for every point to be displayed we eventually produce the whole picture.

Perhaps an example will make this clearer. Suppose we are plotting a pattern at a scale of 10 to 1, with the top left point on the screen representing the point in the pattern with co-ordinates (-200, -150). On most computer systems (and Visual Basic is no exception)

screen addressing treats the top left of the screen as the origin, with the X axis going across the screen from left to right and the Y going vertically from top to bottom (in contrast with the usual co-ordinate geometry convention where the Y axis points upwards). A typical SVGA screen resolution is 1024 x 768 pixels, but if we use a picture box within a VB form the area to be drawn is more likely to be around 400 x 300 pixels. At a scale of 10 to 1 this would provide a window onto a pattern measuring 4,000 x 3,000 points.

It is easy to write a program to visit each point in the display area, then for each point the program needs to determine the colour to be drawn and then plot it. For example, to determine the colour of the point on the screen with co-ordinates (10, 20) we first calculate the pattern co-ordinates as $(-200 + 10 * 10, -150 + 20 * 10)$.



Fig 11 The pattern from the formula $abs(cos(x*y)) * NumColours$, drawn at a magnification of 0.063 to 1

10). This gives the point (-100, -50) in the pattern. There are many formulae we could use but $X^2 + Y^2$ is fairly simple to calculate and produces some interesting patterns. Applying this to the pattern point (-100, -50) we get the result 125,000 by calculating $-100^2 + -50^2$. Supposing there are 16 colours available, we calculate 125,000 modulo 16. The result is 8. 125,000 divided by 16 gives a quotient of 7,812 and a remainder (the modulus) of 8. We may have predetermined that all points producing the number 8 should be plotted as orange, so that is the colour that should be plotted at screen position (10,20). Visual Basic has a convenient QBColor() function that returns an RGB

(Red/Green/Blue) colour code for any integer from 0 to 15, so with a VB program using up to 16 colours this is a particularly easy way to assign colours to numbers. If we were to use the QBColor palette, QBColor (8) gives the colour grey, represented as the hexadecimal number 808080.

In order to explore automatic pattern generation further we have developed a simple Visual Basic program that handles all the necessary calculations, with drawing, zooming and scaling facilities as well. Fig 1 shows the program in action. All activity is confined to the one form, dominated by the large picture box which contains the generated image. The image co-ordinates are given in the text boxes positioned along the top and to the side of the picture box.

At the bottom of the form are a number of command buttons and other controls which are used to influence the drawing process. There is a spin button at the bottom left, which is used to determine the number of colours to be drawn. This can range from 2 to 16 in this instance, although it is easy to modify the program to allow for more colours. The only difficulty is that with more than 16 colours, QBColor() cannot be used and a colour palette has to be designed with an appropriate RGB combination for each possible colour number.

Patterns In Focus



Fig 7 Further magnification of the pattern. This time the top left of the screen plots the point (1000, 1000) and the scale is 0.65 to 1 (100 times the magnification of Fig 5)

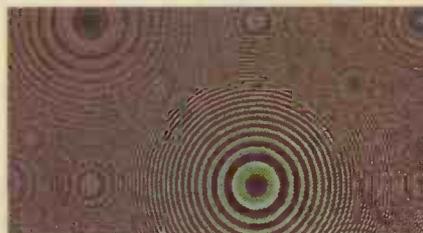


Fig 8 Focusing on a small part of the pattern in Fig 7 and magnifying it further. The scale here is 0.065 to 1, which means that around 15 pixels on the screen map onto one image point. The overall magnification is 1,000 times greater than that used in Fig 5



Fig 9 Using the $abs(cos(x) + sin(y)) * NumColours$ formula. The display scale is 0.10 to 1

Next to the spin button is a combo box which is used to determine the drawing algorithm; this determines the type of pattern that is seen in the picture box. Several formula options can be placed in here, including the $X^2 + Y^2$ we have already described. Alongside the combo box is the Draw command button which clears the picture box and redraws the pattern using the specified options preset by the user. There is also a rough and ready Save option which uses Visual Basic's SavePicture command to save the contents of the picture box into a BMP file. Most of the pictures shown here were created in this manner. Finally, the Exit button terminates the application in the usual way.

Most drawing programs can benefit from a zoom facility that can focus on one small part of the image which may be of further interest. There are two ways of doing this with the program given here. The first mechanism involves typing in the co-ordinates of interest in the text boxes alongside the picture box. For most situations this is not very intuitive, but it does at least guarantee the required fragment of the image can be specified accurately.

The easier method is to use the mouse to define the area of interest by positioning the pointer at one corner of it, holding down the button and dragging to the diagonally opposite corner before releasing it. Fig 2 shows what happens. A small box is displayed, giving the selected area as the mouse is being dragged. It is not actually necessary to move the mouse from top left to bottom right — any pair of diagonally opposite corners will do — but most users tend to use the mouse in this way.

As soon as the mouse button is released the display is redrawn, as shown in Fig 3. The result is a little surprising as it is not purely and simply a magnified display of the selected area. With this particular pattern drawing program, increasing the magnification changes the perceived image, as new interference patterns are introduced.

The form design for the program is shown in Fig 4. There is no skulduggery going on here, just straightforward VB controls planted into an ordinary form in the usual way. Because we haven't implemented any code to handle user actions such as resizing the form, we set the form's Borderstyle to Fixed Single, which allows a minimise button but does not allow its size to be changed otherwise. The picture box is shown here at its normal size, but when experimenting with a different drawing formula it is convenient to make it fairly small so that patterns can be

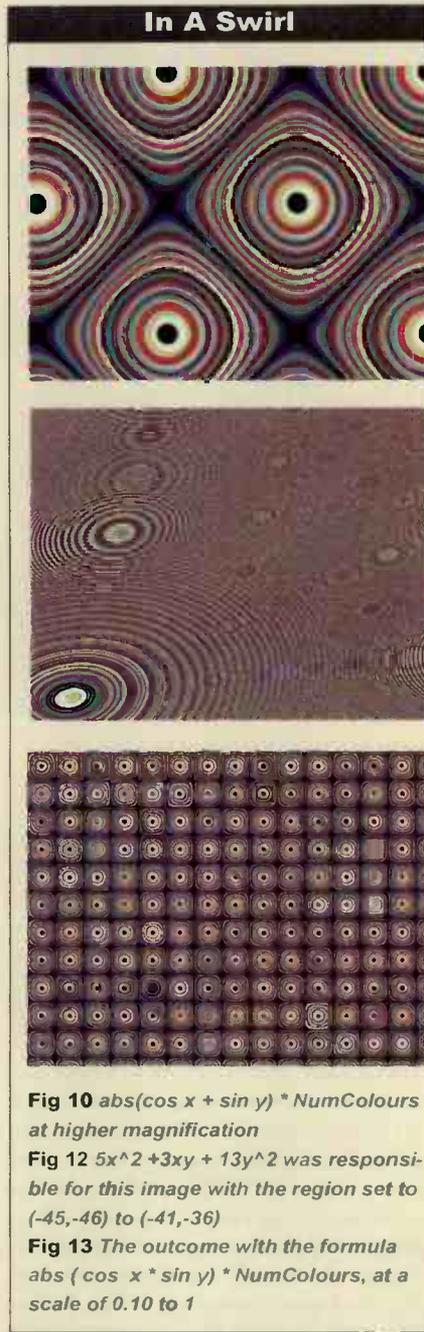


Fig 10 $abs(\cos x + \sin y) * NumColours$ at higher magnification

Fig 12 $5x^2 + 3xy + 13y^2$ was responsible for this image with the region set to (-45,-46) to (-41,-36)

Fig 13 The outcome with the formula $abs(\cos x * \sin y) * NumColours$, at a scale of 0.10 to 1

completed fairly rapidly. The Scalemode property for the picture box is set to Pixel; this makes the drawing process fairly easy as each point in the picture corresponds to a real point in the displayed image. There is no point in choosing a smaller scale than this. Any more points crammed into the picture box cannot be seen anyway as the screen (or rather the video adaptor which generates the image) is incapable of handling that level of detail. Larger scales are possible but will result in a more grainy image, although they take less time to draw.

The output from the spin button is displayed in the label alongside. A text box could do the job as well, but labels do not

allow user input so there is no possibility of a wrong value being entered in this case. The combo patterns control is given the Drop-down List style, which means it can only be used for selecting preset items and user data entry is not possible. The form_load routine initialises this box, and it is more convenient in this case if the list items are not sorted, so the control's Sorted property is set to false.

The most interesting part of the code is the DoPicture routine, which draws the indicated part of the pattern in the picture box. DoPicture takes five arguments. The first two give the co-ordinates that are to be mapped onto the picture box's top left point (the origin). The next argument is the scale: that is, the number of points in the pattern which are to be mapped onto one pixel in the screen. This number is small (between zero and one) for magnified images and comparatively large (typically up to 100) for reduced images. The two remaining arguments give the number of colours to be used in the plot, and a reference to the plotting formula to be used.

In essence, the procedure visits every single pixel in the picture box in turn and decides what colour to draw there, by applying the selected formula. This is achieved by the two long nested for-loops. Within the inner for-loop the picture box co-ordinates (i and j) are converted into the co-ordinates of the underlying image (X and Y) in a fairly straightforward manner, using the supplied origin and scale values. The Select statement determines the formula to be used and this is applied to the (X,Y) co-ordinates. The chosen formula is determined by the patNum argument given when the routine was called, and this comes directly from the user's selection in the combo box, given by the ListIndex property. Whichever formula is used, its result is held in the variable z, and this is used to colour the point (i, j) in the picture box by accessing the relevant colour code.

The Visual Basic method PSet does the work of colouring the pixel: it sets the point (i,j) with colour code computed by $Colour(CLng(z) \text{ mod } NumColours)$. Be warned that there is a bug in Visual Basic, which crashes the system if CLng() (or Cint() or Int()) of z is called with z very large (e.g. greater than 10,000,000,000 or so). As written, the code does not check for inappropriate z but this could easily be added.

A number of this size may seem unlikely but it is easy to generate very large numbers at certain display scales,

Continued on page 606

Pattern Generation Program

```

Option Explicit
'*****
'Variables to determine what bit of the picture is shown
'*****
Dim OX As Single ' , Wd As Single
Dim OY As Single ' , Ht As Single
Dim picScale As Single

'*****
'Variables used for zooming into part of picture
'*****
'whether or not we are in the middle of zooming
Dim zooming As Integer
Const ZOOM_NOT_ALLOWED = 0
Const ZOOM_ALLOWED = 1
Const ZOOM_GOING_ON = 2
'coords of two diagonally opp coords for box
'(not necessarily top-left, bottom-right)
Dim zoomX0 As Single, zoomX1 As Single
Dim zoomY0 As Single, zoomY1 As Single
'remember pic properties which are changed during zooming
Dim remForeColor As Long
Dim remDrawMode As Integer
Dim remDrawWidth As Integer

Const MINX = -100
Const MAXWD = 200
Const MINY = -100
Const MAXHT = 200

Const MAX_COLOURS = 256
Dim Colour(MAX_COLOURS) As Long

Sub cmdDraw_click ()
'Zoom back to the specified view of the picture...
'Should validate text boxes here..
    Enables False
    OX = txtLeft
    OY = txtTop
    If (txtRight - txtLeft) / pic.ScaleWidth < (txtBottom - txtTop) /
pic.ScaleHeight Then
        picScale = (txtRight - txtLeft) / pic.ScaleWidth
        'Wd = (txtRight-txtLeft)
        'Ht = picScale * pic.ScaleHeight
    Else
        picScale = (txtBottom - txtTop) / pic.ScaleHeight
        'Ht = (txtBottom - txtTop)
        'Wd = picScale * pic.ScaleWidth
    End If
    initColours CInt(labNumColours)
    NewBox 0, 0, pic.ScaleWidth - 1, pic.ScaleHeight - 1, OX, OY, picScale
    DoPicture OX, OY, picScale, cmbPatterns.ListIndex, CInt(labNumColours)
    Enables True
End Sub

Sub cmdExit_Click ()
    End
End Sub

Sub cmdsave_Click ()
    SavePicture pic.Image, "c:\temp\temp.bmp"

```

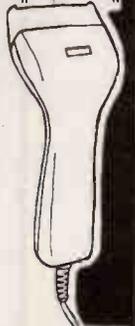
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```

End Sub

Sub DoPicture (ByVal OX As Single, ByVal OY As Single,
ByVal picScale As Single, ByVal patNum As Integer, ByVal
NumColours As Integer)
'Based on John E Connet's algorithm
'Draws picture into pic with picture coord (OX,OY) at top
left of pic
'and with scale = picscale
Dim i As Integer, j As Integer
Dim X As Single, Y As Single, z As Single
pic.Cls
For i = 0 To pic.ScaleWidth - 1
For j = 0 To pic.ScaleHeight - 1
X = OX + i * picScale
Y = OY + j * picScale
Select Case patNum
Case 0:
z = X * X + Y * Y
Case 1:
z = 5 * X * X + 3 * X * Y + 13 * Y * Y
Case 2:
z = Abs(Cos(X) + Cos(Y)) * NumColours
Case 3:
z = Abs(Cos(X) * Sin(Y)) * NumColours
Case 4:
z = Abs(Cos(X * Y)) * NumColours
End Select
pic.PSet (i, j), Colour(CLng(z) Mod
NumColours)
Next j
DoEvents
Next i
End Sub

Sub Enables (ByVal TrueFalse As Integer)
'enable or disable controls..
cmdDraw.Enabled = TrueFalse
cmdSave.Enabled = TrueFalse
cmbPatterns.Enabled = TrueFalse
spnNumColours.Enabled = TrueFalse
txtLeft.Enabled = TrueFalse
txtRight.Enabled = TrueFalse
txtTop.Enabled = TrueFalse
txtBottom.Enabled = TrueFalse
If TrueFalse Then
zooming = ZOOM_ALLOWED
Else
zooming = ZOOM_NOT_ALLOWED
End If
End Sub

Sub Form_Load ()
Dim i As Integer
'form's Borderstyle set to 1 (fixed single),
'control box and maxbutton false at design time
Form1.Move (screen.Width - Form1.Width) / 2,
(screen.Height - Form1.Height) / 2
'always draw in pic one pixel at a time
pic.ScaleMode = 3 'pixels
'preserve its image at all times
pic.AutoRedraw = True
'we are not zooming into a bit of pic

```

```

zooming = ZOOM_ALLOWED
'clear labels
labTopLeft = ""
labBotRight = ""
'Set up for two colours at first
'labNumColours.Borderstyle = 1 set at design time
labNumColours = 2
initColours 2
'Set up the pattern list and select standard one
cmbPatterns.AddItem "x^2 + y^2"
cmbPatterns.AddItem "5x^2 + 3xy + 13y^2"
cmbPatterns.AddItem "abs(cos x + sin y) * NColours"
cmbPatterns.AddItem "abs(cos x * sin y) * NColours"
cmbPatterns.AddItem "abs(cos xy) * NColours"
cmbPatterns.ListIndex = 0
'Set up the display area
txtLeft = MINX
txtTop = MINY
txtRight = MINX + MAXWD
txtBottom = MINY + MAXHT
Form1.Show
cmdDraw_Click

End Sub

```

```

Sub initColours (ByVal NumColours As Integer)
Dim i As Integer
Dim num As Integer
'initialise colours to be used
'commented out shades of grey
'For i = 0 To NumColours - 1
' num = 255 * i / (NumColours - 1)
' Colour(i) = RGB(num, num, num)
'Next i
Select Case NumColours
Case 2:
Colour(0) = QBColor(0)
Colour(1) = QBColor(7)
Case 4:
Colour(0) = QBColor(0)
Colour(1) = QBColor(1)
Colour(2) = QBColor(6)
Colour(3) = QBColor(7)
Case 8, 16:
For i = 0 To NumColours - 1
Colour(i) = QBColor(i)
Next i
End Select
End Sub

Sub NewBox (ByVal zoomX0 As Single, ByVal zoomY0 As Single,
ByVal zoomX1 As Single, ByVal zoomY1 As Single,
newOX As Single, newOY As Single, newPicScale As Single)
Dim temp As Single
Dim newWd As Single, Wd As Single
Dim newHt As Single, Ht As Single
'New box defined for picture, based on zoom coords in
pic
'newOX,newOY and newPicScale are output
'OX,OY and picScale are globals

'first get box coords right way round
If zoomX1 < zoomX0 Then

```

```

temp = zoomX0
zoomX0 = zoomX1
zoomX1 = temp
End If
If zoomY1 < zoomY0 Then
temp = zoomY0
zoomY0 = zoomY1
zoomY1 = temp
End If
'Calc new origin
newOX = OX + zoomX0 * picScale
newOY = OY + zoomY0 * picScale
newWd = (zoomX1 - zoomX0 + 1) * picScale
newHt = (zoomY1 - zoomY0 + 1) * picScale
If newWd / pic.ScaleWidth < newHt / pic.ScaleHeight
Then
newPicScale = newWd / pic.ScaleWidth
Wd = newWd
Ht = newPicScale * pic.ScaleHeight
Else
newPicScale = newHt / pic.ScaleHeight
Ht = newHt
Wd = newPicScale * pic.ScaleWidth
End If
labTopLeft = "(" & newOX & "," & newOY & ")"
labBotRight = "(" & newOX + Wd & "," & newOY + Ht &
")"
txtLeft = newOX
txtTop = newOY
txtRight = newOX + Wd
txtBottom = newOY + Ht
End Sub

Sub pic_MouseDown (Button As Integer, Shift As Integer,
X As Single, Y As Single)
'Do nothing if zooming not allowed
If zooming <> ZOOM_ALLOWED Then Exit Sub

```

```

'User is defining box to zoom into the picture
zooming = ZOOM_GOING_ON
'This is one corner of it - define coords of it...
zoomX0 = X
zoomY0 = Y
zoomX1 = X
zoomY1 = Y

'Set a colour that can be seen for the box, but remem-
ber orig one
remForeColor = pic.ForeColor
pic.ForeColor = RGB(127, 127, 127) 'mid-grey

'Set a drawmode that can be erased by drawing twice,
but remember orig one
remDrawMode = pic.DrawMode
pic.DrawMode = 7 'xor pen and background
'Set a draw width that can be seen, and remember orig
one
remDrawWidth = pic.DrawWidth
pic.DrawWidth = 12

'Draw the box for the first time, actually a single
point here
pic.Line (zoomX0, zoomY0)-(zoomX1, zoomY1), , B

End Sub

Sub pic_MouseMove (Button As Integer, Shift As Integer,
X As Single, Y As Single)
'Check that we are in the middle of defining a box
If zooming = ZOOM_GOING_ON Then
'yes.. so erase the previous box
pic.Line (zoomX0, zoomY0)-(zoomX1, zoomY1), , B
'remember the new diagonally opposite corner
zoomX1 = X
zoomY1 = Y
'and draw the new box to it

```

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```

    pic.Line (zoomX0, zoomY0)-(zoomX1, zoomY1), , B
End If
End Sub

Sub pic_MouseUp (Button As Integer, Shift As Integer, X As Single, Y As Single)
Dim temp As Single
'Check we are defining box
If zooming = ZOOM_GOING_ON Then
    'yes we are, so erase box on display
    pic.Line (zoomX0, zoomY0)-(zoomX1, zoomY1), , B
    'restore original pic properties
    pic.DrawMode = remDrawMode
    pic.ForeColor = remForeColor
    pic.DrawWidth = remDrawWidth
    'no longer zooming
    Enables False
    initColours CInt(labNumColours)
    NewBox zoomX0, zoomY0, zoomX1, zoomY1, 0X, 0Y, picScale
    DoPicture 0X, 0Y, picScale, cmbPatterns.ListIndex,
CInt(labNumColours)
    Enables True
End If
End Sub

Sub spnNumColours_SpinDown ()
If labNumColours > 2 Then
    labNumColours = labNumColours \ 2
End If
End Sub

Sub spnNumColours_SpinUp ()
If labNumColours < 16 Then
    labNumColours = labNumColours * 2
End If
End Sub

```

PCW

Continued from page 602

especially if the formulae contain exponentiation (e.g. x squared, x cubed, etc).

Notice that immediately after Next j is a DoEvents call. DoPicture takes some time to execute (about a minute on a 486 at 50MHz) and this call allows other Windows applications to get a look-in with the processor while it is running. More importantly, it ensures that the screen is updated after each column in the picture box has been plotted. This allows the user to see the pattern grow from left to right as each column is completed.

The program uses mouse events to handle the zoom facility. The event handlers are given the subroutines pic_MouseDown, pic_MouseMove and pic_MouseUp. When the user clicks the mouse button over the picture box, pic_MouseDown is called, and this logs the position of the mouse pointer in the zoom global variables. The idea is that (zoomX0, zoomY0) represents the initial position of the mouse and (zoomX1,

zoomY1) holds its position as it is dragged over the picture box with the button down. Initially these two points are the same. The display of the viewing box is handled by the VB Line method. In this case "Line" is a misnomer as the B argument causes it to draw a box, with diagonally opposite corners given by the zoom co-ordinates. In pic_mouseDown the box is actually shrunk to a single point.

Nearly every time the mouse moves, the pic_MouseMove event handler is called. If the user moves the mouse very fast some events are lost, but with a reasonably fast processor there are sufficient calls made to pic_MouseMove for it to do its job. It erases the old box and draws the new one, which will either be larger or smaller depending on the way the user is manipulating the mouse. It has to do some fancy footwork to erase the old box and this is done by presetting the picture box's Drawmode to 7 (in pic_MouseDown). With Drawmode 7 any graphics drawing method (such as Line or PSet) performs an exclusive-or ('xor')

PCW Cover Disk

The full code for this month's Low Level is on the Cover Disk given with this issue of PCW.

between the colour codes in the background and the colour code being plotted. The neat part about this is that a second call to the same graphics method with the same arguments will always undo the previous call, restoring the old image. Other drawing modes can do this as well. Modes 2, 4 and 8 can be used in conjunction with modes 15, 13 and 9 respectively to achieve the same effect.

When the user releases the mouse button, pic_MouseUp is called. This is used to tidy up the displayed box and redraw the image at higher magnification, according to the actual box specified by the user. The program does not independently scale the X and Y axes (although it is not difficult to arrange this), so if the box specified by the user does not have the same proportion as the picture box, part of it is clipped. NewBox sorts out the details of this, and returns the new scale and origin to be used for drawing the picture.

Figures 5 to 9 show the patterns that can be produced by the simple $X^2 + Y^2$ formula, at different magnifications. $X^2 + Y^2 = a^2$ is the equation for a circle so it might be assumed that the formula would always generate circular types of pattern, and at some magnifications it does. The surprising thing is that at other magnifications, the patterns are anything but circular.

The remaining figures show the results produced by other formulae. It is possible to experiment with all sorts of computations, and the examples here show just a few possibilities. Let's say you want to introduce a new formula into the system. Add a new Case entry (for example "Case 5: z = X*Y") in the DoPicture routine and add an extra "cmbPatterns.AddItem" line in the form_load routine (for example: cmbPatterns.AddItem "x * y"). Make sure that items are added to the cmbPatterns list box in the same order as the Select statement.

PCW Further Reading

For readers interested in further experimentation with pattern generation, **ArmChair Universe** by **AK Dewdney** (WH Freeman & Co, New York 1988) contains a couple of interesting chapters — the Mandelbrot Set and Wallpaper for the Mind. The $x^2 + y^2$ method presented here was first proposed by **John E Connet** in response to Dewdney's column in *Scientific American*.

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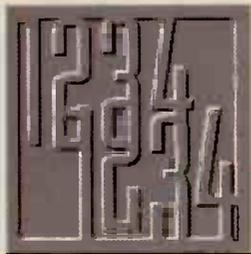
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On the tiles

Beginners Lesson One (with answer) is followed by a Classic Tiling Problem: mathematics for all, presented by Mike Mudge.

BEGINNERS LESSON ONE

Given any positive whole number, or integer, those positive integers which divide into it exactly are called its FACTORS or DIVISORS. Among these are the IMPROPER FACTORS consisting of the number itself and unity or "one". These latter are of no real interest to us at this time — they are indeed trivial or degenerate cases of factors. Clearly then, given two positive integers, these will have a HIGHEST COMMON FACTOR (HCF) or GREATEST COMMON DIVISOR (GCD). If this object is unity we say that the two given numbers are co-prime; if they are denoted by m & n we write $\text{gcd}(m,n) = 1$.

e.g. $12 = 1 \times 2 \times 2 \times 3$ and $35 = 1 \times 5 \times 7$ hence $(12,35) = 1$. If the two numbers m & n are equal then clearly the $\text{gcd}(m,m) = m$, another degenerate.

Problem: how to use a computer to determine the gcd of two given positive integers.

Extension: how to modify this program to determine the gcd of three or more positive integers.

Concern: how to discover the limits on the magnitudes of numbers which a particular program/hardware will handle correctly.

Below is a computer program in PASCAL based on An Introduction to Number Theory with Computing by Peter Gibling, ISBN 0-521-40988-8, 0-521-40182-8. C.U.P. 1993.

PROBLEM (A) Translate the above coding back into algebra and reveal the algorithm (due to EUCLID) for determining the gcd. Implement, either in PASCAL or a simple BASIC translation for example, determine the numerical limit by successive examples (666...666, 777...777) which should produce the answer 111...111. Finally, modify the coding/algorithm as appropriate to handle the gcd of three or more input integers.

```

VAR
  a,b,r: extended;
  (* Use type real if you do not have extended precision, but this *)
  (* limits the number of significant figures to about eleven. *)
BEGIN
  writeln ('type two positive numbers separated by a space');
  read (a,b);
  writeln ('gcd of', a:0:0, 'and', b:0:0, 'is');
  (* Since a and b change their values during the program, we *)
  (* have to put this here. *)
  WHILE b>0 DO
    BEGIN
      r:=a - b*INT(a/b);
      a:=b;
      b:=r;
    END;
  writeln (a:0:0);
END.

```

Notes: (i) INT in PASCAL rounds towards zero, thus if we allow a negative then a modification is needed at line "r:=".

(ii) The 'formatting statement' a:0:0 ensures that with variable types real or extended the answer is written without a decimal point, i.e. as an integer.

PROBLEM (B) Adopt a different approach to this problem, via the determination and examination or the PRIME FACTOR EXPANSION of each input integer; compare the run times of this with the algorithm given above.. over a range of magnitudes of integer input.. conclusion?

WANG TILES, in theory and practice

Named after American logician Hao Wang, these entities were brought to my attention by Mat Newman of Didcot, Such a tile is a unit square of fixed orientation with one of the figures 1,2,3,4 placed at the midpoint of each edge (these need not be DISTINCT).

We agree to represent such a tile algebraically by $T_{a,b,c,d}$: where a is the figure in the topedge and b,c,d are identified clockwise. Given the two types of tile $T_A(1,2,2,1)$ and $T(2,1,1,2)$ we can easily see that the plane can be tiled with adjacent edges of two tiles having the same number... have rows and columns of alternating A's and B's. Mat informs us that no computer program can decide whether such a tiling is possible for arbitrary sets of Wang tiles; but that the question is decidable for certain specific cases.

PROBLEM (C) Investigate the tiling of the plane with the following set of seven Wang tiles:

$T_A(1,3,4,2)$
 $T_B(1,2,3,4)$
 $T_C(1,4,3,3)$
 $T_D(2,2,4,3)$
 $T_E(2,3,3,2)$
 $T_F(3,1,2,1)$
 $T_G(4,1,1,1)$

PROBLEM (D) Investigate the tiling of the plane with a general set of Wang tiles:

(a) with the condition that the numbers on adjacent edges are to be equal.

(b) with some other condition, such as their sum is to be congruent to 1 modulo 2 for example.

PROBLEM (E) For the enthusiast I think! Investigate the tiling of the surface of a cuboid, say $l \times b \times h$ units, with appropriate matching at all of the edges.

Responses to any of the problems above may be sent to Mike Mudge, 22 Gors Fach, Pwll-Trap, St Clears, Carmarthen, Dyfed SA33 4AQ, tel 0994 231121, to arrive by 1st May 1995. Any solutions or attempted solutions received will be judged using suitable subjective criteria, and a prize in the form of a £25 book token, or equivalent overseas voucher, will be awarded by Mike Mudge to the "best" contribution arriving by the closing

date. Such contributions should contain a brief description of the hardware used, details of coding, run times and a summary of the results obtained; all in a form suitable for publication in PCW. Additionally, readers comments upon the general, or specific (i.e. BEGINNERS LESSONS?) nature of this month's column would be most valuable. In particular, references to any recent work (either published or unpublished) on WANG TILES.

Please note that material can only be returned if a suitable stamped addressed envelope is enclosed.

FEEDBACK, both POSITIVE and NEGATIVE

The difficulty of solution of a mathematical problem is often said to be inversely proportional to the length of its statement: Dr. Reg Silvapulle of Edgware asks: "I just wonder whether it is possible to find four positive integers a,b,c,d, such that: $c^2 = a^2 + b^2 + ; d^2 = a^2 - b^2 ?$ "

Eric Adler of 'The proof is in the Pi' fame, PCW January 1995, pp467-8, finds that UBASIC deals very adequately with the factorisation problem H₁ from December 1994, while many other well known mathematical packages do not... Experiences on the factorisation of integers greater than 10³⁰ would be most welcome.

Review of Numbers Count -137- September 1994: JOIN THE DOTS etc.

The etc. has proved to be the most attractive element of the column, generating record response. Space permits only a sample of the various types of response, with apologies to the many respondents whose approach is not mentioned.

Bob Smith of Ytteren, Norway, a self-confessed "computer slave" since 1940, was inspired by the reference to 2048 (recognised as a power of 2) and used QuickBASIC on an Acer 915P 286 PC running at 10MHz with the Norton Commander operating system on DOS 4.01 to search other intervals and reveal — at least empirically — that powers of 2 are the only exceptions. Bob thought to offend mathematicians by invoking ancient history with all years BC being given negative signs to obtain 2048 = -2047-2046....0+1...+2047+2048.

Eric Spielman of Loughton expressed the base of each sequence (b) in terms of the year (y) and the number of terms (t): thus, $b = y/t - (t-1)/2$ and then tested if b is a positive integer, necessary to give a valid solution, he observes that for most numbers there are many solutions. For

instance, the year 1980 has 11 solutions starting with 3 terms (base 659),5,8,9,11,15,24,33,40,45 and finally 55 terms (base 9).

Franz-Josef Rosselli of Bonn, Germany, provides a very elegant analysis of the sum $S(n,k) = n + (n+1) + \dots + (n+k) = 1/2(k+1)(K+2n)$ where one of the factors is odd, and continues to establish a 1-1 correspondence between the odd divisors of a number N and its Sylvester series S(n,k).

Henry Ibstedt's equivalent result that any natural number, $N = 2^t p_a^a p_b^b \dots p_z^z$ can be expressed as a sum of consecutive natural numbers in exactly $c(N) = d(N)/(1+t) - 1$ ways; where d(N) the number of divisors of N is equal to $(1+t)(1+a)(1+b)\dots(1+z)$ was extremely well presented with supporting computation in Visual Basic for a dtk 486/33 computer with an HP IIP laser printer.

Andrew Jones of Harlow drew an analogy with Gauss (age 10) summing $0+1+2...+100$ and did support computing on his "trusty Tandon 386-25SX using only Ami Pro." Robert Newmark of Sunderland introduced the irrelevance that prime numbers are composed *only* of their mid-pairs and no other series. Paul Weston of Birmingham was attracted by the problem since it is a case where "some analytic work with pencil and paper saves a lot of computing time." [Doesn't it always? Mike M.] Echoed by David Ashley of Swansea, whose analysis "confirms the need, recently expressed by one of the major Engineering Departments, for students to eschew an instant use of numeric methods with calculators and computers when simple algebraic reasoning will often produce an answer much more easily."

After much soul searching the very worthy prizewinner is Calum Grant, of 348 Sarehole Road, Hall Green, Birmingham B28 0AQ, whose theoretical presentation is supported by work in Turbo C++ 3.0, on a 486DX/33...not using much computer time: additionally Calum has some results, at least in sketch form, relating to the DOTTYPAPER. Other readers wishing to contribute in this area are invited to contact Calum directly or myself.

PCW Contributions welcome

Mike Mudge welcomes readers' correspondence on any subject within the areas of number theory and computational mathematics, together with suggested subject areas and/or specific problems for future Numbers Count articles.

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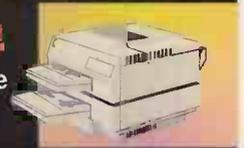


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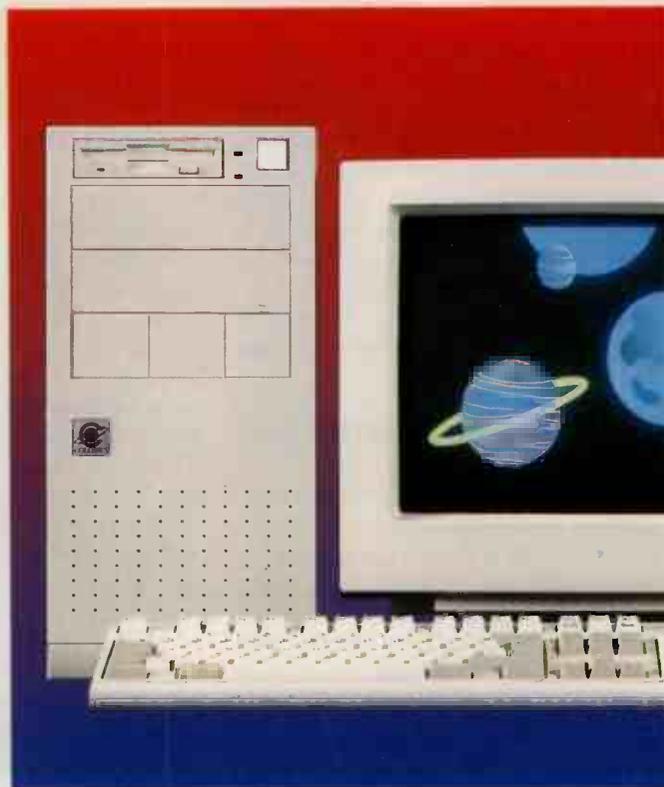
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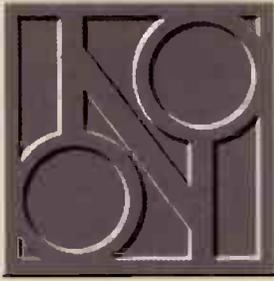


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Express delivery

Stephen Rodda looks at Intel Storage Express 1.4, a high-class, high-cost backup machine for large networks. He reports on the excellent Delrina Fax Box, Cheyenne FaxServe, and there's the usual look at your networking problems.

Let me start with the results of the Delrina Fax Box review which many of you helped me run. Although I moved from the UK to the Netherlands while the test was in progress, the fax box allowed me to collect faxes from you all, and some very boring ones there were, too. There was only one which was original enough to win the prize — a scan of a picture of a bear (geddit?). Despite all your efforts, the fax box held up and didn't crash once. So, if you're constantly on the move and want to be able to receive faxes, I recommend the Fax Box. It worked for me.

The winner is James Clavering. [jmc@cix.compulink.co.uk]. Congratulations, James.

Cheyenne FaxServe

Talking of faxes, I've been looking at Cheyenne FaxServe, which looked useful for those of us with mixed-platform networks. The packaging says: "Enables Macintosh workstations to fax using MHS E-Mail". Unfortunately, this means that the Macintosh (primarily a graphics-based computer) is reduced to having to send text-only faxes. There is only one way, it seems, of sending graphical faxes from both Mac and PC, and that is to have two modems. We found a way of getting around this without carrying a modem around our office, which is for the Mac to print to a PostScript file, and to use GhostScript (a freeware PostScript interpreter) to turn the print file into a series of PCX files. Then, loading the files into a DTP package enabled us to fax. We now have

what my partner refers to as a dream — Delrina FaxPro for Macintosh. Its every function has proved reliable. I do appreciate (before manufacturers start objecting furiously) that several Mac-based network fax solutions are available, but we have only now got the one Mac, and Mac-based fax packages seem to be just as xenophobic as their PC counterparts in not allowing other platforms to connect.

Intel Storage Express 1.4

I recently had a look at this. It was installed

Windows 3.1 clipboard format file — the Storage Express Control program, showing backup in progress

The screenshot shows a window titled "StorageExpress Status" with a menu bar containing "SE-CHANGER" and "Drive 2". The main area displays backup statistics:

Status:	BACKUP	Job: Streamlined Backup - 77.6 %
Bytes Written:	67,354,624	Estimated bytes: 86,780,928
Bytes Read:	0	Estimated files: 1,193
Files:	984	
Elapsed Time:	00:13:55	

Below the statistics is a section for "Source Information":

Name: COPAM	Type: NETWARE
Path: SYS:\FOTOS	
File: RON1.BMP	Name Space: DOS
Size: 359,478	Target: 1 of 2

At the bottom is a section for "Tape Information":

Name: F-STEVE-THU-12/15/94
Session: 1

At the bottom of the window are three buttons: "Events", "Close", and "Help".

in the VNU Amsterdam Eurolabs and I was allowed to play with it. It's a backup solution for networks of various flavours. It consists of an arrangement which looks a bit like a video recorder complete with an LCD with an amplifier below it. Once you open the door at the front on the lower device, the similarity switches to that of a tape recorder below.

The review version of the machine was supplied with an autochanger with six DAT cassettes and a separate single DAT drive. The separate DAT drive is to back up the Storage Express hard disk, which contains details of the backup tapes, their contents, and the backup log. This upgraded version differs from the previous version in that it has a larger internal hard disk (1Gb as opposed to 500Mb), more memory (8Mb of RAM as opposed to 4Mb) and support for more network operating systems (NT, most flavours of Unix such as Intel and SPARC Solaris, SunOS, AIX for the RS/6000 HP-UX and SCO Unix) and fast Ethernet (100baseT) connections. These extra environments have to be purchased separately as extra backup agents for these environments.

The backup software is based on NetWare 3.11 Runtime, with Cheyenne's backup software running the unit, a little like Arcserve, so the correct user count of the software has to be specified as necessary for the servers which are to be backed up. In addition, a separate agent has to be purchased for the backup of each server on the LAN.

The version which I looked at was connected by 10baseT to a Novell NetWare 3.12 LAN and was controlled by a networked Dell workstation. Intel claims that the backup speed is faster than previous

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versions, but since this form of backup is often limited to the speed of the network connection, we noted its figure as being fairly low. In operation, the unit displayed status messages on the LCD screen, which echoed those available at the backup console, though the occasional OK and Cancel while we were having problems with drive selection seemed a little problematic for what is essentially a remote backup solution.

Initially, we had trouble backing up onto the correct drive (remember the spare DAT for backing up the local hard disk?) since we seemed to be selecting this drive as a default, but we eliminated this, finding it was simple finger trouble. Once we had managed to get everything selected correctly at once, we found the backup procedure was reasonably foolproof.

We backed up the NetWare server and the workstation upon which the control software was installed and obtained the following results according to the backup software: 8260kb/sec for the server and 7243kb/sec for the workstation.

This is a respectable backup speed, but where you have a slower (10Mb/sec) network, you might find that a server-based solution would be better, since the

Ethernet cabling would no longer be a problem (except where backing up a workstation).

The Storage Express allows tape cycling (on a grandfather, father, son basis — that is, where tapes are aged and finally re-used) with a monthly, stored backup, if that's what your backup procedure requires. It will also prevent you from overwriting a recent tape, requesting that either a new or older tape be inserted instead. This allows data integrity to be maintained.

Of course, on a large or busy network, the inherent advantage of the Storage Express is that being a standalone solution (with its own processor control) it can be left to get on with its job without tying up a workstation's or a server's processor time. On the other hand, for the price you would pay for another workstation just for backup, you might find you would be better off using this workstation method with its own autochanger.

In conclusion, a good, but expensive, backup solution which would be totally over-specified on all but the largest, fastest networks, where it would definitely come into its own.

Intel 01793 696000

Questions & Answers

Where's the bottleneck?

We are a small company running a 15-user network which is used mainly for running a complex FoxPro/Windows application. The data is on the server and the programs are local.

We have the application running on either a Novell 3.12 network on a 386/25 12Mb server or on NT/AS 3.1 on a 486/33 32Mb EISA server. The Novell has an 8-bit card and the NT server has a 32-bit card and both run on thin Ethernet (but not as yet linked). All workstations are 486/25 or 486/33 with 16-bit cards and run Windows 3.11. I have two questions.

- Despite the obvious imbalance in kit, the Novell server seems faster than the NT/AS server. We would like to stay with NT/AS to make use of MS SQL server software in the future but we are in a dilemma on how to progress. Is Novell going to continue to be significantly faster for database applications than MS NT?

- Is there any package/service which would allow us to identify on an ongoing basis where the network bottlenecks are? We try scanning the magazines for advice and end up almost randomly upgrading different components. Is the main bottleneck the server processor, server disk drive, server

network card, thin Ethernet cables, workstation processors, local disk drives, network cards, choice of network software, or fast Ethernet?

Steve Price

These are two very different networks you're talking about and, as you say, they're running on disparate kit. In order to speed up the NT network, I would do a couple of things — replace the processor with a 486DX2/66, or with a DX4 if you can afford it, and upgrade the software to NT Server 3.5, which is vastly superior and faster, too.

You could also give the NetWare network a real shot in the arm by upgrading the server's Ethernet card to a 16-bit version.

You also mention the fact that you want to use SQL Server on the NT machine. This will, of course, speed up networking no end because the network traffic will be reduced to a trickle, as the SQL Server will act as a remote database engine; thus preventing the transfer (in a worst-case projection) of the whole contents of the database over the network.

Since the workstations seem to run faster on Novell than under NT, obviously the network itself seems not to be causing any

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problem. This is why I suggest a processor and software upgrade for the NT server.

As far as identifying the bottlenecks is concerned, I think we've already found out where they might lurk. The only piece of software I'd recommend is a network packet analyser (available on the Internet and on CIX) which will use a network card in promiscuous mode, called ethld103.zip. Intel also has a version which is supplied with LANDesk.

Hold on!

I want to be able to set a job to hold as it is captured from a program's print output. How do I do it? I can use PCONSOLE to hold a job which is not being serviced, but if someone's printing, say, invoices and statements, and the invoicing paper is in the printer, how do I stop the statements printing on the invoicing paper?

There are three solutions to this problem, all of which are valid, although which one you choose will obviously depend upon how attractive it is to you personally.

- Buy another printer and connect it to another queue so that the correct paper is always online.
- Set the form number to something other than the default and set the printer to service one form only. This can be changed when the other paper is loaded and NetWare may be notified which form is currently loaded.
- Print to a queue (in this case, called "Statement") which temporarily has no printer connected to it. Once the paper is loaded, disconnect the printer from, say, the Invoice queue and connect it to the Statement queue.

Tales of NetWare

I am writing to share a recent experience I had with a NetWare 3.12 server, in the hope that others may learn from it.

I work for a company, where, at head office, we have some machines linked up to a NetWare 3.12 server. Most of the machines are 386DX/40 machines with 4MB of RAM. One machine is a 486DX2/66 PCI SCSI-2.

Our server (25 users) is a 486DX/33, with a simple ISA 16-bit bus, 16MB of RAM, and a SCSI-2 controller.

All network cards are 3Com 3C503/3C509 Ethernet 16-bit ISA cards. Most of these machines run the Microsoft Office pack from the server.

Recently, we needed to back up one of the PCI 486 machines to the server — nothing unusual here, it has been done with many machines at the same time. However, this time, the server practically ground to a

halt, the number of dirty cache buffers rose to equal the total cache buffers, and packet receive buffers soared from 100 to 201.

Setting the maximum concurrent disk cache writes from 50 to 500 did not make much difference. Only setting the dirty disk cache write delay time from 4 seconds to 1 second made any difference, but only just reducing the number of dirty cache buffers. Once the machine had finished copying to the server, the server could then catch up with the writing, devoting 60 percent (usually two to three percent) of its time to the interrupt for the SCSI card, instead of the LAN card. There was very little other activity on the server from other workstations.

This goes to prove that a network card in a workstation is not necessarily the slowest part of a workstation. Also, the server should have a fast architecture: while it may seem overkill to start with, often the server is overlooked when it comes to upgrading workstations to the latest specification. If money is limited, buy a fast network card first, then RAM, then a faster disk system.

However, one thing puzzles me: why should the packet receive buffers increase dramatically, considering both the workstation and the server are using ISA slots, and the same network card? In theory, the two cards should be processing data at the same speed.

MB (@——.demon.co.uk),
IT Department Assistant

You've just found out that the 3Com 3C509 card uses quite a lot of processor time. While the server was being fed by a 386-40 machine running the 3Com card, there was enough slack processor time to deal with the writes in the background. On the PCI machine, the processor is significantly faster than that in the server, thus allowing the data transferred (and hence processor overhead in dealing with the NIC) to overrun its capability of storing it on the SCSI drive. If you use a 3Com card, I always recommend using the fastest server processor possible. Otherwise, the server you currently use is plenty fast enough.

You don't mention how big the SCSI disk on the server is. Possibly the number of cache buffers (and therefore installed memory) isn't quite enough for it when dealing with large quantities of data from a faster machine like the PCI kit.

PCW Contacts

Stephen Rodda is an independent computer consultant specialising in DTP and networking.

He may be contacted as
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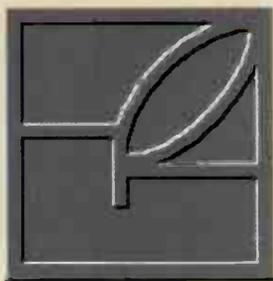
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The sky's the limit

Since Allegiant turned SuperCard into a fully System 7 compatible package, Mick O'Neil has taken to the skies. And finally, there's a new campaign from Apple's marketing department that really hits the spot.

It's a few years since I did my April Fools column about quitting Mac coverage in favour of Windows, but the whine of Apple UK's marketing manager remains fresh in my mind. To be sure, I've never carried favour at Apple.

I'm convinced that for years the company was marketed by amateurs, as was aptly displayed by Apple advertisements on television, in newspapers and magazines. Topics concerning "big brother", ZEN slogans and computers for "the rest of us" were controversial but way off the mark, particularly when you considered

the company was making almost extortionist margins on its hardware. Needless to say, I have enjoyed pointing this out at every opportunity.

But surprising things have been coming out of Cupertino of late. The company's recent TV spot shows an average user trying desperately to upgrade his PC to run a multimedia CD-ROM. After what appears to be a considerable period of time, with dad unsuccessfully adjusting jumper switches and Config.sys files, the son dons his coat to go to his friend's house because his friend's dad owns a Mac.

This brief commercial comes closer to explaining the Macintosh advantage than anything I've seen, and the company should vigorously pursue this line of attack by extending it through to the operating system. It would be interesting, for example, to show a new user trying to use the Windows File Manager to format a floppy disk and copy a word processing file from the C: drive.

While Apple's marketing department finally did something right, IBM once again shot itself in its PC foot. If I were CEO at IBM, the first move I'd make is to fire anyone who had anything to do with naming its latest version of OS/2 Warp. I take it that Warp is a "trekkie" term referring to Isaac Asimov's and, later, Star Trek's Warp drive. For the average PC consumer, however, it may raise other connotations as in "The hard drive is warped" or "The operating system logic is warped" or "This salesman must think I'm warped enough to buy something". Then there's IBM's commercial advertisement that shows a user excited about the ability of Warp to print or fax in the background, something the Mac has been doing for several years.

Finally, I've begun to worry about my friends in Seattle. Microsoft now floods the airways with commercials that seem full of subliminal claptrap. I don't get it. If the company wishes to pursue this line I'd strongly recommend it hires evangelists like Steve Jobs. They successfully confused the Macintosh market for years.

The screenshot shows the SuperCard environment. At the top, a menu bar includes 'File Edit Windows Script'. The main window is titled 'Card "SF02" ID = 116' and contains a 3D scene of an airport with a jet on the tarmac. A smaller window titled 'Card Script "SF02" ID = 116' displays a script with the following code:

```

---FIRST jet
global OPERATION
global TIME1
global TIME2
global TIME3
global TIME4
if OPERATION = 1 then
  put the short time into var1
  if var1 = time1 then add 1 to OPERATION
end if
if OPERATION = 2 then
  put the short time into var1
  if var1 = time2 then add 1 to OPERATION
end if
if OPERATION = 3 then
  put the short time into var1
  if var1 = time3 then add 1 to OPERATION
end if
if OPERATION = 4 then
  put the short time into var1
  if var1 = time4 then add 1 to OPERATION
end if

```

On the right side, there are two smaller windows. The top one shows a flight schedule for 'NORTHWEST AIRLINES' with a table:

DEP	LAX	11:13
ARR	SFO	11:15
DEP	SFO	11:17
ARR	BWI	11:24

The bottom window shows a 3D view of the airport terminal and a jet, with a 'San Francisco' label and a '1' in the corner.

1 SuperCard Scripts can be used to simulate animations in realtime

2 SimAir employs multiple windows, each containing interactive buttons and animations

CLASSIFIED

System 7.5

I recently installed Apple's new System 7.5, and although this upgrade doesn't present the same leap in power as the move from System 6 to System 7, it's significant nevertheless. There are several interface improvements consistent with the Apple Human Interface Guidelines, some of which were previously available from third-party companies. Features like hierarchical windows, sticky labels, collapsible window shades and a more detailed Find File command are evolutionary rather than revolutionary, but they make the system easier to use and add the touch of class that Mac users expect.

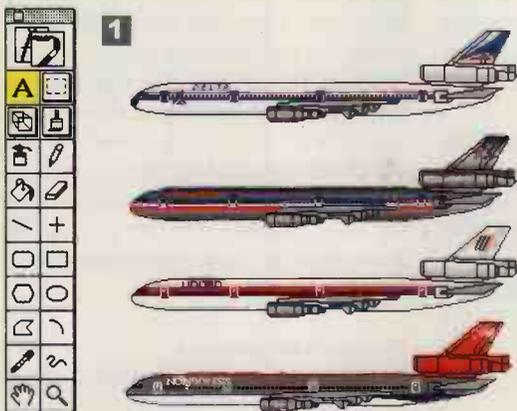
Apple Guide, the new interactive help system, is simply amazing. There are some Macintosh system procedures, like turning on file sharing or accessing files from a DOS disk, that may intimidate a beginner. Apple Guide steps through these processes, circling items in red to point graphically to each step, while providing a dialogue box with explicit instructions. AppleGuide also lets you design your own "guides", tailor-made to teach customised applications. Take it from a professional systems trainer, it doesn't get any easier than this.

Another important tool included in System 7.5 is QuickTime 2.0. Apple rightly claims that this new QuickTime extension supports full-screen video, but at full screen the pixels are awfully large and the motion is still not all that smooth. At quarter-screen, QuickTime 2.0 is very impressive indeed. QuickTime 2.0 also supports MIDI sound files which offer high-quality stereo sound with very small file sizes. You can even load a MIDI file and paste it directly into a QuickTime movie.

Perhaps the most impressive feature presented by the new system software is one that most users won't take advantage of for a while. QuickDraw GX will make a major difference to users only when developers release applications that are QuickDraw GX "aware" or QuickDraw GX "savvy". "Aware" applications will take advantage of some of the new capabilities while "savvy" ones will support all QuickDraw GX features.

QuickDraw provides a series of graphic routines that are called by applications to modify the display of the Mac screen, and the new version should offer significant improvements in speed and flexibility. In addition, QuickDraw GX provides much improved font and printing support including a new type of "smart font" that can contain a maximum of 65,536 characters compared with TrueType and PostScript's normal 255-character limit. This is particularly important for designing fonts to support languages with thousands of characters like Chinese and Japanese. New GX line layout features should result in more widespread use of sophisticated type layout features like kerning and tracking.

QuickDraw GX also includes a new portable digital document (PDD) format that lets you print to a digitised version of any document that can then be



1 SimAir's jets were created by scanning in facsimiles provided by the airlines and adding detail using Aldus SuperPaint

2 SimAir's Airport View provides some interesting if unexpected animations

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opened, viewed or printed by any other Mac running QuickDraw GX, irrespective of the presence of the original application.

Other noteworthy features of System 7.5 include a scriptable Finder (BAT files for the "rest of us"), drag and drop that lets you drag text or graphics from one application to another, support for Macintosh Easy Open that allows you to open MSDOS and Windows files even without the original program, PowerTalk, and a Drag Manager that lets you drag a print job from a queue and drop it on another printer.

Apple's recommended retail price for System 7.5 is £90 plus VAT. That's a considerable piece of change no matter how you look at it, but there's a good possibility that you can upgrade more cheaply via your local dealer. I suspect you'll find the increase in accessible power well worth whatever you end up paying.

SuperCard 1.7

When Allegiant bought SuperCard from Aldus, I was excited. Ever since the first version of SuperCard was released several years ago by Silicon Beach Software, I had been creating my own games and programs using it. Two years later Aldus released SuperCard 1.6, and that turned out to be its last. SuperCard 1.6 was still full of bugs and when System 7 came along it caused even more problems. Aldus dismissed SuperCard as not fitting into its long-term plans, and the program sat in the Aldus backroom for two years. Then Allegiant came along, bought the code, and efficiently released an updated SuperCard 1.7 in June 1994. Although the program remained relatively unaltered, Allegiant sorted out the bugs and turned SuperCard into a fully System 7 compatible package.

SimAir

For two years I have been working on an airline simulation "game" using SuperCard. When Allegiant's bug-free version came along I began work and called my program, however unoriginal, SimAir. My program puts you in charge of one of the four leading airlines of the United States: Northwest, United, American OR Delta. Given two relatively small aircraft to begin with (Boeing 727s) you dictate each aircraft's daily schedule.

An events calendar shows you which national events are occurring and where, and their potential impact on airline scheduling. For example, if the New York Giants have a football game in Los Angeles, the New York-LA route increases in demand. I

plan to expand the program to cover as many as 16 cities worldwide. Once you have selected your routes, you are given the option of watching your aircraft carry out the plan. You can zoom in to any gate at any airport and check up on your aircraft — and your rivals.

The aircraft carry out their daily schedule on a current time frame. For example the time may now be 10:12. Your airplane may leave San Francisco at 10:14 and arrive in Los Angeles at 10:16 — a real-time flight of two minutes. A longer route, such as San Francisco to Washington, may take six or seven minutes. Each aircraft maintains a two-minute stopover at any airport, where it is visually attended to by fuel trucks, food trolleys and baggage men. At the end of your aircraft's "sim-day" a window comes up showing your day's profits and your total cash flow. After a couple of days of managing your aircraft you may have amassed enough money to upgrade your jets to larger, more profitable aircraft such as jumbos or DC-10's.

Graphics

I have a few personal qualms about creating my own programs. If my program does not impress me graphically I am likely to give up on the whole idea. When I decided to create SimAir I chose to do my best possible job on the artwork for every part of the simulation. I didn't want to spend a couple of hours each day on something that didn't look good.

I created my graphics by myself, using Aldus SuperPaint, which gave me many options to draw graphics that are consistent throughout the program. I used both draw and paint layers and then copied my graphics straight into a card in SuperEdit, the application provided with SuperCard to create your own projects.

Animations

Animations, for me, are important in a successful game. I used a couple of methods in SimAir. When you view the "main entry" of an airport, occasional animations occur. For example, outside Baltimore airport is an electric storm. I drew several different kinds of lightning bolts in SuperPaint and transferred them into my program. I then made each bolt hidden or invisible. The idle script that runs through that card randomly chooses one type of bolt, positions it, and then shows it and hides it again twice. This creates a sort of flash and spices up that particular card.

Another animation that gives virtually unlimited possibilities is the PICS animation, a feature in SuperCard that lets you

create your own animation documents. I used this to create an animation for the movement of an airplane boarding gate. I simply drew the sequence of graphics, cropped the image of the largest one and created my own window of that size. Then I created a card for each graphic of the sequence and pasted each graphic in. Using the PICS animation creator, a feature incorporated into the runtime editor, I turned each card into a frame in the animation. Then all I had to do was delete that window and choose to play the animation in any script in the project. I named the animation SFO.GateOpen and this is the script that I used:

```
on mouseUp
  play PICS "SFO.GateOpen" at the loc of
  card button "AnimLoc"
end mouseUp
```

Timing

As I described earlier, the sim-day occurs in a current time frame. If your first airplane is scheduled to be in Detroit at the present time, you want to be able to zoom into the gate at Detroit and see it there. I have created a simple script to accomplish this.

After you have chosen your schedule for the day, a script enters the data into global variables (a variable that you can bring up in any script throughout the program). An idle message runs through the program constantly, checking the time. When you zoom into a gate at any airport, before showing you the screen, a script will check the contents of the variables to see whether the corresponding airport variable matches the airport you are zooming in on. If so, your airplane will be displayed on the screen.

Future developments

My next task is to elaborate and expand on the program to create a strong simulation game. I plan to increase my range of cities to 16, expand on choices of aircraft, and create a window where you can track down your plane — even in the air.

PCW Contacts

Next month, **Chris Cain** will be taking over the Macintosh slot. Send any comments or questions to him at **Chris_Cain@pcw.ccmail.compuserve.com** or as **Cain** at Apple's eWorld

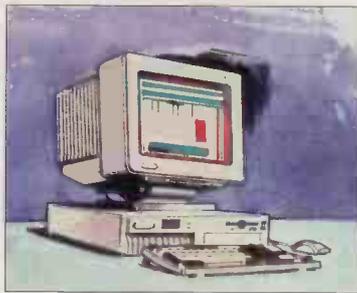
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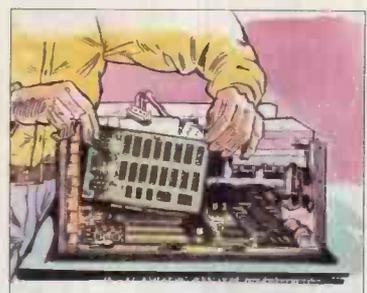
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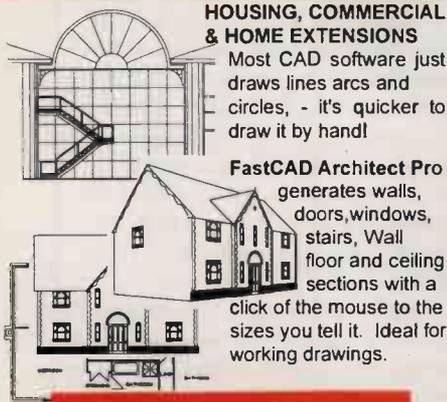


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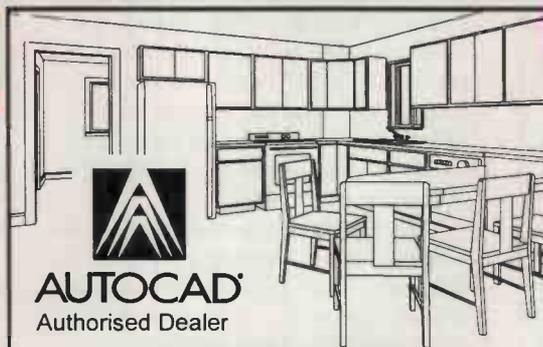
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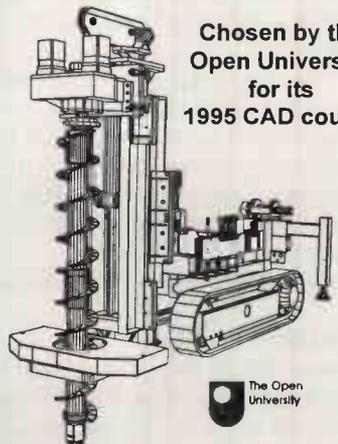
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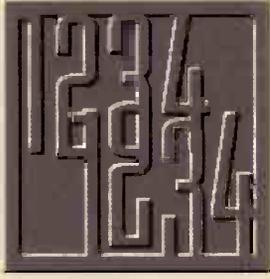


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Any questions?

If you have a computing problem or think you could help other readers out, contact our resident expert, Frank Leonhardt. He'll endeavour to put things right.

Breaking out

In an earlier Computer Answers David Waller asked if it was possible to keep his pupils from breaking out of AUTOEXEC.BAT with the Ctrl+Break combination. Bart Smit has kindly sent in the following novel remedy for this problem that is very simple and effective. All he does is re-map the screen and keyboard to the NUL device.

The remapping is done by starting AUTOEXEC.BAT with the line

```
ctty nul
```

and as soon as all the drivers are loaded, control can be restored with

```
ctty con
```

Although Ctrl+Break can still interrupt the boot process, the PC will no longer echo to the screen. The keyboard buffer will quickly fill with all the mischievous commands from the would-be hackers, eventually resulting in the beeping-on-every-keystroke syndrome so familiar to poor PC users when their machine hangs solidly.

The only remedy is a Vulcan nerve pinch, which will soon tire the pupils. This also removes the need to redirect each individual command's output to NUL. (I have found many drivers to simply bypass the redirection anyway.)

Bart Smit

100116.1360@CompuServe.COM

Partition problem

I own a 286-16. Somewhere down the line, it appears as though a portion of the hard disk has been sectioned off as "D:". There are definitely not two separate units, and I would like to know if there is any way I can reunite this 10Mb with the normal C:.

Joel Williams

mjkquado@fs1.ce.umist.ac.uk

There's lots of good reasons for breaking up a hard disk into several partitions rather than having one great big one. It is potentially safer to have your data spread across two partitions in the event of a software error causing disk corruption. It is also faster when it comes to accessing files and there is often a space saving brought about by the way DOS allocates areas of the disk for storing files. Basically, the larger the disk, the larger the units of space which are allocated to a file.

For example, with a single partition of 128Mb or less, every file needs at least 2Kb on the disk — even if is only one byte long. If the file is 2Kb+1byte long it will take up 4Kb and so on. This is because a 128Mb partition has 2Kb allocation units. However, if a partition is 200Mb, for example, the allocation units will be 4Kb long — with the potential for double the wasted space.

The most likely reason your older 286-based PC has been partitioned is not, I suspect, in order to get the best use out of a 200Mb hard disk. It is more likely a result of using an older version of MSDOS. Prior to DOS version 4.0 (or Compaq DOS 3.31) the largest single hard disk partition you could have was 32Mb. As 40Mb hard disks were quite popular at about this time it was common practice to split them into a 30Mb drive C: and a 10Mb drive D:.

It is possible to join your disk back together, but I may have already persuaded you to leave things alone. If I haven't, I soon will.

For a start you will have to buy a copy of DOS 4.0 or greater. I wouldn't recommend DOS 4.0, however cheaply it may be available. DOS 5.0 or DOS 6.0 would be fine. Once you have upgraded your

version of DOS you can run the copy of FDISK supplied with it. Follow the prompts to remove the extended (D:) partition and then remove the primary (C:) partition. Then create a new primary partition to cover the whole disk, quit FDISK and use FORMAT to initialise your new drive C:.

Unfortunately this procedure will destroy the entire contents of both drive C: and drive D: so you will have to make sure they are securely backed up to floppy disks first. I did say you wouldn't like it.

There really is no way around this in your case. With more complex multi-partition drives it is quite possible to make alterations to some partitions while leaving the others intact, but it isn't a job for the nervous.

Strange extension

I have been online for just over a month now with the IBM PC User Group Connect service. Most of my time online is spend browsing through the file download areas. Just recently I have discovered a large directory of Windows shareware and public domain software. I have had no problems downloading it, except it ends with a strange extension ".ARC". It is obviously compressed but I am unable to find a suitable de-compressor. What software do I require?

Daniel Flatters

An ARC file is an archive and compression standard which was very popular in the second half of the eighties. It has since been topped by PKZIP, which creates files with the extension .ZIP, and does the same job but with slightly better compression. The decompression program which generates ARC files is almost always called simply ARC. To extract all the files in an archive, the command would be ARC X, whatever.ARC.

ARC is produced by a company called System Enhancement Associates in New Jersey. It was distributed as shareware in the same way as PKZIP is today and thanks to this it is fairly easy to find on bulletin boards and in shareware libraries.

For a brief period during the early nineties another standard called LHA was quite popular. This was written by Haruyasu Yoshizaki and has the distinct advantage that it is free for non-commercial users. Files compressed with LHA often have the extension LZH.

In a state about memory upgrading

Here's a strange problem. I've got a DX2/66 machine (built myself) with 256Kb cache. I started off with 4Mb RAM (four 1Mb x nine 60ns SIMMs) and was able to tweak the Advanced Chipset options in the AMI BIOS (11/11/93) to 0 wait state cache writes, and 0 wait state DRAM access. This all worked fine, presumably since I was using 60ns RAM. Then I swapped the four 1Mb x nine SIMMs for four 4Mb x nine 60ns SIMMs — this also worked fine at 0 wait states for both cache and DRAM. But when I then added back the four 1Mb SIMMs (to give a total of 20Mb RAM) the machine refused to boot at 0 wait states, and I had to set it to 1 wait state on the DRAM access (although the cache could quite happily stay at 0).

I tried both combinations of SIMM positioning, i.e. having the 4Mb SIMMs in bank 0, and having the 1Mb SIMMs in bank 0, but to no avail. I simply can't get the machine to boot with 0 wait states when it has 20Mb RAM, but I can with 4Mb or 16Mb. Why should this be?

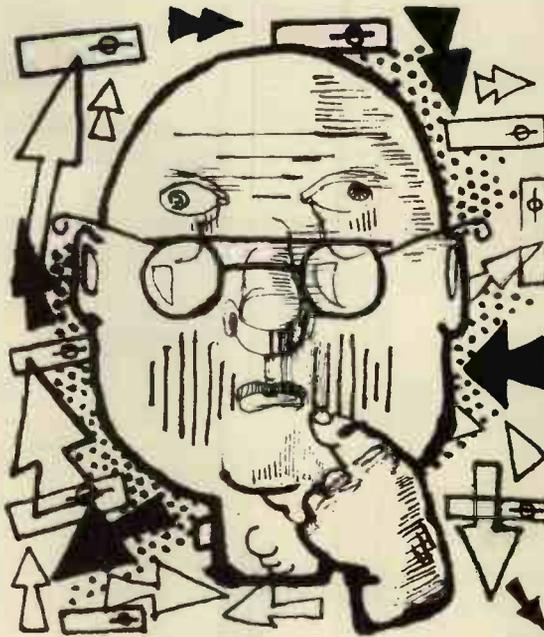
Phil Stanton

ch81ps@surrey.ac.uk

PC memory upgrades sound very simple but there is a lot more funny business taking place on a typical motherboard than most people are aware of. Unfortunately, even the motherboard distributors seem to have little clue about their products so the industry is forced to work on trial-and-error when selecting RAM.

I'm not too surprised to hear you are getting these results — such stories are typical. It is probably down to the fact that the two banks contain different SIMMs and that this is upsetting the cache controller.

Cache controllers seem to be responsible for the bulk of the odd memory configuration effects. For example, if you have 4Mb of RAM and a 256Kb cache, you would expect your machine to run faster than if it had a 128Kb cache, wouldn't you? This isn't necessarily the case: try removing half the cache and in a lot of cases the whole machine will speed up. I don't have a definitive explanation of why this happens but it appears that having all the cache applied to a single bank



of SIMMs causes the controller to waste a lot of time.

If you add another 4Mb of SIMMs in the empty bank you should replace the cache RAM, which will now be balanced with the DRAM having two 64Kb pages for each bank.

There is a theory that 1Mb nine-chip SIMMs are faster than three-chip SIMMs, and are therefore worth paying more money for. This can actually be true, but it is unlikely in most cases. The reason behind this is that a nine-chip SIMM contains nine 1-bit by 1Mb DRAMs but a three-chip SIMM has two 4-bit by 1Mb chips and a 1-bit by 1Mb for the parity.

It can take marginally longer to extract data from the 4-bit chip and in some cases this can tip the balance in favour of reducing the wait-state count by one. It should be stressed that on the vast majority of systems it won't make a blind bit of difference.

One thing which is almost certain to cause trouble is mixing three-chip and nine-chip parts on the same motherboard, and the same principle would apply if you were mixing three-chip 1Mb SIMMs and nine-chip 4Mb SIMMs. The slight timing differences between banks of memory could upset the cache controller and make it wait longer than necessary.

It is often assumed that a machine with zero wait states is going to be faster than a machine with one. This is also a myth. If you set the number of wait-states to zero but the memory fails to produce the data in time, you may end up waiting longer than if you had forced a single wait-state in the first place. The only way

to find out the correct settings is to try all the combinations and run a benchmark between each attempt.

If all this hasn't convinced you that PC memory is too weird to be considered in a scientific manner, then inwardly digest the following:

If you had a motherboard with a cache controller but no actual cache RAM, what would happen if you enabled the external cache in the BIOS configuration program? Chances are that you won't have tried this; either assuming that you would be prevented from doing anything so silly or that you would instantly lock up the machine. I can assure you, however, that there are motherboards out there which will speed up by 15 to 20 percent if you do enable an external cache which doesn't exist.

Timely reminder

It has long been known that there will be some problems in the last year of this century with computer software which can't cope with years greater than 1999. You would hope that, since the start of the decade at least, these problems would have been eliminated. However, Peter de Jager, who appears to have been looking into this problem in Canada, has come up with this nasty example:

Set the date in your computer's BIOS to 31st December 1999 and the time at 23:58. Then turn the computer off and wait at least three minutes.

On starting it up again you would expect the computer to think it is early on the morning of 1st January in the year 2000. I have tried this on several machines and they either claim it is 1st January or the 1st April 1980! This was with a common version of the AMI BIOS, as you are likely to have on your desk right now, and IBM PS/2s.

In fact, I've yet to find a machine on which it does work. If you do, let me know.

PCW Contacts

Shareware Marketing (PKZIP & co)
01297 24088
Fax 01297 24091

Peter de Jager (Year 2000 bugs)
905 792 8706 (Canada)
pdejager@hookup.net

Frank Leonhardt is an independent computer boffin who can sometimes be contacted on 0181 429 3047 or via email as frank@dircon.co.uk or leo2@cix.clink.co.uk. Letters may be sent to PCW at VNU House, 32-34 Broadwick Street, London W1A 2HG, but individual replies are not normally possible. Please do not ask about cover disks or CD-ROMs.

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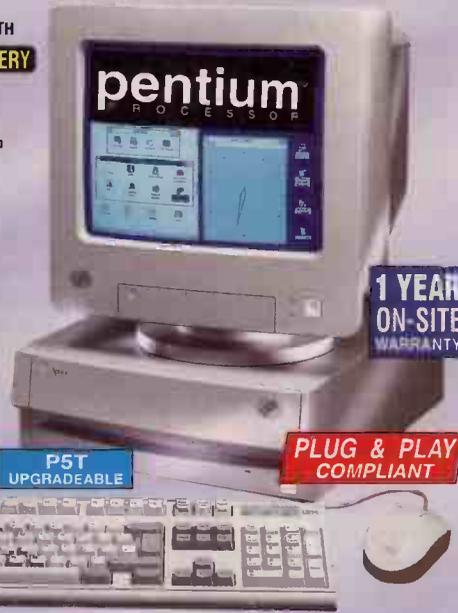
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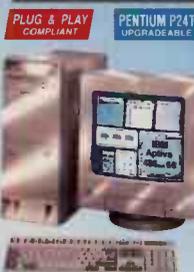
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Memory configuration is one of the most traumatic things you will ever have to do on your PC, and cache flow problems are only half of it. Eleanor Turton-Hill sorts out the highs and lows of conventional memory.

Through a combination of historical accidents, memory configuration has become something of a nightmare. The unfortunate truth is that setting up memory on a PC is not easy. There are no one-word answers or comforting sayings which will help you on your way or fill you with newfound clarity. You've just got to build up a clear mental model of how it all works. Then, the next time your application falls over for no apparent reason, you'll have some idea of the kind of thing to look for.

When you install Windows, the setup program makes a few automatic changes to your system in an attempt to improve performance. It doesn't matter how much memory you have on your system, Windows is still limited to the 640kb restriction imposed by DOS. In order to use memory beyond this limit Windows has to go through some strange contortions. More specifically, it uses a device driver called HIMEM.SYS which allows it to access all the memory on your system. Take a look at your CONFIG.SYS file and

you should find a reference to HIMEM.SYS which Windows added during installation.

Parts of memory

The diagram below shows the different sections of memory used by your PC. You don't have to understand the gruelling details of what goes on in each area, but it helps to have a rough idea of what's controlling what.

Conventional memory is the first 640kb available to the system. Many moons ago, before 286s came on the scene, conventional memory was the only memory available to applications. This meant that developers of DOS applications had very little space to play with. All programs had to fit into the part of conventional memory which is left after DOS and other system software is loaded.

Upper memory is reserved for your system to store BIOS information and is also used for accessory cards. Memory management software and certain features of DOS 5.0 will let you use this part of memory for device drivers and memory-resident applications.

The high memory area is a thin slice above 1024kb used by the Windows HIMEM.SYS to store information about the area above it. It's also handy if you have DOS 5.0 as this enables most of DOS to be loaded into high memory, freeing an additional 45kb of memory.

Expanded and extended memory

This is a useful distinction to imprint on your brain. Expanded memory (EMS) was designed a while ago to

get around the 640kb memory limit placed on DOS applications. This type of memory comes in the form of an add-in board and expanded memory manager, and only some DOS programs are able to use it. For application developers expanded memory was something of a revelation, and for years it was the only additional memory available to them. Expanded memory works by fooling DOS applications into looking at a small memory slice in the upper memory area but actually seeing the area in expanded memory. It does this by mapping small chunks of memory, or "pages", in and out of the upper memory area.

Expanded memory is a pretty ancient idea now, and because of the weaknesses inherent in its design it never came to be used by Windows. But you should

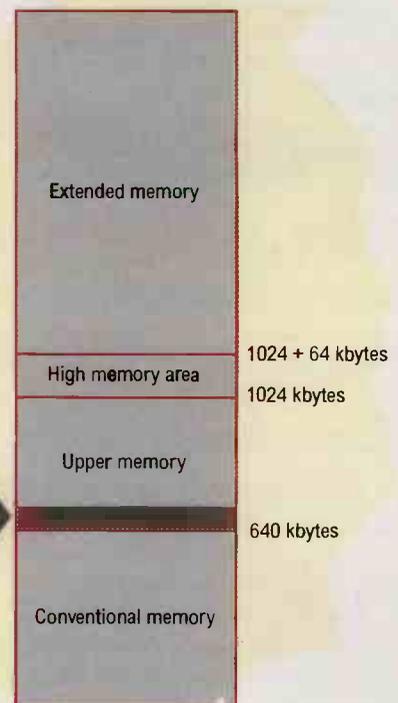
keep your expanded memory preserved on your system for those DOS programs which are capable of using it. If you only use Windows applications, expanded memory will be of no use to you whatsoever.

Extended memory (XMS) is all the memory available above 1024kb. Unlike EMS memory it does not need to be mapped in and out of the high memory area in order to work. This gives it a performance advantage and makes it easier for programmers to manipulate.

Most 386 and 486 PCs have all their memory set up as extended. Expanded memory is provided by emulators which are set up in the CONFIG.SYS file. There are various emulators available commercially, like Compaq's CEMM.EXE and Quarterdeck's QEMM. Some of these cannot co-exist with

The extended memory area shown at the top of the diagram is only available to Windows when the device driver HIMEM.SYS is installed. If the area above 1024K is configured as extended memory, then Windows has no access to it.

Page Frame, or slice of the upper memory area used to create Expanded memory.



Windows, so it provides its own expanded memory emulator, EMM386.EXE. You will need this when you run DOS programs outside of Windows. The command: `DEVICE=EMM386.EXE 256` is entered in your `CONFIG.SYS` automatically when you install Windows. The figure placed after the command specifies the exact amount of memory reserved as expanded.

Standard and enhanced mode

One of the great wonders of Windows is its ability to run more than one application at the same time, a phenomenon now commonly known as "multitasking". Only one application can use the processor at any given time, though, so multitasking is achieved by manipulating memory in various creative ways. The way it works depends on whether you are running Windows in standard or enhanced mode. You can tell which mode you're in by going to the Control Panel and checking for the "386 Enhanced" icon. If it's not there, you're in standard mode; if it is, you're in enhanced.

If you have less than 2Mb RAM you must run Windows in standard mode. There are also some applications which require this. In standard mode, Windows applications are multitasking but DOS applications are single-tasking. DOS applications run in full-screen mode and monopolise the processor, whereas multiple Windows applications can process information at the same time. This means that when you load a DOS application all other processes must be suspended. Windows manages this by swapping the current application out of memory and writing a swap file to the disk. The only piece of code left behind is the Task Switcher, which sits around waiting for when you want to Alt+Tab or Ctrl+Esc. When

```
C:\>smartdrv /s
Microsoft SMARTDrive Disk Cache version 5.0
Copyright 1991,1993 Microsoft Corp.

Room for 256 elements of 8,192 bytes each
There have been 16,105 cache hits
and 1,749 cache misses

Cache size: 2,097,152 bytes
Cache size while running Windows: 2,097,152 bytes

Disk Caching Status
Drive read cache write cache buffering
-----
A: yes no no
B: yes no no
C: yes no no
Write behind data will be committed before command prompt returns.

For help, type "Smartdrv /?".

C:\>
```

you do this Windows is restored, and the DOS program is moved to a separate application swap file. Most people run Windows in enhanced mode, where both DOS and Windows can multitask. If you have a 286, you cannot run Windows in this mode, and it doesn't matter how much RAM you have either. Enhanced mode uses the special characteristics of the 386 and 486 processors to create a "virtual machine" for each DOS application that you run from Windows. This is effectively a simulation of an 8086 processor which inherits the memory configuration you've got set up on your machine. If your conventional memory is badly configured, each virtual machine created by Windows will also be badly configured.

Disk caches

A cache is a piece of software which speeds up access to the hard disk. Windows comes with its own cacheing software called SMARTDRV, which works by storing some of the contents of the hard disk in an area of extended memory. The cache collects the data which is most commonly accessed. It gives Windows applications a big performance advantage because the retrieval of data from memory can be hundreds or thousands of times faster than from the

This status report displays all the details of SMARTDRV's configuration. The figures given for cache hits and misses show that SMARTDRV is working successfully

hard disk. If Windows does not find the required data in the cache and has to get it from the hard disk, the cache adds a new item of data to its store.

SMARTDRV also speeds up the process of writing to disk by writing temporarily to the cache and moving the data to disk later on when the processor is not busy. Windows 3.1, MSDOS 5.0 and 6.0 all come with SMARTDRV included. It is put automatically in the first line of the `AUTOEXEC.BAT` when you install Windows so that it runs immediately on startup. SMARTDRV is an executable program which you can run at any time from the DOS prompt. A report appears showing the size of the cache for DOS and the size for Windows. For a few more details type "SMARTDRV /S". This will tell you how well the cache is working and how much of the cache has been used.

In the screenshot above, the cache size shown at the top is the size of the disk cache when Windows is not running. The SMARTDRV application automatically calculates this value based on the total amount of extended

memory available. Any performance improvements gained by SMARTDRV tend to drop off after 2Mb.

The next figure shows the minimum size of the SMARTDRV disk cache while running Windows. In 386 enhanced mode the SmartDrive cache is reduced to a minimum so as to save memory space. In standard mode, SMARTDRV works with `HIMEM.SYS` to allocate memory to Windows dynamically, or to the cache depending on how much is available.

Is SmartDRV wasting your memory?

SMARTDRV gets a bit confused every now and then as to whether it needs to create a double buffer. Some hard disks require that an extra copy of the disk's contents be kept by the disk cache, and in this instance it automatically creates a double buffer of the disk's addresses. However, on some ESDI and SCSI devices, SMARTDRV automatically creates a double buffer whether you want one or not. There's a simple way of sorting this out. Just open up your `CONFIG.SYS` and look for this line:

```
device = smartdrv.exe /
double_buffer
```

If it's there, SMARTDRV has installed double buffering. If you're not sure whether you need it or not, take a look at your SMARTDRV status report which shows the disk cacheing status for all your system's drivers. If all the entries under Buffering are No, turn this option off. You can get rid of it by removing the line from the `CONFIG.SYS`. The next time you reboot, SMARTDRV will run without double buffering and you'll have a bit more RAM.

Next month I'll be looking at the main differences between Windows 3.1 and Windows for Workgroups, as well as more ways to optimise your system.

Inside your PC

● This machine is fitted with a high-speed Diamond StealthPro VL (VESA local bus) graphics card which provides an on-screen resolution of 1024 x 768 and 256 colours. You can see the card's memory chips along the top of the card

● The BIOS is normally clearly labelled somewhere on the motherboard. This is a ROM (Read Only Memory) chip containing all the "basic input output instructions" which make your PC work

● The CPU, processor or microchip is a small square of silicon that sits on the motherboard. Our illustration shows a DX2 processor in one of the new ZIF (Zero Insertion Force) sockets. In this way, users can upgrade the processor to, say, the Pentium Overdrive just by lifting a lever and lifting out the processor

● Normally the PC's loudspeaker is at the front of the case and connected with wires to the motherboard. Some newer machines use Piezo electric speakers built onto the motherboard

● LED clock speed indicator. Looks flash but is of no practical use

● A keyboard lock still generally fitted to PCs supplies some basic security

● Reset button. This fairly useful feature lets you do a hard reboot of the computer (even if your keyboard is locked up) without turning off the computer

● Turbo button. This is a hangover from the past when some software wouldn't run at high clock speeds. These days it's a waste of space

● Power on/off

● A hard disk, sometimes called a fixed disk, supplies permanent and fairly rapid storage capacity. Mechanically it's very similar to a floppy disk except it uses a rigid hermetically sealed disk which allows much larger amounts of data to be held

● In the machine in our illustration the floppy disk controller and the IDE hard disk interface are on a separate board. On some machines they're built into the motherboard. This board also has a 2Mb hard disk cache. The RAM chips for the cache fit into SIMM slots on the board

● The motherboard pictured is a fairly typical modern design. It has a total of seven slots. The three on the left are VESA local bus slots. The three in the middle are 16-bit ISA slots, the short one on the right is an 8-bit ISA slot

● You can normally spot the battery which backs up the CMOS RAM on a motherboard. The CMOS RAM contains vital configuration information about your PC and also maintains the computer's time and date. On the motherboard we used for this illustration the battery is soldered to the motherboard, which means that when the battery runs out you may have to replace the motherboard

● The power supply is generally in the back right corner of the case and is a common cause of failure in PCs

● All modern motherboards use SIMMs (Single In-Line Memory modules). Boards normally have between four and eight slots. They're easily spotted with their characteristic beige plastic mouldings. The better SIMM sockets have metal clips to hold the memory in place. Break off the plastic toggles found on some boards and you could be looking at a new motherboard. If you plan to run Windows don't buy a machine with less than 4Mb of RAM. 8Mb of RAM is an extra 120 quid or so well spent.

● There are quite a few other chips on a typical motherboard. Unless you've got a special interest in electrical engineering these aren't worth worrying about

● The larger 5in drive bays are filled by a CD-ROM drive and hard disk drive. A ribbon cable (not illustrated) connects the hard disk to the hard disk controller and the CD-ROM drive to its interface on the sound card

● On this machine the floppy disk drive is arranged vertically. The industry has finally standardised on 3.5in floppy disk drives with a capacity of 1.44Mb. If you're buying secondhand or end-of-line machines don't settle for anything less

Illustration by Russell Harvey

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FAX - 9600bps. Receive or send fax messages directly from your PC. Prometheus MaxFax software is included with every PC so that faxes may be sent and received - everything you need is included.

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PLUS!

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- MS-Windows v3.1
- MS-DOS 6
- Microsoft Works for Windows v3
- MS-Entertainment IV
- MS-Money v3.0
- Tab Works
- Compaq Welcome, Control & Learning Centres

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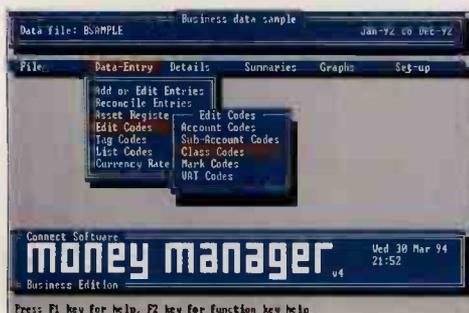
The Standard Edition is designed for small businesses which are VAT-registered (or may soon become registered), but which do not require extensive sales and purchase ledgers.

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If your needs change, you may simply upgrade your edition, using your existing data without having to adapt to a whole new system.



Account codes:	Bank codes:	Class codes:	Month	Year	Balance	Credit	Debit
1000	1000	1000	Jan	94	1000.00		
1001	1001	1001	Feb	94	1000.00		
1002	1002	1002	Mar	94	1000.00		
1003	1003	1003	Apr	94	1000.00		
1004	1004	1004	May	94	1000.00		
1005	1005	1005	Jun	94	1000.00		
1006	1006	1006	Jul	94	1000.00		
1007	1007	1007	Aug	94	1000.00		
1008	1008	1008	Sep	94	1000.00		
1009	1009	1009	Oct	94	1000.00		
1010	1010	1010	Nov	94	1000.00		
1011	1011	1011	Dec	94	1000.00		

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Class Code to specify the category of income or expenditure.

Description (*up to 48 characters*) to describe the transaction precisely.

Mark Code, which is optional and may be used for extra classification (eg project costing).

VAT Code (*if you are VAT registered*) for standard, exempt, part-VAT etc.

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When your bank statements come in you can reconcile them item by item against your own Money Manager records to make sure that you and the bank are in agreement. There is a facility to estimate interest and overdraft charges.

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Bank statements are instantly available for any bank account, showing each individual transaction, with the running balances calculated automatically.

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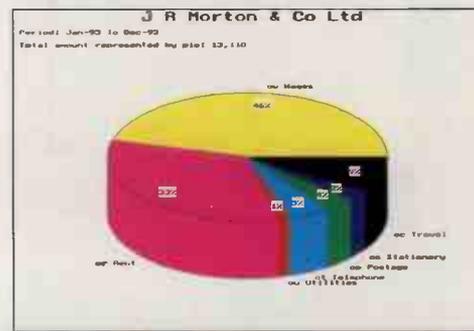
List all individual transactions for specified types of income/expenditure, eg all cash purchases of stationery. Powerful selectivity lets you extract and focus on the information you need.

SUMMARY REPORTS

You may choose a wide variety of reports from the menu to show account balances, totals for various classes of income and expenditure month by month or for a selected period, bank account statistics, etc. The simple coding system allows you to report on just the information you require, in the way you need it.

BAR AND PIE CHARTS

Information may also be shown graphically as bar and pie charts, which can reveal facts about your finances which are not apparent from numbers alone. Ideal for presentations.



BUDGETING

You may create a budget using the past year as a starting point, and then modify the figures in spreadsheet style. You may then produce reports showing actual, budget, difference, total budget and remaining amount. You may have as many separate budgets, forecasts etc. as you need.

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MULTI-CURRENCY ACCOUNTING

(*Business Edition only*) Any account may be specified to be in a foreign currency, with (as appropriate) a different exchange rate for each month. Currency transactions may be listed in that currency or converted to your base currency (eg Sterling).

ASSET REGISTER

There is an Asset Register to record and keep up-to-date the value of assets such as property, contents for insurance purposes, investments etc.

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GUIDANCE AND SUPPORT

The manual, which is less than 1/2" thick, is clear and concise with no American accounting jargon. It includes installation instructions, examples, illustrations, hints, index etc.

There is context-sensitive on-screen help. This means that wherever you are in the program you can press the F1 key to obtain a screen window giving guidance and information on the current operation.

Sample data files are provided to help you learn and experiment before starting on your own accounts.

Telephone support is free and indefinite.

FEATURE LIST

Edition:	Personal Business		
	Standard		
Unlimited sets of accounts	✓	✓	✓
Multiple bank accounts	✓	✓	✓
Bank reconciliation	✓	✓	✓
Standing orders	✓	✓	✓
Detailed bank statements	✓	✓	✓
Detailed expenditure reports	✓	✓	✓
Category totals for year	✓	✓	✓
Unlimited No. of budgets	✓	✓	✓
Budget vs Actual reports	✓	✓	✓
Asset register	✓	✓	✓
Notepad facility	✓	✓	✓
Pop-up calculator	✓	✓	✓
Macro record/replay	✓	✓	✓
Cheque printing	✓	✓	✓
Automatic VAT calculation	-	✓	✓
VAT return	-	✓	✓
EC Sales List	-	✓	✓
Multiple currencies	-	-	✓
Sales & Purchase ledgers	-	-	✓
Client/Member Accounts	-	-	✓
Data-file password	-	-	✓
Month locking	-	-	✓
Data Import/Export	-	-	✓
On-screen help	✓	✓	✓
Free & indefinite support	✓	✓	✓
Entries per month	1000	1000	1000
Account Codes	20	20	30
Class Codes	50	70	100
Mark Codes	50	50	50
VAT Codes	-	20	20
Sub-Accounts Codes	-	-	500



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Business data sample
Detailed Statement for Apr-93

Account	Dr	Cr	Description	Acc	Debit	Credit	Balance
Balance at 1-Apr-93							
1	50		Dr Heat	p	360.00		4,182.00
1	50		44 BBS/HMS	p	1,550.00		4,542.00
3	043		Dr Transf to Ac a	p	100.00		6,942.00
7	50		Dr Archer & Co.	p		150.00	5,992.00
12	043		Dr Transf to Ac a	p	2,492.01		8,484.01
13	047		Dr Postcard	p	853.05		7,208.26
13			Dr Transf from Ac a	p		4,709.50	4,570.60
15	50		Dr Wages	p	500.00		5,070.60
24	042		Dr Packaging	p	8.47		5,079.15
24	043		Dr Baker & Co.	p		436.06	4,650.29
26			Dr Transf from Ac a	p		3,922.63	727.06
28	046		Dr Journal of	p	246.00		1,073.06
28	045		Dr Telephone	p	156.36		1,210.99
Total Debit					6,267.07		
Total Credit						9,210.07	
Net Credit						2,951.00	

Report completed... press Esc to continue, P to print, F for file

COMPUTER REQUIREMENTS

Money Manager will work on any IBM PC compatible from a single floppy-disc mono 8088 machine to the most powerful PC's available.

Although Money Manager is a DOS program, it will run very well under Windows, and PIF and Icon files are included to facilitate this.

Business data sample
Monthly Class Totals for Dec-93

Account	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YEAR
REVENUES														
Accruals														0
Wages	500	500	500	500	500	500	500	500	500	500	500	500	500	6000
Heat	360	360	360	360	360	360	360	360	360	360	360	360	360	4320
Utilities		45												129
Telephone	156			87					294					717
Postage		36	44	23	44	64	56	23	67	477				773
Stationery	22	9	22	31	16		56	10	12	350				488
Travelling	139	76	176	67	82	42	82	55	97	1362				2331
EXPENDITURE														
Advertising	346	492	346	346	346	346	346	346	346	346	346	346	346	4231
Printing														233
PROFIT														0
Raw materials		375	409	78	105	141	172	149	228	2412				4641
Packaging	0	211	66											277
TOTALS														
End Balance	7250	7057	6570	3657	3658	5433	5740	2074	4010	40517				
Income	4570	2730	5514	4626	4146	4306	4009	4154	4710	70874				
Expenses	4570	4425	4514	3571	3780	3931	4036	3507	4184	50851				
Cash flow	7000	3309	961	1045	346	474	27	507	2525	12023				

Report completed... press Esc to continue, P to print, F for file

PRINTERS

Reports and graphs may be printed using all popular types of printer, including Dot-matrix, HP Laser, DeskJet, Canon LBP, BubbleJet, ProPrinter, Daisywheel, Postscript etc.

NO SPECIAL KNOWLEDGE REQUIRED

The program and manual are written so that very little knowledge of accounting or computing is required. Provided that you can understand a bank statement and know what is meant by the computer's Enter key, you can use any of the Money Manager programs. Many of our most successful users happily admit to being novices at both computing and accounting.

Business data sample
VAT Report for Oct-93 to Dec-93

Account	Dr	Cr	Description	Acc	Debit	Credit
VAT						
1	50		Dr VAT on sales & other outputs	p	1,999.52	
2	50		Dr VAT on acquisitions from EC states	p	350.00	
3	50		Total VAT due (sum of boxes 1 & 2)	p	2,349.52	
4	50		Dr VAT reclaimed on purchases & other inputs	p		792.02
Net VAT to be paid						1,557.50
Total						
Total value of sales (incl VAT) (inc box 0)					6:	10,425.03
Total value of purchases (incl VAT) (inc box 9)					7:	5,709.16
Total value of supplies to EC (incl VAT)					8:	3,000.00
Total value of acquisitions from EC (incl VAT)					9:	2,000.00

Report completed... press Esc to continue, P to print, F for file

ORDER NOW!

Order by phone or by fax with your credit card or by post enclosing a cheque. Despatch is by first class post on the same day that your order is received. The package will fit through a normal letterbox. Postage and packing is free.

Name _____
Company _____
Address _____

Telephone _____

Please charge my Visa/Access/Amex card I enclose my cheque

Card No.: _____

Exp. date: _____

Tick here for 5.25" disc instead of 3.5"

Connect Software Ltd

3 Flanchford Rd Tel 0181 743 9792
London W12 9ND Fax 0181 743 8073

Money Manager Personal Edition	<input type="checkbox"/>	£34.00+VAT= £39.95
Money Manager Standard Edition	<input type="checkbox"/>	£49.95+VAT= £58.69
Money Manager Business Edition	<input type="checkbox"/>	£79.95+VAT= £93.94
Final Accounts	<input type="checkbox"/>	£49.95+VAT= £58.69
Final Accounts +Tax	<input type="checkbox"/>	£79.95+VAT= £93.94
Office Manager	<input type="checkbox"/>	£49.95+VAT= £58.69

Total: _____

Save £20 !!! Deduct £20 (£23.50 inc VAT) from the total cost if you order two programs at the same time.

Personal
Computer
World

Buyer's Charter

(M A I L O R D E R P R O T E C T I O N S C H E M E)

PERSONAL COMPUTER WORLD has always endeavoured to protect its readers and to that end will continue to underwrite your purchasing decisions. Our Buyer's Charter is backed by VNU Business Publications, the UK's largest publisher of computer magazines. You do not need to register with us before making a purchase.

IT IS IMPORTANT THAT YOU FOLLOW OUR GUIDELINES AND RECORD DETAILS OF ALL TRANSACTIONS, ESPECIALLY IN THE EVENT OF CLAIMS UNDER THE "BUYER'S CHARTER".

Your Rights

- 1.1 Under the rules that control buying and selling of goods through the post, MAIL order customers are protected partly by law and partly by codes of practice drawn up by advertising agents and publishers.
- 1.2 By Law, advertisements or catalogues inviting people to order goods by post must include the supplier's name and operating address.
- 1.3 If money is sent with an order, it must be returned as soon as possible if the order is not accepted. A customer can sue if there is an unreasonable delay.
- 1.4 No contract exists until the supplier accepts an order. So the customer has no right to demand goods if the supplier chooses to reject his order and no right to compensation if he then has to pay more to buy the goods elsewhere.
- 1.5 But once the goods are sent, there is a binding contract. The customer is entitled to his or her money back if the goods do not correspond with their description. If their quality proves unsuitable for their normal purpose, the customer has the right to demand their replacement, or else a refund.
- 1.6 In addition to any legal requirements the Advertising Standards Authority administers a code of practice which requires MAIL order suppliers who ask for any money in advance to: Provide samples of their goods at the address shown in the advertisement so

that callers can examine them. Refund payment in full if goods are returned UNDAMAGED within SEVEN days of receipt. (It is not necessary for the customer to give any reason for this.) The customer is entitled to try the goods during that period, unless the supplier has previously made it clear that a trial is not permitted — for example, when any use of the goods would make them unfit for sale to anyone else.

Send goods within TWENTY EIGHT days of receiving an order — or notify the customer within TWENTY EIGHT days, with a reply-paid postcard and the offer of a refund. If the customer prefers to wait for the goods he should be sent progress reports every FOURTEEN days.

The Product

Before placing an order, shop around and consider the software and configuration you need. If possible, test the product at a dealer's or at an exhibition, or read magazine reviews of current products. Don't be afraid to speak to manufacturers about parts and accessories, their compatibility with any equipment you already have and the possibility of expanding or upgrading in the future. There is no point buying hardware which will soon be obsolete or is incompatible with your own equipment and requirements. Check the manufacturer's maintenance or service contracts, in response times and any third-party involvement. Many companies offer a one-year maintenance contract, but who will be responsible when it runs out?

The Supplier

Make some enquiries about the company: you are entitled to check its financial status, trading record and customer references. Look at the returns and refund policy, warranty agreements, after-sales service and stock availability. Check its means of delivery and how soon it can dispatch. "ARE THERE ANY HIDDEN EXTRAS?"

Payment

You should not be charged for any goods

until they are despatched and therefore whenever you can, always endeavour to pay on delivery or, failing this, collect them when you buy.

If this is not possible, consider carefully your method of postal payment. By far the greatest protection is afforded by a PERSONAL CREDIT CARD, for in the event of the supplier/advertiser ceasing to trade, or failing to deliver the goods, you are automatically covered under the credit card company's insurance scheme for all transactions in excess of £100.

Should you consider making your postal payment by "CHARGE CARD" you must check carefully with the CHARGE CARD COMPANY to ascertain if they operate a protection scheme similar to that offered by the PERSONAL CREDIT CARD company. INVARIABLY THEY DO NOT.

There is considerable confusion between a credit card and a charge card. Perhaps it would be as well before using a card which will be employed to make the payment to check with the issuing company whether you will be using credit card or a charge card.

If you pay by cheque, cross it, endorse it "Account Payee Only" and fill in all the details on the counterfoil, or payment list, in your cheque book.

If you pay by Postal Order, cross it, fill in the counterfoil and keep it with your record of the advertisement.

If a purchase has to be made with cash, always ensure that such a transaction is only undertaken in person, by you, at the supplier's/advertiser's address and that as a result of that transaction you take immediate possession of those goods for which you have paid.

NEVER SEND CASH THROUGH THE POST

Ordering Goods

Do not place an order until you are sure that both the product and the supplier are reliable. Be precise about what you want: quote the model's make and number, the memory specifications and the hard disk size. With software, state the disk format

Personal Computer World

and support details you require. Check the total price of the goods (including VAT, postage and packing) and make sure there are no hidden extras. Use the "Details of Transactions" form on the reverse side of the "Buyer's Charter" to record those items ordered, and your dealings with a supplier/advertiser.

Delivery

As defined under "YOUR RIGHTS" paragraph 1.5. The customer has a legal right to expect that the goods delivered correspond with the description advertised and in accordance with the order taken.

It is therefore incumbent upon the customer to verify upon delivery that the goods received do correspond accordingly, and if not, to notify the supplier/advertiser immediately.

Purchasing from Overseas Companies

The risks involved in buying from overseas nearly always offset the advantages. Don't consider it unless you cannot buy the product in the UK, or the price advantage is so great it outweighs all other considerations. If you still decide to purchase from overseas, make sure the product is suitable for use in the UK. Hardware has to be adaptable to 240 volts (in the US, 110) and hardware and software have to be configured correctly. It is essential that any software is supported by the manufacturer in the UK: most international versions are not. You should also know the supplier's exact terms of trade and what kind of support to expect. Returning hardware to the US, for example, can be expensive, time-consuming and risky.

Finally, you have to arrange for your goods to be shipped to the UK. Work out how and when they will be delivered, the cost of the exercise and who should insure the goods in transit. You will have to pay duty and VAT whether you clear them through Customs yourself or via a shipping agent.

Problems

In the case of even the smallest problem, CONTACT THE SUPPLIER FIRST. If you are dissatisfied after several attempts to get help, write to our Customer Services Manager. If you paid by credit card, the card company should also be able to assist.

Price Fluctuations

Whilst every endeavour is taken to ensure that goods ordered correspond to

the prices advertised, there are occasions when, due to unforeseen circumstances, such as increases in manufacturing costs occurring during the period that copy was received and subsequently printed (6 to 8 weeks), a fluctuation in prices may be experienced.

Customers should always obtain from the advertiser/supplier a guarantee that

the price advertised still applies to any goods from which an order is to be placed.

Help Line

Always ensure when purchasing a PC or related equipment that you are fully protected and have access to a "HELP" line service.

Personal Computer World Buyer's Charter

1. Private Individual Reader's Protection

When you purchase goods as a Private Individual Reader from a Great Britain Supplier's advertisement in PERSONAL COMPUTER WORLD and pay in advance of delivery to that Supplier who subsequently goes into receivership administration liquidation or bankruptcy or ceases to trade prior to delivery of the goods you may under the Buyer's Charter qualify for compensation from PERSONAL COMPUTER WORLD provided that you have:-

- (i) not had your money returned by the Supplier;
- (ii) have followed the PERSONAL COMPUTER WORLD guidelines when placing your order and have taken all reasonable steps to effect delivery or refund;
- (iii) have retained as proof and for verification purposes:-
 - (a) a copy of the original advertisement
 - (b) a copy of the PERSONAL COMPUTER WORLD Details of Transaction Form
 - (c) comprehensive proof of payment

2. Claims

(a) Claims must be submitted in writing to the customer services manager of PERSONAL COMPUTER WORLD with full details of the claim not earlier than 28 days and not later than 3 months from the official sale date of the relevant issue of PERSONAL COMPUTER WORLD.

Claims received outside this period will not qualify under any circumstances for compensation under the Buyer's Charter. The official sale date of PERSONAL COMPUTER WORLD is the first Thursday of each month.

(b) Once a Supplier has become subject to insolvency proceedings or has ceased to trade, PERSONAL COMPUTER WORLD guarantees to process as expeditiously as possible any private individual reader's claim properly made and submitted.

(c) If there are insufficient tangible assets available processing of claims under the Buyer's Charter will commence immediately.

(d) If there are assets available and it has been confirmed that a dividend will be made then pending payment of a dividend claimants under the Buyer's Charter will receive compensation for any shortfall existing after the payment of such a dividend.

(e) Payments by PERSONAL COMPUTER WORLD will take into consideration and reflect on the rights the Private Individual Reader might have against third parties such as credit card or insurance companies.

(f) PERSONAL COMPUTER WORLD reserves the right to take an assignment of any claim made by a Private Individual Reader as a condition of making a payment under the Buyer's charter.

3. Limitations

(a) PERSONAL COMPUTER WORLD's Liability under the Buyer's Charter will not exceed £1,500 in respect of any claim submitted by any one Private Individual Reader and in any event will not exceed £65,000 in respect of claims submitted by any Private Individual Reader against all Suppliers in any one calendar year. Any additional payments by PERSONAL COMPUTER WORLD will be made entirely at the publisher's discretion.

(b) The Buyer's Charter only applies to advance payments made by Private Individual Readers and as a direct response solely to goods itemised in display advertisements in the magazine; it does not include goods purchased from classified advertisements, loose inserts, catalogues or other sales material obtained from any relevant advertiser.

(c) The Buyer's Charter is designed to safeguard the Private Individual Reader not companies, societies, organisations, unincorporated bodies or any other commercially orientated outlet of any description. There is no protection for goods purchased from outside Great Britain or goods purchased for resale.

CAST IRON BACKUP

Service

Specialists to assist in your selection - identify and match your requirements - ultimately this will save YOU time and money.

Technical Support

Dedicated technical staff to assist in installation and after...

The 3 e's Proven Track record

Experience and expertise in processing orders efficiently is reflected in our solid client base comprising of Universities, Government bodies, Financial Institutions, etc.

Full Manufacturers Warranty

All products are authorised UK versions and carry a full manufacturers warranty.

Overnight Delivery

All stocked orders are dispatched the same day. Delivery charged at £8 plus VAT.

You Are The Final Judge

We have chosen with care, and we guarantee, you will be happy when you order from us. If you are not satisfied with your purchase for any reason, just return it to us within 14 days, and we will promptly exchange it or send you a refund as you request. Please contact our sales office.

Managing Director
Computer Bits & PCs Plc

Optical Drives

		INT	EXT
Yajitsu			
I2512	230MB 3.5" Bare Drive	£465	£530
Hewlett Packard			
1716T	1.3GB MultiFunctional Drive	£1440	£1622
Sanasonic			
F-7300	1.5GB MultiFunctional Drive	£1510	£1590

BM Xyratex
Includes SCSI terminator, software installation and user guides for the appropriate operating system.

BM Xyratex			
3000	230MB Unix version		£805
3000PP	230MB Parallel Port Kit		£782
3000DOS	230MB DOS/OS2 Kit		£691
5000UN	1.3GB Unix Version		£1890
5000DOS	1.3GB DOS/OS2 Kit		£1787

CD-ROM

Hitachi/External CD-ROMS			
CDR1950S	SCSI-2 5MB/s transfer, 235ms access 256kb buffer bare unit		£280
CDR1950SY	Specs as CDR1950S, includes ISA Bus Kit cables and software		£367
CDR1950SZ	Specs as CDR1950S, includes MCA Bus Kit cables and software		£440
CDR1950PP	Parallel Port Version		£375

Hitachi/Internal CD-ROMS			
CDR6750	SCSI-2 5MB/s transfer 235ms access 256kb buffer bare unit		£186
CDR6750Y	Specs as CDR6750, includes AT Kit cables and software		£231
CDR-6550	SCSI 300kb/s 270ms access bare drive		£135

		BARE	KIT
TOSHIBA			
XM-3501	SCSI 600kb/s 150ms access Int.	£253	£314
XM-3501	SCSI 600kb/s 150ms access Ext.	£306	£370

COMPUTER BITS & PCs PLC

Hard Drives

SEAGATE				
3.5" IDE (2 year warranty)				
ST3660A	540MB	14MS		£165
ST3780A	730MB	12MS		£241
ST31220A	1.08GB	12MS		£371
3.5" SCSI (2-5 year warranty)				
ST5660N	545MB	12MS		£234
ST31200N	1.05GB	10.5MS		£386
ST12400N	2.1GB	9MS		£717
ST12550N	2.14GB	8MS		£840
ST15150N	4.29GB	9MS		£1659
ST15230N	4.3GB	10.5MS		£1350

CONNER				
3.5" IDE (2 year warranty)				
CFA540A	540MB	12MS		£190
CFA850A	850MB	10MS		£272
CFA1275A	1.27GB	12MS		£419
3.5" SCSI (2-5 year warranty)				
CFA540S	540MB	13MS		£233
CFP1060S	1.06GB	9MS		£426

IBM				
3.5" SCSI (5 year warranty)				
1005MB	1.0GB	9MS		£425
2000MB	2.0GB	9MS		£759
5.25" SCSI (5 year warranty)				
4000MB	4.0GB	9MS		£1541

MICROPOLIS				
3.5" IDE (5 year warranty)				
MIC4110A	1.05GB	8.5MS		£375
3.5" SCSI (5 year warranty)				
MIC4110	1.0GB	8.5MS		£375
MIC4221	2.05GB	8.5MS		£799
MIC3243	4.2GB	8.5MS		£1440
5.25" SCSI				
MIC1936	3.02GB	11MS		£910
MIC1991	9.1GB	12MS		£2167

Audio Visual Drives				
3.5" SCSI (5 year warranty)				
MIC4110AV	1.0GB	8.5MS		£445
MIC4221AV	2.05GB	8.5MS		£891
MIC3243AV	4.2GB	8.5MS		£1579
5.25" SCSI (5 year warranty)				
MIC1991AV	9.1GB	12MS		£2493

DIGITAL				
3.5" SCSI (5 year warranty)				
DSP3107	1.07GB	9.5MS		£425
DSP3160	1.6GB	9.5MS		£595
DSP3210	2.1GB	10MS		£865
5.25" SCSI (5 year warranty)				
DSP5400	4.0GB	11MS		£1685

HEWLETT PACKARD				
3.5" SCSI (5 year warranty)				
C3323A	1.05GB	9.5MS		£415
C2490A	2.1GB	9MS		£750

QUANTUM				
3.5" IDE (2 year warranty)				
MV540AT	540MB	14MS		£180
3.5" SCSI (2-5 year warranty)				
LGT540	540MB	11MS		£179
LGT730	730MB	11MS		£224
GPX4280S	4.28GB	8.6MS		£1755

WESTERN DIGITAL				
3.5" IDE (3 year warranty)				
AC2540	540MB	13MS		£185
AC2700	730MB	10MS		£220
AC3100	1GB	10MS		£365

Tape Backup

		INT	EXT
Digital Audio Tape Backup (DAT)			
Wangdat			
3100	2GB 4mm DAT	£599	£699
3200	2/8GB 4mm DAT	£650	£750

Sony			
SDT5200	4GB 4mm DAT-DDS 2	£575	£620
SDT5000	4/16GB 4mm DAT-DDS 2	£620	£705

Exabyte			
8205	2.5 - 5GB 8mm	£946	£1046
8505XL	7 - 14GB 8mm	£1659	£1737

Hewlett Packard			
HP 35470	2GB 4mm DAT	£545	£640
HP 35480	8GB 4mm DAT	£632	£730
C1533A	4-16 GB 4mm DAT-DDS 2	£738	£827
C1553A	48GB Autoloader	£1601	£1715

Hewlett Packard Jetstore			
2000	2GB DAT System & Cheyenne Arcserve/solo software and ISA Host Bus Adaptor		£881
5000	4GB DAT System & Cheyenne Arcserve 4.0 Software (250 User Version) & ISA Host Adaptor		£1573
6000	8GB DAT system & Cheyenne Arcserve version 5.1 software (250 user version) and ISA host adaptor		£1993

Tape Backup Colorado			
Trakker	340MB Parallel Port Drive		£225
Trakker	680MB Parallel Port Drive		£315

Tandberg Data
The range below includes Drive, Adaptec 1510 Controller, Data Cartridge (appropriate capacity) Firstserve Software, Cables and Installation Manual.

FS 2501	250MB Tape Drive	£532	£646
FS525	500M Tape Drive	£673	£787
FS1200	1.2GB Tape Drive	£797	£910
FS2000	2.5GB Tape Drive	£890	£976

Removable Storage

Ministor PCMCIA - Hard disks			
MP85P	85/170MB		£250
MP130P	130/260MB		£365
MP340P	171/340MB		£445
Cardwise	Docking Station		£205

Maxtor PCMCIA - Hard Disks			
MXT105PC	105MB		£257
MXT131PC	131MB		£267
MXT171PC	171MB		£325

Mountaingate - Removable Int/Ext available.			
Passport			
QP170	170MB		£402
QP240	270MB		£510
QP525	525MB		£1032

IBM Datablazer External Hard Drives			
Z1001	5.25" 1GB SCSI Drive		£570
Z1002	5.25" 2GB SCSI Drive		£970
Includes SCSI terminator, mains cable & installation guide.			

COMPUTER BITS & PCs PLC

133 UPPER STREET,
ISLINGTON, LONDON, N1 1QP.

TEL. 0171-359 8898

FAX. 0171-359 1812

INVESTING IN SERVICE E & OE - prices are subject to change. All prices exclude VAT.

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We stock many items for which there is no space in these advertisements.

News & Views

DELPHI IS HERE!!!

Why all the excitement about Delphi? Quite simply, it is a uniquely multi-faceted tool that will appeal to a wider range of developers than anything else on the market.

The visual design facilities are second-to-none. The user interface is based around an application framework (the Visual Component Library or VCL) so you can actually structure your applications - unlike with VB. VCL itself is high-level and 16/32-bit portable. Object Pascal is an excellent language for general development - easier and more secure than C++, more powerful and expressive than Basic. Database access uses the same engine as Paradox 5, with full SQL & QBE on local and remote files. And, of course, it is a native code compiler that can create both EXEs and DLLs.

And the majority of Delphi is written in itself! I don't think Visual Basic can make the same claim. Maybe the next version of Visual Basic will be written in Delphi?! Stranger things have happened...

Call us now for full details and pricing.

ORPHEUS from TurboPower

This is the first native VCL library available for Delphi. Includes validated data entry, virtual list box, tabs, editor (16M files), table, spins, meter, calendar, etc. Full source code, royalty-free, ONLY £135.

Other VCL Libraries

By the time this ad appears, we expect to have some other VCL libraries available. Call us for all the latest info.

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Borland Database Engine 2.0	£205	Zinc 4.0 for Windows & NT	£505
CodeBase 5.1	£259		
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Integra VDB/C++, Desktop	£209		
List & Labels for Win (Pro)	£395		
POET SDK 2.1	£360		
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We supply C and Forth Cross Compilers by 2500AD, Avocet, Aztec, Crossware, Lattice, IAR, Hi-Tech, MPE & PLC hosted on DOS and targeted on Z80/64180, 6502, 6801, 68HC11, 6301, 6809, 7811, 8051, 8096 & 680x0. Also cross assemblers by 2500AD, Avocet, Crash Barrier (META) and IAR Systems hosted on DOS with over 30 target processors. In total over 200 products with no space to list them here. We hold some stock but you should allow 10-14 days for delivery. PLEASE CALL FOR INFORMATION OR ADVICE.

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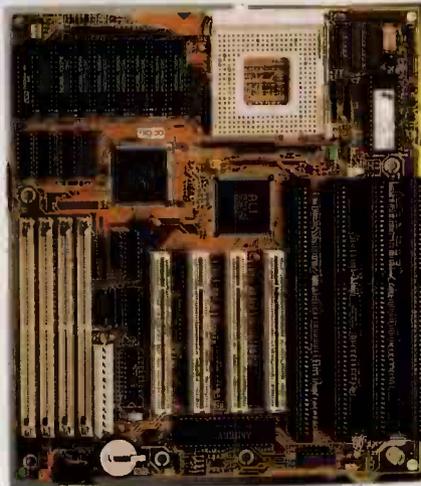
Pentium 60MHz: Landmark V2.01 CPU: 346MHz, FPU: 1019MHz. Graphic Winmark (ET4000): >20 Million.
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 - * 14" MPRII colour monitor
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Intel Premier P60 Pentium board.

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● As expected, Pentium jokes are still coming thick and fast, but this month's ChipChat isn't going to be filled to the brim with them. Instead we've decided just to sneak the best ones in every now and then, and this month's winner comes from sister magazine PC Week

Q. How many Pentium engineers does it take to change a light bulb?

A. Three. One to screw in the lightbulb, and one to hold the ladder.

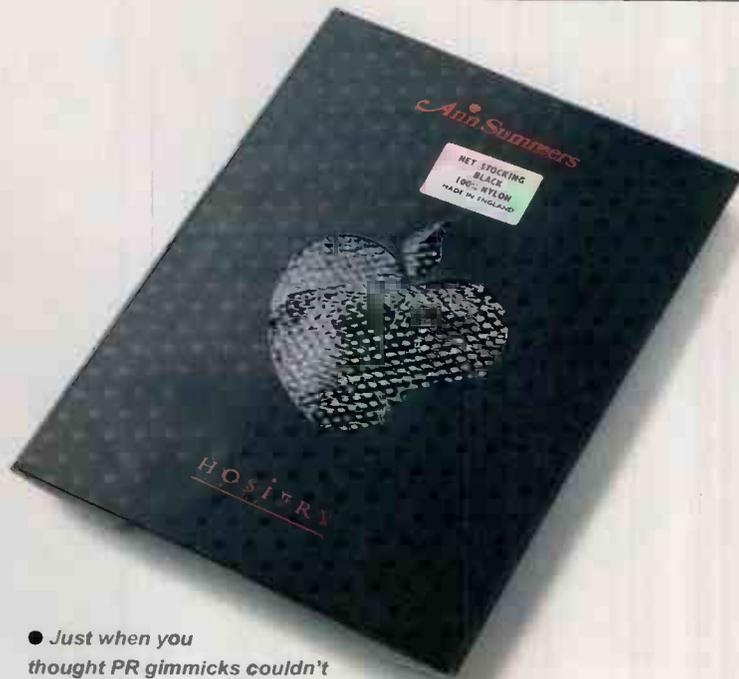
● While we're on the subject of Intel, PCW must remind its readers that the infamous floating point bug was first brought to the public's attention on the Internet. It was also here that Intel's chairman, Andy Grove, finally admitted to knowing all about his faulty hardware.

According to a paper published way back in November 1993, this sort of embarrassing situation can be avoided if big companies take the proper precautions. Entitled *Horses and Barn Doors: Evolution of Corporate Guidelines for Internet Usage*, it was written by Sally Hambridge and Jeffrey C Sedayao, hard-working employees of Intel Corporation...

● Just to prove we're not picking on Intel, here's a quick observation on Microsoft from reader Richard Howells of Swindon. Q. Was it wise to rename Chicago as Windows 95?

A. Yes. When it ships Bill Gates will

● *Left neglected in a Las Vegas corner, passing gamblers were surprised to see the new Pioneer no-arm bandit malfunction and offer its maximum payout of 500 CD-ROMs...*



● *Just when you thought PR gimmicks couldn't get any worse, Portable Add-ons of Guildford strikes again. Enclosed with a brief news release on their new PCMCIA Enternet+ card was a pair of Ann Summers' best sexy stockings: novel netware, perhaps...*

redefine 1995 with enough months to cover the slippage.

● Visitors to MacWorld Expo in San Francisco were intrigued by one Apple employee who stood making faces at the Apple stand. Further investigation revealed that he was looking into a video camera, with a sign attached inviting attendees to record their comments for company president Michael Spindler.

Obviously this chap thought he'd have a bit of laugh, and as he was silent good old Michael wouldn't know him from Adam. We agree it looked like great fun. Pity he forgot about the name badge he was wearing.

● The kidnapper and murderer, Keith Rose, who recently embarrassed Michael Howard by escaping from Parkhurst prison on the Isle of Wight, was the same Keith Rose who founded modem dealership, Modem House. When he was sent down in 1991 we covered the episode in Newsprint (May '91) and "fondly" recalled some of his erstwhile exploits such as "the time he was found in Dixons peeling the green stickers off its telephones so that he could stick them on his modems". Soon after that "he started printing his own green 'approved stickers'", only instead of being approved by the BABT they were "Approved by the Intergalactic Federation". Rose later accused rival modem supplier Barry Rubery (of Pace) of pouring paint stripper all over his Porsche. It turned out that Rose had applied the paint stripper himself.

● "Hewlett Packard sails into warship design", boasted a press release from the company, announcing that the Ministry of Defence has bought 38 HP 9000 workstations for its naval architects. Let's hope the ship designers fare rather better than the ones who changed the spec for the rubber on the paper-feed rollers on HP's DeskJet 550 and 550c models (see this month's Newsprint). The rubber lost its grip. Wouldn't do for that to happen to the warship anchors. Or to the sailors, come to that...

Sorry, Our Mistakes

● In February's monitor group test we incorrectly quoted the Taxan 1080 LR as being a 21in monitor, when it is in fact a 20in. However, with a street price of under £1000 it is still the cheapest 20in monitor we tested, retaining its Highly Commended award, and leaving a gap for a cheap 21in winner. This is filled by the Idek Vision-Master Pro 21, which represents excellent value for money, particularly with the excellent Mitsubishi Diamondtron tube. We were concerned about losing the remote control, but Iiyama assured us that after a while outside the unit, the remote starts beeping frantically.

Iiyama 01438 745482

Taxan 01344 484646

● We failed to credit Daedelus CD-i Productions Amsterdam for the use of the picture on last month's cover. This comes from their *Live Without Monty Python* disc, which won a CD-i award for best design. It was designed by Maarten Hessel van Dinter and Joost Holscher.

Chipchat



"Power and portability. That's what I look for in a notebook PC - and the Dossier has it all and much more!"

CASE STYLE

NOTEBOOK
Dimensions
(W x H x D) mm
279 x 41 x 216 closed



LCD Status icon display panel including battery charge gauge.



Ergonomically placed large 16mm trackball for easy use in Windows and palm rest to reduce wrist fatigue.



CPU upgradeable. Easy to upgrade CPU up to DX4 100MHz. Also easy to upgrade RAM to 8MB, 12MB or 20MB.



Two separate PCMCIA type 2 slots or one type 3 allowing a host of PCMCIA cards (for modems, networks, storage and more) to be used.



Docking station accessory option. Just slip the Dossier 486 Advanced into the docking station to transform into an instant desktop system.

DOSSIER[®] 486 ADVANCED SOUND

THE NOTEBOOK WITH AN EXTRA DIMENSION - NOW IT EVEN SOUNDS GOOD!

The Dossier 486 ADVANCED heralds a new era in PC notebook capability.

It's not just the performance of the Dossier 486 ADVANCED Sound that's impressive - although as you can see, many desktop PCs would be hard-pressed to keep up - but also the upgrade options available.

You can choose a 486DX 33MHz, 486DX2 66MHz or the latest 486DX4 with either a 75 or a 100MHz processor; together with an 8MB or 20MB RAM upgrade and the option to increase the Hard Disk to 455MB.

But the new Dossier's real advantage is its wide range of features. From CPU upgradeability, a built-in ergonomic trackball, LCD status icons and long battery life to the choice of three top quality screens, the specification is exceptional.

And now the specification includes built-in sound hardware compatible with Soundblaster and Microsoft sound system, allowing you to manipulate sound and music to enhance your productivity.

Plus there's a whole range of accessories, from the flexibility of the Dossier docking station, PCMCIA cards and a car battery adaptor to a deluxe carrying case.

Clearly the Dossier 486 ADVANCED is a notebook that needs to be seen - and heard.

- to be believed.

STANDARD SPECIFICATION

- IBM PC/AT compatible.
- Intel SL enhanced 486SX 25MHz, option for 486DX 33MHz, 486DX2 66MHz, DX4 75MHz and DX4 100MHz.
- 3.3 volt technology.
- 4MB RAM, upgradeable to 8MB, 12MB and 20MB.
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- 8K internal cache.
- 3.5", 1.44MB floppy Drive.
- Local bus accelerated Super VGA Graphics with 1MB Video DRAM.
- Choice of Mono (9.5" STN), Colour DSTN (10.3" Dual Scan STN), or Colour TFT (9.5" TFT).
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- CPU upgradeable to 486DX 33MHz, 486DX2 66MHz, DX4 75MHz and DX4 100MHz (All Intel SL Enhanced CPU's).
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- Battery life indicator.
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INTEL SL ENHANCED 486SX 25MHz

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DOSSIER 486 AM
August 1994

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- N4ARAM04 Upgrade to 8MB RAM £164
- HARD DISK UPGRADES:**
- N4XHD260 Upgrade to 260MB Hard Disk £49
 - N4XHD445 Upgrade to 445MB Hard Disk £199
- ACCESSORIES:**
- N4ADXDK0 Docking station for Dossier 486 ADVANCED £309
 - N4XDELUX Deluxe padded carrying case £49
 - N4XPSXDC Universal car battery adaptor £69
 - NXXMA010 105MB PCMCIA Hard Drive £249
 - PAMSPS01 External amplified speakers for louder sound £23

A range of PCMCIA Cards are available. Please call. The above are only some of the options available. For a full list of other items please call our Sales Department.



RING 0181 758 7000



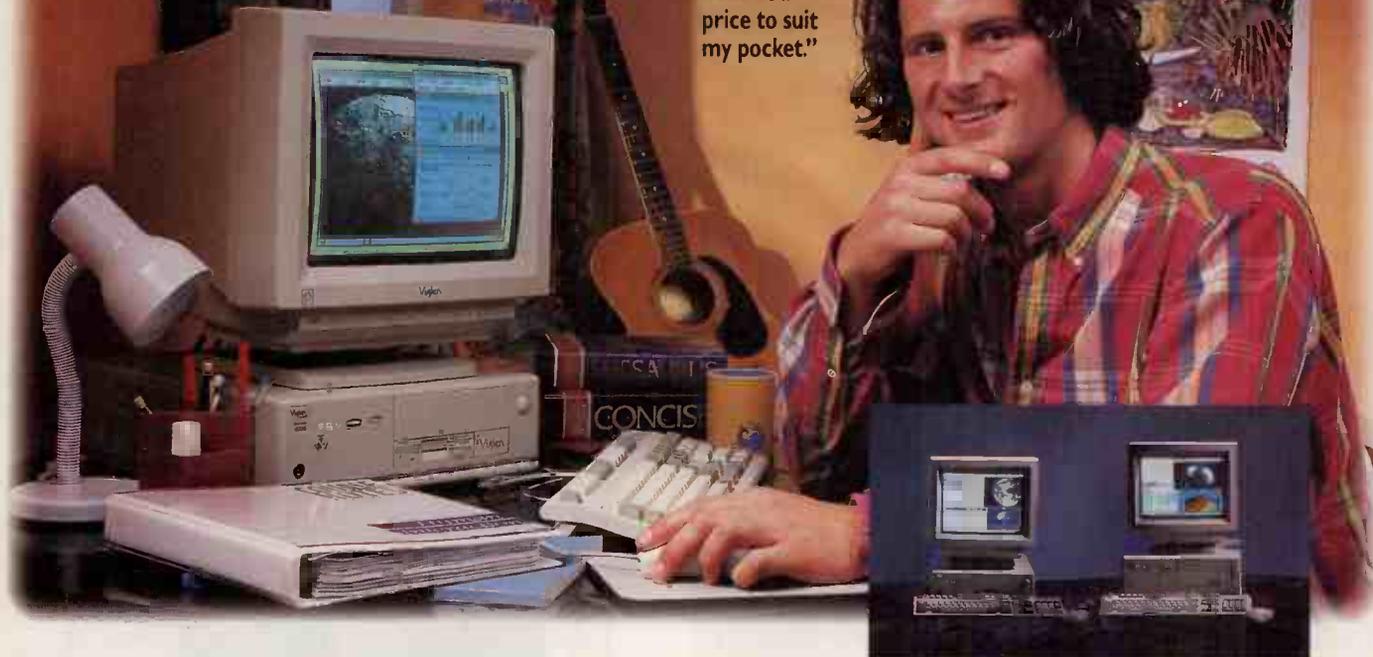
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642
PERSONAL COMPUTER WORLD
MARCH 1995

Viglen Limited, Viglen House, Alperton Lane, Alperton, Middlesex HA0 1DX.

"With the Contender I've got all the performance I need at a price to suit my pocket."



CASE STYLE

CONTENDER EXECUTIVE

Dimensions (W x H x D) mm: 330 x 105 x 390

6 free 16 bit expansion sockets. A free 5.25" drive bay can be made available by specifying a rear fitting of the internal hard disk, which takes up three expansion slots.

CONTENDER PROFESSIONAL

Dimensions (W x H x D) mm: 380 x 150 x 415

5 free 16 bit full length expansion sockets, with two free 5.25" drive bays for additional disk drives.

MICROSOFT[®] ERGONOMIC MOUSE

Supplied as standard with the Contender Range.

33MHz 486SX

Add £20 to the 486SX 25MHz if a 33MHz 486SX system is required

Now all Contenders comply with EPA energy saving specification.



OPTIONS:

ZSM12NBD 12 Months On-Site Maintenance **£39**

VTC15PXL 15" Colour monitor instead of 14" as supplied **£90**

VTC17260 17" Colour Monitor instead of 14" as supplied **£410**

The above are only some of the options available. For a full list of other items please call our Sales Department.

The Contender[®] Range THE LEADER IN COMPUTING ON A BUDGET

The Contender[®] is a value range of personal computers and is one of the lowest cost PC investments you can make without compromising quality, reliability or support. And you won't be disappointed when it comes to performance. It comes with a choice of case styles and processors and is ideal for most office applications such as word processing, accounts and spreadsheets. And it offers amazing value for money.

The Contender[®] comes with MS-DOS 6.2 and Windows 3.1 pre-installed and ready to run. A CPU upgradeability feature means that by replacing a CPU chip you get up to 486DX2, 66MHz performance and beyond, including the future Intel Overdrive processor based on Pentium[™] technology.

The Contender[®] comes in 2 case

styles (See inset box). Choose the case, then pick your processor, memory and hard disk configuration from the table below. For any other specification or add

ons, please call and we'll build a system to your exact specification.

STANDARD SPECIFICATION

- IBM PC/AT compatible.
- Choice of processor, memory and hard disk capacity.
- 8K Cache RAM built into CPU. 128K second level external cache.
- One 1.44MB floppy drive.
- Choice of case styles - Contender[®] Executive, which is a small footprint and low profile case. Contender[®] Professional, which is a standard desktop size.
- Windows accelerated local bus. Super VGA Graphics (1024 x 768).
- A 14" Super VGA Colour monitor with EEC Low emission standards.
- 2 Serial, 1 Parallel, 1 PS/2 port.
- CPU Upgradeable up to 486DX2 66MHz and Intel OverDrive Processors, including those based on Pentium[™] technology.
- 102 Key compact ergonomic keyboard.
- Microsoft mouse with Microsoft Mouse Manager Utilities.
- MS-DOS[®] 6.2 and Windows 3.1 and Works for Windows[™] ready-to-run.
- User friendly manuals.
- 12 months parts and labour warranty with option for low cost on-site parts and labour maintenance for up to 5 years.
- Free lifetime hotline technical.

THE CONTENDER RANGE

COLOUR SUPER VGA	CONTENDER 4SX25	CONTENDER 4DX33	CONTENDER 4DX266	
HARD DISK	RAM	486SX 25MHz	486DX 33MHz	486DX2 66MHz
270MB	4MB	£779	£879	£919
420MB	8MB	£929	£999	£1059
540MB	16MB	£1179	£1259	£1299
1GB	16MB	£1339	£1419	£1459

The prices above are for complete Contender Executive and Professional systems ready to run with MS-DOS 6.2 and Windows 3.1. To order please quote the relevant model along with the hard disk and RAM capacity required and PLEASE DO NOT FORGET to specify the case style required.

ALL PRICES EXCLUDE VAT AT 17.5%

WHAT PERSONAL COMPUTER

TOP DOG

The overall winner has to be the Viglen Contender. This gives you plenty of options and performance before you start thinking about upgrading.

May 1993
What Personal Computer

WORKS

This machine has surprised me more than somewhat in that it keeps up with CD-based video at native resolutions very well, and can cope with some pretty hefty stuff from its hard disk as well.

June 1994
Contender
Multi-media
Practical PC

MULTIMEDIA

Why not add Multimedia to the system of your choice? **PC2**

See 'Viglen Options' page for details.

TAKE ADVANTAGE OF THE SOFTWARE BONUS WITH EACH VIGLEN PC - SEE 'SOFTWARE BONUS' PAGE FOR DETAILS.



MS-DOS 6.2



EASY 2 OWN

Easy to Own payment scheme from **£1.27** per mth over 36 mths 19.9% APR 10% deposit. See "Ordering couldn't be easier page" for typical example.



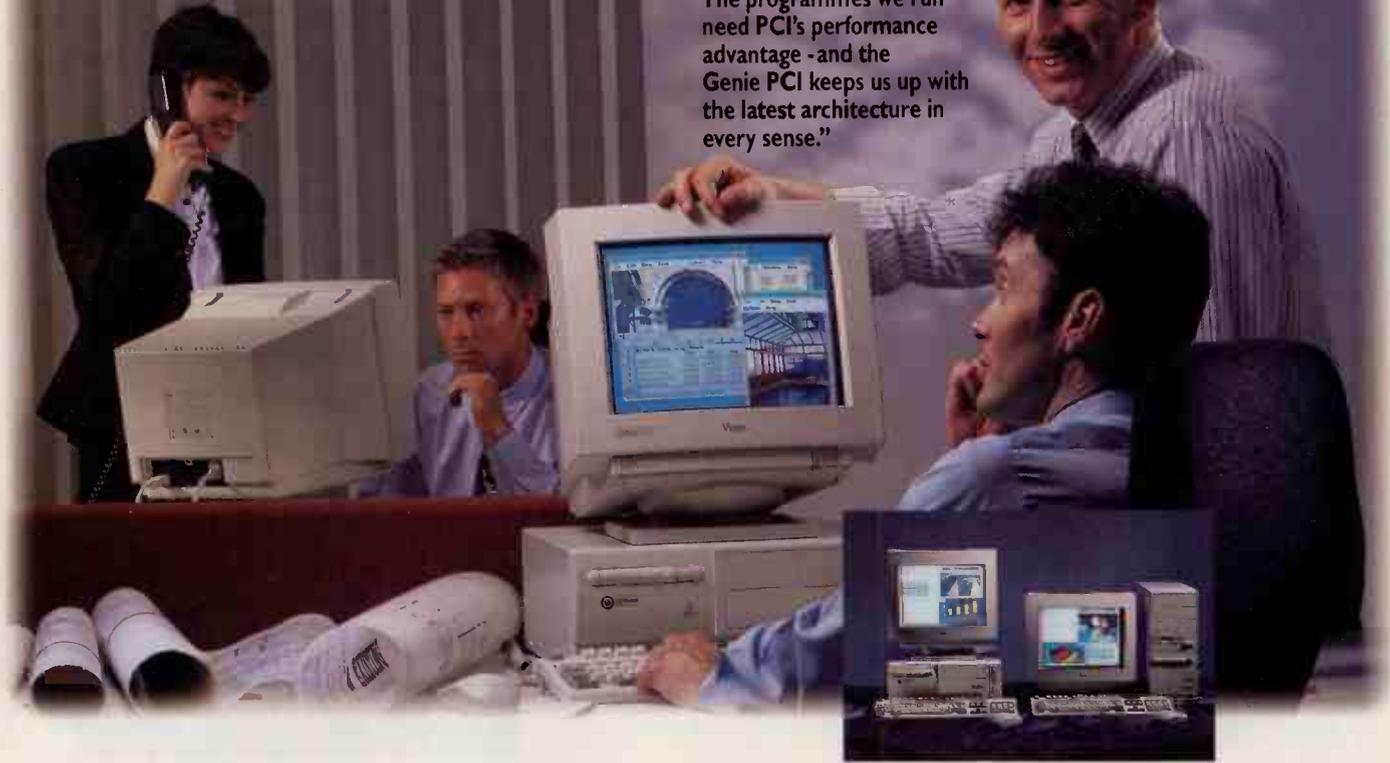
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FAX 0181 758 7080

"The programmes we run need PCI's performance advantage - and the Genie PCI keeps us up with the latest architecture in every sense."



CASE STYLE

GENIE PCI PROFESSIONAL
Dimensions (W x H x D) mm: 380 x 150 x 415

Two free 5.25" drive bays.

GENIE PCI MEDIUM TOWER
Dimensions (W x H x D) mm: 170 x 380 x 420

Three free 5.25" drive bays and two free (one internal) 3.5" drive bays.

MICROSOFT® ERGONOMIC MOUSE

Supplied as standard with the PCI Range.

VGA Performance in New Winmarks 95
Figures based on Pentium based Genie PCI systems.

3.5m	6m	12m	13m	13.8m
TYPICAL VGA	TYPICAL VGA PCI STANDARD OPTION	GENIE PCI OPTIONS	PCI MACHIN OPTION	STEALTH 64

OPTIONS:

ZSM12NBD 12 Months On-Site Maintenance **£39**

PDDXPAT4 High Performance ATI Mach 64 SVGA card with 2MB of VRAM and 64bit graphics engine instead of standard card **£149**

PDDXPST4 Ultra High Performance Stealth 64 SVGA card with 2MB of VRAM and 64bit graphics engine instead of standard card **£209**

VTC17260 17" Colour Monitor instead of 15" as supplied **£320**

The above are only some of the options available. For a full list of other items please call our Sales Department.

15" MONITOR SUPPLIED AS STANDARD

SAVE £60 VESA NON-INTERLACED 75Hz AT 1024 X 768

A 14" colour Super VGA monitor can be provided instead of the 15" standard for £60 less.

The *genie*® PCI Range **THE NEXT GENERATION OF COMPUTERS**

Viglen have always been at the forefront of new technology. And now we've done it again with the Genie® PCI.

As a radical change to PC architecture, PCI not only offers tremendous performance advantages for running programs such as Windows, high speed video and multi-media, but also has the ability to expand in future for ever more demanding applications. With its plug and play capacity for easy to configure add-in cards, it eliminates the trial and error guesswork of yesterdays technology.

Combine that with Viglen's existing reputation for quality, service and reliability, and you have to agree the Genie® PCI is the next generation of personal computer.

STANDARD SPECIFICATION

- Choice of processor, memory and hard disk capacity.
- 4 ISA, 2 PCI, 1 PCI/ISA shared slots.
- Enhanced IDE support.
- 256K secondary WRITEBACK cache.
- One 1.44MB floppy drive.
- 2 serial, 1 parallel printer port (EPP).
- Choice of case styles, either **Professional** or **Medium Tower**.
- 486 based systems upgradeable to Intel Overdrive™ processors including those based on **Pentium™ Technology** and the DX4 100MHz.
- High performance PCI bus Windows accelerated Super VGA card with 1MB RAM. Option for even faster Super VGA cards.
- Viglen ENVY ISP Super VGA 15" FST colour monitor.
- 102 key compact ergonomical keyboard.
- Microsoft mouse with Microsoft Mouse Manager software utilities.
- MS DOS® 6.2 and Works for Windows™ ready-to-run.
- User friendly manuals.
- 12 months **parts and labour** warranty with option for low cost **parts and labour** maintenance for up to **5 years**.
- FREE lifetime hotline technical support.
- Option for competitive application bundles.

PLAY Includes software for easy configuration of add-in cards

THE GENIE PCI 486 RANGE

COLOUR SUPER VGA	PCI 4DX33	PCI 4DX266
HARD DISK RAM	486DX 33MHz	486DX2 66MHz
270MB IDE 8MB	£1239	£1289
420MB IDE 8MB	£1259	£1309
540MB IDE 16MB	£1509	£1559
1GB IDE 16MB	£1679	£1719
1GB SCSI 2 16MB	£1839	£1879

THE GENIE PCI PENTIUM RANGE

	PCI P5160	PCI P5166	PCI P5190	PCI P51100
	Pentium 60MHz	Pentium 66MHz	Pentium 90MHz	Pentium 100MHz
	£1469	£1559	£1669	£2089
	£1489	£1579	£1689	£2109
	£1739	£1829	£1939	£2359
	£1899	£1989	£2099	£2519
	£2119	£2209	£2319	£2739

The prices above are for complete Genie PCI Professional and Medium Tower systems, ready to run with MS-DOS 6.2 and Windows 3.1. To order please quote the relevant model along with the Hard Disk and RAM capacity required and PLEASE DO NOT FORGET to specify the case style required.

ALL PRICES EXCLUDE VAT AT 17.5%

Windows BEST TEST Users Sept 1994

Which Computer June 1994

Computer Buyer June 1994

WHAT PC? June 1994

Intel Verified: for the Pentium™ Overdrive™ Processor

PC MAGAZINE October 1993

This system produces better processor and memory results than any of the others. Choose The Viglen Genie PCI if you want the fastest PCI machine.

PERSONAL COMPUTER REVIEWER'S CHOICE January 1994

... the clear winner in our tests is the Genie Professional PCI P5160 from British direct-seller Viglen. On aggregate, it came out top in our tests and also the second cheapest which makes this machine a clear winner for price/performance.

WORKS

TAKE ADVANTAGE OF THE SOFTWARE BONUS WITH EACH VIGLEN PC - SEE 'SOFTWARE BONUS' PAGE FOR DETAILS.

MULTIMEDIA

Why not add Multimedia to the system of your choice? See 'Viglen Options' page for details.

MICROSOFT WINDOWS READY-TO-RUN

MS-DOS 6.2

ENHANCED IDE

CPU UPGRADEABLE

WINDOWS ACCELERATION

PCI LOCAL BUS

yes

NetWare Tested and Approved

EASY 2 OWN™

Easy to Own payment scheme from **£53.94** per mth over **36 mths** **19.9% APR** 10% deposit. See "Ordering couldn't be easier page" for typical example.

intel inside

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"Viglen Options,
made to fit your measure."

The Software Bonus



Get the WORKS with Viglen!

In addition to MS-DOS® 6.2 and Windows 3.1, all Viglen systems are now supplied with Microsoft® Works 3.0 for Windows™ which is an easy to use integrated package comprising of a word processor, spreadsheet, database and electronic communication software; the ideal tool to run a small business. This software is pre-installed on the hard disk, ready to run with full on-line help documentation. In order to provide the best value, **Works for Windows™** manuals and disks are not included. These can be provided at small additional cost.

To order the Microsoft® Works manual and disk set, please quote the following:
Order code **WAPCMD10** Works 3.0 for Windows Manual and disks **£9.99**

**NOW TAKE
ADVANTAGE OF
THE SOFTWARE
BONUS WITH
EACH VIGLEN PC.**

Software Bonus Upgrades

The additional software bonus obtained from Viglen gives you a choice of upgrading to further powerful applications from Microsoft at very competitive bonus upgrade prices. These bonus upgrade prices are only available when ordered with a Viglen PC at the time of purchase. The following applications are available. Please add the relevant order code when ordering.



Microsoft® Office 4.2

This is the latest version of the most popular and powerful integrated software package from Microsoft featuring the technology of Intellisense. The package includes Word for Windows™ 6, Excel 5 and Powerpoint 4 as well as a licence to use MS Mail. Supplied pre-installed with full manuals and disks.
Order code **WAPMMX30** Bonus Upgrade Price **£189**



Microsoft® Office Professional 4.3

This is the same as Microsoft Office 4.2 with the addition of the latest version of Access 2.0 the powerful yet simple to use Windows based database. Supplied pre-installed with full manuals and disks.
Order code **WAPMMX50** Bonus Upgrade Price **£269**



Viglen Consumer Bundle

Microsoft® Publisher 2.0, the easy to use desk top publishing package plus Microsoft® Money 3.0 for money management made simple. Both these packages are fully pre-installed and supplied with full manuals and disks.
Order code **WAPMMX60** **£49**

Software may be supplied in Viglen CD-ROM packaging.

CD ROM and Multimedia

Why not add a CD ROM drive or indeed a full multimedia option including CD ROM drive and a 16 bit sound card to the system of your choice?

You can choose from one of the following two new exciting and cost effective options. Remember, all options are factory fitted, installed, fully tested and ready to run



**ONLY
£99 + VAT**

CD ROM Drive Option

Take advantage of the ability to use all the new software that is being supplied on CD ROM format by having the latest in CD ROM technology in your system. You can now add an IDE CD ROM double speed photo CD compatible drive to your system for **only £99.00 + VAT**. Please quote order code **DCDDNP01** when ordering.

Multimedia Option PC2

For a complete multimedia solution including both CD ROM drive and a sound card, choose our new

Multimedia Option 1 to be fitted in your system. This provides a genuine 16 bit Soundblaster card along with an IDE CD ROM drive as well as all the accessories to get you started. The Multimedia Option 1 can be added to your system for **only £195.00 + VAT**.

Please quote order code **UCDM01N1** when ordering.

The multimedia option 1 includes:

- Genuine Soundblaster 16 bit card
- Soundblaster Creative Ensemble software and more
- Double Speed Photo CD compatible IDE CD ROM Drive
- Pair of Amplified Speakers
- Microphone
- 3CD ROM Titles from Microsoft: Musical Instruments, Cinemania 1994 and Golf

**SOUND
BLASTER**

**ONLY
£195 + VAT**

Multimedia option 1 fitted to a Genie Professional system.



**ALL PRICES EXCLUDE
VAT AT 17.5%**

First for Support

Unlike many PC manufacturers, Viglen puts equal emphasis on its after-sales service - that means not only a comprehensive standard warranty on every product but a choice of service packages that offer total cover for up to five years.

**12 MONTHS
COLLECT AND RETURN
WARRANTY**

All Viglen PCs are supplied with a 12 months collect and return warranty. This covers your Viglen PC and any other options that are factory fitted, covering parts and labour. In addition to these standard warranty terms, which provide a better and quicker response than some of our competitors, Viglen offer a choice of additional low-cost on-site options to meet specific user requirements - See below.

ADDITIONAL ON-SITE OPTIONS For complete peace of mind choose one of the additional low-cost on-site warranty options.

**THE
STANDARD
ON-SITE
NEXT DAY
RESPONSE**

This option converts the standard Viglen warranty into a next business day on-site response for 12 months covering parts and labour.

Order code **ZSM12NBD** **£39**- for all desktop and Tower models.

Order code **ZSM12DSS** **£149**- for Dossier portable range.

**THE
PREMIUM
ON-SITE
4 HOUR
RESPONSE**

This option converts the standard Viglen warranty into a 4 hour on-site response for 12 months covering parts and labour. Please call for details of this individually tailored package.

Do not forget, when you compare our services with our competitors, please read their small print. With Viglen, you have a choice and your choice is clear.

Monitor Options



ENVY 15P 15" Monitor



ENVY 17 17" Monitor

Depending on the Viglen model chosen, it will be supplied with either a 14" or 15" colour monitor. To upgrade to a larger monitor please quote one of the relevant product codes shown below with your order.

UPGRADE TO 15" MONITOR

CONTENDER RANGE UPGRADE TO ENVY™ 15P MONITOR A fully-featured 15" Monitor with a unique VESA power saving mode.
Order Code **VTC15PXL** **£90.00**

UPGRADE TO 17" MONITOR

CONTENDER RANGE UPGRADE TO ENVY™ 17PE MONITOR One of the most advanced high resolution 17" monitors.
Order Code **VTC17PXL** **£410.00**

GENIE PCI RANGE UPGRADE TO ENVY™ 17PE MONITOR One of the most advanced high resolution 17" monitors.
Order Code **VTC17PXL** **£320.00**

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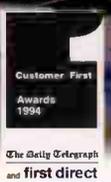
INDEPENDENT SURVEY
COMPUTERWEEKLY
Datapro
IT SYSTEMS USER SATISFACTION SURVEY

Viglen swept the board as the 'users' favourite' voted best PC manufacturer with the best machines.

PC COMPANY RATINGS 1993/4
 Pre-Sales Support **FIRST**
 After Sales Support **FIRST**
 Strength of Product Range **FIRST**
 Overall Satisfaction **FIRST**

PC HARDWARE RATINGS 1993/4
 Price/Performance **FIRST**
 Reliability **FIRST**
 Expansion Capability **FIRST**
 Quality of Documentation **FIRST**
 Ergonomics **FIRST**
 Overall Satisfaction **FIRST**

"With Viglen's reputation and support, we guarantee you peace of mind and a tailor made solution designed for you."



Ordering couldn't be easier

If you require any help or advice on choosing a system to suit your requirements please call our Sales Department. To help us identify your requirements please state the product code, description and price of items required.

When you have decided on your system please fax or phone your orders. You will need to add £15.00 per system for courier delivery, add 17.5% VAT on top. Collections may be made by prior arrangement. Allow 7-10 working days for delivery.

BY PHONE:
081 758 7000

Credit card, Switch, Connect or American Express card holders can order by telephone. Just call us and ask for our Sales Department.

BY POST OR FAX:
081 758 7080

You can place your order with our Sales Department by post or fax to the address or number shown below. We will require a cheque for the full amount by return post. Credit card, Switch, Connect or American Express card holders may authorise payment by quoting the credit card number, expiry date.

Official orders from educational establishments, government departments and PLCs accepted. **Very competitive Lease Rental** arrangements are available for bona fide businesses, educational and government establishments.

36 MONTH monthly payment scheme is available to private purchasers subject to status. Typical example of payment calculation of PC costing **£799** ex VAT: £799+£15 (delivery) +17.5% VAT = £956.45 total cash price. 10% deposit of **£95.65** required followed by 36 monthly payments of **£31.27 (APR=19.9%)**. For purchases over £1499 ex VAT, APR drops to **14.9%**. Additional payment protection insurance is available. Viglen Ltd is a licensed credit broker.

EDI. Purchase orders via electronic data interchange accepted using INS Tradanet service.

Public sector customers may also purchase at special prices through the HMSO. Please ring 0603 694153

Personal visits

Viglen Limited, Viglen House, Alperton Lane, Alperton, Middlesex HA0 1DX.

Showroom open
 Monday-Friday 9.00 - 5.30
 Saturdays 9.00 - 1.00

Showroom closed
 Public and Bank Holidays, Also Saturdays preceding a Bank Holiday Monday

Viglen systems are exclusively distributed in Eire by Lendac Data Systems, Unit 31, 1DA Enterprise Centre, Pearse St, Dublin 2, Ireland. Tel No: Dublin 710796 Fax No: Dublin 710135. Prices in Eire differ from those quoted in this advertisement.

PHONE YOUR ORDER NOW!

ASK FOR YOUR COPY OF THE VIGLEN DIRECT GUIDE

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At Viglen, PC also means Pleasing Customers. Our customer first philosophy ensures every aspect of our business is geared to customer satisfaction. In recognition of this the 1993/4 Computer Weekly Datapro Survey consistently rated Viglen first for reliability, sales support and overall satisfaction. Viglen were also highly commended in The Daily Telegraph and First Direct Customer First Awards 1994.

VALUE The entire Viglen product range provides the best value for money available. Viglen topped the price performance ratings in the 1993/4 Computer Weekly Datapro Survey.

TECHNICAL SUPPORT Widely regarded as the best support in the industry, each Viglen product purchased gives **FREE lifetime access to our technical support** telephone service and bulletin board.

HELP! Our sales staff will gladly guide you through the jungle of computer jargon with help on the ideal system for you. **Technical specialists are always available** for more specialised advice.

WARRANTY Each Viglen system has a **12 months parts and labour warranty**, including collection from and return to you at our expense. For complete peace of mind there is also a further choice of low-cost on-site service packages for up to 5 years. With minimum critical systems, such as a fileserver our 4 hour response premium on-site service is available.

Remember to carefully read the small print of our competitors when comparing services. At Viglen we believe in giving you a choice and making that choice crystal clear.

Service Our pedigree is impeccable, with over 19 years experience in providing quality manufacture and support services.

COMPATIBILITY GUARANTEED Don't worry about compatibility - Viglen's PCs are guaranteed to run all software that operates on equivalent IBM PC/AT. Viglen is licensed under the relevant IBM patents.

MADE IN THE UK Viglen's desktop systems are made in the UK to exacting quality control procedures to give you added confidence in our products.

SERVICE AND UPGRADING Extremely competitive repair and upgrade services are always available from our service department.

Novell Authorised OEM NETWORKS As a Novell authorised OEM Viglen take the work out of networking by providing the very best in network solutions and support - for 2 to 250+ users. In-house Novell certification labs and the availability of more than two Certified Novell Engineers at all times mean that Viglen are a networks supplier to rely on.

VOTED #1 FOR QUALITY Our quality and reliability standards are second to none, thanks to the latest design and manufacturing processes approved to BS5750 quality standard. The Datapro survey rated Viglen first for reliability.

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 YOU'LL NEVER LOOK BACK

Viglen Limited, Viglen House, Alperton Lane, Alperton, Middlesex HA0 1DX.

THOUGHT YOU BOUGHT THE PRINTER?



HP LASERJET 4 PLUS

£1,309

PURCHASE PRICE AT RRP



ECOSYS FS-1600

£1,469

PURCHASE PRICE AT RRP

YOU ONLY MADE THE DOWN-PAYMENT.



HP LASERJET 4 PLUS

£6,759

PURCHASE PRICE PLUS CONSUMABLES COSTS AT RRP
(OVER 300,000 PAGES WITH 5% TONER COVERAGE.)



ECOSYS FS-1600

£2,999

PURCHASE PRICE PLUS CONSUMABLES COSTS AT RRP
(OVER 300,000 PAGES WITH 5% TONER COVERAGE.)

Every page printer comes with some unwelcome extras. Running costs – in the form of printer consumables.

Take them into account, and similar printers turn out to be anything but.

ECOSYS printers from **Ecosys** Kyocera have a unique cartridge-free design – which means that toner is the only consumable you replace.

The range also offers a choice of 10 or 18 ppm

speeds, 300 or 600 dpi resolution, and LaserJet and Postscript emulations. Along with duplex, networking and sorter/collator options.

Find out more by sending for our free booklet, which comes complete with an interactive printer cost-comparison disk.

Just use the coupon or call us free.



To: Kyocera Electronics (UK) Ltd, 8 Beacontree Plaza,
Gillette Way, Reading, RG2 0BP. Fax: (0734) 311108.
Please send me more information on printers and printing costs.

Name _____
Position _____
Company _____
Address _____
Postcode _____ Tel no _____

0800 111444

PCW 3 D

PRINTING COSTS. STOP PAYING THE PRICE.

PRICES SHOWN CORRECT AT TIME OF GOING TO PRESS, EXCLUSIVE OF VAT. ALL TRADE MARKS ACKNOWLEDGED.

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